Item 25 in the Forest Service letter dated October 25, 2007 specifically requested the following:

“Information relative to hazardous material quantities and their specific storage locations.”

Because the term “hazardous material” is defined differently for the various regulations, not only reagents, laboratory and industrial chemicals but everyday fuels and lubricants will require consideration in order to fully answer this question. This technical memorandum deals with these items that may meet the criteria of hazardous substance in the regulations and the anticipated quantities of those substances that will be on-site at the Rosemont operations. Figure FDD-4.1 identifies the specific storage locations for the various chemicals, reagents, and fuels.

Operational Area

Potential reagents, fuels, and lubricants used in the Rosemont process facilities are identified in Table 1 with the expected consumption rate, storage quantities, and specific storage locations. MSDS sheets are provided in Attachment A for major reagents, where available. All reagents are listed without regard to the determination of a hazardous classification.

Reagents used in the Solvent Extraction / Electrowinning process and received in dry form will be stored in the main receiving warehouse and transferred to the Solvent Extraction Tank Farm for mixing and metering into the process. Extractant (Acorga M5774) received in drums on pallets at the main receiving warehouse will be transferred to the Solvent Extraction area for addition to the process. Sulfuric acid and diluent (kerosene) will be received by tank truck and unloaded directly to storage tanks near the solvent extraction plant.
Reagents for use in the sulfide plant are all received in drums (liquid) or bags (dry) and stored at the reagent storage and mixing facility located adjacent to the flotation plant. The reagents will be mixed at the facility and metered into the process. Pebble lime will be received in bulk and stored in a silo adjacent to the reagent mixing facility. The pebble lime is slaked to milk of lime (MOL) for metering into the process.

Fuels and lubricants will be received in bulk by truck and stored in individual storage tanks at the mine truck shop for mine equipment and near the light vehicle maintenance area for other plant mobile equipment. Waste antifreeze, motor oils, and lubricants will be stored in separate tanks at the mine truck shop and light vehicle maintenance shop for return to the vendor for recycling.

Ammonium nitrate used for blasting in the mine will be received in bulk by truck and stored in three 75 ton silos near the mine truck shop. Powder and blasting caps will be received and stored at the powder magazines located in a secure compound immediately south of the open pit.
# Table 1 – Operational Reagent and Fuels

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Received or Shipped</th>
<th>Usage</th>
<th>Storage</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxide Plant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric Acid (93%)</td>
<td>Liquid by Tank Truck</td>
<td>73,200 stpy(^1)</td>
<td>Two 1,200 ton storage tanks</td>
<td>Location A - Acid Storage</td>
</tr>
<tr>
<td>Diluent (Kerosene)</td>
<td>Liquid by Tank Truck</td>
<td>6.2 stpy</td>
<td>In 12,000 gallon storage tank</td>
<td>Location B - SX Tank Farm</td>
</tr>
<tr>
<td>Extractant (Acorga M5774)</td>
<td>Liquid by Drums</td>
<td>0.9 stpy</td>
<td>Drums on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Cobalt Sulfate</td>
<td>Dry Crystals in Bags or Super Sacks</td>
<td>1.7 stpy</td>
<td>Bags on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Guar</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>42.7 stpy</td>
<td>Bags on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Mist Suppressor (FC-1100)</td>
<td>Liquid in Drums</td>
<td>1.1 stpy</td>
<td>Drums on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Diatomaceous Earth</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>171 stpy</td>
<td>Bags on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Clay</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>171 stpy</td>
<td>Bags on pallets in warehouse</td>
<td>Location C - Main Warehouse</td>
</tr>
<tr>
<td>Diesel Fuel for EW Boiler</td>
<td>Liquid by Tank Truck</td>
<td>200 stpy</td>
<td>In 12,000 gallon storage tank</td>
<td>Location D - EW Diesel Fuel Storage</td>
</tr>
<tr>
<td><strong>Sulfide Plant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allyl Alkyl Thionocarbamate</td>
<td>Liquid in Drums</td>
<td>465 stpy</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Sodium Isobutyl Xanthate</td>
<td>Dry in Drums</td>
<td>1,725 stpy</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
</tbody>
</table>

\(^1\) stpy refers to short tons per year
<table>
<thead>
<tr>
<th>Reagent</th>
<th>Received or Shipped</th>
<th>Usage</th>
<th>Storage</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dowfroth 250 (Frother)</td>
<td>Liquid in Drums</td>
<td>766</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Methyl Isobutyl Carbinol (MIBC, Frother)</td>
<td>Liquid in Drums</td>
<td>150</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Pebble Lime (CaO, pH Modifier)</td>
<td>Bulk by Truck</td>
<td>37,200</td>
<td>Dry in 500 ton silo &amp; as Milk of Lime (Reagent Storage)</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Sodium Met-Silicate (Dispersant)</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>2,423</td>
<td>Bags or sacks on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>No. 2 Diesel Fuel (Collector)</td>
<td>Liquid - Drums</td>
<td>150</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Sodium Hydrosulfide (NaHS, Copper Depressant)</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>2,053</td>
<td>Bags or sacks on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Flomin D-910 (Copper Depressant)</td>
<td>Liquid in Drums</td>
<td>192</td>
<td>Drums on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Flocculent</td>
<td>Dry Powder in Bags or Super Sacks</td>
<td>2,053</td>
<td>Bags or sacks on pallets in reagent storage</td>
<td>Location E - Reagent Storage</td>
</tr>
<tr>
<td>Mine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>Bulk by Truck</td>
<td>20,100</td>
<td>Dry in 3 - 75 ton storage silos (By Mine Truck Shop)</td>
<td>Location F - Mine shop Area</td>
</tr>
<tr>
<td>Blasting Powder</td>
<td>Dry in Boxes</td>
<td>1,170</td>
<td>Boxes in powder magazine</td>
<td>Location L - Mine Area</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diesel Fuel - Mine use</td>
<td>Liquid by Tank Truck</td>
<td>9,000,000</td>
<td>gal/yr(^2)</td>
<td>In 2 - 100,000 gallon tanks near mine truck shop</td>
</tr>
</tbody>
</table>

\(^2\) gal/yr refers to gallons per year
<table>
<thead>
<tr>
<th>Reagent</th>
<th>Received or Shipped</th>
<th>Usage</th>
<th>Storage</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel - Light Vehicles</td>
<td>Liquid by Tank Truck</td>
<td>100,000 gal/yr</td>
<td>In one 10,000 gallon tank by light truck shop</td>
<td>Location H - Light Truck Shop Area</td>
</tr>
<tr>
<td>Gasoline</td>
<td>Liquid by Tank Truck</td>
<td>100,000 gal/yr</td>
<td>In one 10,000 gallon tank by light truck shop</td>
<td>Location H - Light Truck Shop Area</td>
</tr>
<tr>
<td>Antifreeze - Mine Truck Shop</td>
<td>Liquid by Tank Truck</td>
<td>10,000 gal/yr</td>
<td>In a 1,200 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Engine Oils - Mine Truck Shop</td>
<td>Bulk by Truck</td>
<td>30,000 gal/yr</td>
<td>In a 5,800 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Gear Oil - Mine Truck Shop</td>
<td>Bulk by Truck</td>
<td>20,000 gal/yr</td>
<td>In a 3,000 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Automatic Transmission Fluid</td>
<td>Bulk by Truck</td>
<td>20,000 gal/yr</td>
<td>In a 3,000 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Hydraulic Fluid - Mine Truck Shop</td>
<td>Bulk by Truck</td>
<td>20,000 gal/yr</td>
<td>In a 3,000 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Waste Oil Storage - Mine Truck Shop</td>
<td>Liquid by Tank Truck</td>
<td>30,000 gal/yr</td>
<td>In a 5,800 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Waste Antifreeze - Mine Truck Shop</td>
<td>Liquid by Tank Truck</td>
<td>10,000 gal/yr</td>
<td>In a 5,800 gallon tank at Truck Wash and Lube facility at Mine truck shop area.</td>
<td>Location J - Truck Wash &amp; Lube</td>
</tr>
<tr>
<td>Waste Oil Storage - Light Vehicle Shop</td>
<td>Liquid by Tank Truck</td>
<td>1,000 gal/yr</td>
<td>In a 2,300 gallon tank at Light Vehicle Shop.</td>
<td>Location K - Light Vehicle Shop</td>
</tr>
<tr>
<td>Waste Antifreeze - Light Vehicle Shop</td>
<td>Liquid by Tank Truck</td>
<td>1,000 gal/yr</td>
<td>In a 2,300 gallon tank at Light Vehicle Shop.</td>
<td>Location K - Light Vehicle Shop</td>
</tr>
</tbody>
</table>
Laboratory

Table 2 below shows the potential chemicals that will be used in the on-site laboratory and the anticipated container size. This will be the amount open at any one time. Dependent upon availability of the chemical for delivery and the number of analyses that are performed daily, the total amount of chemical in the lab may vary from one container to 10 times that amount. However, these materials will all be in a controlled environment, used in laboratory quantities, and managed specifically to ensure there is no outside contact with personnel or the environment. Depending upon the material, they will be returned to the process, returned to the manufacturer, or disposed of by a hazardous waste disposal company. Delivery of the chemicals will be to the warehouse and storage will be in the laboratory area. MSDS information for the specific laboratory chemicals is included in Attachment B.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>Container Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant Leach Solution (process solution)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Raffinate (process solution)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Organic (process solution)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lixivant (process reagent)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Copper concentrate (product)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Copper flotation metallurgical samples</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Copper cathode (product)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Flotation chemicals for metallurgical tests</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Ore samples</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1,1,2,2 Tetrabromoethane</td>
<td>79-27-6</td>
<td>250 g</td>
</tr>
<tr>
<td>Acetic Acid (reagent grade)</td>
<td>64-19-7</td>
<td>5 L</td>
</tr>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
<td>16 L</td>
</tr>
<tr>
<td>Acetylene</td>
<td>74-86-2</td>
<td>cylinder</td>
</tr>
<tr>
<td>Alcohol (GR)</td>
<td>67-56-1</td>
<td>1 L</td>
</tr>
<tr>
<td></td>
<td>67-63-0</td>
<td></td>
</tr>
<tr>
<td>Ammonium Bifluoride</td>
<td>1341-49-7</td>
<td>500 g</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>6484-52-2</td>
<td>500 g</td>
</tr>
<tr>
<td>Ammonium Hydroxide</td>
<td>1336-21-6</td>
<td>1 L</td>
</tr>
<tr>
<td>Antimony and Antimony Standard</td>
<td>7647-01-0</td>
<td>500 ml</td>
</tr>
<tr>
<td></td>
<td>10025-91-9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7440-36-0</td>
<td>500g</td>
</tr>
</tbody>
</table>
Table 2 – Laboratory Chemicals

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>Container Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argon (compressed gas)</td>
<td>7440-37-1</td>
<td>cylinder</td>
</tr>
<tr>
<td>Arsenic Standard</td>
<td>1327-53-3</td>
<td>500 mL</td>
</tr>
<tr>
<td>Ascarite</td>
<td>81133-20-2</td>
<td>500 g</td>
</tr>
<tr>
<td>Barium Chloride</td>
<td>10326-27-9</td>
<td>200 g</td>
</tr>
<tr>
<td>Bismuth Standard</td>
<td>7440-69-9</td>
<td>500 g</td>
</tr>
<tr>
<td>Buffer Solutions (various, pH 1-10)</td>
<td>Various</td>
<td>500 ml each</td>
</tr>
<tr>
<td>Cadmium Standard</td>
<td>7440-43-9</td>
<td>500 ml</td>
</tr>
<tr>
<td>Can of Air (instrument cleaning)</td>
<td>68476-86-8</td>
<td>3.75 oz</td>
</tr>
<tr>
<td>Chloride Standards</td>
<td>7647-14-5</td>
<td>500 ml</td>
</tr>
<tr>
<td>Chromium Standard</td>
<td>7778-50-9</td>
<td>500 ml</td>
</tr>
<tr>
<td>Cobalt Standard</td>
<td>7440-48-4</td>
<td>500 ml</td>
</tr>
<tr>
<td>Cobalt Sulfate Heptahydrate</td>
<td>10026-24-1</td>
<td>500 g</td>
</tr>
<tr>
<td>Conductivity Standards (10 – 10,000 μS)</td>
<td>Mixture</td>
<td>500 ml each</td>
</tr>
<tr>
<td>Copper Standard</td>
<td>7697-37-2</td>
<td>500 ml</td>
</tr>
<tr>
<td>Cupric Sulfate (anhydrous)</td>
<td>7758-98-7</td>
<td>500 g</td>
</tr>
<tr>
<td>Electrode Filling Solutions (1M KNO₃ &amp; 0.2M (KCl w/AG and 3M KCl, and Ag/AgCl)</td>
<td>Various</td>
<td>500 ml</td>
</tr>
<tr>
<td>Electrode Storage Solution</td>
<td>877-24-7</td>
<td>2760 ml</td>
</tr>
<tr>
<td>Ferric Chloride (anhydrous)</td>
<td>7705-08-0</td>
<td>500 g</td>
</tr>
<tr>
<td>Ferric Sulfate</td>
<td>10028-22-5</td>
<td>500 g</td>
</tr>
<tr>
<td>Ferrous Ammonium Sulfate (0.5N and crystals)</td>
<td>7783-85-9</td>
<td>1200 mL</td>
</tr>
<tr>
<td>Ferrous Sulfate (heptahydrate)</td>
<td>7782-63-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Glycerol</td>
<td>56-81-5</td>
<td>1 L</td>
</tr>
<tr>
<td>Gold Chloride</td>
<td>13453-07-1</td>
<td>500 mg</td>
</tr>
<tr>
<td>Hexane</td>
<td>110-54-3</td>
<td>500 ml</td>
</tr>
<tr>
<td>Hexone</td>
<td>108-10-1</td>
<td>1 L</td>
</tr>
<tr>
<td>Hydrochloric Acid</td>
<td>7647-01-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Hydrofluoric Acid (48%)</td>
<td>7664-39-3</td>
<td>1 lb</td>
</tr>
<tr>
<td>Hydrogen Peroxide (30%)</td>
<td>7722-84-1</td>
<td>500 ml</td>
</tr>
<tr>
<td>Chemical</td>
<td>CAS Number</td>
<td>Container Size</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Iron Standard</td>
<td>7439-89-6</td>
<td>500 ml</td>
</tr>
<tr>
<td>Lanthanum Oxide</td>
<td>1312-81-8</td>
<td>250 g</td>
</tr>
<tr>
<td>Lead Oxide and Lead Standard</td>
<td>1317-36-8; 10099-74-8</td>
<td>2.5 kg; 500 ml</td>
</tr>
<tr>
<td>Light’s Solution (ORP)</td>
<td>Mixture</td>
<td>500 ml</td>
</tr>
<tr>
<td>Manganese Standard</td>
<td>7439-96-5</td>
<td>500 ml</td>
</tr>
<tr>
<td>Manganese Sulfate (crystal)</td>
<td>10034-96-5</td>
<td>500 g</td>
</tr>
<tr>
<td>Methanol</td>
<td>67-56-1</td>
<td>4 L</td>
</tr>
<tr>
<td>Molybdenum (powder)</td>
<td>7439-98-7</td>
<td>100 g</td>
</tr>
<tr>
<td>Nickel Standard</td>
<td>7440-02-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Nitric Acid (90%)</td>
<td>7697-37-2</td>
<td>500 ml</td>
</tr>
<tr>
<td>Oxalic Acid (crystals)</td>
<td>6153-56-6</td>
<td>500 g</td>
</tr>
<tr>
<td>Phenolphthalein, Methyl Orange, or similar</td>
<td>77-09-8</td>
<td>1 L</td>
</tr>
<tr>
<td>Phosphorous AA Standard</td>
<td>7723-14-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>7447-70-7</td>
<td>500 g</td>
</tr>
<tr>
<td>Potassium Iodine</td>
<td>7681-11-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Potassium Oxalate Monohydrate</td>
<td>6487-48-5</td>
<td>250 g</td>
</tr>
<tr>
<td>Potassium Permanganate (0.1N)</td>
<td>7722-64-7</td>
<td>1 L</td>
</tr>
<tr>
<td>Potassium Sulfate (powder)</td>
<td>7778-80-5</td>
<td>500 g</td>
</tr>
<tr>
<td>Potassium Thiocyanate (crystal)</td>
<td>333-20-0</td>
<td>100 g</td>
</tr>
<tr>
<td>Propane</td>
<td>74-98-6</td>
<td>cylinder</td>
</tr>
<tr>
<td>Quinhydrone (ORP)</td>
<td>106-34-3</td>
<td>500 g</td>
</tr>
<tr>
<td>Reference Fill Solution (0.1 KNO₃; 2m KCl; Saturated Ag)</td>
<td>Various</td>
<td>Various</td>
</tr>
<tr>
<td>Selenium Standard</td>
<td>7782-49-2</td>
<td>500 ml</td>
</tr>
<tr>
<td>Silicon Standard</td>
<td>7440-21-3</td>
<td>100 ml</td>
</tr>
<tr>
<td>Silver and Silver Standard</td>
<td>7440-22-4</td>
<td>500 ml</td>
</tr>
<tr>
<td>Silver Chloride Electrode Solution</td>
<td>Mixture</td>
<td>120 ml</td>
</tr>
<tr>
<td>Silver Nitrate (0.1N Solution and crystals)</td>
<td>7761-88-8</td>
<td>500 ml</td>
</tr>
<tr>
<td>Sodium Carbonate (anhydrous)</td>
<td>497-19-8</td>
<td>500 g</td>
</tr>
<tr>
<td>Sodium Hydroxide (0.1 N; 2.04 N; 2.50 N; 4.00 N; solid; and pellets)</td>
<td>1310-73-2</td>
<td>1 L</td>
</tr>
<tr>
<td>Sodium Hypochlorite (5%)</td>
<td>7681-52-9</td>
<td>1 L</td>
</tr>
</tbody>
</table>
### Table 2 – Laboratory Chemicals

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>Container Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Oxalate</td>
<td>62-76-0</td>
<td>500 g</td>
</tr>
<tr>
<td>Sodium Sulfate (crystals)</td>
<td>7727-73-3</td>
<td>500 g</td>
</tr>
<tr>
<td>Sodium Thiosulfate (0.1 N solution)</td>
<td>7772-98-7</td>
<td>1 L</td>
</tr>
<tr>
<td>Stannous Chloride</td>
<td>10025-69-1</td>
<td>500 g</td>
</tr>
<tr>
<td>Starch Indicator</td>
<td>9005-25-8</td>
<td>1 L</td>
</tr>
<tr>
<td>Sulfur Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric Acid (5%)</td>
<td>7664-93-9</td>
<td>1 L</td>
</tr>
<tr>
<td>Tellurium Standard</td>
<td>7647-01-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Thiourea</td>
<td>62-56-6</td>
<td>500 g</td>
</tr>
<tr>
<td>Tin and Tin Standard</td>
<td>7647-01-0</td>
<td>500 ml</td>
</tr>
<tr>
<td>Urea</td>
<td>57-13-6</td>
<td>500 g</td>
</tr>
<tr>
<td>Yttrium Standard</td>
<td>7697-37-2</td>
<td>500 ml</td>
</tr>
<tr>
<td>Zinc and Zinc Standard</td>
<td>7440-66-6</td>
<td>500 ml</td>
</tr>
<tr>
<td></td>
<td>7697-37-2</td>
<td></td>
</tr>
<tr>
<td>Zobell’s Solution (ORP)</td>
<td>Mixture</td>
<td>500 ml</td>
</tr>
</tbody>
</table>

The table above may not be an exhaustive list of the chemicals needed to run the laboratory. For instance, the standards listed above are for Atomic Adsorption (AA) analysis only and do not include standards that may be necessary for Inductively Coupled Plasma (ICP) analysis. While the standards will be similar, the MSDS information may be slightly different.

There may also be a situation in which the lab may wish to become certified by Arizona Department of Health Services (ADHS) to perform analysis that meet Environmental Protection Agency (EPA) standards. If this is the situation, then there may be additional equipment or laboratory materials that will be necessary to maintain the certifications.

This list also does not include any cleaning supplies, maintenance, or other supply materials that would be classified as a hazardous and used in the laboratory. The Material Safety Data Sheets (MSDS) for each product listed above excluding the process materials are attached.
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: ACORGA® M5774 Solvent Extraction Reagent
Synonyms: none
Molecular Formula: Mixture
Molecular Weight: Mixture

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>% (w/w)</th>
<th>OSHA (PEL):</th>
<th>ACGIH (TLV):</th>
<th>Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Nonyl-2-hydroxy-benzaldoxime 174333-80-3</td>
<td>30 - 60</td>
<td>Not established</td>
<td>Not established</td>
<td>-</td>
</tr>
<tr>
<td>Petroleum distillate hydrotreated light 64742-47-8</td>
<td>7 - 13</td>
<td>500 ppm 1200 mg/m³ (Supplier)</td>
<td>165 ppm (Supplier)</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:
- Color: clear amber
- Appearance: liquid
- Odor: none

STATEMENTS OF HAZARD:
WARNING! CAUSES EYE AND SKIN IRRITATION

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:
The acute oral (rat) and dermal (rabbit) LD50 values are estimated to be between 1,600 - 3,000 mg/kg, and greater than 2,000 mg/kg, respectively.
Direct contact with this material may cause moderate eye and skin irritation. Overexposure to vapors may cause irritation of the respiratory tract and eyes and may cause central nervous system effects. Refer to Section 11 for toxicology information on the regulated components of this product.

4. FIRST AID MEASURES

Ingestion:  
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin Contact:  
Wash immediately with plenty of water and soap.

Eye Contact:  
Rinse immediately with plenty of water for at least 15 minutes. Obtain medical advice if there are persistent symptoms.

Inhalation:  
Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:  
Use water spray or fog, carbon dioxide or dry chemical.

Protective Equipment:  
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection).

Special Hazards:  
Keep containers cool by spraying with water if exposed to fire.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:  
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

Methods For Cleaning Up:  
Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

Environmental Precautions:  
Use appropriate containment to avoid environmental contamination.

7. HANDLING AND STORAGE

HANDLING

Precautionary Measures: Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Special Handling Statements: None
STORAGE
Areas containing this material should have fire safe practices and electrical equipment in accordance with applicable regulations and/or guidelines. Standards are primarily based on the material’s flashpoint, but may also take into account properties such as miscibility with water or toxicity. All local and national regulations should be followed.
In the Americas, National Fire Protection Association (NFPA) 30: Flammable and Combustible Liquids Code, is a widely used standard. NFPA 30 establishes storage conditions for the following classes of materials: Class I Flammable Liquids, Flashpoint <37.8 °C. Class II Combustible Liquids, 37.8 °C < Flashpoint <60 °C. Class IIIa Combustible Liquids, 60 °C < Flashpoint < 93 °C. Class IIIb Combustible Liquids, Flashpoint > 93 °C.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:
Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:
Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>clear amber</td>
</tr>
<tr>
<td>Appearance</td>
<td>liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>none</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Specific Gravity/Density</td>
<td>0.96 - 0.98@ 25°C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Percent Volatile (% by wt.)</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Saturation In Air (% By Vol.)</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility In Water</td>
<td>insoluble</td>
</tr>
<tr>
<td>Volatile Organic Content</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>115 °C 239 °F Pensky-Martens Closed Cup</td>
</tr>
<tr>
<td>Flammable Limits (% By Vol.)</td>
<td>Not available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water):</td>
<td>Not available</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: None known

Polymerization: Will not occur
Conditions To Avoid: None known

Materials To Avoid:
- oxygen
- Strong oxidizing agents.

Hazardous Decomposition Products:
oxides of carbon and nitrogen, ammonia

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION.

Toxicological information on the regulated components of this product is as follows:

Petroleum distillates, hydrotreated light (CAS# 64742-47-8) has acute oral (rat) and dermal (rabbit) LD50 values of >5 g/kg and >3.16 g/kg, respectively. Prolonged or repeated skin contact tends to remove skin oils, possibly leading to irritation and dermatitis. Direct contact may cause eye irritation. Overexposure to high vapor concentrations, >~700 ppm, are irritating to the eyes and respiratory tract and may cause headaches, dizziness, drowsiness, and other central nervous system effects, including death. Aspiration of minute amounts during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death. In a 90-day oral gavage (rats) study at 100, 500, or 1000 mg/kg, no treatment-related mortalities were observed. There were no significant changes in body weights or food consumption in any dose groups. Increased liver weights were observed in male and female rats a 500 and 1000 mg/kg. Increased kidney weights were observed only in male rats at 500 and 1000 mg/kg. Testes weights were significantly elevated in male rats at 1000 mg/kg. Kidney effects, indicative of light hydrocarbon nephropathy, occurred in male rat kidneys at all dose levels. Histological findings of hepatocellular hypertrophy were seen in the livers of male rats at 1000 mg/kg and in female rats at 500 and 1000 mg/kg. All treatment-related effects were reversible within the 4-week recovery period. Observed kidney effects (including light hydrocarbon nephropathy and increased kidney weight) are a unique response by male rats to chronic hydrocarbon exposure, which the U.S. EPA has declared `not relevant to humans`. High-dose liver effects (including hepatocellular hypertrophy, or enlarged liver cells) are a direct consequence of the sustained high-fat `hydrocarbon diet`. The No Observed Adverse Effect Level (NOAEL) for this study was 1000 mg/kg.

5-Nonyl-2-hydroxy-benzaldoxime has an oral LD50 (rat) of 1.25 to 5 mL/Kg, a dermal LD50 (rat) of > 2.5 mL/Kg, and an inhalation LC50 (rat) of > 1.6 mg/L/1 hr./70 °C. Rat skin testing indicates it is a moderate dermal irritant, and rabbit eye testing indicated a slight potential for irritation. Guinea pig dermal sensitization tests were negative. It is expected to be irritating to eyes, skin, and all mucous membranes. Ingestion of 5-Nonyl-2-hydroxy-benzaldoxime is expected to cause moderate to severe gastrointestinal irritation. Symptoms of inhalation exposure may include coughing, choking, pain and moderate to severe irritation of mucous membranes. Depending on quantity and duration of exposure, contact will likely cause moderate skin and eye irritation. In a 14-day subacute feeding study in rats, doses of 0.1 ml/kg did not produce any adverse effects. Overexposure (based on aromatic oxime) can cause central nervous system (CNS) depression, with symptoms ranging from headache and confusion to coma and respiratory failure. This material is likely to be an endocrine disrupter.

California Proposition 65 Warning (applicable in California only) - This product contains (a) chemical(s) known to the State of California to cause birth defects or other reproductive harm.

12. ECOLOGICAL INFORMATION

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
12. ECOLOGICAL INFORMATION
The ecological assessment for this material is based on an evaluation of its components.

13. DISPOSAL CONSIDERATIONS
The information on RCRA waste classification and disposal methodology provided below applies only to the product, as supplied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA ‘listed hazardous waste’ or has any of the four RCRA ‘hazardous waste characteristics.’ Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA ‘listed hazardous waste’; information contained in Section 15 of this MSDS is not intended to indicate if the product is a ‘listed hazardous waste.’

RCRA Hazardous Waste Characteristics: There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, see Section 9 of this MSDS (flash point). For Corrosivity, see Sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 2 (composition). Federal regulations are subject to change. State and local requirements, which may differ from or be more stringent than the federal regulations, may also apply to the classification of the material if it is to be disposed. The Company encourages the recycle, recovery and reuse of materials, where permitted, as an alternate to disposal as a waste. The Company recommends that organic materials classified as RCRA hazardous wastes be disposed of by thermal treatment or incineration at EPA approved facilities.

The Company has provided the foregoing for information only; the person generating the waste is responsible for determining the waste classification and disposal method.

14. TRANSPORT INFORMATION
This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Hazard Class: 9
Packing Group: III
UN/ID Number: UN3082
Transport Label Required: Miscellaneous
Technical Name (N.O.S.): 5-Nonyl-2-hydroxy-benzaldoxime
Hazardous Substances: Marine Pollutant
Not applicable
Comments: Marine Pollutants - DOT requirements specific to Marine Pollutants do not apply to non-bulk packagings transported by motor vehicles, rail cars or aircraft.

TRANSPORT CANADA
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Hazard Class: 9  
Packing Group: III  
UN Number: 3082  
Transport Label Required: Miscellaneous  
Marine Pollutant  
Technical Name (N.O.S.): 5-Nonyl-2-hydroxy-benzaldoxime

ICAO / IATA
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.  
Hazard Class: 9  
Packing Group: III  
UN Number: 3082  
Transport Label Required: Miscellaneous  
Packing Instructions/Maximum Net Quantity Per Package:  
   Passenger Aircraft: 914; No Limit  
   Cargo Aircraft: 914; No Limit  
Technical Name (N.O.S.): 5-Nonyl-2-hydroxy-benzaldoxime

Comments: Special Provision A97 states that substances classified as UN3077 or UN3082 by the regulations of other modes of transport may also be transported by air under these entries. This classification does NOT apply if the regulations of the other modes of transport allow the substances to be shipped as “Non-Dangerous Goods” because of package size or transport mode.

IMO
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.  
Hazard Class: 9  
UN Number: 3082  
Packing Group: III  
Transport Label Required: Miscellaneous  
Marine Pollutant  
Technical Name (N.O.S.): 5-Nonyl-2-hydroxy-benzaldoxime

15. REGULATORY INFORMATION

INVENTORY INFORMATION

United States (USA): All components of this product are included on the TSCA Inventory in compliance with the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq.  
This product contains a chemical substance that is subject to export notification under Section 12 (b) of the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq. (This requirement applies to exports from the United States only.)

Canada: Components of this product have been reported to Environment Canada in accordance with Sections 66 and/or 81 of the Canadian Environmental Protection Act (1999), and are included on the Domestic Substances List.

European Union (EU): All components of this product are included on the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS).

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

Japan: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese inventory.
Korea: All components of this product are included on the Korean (ECL) inventory or are not required to be listed on the Korean inventory.

Philippines: All components of this product are NOT included on the Philippine (PICCS) inventory.

OTHER ENVIRONMENTAL INFORMATION
The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.) See Section 13 for information on waste classification and waste disposal of this product.

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>%</th>
<th>TPQ (lbs)</th>
<th>RQ(lbs)</th>
<th>S313</th>
<th>TSCA 12B</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Nonyl-2-hydroxy-benzaldoxime</td>
<td>30 - 60</td>
<td>None</td>
<td>0</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA

- Acute

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)

Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire: 1 - Materials that must be preheated before ignition can occur.

Reactivity: 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

Reasons For Issue: Revised Section 15

Randy Deskin, Ph.D., DABT +1-973-357-3100

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: AERO® 317 Xanthate
Product Description: Sulfide mineral collector
Use: Mining chemical

Supplied By: CYTEC CANADA INC., GARNER ROAD, P.O. BOX 240, NIAGARA FALLS, ONTARIO, CANADA L2E 6T4 1-905/356-9000
EMERGENCY PHONE: In CANADA: 905/356-8310 In USA: 1-800/424-9300 or 1-703/527-3887.

Manufactured By: CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA, WEST PATERSON, NEW JERSEY 07424, USA - 973/357-3100

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2. COMPOSITION/INFORMATION ON INGREDIENTS

WHMIS REGULATED COMPONENTS

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>% (w/w)</th>
<th>OSHA (PEL):</th>
<th>ACGIH (TLV):</th>
<th>Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonodithioic acid O-(2-Methylpropyl) ester, sodium salt 25306-75-6</td>
<td>&gt; 85</td>
<td>Not established</td>
<td>Not established</td>
<td>-</td>
</tr>
<tr>
<td>Sodium hydroxide 1310-73-2</td>
<td>0 - 1</td>
<td>2 mg/m³</td>
<td>2 mg/m³ (ceiling)</td>
<td>-</td>
</tr>
<tr>
<td>Sodium sulfide 1313-82-2</td>
<td>0 - 1</td>
<td>Not established</td>
<td>Not established</td>
<td>-</td>
</tr>
<tr>
<td>Sodium carbonate 497-19-8</td>
<td>0 - 3</td>
<td>Not established</td>
<td>Not established</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:
Color: yellow-green
Appearance: pellets or powder
Odor: disagreeable

STATEMENTS OF HAZARD:
POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:
The acute oral LD50 value for this material is between 500 and 2000 mg/kg. The dermal (rabbit) LD50 is 440 mg/kg. Skin or eye contact with solutions of this product may cause moderate skin and eye irritation. Airborne dust may cause significant eye, skin or respiratory tract irritation. Refer to Section 11 for toxicology information on the regulated components of this product.

4. FIRST AID MEASURES

Ingestion:
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin Contact:
Remove contaminated clothing and shoes without delay. Wash immediately with plenty of water. Do not reuse contaminated clothing without laundering. Get medical attention if pain or irritation persists after washing or if signs and symptoms of overexposure appear.

Eye Contact:
Rinse immediately with plenty of water for at least 15 minutes. Obtain medical advice if there are persistent symptoms.

Inhalation:
Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:
Use carbon dioxide, dry chemical or large quantities of water.

Protective Equipment:
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing.

Special Hazards:
Solid xanthates are stable when kept cool and dry. Exposure to heat and moisture can cause decomposition to flammable and explosive vapor of carbon disulfide. Since xanthates decompose in solution, even at room temperature, fire and explosion hazards can develop with aging.

Mechanical/Static Sensitivity Statements:
Minimize dust. Special precautions against fire and explosion must be observed in (1) pumping xanthate solutions, (2) draining mobile tanks, (3) cleaning mobile tanks, and (4) performing maintenance work on storage tanks and pipelines leading to and from tanks. Use nonsparking tools and do not smoke when opening drums of xanthate. Heating or overexposure to moisture of solid xanthates or heating or aging of xanthate solutions causes some decomposition to poisonous and flammable carbon disulfide. Storage tanks should have certain design features for maximum safety, and the vapor space should be free of sources of ignition.
6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. Refer to Section 8 (Exposure Controls/Personal Protection) for appropriate personal protective equipment.

Methods For Cleaning Up:
Sweep up into containers for disposal. Flush spill area with water.

7. HANDLING AND STORAGE

HANDLING
Precautionary Measures: Avoid excessive heat or moisture. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Keep container closed. Wash thoroughly after handling. Use non-sparking tools and do not smoke when opening drum. Use with adequate ventilation. Contains finely divided material. Dust suspended in air may ignite with static discharge, sparks or flame. Equipment, including venting systems, should be grounded. Provide adequate ventilation in areas of use to remove dust. Wash contaminated clothing before reuse.

Special Handling Statements: Minimize dust. Special precautions against fire and explosion must be observed in (1) pumping xanthate solutions, (2) draining mobile tanks, (3) cleaning mobile tanks, and (4) performing maintenance work on storage tanks and pipelines leading to and from tanks. Use non-sparking tools and do not smoke when opening drums of xanthate. DUST EXPLOSION HAZARD CLASS - 2 Handling of material should be in accordance with standards for venting of deflagrations (e.g. NFPA-68). If handled with flammable or combustible materials the explosion hazard may increase.

STORAGE
Heating or overexposure to moisture of solid xanthates or heating or aging of xanthate solutions causes some decomposition to poisonous and flammable carbon disulfide. Storage tanks should have certain design features for maximum safety, and the vapor space should be free of sources of ignition.

Storage Temperature: Store at <32.2 - 10 °C 90 - 50 °F
Reason: Safety

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:
Wear eye/face protection such as chemical splash proof goggles or face shield. Eyewash equipment and safety shower should be provided in areas of potential exposure.

Skin Protection:
Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.
9. PHYSICAL AND CHEMICAL PROPERTIES

Color: yellow-green
Appearance: pellets or powder
Odor: disagreeable
Boiling Point: Not applicable
Melting Point: Not available
Vapor Pressure: Not applicable
Specific Gravity: 1.24 @ 20 °C
Vapor Density: Not applicable
Percent Volatile (% by wt.): Not available
pH: Not applicable
Saturation In Air (% By Vol.): Not applicable
Evaporation Rate: Negligible
Solubility In Water: 53g/100 g @ 20 °C
Volatile Organic Content: Not available
Flash Point: Not applicable
Flammable Limits (% By Vol.): Not applicable
Autoignition Temperature: >=120 °C 248 °F (value for carbon disulfide)
Decomposition Temperature: >131 °C 267.8 °F
Partition coefficient (n-octanol/water): Not available
Odor Threshold: See Section 2 for exposure limits.

10. STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Containers filled with this product should be kept closed when not in use. Keep container in a cool, well-ventilated area. Exposure of the solid xanthate to heat or moisture and heating or aging of xanthate solutions. Avoid prolonged exposure to heat; avoid strong acids, alkalies and oxidizing agents. Keep water and moist air out of container.
Polymerization: Will not occur
Conditions To Avoid: None known
Materials To Avoid: Strong oxidizing agents, acidic material, high temperatures
Hazardous Decomposition Products: carbon disulfide, carbon monoxide, carbon dioxide, oxides of sulfur (includes sulfur di and tri oxides), hydrogen sulfide

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION. Toxicological information on the regulated components of this product is as follows:

Sodium isobutyl xanthate has an acute oral (rat) LD50 value between 500 and 2,000 mg/kg. The acute dermal (rabbit) LD50 value is 440 mg/kg. The estimated 4-hour LC50 is 5 mg/kg. Direct contact with this material may cause moderate eye and skin irritation. Airborne dust may cause significant eye, skin or respiratory tract irritation.
12. ECOLOGICAL INFORMATION

This material is not classified as dangerous for the environment.
The ecological assessment for this material is based on an evaluation of its components.

13. DISPOSAL CONSIDERATIONS

Cytec encourages the recycle, recovery and reuse of materials, where permitted, as an alternative to disposal as a waste. Cytec recommends that organic materials classified as hazardous waste according to the relevant local or national regulations be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

**US DOT**
- Proper Shipping Name: Xanthates
- Hazard Class: 4.2
- Packing Group: II
- UN/ID Number: UN3342
- Transport Label Required: Spontaneously Combustible
- Hazardous Substances: Not applicable

**TRANSPORT CANADA**
- Proper Shipping Name: Xanthates
- Hazard Class: 4.2
- Packing Group: II
- UN Number: 3342
- Transport Label Required: Spontaneously Combustible

**ICAO / IATA**
- Proper Shipping Name: Xanthates

Acute overexposure to sodium hydroxide mists or dusts causes severe respiratory irritation. A solution of sodium hydroxide can produce irreversible damage to eyes and skin.

Sodium sulfide has an acute oral (rat) LD50 value of 208 mg/kg. Sodium sulfide severely irritates the skin and eyes, as well as, mucous membranes. This material liberates hydrogen sulfide upon contact with acids.

Sodium carbonate has acute oral (rat) LD50 value of > 4,000 mg/kg. Direct contact with this material may cause moderate eye and mild skin irritation.
Hazard Class: 4.2
Packing Group: II
UN Number: 3342
Transport Label Required: Spontaneously Combustible
Packing Instructions/Maximum Net Quantity Per Package:
Passenger Aircraft: 415; 15kg
Cargo Aircraft: 417; 50kg

IMO
Proper Shipping Name: Xanthates
Hazard Class: 4.2
UN Number: 3342
Packing Group: II
Transport Label Required: Spontaneously Combustible

15. REGULATORY INFORMATION
This product has been classified in accordance with the hazard criteria of the Controlled products Regulations and this Material Safety Data Sheet contains all the information required by the Controlled Products Regulations.

WHMIS CLASSIFICATION:
Class B6 Reactive Flammable
Class D1B Toxic
Class D2B Toxic

INVENTORY INFORMATION
United States (USA): All components of this product are included on the TSCA Inventory in compliance with the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq.
Canada: Components of this product have been reported to Environment Canada in accordance with Sections 66 and/or 81 of the Canadian Environmental Protection Act (1999), and are included on the Domestic Substances List.
Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS).
China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.
Japan: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese inventory.
Korea: All components of this product are NOT included on the Korean (ECL) inventory.
Philippines: All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine inventory.

16. OTHER INFORMATION
NFPA Hazard Rating (National Fire Protection Association)
Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
Fire: 2 - Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.
Reactivity: 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.

**Reasons For Issue:**
- Revised Section 2
- Revised Section 7
- Revised Section 9
- Revised Section 11

Prepared By: Randy Deskin, Ph.D., DABT +1-973-357-3100

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: REAGENT S-8944M Promoter
Synonyms: Formulated Thionocarbamate
Molecular Weight: Mixture

CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA, WEST PATERSON, NEW JERSEY 07424, USA
For Product Information call 1-800/652-6013. Outside the USA and Canada call 1-973/357-3193.
EMERGENCY PHONE: For emergency involving spill, leak, fire, exposure or accident call CHEMTREC: 1-800/424-9300. Outside the USA and Canada call 1-703/527-3887.

® indicates trademark registered in the U.S. Outside the U.S., mark may be registered, pending or a trademark. Mark is or may be used under license.

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>% (w/w)</th>
<th>OSHA (PEL)</th>
<th>ACGIH (TLV)</th>
<th>Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified thionocarbamate (#2)</td>
<td>40 - 70</td>
<td>Not Established</td>
<td>Not Established</td>
<td>-</td>
</tr>
<tr>
<td>Isopropanol 67-63-0</td>
<td>1 - 5</td>
<td>400 ppm</td>
<td>400 ppm</td>
<td>500 ppm STEL</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:
Color: amber
Appearance: liquid
Odor: petroleum

STATEMENTS OF HAZARD:
WARNING! MAY CAUSE ALLERGIC SKIN REACTION
MAY CAUSE EYE IRRITATION
COMBUSTIBLE LIQUID AND VAPOR

POTENTIAL HEALTH EFFECTS:

EFFECTS OF OVEREXPOSURE:
The acute oral (rat) and dermal (rabbit) LD50 values are estimated to be greater than 2,500 mg/kg and greater than 2,000 mg/kg, respectively.
Repeated or prolonged dermal contact may cause allergic skin reactions. Direct contact with this material may cause mild eye and minimal skin irritation. Overexposure to vapor may cause respiratory tract irritation and central nervous system depression. Refer to Section 11 for toxicology information on the regulated components of this product.

4. FIRST AID MEASURES

Ingestion:
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin Contact:
Remove contaminated clothing and shoes without delay. Wash immediately with plenty of water. Do not reuse contaminated clothing without laundering. Get medical attention if pain or irritation persists after washing or if signs and symptoms of overexposure appear.

Eye Contact:
Rinse immediately with plenty of water for at least 15 minutes. Obtain medical attention immediately.

Inhalation:
Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:
Use water spray, alcohol foam, carbon dioxide or dry chemical to extinguish fires. Water stream may be ineffective.

Protective Equipment:
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See Section 8 (Exposure Controls/Personal Protection).

Special Hazards:
Keep containers cool by spraying with water if exposed to fire.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

Methods For Cleaning Up:
Remove sources of ignition. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

7. HANDLING AND STORAGE

HANDLING
Precautionary Measures: Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Wash thoroughly after handling. Keep away from heat and flame.

Handling Statements: None
STORAGE
Areas containing this material should have fire safe practices and electrical equipment in accordance with applicable regulations and/or guidelines. Standards are primarily based on the material’s flashpoint, but may also take into account properties such as miscibility with water or toxicity. All local and national regulations should be followed. In the Americas, National Fire Protection Association (NFPA) 30: Flammable and Combustible Liquids Code, is a widely used standard. NFPA 30 establishes storage conditions for the following classes of materials: Class I Flammable Liquids, Flashpoint <37.8°C; Class II Combustible Liquids, 37.8°C < Flashpoint <60°C; Class IIIa Combustible Liquids, 60°C < Flashpoint <93°C; Class IIIb Combustible Liquids, Flashpoint > 93°C.

Storage Temperature: Room temperature
Reason: Integrity

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:
Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:
Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color: amber
Appearance: liquid
Odor: petroleum
Boiling Point: Not available
Melting Point: Not available
Vapor Pressure: Not available
Specific Gravity: 0.95 - 0.98
Vapor Density: Not available
Percent Volatile (By Wt.): Negligible
pH: Not applicable
Saturation In Air (% By Vol.): Not available
Evaporation Rate: Negligible
Solubility In Water: Dispersible
Volatile Organic Content: Not available
Flash Point: 72 °C 161 °F Tag Closed Cup
Flammable Limits (% By Vol.): Not available
Autoignition Temperature: Not available
Decomposition Temperature: Not available
Partition coefficient (n-octanol/water): Not available
Odor Threshold: See Section 2 for exposure limits.
10. STABILITY AND REACTIVITY

Stability: Stable

Conditions To Avoid: Avoid contact with oxidizing agents.

Polymerization: Will not occur

Materials To Avoid: Strong acids and alkalies cause hydrolysis; strong oxidizing agents.

Hazardous Decomposition Products:
- carbon monoxide
- carbon dioxide
- oxides of nitrogen
- oxides of sulfur (includes sulfur di and tri oxides)

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION. Toxicological information on the regulated components of this product is as follows:

Modified thionocarbamate (#2) has acute oral (rat) and dermal (rabbit) LD50 values of >2300 mg/kg and >2000 mg/kg, respectively. This material causes mild eye and minimal skin irritation in studies with rabbits. Material tested positive (Guinea pig) for skin sensitization. This material is not expected to be an Ames mutagen based on SAR analysis.

Isopropanol has acute oral (rat) and dermal (rabbit) LD50 values of 5.0 g/kg and 12.8 g/kg, respectively. The 4-hour inhalation LC50 (rat) for isopropanol is >16,000 ppm (40.86 mg/L). Acute overexposure to isopropanol vapor may cause mild irritation of the eyes and respiratory tract. Chronic overexposure to isopropanol vapors may cause central nervous system depression, headaches, dizziness, nausea, and staggered gait. Liquid isopropanol is a severe eye irritant.

12. ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The ecological assessment for this material is based on an evaluation of its components.

13. DISPOSAL CONSIDERATIONS
The information on RCRA waste classification and disposal methodology provided below applies only to the Cytec product, as supplied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA `listed hazardous waste’ or has any of the four RCRA `hazardous waste characteristics.’ Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA `listed hazardous waste’; information contained in Section 15 of this MSDS is not intended to indicate if the product is a `listed hazardous waste’. RCRA Hazardous Waste Characteristics: There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, see Section 9 of this MSDS (flash point). For Corrosivity, see Sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 2 (composition). Federal regulations are subject to change. State and local requirements, which may differ from or be more stringent than the federal regulations, may also apply to the classification of the material if it is to be disposed. Cytec encourages the recycle, recovery and reuse of materials, where permitted, as an alternate to disposal as a waste. Cytec recommends that organic materials classified as RCRA hazardous wastes be disposed of by thermal treatment or incineration at EPA approved facilities. Cytec has provided the foregoing for information only; the person generating the waste is responsible for determining the waste classification and disposal method.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

**US DOT**
- Proper Shipping Name: Combustible liquid, n.o.s.
- Hazard Class: Combustible liquid
- Packing Group: III
- UN/ID Number: NA1993
- Transport Label Required: None
- Technical Name (N.O.S.): Contains isopropanol
**TRANSPORT CANADA**
- Proper Shipping Name: Not applicable/Not regulated

**ICAO / IATA**
- Proper Shipping Name: Not applicable/Not regulated
- Packing Instructions/Maximum Net Quantity Per Package:
  - Passenger Aircraft: -
  - Cargo Aircraft: -

**IMO**
- Proper Shipping Name: Not applicable/Not regulated

15. REGULATORY INFORMATION

**INVENTORY INFORMATION**

**United States (USA):** All components of this product are included on the TSCA Inventory in compliance with the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq.

**Canada:** Components of this product have been reported to Environment Canada in accordance with Sections 66 and/or 81 of the Canadian Environmental Protection Act (1999), and are included on the Domestic Substances List.

OTHER ENVIRONMENTAL INFORMATION
The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.). See Section 13 for information on waste classification and waste disposal of this product.

This product does not contain any components regulated under these sections of the EPA

PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA
- Acute
- Fire

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)
- Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
- Fire: 2 - Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.
- Reactivity: 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

Reasons For Issue: New Product

Randy Deskin, Ph.D., DABT +1-973-357-3100

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.
MATERIAL SAFETY DATA SHEET

QUICK IDENTIFIER (In Plant Common Name)

Thunderstorm ATC Formula F-603A

Manufacturer's Name: ANSUL INCORPORATED
Address: One Stanton Street, Marinette, WI 54143-2542
Prepared By: Safety and Health Department

Emergency Telephone No.: CHEMTREC (800) 424-9300 or (703) 527-3887
Other Information Calls: (715) 735-7411

SECTION 1 – IDENTIFICATION

Common Name: Thunderstorm ATC Formula F-603A
(Trade Name and Synonyms)

Chemical Name: N/A This is a Mixture

Formula: N/A

SECTION 2 – INGREDIENTS

PART A – HAZARDOUS INGREDIENTS

Principal Hazardous Component(s) (chemical and common name(s)):

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>Acute Toxicity Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>112-34-5</td>
<td>N/E</td>
</tr>
<tr>
<td>*Diethylene Glycol Monobutyl Ether (Butyl Carbitol) Chemical listed under SARA Title III - Section 313 under generic heading &quot;Glycol Ethers&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Chemical listed under SARA Title III - Section 313. Subject to reporting requirements of SARA Title III & 40CFR Part 372 reporting requirements of SARA Title III & 40 CFR Part 372

PART B – OTHER INGREDIENTS

Other Component(s) (chemical and common name(s)):

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>Acute Toxicity Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/E</td>
<td>N/E</td>
</tr>
<tr>
<td>Proprietary mixture of Fluorosurfactants, foaming surfactants, inorganic salts, high molecular weight polymers and propylene glycol; not otherwise specified. Exact composition is a trade secret.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Water

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>ACGIH TLV</th>
<th>Acute Toxicity Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>N/E</td>
<td>NDA</td>
</tr>
<tr>
<td>70 To 80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: All components of this product are Listed in the USA TSCA inventory and Canadian DSL inventory.

SECTION 3 – PHYSICAL AND CHEMICAL CHARACTERISTICS (Fire and Explosion Data)

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point: Greater than 99 Deg. C</td>
<td></td>
</tr>
<tr>
<td>Specific Gravity (H&lt;sub&gt;2&lt;/sub&gt;O = 1): 1.025-1.035</td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure (mm Hg): Approx. 12</td>
<td></td>
</tr>
<tr>
<td>Percent Volatile by Volume (%): Approx. 70 - 80 solvents &amp; water</td>
<td></td>
</tr>
<tr>
<td>Vapor Density (Air = 1): Not Determined</td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate (Butyl Acetate = 1): Approx. 0.002</td>
<td></td>
</tr>
<tr>
<td>Solubility in Water: Infinitely Soluble</td>
<td></td>
</tr>
<tr>
<td>Reactivity in Water: Not Reactive</td>
<td></td>
</tr>
<tr>
<td>Appearance and Odor: Opaque green colored gelled liquid with slightly sweet odor</td>
<td></td>
</tr>
<tr>
<td>Flash Point: Approx. 65 Deg. C by PMCC</td>
<td></td>
</tr>
<tr>
<td>Flammable Limits in Air % by Volume: N/E</td>
<td></td>
</tr>
<tr>
<td>Extinguisher Media: N/A</td>
<td></td>
</tr>
<tr>
<td>Auto-Ignition Temperature: N/E</td>
<td></td>
</tr>
<tr>
<td>Special Fire Fighting Procedures: NONE – THIS IS AN EXTINGUISHING AGENT</td>
<td></td>
</tr>
<tr>
<td>Unusual Fire and Explosion Hazards: None</td>
<td></td>
</tr>
</tbody>
</table>

SECTION 4 – PHYSICAL HAZARDS

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Unstable ☒</th>
<th>Stable ☒</th>
<th>Conditions to Avoid: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Incompatibility (Materials to Avoid): Reactive metals, electrically energized equipment, any materials reactive with water, strong oxidizers.

Hazardous Decomposition Products: None known; however, oxides of nitrogen, sulfur, and carbon may be formed. Hydrogen sulfide may form during bacterial decomposition under anaerobic conditions.

Hazardous Polymerization: May Occur ☒ | Conditions N/A to Avoid: ☒
SECTION 5 – HEALTH HAZARDS

Threshold Limit Value:

Routes of Entry:
Eye Contact: May cause mild transient irritation

Skin Contact: May cause mild transient irritation and/or dermatitis

Inhalation: Inhalation is not anticipated to be a route of entry. Inhalation of foam produced from this concentrate may cause irritation to the bronchial tract.

Ingestion: Possible irritation to mucous membranes, large doses may produce narcosis. Possible G/I irritation.

Signs and Symptoms:
Acute Overexposure: Irritation of the skin, eyes or mucous membranes

Chronic Overexposure: Possible delayed liver or kidney damage

Medical Conditions Generally Aggravated by Exposure: Diseases of the kidney or liver

Chemical Listed as Carcinogen National Toxicology Program: Yes I.A.R.C. Monographs: Yes OSHA: Yes

SECTION 6 – EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: Flush with large amounts of water; if irritation persists, seek medical attention

Skin Contact: Wash with soap and large amounts of fresh water; if irritation persists, seek medical attention

Inhalation: Remove victim to fresh air; if discomfort continues, seek medical attention

Ingestion: If patient is conscious, induce vomiting. After material has cleared, give large amounts of water and seek medical attention.

SECTION 7 – SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type): Not normally necessary. Approved organic vapor respirator in absence of environmental controls

Ventilation: Local Exhaust: Not normally necessary Mechanical (General): Recommended as an environmental control

Protective Gloves: Rubber or latex recommended Eye Protection: Chemical goggles or splash-proof glasses recommended

Other Protective Clothing or Equipment: Eye wash and safety showers are good safety practice. Clean body-covering clothing recommended.

SECTION 8 – SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage: Store in original container or container approved by the manufacturer. Note incompatibility information in section 4.

Other Precautions: Do not mix agents. Avoid eye and skin contact. Avoid ingestion.

Steps to be Taken in Case Material is Released or Spilled: Rinse floor thoroughly with water as material can present a slipping hazard. Prevent material from reaching sewers or waterways to avoid nuisance foaming.

Waste Disposal Methods: Dispose of in compliance with all local, state and federal regulations.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATINGS

<table>
<thead>
<tr>
<th>HAZARD INDEX</th>
<th>HEALTH</th>
<th>FLAMMABILITY</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

WHMIS RATING: D2B – Skin or Eye Irritant

MSDS AVAILABILITY

MSDS AVAILABLE AT: www.ansul.com

MSDS FAX ON DEMAND: 1-800-323-8493 or 715-735-7411, extension 3091

AGENT

THUNDERSTORM ATC FORMULA F-603A

INDEX NUMBER

2001082

N/A = Not Applicable NDA = No Data Available

ANSUL is a registered trademark.

ANSUL INCORPORATED, ONE STANTON STREET, MARINETTE, WI 54143-2542 715-735-7411 Form No. F-2001082xxx ©2001 Ansul Incorporated Litho in U.S.A.
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: COBALT SULFATE MONOHYDRATE
PRODUCT CODE: 00186

MANUFACTURING LOCATION:
OMG AMERICAS, INC.
TWO MILE RUN ROAD
VENANGO COUNTY, FRANKLIN, PA 16323

DATE REVISED: 03/08/2005
DATE PRINTED: 03/08/2005

IN CASE OF EMERGENCY CONTACT:
8:00 a.m. to 5:00 p.m. (EST): 440-899-2950
After 5:00 p.m. (EST): 814-432-2125

CHEMICAL FAMILY/USE: Inorganic salt
CHEMICAL FORMULA: NA

HMIS:
HEALTH: 1*
FLAMMABILITY: 0
REACTIVITY: 0
PERSONAL PROTECTION: E

*Chronic health hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component/CAS number</th>
<th>Percent</th>
<th>ACGIH TLV:</th>
<th>ACGIH Short Term Exposure Limit (STEL) value:</th>
<th>OSHA PEL:</th>
<th>OSHA Short Term Exposure Limit (STEL) value:</th>
<th>Units that the TWAs and STELs for ACGIH and OSHA are in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt Sulfate</td>
<td>89</td>
<td>0.02</td>
<td>NE</td>
<td>0.1+</td>
<td>NE</td>
<td>mg/m3</td>
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<tr>
<td>10124-43-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water of Hydration</td>
<td>10</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td></td>
</tr>
<tr>
<td>7732-18-5</td>
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<td></td>
</tr>
<tr>
<td>Nickel Sulfate</td>
<td>&lt;1</td>
<td>0.1**</td>
<td>NE</td>
<td>1</td>
<td>NE</td>
<td>mg/m3</td>
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<tr>
<td>7786-81-4</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+For metal dust and fume, as Co
**For Nickel, Soluble compounds, as Ni

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
May cause sensitization by skin contact which may produce allergic contact dermatitis. May cause sensitization by inhalation which may produce occupational asthma. May cause eye and respiratory irritation.

EYE CONTACT:
May cause eye irritation.

SKIN CONTACT:
May cause allergic contact dermatitis if there is prior sensitization. Most rashes associated with cobalt occur on the hands and appear.
within the first year of occupational exposure to cobalt.

**INGESTION:**
May be harmful if swallowed.

**INHALATION:**
Cobalt is a known allergen that produces characteristic symptoms of asthma, such as wheezing, dry cough, and labored breathing. Usually the asthma symptoms appear 4-6 hours after exposure and often worsen again later in the same day. Even later asthma reactions to inhaled cobalt may occur up to 48 hours after exposure. Improvement typically occurs when cobalt exposure ceases, e.g. weekends, vacations. Other cobalt-containing compounds such as hard metal dust, but not cobalt powder itself, are associated with subacute fibrosis alveolitis and chronic diffuse interstitial pulmonary fibrosis.

### 4. FIRST AID MEASURES

**EYES:**
Flush immediately with large amounts of water and continue flushing for 15 minutes or until irritation subsides, whichever is longer.

**SKIN:**
Remove victim from contaminated area. Wash immediately and thoroughly with soap or mild detergent and water. Remove and isolate contaminated clothing, jewelry, and shoes. Gently brush away excess solid contaminate. Consult a physician if irritation persists.

**INHALATION:**
Remove from exposure. Provide ventilation assistance and oxygen as indicated. Physicians should administer usual asthma medications for acute attacks.

**INGESTION:**
Give large amounts of water to drink if person is completely conscious. Get medical attention as a precaution.

**MEDICAL CONDITIONS AGGRAVATED:**
Individuals already sensitized to cobalt are at greater risk for asthma attacks. Risk factors for severe eczema include not only prior cobalt sensitization, but also prior nickel sensitization and irritant dermatitis. The sensitization to cobalt and nickel results from co-exposure rather than cross-reactivity.

**NOTE TO PHYSICIAN:**
Toxic concentrations of cobalt in urine and blood are not well defined. In the general population, the 95th percentile for cobalt concentration was 8.3 ug/l in urine (National Health and Nutrition Examination Survey III). Chelation treatments, for example, calcium disodium edetate or dimercaprol, are controversial. Contact a poison control center for current recommendations. Individuals with polymorphism in the HLA-DP gene (presence of glutamate 69 in the beta chain) may be more susceptible to cobalt toxicity.

### 5. FIRE FIGHTING MEASURES

**FLASH POINT (° F)** Not Applicable

**OSHA FLAMMABILITY CLASSIFICATION:**
Not Applicable.

**EXTINGUISHING MEDIA:**
Not applicable. Product does not burn.

**SPECIAL FIREFIGHTING PROCEDURES:**
None required; however, when fighting chemical fires, self-contained breathing apparatus and protective clothing is recommended.

**EXPLOSION LIMITS IN AIR - LOWER (%)** Unknown

**EXPLOSION LIMITS IN AIR - UPPER (%)** Unknown

**AUTOIGNITION TEMP (° F)** Unknown

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**
High concentrations of dust may present a dust explosion hazard.

### 6. ACCIDENTAL RELEASE MEASURES

**ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:**
The spill should first be contained and the area should be cleaned by wet-sweeping or vacuum cleaning (HEPA filter). Minimize the creation of dust. Approved NIOSH respirator for dust should be worn.

### 7. HANDLING AND STORAGE

**HANDLING:**
Avoid contact with skin and eyes. Avoid breathing dust. Use only with adequate ventilation. Always use gloves and safety glasses when opening/emptying containers or processing this material. Do not eat or drink in work area. Wash in soap and water after

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exposure to any dust.

STORAGE:
This material should be stored in sealed containers to avoid dampness and dust. Partly used containers should be sealed. Otherwise, no special precautions are required.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

ENGINEERING CONTROLS:
Proper ventilation should be installed in order to maintain cobalt dust concentration in the air below the occupational exposure limits.

RESPIRATORY PROTECTION EQUIPMENT:
Use NIOSH approved respiratory protection where airborne level exceeds appropriate occupational exposure limit.

PROTECTIVE GLOVES:
Gloves, rubber or impervious coating.

EYE AND FACE PROTECTION:
Wear safety glasses or face shield in operations that do scatter fine particles in the air.

OTHER PROTECTIVE EQUIPMENT:
To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

VENTILATION:
Use local exhaust ventilation directed towards the source of dust and which is adequate to limit personal exposure to levels which do not exceed the PEL or TLV. If such equipment is not available use respirators as specified above.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Range/Point</td>
<td>Unknown</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Unknown</td>
</tr>
<tr>
<td>Vapor Density (AIR=1)</td>
<td>Unknown</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>Unknown</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Unknown</td>
</tr>
<tr>
<td>Physical State</td>
<td>Powder</td>
</tr>
<tr>
<td>Color</td>
<td>Pink</td>
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<tr>
<td>% Volatile by Weight</td>
<td>Unknown</td>
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<tr>
<td>% Volatile by Volume</td>
<td>Unknown</td>
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<tr>
<td>Evaporation Rate (Butyl Acetate=1)</td>
<td>Unknown</td>
</tr>
<tr>
<td>Specific Gravity @ 25°C</td>
<td>1.04</td>
</tr>
<tr>
<td>Weight per gallon</td>
<td>8.7 lbs.</td>
</tr>
</tbody>
</table>

**10. STABILITY AND REACTIVITY**

STABILITY:
Stable.

HAZARDOUS POLYMERIZATION:
Will not occur.

HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS:
Toxic fumes of Cobalt Oxide. Sulfur dioxide.

INCOMPATIBILITY (MATERIALS TO AVOID):
Strong oxidizers.

CONDITIONS TO AVOID:
Avoid dust generation.

**11. TOXICOLOGICAL INFORMATION**

TOXICITY DATA:
IARC has stated that there is sufficient evidence for the carcinogenicity of Cobalt metal powder in experimental animals. On the basis of animal evidence from experiments not regarded as relevant to human exposure, IARC has classified Cobalt as 2B, possible carcinogen for humans. ACGIH has given Cobalt a rating of A3, animal carcinogen. They state that available epidemiologic studies do not confirm an increased risk of cancer in exposed humans.

The National Toxicology Program has classified Cobalt Sulfate as "reasonably anticipated to be a human carcinogen." The listing is based on findings from long-term inhalation studies of this chemical in laboratory animals where it caused lung tumors in both mice.

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and rats and adrenal-gland tumors in female rats.

ACUTE ORAL LD50: No data at this time.
ACUTE DERMAL LD50: No data at this time.
ACUTE INHALATION LC50: No data at this time.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:
No data at this time.
CHEMICAL FATE INFORMATION:
No data at this time.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:
Disposal should be made in accordance with federal, state and local regulations. Cobalt spills can be swept up and, if uncontaminated, re-used. Cobalt can be recycled and consideration of this route should be given. This product is not regulated as a hazardous waste under RCRA but may be regulated in certain states. Dispose of in accordance with Federal, State and Local laws.

14. TRANSPORT INFORMATION

DOT SHIPPING NAME: Not Regulated
DOT HAZARD CLASS: None
UN/NA NUMBER: None
DOT PACKING GROUP: None

AIR FREIGHT TRANSPORTATION: Not Regulated
OCEAN TRANSPORTATION: Not Regulated

15. REGULATORY INFORMATION

TSCA STATUS:
All components of this product are on the US TSCA Inventory.

TSCA 12(b) EXPORT NOTIFICATION:
No components of this product are subject to TSCA 12(b) export notification requirements.

CALIFORNIA PROPOSITION 65:
This material may contain the following chemicals which are known to the State of California to cause cancer or birth defects and are subject to the requirements of California Proposition 65:
Cobalt Sulfate (10124-43-3) Cancer
Nickel And Certain Nickel Compounds Cancer

CLEAN AIR ACT S112 HAZARDOUS AIR POLLUTANTS:
Cobalt Compounds. Nickel Compounds.

SARA 302 EXTREMELY HAZARDOUS SUBSTANCES LIST:
This product does not contain greater than 1.0% of any chemical substance on the SARA Extremely Hazardous Substance List.

SARA (311, 312) HAZARD CLASS:
Acute health hazard. Chronic health hazard.

SARA SECTION 313 TOXIC CHEMICALS:
Cobalt Compounds 89%
Nickel Compounds <1%

AUSTRALIAN INVENTORY CHEMICAL SUBSTANCES:
All components are listed on the Australian Core Inventory of Chemical Substances (ACOIN).

CANADIAN INVENTORY:
All components are on the Domestic Substance List (DSL).

EINECS REGULATIONS:
All components are on the European Inventory of Existing Commercial Chemical Substances (EINECS).

JAPAN:

OMG Americas, Inc.
COBALT SULFATE MONOHYDRATE 00186
Page 4 of 5
All components are listed on the Japanese Existing and New Chemical Substances (ENCS).

KOREAN CHEMICAL INVENTORY:
All components are on the Korean List of Existing Chemical Substances.

PHILIPPINE INVENTORY:
All components are listed on the Philippines Inventory of Chemicals and Chemical Substances (PICCS).

CHINESE INVENTORY:
All components are listed on the Chinese Inventory of Existing Chemical Substances.

16. OTHER INFORMATION

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
The information in this document is believed to be correct as of the date issued. However, no warranty of merchantability, fitness for any particular purpose, or any other warranty is expressed or is to be implied regarding the accuracy or completeness of this information, the results to be obtained from the use of this information or the product, the safety of this product, or the hazards related to its use. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

17. LABEL INFORMATION

SIGNAL WORD: CAUTION
TARGET ORGANS:
May cause sensitization by inhalation and skin contact. Prolonged inhalation of cobalt dust, or metal dust, fume or mist containing cobalt may cause serious respiratory illness.

CANCER HAZARD (contains cobalt sulfate which) can cause cancer. Risk of cancer depends on duration and level of exposure.

EYES:
Flush immediately with large amounts of water and continue flushing for 15 minutes or until irritation subsides, whichever is longer.

SKIN:
Remove victim from contaminated area. Wash immediately and thoroughly with soap or mild detergent and water. Remove and isolate contaminated clothing, jewelry, and shoes. Gently brush away excess solid contaminant. Consult a physician if irritation persists.

INHALATION:
Remove from exposure. Provide ventilation assistance and oxygen as indicated. Physicians should administer usual asthma medications for acute attacks.

INGESTION:
Give large amounts of water to drink if person is completely conscious. Get medical attention as a precaution.

HANDLING:
Avoid contact with skin and eyes. Avoid breathing the dust. Use with adequate ventilation. Always use an approved respirator for dust, gloves and safety glasses when opening/emptying containers or processing this material. Do not eat or drink in work area. Wash in soap and water after exposure to any dust.

STORAGE:
This material should be stored in sealed containers to avoid dampness and dust. Partly used containers should be sealed. Otherwise, no special precautions are required.

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
The spill should first be contained and the area should be cleaned by wet-sweeping or vacuum cleaning (HEPA filter). Minimize the creation of dust. Approved NIOSH respirator for dust should be worn.

EXTINGUISHING MEDIA:
Not applicable. Product does not burn.
MATERIAL SAFETY DATA SHEET

Diesel Fuels

VALERO MARKETING & SUPPLY COMPANY
and Affiliates
P.O. Box 696000
San Antonio, TX 78269-6000

Emergency Phone Numbers
24 Hour Emergency: 866-565-5220
Chemtrec Emergency: 800-424-9300

General Assistance
General Assistance: 210-345-4593

BRAND NAMES: Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

Section 1. Chemical Product and Company Identification

Common / Trade name : Diesel Fuels
Synonym : Diesel Fuels All Grades, Diesel Fuel No.2, Fuel Oil No.2, High Sulfur Diesel Fuel, Low Sulfur Diesel Fuel, Ultra Low Sulfur Diesel Fuel, Off-Road Diesel fuel, Dyed Diesel Fuel, X Grade Diesel Fuel, X-1 Diesel Fuel

SYNONYMS/COMMON NAMES: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

MSDS # : 102
CAS # : 68476-34-6

Section 2. Composition, information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>Concentration ( % )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel fuel</td>
<td>68476-34-6</td>
<td>85 - 95</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>1 - 3</td>
</tr>
<tr>
<td>n-Nonane</td>
<td>111-84-2</td>
<td>1 - 3</td>
</tr>
<tr>
<td>Hexane (Other Isomers)</td>
<td>mixture</td>
<td>1 - 3</td>
</tr>
<tr>
<td>n-Heptane</td>
<td>142-82-5</td>
<td>1 - 2</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>110-54-3</td>
<td>1 - 2</td>
</tr>
<tr>
<td>Octane (All Isomers)</td>
<td>111-65-9</td>
<td>1 - 2</td>
</tr>
</tbody>
</table>

Section 3. Hazards Identification

Danger! Diesel Exhaust has been Reported to be an Occupational hazard due to NIOSH-reported potential carcinogenic properties.
Danger! Product May Contain or Release Hydrogen Sulfide. H2S is a highly toxic, highly flammable gas which can be fatal if inhaled at certain concentrations.
May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Avoid prolonged or repeated skin contact. Combustible Liquid. Vapors may explode.

Physical state : Liquid. (May be dyed red.)

Continued on next page
Emergency overview: Danger!

CAUSES EYE BURNS.
HARMFUL IF SWALLOWED.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LIVER, PERIPHERAL NERVOUS SYSTEM, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LEN'S OR CORNEA.
SUSPECT CANCER HAZARD.
CONTAINS MATERIAL WHICH MAY CAUSE CANCER.
COMBUSTIBLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FIRE.

Do not ingest. Do not get in eyes or on skin or clothing. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

Routes of entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Eyes: Corrosive to eyes. May cause severe irritation, redness, tearing, blurred vision and conjunctivitis.

Skin: Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Injury may not appear serious at first. Within a few hours, tissues will become swollen, discolored and extremely painful.

Inhalation: Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes. NIOSH Current Intelligence Bulletin 50 reports a potential occupational carcinogenic hazard exists due to human exposure to diesel exhaust.

Ingestion: Toxic if swallowed. May cause burns to mouth, throat and stomach. This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

Medical conditions aggravated by over-exposure: Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray or mist may produce respiratory tract irritation, leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Over-exposure signs/symptoms: Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest or sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological information (section 11)
Section 4. First Aid Measures

Eye contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues.

Skin contact: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention. Wash exposed area thoroughly with soap and water. Remove contaminated clothing promptly and launder before reuse. Contaminated leather goods should be discarded. If irritation persists or symptoms described in the MSDS develop, seek medical attention. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Get immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion: This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

Notes to physician: In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an intratracheal tube, to prevent aspiration. Irregular heart beat may occur, use of adrenalin is not advisable. Individuals intoxicated by the product should be hospitalized immediately, with acute and continuing attention to neurological and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be monitored for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be monitored for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

Section 5. Fire Fighting Measures

Flammability of the product: Combustible.
Auto-ignition temperature: 257.2°C (495°F)
Flash point: Closed cup: 51.67 to 87.78°C (125 to 190°F).
Flammable limits: Lower: 0.4% Upper: 8%
Products of combustion: These products are carbon oxides (CO, CO₂), nitrogen and sulfur oxides (NOₓ, SOₓ), particulate matter, VOC's.
Fire hazards in the presence of various substances: Flammable in the presence of open flames, sparks and static discharge.
Explosion hazards in the presence of various substances: Explosive in the presence of open flames, sparks and static discharge.
Fire-fighting media and instructions: Combustible Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. Water can be used to cool fire- exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers. Collect contaminated fire-fighting water separately. It must not enter the sewage system. Dike area of fire to prevent runoff. Decontaminate emergency personnel and equipment with soap and water.

Continued on next page
**Special remarks on fire hazards**

Combustible liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

**Special protective equipment for fire-fighters**

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

**Special remarks on explosion hazards**

No additional remark.

## Section 6. Accidental Release Measures

### Personal precautions

Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic, flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.

### Environmental precautions

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424-8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

### Methods for cleaning up

If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

## Section 7. Handling and Storage

### Handling

Do not ingest. Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Use only in well ventilated locations. Keep away from heat, spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire and Explosion Hazard Data section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire.

*Continued on next page*
Diesel Fuels

Keep out of reach of children. Failure to use caution may cause serious injury or illness. Never siphon by mouth. For use as a motor fuel only. Do not use as a cleaning solvent or for other non-motor fuel uses. Wash thoroughly after handling. To prevent ingestion and exposure - Do not siphon by mouth to transfer product between containers. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

Storage: Store in tightly closed containers in cool, dry, isolated and well ventilated area away from heat, sources of ignition and incompatible materials. Use non-sparking tools and explosion proof equipment. Ground lines, containers, and other equipment used during product transfer to reduce the possibility of a static induced spark. Do not "switch load" because of possible accumulation of a static charge resulting in a source of ignition. Use good personal hygiene practices.

Section 8. Exposure controls, personal protection

Engineering controls: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protective equipment:

Eyes: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame Retardant Clothing is recommended.

Respiratory: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protective equipment (Pictograms): Consult your supervisor or S.O.P. for special handling direction.

Personal protection in case of a large spill: Splash goggles. Full suit. Vapor respirator. Boots. Gloves. Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

Component | Exposure limits
--- | ---
Diesel fuel | ACGIH TLV (United States, 1/2004). Skin Notes: 2002 Adoption.

TWA: 100 mg/m$^3$ 8 hour/hours. Form: Total hydrocarbons

NIOSH REL (United States, 6/2001).

STEL: 15 ppm 15 minute/minutes. Form: All forms

TWA: 10 ppm 10 hour/hours. Form: All forms

OSHA PEL (United States, 6/1993).

TWA: 10 ppm 8 hour/hours. Form: All forms


STEL: 15 ppm 15 minute/minutes. Form: All forms

TWA: 10 ppm 8 hour/hours. Form: All forms

Naphthalene

n-Nonane | NIOSH REL (United States, 6/2001).

TWA: 200 ppm 10 hour/hours. Form: All forms

Continued on next page
### Section 9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid. (May be dyed red.)</td>
</tr>
<tr>
<td>Color</td>
<td>Clear. Straw.</td>
</tr>
<tr>
<td>Odor</td>
<td>Kerosene (Strong.)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>162.78 to 371.11°C (325 to 700°F)</td>
</tr>
<tr>
<td>Melting/freezing point</td>
<td>May start to solidify at -51.15°C (-60.1°F) based on data for: n-Nonane. Weighted average: -92.6°C (-134.7°F)</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>0.84 to 0.93 (Water = 1) (@ 60 °F)</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>&lt;0.7 kPa (&lt;5.2 mm Hg) (at 20°C)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>3 (Air = 1)</td>
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<tr>
<td>Volatility</td>
<td>Negligible</td>
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<tr>
<td>Evaporation rate</td>
<td>0.02</td>
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### Section 10. Stability and reactivity data

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability and reactivity</td>
<td>The product is stable.</td>
</tr>
<tr>
<td>Incompatibility with various substances</td>
<td>Reactive with oxidizing agents, acids, alkalis.</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>These products are carbon oxides (CO, CO₂), nitrogen and sulfur oxides (NOₓ, SOₓ), particulate matter, VOC's.</td>
</tr>
<tr>
<td>Hazardous polymerization</td>
<td>Will not occur.</td>
</tr>
</tbody>
</table>

Consult local authorities for acceptable exposure limits.
Section 11. Toxicological Information

Toxicity data

**DIESEL EXHAUST FUMES** have been reported to be a potential occupational carcinogen in humans by NIOSH Current Intelligence Bulletin 50.

**HEPTANE** can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Heptane vapor is a narcotic. Concentrations of 10,000 to 15,000 ppm produced narcosis in mice within 30 to 60 minutes, while 15,000 to 20,000 ppm caused convulsions and death. At 48,000 ppm, respiratory arrest was produced in mice in 3 to 4 minutes from the start of exposure. Human subjects exposed to 1,000 ppm for 6 minutes, or to 2,000 ppm for 4 minutes, reported slight vertigo. At 5,000 ppm for 4 minutes, there was marked vertigo, inability to walk a straight line, hiliarity, and incoordination, but no complaints of eye and upper respiratory tract or mucous membrane irritation. A 15-minute exposure at 5,000 ppm produced in some subjects a state of stupor lasting for 30 minutes after exposure. These subjects also reported loss of appetite, slight nausea, and a taste resembling gasoline for several hours after exposure. Although chronic nervous system effects have not been attributed to heptane, polyneuritis has been reported following prolonged exposure to a petroleum fraction with boiling range between 70°C and 100°C, and this fraction would normally contain various isomers of heptane as major ingredients.

**n-HEXANE** can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Hexane vapor is a narcotic and a mild upper respiratory irritant. Polynueropathy (peripheral nerve damage) has been reported to occur in workers exposed to hexane vapors, characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and severity of nerve damage. Concentrations of 30,000 ppm produced narcosis in mice within 30 to 60 minutes, convulsions and death occurred at 35,000 to 40,000 ppm, and at 64,000 ppm respiratory arrest was produced in 2.5 to 4.5 minutes from the start of exposure. Concentrations up to 8000 ppm produced no anesthesia. In human subjects, 2000 ppm for 10 minutes produced no effects, but 5000 ppm resulted in dizziness and a sensation of giddiness. Other investigators reported slight nausea, headache and irritation of the eyes and throat at 1400 to 1500 ppm. In industrial practice, mild narcotic symptoms such as dizziness have been observed when concentrations exceeded 1000 ppm, but not below 500 ppm.

**NONANE** causes a four hour LC50 in rats at concentrations of 3200 ppm, or at about the same level as VM&P Naphtha. This level is markedly lower than the lethal concentrations reported in earlier mouse studies involving octane (13,500 ppm) and heptane (16,000 ppm), supporting the lower limit for nonane.

**OCTANE** can affect the body if it is inhaled, comes in contact with the skin or eyes or is swallowed. Octane vapor is a mild narcotic and mucous membrane irritant. Concentrations of 6600 to 13,700 ppm produced narcosis in mice in 30 to 90 minutes, the fatal concentration for animals is near 13,500 ppm. No chronic systemic effects have been reported in humans.

**NAPHTHALENE** can affect the body if it is inhaled, comes into contact with the eyes or the skin or if it is swallowed. Naphthalene vapor causes hemolysis and eye irritation, and may cause cataracts. Severe intoxication from ingestion of the solid results in characteristic manifestations of marked intravascular hemolysis and its consequences, including potentially fatal hyperkalemia. Initial symptoms include eye irritation, headache, confusion, excitement, malaise, profuse sweating, nausea, vomiting, abdominal pain, and irritation of the bladder. There may be progression to jaundice, hematuria, hemoglobinuria, renal tubular blockage, and acute renal shutdown. Hematologic features include red cell fragmentation, icterus, severe anemia with nucleated red cells, leukocytosis, and dramatic decreases in hemoglobin, hematocrit and red cell count; sometimes there is formation of Heinz bodies and methemoglobin. Individuals with a deficiency of glucose-6-phosphate dehydrogenase in erythrocytes may be more susceptible to hemolysis by nucleated red cells, leukocytosis, and dramatic decreases in hemoglobin, hematocrit and red cell count; sometimes there is formation of Heinz bodies and methemoglobin. Individuals with a deficiency of glucose-6-phosphate dehydrogenase in erythrocytes may be more susceptible to hemolysis by naphthalene. Cataracts and ocular irritation have been produced experimentally in animals and humans. Of 21 workers exposed to high concentrations of fume or vapor for 5 years, 8 had peripheral lens opacities; in other studies, no abnormalities of the eyes have been detected in workers exposed to naphthalene for several years. The vapor causes eye irritation at 15 ppm. Eye contact with the solid may result in conjunctivitis, superficial injury to the cornea, chorioretinitis, scotoma, and diminished visual acuity. Naphthalene on the skin may cause hypersensitivity dermatitis, chronic dermatitis is rare.

**HEXANE ISOMERS** are three times as toxic to mice as is pentane. Narcosis was produced in mice within 30-60 minutes at concentrations of 30,000 ppm. In man, concentrations for 10 minutes at 2000 ppm produced no effects, but 5000 ppm caused dizziness and a sense of giddiness. Concentrations of 1400-1500 ppm produced slight nausea, headache, eye, and throat irritation.
Specific effects

Carcinogenic effects: Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs: Contains material which causes damage to the following organs: blood, kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Section 12. Ecological Information

Ecotoxicity data

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Species</th>
<th>Period</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>Naphthalene</td>
<td>Daphnia magna (EC50)</td>
<td>48 hour/hours</td>
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<td>Daphnia magna (EC50)</td>
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<td>Daphnia magna (EC50)</td>
<td>48 hour/hours</td>
<td>2.55 mg/l</td>
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<tr>
<td></td>
<td>Daphnia pulex (LC50)</td>
<td>96 hour/hours</td>
<td>1 mg/l</td>
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<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour/hours</td>
<td>1.6 mg/l</td>
</tr>
<tr>
<td></td>
<td>Pimephales promelas (LC50)</td>
<td>96 hour/hours</td>
<td>1.8 mg/l</td>
</tr>
</tbody>
</table>

n-Hexane

Products of degradation: These products are carbon oxides (CO, CO₂) and water.

Toxicity of the products of biodegradation: The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

Waste disposal: The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport Information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Class</th>
<th>Packing group</th>
<th>Label</th>
<th>Additional information</th>
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<tr>
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<td>UN1993</td>
<td>Diesel fuel</td>
<td>3 Combustible liquid.</td>
<td>III</td>
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<td>TDG Classification</td>
<td>UN1993</td>
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<td>III</td>
<td>![Flammable Label]</td>
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</table>
Section 15. Regulatory Information

United States

U.S. Federal regulations

- TSCA 4(a) final test rules: Hexane (Other Isomers); n-Hexane
- TSCA 8(a) PAIR: Naphthalene; n-Heptane; n-Nonane
- TSCA 8(b) inventory: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene
- SARA 302/304/311/312 extremely hazardous substances: No products were found.
- SARA 302/304 emergency planning and notification: No products were found.
- SARA 302/304/311/312 hazardous chemicals: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Octane (All Isomers)
- SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Hexane (Other Isomers): Fire hazard, Immediate (acute) health hazard; Naphthalene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; n-Heptane: Fire hazard; n-Hexane: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; n-Nonane: Fire hazard, Immediate (acute) health hazard; Octane (All Isomers): Fire hazard

- Clean Water Act (CWA) 307: Naphthalene; Toluene; Benzene
- Clean Water Act (CWA) 311: Naphthalene; Toluene; Benzene
- Clean Air Act (CAA) 112 accidental release prevention: No products were found.
- Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
- Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

<table>
<thead>
<tr>
<th>Form R - Reporting requirements</th>
<th>Product name</th>
<th>CAS number</th>
<th>Concentration</th>
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</thead>
<tbody>
<tr>
<td>Supplier notification</td>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>1 - 3</td>
</tr>
<tr>
<td></td>
<td>n-Hexane</td>
<td>110-54-3</td>
<td>1 - 2</td>
</tr>
</tbody>
</table>

- Naphthalene 91-20-3
- n-Hexane 110-54-3

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

- Connecticut hazardous material survey.: Naphthalene; n-Hexane; Toluene; Benzene
- Illinois toxic substances disclosure to employee act: Naphthalene; n-Hexane; Toluene; Benzene
- Rhode Island RTK hazardous substances: Naphthalene; n-Hexane; Toluene; Benzene
- Pennsylvania RTK: Hexane (Other Isomers): (generic environmental hazard); Naphthalene: (environmental hazard, generic environmental hazard); n-Heptane: (generic environmental hazard); n-Hexane: (generic environmental hazard); n-Nonane: (generic environmental hazard); Octane (All Isomers): (generic environmental hazard); Toluene: (environmental hazard, generic environmental hazard); Benzene: (special hazard, environmental hazard, generic environmental hazard)
- Florida: Naphthalene; n-Hexane; Toluene; Benzene
- Michigan critical material: Toluene; Benzene
- Massachusetts RTK: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Octane (All Isomers); Toluene; Benzene
- New Jersey: Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene

**WARNING:** This product contains chemical/chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.: Naphthalene; Toluene; Benzene

**WARNING:** This product contains chemical/chemicals known to the state of California to cause reproductive harm (male).: Benzene

California prop. 65 (no significant risk level): Benzene

California prop. 65 (Maximum Acceptable Dosage Level): Toluene; Benzene

**WARNING:** This product contains chemical/chemicals known to the state of California to cause birth defects or other reproductive harm.: Toluene; Benzene

**WARNING:** This product contains chemical/chemicals known to the state of California to cause reproductive harm (male).: Benzene

Continued on next page
cause cancer.: Naphthalene; Benzene

**Canada**

**WHMIS (Canada)**

: Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
: Class D-1B: Material causing immediate and serious toxic effects (Toxic).
: Class D-2A: Material causing other toxic effects (Very toxic).
: Class D-2B: Material causing other toxic effects (Toxic).
: Class E: Corrosive liquid.
: CEPA DSL: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene

**Section 16. Other Information**

**Label requirements**

: CAUSES EYE BURNS.
: HARMFUL IF SWALLOWED.
: CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
: BLOOD, KIDNEYS, LIVER, PERIPHERAL NERVOUS SYSTEM, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
: SUSPECT CANCER HAZARD.
: CONTAINS MATERIAL WHICH MAY CAUSE CANCER.
: COMBUSTIBLE LIQUID AND VAPOR.
: VAPOR MAY CAUSE FIRE.

**Hazardous Material Information System (U.S.A.)**

<table>
<thead>
<tr>
<th>Hazardous Material Information System (U.S.A.)</th>
<th>Health</th>
<th>Fire hazard</th>
<th>Physical Hazard</th>
<th>Personal protection</th>
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</tbody>
</table>

**National Fire Protection Association (U.S.A.)**

<table>
<thead>
<tr>
<th>National Fire Protection Association (U.S.A.)</th>
<th>Flammability</th>
<th>Instability</th>
<th>Specific hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Health" /></td>
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</tr>
</tbody>
</table>

**Date of printing**

: 1/30/2006.

**Date of issue**

: 1/30/2006.

**Version**

: 1.01

**Disclaimer**

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Definitions of Material Safety Data Sheet Terminology

GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, (private association)
DOT - United States Department of Transportation
EPA - United States Environmental Protection Agency
IARC - International Agency for Research on Cancer, (private association)
NFPA - National Fire Protection Association, (private association)
MSHA - Mine Safety and Health Administration, U.S. Department of Labor
NIOSH - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services
NTP - National Toxicology Program, (private association)
OSHA - Occupational Safety and Health Administration, U.S. Department of Labor
WHMIS - Workplace Hazardous Material Information System
CSA - Canadian Standards Association

HAZARD AND EXPOSURE INFORMATION

Acute Hazard - An adverse health effect which occurs rapidly as a result of short term exposure.
CAS # - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.
Ceiling - The concentration that should not be exceeded during any part of the working exposure
Chronic Hazard - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration
Fire Hazard - A material that poses a physical hazard by being flammable, combustible, phyrophoric or an oxidizer as defined by 29 CFR 1910.1200
Hazard Class - DOT hazard classification
Hazardous Ingredients - Names of ingredients which have been identified as health hazards
IDLH - Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.
mg/m^3 - Milligrams of contaminant per cubic meter of air, a mass to volume ratio
N/A - Not available or no relevant information found
NA - Not applicable
PEL - OSHA permissible exposure limit; an action level of one half this value may be applicable
ppm - Part per million (one volume of vapor or gas in one million volumes of air)
Pressure Hazard - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200
Reactive Hazard - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.
STEL - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.
TLV - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.
8-hour TWA - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.
LD50 – Single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of the defined animal population.
LC50 - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.
SECTION 1. CHEMICAL IDENTIFICATION

CHEMINFO Record Number: 177
CCOHS Chemical Name: Polypropylene glycol monomethyl ether

Synonyms:
- alpha-Methyl-omega-hydroxypropy-(oxy(methyl-1,2-ethanediyl))
- Polypropylene glycol methyl ether
- Poly(oxypropylene) monomethyl ether
- Propylene oxide-methanol adduct
- Ether monométhylélique du polypropyléneglycol

Trade Name(s):
- Dowfroth 1012 Flotation Frother
- Dowfroth 250-C Flotation Frother
- Jeffox OL 2700
- Slovasol 2430

CAS Registry Number: 37286-64-9
RTECS Number(s): TR4690000
Chemical Family: Aliphatic ether alcohol / aliphatic glycol ether / aliphatic poly glycol ether / aliphatic poly glycol mono ether / propylene glycol ether / polypropylene glycol monoether
Molecular Formula: (C3-H6-O)n.C-H4-O
Structural Formula: H(-O-C3H6-)_x-O-CH3

SECTION 2. DESCRIPTION

Appearance and Odour:
Colourless to amber coloured liquid; odourless.(1,3,4)

Odour Threshold:
No information is available

Warning Properties:
No information is available for evaluation.
Uses and Occurrences:
Component of surfactants, lubricants, hydraulic fluids; water insoluble lubricant; flotation frother; solvent.

SECTION 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
Colourless to amber, odourless liquid. Little or no hazard if spilled. Can probably burn if strongly heated.

POTENTIAL HEALTH EFFECTS

Effects of Short-Term (Acute) Exposure

Inhalation:
Polypropylene glycol monomethyl ether is not expected to produce vapours under normal conditions. Mists might be mildly irritating.

Skin Contact:
Based on similarity to other propylene glycol methyl ethers, polypropylene glycol monomethyl ether is not expected to be a skin irritant. Although skin absorption is likely, toxic amounts are not expected to be absorbed with normal handling and use.

Eye Contact:
No information available. Related materials, such as dipropylene glycol methyl ether and tripropylene glycol methyl ether, cause only mild temporary irritation with no corneal injury.

Ingestion:
Due to the very low oral toxicity shown in animal studies, it is very unlikely that toxic amounts would be ingested with normal use and handling.

Effects of Long-Term (Chronic) Exposure

No chronic effects have been reported. Based on similarity to other propylene glycol methyl ethers, none are expected.

Carcinogenicity:

No human or animal information is available.

The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of this chemical.

The American Conference of Governmental Industrial Hygienists (ACGIH) has no listing for this chemical.

The US National Toxicology Program (NTP) has not listed this chemical in its report on carcinogens.
Teratogenicity and Embryotoxicity:
Animal studies with the chemically related propylene glycol monomethyl ether have shown no reproductive effects. None are expected for polypropylene glycol monomethyl ether.

Reproductive Toxicity:
No human or animal information is available.

Mutagenicity:
No information is available.

Toxicologically Synergistic Materials:
No information is available

Potential for Accumulation:
Industrial exposure may occur by any of the common routes, but under normal conditions of use, the hazards would be expected to be minimal, except under the most adverse conditions. It is best to minimize contact/exposure until more information is available. Based on what is known about other propylene glycol ethers, polypropylene glycol monomethyl ether is probably absorbed by inhalation, dermal and oral routes, but it is unlikely to accumulate.

SECTION 4. FIRST AID MEASURES

Inhalation:
If symptoms are experienced, remove source of contamination or move victim to fresh air. Obtain medical advice immediately.

Skin Contact:
As quickly as possible, flush with lukewarm, gently flowing water for at least 5 minutes or until the chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). If irritation persists, repeat flushing. Obtain medical advice immediately. Completely decontaminate clothing, shoes and leather goods before re-use or discard.

Eye Contact:
If irritation occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 5 minutes, or until the chemical is removed, while holding the eyelid(s) open. If irritation persists, obtain medical advice immediately.

Ingestion:
Never give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz.) of water. If vomiting occurs naturally, rinse mouth and repeat administration of water. Obtain medical advice immediately.

First Aid Comments:
Consult a doctor and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact.
All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

SECTION 5. FIRE FIGHTING MEASURES

**Flash Point:**
172 deg C (342 deg F) (Setaflash closed cup).(3)

**Lower Flammable (Explosive) Limit (LFL/LEL):**
Not available

**Upper Flammable (Explosive) Limit (UFL/UEL):**
Not available

**Autoignition (Ignition) Temperature:**
Not available

**Sensitivity to Mechanical Impact:**
Not sensitive. Stable material.

**Sensitivity to Static Charge:**
Not sensitive. Not combustible.

**Fire Hazard Summary:**
This material can probably burn if strongly heated.

**Extinguishing Media:**
No specific data available. Probably can use carbon dioxide, dry chemical, alcohol foam, polymer foam. Water spray may cause frothing.

**Fire Fighting Instructions:**
Water spray or fog or alcohol foam can be used to extinguish fires involving polypropylene glycol monomethyl ether. Water or foam may cause frothing. However, a water spray or fog that is gently applied to the surface of the liquid, preferably with a fine spray or fog nozzle, will cause frothing that will blanket and extinguish the fire. Water spray or mist can be used to absorb heat, keep containers cool and protect exposed material. If a leak or spill has not ignited, use water spray to disperse the vapours (dilute the spill to a nonflammable mixture) and protect personnel attempting to stop a leak. Water spray may be used to flush spills away from ignition sources. Polypropylene glycol monomethyl ether is practically nonhazardous to health. Firefighters may enter the area if positive pressure self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) and full Bunker Gear is worn.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD IDENTIFICATION

**NFPA - Comments:**
NFPA has no listing for this chemical in Codes 49 or 325.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**Molecular Weight:** Not available. Variable. Polymer.

**Conversion Factor:**
Not applicable

**Physical State:**
Liquid

**Melting Point:**
Not available

**Boiling Point:**
310 deg C (590 deg F) (3)

**Relative Density (Specific Gravity):**
0.985 at 25 deg C (water = 1) (3)

**Solubility in Water:**
Soluble in all proportions (1,4)

**Solubility in Other Liquids:**
Soluble in all proportions with many organic solvents

**Coefficient of Oil/Water Distribution (Partition Coefficient):**
Not available

**pH Value:**
Not available

**Vapour Density:**
Not available

**Vapour Pressure:**
Very low. 0.00013 kPa (0.001 mm Hg) at 20 deg C (4)

**Saturation Vapour Concentration:**
1.3 ppm (0.00013%) (calculated)

**Evaporation Rate:**
Approximately zero (butyl acetate = 1) (3,4)

SECTION 10. STABILITY AND REACTIVITY

**Stability:**
Normally stable

**Hazardous Polymerization:**
Will not occur

**Incompatibility - Materials to Avoid:**

NOTE: Chemical reactions that could result in a hazardous situation (e.g. generation of flammable or toxic chemicals, fire or detonation) are listed here. Many of these reactions can be done safely if specific control measures (e.g. cooling of the reaction) are in place. Although not intended to be complete, an overview of important reactions involving common chemicals is provided to assist in the development of safe work practices.

No information available

**Hazardous Decomposition Products:**
None reported

**Conditions to Avoid:**
Temperatures above 172 deg C
Corrosivity to Metals:
Probably not corrosive

Stability and Reactivity Comments:
Some glycol ethers can form peroxides during prolonged storage in contact with air. Formation of peroxides occurs more readily in sunlight. The rate and extent of peroxide formation for this chemical is unknown, but is expected to be low. This is not expected to pose any hazard.

SECTION 11. TOXICOLOGICAL INFORMATION

LD50 (oral, rat): 49 g/kg (2)
LD50 (dermal, rabbit): greater than 20 g/kg (2)

SECTION 16. OTHER INFORMATION

Selected Bibliography:
(2) RTECS record for poly(oxy(methyl-1,2-ethanediyi),alpha-methyl-omega-hydroxy-. Last updated 9109
(3) Dowfroth (R) 1012 Flotation Frother (Dow Chemical Canada Inc.) Printout from MSDS Database. Date of MSDS: 90/06/18
(4) Dowfroth (R) 250-C Flotation Frother (Dow Chemical Canada Inc.) Printout from MSDS Database. Date of MSDS: 90/06/18

Information on chemicals reviewed in the CHEMINFO database is drawn from a number of publicly available sources. A list of general references used to compile CHEMINFO records is available in the database Help.

Review/Preparation Date: 1993-03-04

Revision Indicators:
TDG 1994-03-01
Fire fighting instructions 1995-01-01
HANDLING AND STORAGE 1995-01-01
Conditions to avoid 1995-01-01
Sampling 1995-11-01
EU class 1995-11-01
US transport 1995-11-01
Respiratory guidelines 1995-11-01
Resistance of materials 1995-11-01
Bibliography 1995-11-01
WHMIS disclosure list 2003-05-28
Carcinogenicity 2003-05-28
PEL-TWA transitional 2003-10-16
Material Safety Data Sheet

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SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: FC-1100 FLUORAD (TM) Brand Mist Control Agent
MANUFACTURER: 3M
DIVISION: Specialty Materials
ADDRESS: 3M Center
St. Paul, MN  55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 10/14/2005
Supercedes Date: 09/28/2004
Document Group: 09-6764-6

Product Use:
Specific Use: Surfactant

SECTION 2: INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>C.A.S. No.</th>
<th>% by Wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRYLATE ADDUCT +(5965P)</td>
<td>Trade Secret</td>
<td>45 - 55</td>
</tr>
<tr>
<td>WATER</td>
<td>7732-18-5</td>
<td>45 - 55</td>
</tr>
<tr>
<td>FLUOROALKYL SULFONATES</td>
<td>Mixture</td>
<td>0 - 5</td>
</tr>
<tr>
<td>2-METHYL-5-ETHYLPYRIDINE</td>
<td>104-90-5</td>
<td>&lt; 0.4</td>
</tr>
<tr>
<td>RESIDUAL IMPURITIES</td>
<td>Mixture</td>
<td>&lt; 0.4</td>
</tr>
</tbody>
</table>

New Jersey Trade Secret Registry (EIN) 04499600+

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Odor, Color, Grade: Dark brown with slight amine odor.
General Physical Form: Liquid
Immediate health, physical, and environmental hazards:

3.2 POTENTIAL HEALTH EFFECTS
Eye Contact:
Moderate Eye Irritation: Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact:
Mild Skin Irritation: Signs/symptoms may include localized redness, swelling, and itching.

Inhalation:
Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

If thermal decomposition occurs:
May be harmful if inhaled.

Ingestion:
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

Biodegradability:
BOD28/COD: <23.7%

Aquatic toxicity:
Microtox: 30 min EC50: 570 mg/L

Daphnia magna: 48-hr EC50: 675 mg/L

Green algae (Selenastrum capricornutum): 96-hr ErC50: 150 mg/L
Was determined to be algistatic rather than algicidal.

Fathead minnow: 96-hr LC50: 800 mg/L

Activated Sludge Respiration Inhibition Test:
3-hr EC50: >1000 mg/L

LC50: Median Lethal Concentration. The concentration of a test substance which kills 50% of the test organisms after a specified exposure period. An LC50 is the usual endpoint in an acute toxicity test with fish.

EC50: Median Effective Concentration. The concentration of a test substance which causes a 50% effect on a specific characteristic of the test organisms (e.g. immobilization of 50% of the Daphnia, reduction in algal cell growth by 50% as compared to the controls, etc.) after a specified exposure period. An EC50 is the usual endpoint in a toxicity test with Daphnia and other small organisms where death is hard to determine or in tests where growth is measured.

SECTION 4: FIRST AID MEASURES
4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.

Skin Contact: Wash affected area with soap and water. If signs/symptoms develop, get medical attention.

Inhalation: Remove person to fresh air. If signs/symptoms develop, get medical attention.

If Swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autoignition temperature</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Flammable Limits - LEL</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Flammable Limits - UEL</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

5.2 EXTINGUISHING MEDIA

Non-combustible. Choose material suitable for surrounding fire.

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Exposure to extreme heat can give rise to thermal decomposition. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Not applicable.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Evacuate unprotected and untrained personnel from hazard area. The spill should be cleaned up by qualified personnel. Ventilate the area with fresh air. Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Collect as much of the spilled material as possible. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the solvent label and MSDS. Collect the resulting residue containing solution. Place in a metal container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible.

In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.
SECTION 7: HANDLING AND STORAGE

7.1 HANDLING
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Avoid breathing of vapors, mists or spray. Avoid prolonged or repeated skin contact. Avoid eye contact.

7.2 STORAGE
Store away from strong bases.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS
Use with appropriate local exhaust ventilation. For those situations where the fluid might be exposed to extreme overheating due to misuse or equipment failure, use with appropriate local exhaust ventilation sufficient to maintain levels of thermal decomposition products below their exposure guidelines.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection
Avoid eye contact.
The following eye protection(s) are recommended: Indirect Vented Goggles.

8.2.2 Skin Protection
Gloves not normally required. Avoid prolonged or repeated skin contact.
Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.
Gloves made from the following material(s) are recommended: Butyl Rubber, Fluoroelastomer (Viton), Polyethylene/Ethylene Vinyl Alcohol.

8.2.3 Respiratory Protection
Avoid breathing of vapors, mists or spray.
Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half faciecepiece or fullface air-purifying respirator with organic vapor cartridges and N95 particulate prefilters. Consult the current 3M Respiratory Selection Guide for additional information or call 1-800-243-4630 for 3M technical assistance.

8.2.4 Prevention of Swallowing
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

8.3 EXPOSURE GUIDELINES
None Established

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

- **Odor, Color, Grade:** Dark brown with slight amine odor.
- **General Physical Form:** Liquid
- **Autoignition temperature:** Not Applicable
- **Flash Point:** Not Applicable
- **Flammable Limits - LEL:** Not Applicable
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable Limits - UEL</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling point</td>
<td>Approximately 100 ºC</td>
</tr>
<tr>
<td>Density</td>
<td>1.15 - 1.25 g/ml</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>0.84 [ @ 20 ºC] [Ref Std: AIR=1]</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>&lt; 18 mmHg [ @ 20 ºC]</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.15 - 1.25 [Ref Std: WATER=1]</td>
</tr>
<tr>
<td>pH</td>
<td>4.4</td>
</tr>
<tr>
<td>Melting point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Moderate</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Percent volatile</td>
<td>Approximately 50 % weight</td>
</tr>
<tr>
<td>VOC Less H2O &amp; Exempt Solvents</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>&lt;=100 centipoise [ @ 20 ºC] [Test Method: Brookfield]</td>
</tr>
</tbody>
</table>

### SECTION 10: STABILITY AND REACTIVITY

**Stability:** Stable.

**Materials and Conditions to Avoid:** Strong bases

**Hazardous Polymerization:** Hazardous polymerization will not occur.

**Hazardous Decomposition or By-Products**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>During Combustion</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>During Combustion</td>
</tr>
<tr>
<td>Hydrogen Fluoride</td>
<td>During Combustion</td>
</tr>
<tr>
<td>Oxides of Nitrogen</td>
<td>During Combustion</td>
</tr>
<tr>
<td>Oxides of Sulfur</td>
<td>During Combustion</td>
</tr>
</tbody>
</table>

**Hazardous Decomposition:** Hydrogen fluoride has an ACGIH Threshold Limit Value of 3 parts per million (as fluoride) as a Ceiling Limit and an OSHA PEL of 3 ppm of fluoride as an eight hour Time-Weighted Average and 6 ppm of fluoride as a Short Term Exposure Limit. The odor threshold for HF is 0.04 ppm, providing good warning properties for exposure.

### SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

### SECTION 12: ECOLOGICAL INFORMATION

**ECOTOXICOLOGICAL INFORMATION**

Not determined.
CHEMICAL FATE INFORMATION

Not determined.

SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Disposal Method:** Incinerate in an industrial or commercial facility. Combustion products will include HF. Facility must be capable of handling halogenated materials. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste.

**EPA Hazardous Waste Number (RCRA):** Not regulated

*Since regulations vary, consult applicable regulations or authorities before disposal.*

SECTION 14: TRANSPORT INFORMATION

**ID Number(s):**

Please contact the emergency numbers listed on the first page of the MSDS for Transportation Information for this material.

SECTION 15: REGULATORY INFORMATION

**US FEDERAL REGULATIONS**
Contact 3M for more information.

**311/312 Hazard Categories:**
- Fire Hazard: No
- Pressure Hazard: No
- Reactivity Hazard: No
- Immediate Hazard: Yes
- Delayed Hazard: No

**STATE REGULATIONS**
Contact 3M for more information.

**CHEMICAL INVENTORIES**
The components of this product are in compliance with the chemical notification requirements of TSCA.

Contact 3M for more information.
INTERNATIONAL REGULATIONS
Contact 3M for more information.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification
Health: 3  Flammability: 0  Reactivity: 0  Special Hazards: None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

HMIS Hazard Classification
Health: 2  Flammability: 0  Reactivity: 0  Protection: X - See PPE section.

Hazardous Material Identification System (HMIS(r)) hazard ratings are designed to inform employees of chemical hazards in the workplace. These ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS(r) ratings are to be used with a fully implemented HMIS(r) program. HMIS(r) is a registered mark of the National Paint and Coatings Association (NPCA).

Reason for Reissue: The MSDS has been revised because 3M has adopted the 16-section ANSI/ISO format. The potential hazards of the product have not changed. We encourage you to reread the MSDS and review the information.

Revision Changes:
Section 1: Division name was modified.
Copyright was modified.
Section 3: Potential effects from eye contact was modified.
Section 3: Potential effects from skin contact information was modified.
Section 3: Potential effects from inhalation information was modified.
Section 3: Potential effects from ingestion information was modified.
Section 8: Skin protection phrase was modified.
Section 4: First aid for ingestion (swallowing) - decontamination - was modified.
Section 4: First aid for ingestion (swallowing) - medical assistance - was modified.
Section 2: Ingredient table was modified.
Section 15: 311/312 Delayed Hazard score was modified.
Section 3: Other potential health effects heading was deleted.
Section 3: Immediate other hazard(s) was deleted.
Section 3: Other health effects information was deleted.
Section 3: Other health effects information (reproductive hazards) was deleted.
Section 11: Component-based toxicology information was deleted.
Section 11: Component-based toxicology information comment heading was deleted.

DISCLAIMER: The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.
use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

3M provides information in electronic form as a service to its customers. Due to the remote possibility that electronic transfer may have resulted in errors, omissions or alterations in this information, 3M makes no representations as to its completeness or accuracy. In addition, information obtained from a database may not be as current as the information in the MSDS available directly from 3M.

3M MSDSs are available at www.3M.com
SECTION 1: CHEMICAL PRODUCT and COMPANY IDENTIFICATION

PRODUCT NAME: GUARFLOC 66-C
PRODUCT DESCRIPTION: Guar gum
SYNONYMS: Guar gum 66-C
CASRN: 9000-30-0
MANUFACTURER: Cognis Corporation
4900 Este Avenue
Cincinnati, OH 45232
Phone: 800-328-6198 Fax: 520-624-0912

EMERGENCY NUMBERS:
CHEMTREC: 800-424-9300

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>CONCENTRATION (Wt.%)</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guar gum</td>
<td>100.0</td>
<td>None Established</td>
</tr>
<tr>
<td>CASRN: 9000-30-0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 3: HAZARDS IDENTIFICATION

*************** Emergency ***************
*************** Overview ***************

CAUTION!
Low hazard for usual industrial or commercial handling.
Powdered material may form explosive dust-air mixtures.
Static electricity may be generated when handling. Use proper grounding procedures when handling near flammable or explosive materials.

Dry Cream Colored Powder

SKIN CONTACT:
No hazard expected.

EYE CONTACT:
May cause eye irritation by abrasion.

INHALATION:
No adverse health effects are known.

INGESTION:
Considered to be non-toxic based on toxicological data for components.

CHRONIC EFFECTS:
None Known.

OTHER HEALTH EFFECTS:
No carcinogenic, mutagenic or teratogenic effects are known. No effects of chronic exposure or target organ effects are known. No exposure limits have been established for this product.

PRIMARY ROUTES OF EXPOSURE: Inhalation, Skin

SECTION 4: FIRST AID MEASURES

SKIN CONTACT:
Wash affected area with soap and water.

EYE CONTACT:
Immediately flush with plenty of water for at least 15 minutes holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Get medical attention.

INHALATION:
Move to fresh air. If symptoms persist, consult a Physician.

INGESTION:
Do not induce vomiting. If vomiting should occur spontaneously, keep airway clear. Get medical attention. Never give anything by mouth to an unconscious person.

SECTION 5: FIRE FIGHTING MEASURES

Flash Point: Not Applicable
LFL: % UFL: %
AUTOIGNITION TEMPERATURE Not Determined

RECOMMENDED EXTINGUISHING MEDIA:
Carbon dioxide, Dry chemical, Foam, Water spray

SPECIAL FIRE FIGHTING PROCEDURES:
Not determined.

UNUSUAL FIRE OR EXPLOSION HAZARDS:
Product dusts may be explosive in mixtures with air. Product becomes slippery when wet.

HAZARDOUS COMBUSTION PRODUCTS:
Carbon dioxide and carbon monoxide.
SECTION 6: ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IN CASE OF SPILL OR LEAK:
Using explosion-proof equipment, pick up spilled material and containerize. Vacuum area or flush with water to remove residues.

ENVIRONMENTAL IMPACT:
No environmental impact is expected under conditions of normal use.

SECTION 7: HANDLING AND STORAGE

Powder may form explosive mixtures with air. Do not store or handle in the presence of heat or an ignition source. Do not allow powder or dust to accumulate.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION:
Safety glasses with side shields

SKIN PROTECTION:
Rubber gloves

RESPIRATORY PROTECTION:
For most conditions, no respiratory protection should be needed, however, in dusty atmospheres, use a NIOSH/MSHA approved dust respirator.

ENGINEERING CONTROLS:

SECTION 9: PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE: Solid
APPEARANCE: Dry Cream Colored Powder
ODOR:
ODOR THRESHOLD: Not Determined
pH: Not Determined
MELTING POINT: Not Determined
BOILING POINT: Not Determined
SPECIFIC GRAVITY: .6-.9 G/ML
SOLUBILITY IN WATER: N/A Thickener - Water
PERCENT VOLATILES(by Wt.): Not Determined
VAPOR DENSITY: Not Determined
VAPOR PRESSURE: Not Determined
EVAPORATION RATE(N-BUTYL ACETATE=1): Not determined
VOC CONTENT(EPA Method 24): Not Determined
SECTION 10: STABILITY AND REACTIVITY

STABILITY: Normally Stable

HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBLE MATERIALS:
Strong acids, bases and oxidizing agents.

CONDITIONS TO AVOID:
Product dusts may be explosive in mixtures with air.

HAZARDOUS DECOMPOSITION PRODUCTS:
Decomposition products contain carbon dioxide and carbon monoxide.

SECTION 11: TOXICOLOGICAL INFORMATION

No inhalation toxicity information available.

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL TOXICITY:
Ecotoxicity for this product has not been determined.

ENVIRONMENTAL FATE:
Readily and rapidly degradable: all individual organic substances contained in the product achieve values in tests for ready biodegradability (e.g., OECD 301 A-F) of at least 60% BOD/COD or 70% DOC reduction (tolerance value for classification as "readily biodegradable")

SECTION 13: DISPOSAL CONSIDERATIONS

This product, if disposed as shipped, is not a hazardous waste as specified in 40 CFR 261. Dispose of in an approved landfill in accordance with state and local regulations.

SECTION 14: TRANSPORTATION INFORMATION

GUMS, NATURAL, NOI
NMFC: 91380
The information provided is for domestic highway transportation only. This product may be regulated differently when shipped in other types of containers or by modes other than that addressed by this section of the MSDS. For information, please contact Regulatory Affairs at 513/482-5022.

For RQ applicability, please see Section XV.

SECTION 15: REGULATORY INFORMATION

TSCA INVENTORY STATUS:
This product and/or all of its components are either included on or exempt from the TSCA Inventory of Chemical Substances.

TSCA 12(b) COMPONENTS:
None

SARA 311/312 HAZARD CATEGORIES: Fire

SARA 313 TOXIC CHEMICALS:
None

SARA 302 EXTREMELY HAZARDOUS SUBSTANCES:
None

CERCLA HAZARDOUS SUBSTANCES:
None

CALIFORNIA PROPOSITION 65 COMPONENTS:
None

SECTION 16: OTHER INFORMATION

HMIS RATINGS: HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 0

NFPA RATINGS: HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 0 OTHER: None

THE FOLLOWING WARNING INFORMATION IS PROVIDED ON THE LABEL FOR THIS PRODUCT:

CAUTION!
Low hazard for usual industrial or commercial handling. Powdered material may form explosive dust-air mixtures. Static electricity may be generated when handling. Use proper grounding procedures when handling near flammable or explosive materials.

FIRST AID - SKIN CONTACT:
Wash affected area with soap and water.

FIRST AID - EYE CONTACT:
Immediately flush with plenty of water for at least 15 minutes holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Get medical...
attention.
FIRST AID - INGESTION:
Do not induce vomiting. If vomiting should occur spontaneously, keep airway clear. Get medical attention. Never give anything by mouth to an unconscious person.
UNUSUAL FIRE OR EXPLOSION HAZARDS:
Product dusts may be explosive in mixtures with air.
STEPS TO TAKE IN CASE OF SPILL OR LEAK:
Using explosion-proof equipment, pick up spilled material and containerize. Vacuum area or flush with water to remove residues.
HANDLING AND STORAGE:
Powder may form explosive mixtures with air. Do not store or handle in the presence of heat or an ignition source. Do not allow powder or dust to accumulate.

ABBREVIATIONS USED:
ND or N/D = Not Determined
NA or N/A = Not Applicable or Not Available
NE or N/E = Not Established
N/AP = Not Applicable

All information, recommendations, and suggestions appearing herein concerning our product are based upon tests and data believed to be reliable. However, it is the user's responsibility to determine the safety, toxicity, and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, express or implied, is made by Cognis Corporation as to the effects of such use, the results obtained, or the safety and toxicity of the product nor does Cognis Corporation assume any liability arising out of use, by others, of the product referred to herein. The information herein is not to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

PREPARED BY:
Cognis Corporation
Product Safety/Regulatory Affairs
4900 Este Ave.
Cincinnati, Ohio 45232
513-482-2206 (voice) 513-482-2007 (fax)
# MATERIAL SAFETY DATA SHEET

## Kerosene

**VALERO MARKETING & SUPPLY COMPANY**
and Affiliates  
P.O. Box 696000  
San Antonio, TX 78269-6000

**Emergency Phone Numbers**  
24 Hour Emergency: 866-565-5220  
Chemtrec Emergency: 800-424-9300

**General Assistance**  
General Assistance: 210-345-4593

**BRAND NAMES:** Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

### Section 1. Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Common / Trade name</th>
<th>Synonym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td>K-1 Kerosene, K-2 Kerosene, Paraffinic Kerosene, Petroleum Distillate-Kerosene, Low-Sulfur Kerosene</td>
</tr>
</tbody>
</table>

**SYNONYMS/COMMON NAMES:** This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Material uses**  

**MSDS#**  
105

**CAS #**  
8008-20-6

### Section 2. Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td>8008-20-6</td>
<td>0 - 100</td>
</tr>
<tr>
<td>Distillates, petroleum residues vacuum</td>
<td>68955-27-1</td>
<td>0 - 100</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>0 - 3</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>1330-20-7</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>110-82-7</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>0 - 0.5</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>7783-06-4</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>

### Section 3. Hazards Identification

**Danger! Exhaust Fumes Have Been Reported to be an Occupational hazard due to NIOSH-reported potential carcinogenic properties.**

May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Avoid prolonged or repeated skin contact. Flammable Liquid. Vapors may explode.

CAUTION: Flammable material.

Keep liquid and vapor away from heat, sparks and flame. Surface that are sufficiently hot may ignite liquid product in the absence of sparks or flames. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all

*Continued on next page*
Kerosene Page: 2/14

vapors are gone. Vapors may accumulate and travel to ignition sources distant from the handling site; flash-fire can result. Keep containers closed when not in use. Use only with adequate ventilation. Containers even those that have been emptied can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. The fumes may contain hydrogen sulfide, avoid breathing fumes.

Physical state: Liquid. (May be dyed red.)

Emergency overview:

- MAY BE FATAL IF INHALED.
- CANCER HAZARD
- CONTAINS MATERIAL WHICH CAN CAUSE CANCER
- HARMFUL IF SWALLOWED.
- CAUSES SKIN IRRITATION.
- CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
  BLOOD, KIDNEYS, LIVER, GASTROINTESTINAL TRACT, RESPIRATORY TRACT,
  SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
- MAY BE HARMFUL IF ABSORBED THROUGH SKIN.
- COMBUSTIBLE LIQUID AND VAPOR.
- VAPOR MAY CAUSE FIRE.

Do not ingest. Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

Routes of entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects:

Eyes:
- Corrosive to eyes. May cause severe irritation, redness, tearing, blurred vision and conjunctivitis.

Skin:
- Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Injury may not appear serious at first. Within a few hours, tissues will become swollen, discolored and extremely painful.

Inhalation:
- Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes. NIOSH Current Intelligence Bulletin 50 reports a potential occupational carcinogenic hazard exists due to human exposure to diesel exhaust.

Ingestion:
- Toxic if swallowed. May cause burns to mouth, throat and stomach. This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

Medical conditions aggravated by overexposure:
- Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Over-exposure signs/symptoms:
- Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest or sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological Information (section 11)

Continued on next page
Section 4. First Aid Measures

**Eye contact**: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues.

**Skin contact**: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. Wash exposed area thoroughly with soap and water. Remove contaminated clothing promptly and launder before reuse. Contaminated leather goods should be discarded. If irritation persists or symptoms described in the MSDS develop, seek medical attention. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Get immediate medical attention.

**Inhalation**: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

**Ingestion**: This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

**Notes to physician**: In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an intratracheal tube, to prevent aspiration. Irregular heart beat may occur, use of adrenalin is not advisable. Individuals intoxicated by the product should be hospitalized immediately, with acute and continuing attention to neurological and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be monitored for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be monitored for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

Section 5. Fire Fighting Measures

**Flammability of the product**: FLAMMABLE.

**Auto-ignition temperature**: 204.4°C (399.9°F)

**Flash point**: Closed cup: 10 to 104.4°C (50 to 219.9°F).

**Flammable limits**: Lower: 0.7%  Upper: 6%

**Products of combustion**: These products are carbon oxides (CO, CO₂), nitrogen and sulfur oxides (NOₓ, SOₓ), particulate matter, VOC's.

**Fire hazards in presence of various substances**: Flammable in presence of open flames, sparks and static discharge.

**Explosion hazards in presence of various substances**: Explosive in presence of open flames, sparks and static discharge.

**Fire fighting media and instructions**: Flammable Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. Water can be used to cool fire- exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers. Collect contaminated fire fighting water separately. It must not enter the sewage system. Dike area of fire to prevent product run-off. Decontaminate emergency personnel and equipment with soap and water.
Flammable liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

No additional remark.

Runoff to sewer may create fire or explosion hazard.

Special protective equipment for fire-fighters

Special remarks on fire hazards

Special remarks on explosion hazards

Section 6. Accidental Release Measures

Personal precautions

Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic, flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.

Environmental precautions

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424-8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

Methods for cleaning up

If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

Section 7. Handling and Storage

Handling

Do not ingest. Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Use only in well ventilated locations. Keep away from heat, spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire and Explosion Hazard Data section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire.
**Kerosene**

Keep out of reach of children. Failure to use caution may cause serious injury or illness. Never siphon by mouth. For use as a motor fuel only. Do not use as a cleaning solvent or for other non-motor fuel uses. Wash thoroughly after handling. To prevent ingestion and exposure - Do not siphon by mouth to transfer product between containers. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

**Storage**

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

---

**Section 8. Exposure Controls, Personal Protection**

<table>
<thead>
<tr>
<th>Engineering controls</th>
<th>Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protection</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td>Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame Retardant Clothing is recommended.</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td>Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.</td>
</tr>
<tr>
<td><strong>Hands</strong></td>
<td>Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.</td>
</tr>
<tr>
<td><strong>Personal protective equipment (Pictograms)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Personal protection in case of a large spill</strong></td>
<td>Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.</td>
</tr>
</tbody>
</table>

**Component**

**Exposure limits**

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV (United States, 1/2004). Skin Notes: Application restricted to conditions in which there are negligible aerosol exposures. ACGIH 2003 Adoption Refers to Appendix A -- Carcinogens.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td>TWA: 200 mg/m³ 8 hour(s). Form: All forms</td>
</tr>
<tr>
<td></td>
<td>NIOSH REL (United States, 6/2001).</td>
</tr>
<tr>
<td></td>
<td>TWA: 100 mg/m³ 10 hour(s). Form: All forms</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>NIOSH REL (United States, 6/2001).</td>
</tr>
<tr>
<td></td>
<td>STEL: 15 ppm 15 minute(s). Form: All forms</td>
</tr>
<tr>
<td></td>
<td>TWA: 10 ppm 10 hour(s). Form: All forms</td>
</tr>
<tr>
<td></td>
<td>OSHA PEL (United States, 6/1993).</td>
</tr>
<tr>
<td></td>
<td>TWA: 10 ppm 8 hour(s). Form: All forms</td>
</tr>
<tr>
<td></td>
<td>STEL: 15 ppm 15 minute(s). Form: All forms</td>
</tr>
<tr>
<td></td>
<td>TWA: 10 ppm 8 hour(s). Form: All forms</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>ACGIH TLV (United States, 5/2004).</td>
</tr>
</tbody>
</table>

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*Continued on next page*
Kerosene Page: 6/14

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid. (May be dyed red.)</td>
</tr>
<tr>
<td>Color</td>
<td>Clear. Straw color. Yellow or brown.</td>
</tr>
<tr>
<td>Odor</td>
<td>Kerosene (Strong.)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>104.4 to 304.4°C (219.9 to 579.9°F)</td>
</tr>
<tr>
<td>Melting/freezing point</td>
<td>May start to solidify at -51.15°C (-60.1°F) based on data for: n-Nonane. Weighted average: -99.54°C (-147.2°F)</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>0.79 to 0.9 (Water = 1) @ 60 °F</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>&lt;0.7 kPa (&lt;5.2 mm Hg) (at 20°C)</td>
</tr>
</tbody>
</table>

Continued on next page
agents. Workers exposed at less than 200 ppm have complained of headache, lassitude and nausea, but physical findings were essentially negative. At

Such sensitization may cause fatal changes in heart rhythms. This later effect was shown to be enhanced by hypoxia or the injection of adrenalin-like

irritation, complete recovery occurred within 48 hours. Animal studies have shown that inhalation of high levels of toluene produced cardiac sensitization.

same chronic injury to bone marrow caused by benzene. Liquid splashed in the eyes of workers has caused transient corneal damage and conjunctival

concentrations in the range of 80 to 300 ppm, there was no clinical or laboratory evidence of altered liver function. Toluene exposure does not result in the

pronounced, and after effects included nervousness, muscular fatigue and insomnia persisting for several days. In workers exposed for many years to

vapors cause narcosis. Controlled exposures of human subjects to 200 ppm for 8 hours produced mild fatigue, weakness, confusion, lacrimation and

From the above data it can be seen that kerosene is a potentially hazardous material that requires proper handling and storage to prevent exposure and health effects.

Toxicity data

DIESEL EXHAUST FUMES have been reported to be a potential occupational carcinogen in humans by NIOSH Current Intelligence Bulletin 50.

NAPHTHALENE can affect the body if it is inhaled, comes into contact with the eyes or if it is swallowed. Naphthalene vapor causes hemolysis and eye irritation, and may cause cataracts. Severe intoxication from ingestion of the solid results in characteristic manifestations of marked intravascular hemolysis and its consequences, including potentially fatal hyperkalemia. Initial symptoms include eye irritation, headache, confusion, excitement, malaise, profuse sweating, nausea, vomiting, abdominal pain, and irritation of the bladder. There may be progression to jaundice, hematuria, hemoglobinuria, renal tubular blockade, and acute renal shutdown. Hematologic features include red cell fragmentation, icterus, severe anemia with nucleated red cells, leukocytosis, and dramatic decreases in hemoglobin, hematocrit and red cell count; sometimes there is formation of Heinz bodies and methemoglobin. Individuals with a deficiency of glucose-6-phosphate dehydrogenase in erythrocytes may be more susceptible to hemolysis by naphthalene. Cataracts and ocular irritation have been produced experimentally in animals and have been described in humans. Of 21 workers exposed to high concentrations of fume or vapor for 5 years, 8 had peripheral lens opacities; in other studies, no abnormalities of the eyes have been detected in workers exposed to naphthalene for several years. The vapor causes eye irritation at 15 ppm. Eye contact with the solid may result in conjunctivitis, superficial injury to the cornea, chorioretinitis, scotoma, and diminished visual acuity. Naphthalene on the skin may cause hypersensitivity dermatitis, chronic dermatitis is rare.

PETROLEUM DISTILLATES (naphtha, C6H14, C6H16, C8H18 aliphatics) can affect the body if they are inhaled, come in contact with the eyes or skin, or are swallowed. The vapors of petroleum distillates are mild narcotics and mucous membrane irritants. There have been few toxicologic studies, either on animals or man. While 4,000 to 7,000 ppm are tolerated for 1 hour by human subjects, symptoms of narcosis, such as dizziness and drowsiness, occur at these concentrations. Continuing exposure may produce signs of inebriation, followed by headache or nausea. Exposure at 10,000 to 20,000 ppm is regarded as immediately hazardous to life. The higher boiling fractions may produce irritation of the eyes, nose, and throat in addition to symptoms of mild narcosis. No chronic systemic effects have been reported from widespread industrial use. If benzene is present in the distillate; however, the hazard of both acute and chronic poisoning is increased.

Lifetime skin painting studies conducted by the American Petroleum Institute, Exxon, and others have shown that similar products boiling between 175-370°C (350-700°F) usually produce skin tumors and/or skin cancer in laboratory mice. The degree of carcinogenic response was weak to moderate with a relatively long latent period. The implications of these results for humans have not been determined.

Limited studies on oils that are very active carcinogens have shown that washing the animals' skin with soap and water between applications greatly reduces tumor formation. These studies demonstrate the effectiveness of cleansing the skin after contact.

MIDDLE DISTILLATE FUELS have been demonstrated to cause chromosome damage in the in vivo rat bone marrow cytogenetics assay, and mutagenic in the L5178Y mouse lymphoma assay. Repeated dermal application of high levels of middle distillate fuels in experimental animals has produced extremely severe irritation on the skin. Varying degrees of liver and kidney damage were noted in these studies, including congestion, enlargement, motting, and multifocal necrosis.

BENZENE is considered to be a carcinogen to humans, and may cause adverse health effects following exposure via inhalation, ingestion or dermal or eye contact. Acute inhalation of benzene by rats, mice or rabbits caused narcosis, spontaneous heart contractions (ventricular fibrillation) and death due to respiratory paralysis. Subchronic inhalation of benzene by rats produced decreased white blood cell counts, decreased bone marrow cell activity, increased red blood cell activity and cataracts. In rats, chronic inhalation or oral administration of benzene produced cancers of the liver, mouth and Zymbal gland. Acute inhalation exposure of benzene in humans has caused nerve inflammation (polyneuritis), central nervous system depression and cardiac sensitization. Chronic exposure to benzene has produced anorexia and irreversible injury to the blood forming organs. Effects include aplastic anemia and leukemia. Animal studies have demonstrated testicular effects, alterations in reproductive cycles, chromosomal aberrations, and embryo/fetotoxicity. No birth defects have been shown to occur in pregnant laboratory animals exposed to doses not toxic to the mother.

TOLUENE can affect the body if it is inhaled, comes in contact with the eyes or skin or if it is swallowed. It may also enter the body through the skin. Toluene vapors cause narcosis. Controlled exposures of human subjects to 200 ppm for 8 hours produced mild fatigue, weakness, confusion, lacrimation and paresthesia. At 600 ppm for 8 hours, there was euphoria, headache, dizziness, dilated pupils and nausea. At 800 ppm for 8 hours, symptoms were more pronounced, and after effects included nervousness, muscular fatigue and insomnia persisting for several days. In workers exposed for many years to concentrations in the range of 80 to 300 ppm, there was no clinical or laboratory evidence of altered liver function. Toluene exposure does not result in the same chronic injury to bone marrow caused by benzene. Liquid splashed in the eyes of workers has caused transient corneal damage and conjunctival irritation, complete recovery occurred within 48 hours. Animal studies have shown that inhalation of high levels of toluene produced cardiac sensitization. Such sensitization may cause fatal changes in heart rhythms. This later effect was shown to be enhanced by hypoxia or the injection of adrenalin-like agents. Workers exposed at less than 200 ppm have complained of headache, lassitude and nausea, but physical findings were essentially negative. At

Continued on next page
HYDROGEN SULFIDE can affect the body if it is inhaled, comes in contact with the eyes, skin, nose or throat. Hydrogen sulfide gas is a rapidly acting systemic poison which causes respiratory paralysis with consequent asphyxia at high concentrations (500 to 1000 ppm). A case of pneumonia and encephalopathy from one day’s exposure to a concentration insufficient to cause loss of consciousness has been reported. It irritates the eyes and respiratory tract at lower concentrations (50 to 500 ppm). Pulmonary edema and bronchial pneumonia may follow prolonged exposure at concentrations exceeding 250 ppm. Exposure to concentrations of hydrogen sulfide around 50 ppm for one hour may produce rhinitis, pharyngitis, bronchitis, pneumonitis, acute conjunctivitis with pain, laceration and photophobia, in severe form this may progress to keratoconjunctivitis and vesiculation of the corneal epithelium. In lower concentrations, hydrogen sulfide may cause headache, fatigue, irritability, insomnia, and gastrointestinal disturbances, as well as central nervous system disturbances, causing excitation and dizziness. Repeated exposure to hydrogen sulfide results in increased susceptibility, so that eye irritation, cough and systemic effects may result from concentrations previously tolerated without any effect.

CYCLOHEXANE can affect the body if it is inhaled, swallowed, or comes in contact with the eyes or skin. Xylene is primarily a local irritant and central nervous system depressant. The depressant effect is from exposure to concentrations above 12,000 ppm, while prolonged or repeated exposure to concentrations above 300 ppm produces a mild irritation of the eyes and upper respiratory tract.

ETHYLBENZENE can affect the body if it is inhaled, swallowed or comes in contact with the eyes or skin. Toluene is primarily a local irritant and central nervous system depressant. Systemic absorption causes depression of the central nervous system with narcosis at very high concentrations. On the eyes and nose, the vapor at 5000 ppm causes intolerable irritation, eye irritation and lacrimation are immediate and severe at 2000 ppm, irritation and tearing occur at 1000 ppm although tolerance develops rapidly, and the vapor is a transient irritant on human eyes at 200 ppm. Aspiration of small amounts causes extensive edema and hemorrhage of lung tissue.

A draft report on a study conducted by the National Toxicology program states that lifetime inhalation exposure of rats and mice to concentrations of ethylbenzene(750 ppm) resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations of ethylbenzene (75 ppm or 250 ppm). The draft report does not address the relevance of these results to humans.

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Test</th>
<th>Result</th>
<th>Route</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td>LD50</td>
<td>2835 mg/kg</td>
<td>Oral</td>
<td>Rabbit</td>
</tr>
<tr>
<td></td>
<td>LDLo</td>
<td>500 mg/kg</td>
<td>Oral</td>
<td>man</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>LD50</td>
<td>490 mg/kg</td>
<td>Oral</td>
<td>Rat</td>
</tr>
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<td>LD50</td>
<td>316 mg/kg</td>
<td>Oral</td>
<td>Mouse</td>
</tr>
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<td></td>
<td>LD50</td>
<td>1200 mg/kg</td>
<td>Oral</td>
<td>Guinea pig</td>
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<td>&gt;2500 mg/kg</td>
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<td>LDLo</td>
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<td>LDLo</td>
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<td>Xylene (o,m,p isomers)</td>
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<td>4300 mg/kg</td>
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<td>LD50</td>
<td>2119 mg/kg</td>
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<td>LD50</td>
<td>4300 mg/kg</td>
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<td>Mammal</td>
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<td>Rabbit</td>
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<td>LDLo</td>
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<td>LDLo</td>
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<td>Mammal</td>
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<td>LD50</td>
<td>48 mg/kg</td>
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<td>Mouse</td>
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<td></td>
<td>LDLo</td>
<td>50 mg/kg</td>
<td>Oral</td>
<td>man</td>
</tr>
</tbody>
</table>

Continued on next page

Contains material which causes damage to the following organs: blood, kidneys, liver, gastrointestinal tract, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Other toxic effects on humans: Very hazardous in case of eye contact (corrosive). Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant).

Special remarks on toxicity to animals: No additional remark.

Special remarks on chronic effects on humans: No additional remark.

Special remarks on other toxic effects on humans: No additional remark.

Specific effects:

Carcinogenic effects: Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs: Contains material which causes damage to the following organs: blood, kidneys, liver, gastrointestinal tract, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Section 12. Ecological Information

Ecotoxicity data

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Species</th>
<th>Period</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalene</td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>1.6 mg/l</td>
</tr>
<tr>
<td></td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>2.194 mg/l</td>
</tr>
<tr>
<td></td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>2.55 mg/l</td>
</tr>
<tr>
<td></td>
<td>Daphnia pulex (LC50)</td>
<td>96 hour(s)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>1.6 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>1.8 mg/l</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>3.3 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>8.2 mg/l</td>
</tr>
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<td></td>
<td>Lepomis macrochirus (LC50)</td>
<td>96 hour(s)</td>
<td>8.6 mg/l</td>
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<td></td>
<td>Lepomis macrochirus (LC50)</td>
<td>96 hour(s)</td>
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<td>Lepomis macrochirus (LC50)</td>
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<td>Pimephales promelas (LC50)</td>
<td>96 hour(s)</td>
<td>13.4 mg/l</td>
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<tr>
<td>Toluene</td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>6 mg/l</td>
</tr>
<tr>
<td></td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>6.56 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (EC50)</td>
<td>48 hour(s)</td>
<td>6.78 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>5.8 mg/l</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss (LC50)</td>
<td>96 hour(s)</td>
<td>6.78 mg/l</td>
</tr>
<tr>
<td></td>
<td>Pimephales promelas (LC50)</td>
<td>96 hour(s)</td>
<td>12.6 mg/l</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>2.93 mg/l</td>
</tr>
<tr>
<td></td>
<td>Daphnia magna (EC50)</td>
<td>48 hour(s)</td>
<td>2.97 mg/l</td>
</tr>
<tr>
<td></td>
<td>Selenastrum capricornutum</td>
<td>48 hour(s)</td>
<td>7.2 mg/l</td>
</tr>
</tbody>
</table>

Continued on next page
These products are carbon oxides (CO, CO$_2$) and water. The products of degradation are less toxic than the product itself.

**Products of degradation**: These products are carbon oxides (CO, CO$_2$) and water.

**Toxicity of the products of biodegradation**: The products of degradation are less toxic than the product itself.

### Section 13. Disposal Considerations

**Waste disposal**: The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

### Section 14. Transport Information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Class</th>
<th>Packing group</th>
<th>Label</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT Classification</td>
<td>UN1268</td>
<td>PETROLEUM DISTILLATES, N.O.S.</td>
<td>3</td>
<td>III</td>
<td><img src="image" alt="Flammable Liquid" /></td>
<td>Not available.</td>
</tr>
<tr>
<td>TDG Classification</td>
<td>UN1268</td>
<td>PETROLEUM DISTILLATES, N.O.S.</td>
<td>3</td>
<td>III</td>
<td><img src="image" alt="Flammable Liquid" /></td>
<td>Not available.</td>
</tr>
</tbody>
</table>

### Section 15. Regulatory Information

**United States**

**U.S. Federal regulations**: TSCA 8(a) PAIR: Naphthalene
TSCA 8(b) inventory: Kerosene; Distillates, petroleum residues vacuum; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Cyclohexane; Benzene; Hydrogen Sulfide

*Continued on next page*
Kerosene

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Kerosene; Naphthalene; Xylene (o,m,p isomers)

Clean Water Act (CWA) 307: Naphthalene; Toluene; Ethylbenzene; Benzene
Clean Water Act (CWA) 311: Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Cyclohexane; Benzene

Clean air act (CAA) 112 accidental release prevention: Hydrogen Sulfide
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: Hydrogen Sulfide

SARA 313

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS number</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalene</td>
<td>91-20-3</td>
<td>0 - 3</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>1330-20-7</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>0 - 0.5</td>
</tr>
</tbody>
</table>

Supplier notification:
Naphthalene 91-20-3 0 - 3
Xylene (o,m,p isomers) 1330-20-7 0 - 2
Ethylbenzene 100-41-4 0 - 1
Benzene 71-43-2 0 - 0.5

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations:
Connecticut carcinogen reporting list.: Benzene
Connecticut hazardous material survey.: Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Benzene
Illinois toxic substances disclosure to employee act: Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Benzene
Illinois chemical safety act: Distillates, petroleum residues vacuum
Rhode Island RTK hazardous substances: Distillates, petroleum residues vacuum; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Benzene
Pennsylvania RTK: Kerosene: (generic environmental hazard); Distillates, petroleum residues vacuum; Naphthalene: (environmental hazard, generic environmental hazard); Xylene (o,m,p isomers): (environmental hazard, generic environmental hazard); Ethylbenzene: (environmental hazard, generic environmental hazard); Benzene: (special hazard, environmental hazard, generic environmental hazard);
Hydrogen Sulfide: (environmental hazard, generic environmental hazard)
Florida: Distillates, petroleum residues vacuum; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Benzene
Minnesota: Distillates, petroleum residues vacuum
Michigan critical material: Xylene (o,m,p isomers); Toluene; Benzene
Massachusetts RTK: Kerosene; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Cyclohexane; Benzene; Hydrogen Sulfide
New Jersey: Kerosene; Distillates, petroleum residues vacuum; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethylbenzene; Cyclohexane; Benzene; Hydrogen Sulfide
Louisiana RTK reporting list: Distillates, petroleum residues vacuum

Continued on next page
WARNING: This product contains chemical(s) known to the state of California to cause cancer, birth defects or other reproductive harm: Naphthalene; Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause reproductive harm (male): Benzene

California prop. 65 (no significant risk level): Benzene

California prop. 65 (acceptable daily intake level): Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause birth defects or other reproductive harm.: Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause cancer.: Naphthalene; Benzene

Canada

WHMIS (Canada): Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

Class D-1B: Material causing immediate and serious toxic effects (TOXCIC).

Class D-2A: Material causing other toxic effects (VERY TOXCIC).

Class D-2B: Material causing other toxic effects (TOXCIC).

Class E: Corrosive liquid.

CEPA DSL: Kerosene; Distillates, petroleum residues vacuum; Naphthalene; Xylene (o,m,p isomers); Toluene; Ethybenzene; Cyclohexane; Benzene; Hydrogen Sulfide

Section 16. Other Information

Label Requirements: MAY BE FATAL IF INHALED.

CANCER HAZARD

CONTAINS MATERIAL WHICH CAN CAUSE CANCER

HARMFUL IF SWALLOWED.

CAUSES SKIN IRRITATION.

CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:

BLOOD, KIDNEYS, LIVER, GASTROINTESTINAL TRACT, RESPIRATORY TRACT,

SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.

MAY BE HARMFUL IF ABSORBED THROUGH SKIN.

COMBUSTIBLE LIQUID AND VAPOR.

VAPOR MAY CAUSE FIRE.

Hazardous Material Information System (U.S.A.)

<table>
<thead>
<tr>
<th>Health</th>
<th>Fire hazard</th>
<th>Physical Hazard</th>
<th>Personal protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

National Fire Protection Association (U.S.A.)

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
<th>Specific hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Date of printing: 11/28/2005.


Date of previous issue: No Previous Validation.

Version: 1

Disclaimer
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Definitions of Material Safety Data Sheet Terminology

GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, (private association)
DOT - United States Department of Transportation
EPA - United States Environmental Protection Agency
IARC - International Agency for Research on Cancer, (private association)
NFPA - National Fire Protection Association, (private association)
MSHA - Mine Safety and Health Administration, U.S. Department of Labor
NIOSH - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services
NTP - National Toxicology Program, (private association)
OSHA - Occupational Safety and Health Administration, U.S. Department of Labor
WHMIS - Workplace Hazardous Material Information System
CSA - Canadian Standards Association

HAZARD AND EXPOSURE INFORMATION

Acute Hazard - An adverse health effect which occurs rapidly as a result of short term exposure.
CAS # - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.
Ceiling - The concentration that should not be exceeded during any part of the working exposure
Chronic Hazard - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration
Fire Hazard - A material that poses a physical hazard by being flammable, combustible, phyrophoric or an oxidizer as defined by 29 CFR 1910.1200
Hazard Class - DOT hazard classification
Hazardous Ingredients - Names of ingredients which have been identified as health hazards
IDLH - Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.
mg/m3 - Milligrams of contaminant per cubic meter of air, a mass to volume ratio
N/A - Not available or no relevant information found
NA - Not applicable
PEL - OSHA permissible exposure limit; an action level of one half this value may be applicable
ppm - Part per million (one volume of vapor or gas in one million volumes of air)
Pressure Hazard - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200
Reactive Hazard - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.
STEL - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.
TLV - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.
8-hour TWA - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.
LD50 – Single dose of a substance that, when administered by a defined route in an animal assay, is expected to the cause the death of 50% of the defined animal population.

Continued on next page
LC50 - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.
Cognis Corporation

Material Safety Data Sheet

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SECTION 1: CHEMICAL PRODUCT and COMPANY IDENTIFICATION

Revised: 05/08/2006
Supercedes: 09/04/2001

PRODUCT NAME: LIX 984N-C
PRODUCT DESCRIPTION: PHENOLIC OXIME DERIVATIVE MIXTURE
SYNONYMS: PHENOLIC OXIME DERIVATIVE MIXTURE
CASRN: Not Applicable - Mixture
MANUFACTURER: Cognis Corporation
4900 Este Avenue
CINCINNATI, OH 45232
Phone: 800-328-6198      Fax: 520-624-0912

EMERGENCY NUMBERS:
CHEMTREC: 800-424-9300

---

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>CONCENTRATION (Wt.%)</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonylphenol</td>
<td>8.0</td>
<td>None Established</td>
</tr>
<tr>
<td>5-T-NONYL-2-HYDROXYACETOPHENONE, OXIME</td>
<td>35.0</td>
<td>None Established</td>
</tr>
<tr>
<td>SOLUTION/MIXTURE AS A WHOLE</td>
<td>100.0</td>
<td>None Established</td>
</tr>
<tr>
<td>DISTILLATES (petroleum), hydrotreated light</td>
<td>&lt; 18.0</td>
<td>Supplier: 200 ppm (TWA)</td>
</tr>
<tr>
<td>BENZALDEHYDE, 2-HYDROXY-5-NONYL, OXIME</td>
<td>39.0</td>
<td>None Established</td>
</tr>
</tbody>
</table>

---

SECTION 3: HAZARDS IDENTIFICATION

*************** Emergency ***************
*************** Overview ***************

DANGER!
Causes severe skin and eye irritation or burns.
May become unstable if stored or heated over 80 Deg C (176 F).
Combustible!
Harmful if swallowed.
May be harmful to aquatic life

DARK AMBER LIQUID

SKIN CONTACT:
Causes severe skin irritation or burns.

EYE CONTACT:
Causes severe eye irritation or burns.

INHALATION:
May cause irritation to upper respiratory tract.

INGESTION:
Harmful if swallowed.

CHRONIC EFFECTS:
None Known.

OTHER HEALTH EFFECTS:
No carcinogenic, mutagenic or teratogenic effects are known. No effects of chronic exposure or target organ effects are known. No exposure limits have been established for this product.

PRIMARY ROUTES OF EXPOSURE: Inhalation, Skin

---

SECTION 4: FIRST AID MEASURES
---

SKIN CONTACT:
In case of contact, immediately flush with water for at least 15 minutes while removing contaminated clothing and shoes. Call a Physician.

EYE CONTACT:
In case of contact, immediately flush eyes with water for at least 15 minutes. Do not let victim rub eyes. Get IMMEDIATE medical attention.

INHALATION:
Move to fresh air. If symptoms persist, consult a Physician.

INGESTION:
If swallowed, call a Physician immediately. Do not induce vomiting unless directed to do so by a Physician. Never give anything by mouth to an unconscious person.

---

SECTION 5: FIRE FIGHTING MEASURES
---

Flash Point: >170 Deg F (Setaflash Closed Cup)
LFL: Not Determined
UFL: Not Determined
AUTOIGNITION TEMPERATURE: Not Determined

RECOMMENDED EXTINGUISHING MEDIA:
Carbon dioxide, Dry chemical, Foam, Water fog
SPECIAL FIRE FIGHTING PROCEDURES:
Keep personnel removed and upwind of fire. Wear full firefighting turnout gear (full bunker gear), and respiratory protection (SCBA). Cool container with water spray.

UNUSUAL FIRE OR EXPLOSION HAZARDS:
Exposing product to temperatures greater than 80 Deg C (176F) may result in pressure build-up in the containers. May produce hazardous fumes or hazardous decomposition products.

HAZARDOUS COMBUSTION PRODUCTS:
Irritating and toxic gases or fumes may be released during a fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IN CASE OF SPILL OR LEAK:
Using adequate protective equipment, add dry material to absorb spills (if large spill, first dike to contain). Pick up and containerize. Rinse area with water. Collect rinsate for disposal. Prevent from contaminating soil or from entering sewage and drainage systems and bodies of water. Spills may need to be reported to state, federal, or local authorities. Refer to Section 15 of the MSDS.

SECTION 7: HANDLING AND STORAGE

Do not store or handle product in the presence of heat, sparks, or open flame. Ground and bond container when transferring.

Do not handle or use product until safety precautions recommended in the MSDS have been read and fully understood.

Do not store in mild steel containers. Consult Cognis Corporation for details.

Do not heat or store over 80 Deg C (176F). Refer to Section 10 of the MSDS.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION:
Chemical splash goggles or face shield.

SKIN PROTECTION:
Nitrile gloves, 22 mil, or equivalent.

RESPIRATORY PROTECTION:
Respirator with organic vapor cartridge. Not applicable with local exhaust.
ENGINEERING CONTROLS:
Local exhaust

SECTION 9: PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid
APPEARANCE: DARK AMBER LIQUID
ODOR: PETROLEUM
ODOR THRESHOLD: Not Determined
pH: Not Determined
MELTING POINT: N/A Deg C
BOILING POINT: N/D Deg C
SPECIFIC GRAVITY: 0.955
SOLUBILITY IN WATER: Insoluble
PERCENT VOLATILES (by Wt.): <27 @ 70 Deg F.
VAPOR DENSITY: Not Determined
VAPOR PRESSURE: <1 MM mm Hg
EVAPORATION RATE (N-BUTYL ACETATE=1): Not determined
VOC CONTENT (EPA Method 24): Not Determined

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Normally Stable
HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBLE MATERIALS:
Strong acids, oxidizers.

CONDITIONS TO AVOID:
Prolonged exposure of phenolic oxime type copper extractants (as formulated) to elevated temperatures may result in an exothermic decomposition accompanied by pressure build-up in sealed containers. This product should not be heated to, or stored at, temperatures above 80 Deg C (176F).

HAZARDOUS DECOMPOSITION PRODUCTS:
Upon decomposition, this product emits carbon monoxide, carbon dioxide, and/or low molecular weight hydrocarbons.

SECTION 11: TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>TYPE OF STUDY</th>
<th>RESULTS</th>
<th>SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DERMAL LD(50)</td>
<td>&gt;2.0 g/kg</td>
<td>Rat</td>
</tr>
<tr>
<td>DOT CORROSIVITY</td>
<td>POS</td>
<td>Rabbit</td>
</tr>
<tr>
<td>EYE IRRITATION</td>
<td>&lt;40 (Scale 0-110)</td>
<td>Rabbit</td>
</tr>
<tr>
<td>SKIN IRRITATION</td>
<td>8 (Scale 0-8)</td>
<td>Rabbit</td>
</tr>
</tbody>
</table>
SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL TOXICITY:
Specific ecological testing has not been conducted on this product. However, based upon evaluation of the individual product components, generated by either component test data or review of the scientific literature, the product should be considered toxic to fish and aquatic organisms. According to the ecological product profile, introduction of this product into surface waters may endanger aquatic life. Avoid contamination of surface waters.

ENVIRONMENTAL FATE:
Not Determined

SECTION 13: DISPOSAL CONSIDERATIONS

This product, if disposed as shipped, is not a hazardous waste as specified in 40 CFR 261. Consult state or local officials for proper disposal method.

SECTION 14: TRANSPORTATION INFORMATION

CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Alkylated Phenol Oxime Solution, Nonylphenol), 8, UN3265, PG III, ERG# 153 ATTACHED, CORROSIVE LIQUIDS, NOI, BULK (PG III) NMFC: 44155 Sub 8

The information provided is for domestic highway transportation only. This product may be regulated differently when shipped in other types of containers or by modes other than that addressed by this section of the MSDS. For information, please contact Regulatory Affairs at 513/482-5022.

For RQ applicability, please see Section XV.

SECTION 15: REGULATORY INFORMATION

TSCA INVENTORY STATUS:
This product and/or all of its components are either included on or exempt from the TSCA Inventory of Chemical Substances.

TSCA 12(b) COMPONENTS:
None

SARA 311/312 HAZARD CATEGORIES: Acute
SARA 313 TOXIC CHEMICALS:
None

SARA 302 EXTREMELY HAZARDOUS SUBSTANCES:
None

CERCLA HAZARDOUS SUBSTANCES:
None

CALIFORNIA PROPOSITION 65 COMPONENTS:
None

SECTION 16: OTHER INFORMATION

HMIS RATINGS: HEALTH: 3 FLAMMABILITY: 2 REACTIVITY: 1

NFPA RATINGS: HEALTH: 3 FLAMMABILITY: 2 REACTIVITY: 1 OTHER: None

THE FOLLOWING WARNING INFORMATION IS PROVIDED ON THE LABEL FOR THIS PRODUCT:

DANGER!
Causes severe skin and eye irritation or burns.
May become unstable if stored or heated over 80 Deg C (176 F).
Combustible!
Harmful if swallowed.
May be harmful to aquatic life
CHRONIC EFFECTS:
None Known.
FIRST AID - INHALATION:
Move to fresh air. If symptoms persist, consult a Physician.
FIRST AID - SKIN CONTACT:
In case of contact, immediately flush with water for at least 15 minutes while removing contaminated clothing and shoes. Call a Physician.
FIRST AID - EYE CONTACT:
In case of contact, immediately flush eyes with water for at least 15 minutes. Do not let victim rub eyes. Get IMMEDIATE medical attention.
FIRST AID - INGESTION:
If swallowed, call a Physician immediately. Do not induce vomiting unless directed to do so by a Physician. Never give anything by mouth to an unconscious person.
HANDLING AND STORAGE:
Do not store or handle product in the presence of heat, sparks, or open flame. Ground and bond container when transferring.
Do not handle or use product until safety precautions recommended in the MSDS have been read and fully understood.
Do not store in mild steel containers. Consult Cognis Corporation for details.
Do not heat or store over 80 Deg C (176F). Refer to Section 10 of the MSDS.
ABBREVIATIONS USED:

ND or N/D = Not Determined  
NA or N/A = Not Applicable or Not Available  
NE or N/E = Not Established  
N/AP = Not Applicable

All information, recommendations, and suggestions appearing herein concerning our product are based upon tests and data believed to be reliable. However, it is the user's responsibility to determine the safety, toxicity, and suitability for his own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, express or implied, is made by Cognis Corporation as to the effects of such use, the results obtained, or the safety and toxicity of the product nor does Cognis Corporation assume any liability arising out of use, by others, of the product referred to herein. The information herein is not to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

PREPARED BY:

Cognis Corporation  
Product Safety/Regulatory Affairs  
4900 Este Ave.  
Cincinnati, Ohio 45232  
513-482-5572 (voice)  513-482-2862 (fax)
Material Safety Data Sheet

Methyl Isobutyl Carbinol

PRODUCT & COMPANY IDENTIFICATION

In case of Emergency call CHEMTREC 1-800-424-9300

Supplier
TransChem, Inc.
3785 Via Nona Marie, Suite 300
Carmel, CA 93923
831-626-6140

Chemical Name
Methyl Isobutyl Carbinol [108-11-2]

Synonyms
Isobutylmethylcarbinol; Isobutylmethylmethanol; Methylisobutylcarbinol; MAOH; MIBC; MIC; 2-Methyl-4-Pentanol; 3-MIC; 4-Methyl-2-Pentanol; 1,3-Dimethylbutanol; Methyl amyl alcohol; 4-Methylpentan-2-ol; Alcool methyl amylique; Metilamyl alcohol; 2-Methanol-4-pentanol; 4-Methylpentanol-2; 4-Metilpantan-2-olo; Methyl-isobutylkarbinol; 4-Pentanol, 2-methyl-; UN 2053; 4-Methyl-2-pentyl alcohol; 1,3-Dimethyl-1-butanol

Formula
C₆H₁₄O

Mol. Wgt
102.176

COMPOSITION/INFORMATION ON INGREDIENTS

Common Chemical Name
4-Methyl-2-Pentanol

CAS Number
108-11-2

% 99

EINECS 203-551-7

HAZARD IDENTIFICATION

Appearance
Clear, colorless.

Flash Point
41 °C

Caution
Combustible liquid. Causes eye and skin irritation. May cause respiratory, digestive tract irritation, and possible burns.

Target Organs
None.
POTENTIAL HEALTH EFFECTS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eye</strong></td>
<td>Causes moderate eye irritation and possible burns.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Causes moderate skin irritation and possible burns.</td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>May cause irritation of the digestive tract.</td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td>May cause respiratory tract irritation.</td>
</tr>
<tr>
<td><strong>Chronic</strong></td>
<td>No information found.</td>
</tr>
</tbody>
</table>

FIRST AID MEASURES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eyes</strong></td>
<td>Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.</td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>If victim is conscious and alert, give 2-4 cupfuls of milk or water. Do not induce vomiting. Allow the victim to rinse their mouth and then drink 2-5 cupfuls of water. Seek medical advice and get medical aid immediately.</td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td>Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.</td>
</tr>
<tr>
<td><strong>Notes to Physician</strong></td>
<td>Treat symptomatically and supportively.</td>
</tr>
</tbody>
</table>

FIRE FIGHTING MEASURES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Information</strong></td>
<td>As in any fire, wear a self-contain breathing apparatus in pressure—demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapor may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Container may explode in the heat of a fire. Flammable liquid. Vapors may be heavier that air. They can spread along the ground and collect in low or confined areas.</td>
</tr>
<tr>
<td><strong>Extinguishing Media</strong></td>
<td>For small fires, use dry chemical, carbon dioxide, and water spray of alcohol-resistant foam. Water may be ineffective. Use agent most appropriate to extinguish fire. For large fires, use water spray or fog. Cool containers with flooding quantities of water until well after fire is out.</td>
</tr>
<tr>
<td><strong>NFPA Rating</strong></td>
<td>Health – 2 Flammability – 2 Reactivity - 0</td>
</tr>
<tr>
<td><strong>Flash Point</strong></td>
<td>41 ºC (105.80 ºF)</td>
</tr>
<tr>
<td><strong>Explosion Limits</strong></td>
<td>Lower: 1% Upper: 5.5%</td>
</tr>
</tbody>
</table>
## ACCIDENTAL RELEASE MEASURES

<table>
<thead>
<tr>
<th>General Information</th>
<th>Use proper personal protective equipment as indicated in section 8.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spills/Leaks</td>
<td>Absorb spill with inert material, (e.g., dry sand or earth), and then place into a chemical waste container. Clean up spills immediately, observing precautions in the protective equipment section. Remove all sources of ignition. Use a spark-proof tool.</td>
</tr>
</tbody>
</table>

## HANDLING AND STORAGE

| Handling | Wash thoroughly after handling. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid contact with heat, sparks and flame. Wash clothing before reuse. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. |
| Storage  | Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in cool, dry, well-ventilated area from incompatible substances. Flammables-area. |

## EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA – Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Methyl-2-Pentanol</td>
<td>25 ppm; 104 mg/m3; 40 ppm. STEL;167 mg/m3, STEL; skin – potential for cutaneous absorption</td>
<td>25 ppm TWA; 100 mg/m3 TWA 400 ppm</td>
<td>25 ppm TWA; 100 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: 4-Methyl-2-Pentanol: 25 ppm TWA; 100 mg/m3 TWA

## PERSONAL PROTECTIVE EQUIPMENT

| Eyes | Wear safety glasses and chemical goggles if splashing is possible. Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European standard EN 166. |
| Skin | Wear appropriate protective gloves and clothing to prevent skin exposure. |
| Clothing | Wear appropriate protective clothing to prevent contact with skin. |
| Respirators | A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European standard En 149 must be followed whenever workplace conditions warrant a respirator’s use. Wear a NIOSH/MSHA or European Standard EN 149 approved full-face piece airline respirator in the positive pressure mode with emergency escape provisions. |
PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear, colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild odor</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>2.8 mmHg @ 20ºC</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>1.01</td>
</tr>
<tr>
<td>Viscosity</td>
<td>mPas 20ºC</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>131 ºC</td>
</tr>
<tr>
<td>Freezing/Melting Point</td>
<td>-90ºC</td>
</tr>
<tr>
<td>Solubility</td>
<td>Slightly soluble</td>
</tr>
<tr>
<td>Specific Gravity/Density</td>
<td>.8100/cm³</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>C₆H₁₄O</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>102.18</td>
</tr>
</tbody>
</table>

STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Stability</td>
<td>Stable under normal temperatures and pressure.</td>
</tr>
<tr>
<td>Conditions To Avoid</td>
<td>Incompatible materials, ignition sources, excess heat, strong oxidants.</td>
</tr>
<tr>
<td>Incompatibilities With Other Materials</td>
<td>Acids, acid chlorides and oxidizing agents.</td>
</tr>
<tr>
<td>Hazardous Decomposition Products</td>
<td>Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.</td>
</tr>
<tr>
<td>Hazardous Polymerization</td>
<td>Has not been reported.</td>
</tr>
</tbody>
</table>

TOXICOLOGICAL INFORMATION

RTECS: CAS # 108-11-2: SA7350000, LD50/LC50: CAS# 108-11-2; Oral, rat: LD50 = 2590 mg/kg; skin, rabbit; LD50 = 3560 mg/kg. Carcinogenicity: 4-Methyl-2-Pentanol – not listed by ACGIH, IARC, NIOSH, NTP, OR OSHA.

DISPOSAL CONSIDERATION

Dispose of in a manner consistent with federal, state, and local regulations.
## TRANSPORT INFORMATION

### U.S. DOT:

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>Methyl Isobutyl Carbinol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN2053</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

### ISO:

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>Methyl Isobutyl Carbinol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class</td>
<td>3.3</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN2053</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

### IATA:

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>Methyl Isobutyl Carbinol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN2053</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

### RID/ADR

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>Methyl Isobutyl Carbinol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dangerous Goods Code</td>
<td>3(31C)</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN2053</td>
</tr>
</tbody>
</table>

### Canadian TDG:

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>Methyl Isobutyl Carbinol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN2053</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
<tr>
<td>Other Information</td>
<td>Flashpoint 41°C</td>
</tr>
</tbody>
</table>
REGULATORY INFORMATION

TSCA: CAS# 108-11-2 is listed on the TSCA inventory.
European/International Regulations. European Labeling in Accordance with EC directives.

<table>
<thead>
<tr>
<th>Hazard Symbols</th>
<th>XI</th>
</tr>
</thead>
</table>
| Risk Phrases   | R 10 Flammable  
|                | R 37 irritation to respiratory system. |
| Safety Phrases | S 24/25 avoid contact with skin and eyes. |
| WGK (water Danger/ Protection) | CAS# 108-11-2: 1 |

EXPOSURE LIMITS

CAS# 108-11-2: OEL-AUSTRALIA: TWA 25 ppm (100 mg/m3); STEL 40 ppm; skin OEL-BELGIUM: TWA 25 ppm (104 mg/kg) STEL 40 ppm (166 mg/kg); skin. OEL-DENMARK: TWA 25ppm (100mg/m3); skin. OEL-FINLAND: TWA 25 ppm (100mg/m3); STEL 40ppm (170mg/kg) skin. OEL-GERMANY: TWA 25-ppm (100mg/m3); skin. OEL-RUSSIA: STEL 10mg/kg; Skin OEL-SWITZERLAND: TWA 25 ppm (100mg/m3); STEL 125 ppm; skin. OEL-UNITED KINGDOM: TWA 25 ppm (100 mg/m3); STEL 40 ppm; skin. OEL in BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL in NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV.

DISCLAIMER

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Material Safety Data Sheet

Sodium hydrosulfide solution

MSDS Number: 8000TDC (Revised: 1/21/02) 6 Pages

Section 1: CHEMICAL PRODUCT and COMPANY IDENTIFICATION

1.1 Product Name: Sodium hydrosulfide solution
Chemical Family: Inorganic salt solution
Synonyms: Sodium Sulphhydride, KI-300 depressant, NaHS, NaSH
Formula: NaHS

1.2 Manufacturer: Tessenderlo Davison Chemicals (TDC)
1916 Farmerville Highway
Ruston, Louisiana 71270
Information: (318) 242-5305

1.3 Emergency Contact: (800) 877-1737 (Tessenderlo Karley)
(860) 424-9300 (CHEMTREC)

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

2.1 Chemical Ingredients (% by wt.)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS #:</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Hydrosulfide</td>
<td>016721-80-5</td>
<td>20-47%</td>
</tr>
<tr>
<td>Sodium Sulfide (Na2S)</td>
<td>001313-82-2</td>
<td>0-3.0%</td>
</tr>
<tr>
<td>Sodium Carbonate (Na2CO3)</td>
<td>000497-19-6</td>
<td>0-4.0%</td>
</tr>
<tr>
<td>Water</td>
<td>007732-18-5</td>
<td>50-80%</td>
</tr>
</tbody>
</table>

(See Section 8 for exposure guidelines)

Registry Number/Index Name: 016721-80-5/Sodium Sulfide (9Cl)

Section 3: HAZARDS IDENTIFICATION

NFPA: Health - 3 Flammability - 2 Reactivity - 1

EMERGENCY OVERVIEW

Warning: Solution is highly alkaline.
Contains hydrogen sulfide (H2S), a highly toxic gas.
Eye contact will cause marked eye irritation and possibly severe corneal damage.
Skin contact will result in irritation and possible corrosion of the skin.
Ingestion will irritate/make mouth, throat and gastrointestinal tract.
Contact with stomach acid will cause hydrogen sulfide vapors to be released.
Heating or contact with acid will cause hydrogen sulfide (H2S) gas to evolve.
Section 3: HAZARDS IDENTIFICATION

3.1 POTENTIAL HEALTH EFFECTS

EYE: Contact with the eyes will cause marked eye irritation and possibly severe corneal damage.

SKIN CONTACT: Contact with the skin will cause skin irritation or burning sensation. Prolonged contact will result in corrosion of the skin.

SKIN ABSORPTION: Absorption is unlikely to occur.

INGESTION: Ingestion will result in severe burning and corrosion of mouth, throat and the gastrointestinal tract. If the ingested material contacts stomach acid, highly toxic hydrogen sulfide (H₂S) gas will be evolved.

INHALATION: Product solution and vapors contain highly toxic hydrogen sulfide gas. Exposure to this gas causes headaches, nausea, dizziness and vomiting. Continued exposure can lead to loss of consciousness and death.

CHRONIC EFFECTS/CARCINOGENICITY: Not listed as a carcinogen by NTP, IARC or OSHA.

Section 4: FIRST AID MEASURES

4.1 EYES: Immediately flush with large quantities of water for 15 minutes. Hold eyelids apart during irrigation to insure thorough flushing of the entire area of the eye. Obtain immediate medical attention.

4.2 SKIN: Immediately flush with large quantities of water. Remove contaminated clothing under a safety shower. Obtain immediate medical attention.

4.3 INGESTION: DO NOT INDUCE VOMITING. If victim is conscious, immediately give 2 to 4 glasses of water. If vomiting does occur, repeat fluid administration. Obtain immediate medical attention.

4.4 INHALATION: Remove victim from contaminated atmosphere. If breathing is labored, administer oxygen. If breathing has ceased, clear airway and start mouth-to-mouth resuscitation. If heart has stopped beating, external heart massage should be applied. Obtain immediate medical attention.

Section 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

FLASH POINT: Not flammable

METHOD USED: NA

5.2 FLAMMABLE LIMITS

Hydrogen sulfide

LFL: 4%  
UFL: 44%

5.3 EXTINGUISHING MEDIA: Water spray, foam or a fog or as appropriate for combustibles involved in fire.

5.4 FIRE & EXPLOSIVE HAZARDS: Solution is non-flammable. However, if these solutions are exposed to heat or acids, hydrogen sulfide (H₂S) will be released and may form explosive mixtures with air (see above). Keep containers/storage vessels in fire area cooled with water spray. Heating may cause the release of hydrogen sulfide vapors.
5.5 FIRE FIGHTING EQUIPMENT: Because of the possible presence of toxic gases and the corrosive nature of the product, wear self-contained breathing apparatus, pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6.1 SMALL RELEASES: Confinement and absorb small releases on sand or earth. Oxidize residual reactive sulfides with a weak (3-5%) hydrogen peroxide solution.

6.2 LARGE RELEASES: Wear proper protective equipment. Confinement and qualified personnel. Shut off release if safe to do so. Dig spill area to prevent run-off into sewers, drains (potential explosive mixtures of hydrogen sulfide in confined spaces) or surface waters (potential aquatic toxicity). Recovery as much of the solution as possible. Treat remaining material as a small release (above).

7.1 HANDLING AND STORAGE:
7.1 Handling: Wear proper protective equipment (See Section 8). Avoid breathing product vapors. Avoid contact with skin and eyes. Use only in well ventilated area. Protect product only in enclosed containers. Wash thoroughly after handling.

7.2 Storage: Store in well ventilated areas. Do not store combustibles in the area of storage vessels. Keep away from any sources of heat or flame. Store large and smaller containers out of direct sunlight at moderate temperatures (<80°F / 27°C). (See Section 10-4 for materials of construction)

8.1 RESPIRATORY PROTECTION: If working near open container or storage vessel opening or open tank truck dome cover, wear self-contained breathing apparatus, pressure demand, MSHA/NIOSH (approved or equivalent).

8.2 SKIN PROTECTION: Neoprene rubber gloves, chemical suit and boots should be worn to prevent contact with the liquid. Wash contaminated clothing prior to reuse. Contaminated leather shoes cannot be cleaned and should be discarded.

8.3 EYE PROTECTION: Chemical goggles and a full face shield. DO NOT WEAR CONTACT LENSES.

8.4 EXPOSURE GUIDELINES:

<table>
<thead>
<tr>
<th></th>
<th>OSHA</th>
<th>ACGIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen sulfide (H2S)</td>
<td>20 ppm (ceiling)</td>
<td>10 ppm (ceiling)</td>
</tr>
</tbody>
</table>

8.5 ENGINEERING CONTROLS: Use adequate exhaust ventilation to prevent inhalation of product vapors. Where feasible, scrub process or storage vessel vapors with caustic solution. Maintain eyewash/safety shower in areas where chemical is handled.
9.1 APPEARANCE: Yellow to dark green liquid.
9.2 ODOR: Strong hydrogen sulfide (rotten egg) odor.
9.3 BOILING POINT: 253 °F (122.8 °C) - 259 °F (131.7 °C)
9.4 VAPOR PRESSURE: 17 mm Hg @ 68 °F (20 °C)
9.5 VAPOR DENSITY: (Air = 1.0) 1.17
9.6 SOLUBILITY IN WATER: Complete
9.7 SPECIFIC GRAVITY: 1.152 - 1.303 (9.8 - 10.9 lbs/gal)
9.8 FREEZING POINT: 0°F (11.1°C) - 20%
               56°F (13.3°C) - 45%
9.9 pH: 10.4 - 11.5
9.10 VOLATILE: Not applicable

10.1 STABILITY: This is a stable material.
10.2 HAZARDOUS POLYMERIZATION: Will not occur.
10.3 HAZARDOUS DECOMPOSITION PRODUCTS: Heating this product will evolve hydrogen sulfide. Fire conditions will also cause the production of sulfur dioxide (SO₂). Hydrogen sulfide (H₂S) (4-44%) may form flammable mixtures with air.
10.4 INCOMPATIBILITY: Acids will cause the release of highly toxic hydrogen sulfide. Sodium hydroxide solution is not compatible with copper, zinc, aluminum or their alloys (i.e. bronze, brass, galvanized metals, etc.). Corrosive to steel above 150°F (65.5°C). These materials of construction should not be used in handling systems or storage containers for this product. (SEE Section 7.2, Storage)

11.1 ORAL: Data not available
11.2 DERMAL: Data not available
11.3 INHALATION: INH-RAT LC₅₀: 444 ppm (hydrogen sulfide)
11.4 CHRONIC/CARCINOGENICITY: No evidence available
11.5 TERATOLOGY: Data not available
11.6 REPRODUCTION: Data not available
11.7 MUTAGENICITY: Data not available
Section 12: ECOLOGICAL INFORMATION

Static acute 96 hour-LC₅₀ for mosquito fish is 206 mg/L. (Tₚₘ - fresh water)

Section 13: DISPOSAL CONSIDERATIONS

If released to the environment for other than its intended purpose, this product contains some reactive sulfides which may be in sufficient quantity to meet the definition of a D003, hazardous waste.

Section 14: TRANSPORT INFORMATION

14.1 DOT Shipping Name: Sodium hydrosulfide, solution (Domestic only)
Corrosive liquids, toxic, n.o.s. (International)

14.2 DOT Hazard Class: 8

14.3 UN/NA Number:
NA2922 (Domestic)
UN2922 (International)
UN2949 (IMDG - over water)

14.4 Packing Group: II

14.5 DOT Placard: Corrosive

14.6 DOT Label(s): Corrosive
Toxic

14.7 IMO Shipping Name: Sodium hydrosulfide solution

14.8 RQ (Reportable Quantity): 5,000 lbs (2,268 Kg) 100% basis

14.9 RR STCC Number: 28-123-33

Section 15: REGULATORY INFORMATION

15.1 OSHA: This product is listed as a hazardous material under criteria of the Federal OSHA Hazard Communication Standard, 29 CFR 1910.1200.

15.2 SARA TITLE III:

a. EHS (Extremely Hazardous Substance) List: No

b. Section 311/312. (Tier I,II) Categories:
   Immediate (acute) Fire Yes
   Sudden release Yes
   Reactivity No
   Delayed (chronic) Yes

c. Section 313 (Toxic Release Report-Form R): No
Section 15: REGULATORY INFORMATION (Cont.)

d. TPQ (Threshold Planning Quantity):
   No

15.3 CERCLA/SUPERFUND: RG (Reportable Quantity)
   5,000 lbs
   (2,270 Kg)

15.4 TSCA (Toxic Substance Control Act) Inventory List:
   Yes

15.5 RCRA (Resource Conservation and Recovery Act) Status:
   D003 (See Section 13)

15.6 WHMIS (Canada) Hazard Classification:
   E, D1

15.7 DOT Hazardous Material: (See Section 14)
   Yes

15.8 CAA Hazardous Air Pollutant (HAP)
   No

Section 16: OTHER INFORMATION

REVISIONS: The entire MSDS was reformatted to comply to ANSI Standard Z400.1-1993.

The information published in this material safety data sheet has been compiled from our experience and OSHA, ANSI, NFPA, DOT, CERG, and CHRIUS. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise material safety data sheets periodically as new information becomes available.
Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

IDENTITY
Calcium Oxide (Quicklime) (Lime) (CaO)

Section I

Manufacturer's Name
Chemical Lime Company (West)
Address (Number, Street, City, State, and ZIP Code)
7272 E. Indian School Rd. #350
Scottsdale, AZ 85251-3951

Emergency Telephone Number
Chemtrec 800-424-9300
Telephone Number for Information
602-941-1291
Date Prepared
9-Nov-93
Signature of Preparer (optional)

Section II - Hazardous Ingredients/Identity Information

<table>
<thead>
<tr>
<th>Hazardous Components (Specific Chemical Identity; Common Name(s))</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>Other Limits Recommended</th>
<th>% (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium oxide</td>
<td>1305-79-8</td>
<td>Quicklime</td>
<td>5 mg/m3</td>
<td>2 mg/m3</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>1309-38-4</td>
<td>Periclase</td>
<td>15 mg/m3</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Calcium carbonate</td>
<td>1317-65-3</td>
<td>Limestone</td>
<td>15 mg/m3</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Silicon dioxide</td>
<td>14808-60-7</td>
<td>Quartz</td>
<td>0.1 mg/m3</td>
<td>0.1 mg/m3</td>
</tr>
</tbody>
</table>

LD50
oral/rat

Section III - Physical/Chemical Characteristics

<table>
<thead>
<tr>
<th>Boiling Point</th>
<th>2850 oC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity (H2O = 1)</td>
<td>3.3 g/cc</td>
</tr>
<tr>
<td>Melting Point</td>
<td>N.A.</td>
</tr>
<tr>
<td>Evaporation rate (Butyl Acetate = 1)</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Solubility in Water
Reactive with water to form Ca(OH)2 with large amounts of heat

pH = 12.4 @ 25oC

Appearance and Odor
White or gray lumps and powder, odorless

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) Not applicable
Flammable Limits Not applicable
LEL N.A.
UEL N.A.

Extinguishing Media
Use extinguishing agent suitable for surrounding fire

Special Firefighting Procedures
In large amounts Calcium oxide will react with water to produce heat and possibly steam.

Flood with excess water to remove heat.

Unusual Fire and Explosion Hazards
If calcium oxide gets wet, add excess amounts of water to remove heat.
Section V - Reactivity Data

<table>
<thead>
<tr>
<th>Stability</th>
<th>Unstable</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stable</td>
<td></td>
</tr>
</tbody>
</table>

Conditions to Avoid
Reacts with water to form Ca(OH)₂ and large amounts of heat.
Reacts with CO₂ to form CaCO₃.

Incompatibility (Materials to Avoid)
Acids: React violently and produces heat
Maleic Anhydride: May react explosively
Nitro Organic Compounds: May react to form explosive salts
Phosphorous: May form flammable products when heated

Hazardous Polymerization
May Occur
Conditions to Avoid
X

Section VI - Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?
Yes Yes Yes

Health Hazards (Acute and Chronic)
Mild to moderate corrosive: Avoid skin and eye contact as irritation will occur.
Inhalation will cause coughing, sneezing, or inflammation of the respiratory system.
Material in contact with wet skin could cause burning and corrosion.

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated?
No Yes No

Silica
Free crystalline silica is classified by IARC as "probably carcinogenic to humans"

Signs and Symptoms of Exposure
Skin or eye irritation; coughing or breathing problems.

Medical Conditions
Generally Aggravated by Exposure
Respiratory problems, asthma
Dermatitis or skin or eye sensitivity.

Emergency and First Aid Procedure
Flush contaminated area with excess water. If eye contact, rinse eye with warm water for 30 minutes, and seek medical attention immediately.

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled
Protect skin from contact and avoid inhalation of dust. If material is dry pick up and keep away from acids or organic materials. Place in metal drums. If wet add excess water to remove heat.

Waste Disposal Method
Carefully add water and flush to sewer. Consult local, state, or federal regulations.

Precautions to be Taken in Handling and Storage
Store in tightly closed containers. Keep dry and away from acids or other incompatible substances.

Other Precautions
Keep material dry, if material gets wet flood with excess water to remove heat.

Section VIII - Control Measures

Respiratory Protection (Specify Type)
NIOSH approved dust filter respirator in dusty conditions.

Ventilation
Local Exhaust Vent to dust collector Mechanical (General) Vent to meet TLV requirements
Special Other

Protective Gloves
Clean dry rubber gloves

Other Protective Clothing or Equipment
Full clothing to cover arms and legs, safety glasses or face shield.

Work/Hygienic Practices
Eye wash and shower station should be readily available.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: REAGENT S-8944 Promoter
Synonyms: None
Chemical Family: Formulated thionocarbamate
Molecular Weight: Mixture

CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA, WEST PATERNON, NEW JERSEY 07424, USA
For Product Information call 1-800/652-6013. Outside the USA and Canada call 1-973/357-3193.
EMERGENCY PHONE: For emergency involving spill, leak, fire, exposure or accident call CHEMTREC: 1-800/424-9300. Outside the USA and Canada call 1-703/527-3887.

® indicates trademark registered in the U.S. Outside the U.S., mark may be registered, pending or a trademark. Mark is or may be used under license.

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

<table>
<thead>
<tr>
<th>Component / CAS No.</th>
<th>% (w/w)</th>
<th>OSHA (PEL):</th>
<th>ACGIH (TLV):</th>
<th>Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropylethyl thionocarbamate 141-98-0</td>
<td>93 - 95</td>
<td>Not Established</td>
<td>Not Established</td>
<td>-</td>
</tr>
<tr>
<td>Isopropanol 67-63-0</td>
<td>0.5 - 2</td>
<td>400 ppm</td>
<td>400 ppm</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>500 ppm STEL</td>
<td></td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:
Color: amber
Appearance: liquid
Odor: unpleasant

STATEMENTS OF HAZARD:
WARNING! MAY CAUSE ALLERGIC SKIN REACTION
MAY CAUSE EYE IRRITATION
COMBUSTIBLE LIQUID AND VAPOR

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:
The estimated acute oral (rat) LD50, acute dermal (rabbit) LD50 and 4-hour inhalation (rat) LC50 values for this material are >5,000 mg/kg, >2,000 mg/kg and >20 mg/L, respectively. Repeated or prolonged dermal contact may cause allergic skin reactions. Direct contact with this material may cause mild eye and skin irritation. Refer to Section 11 for toxicology information on the regulated components of this product.

4. FIRST AID MEASURES

Ingestion:
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin Contact:
Wash immediately with plenty of water and soap. Remove contaminated clothing and shoes without delay. Obtain medical attention. Do not reuse contaminated clothing without laundering. Destroy or thoroughly clean shoes before reuse.

Eye Contact:
Rinse immediately with plenty of water for at least 15 minutes.

Inhalation:
Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:
Use water spray, alcohol foam, carbon dioxide or dry chemical to extinguish fires. Water stream may be ineffective.

Protective Equipment:
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection).

Special Hazards:
Keep containers cool by spraying with water if exposed to fire.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Where exposure level is known, wear approved respirator suitable for level of exposure. Where exposure level is not known, wear approved, positive pressure, self-contained respirator. In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

Methods For Cleaning Up:
Remove sources of ignition. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

7. HANDLING AND STORAGE

HANDLING
Precautionary Measures: Keep away from heat and flame. Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling.

Handling Statements: None
STORAGE
Areas containing this material should have fire safe practices and electrical equipment in accordance with applicable regulations and/or guidelines. Standards are primarily based on the material’s flashpoint, but may also take into account properties such as miscibility with water or toxicity. All local and national regulations should be followed. In the Americas, National Fire Protection Association (NFPA) 30: Flammable and Combustible Liquids Code, is a widely used standard. NFPA 30 establishes storage conditions for the following classes of materials: Class I Flammable Liquids, Flashpoint <37.8 °C. Class II Combustible Liquids, 37.8 °C < Flashpoint <60 °C. Class IIIa Combustible Liquids, 60 °C < Flashpoint < 93 °C. Class IIIb Combustible Liquids, Flashpoint > 93 °C.

Storage Temperature: Room temperature
Reason: Integrity

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:
Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:
Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>amber</td>
</tr>
<tr>
<td>Appearance</td>
<td>liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>unpleasant</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.98 @ 20 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Percent Volatile (% by wt.)</td>
<td>100(by volume)</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Saturation In Air (% By Vol.)</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Solubility In Water</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Volatile Organic Content</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>72 °C 161 °F Tag Closed Cup</td>
</tr>
<tr>
<td>Flammable Limits (% By Vol.)</td>
<td>Not available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>Not available</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>See Section 2 for exposure limits.</td>
</tr>
</tbody>
</table>


10. STABILITY AND REACTIVITY

Stability: Stable

Conditions To Avoid: None known

Polymerization: Will not occur

Conditions To Avoid: None known

Materials To Avoid: Oxidizing materials, oxygen

Hazardous Decomposition Products: carbon monoxide, carbon dioxide, oxides of sulfur (includes sulfur di and tri oxides)

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION. Toxicological information on the regulated components of this product is as follows:

Isopropylethyl thionocarbamate (IPETC) has acute oral (rat) and dermal (rabbit) LD50 values of 2324 mg/kg and >2000 mg/kg, respectively. This material causes mild eye and minimal skin irritation in studies with rabbits. Material tested positive (Guinea pig) for skin sensitization. This material is not expected to be an Ames mutagen based on SAR analysis.

Isopropanol has acute oral (rat) and dermal (rabbit) LD50 values of 5.0 g/kg and 12.8 g/kg, respectively. The 4-hour inhalation LC50 (rat) for isopropanol is >16,000 ppm (40.86 mg/L). Acute overexposure to isopropanol vapor may cause mild irritation of the eyes and respiratory tract. Chronic overexposure to isopropanol vapors may cause central nervous system depression, headaches, dizziness, nausea, and staggered gait. Liquid isopropanol may cause moderate to severe eye irritation. In laboratory animals studies, isopropanol has produced fetotoxic effects at levels that were maternally toxic and developmental effects at levels that were maternally non-toxic, and inhalation exposures that produced reduced fetal weight at non-maternally toxic levels.

12. ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The ecological assessment for this material is based on an evaluation of its components.
13. DISPOSAL CONSIDERATIONS

The information on RCRA waste classification and disposal methodology provided below applies only to the Cytec product, as supplied. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Hazardous waste classification under federal regulations (40 CFR Part 261 et seq) is dependent upon whether a material is a RCRA "listed hazardous waste" or has any of the four RCRA "hazardous waste characteristics." Refer to 40 CFR Part 261.33 to determine if a given material to be disposed of is a RCRA "listed hazardous waste"; information contained in Section 15 of this MSDS is not intended to indicate if the product is a "listed hazardous waste." RCRA Hazardous Waste Characteristics: There are four characteristics defined in 40 CFR Section 261.21-61.24: Ignitability, Corrosivity, Reactivity, and Toxicity. To determine Ignitability, see Section 9 of this MSDS (flash point). For Corrosivity, see Sections 9 and 14 (pH and DOT corrosivity). For Reactivity, see Section 10 (incompatible materials). For Toxicity, see Section 2 (composition). Federal regulations are subject to change. State and local requirements, which may differ from or be more stringent than the federal regulations, may also apply to the classification of the material if it is to be disposed. Cytec encourages the recycle, recovery and reuse of materials, where permitted, as an alternate to disposal as a waste. Cytec recommends that organic materials classified as RCRA hazardous wastes be disposed of by thermal treatment or incineration at EPA approved facilities. Cytec has provided the foregoing for information only; the person generating the waste is responsible for determining the waste classification and disposal method.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT
Proper Shipping Name: Combustible liquid, n.o.s.
Hazard Class: Combustible liquid
Packing Group: III
UN/ID Number: NA1993
Transport Label Required: None
Technical Name (N.O.S.): Contains isopropanol
Hazardous Substances: Not applicable

TRANSPORT CANADA
Proper Shipping Name: Not applicable/Not regulated

ICAO / IATA
Proper Shipping Name: Not applicable/Not regulated
Packing Instructions/Maximum Net Quantity Per Package:
Passenger Aircraft: -
Cargo Aircraft: -

IMO
Proper Shipping Name: Not applicable/Not regulated

15. REGULATORY INFORMATION

INVENTORY INFORMATION

United States (USA): All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical Inventory.

Canada: All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL.
European Union (EU): One or more components of this product are NOT included in the European Inventory of Existing Chemical Substances (EINECS). These components can be supplied in quantities of less than 100 kg/yr for research and analysis purposes.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on AICS.

China: All components of this product are NOT included on the Chinese inventory.

Japan: All components of this product are NOT included on the Japanese (ENCS) inventory.

Korea: All components of this product are NOT included on the Korean (ECL) inventory.

Philippines: All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine inventory.

OTHER ENVIRONMENTAL INFORMATION
The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.) See Section 13 for information on waste classification and waste disposal of this product.

This product does not contain any components regulated under these sections of the EPA

PRODUCT HAZARD CLASSIFICATION UNDER SECTION 311 OF SARA
• Acute
• Fire

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)
Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire: 2 - Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.

Reactivity: 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

Reasons For Issue: New Format
Revised Section 2
Revised Section 3
Revised Section 4
Revised Section 7
Revised Section 11
Revised Section 12
Revised Section 15
Revised Section 16
SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Sulfuric Acid (93 percent)

Manufacturer: Teck Cominco Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier: Teck Cominco American Incorporated
Industrial Chemicals
15918 East Euclid Avenue
P.O. Box 3087
Spokane, WA 99216-1815

MSDS Preparer: Teck Cominco Metals Ltd.
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9


Product Use: Used in the manufacturing of chlorine dioxide (a pulp and paper bleaching chemical), in the manufacturing of phosphate and sulphate fertilizers, in the manufacturing of metal sulfates, as a metal pickling chemical and as a component of lead storage batteries.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Ingredient</th>
<th>Approximate Percent by Weight</th>
<th>C.A.S. Number</th>
<th>Occupational Exposure Limits (OELs)</th>
<th>LD₅₀ / LC₅₀ Species and Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric Acid</td>
<td>93</td>
<td>7664-93-9</td>
<td>OSHA PEL 1 mg/m³</td>
<td>LD₅₀ orl-rat 2140 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH TLV 1 mg/m³</td>
<td>LC₅₀ ihl-rat 510 mg/m³/2H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NIOSH REL 1 mg/m³</td>
<td>LC₅₀ ihl-mouse 320 mg/m³/2H</td>
</tr>
</tbody>
</table>

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction.
OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL - Occupational Exposure Limit, PEL - Permissible Exposure Limit, TLV - Threshold Limit Value, REL - Recommended Exposure Limit.

Trade Names and Synonyms: Oil of vitriol, electrolyte acid, battery acid, matting acid, H₂SO₄.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A strong mineral acid present as a colorless and odorless oily liquid when pure but may appear yellow to dark brown when impure. Extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns. Skin or eye contact requires immediate first aid. Can decompose at high temperatures forming toxic gases such as sulfur oxides. Non-flammable but reacts violently with water generating large amounts of heat with potential for spattering of the acid. Can react with combustible materials to generate heat and ignition. Reacts with most metals, particularly when diluted with water, to form flammable hydrogen gas which may create an explosion hazard. It is highly toxic to aquatic organisms and plant life.

Potential Health Effects: Sulfuric acid is not very volatile and workplace exposures are therefore primarily due to accidental splashes or to processes or actions that generate an acid mist. It is extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns on contact with the skin or eyes. Skin or eye contact requires immediate first aid. Inhalation of sulfuric acid mist or fumes may produce irritation of the nose, throat and respiratory tract. High levels of acid mist are also irritating to the skin and eyes. Chronic inhalation of acid mist may cause pitting and erosion of tooth enamel. Sulfuric acid is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. IARC, the ACGIH and the NTP have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans. (see Toxicological Information, Section 11)

Potential Ecological Effects: It is highly toxic to aquatic organisms and plant life but does not bioaccumulate or concentrate in the food chain. (see Ecological Information, Section 12)

EU Risk Phrase: R35 - Causes severe burns.
SECTION 4. FIRST AID MEASURES

Eye Contact: Immediately flush with warm, running water, including under the eyelids, for at least 15 minutes. Seek medical attention immediately. Flushing must begin immediately if permanent eye tissue damage is to be avoided.

Skin Contact: Immediately remove contaminated clothing and footwear under shower and thoroughly flush affected area. Seek immediate medical attention. Discard contaminated clothing, shoes and leather goods (e.g. watch bands, belts, etc.).

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

Ingestion: If victim is conscious and can swallow, dilute stomach contents with 2 to 4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention immediately and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Sulfuric acid is not flammable or combustible. However, fires may result from the heat generated by contact of concentrated sulfuric acid with combustible materials. Sulfuric acid reacts with most metals, especially when diluted with water, to produce hydrogen gas which can accumulate to explosive concentrations inside confined spaces. It reacts violently with water and organic materials evolving a considerable amount of heat and is very hazardous when in contact with carbides, cyanides, and sulfides.

Extinguishing Media: Use dry chemical or carbon dioxide extinguishers. Use water spray to cool fire-exposed containers. Use water only if absolutely necessary and DO NOT USE WATER DIRECTLY ON ACID as a violent reaction may occur resulting in spattering of the acid.

Fire Fighting: Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask. For fires close to a spill or where vapors are present, use acid-resistant personal protective equipment.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do safely. Contain spill, isolate hazard area, and deny entry to unauthorized personnel. Dike area around spill and pump uncontaminated acid back to process if possible. Neutralize spilled material with alkali such as sodium carbonate or sodium bicarbonate, soda ash, lime or limestone granules. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas. Allow to stand for 1-2 hours to complete neutralization, then absorb any liquid in solid absorbent such as vermiculite or clay absorbents. Place spilled material in suitable labeled containers for final disposal. Treat or dispose of wastespill material and/or contaminated absorbent material in accordance with all local, regional and national regulations.

Personal Precautions: Acid resistant protective clothing and gloves. Sleeves and pant legs should be worn outside, not tucked into gloves and rubber boots. Use close-fitting safety goggles or a combination of safety goggles and a face shield where splashing is a possibility. Respiratory protection equipment should be worn where exposure to hazardous levels of mist or fume is possible.

Environmental Precautions: This product can pose a threat to the environment. Contamination of soil and water should be prevented. Keep spillage from entering ground, streams or sewers.

SECTION 7. HANDLING AND STORAGE

Store in a dry, cool, well-ventilated area away from incompatible substances. Keep in tightly closed containers which are appropriately labeled. Do not allow contact with water. Do not store near alkaline substances. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking.
EU Safety Phrase(s): S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S30 - never add water to this product; S45 – In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Protective clothing and gloves as well as glasses, goggles or face shield. Appropriate protective clothing should be worn where any possibility exists that skin contact can occur. Use close-fitting safety goggles or a combination of safety goggles and a face shield where any possibility exists that eye contact can occur. An eyewash and quick drench should be provided. Workers should wash immediately when skin becomes contaminated and at the end of each work shift.

Ventilation: Use adequate local or general ventilation to maintain the concentration of sulfuric acid aerosol mists below recommended occupational exposure limits.

Respiratory Protection: Where sulfuric acid mists are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a combination of a 42CFR84 Class N, R or P-100 particulate filter and an acid gas cartridge). Note: sulfuric acid mist also causes eye irritation at high concentrations and a full face respirator or supplied air respirator may be necessary in some cases.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear, Colorless, Oily Liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless when cold</td>
</tr>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH</td>
<td>Concentration dependant</td>
</tr>
<tr>
<td></td>
<td>&lt;0.1 (93% Sol’n), 0.3 (5% or 1N Sol’n)</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>&lt;0.04 kPa (&lt;0.3 mm Hg) @ 25°C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>3.4 (air = 1)</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>280°C</td>
</tr>
<tr>
<td>Freezing/Melting Point/Range</td>
<td>-35°C</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.84</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Coefficient of Water/Oil</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Completely soluble with generation of heat</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>&gt; 1 mg/m³</td>
</tr>
</tbody>
</table>

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Stable under normal temperatures and pressures. Decomposes at 340°C into sulfur trioxide and water. Extremely reactive with metals, alkalis and many other organic and inorganic chemicals. Hazardous gases such as hydrogen cyanide, hydrogen sulfide and acetylene are evolved on contact with chemicals such as cyanides, sulfides and carbides. Contact with combustible organic matter may cause fire or explosion. Dilution with water generates excessive heat and spattering or boiling may occur. Always add acid to water, NEVER ADD WATER TO ACID.

Incompatibilities: Combustible materials, organic materials, oxidizers, amines, bases, water, excess heat, and metals.

Hazardous Decomposition Products: Sulfur dioxide, sulfur trioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Concentrated sulfuric acid exerts a strong corrosive action on all tissues due to its severe dehydration action (removing water from tissues). The severity of the chemical burn produced by the concentrated acid is proportional to the strength of the acid and the duration of contact. Burns are deep but typically not severely painful. Prolonged exposure to dilute solutions or acid mists may lead to irritation of the eyes and skin causing chronic conjunctivitis and dermatitis. Inhalation of sulfuric acid mist or fumes may result in irritation of the respiratory tract possibly leading to laryngeal spasm. Asthmatics may be more sensitive to inhaling sulfuric acid mists. IARC and the ACGIH have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans.

Acute: Skin/Eye: Splashes can cause severe eye burns and may cause irreversible eye injury and possible blindness. Skin contact results in severe burns and may result in permanent scarring. High levels of sulfuric acid mists and aerosols are also irritating to the eyes and skin.
**Inhalation:** Inhalation may cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath, laryngeal spasm and delayed lung edema. These symptoms may be aggravated by physical exertion.

**Ingestion:** Ingestion is unlikely in industrial use but will result in severe burns to the mouth, throat, esophagus and stomach which could lead to permanent damage to the digestive tract. Small amounts of acid can also enter the lungs during ingestion or subsequent vomiting and cause serious lung injury.

**Chronic:** Prolonged exposure to dilute solutions or mists may result in eye irritation (chronic conjunctivitis) and produce skin dermatitis. Exposure to high concentrations of acid mist has caused erosion and discoloration of the anterior teeth. Sulfuric acid is not listed as a carcinogen by OSHA, National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), ACGIH or the EU. IARC has concluded that there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans, resulting in an increased incidence of primarily laryngeal cancers. The ACGIH lists strong inorganic acid mists containing sulfuric acid as a suspect human carcinogen (A2) and the NTP have recently re-classified strong inorganic acid mists containing sulfuric acid to a known human carcinogen. OSHA and the EU do not list sulfuric acid mist as a carcinogen.

**SECTION 12. ECOLOGICAL INFORMATION**

Sulfuric acid is very corrosive and is highly toxic to aquatic and terrestrial life at low concentrations.

**SECTION 13. DISPOSAL CONSIDERATIONS**

Do not wash down drain or allow to reach natural watercourses. Dispose of neutralized waste consistent with regulatory requirements. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas.

**SECTION 14. TRANSPORT INFORMATION**

Proper Shipping Name Transport Canada and U.S. DOT........................................Sulfuric Acid
Transport Canada and U.S. DOT Hazard Classification....................................Class 8, Packing Group II
Transport Canada and U.S. DOT Product Identification Number................UN1830
Marine Pollutant.................................................................No
IMO Classification.................................................................Class 8

**SECTION 15. REGULATORY INFORMATION**

**U.S.**
Listed on TSCA Inventory...........................................................Yes
Hazardous Under Hazard Communication Standard.................................Yes
CERCLA Section 103 Hazardous Substances............................................Sulfuric Acid Yes RQ: 1000 lbs. (454 kg.)
EPCRA Section 302 Extremely Hazardous Substance..................................Yes RQ: 1000 lbs. (454 kg.)
Threshold Planning Quantity: 1000 lbs.
EPCRA Section 311/312 Hazard Categories ...........................................Immediate (Acute) Health Hazard - Corrosive
Immediate (Acute) Health Hazard - Highly Toxic
EPCRA Section 313 Toxic Release Inventory.............................................Sulfuric Acid CAS NO. 7664-93-9
Percent by Weight: 93

**CANADIAN:**
Listed on Domestic Substances List...................................................Yes
WHMIS Classification.................................................................Controlled Product, Classification D1A (Immediate & Serious Toxic Effects), E (Corrosive Material)

**EUROPEAN UNION:**
Listed on the European Inventory of Existing Commercial Chemical Substances (EINECS)........................................Yes
EU Classification:..................................................................................Corrosive

December 15, 2003  Sulfuric Acid  Page 4 of 5
SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2003, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Canadian Centre for Occupational Health & Safety CHEMINFO Record No. 122 - Sulfuric Acid, 2003-04.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique, Acide Sulfurique, 2000-03.
- Industry Canada, Controlled Products Regulations SOR/88-66, as amended.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Cominco American Incorporated extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.
MATERIAL SAFETY DATA SHEET

Unleaded Gasoline

VALERO MARKETING & SUPPLY COMPANY
and Affiliates
P.O. Box 696000
San Antonio, TX 78269-6000

Emergency Phone Numbers
24 Hour Emergency: 866-565-5220
Chemtrec Emergency: 800-424-9300

General Assistance
General Assistance: 210-345-4593

BRAND NAMES: Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

Section 1. Chemical Product and Company Identification

| Common / Trade name | : Unleaded Gasoline |
| Synonym            | : Regular/Premium/Midgrade - Unleaded Gasoline, Petrol, Motor Fuel, Reformulated Gasoline, RFG, Conventional, Oxygenated, Non-Oxygenated, CARB Gasoline |

SYNONYMS/COMMON NAMES: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

| Material uses | : Motor fuels. |
| MSDS#         | : 002 |
| CAS #         | : 86290-81-5 |

Section 2. Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>Concentration ( % )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>86290-81-5</td>
<td>0 - 100</td>
</tr>
<tr>
<td>Hexane (Other Isomers)</td>
<td>mixture</td>
<td>5 - 25</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>0 - 30</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>1330-20-7</td>
<td>0 - 25</td>
</tr>
<tr>
<td>Octane (All Isomers)</td>
<td>111-65-9</td>
<td>0 - 18.5</td>
</tr>
<tr>
<td>Methyl Tertiary Butyl Ether (MTBE)</td>
<td>1634-04-4</td>
<td>0 - 16</td>
</tr>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>0 - 10</td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
<td>0 - 6</td>
</tr>
<tr>
<td>n-Heptane</td>
<td>142-82-5</td>
<td>1 - 5</td>
</tr>
<tr>
<td>Pentane</td>
<td>109-66-0</td>
<td>1 - 5</td>
</tr>
<tr>
<td>Tertiary Amyl Methyl Ether (TAME)</td>
<td>994-05-8</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>0 - 4.9</td>
</tr>
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<td>Cyclohexane</td>
<td>110-82-7</td>
<td>0 - 3</td>
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<tr>
<td>n-Hexane</td>
<td>110-54-3</td>
<td>0 - 3</td>
</tr>
</tbody>
</table>

Continued on next page
Section 3. Hazards Identification

Danger! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard; can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Extremely flammable liquid. Vapors may explode.

**Emergency overview**

**Physical state**: Liquid.

**Warning!**

CANCER HAZARD
CONTAINS MATERIAL WHICH CAN CAUSE CANCER
HIGHLY FLAMMABLE LIQUID AND VAPOR.
HARMFUL IF SWALLOWED.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
BLOOD, KIDNEYS, LUNGS, REPRODUCTIVE SYSTEM, LIVER, PERIPHERAL NERVOUS SYSTEM, GASTROINTESTINAL TRACT, RESPIRATORY TRACT, SKIN, BONE MARROW, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
VAPOR MAY CAUSE FLASH FIRE.
MAY BE HARMFUL IF ABSORBED THROUGH SKIN.

Do not ingest. Avoid prolonged contact with eyes, skin, and clothing. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

**Routes of entry**

**Potential acute health effects**

**Eyes**: May cause severe irritation, redness, tearing, blurred vision and conjunctivitis.

**Skin**: Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Injury may not appear serious at first. Within a few hours, tissues will become swollen, discolored and extremely painful.

**Inhalation**: Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes.

**Ingestion**: Toxic if swallowed. This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

**Medical conditions aggravated by overexposure:**

Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs. Preexisting eye, skin, heart, central nervous system and respiratory disorders may be aggravated by exposure to this product. Impaired kidney, liver and blood disorders may be aggravated by exposure to this product.

**Over-exposure signs/symptoms**: Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest or sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological Information (section 11)

Continued on next page
Section 4. First Aid Measures

**Eye contact**: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues.

**Skin contact**: Remove contaminated clothing and shoes. Wash exposed area thoroughly with soap and water. Remove contaminated clothing promptly and launder before reuse. Contaminated leather goods should be discarded. If irritation persists or symptoms described in the MSDS develop, seek medical attention. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Get immediate medical attention.

**Inhalation**: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

**Ingestion**: This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

**Notes to physician**: In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an intratracheal tube, to prevent aspiration. Irregular heart beat may occur, use of adrenalin is not advisable. Individuals intoxicated by the product should be hospitalized immediately, with acute and continuing attention to neurological and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be monitored for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be monitored for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

Section 5. Fire Fighting Measures

**Flammability of the product**: Flammable.

**Auto-ignition temperature**: >260°C (500°F)

**Flash point**: Closed cup: -40°C (-40°F).

**Flammable limits**: Lower: 1.3% Upper: 7.1%

**Products of combustion**: These products are carbon oxides (CO, CO₂), nitrogen and sulfur oxides (NOₓ, SOₓ), particulate matter, VOC's.

**Fire hazards in presence of various substances**: Extremely flammable in presence of open flames, sparks and static discharge.

**Explosion hazards in presence of various substances**: Explosive in presence of open flames, sparks and static discharge.

**Fire fighting media and instructions**: Flammable Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. Subsurface application is only recommended where it is known that the fuel contains less than 3% oxygenated blending components. Water can be used to cool fire-exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers.

Collect contaminated fire fighting water separately. It must not enter the sewage system. Dike area of fire to prevent product run-off. Decontaminate emergency personnel and equipment with soap and water.
Unleaded Gasoline

**Special protective equipment for fire-fighters**

Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

**Special remarks on fire hazards**

Dangerous when exposed to heat or flame. Vapors form flammable or explosive mixtures with air at room temperature. Vapor or gas may spread to distant ignition sources (pilot lights, welding equipment, electrical equipment, etc.) and flash back. Vapors may accumulate in low areas. Vapors may concentrate in confined areas. Flowing product can be ignited by self generated static electricity. Use adequate bonding and grounding to prevent static buildup. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Irritating or toxic substances may be emitted upon thermal decomposition. For fires involving this material, do not enter any enclosed or confined space without proper protective equipment, which may include NIOSH approved self-contained breathing apparatus with full face mask. Clothing, rags or similar organic material contaminated with this product and stored in a closed space may undergo spontaneous combustion. Transfer to and from commonly bonded and grounded containers.

**Special remarks on explosion hazards**

No additional remark.

### Section 6. Accidental Release Measures

**Personal precautions**

Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic, flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.

**Environmental precautions**

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Gasoline may contain oxygenated blend products (Ethanol, MTBE, etc.) that are soluble in water and therefore precautions should be taken to protect surface and groundwater sources from contamination. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424- 8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

**Methods for cleaning up**

If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

*Continued on next page*
Section 7. Handling and Storage

Handling: Do not ingest. Avoid prolonged contact with eyes, skin, and clothing. Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Use only in well-ventilated locations. Keep away from heat, spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire and Explosion Hazard Data section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire.

Keep out of reach of children. Failure to use caution may cause serious injury or illness. Never siphon by mouth. For use as a motor fuel only. Do not use as a cleaning solvent or for other non-motor fuel uses. To avoid fire or explosion - Do not siphon by mouth to transfer product between containers. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

Storage: Store in tightly closed containers in cool, dry, isolated and well-ventilated area away from heat, sources of ignition and incompatible materials. Use non-sparking tools and explosion proof equipment. Ground lines, containers, and other equipment used during product transfer to reduce the possibility of a static induced spark. Do not "switch load" because of possible accumulation of a static charge resulting in a source of ignition. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

Section 8. Exposure Controls, Personal Protection

Engineering controls: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal protection:

Eyes: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Keep away from eyes. Eye contact can be avoided by wearing safety glasses or chemical splash goggles.

Skin: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Keep away from skin. Skin contact can be minimized by wearing protective gloves such as neoprene, nitrile-butadiene rubber, etc. and, where necessary, impervious clothing and boots. Leather goods contaminated with this product should be discarded. A source of clean water should be available in the work area for flushing eyes and skin. Flame Retardant Clothing is recommended.

Respiratory: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.

Hands: Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protective equipment (Pictograms): Consult your Supervisor or S.O.P. for special handling directions.

Continued on next page
### Personal protection in case of a large spill

- Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Component

**Exposure limits**

**Gasoline**

- **ACGIH TLV (United States, 5/2004).**
  - STEL: 500 ppm 15 minute(s). Form: All forms
  - TWA: 300 ppm 8 hour(s). Form: All forms

**Hexane (Other Isomers)**

- **ACGIH TLV (United States, 9/2004).**
  - STEL: 1000 ppm 15 minute(s). Form: All forms
  - TWA: 500 ppm 8 hour(s). Form: All forms

**Toluene**

- **ACGIH TLV (United States, 5/2004).** Skin Notes: 1996 Adoption
  - STEL: 1000 ppm 15 minute(s). Form: All forms
  - TWA: 50 ppm 8 hour(s). Form: All forms

**Xylene (o,m,p isomers)**

- **ACGIH TLV (United States, 5/2004).**
  - STEL: 150 ppm 15 minute(s). Form: All forms
  - TWA: 100 ppm 8 hour(s). Form: All forms

**Octane (All Isomers)**

- **NIOSH REL (United States, 6/2001).**
  - CEIL: 385 ppm 15 minute(s). Form: All forms
  - TWA: 75 ppm 10 hour(s). Form: All forms

**Methyl Tertiary Butyl Ether (MTBE)**

- **ACGIH TLV (United States, 1/2004).** Notes: 2002 Adoption
  - STEL: 500 ppm 15 minute(s). Form: All forms
  - TWA: 300 ppm 8 hour(s). Form: All forms

**Ethanol**

- **ACGIH TLV (United States, 5/2004).** Notes: 1996 Adoption Refers to Appendix A -- Carcinogens.
  - STEL: 500 ppm 15 minute(s). Form: All forms
  - TWA: 1000 ppm 8 hour(s). Form: All forms

**1,2,4-Trimethylbenzene**

- **NIOSH REL (United States, 6/2001).**
  - STEL: 25 ppm 10 minute(s). Form: All forms

**n-Heptane**

- **ACGIH TLV (United States, 9/2004).**
  - STEL: 500 ppm 15 minute(s). Form: All forms
  - TWA: 400 ppm 8 hour(s). Form: All forms

**Pentane**

- **ACGIH TLV (United States, 9/2004).** Notes: 1998 Adoption.
  - STEL: 600 ppm 15 minute(s). Form: All forms
  - TWA: 350 mg/m$^3$ 10 hour(s). Form: All forms

**Continued on next page**
Physical state: Liquid.
Color: Light Straw to Red Clear Liquid
Odor: Characteristic Gasoline Odor (Strong.)
Boiling point: 26.7 to 226.7°C (80.1 to 440.1°F)
Melting/freezing point: 60.8 to 101.3 kPa (456 to 760 mm Hg) (at 20°C)
Specific gravity: 0.66 to 0.75 (Water = 1) (@ 60 °F)
Vapor pressure: 3 to 4 (Air = 1)
Vapor density: Essentially 100%
Section 10. Stability and Reactivity Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>10 to 11 compared to Butyl acetate.</td>
</tr>
<tr>
<td><strong>Solubility</strong></td>
<td>Very slightly soluble in cold water, hot water.</td>
</tr>
</tbody>
</table>

Section 11. Toxicological Information

**Toxicity data**

**BENZENE** is considered to be a carcinogen to humans, and may cause adverse health effects following exposure via inhalation, ingestion or dermal or eye contact. Acute inhalation of benzene by rats, mice or rabbits causes narcosis, spontaneous heart contractions (ventricular fibrillation) and death due to respiratory paralysis. Subchronic inhalation of benzene by rats produced decreased white blood cell counts, decreased bone marrow cell activity, increased red blood cell activity and cataracts. In rats, chronic inhalation or oral administration of benzene produced cancers of the liver, mouth and Zymbal gland. Acute inhalation exposure of benzene in humans has caused nerve inflammation (polyneuritis), central nervous system depression and cardiac sensitization. Chronic exposure to benzene has produced anorexia and irreversible injury to the blood forming organs. Potential effects include aplastic anemia and leukemia. It has been caused fetal defects in tests on laboratory animals.

**CUMENE** can affect the body if it is inhaled, swallowed or comes in contact with the eyes or skin. The main toxic effect is irritation of the eyes, skin and upper respiratory tract. Narcosis has been reported to occur in animals on high exposure. There are no reports of systemic effects in man as a result of industrial exposure. Chronic exposure of rats above 500 ppm causes congestion of lungs, liver and kidneys, but no bone marrow changes.

**CYCLOHEXANE** can affect the body if it is inhaled, swallowed, or comes in contact with the eyes or skin. It is primarily a local irritant and central nervous system depressant. The depressant effect is from exposure to concentrations above 12,000 ppm, while prolonged or repeated exposure to concentrations above 300 ppm produces a mild irritation of the eyes and upper respiratory tract.

**ETHANOL** is rapidly absorbed through the gastrointestinal tract and normally metabolized and excreted in a relatively few hours. Only in very unusual work situations could the inhalation of ethanol vapors result in symptoms of alcohol intoxication. Can be fatal or cause blindness if swallowed in extreme quantities. Inhalation or ingestion can cause headache, nausea, dizziness or narcosis. Chronic overexposure (inhalation or ingestion) can cause damage to the gastrointestinal tract, liver, kidneys and cardiovascular system. Prolonged contact causes irritation to skin and eyes. Medical conditions aggravated by exposure include kidney, liver, heart and GI conditions. This material is not listed as a cancer causing agent but is suspected of being a promoter.

**ETHYLBENZENE** can affect the body if it is inhaled, swallowed or comes in contact with the eyes or skin. It is primarily an irritant of skin, and to some degree, of eyes and upper respiratory tract. Systemic absorption causes depression of the central nervous system with narcosis at very high concentrations. On the eyes and nose, the vapor at 5000 ppm causes intolerable irritation, eye irritation and lacrimation are immediate and severe at 2000 ppm, irritation and tearing occur at 1000 ppm although tolerance develops rapidly, and the vapor is a transient irritant on human eyes at 200 ppm. Aspiration of small amounts causes extensive edema and hemorrhage of lung tissue. A draft report on a study conducted by the National Toxicology program states that lifetime inhalation exposure of rats and mice to concentrations of ethylbenzene(750 ppm) resulted in increases in certain types of tumors in both species. The material has caused kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations of ethylbenzene (75 ppm or 250 ppm). The draft report does not address the relevance of these results to humans.

**GASOLINE** contains benzene, as well as n-hexane, other aromatics and certain olefins. Gasoline generally acts as an anesthetic and mucous membrane irritant. Inhalation is the most important route of occupational entry. Eye and throat irritation occur in several hours at exposures of 160 to 270 ppm, eye, nose and throat irritation and dizziness occurs at exposures of 500 to 900 ppm in one hour, mild anesthesia occurs in 30 minutes at exposures of 2000 ppm. The threshold for immediate mild toxic effect if 900 to 1000 ppm. There are reports of toxic neuritis after exposure to gasoline. Repeated exposure of laboratory animals to high concentrations of gasoline vapors has caused kidney damage and cancer in rats and cancer in mice. Gasoline was evaluated for genetic activity in assays using microbial cells, cultured mammalian cells and rat bone marrow cells. The results were all negative so gasoline was considered nonmutagenic under these conditions. Overexposure to this product or its components has been suggested as a cause of liver abnormalities in laboratory animals and humans. Lifetime studies by the American Petroleum Institute have shown that kidney damage and kidney cancer can occur in male rats after prolonged inhalation exposure at elevated concentrations of total gasoline. Kidneys of mice and female rats were unaffected. The U.S. EPA Risk Assessment Forum has concluded that the male rat kidney tumor results are not relevant for humans. Total gasoline exposure also produced liver tumors in female mice only. The implication of these data for humans has not been determined.

**HEPTANE** can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Heptane vapor is a narcotic. Concentrations of 10,000 to 15,000 ppm produced narcosis in mice within 30 to 60 minutes, while 15,000 to 20,000 ppm caused convulsions and death. At 48,000 ppm, respiratory arrest was produced in mice in 3 to 4 minutes from the start of exposure. Human subjects exposed to 1,000 ppm for 6 minutes, or to 2,000 ppm for 4 minutes, reported slight vertigo. At 5,000 ppm for 4 minutes, there was marked vertigo, inability to walk a straight line, hilarity, and incoordination, but no complaints of eye and upper respiratory tract or mucous membrane irritation. A 15-minute exposure at 5,000 ppm produced in some subjects a state of stupor lasting for 30 minutes after exposure. These subjects also reported loss of appetite, slight nausea, and a taste resembling gasoline for several hours after exposure. Although chronic nervous system effects have not been attributed to heptane, polyneuritis has been reported following prolonged exposure to a petroleum fraction with boiling range between 70°C and 100°C, and this fraction would normally contain various isomers of heptane as major ingredients.
n-HEXANE can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Hexane vapor is a narcotic and a mild upper respiratory irritant. Polynuropathy (peripheral nerve damage) has been reported to occur in workers exposed to hexane vapors, characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and severity of nerve damage. Concentrations of 30,000 ppm produced narcosis in mice within 30 to 60 minutes, convulsions and death occurred at 35,000 to 40,000 ppm, and at 64,000 ppm respiratory arrest was produced in 2.5 to 4.5 minutes from the start of exposure. Concentrations up to 8000 ppm produced no anesthesia. In human subjects, 2000 ppm for 10 minutes produced no effects, but 5000 ppm resulted in dizziness and a sensation of giddiness. Other investigators reported slight nausea, headache and irritation of the eyes and throat at 1400 to 1500 ppm. In industrial practice, mild narcotic symptoms such as dizziness have been observed when concentrations exceeded 1000 ppm, but not below 500 ppm.

MTBE is a mild irritant to the eye. An increase in anesthesia with increasing concentrations was observed during a rat exposure study. Controlled human exposure to MTBE in air under relatively temperate conditions does not cause increased symptoms or measurable responses (irritation, behavioral changes) in healthy adult subjects. Although MTBE and TBA were detectable in the blood of subjects in clinical studies, no increase in symptoms occurred. A tentative review of the carcinogenicity (i.e., a tentative C classification). A sensitivity analysis of cancer risk indices also suggests that, if MTBE is carcinogenic, its potency is not likely to be greater than that already assigned to gasoline itself, which currently has a hazard classification of "probable" human carcinogen.

OCTANE can affect the body if it is inhaled, comes in contact with the skin or eyes or is swallowed. Octane vapor is a mild narcotic and mucous membrane irritant. Concentrations of 6600 to 13,700 ppm produced narcosis in mice in 30 to 90 minutes, the fatal concentration for animals is near 13,500 ppm. No chronic systemic effects have been reported in humans.

PENTANE can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. The chief effects of inhalation are narcosis and irritation of the respiratory passages. Exposures of 90,000 to 120,000 ppm resulted in narcosis in animals in 5 to 6 minutes, 130,000 ppm was fatal with respiratory arrest occurring within 5 minutes of exposure. Pentane injected subcutaneously in rats produced temporary impairment of liver function and moderate neutropenia. While other aliphatic hydrocarbons produce drowsiness and mild irritation of the eyes and nose in human subjects, no symptoms resulted from exposure to pentane vapor for 10 minutes at 5000 ppm. Chronic exposure to high concentrations may lead to polyneuropathy (peripheral nerve damage), characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity.

TOLUENE can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. Toluene vapors cause narcosis. Controlled exposures of human subjects to 200 ppm for 8 hours produced mild fatigue, weakness, confusion, lacrimation and moderate neutropenia. At 800 ppm for 8 hours, symptoms were more pronounced, and after effects included nervousness, muscular fatigue and insomnia persisting for several days. In workers exposed for many years to concentrations in the range of 80 to 300 ppm, there was no clinical or laboratory evidence of altered liver function. Toluene exposure does not result in the same chronic injury to bone marrow caused by benzene. Liquid splashed in the eyes of workers has caused transient corneal damage and conjunctival irritation, complete recovery occurred within 48 hours. Animal studies have shown that inhalation of high levels of toluene produced cardiac sensitization. Such sensitization may cause fatal changes in heart rhythms. This later effect was shown to be enhanced by hypoxia or the injection of adrenalin-like agents. Workers exposed at less than 200 ppm have complained of headache, lassitude and nausea, but physical findings were essentially negative. At concentrations between 200 and 500 ppm, impairment of coordination, momentary loss of memory and anoxia were present. Between 500 and 1500 ppm, palpitation, extreme weakness, pronounced loss of coordination and impairment of reaction time were noted. The red cell count fell in many instances and there were cases of aplastic anemia in which recovery followed intensive hospital treatment (although some of the effects may have been due to benzene impurity). Toluene has been reported to decrease immunological responses and cause recordable hearing loss in test animals. Damages genetic material in mammalian test systems. May cause adverse reproductive effects based on animal testing.

TRIMETHYL BENZENE (PSEUDOCUMENE) can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. The liquid is a primary skin irritant, but system intoxication due to absorption through the skin is not probable. High concentrations of vapors (5000 to 9000 ppm) caused central nervous system depression. Pseudocumene may cause nervousness, tension, anxiety, and asthmatic bronchitis. In addition, the peripheral blood showed a tendency to hypochromic anemia and a deviation from the normal in the coagulability of the blood.

XYLENE can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. The liquid is a primary skin irritant, but system intoxication due to absorption through the skin is not probable. High concentrations of vapors (5000 to 9000 ppm) caused central nervous system depression. Pseudocumene may cause nervousness, tension, anxiety, and asthmatic bronchitis. In addition, the peripheral blood showed a tendency to hypochromic anemia and a deviation from the normal in the coagulability of the blood.

Xylenes (o,m,p isomers) can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. Xylene vapor irritates the eyes, mucous membranes and skin. At high concentrations it causes narcosis. In animals, xylene causes blood changes reflecting mild toxicity to the hematopoietic system. Laboratory animals exposed by various routes to high does of xylene showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Rats exposed to xylene vapor during pregnancy showed embryo/fetotoxic effects. Mice exposed orally to doses producing maternal toxicity also showed embryo or fetotoxic effects. Laboratory rats exposed to high concentrations of toluene experienced recordable hearing loss. In humans, exposure to high concentrations can cause dizziness, excitement, drowsiness, incoordination and a staggering gait. Workers exposed to concentrations above 200 ppm complain of anoxia, nausea, vomiting and abdominal pain. Brief exposures of humans to 200 ppm caused irritation of the eyes, nose and throat. There are reports of reversible corneal vacuolation in workers exposed to xylene, or to xylene plus other volatile solvents.

HEXANE ISOMERS are three times as toxic to mice as is pentane. Narcosis was produced in mice within 30-60 minutes at concentrations of 30,000 ppm. In man, concentrations for 10 minutes at 2000 ppm produced no effects, but 5000 ppm caused dizziness and a sense of giddiness. Concentrations of 1400-1500 ppm produced slight nausea, headache, eye, and throat irritation.

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Test</th>
<th>Result</th>
<th>Route</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
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<td>Rat</td>
</tr>
<tr>
<td></td>
<td>LDLo</td>
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<td>human</td>
</tr>
<tr>
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<td>Rat</td>
</tr>
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</tr>
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<tr>
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<td>LDLo</td>
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<td>Oral</td>
<td>human</td>
</tr>
</tbody>
</table>

Continued on next page
## Specific effects

### Carcinogenic effects
Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

### Target organs
Contains material which causes damage to the following organs: blood, kidneys, lungs, the reproductive system, liver, peripheral nervous system, gastrointestinal tract, upper respiratory tract, skin, bone marrow, central nervous system (CNS), eye, lens or cornea.

## Target organs
Contains material which causes damage to the following organs: blood, kidneys, lungs, the reproductive system, liver, peripheral nervous system, gastrointestinal tract, upper respiratory tract, skin, bone marrow, central nervous system (CNS), eye, lens or cornea.

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## Target organs
Contains material which causes damage to the following organs: blood, kidneys, lungs, the reproductive system, liver, peripheral nervous system, gastrointestinal tract, upper respiratory tract, skin, bone marrow, central nervous system (CNS), eye, lens or cornea.

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<td>Rabbit</td>
</tr>
<tr>
<td>Ethanol</td>
<td>3450 mg/kg</td>
<td>Oral</td>
<td>Mouse</td>
</tr>
<tr>
<td>Ethanol</td>
<td>1400 mg/kg</td>
<td>Oral</td>
<td>human</td>
</tr>
<tr>
<td>Ethanol</td>
<td>5500 mg/kg</td>
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<td>Dog</td>
</tr>
<tr>
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<td>Oral</td>
<td>Rat</td>
</tr>
<tr>
<td>Pentane</td>
<td>400 mg/kg</td>
<td>Oral</td>
<td>Rat</td>
</tr>
<tr>
<td>Cumene</td>
<td>1400 mg/kg</td>
<td>Oral</td>
<td>Rat</td>
</tr>
<tr>
<td>Cumene</td>
<td>12750 mg/kg</td>
<td>Oral</td>
<td>Mouse</td>
</tr>
<tr>
<td>Ethylbenzene</td>
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<td>Rat</td>
</tr>
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<td>Rat</td>
</tr>
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<td>Benzene</td>
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<td>Mouse</td>
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<td>Benzene</td>
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<td>Rabbit</td>
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<td>Tertiary Amyl Methyl Ether (TAME)</td>
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<td>Oral</td>
<td>Rat</td>
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<td>Rat</td>
</tr>
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<td>Mouse</td>
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<tr>
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<td>Oral</td>
<td>Rabbit</td>
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**Chronic effects on humans**: Chronic effects on humans

**Other toxic effects on humans**: Other toxic effects on humans

**Special remarks on toxicity to animals**: No additional remark.

**Special remarks on chronic effects on humans**: No additional remark.

**Special remarks on other toxic effects on humans**: No additional remark.

**Specific effects**

**Carcinogenic effects**: Carcinogenic effects

**Target organs**: Target organs

---

Continued on next page
### Ecotoxicity data

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<th>Period</th>
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<td></td>
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<td>93 mg/l</td>
</tr>
</tbody>
</table>

**Products of degradation**: These products are carbon oxides (CO, CO₂) and water.

**Toxicity of the products of biodegradation**: The products of biodegradation are as toxic as the original product.

**Special remarks on the products of biodegradation**: No additional remark.
Section 13. Disposal Considerations

Waste disposal: The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport Information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Class</th>
<th>Packing group</th>
<th>Label</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT Classification</td>
<td>1203</td>
<td>Gasoline</td>
<td>3</td>
<td>II</td>
<td>Not available.</td>
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</tr>
<tr>
<td>TDG Classification</td>
<td>1203</td>
<td>Gasoline (Hexane (Other Isomers), Toluene)</td>
<td>3</td>
<td>II</td>
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</tr>
</tbody>
</table>

Section 15. Regulatory Information

United States U.S. Federal regulations: TSCA 4(a) final test rules: Hexane (Other Isomers); n-Hexane TSCA 8(a) PAIR: Tertiary Amyl Methyl Ether (TAME); n-Heptane; Pentane TSCA 8(b) inventory: Toluene; Hexane (Other Isomers); Xylene (o,m,p isomers); Octane (All Isomers); Methyl Tertiary Butyl Ether (MTBE); Ethanol; Tertiary Amyl Methyl Ether (TAME); 1,2,4-Trimethylbenzene; n-Heptane; Pentane; Cumene; Ethylbenzene; Benzene; n-Hexane; Cyclohexane; Trimethyl Benzene (Pseudocumene); Gasoline SARA 302/304/311/312 extremely hazardous substances: No products were found. SARA 302/304 emergency planning and notification: No products were found. SARA 302/304/311/312 hazardous chemicals: Toluene; Hexane (Other Isomers); Xylene (o,m,p isomers); Octane (All Isomers); Methyl Tertiary Butyl Ether (MTBE); Ethanol; 1,2,4-Trimethylbenzene; n-Heptane; Pentane; Cumene; Ethylbenzene; Benzene; n-Hexane; Cyclohexane SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Toluene: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; Hexane (Other Isomers): Fire hazard, Immediate (Acute) Health Hazard; Xylene (o,m,p isomers): Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; Octane (All Isomers): Fire hazard; Methyl Tertiary Butyl Ether (MTBE): Fire hazard, Immediate (Acute) Health Hazard; Ethanol: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; 1,2,4-Trimethylbenzene: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; n-Heptane: Fire hazard; Pentane: Fire hazard, Immediate (Acute) Health Hazard; Cumene: Fire hazard, Immediate (Acute) Health Hazard; Ethylbenzene: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; Benzene: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; Cyclohexane: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; Gasoline: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard Clean Water Act (CWA) 307: Toluene; Ethylbenzene; Benzene Clean Water Act (CWA) 311: Toluene; Xylene (o,m,p isomers); Ethylbenzene; Benzene; Cyclohexane Clean air act (CAA) 112 accidental release prevention: Pentane Clean air act (CAA) 112 regulated flammable substances: Pentane

Continued on next page
Clean air act (CAA) 112 regulated toxic substances: No products were found.

**SARA 313**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>0 - 30</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>1330-20-7</td>
<td>0 - 25</td>
</tr>
<tr>
<td>Methyl Tertiary Butyl Ether (MTBE)</td>
<td>1634-04-4</td>
<td>0 - 16</td>
</tr>
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<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
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<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>0 - 4.9</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>110-54-3</td>
<td>0 - 3</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>110-82-7</td>
<td>0 - 3</td>
</tr>
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</table>

**Supplier notification**

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS number</th>
<th>Concentration</th>
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</thead>
<tbody>
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<td>Toluene</td>
<td>108-88-3</td>
<td>0 - 30</td>
</tr>
<tr>
<td>Xylene (o,m,p isomers)</td>
<td>1330-20-7</td>
<td>0 - 25</td>
</tr>
<tr>
<td>Methyl Tertiary Butyl Ether (MTBE)</td>
<td>1634-04-4</td>
<td>0 - 16</td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>95-63-6</td>
<td>0 - 6</td>
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<tr>
<td>Cumene</td>
<td>98-82-8</td>
<td>0 - 5</td>
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<td>110-54-3</td>
<td>0 - 3</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>110-82-7</td>
<td>0 - 3</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

**State regulations**

- Connecticut carcinogen reporting list: Benzene
- Connecticut hazardous material survey: Toluene; Xylene (o,m,p isomers); Ethanol; Cumene; Ethylbenzene; Benzene; n-Hexane; Gasoline
- Illinois toxic substances disclosure to employee act: Toluene; Xylene (o,m,p isomers); Ethanol; Cumene; Ethylbenzene; Benzene; n-Hexane; Gasoline
- Rhode Island RTK hazardous substances: Toluene; Xylene (o,m,p isomers); Ethanol; Cumene; Ethylbenzene; Benzene; n-Hexane; Gasoline
- Pennsylvania RTK: Toluene: (environmental hazard, generic environmental hazard); Hexane (Other Isomers): (generic environmental hazard); Xylene (o,m,p isomers): (environmental hazard, generic environmental hazard); Octane (All Isomers): (generic environmental hazard); Methyl Tertiary Butyl Ether (MTBE): (environmental hazard, generic environmental hazard); Ethanol: (generic environmental hazard); 1,2,4-Trimethylbenzene: (environmental hazard, generic environmental hazard); n-Heptane: (generic environmental hazard); Pentane: (generic environmental hazard); Cumene: (environmental hazard, generic environmental hazard); Ethylbenzene: (environmental hazard, generic environmental hazard); Benzene: (special hazard, environmental hazard, generic environmental hazard); n-Hexane: (generic environmental hazard); Cyclohexane: (environmental hazard, generic environmental hazard); Trimethyl Benzene (Pseudocumene): (generic environmental hazard); Gasoline: (generic environmental hazard)
- Florida: Toluene; Xylene (o,m,p isomers); Ethanol; Cumene; Ethylbenzene; Benzene; n-Hexane; Gasoline
- Michigan critical material: Toluene; Xylene (o,m,p isomers); Cumene; Benzene
- Massachusetts RTK: Toluene; Hexane (Other Isomers); Xylene (o,m,p isomers); Octane (All Isomers); Methyl Tertiary Butyl Ether (MTBE); Ethanol; 1,2,4-Trimethylbenzene; n-Heptane; Pentane; Cumene; Ethylbenzene; Benzene; n-Hexane; Cyclohexane; Trimethyl Benzene (Pseudocumene); Gasoline
- New Jersey: Toluene; Xylene (o,m,p isomers); Octane (All Isomers); Methyl Tertiary Butyl Ether (MTBE); Ethanol; 1,2,4-Trimethylbenzene; n-Heptane; Pentane; Cumene; Ethylbenzene; Benzene; n-Hexane; Cyclohexane; Trimethyl Benzene (Pseudocumene); Gasoline
- Louisiana RTK reporting list: Gasoline

Continued on next page
WARNING: This product contains chemical(s) known to the state of California to cause cancer, birth defects or other reproductive harm: Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause reproductive harm (male): Benzene

California prop. 65 (no significant risk level): Benzene
California prop. 65 (acceptable daily intake level): Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause birth defects or other reproductive harm.: Toluene; Benzene

WARNING: This product contains chemical(s) known to the state of California to cause cancer.: Benzene

Canada

WHMIS (Canada): Class B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
Class D-2A: Material causing other toxic effects (VERY TOXIC).
Class D-2B: Material causing other toxic effects (TOXIC).
CEPA DSL: Toluene; Hexane (Other Isomers); Xylene (o,m,p isomers); Octane (All Isomers); Methyl Tertiary Butyl Ether (MTBE); Ethanol; Tertiary Amyl Methyl Ether (TAME); 1,2,4-Trimethylbenzene; n-Heptane; Pentane; Cumene; Ethylbenzene; Benzene; n-Hexane; Cyclohexane; Trimethyl Benzene (Pseudocumene); Gasoline

Section 16. Other Information

Label Requirements: CANCER HAZARD
CONTAINS MATERIAL WHICH CAN CAUSE CANCER
HIGHLY FLAMMABLE LIQUID AND VAPOR.
HARMFUL IF SWALLOWED.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
BLOOD, KIDNEYS, LUNGS, REPRODUCTIVE SYSTEM, LIVER, PERIPHERAL NERVOUS SYSTEM, GASTROINTESTINAL TRACT, RESPIRATORY TRACT, SKIN, BONE MARROW, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
VAPOR MAY CAUSE FLASH FIRE.
MAY BE HARMFUL IF ABSORBED THROUGH SKIN.

Hazardous Material Information System (U.S.A.)

<table>
<thead>
<tr>
<th>Hazardous Material Information System (U.S.A.)</th>
<th>Health</th>
<th>Fire hazard</th>
<th>Physical Hazard</th>
<th>Personal protection</th>
</tr>
</thead>
</table>

National Fire Protection Association (U.S.A.)

Flammability

<table>
<thead>
<tr>
<th>Flammability</th>
<th>Health</th>
<th>Instability</th>
</tr>
</thead>
</table>

| Specific hazard | |
|-----------------| |

Date of printing: 11/28/2005.
Date of previous issue: No Previous Validation.
Version: 1

Disclaimer

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Continued on next page
OBTAINED, OR THE SAFETY AND TOXICITY OF THE PRODUCT IN ANY SPECIFIC APPLICATION. FURTHERMORE, THE INFORMATION HEREFIN IS NOT REPRESENTED AS ABSOLUTELY COMPLETE, SINCE IT IS NOT PRACTICABLE TO PROVIDE ALL THE SCIENTIFIC AND STUDY INFORMATION IN THE FORMAT OF THIS DOCUMENT, PLUS ADDITIONAL INFORMATION MAY BE NECESSARY UNDER EXCEPTIONAL CONDITIONS OF USE, OR BECAUSE OF APPLICABLE LAWS OR GOVERNMENT REGULATIONS.

**Definitions of Material Safety Data Sheet Terminology**

**GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS**

- **ACGIH** - American Conference of Governmental Industrial Hygienists, (private association)
- **DOT** - United States Department of Transportation
- **EPA** - United States Environmental Protection Agency
- **IARC** - International Agency for Research on Cancer, (private association)
- **NFPA** - National Fire Protection Association, (private association)
- **MSHA** - Mine Safety and Health Administration, U.S. Department of Labor
- **NIOSH** - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services
- **NTP** - National Toxicology Program, (private association)
- **OSHA** - Occupational Safety and Health Administration, U.S. Department of Labor
- **WHMIS** - Workplace Hazardous Material Information System
- **CSA** - Canadian Standards Association

**HAZARD AND EXPOSURE INFORMATION**

- **Acute Hazard** - An adverse health effect which occurs rapidly as a result of short term exposure.
- **CAS #** - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.
- **Ceiling** - The concentration that should not be exceeded during any part of the working exposure.
- **Chronic Hazard** - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration.
- **Fire Hazard** - A material that poses a physical hazard by being flammable, combustible, phyrophoric or an oxidizer as defined by 29 CFR 1910.1200
- **Hazard Class** - DOT hazard classification
- **Hazardous Ingredients** - Names of ingredients which have been identified as health hazards.
- **IDLH** - Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.
- **mg/m^3** - Milligrams of contaminant per cubic meter of air, a mass to volume ratio
- **N/A** - Not available or no relevant information found
- **NA** - Not applicable
- **PEL** - OSHA permissible exposure limit; an action level of one half this value may be applicable
- **ppm** - Part per million (one volume of vapor or gas in one million volumes of air)
- **Pressure Hazard** - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200
- **Reactive Hazard** - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.
- **STEL** - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.
- **TLV** - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.
- **8-hour TWA** - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.
- **LD50** - Single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of the defined animal population.
- **LC50** - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.
Material Safety Data Sheet
1,1,2,2-Tetrabromoethane MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,1,2,2-Tetrabromoethane
Catalog Codes: SLT1357
CAS#: 79-27-6
RTECS: KI8225000
TSCA: TSCA 8(b) inventory: 1,1,2,2-Tetrabromoethane
Cl#: Not applicable.
Synonym:
Chemical Name: 1,1,2,2-Tetrabromoethane
Chemical Formula: CHBr2CHBr2

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>{1,1,2,2-}Tetrabromoethane</td>
<td>79-27-6</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: 1,1,2,2-Tetrabromoethane: ORAL (LD50): Acute: 1200 mg/kg [Rat]. 269 mg/kg [Mouse]. VAPOR (LC50): Acute: 549 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator). Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator).
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Classified SUSPECTED for human.
DEVELOPMENTAL TOXICITY: PROVEN
The substance is toxic to the nervous system, the reproductive system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.
Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:**
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

**Ingestion:**
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 335°C (635°F)

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** These products are carbon oxides (CO, CO2), halogenated compounds.

**Fire Hazards in Presence of Various Substances:** Slightly flammable to flammable in presence of oxidizing materials, of reducing materials.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Keep container tightly closed.

**Special Remarks on Explosion Hazards:** Not available.

Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.
Section 7: Handling and Storage

Precautions:
Keep locked up. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Camphor and Iodoform

Taste: Not available.

Molecular Weight: 345.65 g/mole

Color: Colorless to light yellow.

pH (1% soln/water): Not applicable.

Boiling Point: 240°C (464°F)

Melting Point: 0°C (32°F)

Critical Temperature: Not available.
Specific Gravity: 2.97 (Water = 1)

Vapor Pressure: <0.1 mm of Hg (@ 20°C)

Vapor Density: 11.9 (Air = 1)

Volatile: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 280

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Soluble in methanol, diethyl ether, acetone.
Insoluble in cold water, hot water, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with oxidizing agents.
Reactive with acids, alkalis.
Slightly reactive to reactive with reducing agents, organic materials, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 269 mg/kg [Mouse].
Acute toxicity of the vapor (LC50): 549 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
TERATOGENIC EFFECTS: Classified SUSPECTED for human.
DEVELOPMENTAL TOXICITY: PROVEN
The substance is toxic to the nervous system, the reproductive system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation.
Hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

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**Section 12: Ecological Information**

Ecotoxicity: Not available.

BOD5 and COD: Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

---

**Section 13: Disposal Considerations**

Waste Disposal:

---

**Section 14: Transport Information**

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Tetrabromoethane : UN2504 PG: III

**Special Provisions for Transport:** Marine Pollutant

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**Section 15: Other Regulatory Information**

**Federal and State Regulations:**
Pennsylvania RTK: 1,1,2,2-Tetrabromoethane
Massachusetts RTK: 1,1,2,2-Tetrabromoethane
TSCA 8(b) inventory: 1,1,2,2-Tetrabromoethane


**Other Classifications:**

**WHMIS (Canada):**
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**
R20/22- Harmful by inhalation and if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R61- May cause harm to the unborn child.

**HMIS (U.S.A.):**

Health Hazard: 3
Fire Hazard: 1
Reactivity: 0
Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 3
Flammability: 0
Reactivity: 1
Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information


Other Special Considerations: Not available.

Created: 10/10/2005 08:53 PM
Last Updated: 10/10/2005 08:53 PM

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Material Safety Data Sheet
Acetic acid, >96%

ACC# 00120

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Acetic acid, >96%


**Synonyms:** Ethanoic acid; Ethylic acid; Methanecarboxylic acid; Vinegar acid.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

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Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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</thead>
<tbody>
<tr>
<td>64-19-7</td>
<td>Acetic acid</td>
<td>&gt;96</td>
<td>200-580-7</td>
</tr>
</tbody>
</table>

---

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

**Appearance:** clear, colorless liquid. Flash Point: 39 deg C.

**Danger!** Causes severe eye and skin burns. Causes severe digestive and respiratory tract burns. **Flammable liquid and vapor.** May be harmful if absorbed through the skin. Glacial acetic acid solidifies below 62°F (17°C). Corrosive to metal.

**Target Organs:** Teeth, eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes severe eye irritation. Contact with liquid or vapor causes severe burns and possible irreversible eye damage.

**Skin:** Causes skin burns. May be harmful if absorbed through the skin. Contact with the skin may cause blackening and hyperkeratosis of the skin of the hands.

**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause polyuria, oliguria (excretion of a diminished amount of urine in relation to the fluid intake) and anuria (complete suppression of urination). Rapidly absorbed from the gastrointestinal tract.

**Inhalation:** Effects may be delayed. Causes chemical burns to the respiratory tract. Exposure may lead to bronchitis, pharyngitis, and dental erosion. May be absorbed through the lungs.

**Chronic:** Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Acetic acid can cause occupational asthma. One case of a delayed asthmatic response to glacial acetic acid has been reported in a person with bronchial asthma. Skin sensitization to acetic acid is rare, but has occurred.
**Section 4 - First Aid Measures**

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Persons with pre-existing skin disorders or impaired respiratory or pulmonary function may be at increased risk to the effects of this substance. Treat symptomatically and supportively.

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Reacts with most metals to form highly flammable hydrogen gas which can form explosive mixtures with air. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** Use water spray, dry chemical, "alcohol resistant" foam, or carbon dioxide.

**Flash Point:** 39 deg C (102.20 deg F)

**Autoignition Temperature:** 426 deg C (798.80 deg F)

**Explosion Limits, Lower:** 4.0 vol %

**Upper:** 19.9 vol %

**NFPA Rating:** (estimated) Health: 3; Flammability: 2; Instability: 0

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wash area with soap and water. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures. Control runoff and isolate discharged material for proper disposal. Spill may be carefully neutralized with soda ash (sodium carbonate).

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Discard contaminated shoes. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Do not breathe vapor or mist. Use corrosion-resistant transfer equipment when dispensing.

**Storage:** Keep away from heat, sparks, and flame. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near alkaline substances. Acetic acid should be kept above its freezing point of 62°F(17°C) to allow it to be handled as a liquid. It will contract slightly on freezing. Freezing and thawing does not affect product quality.

**Section 8 - Exposure Controls, Personal Protection**
**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
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<tr>
<td>Acetic acid</td>
<td>10 ppm TWA; 15 ppm STEL</td>
<td>10 ppm TWA; 25 mg/m3 TWA</td>
<td>10 ppm TWA; 25 mg/m3 TWA</td>
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</table>

**OSHA Vacated PELs:** Acetic acid: 10 ppm TWA; 25 mg/m3 TWA

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles and face shield.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** pungent odor - vinegar odor

**pH:** <.01

**Vapor Pressure:** 11.4 mm Hg @ 20 deg C

**Vapor Density:** 2.10 (Air=1)

**Evaporation Rate:** 0.97 (n-Butyl acetate=1)

**Viscosity:** 1.22 cP

**Boiling Point:** 117 - 118 deg C

**Freezing/Melting Point:** 16.6 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.05 (Water=1)

**Molecular Formula:** C2H4O2

**Molecular Weight:** 60.04

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Ignition sources, excess heat, freezing temperatures, confined spaces, Note: Use great caution in mixing with water due to heat evolution that causes explosive spattering. Always add the acid to water, never the reverse.

**Incompatibilities with Other Materials:** Metals, strong oxidizing agents, bases, chlorine trifluoride, nitric acid, acetaldehyde, chlorosulfonic acid, oleum, bromine pentafluoride, perchloric acid, potassium tert-butoxide, ethyleneimine, 2-aminoethanol, ethylene diamine, phosphorus trichloride, phosphorus isocyanate, chromic acid.

**Hazardous Decomposition Products:** Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

**Hazardous Polymerization:** Will not occur.

### Section 11 - Toxicological Information

**RTECS#:**

**CAS #** 64-19-7: AF1225000
**LD50/LC50:**
CAS# 64-19-7:
- Draize test, rabbit, skin: 50 mg/24H Mild;
- Inhalation, mouse: LC50 = 5620 ppm/1H;
- Oral, rat: LD50 = 3310 mg/kg;
- Skin, rabbit: LD50 = 1060 uL/kg;

**Carcinogenicity:**
CAS# 64-19-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information available.

**Teratogenicity:** No teratogenic effects were observed among the offspring of mice, rats, or rabbits that had been given very large doses of apple cider vinegar (containing acetic acid) during pregnancy. Acetic acid treatment of suckling rats (via maternal administration) was associated with abnormalities of behavioral testing.

**Reproductive Effects:** Intratesticular, rat: TDLo = 400 mg/kg (male 1 day(s) pre-mating) Fertility - male fertility index (e.g. # males impregnating females per # males exposed to fertile nonpregnant females).

**Mutagenicity:**
- Sister Chromatid Exchange: Human, Lymphocyte = 5 mmol/L.;
- Unscheduled DNA Synthesis: Administration onto the skin, mouse = 79279 ug/kg.;
- Cytogenetic Analysis: Hamster, Ovary = 10 mmol/L.

**Neurotoxicity:** No information available.

**Other Studies:**

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**Section 12 - Ecological Information**

**Ecotoxicity:** Fish: Fathead Minnow: LC50 = 88 mg/L; 96 Hr; Static bioassay @ 18-22°C Fish: Bluegill/Sunfish: LC50 = 75 mg/L; 96 Hr; UnspecifiedFish: Goldfish: LC50 = 423 mg/L; 24 Hr; UnspecifiedWater flea Daphnia: EC50 = 32-47 mg/L; 24-48 Hr; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 8.86-11 mg/L; 5,15,25 min; Microtox test If released to water or soil, acetic acid will biodegrade readily. Evaporation from dry surfaces is likely to occur. When spilled on soil, the liquid will spread on the surface and penetrate into the soil at a rate dependent on the soil type and its water content. Acetic acid shows no potential for biological accumulation or food chain contamination.

**Environmental:** If released to the atmosphere, it is degraded in the vapor-phase by reaction with photochemically produced hydroxyl radicals (estimated typical half-life of 26.7 days). It occurs in atmospheric particulate matter in acetate form and physical removal from air can occur via wet and dry deposition.

**Physical:** Natural waters will neutralize dilute solutions to acetate salts.

**Other:** No information available.

---

**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

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**Section 14 - Transport Information**

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<th>Canada TDG</th>
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</thead>
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<td>ACETIC ACID GLACIAL</td>
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<td><strong>Packing Group:</strong></td>
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</table>
US FEDERAL

TSCA
  CAS# 64-19-7 is listed on the TSCA inventory.

Health & Safety Reporting List
  None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
  None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
  None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
  None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
  CAS# 64-19-7: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
  None of the chemicals in this product have a TPQ.

SARA Codes
  CAS # 64-19-7: immediate, delayed, fire.

Section 313
  No chemicals are reportable under Section 313.

Clean Air Act:
  This material does not contain any hazardous air pollutants.
  This material does not contain any Class 1 Ozone depletors.
  This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
  CAS# 64-19-7 is listed as a Hazardous Substance under the CWA.
  None of the chemicals in this product are listed as Priority Pollutants under the CWA.
  None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
  None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
  CAS# 64-19-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
  California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
  C

Risk Phrases:
  R 10 Flammable.
  R 35 Causes severe burns.

Safety Phrases:
  S 23 Do not inhale gas/fumes/vapour/spray.
  S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
  CAS# 64-19-7: 1

Canada - DSL/NDSL
  CAS# 64-19-7 is listed on Canada's DSL List.

Canada - WHMIS
  This product has a WHMIS classification of E, B3.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 64-19-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

**MSDS Creation Date:** 7/21/1999  
**Revision #12 Date:** 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Acetone

ACC# 00140

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Acetone

**Synonyms:** Dimethylketone; 2-Propanone.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-64-1</td>
<td>Acetone</td>
<td>&gt;99</td>
<td>200-662-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid. Flash Point: -20 deg C.

**Danger!** Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes eye irritation. Breathing vapors may cause drowsiness and dizziness. Causes respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Prolonged or repeated contact may dry the skin and cause irritation.

**Target Organs:** Central nervous system, respiratory system, eyes, skin.

**Potential Health Effects**
**Eye:** Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Vapors cause eye irritation.

**Skin:** May be absorbed through the skin. Repeated or prolonged exposure may cause drying and cracking of the skin.

**Ingestion:** May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

**Inhalation:** Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause motor incoordination and speech abnormalities.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause effects similar to those of acute inhalation. Matsushita et al. exposed human volunteers 6 hours/day for 6 days at 500 ppm acetone and found hematologic changes including significantly increased leukocyte and eosinophil counts and decreased neutrophil phagocytic activity.

### Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

**Ingestion:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Vapors are heavier than air and may travel to a source of ignition and flashback. Vapors can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** Use dry chemical, carbon dioxide, or appropriate foam. Water spray may reduce vapor but may not prevent ignition in closed spaces. Use only non-sparking tools and equipment.

**Flash Point:** -20 deg C (-4.00 deg F)

**Autoignition Temperature:** 465 deg C (869.00 deg F)

**Explosion Limits, Lower:** 2.5%

**Upper:** 12.8%

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Wear appropriate protective clothing to minimize contact with skin. Remove all sources of ignition. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces. Use only non-sparking tools and equipment.
**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.

**Storage:** Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

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**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Ventilation fans and other electrical service must be non-sparking and have an explosion-proof design.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>500 ppm TWA; 750 ppm STEL</td>
<td>250 ppm TWA; 590 mg/m3 TWA 2500 ppm IDLH</td>
<td>1000 ppm TWA; 2400 mg/m3 TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Acetone: 750 ppm TWA; 1800 mg/m3 TWA

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear butyl rubber gloves, apron, and/or clothing.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A NIOSH/MSHA approved or European Standard EN 149 air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected.

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**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** sweetish odor

**pH:** 7

**Vapor Pressure:** 231 mm Hg @ 25 deg C

**Vapor Density:** 2.0 (Air=1)

**Evaporation Rate:** 5.6 (n-Butyl acetate=1)

**Viscosity:** 0.32 cps @ 20 deg C

**Boiling Point:** 56.5 deg C

**Freezing/Melting Point:** -94 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 0.788 @ 25°C

**Molecular Formula:** C₃H₆O

**Molecular Weight:** 58.08

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**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: High temperatures, ignition sources, confined spaces.

Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, strong bases, nitric acid, hexachloromelamine, sulfur dichloride, potassium tert-butoxide.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 67-64-1: AL3150000

LD50/LC50: 
CAS# 67-64-1:
  Dermal, guinea pig: LD50 = >9400 uL/kg;
  Draize test, rabbit, eye: 20 mg Severe;
  Draize test, rabbit, eye: 20 mg/24H Moderate;
  Draize test, rabbit, eye: 10 uL Mild;
  Draize test, rabbit, skin: 500 mg/24H Mild;
  Inhalation, mouse: LC50 = 44 gm/m3/4H;
  Inhalation, rat: LC50 = 50100 mg/m3/8H;
  Oral, mouse: LD50 = 3 gm/kg;
  Oral, rabbit: LD50 = 5340 mg/kg;
  Oral, rat: LD50 = 5800 mg/kg;

Carcinogenicity:
CAS# 67-64-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: In a series of studies, no statistically significant differences in causes of death or clinical laboratory results were observed in 948 employees exposed to up to 1070 ppm acetone over 23 years.

Teratogenicity: Animal studies have only shown harmful effects in the offspring of animals exposed to doses which also produced significant maternal toxicity.

Reproductive Effects: During the Stewart et al. study, four adult female volunteers were exposed 7.5 hours to acetone vapor at a nominal concentration of 1000 ppm. Three of the four women experienced premature menstrual periods which were attributed to the acetone exposure.

Mutagenicity: Sex chromosome loss and nondisjunction(Yeast - Saccharomyces cerevisiae) = 47600 ppm; Cytogenetic analysis(Rodent - hamster Fibroblast)= 40 gm/L.

Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: 5540 mg/l; 96-hr; LC50Fish: Bluegill/Sunfish: 8300 mg/l; 96-hr; LC50 No data available.

Environmental: Volatilizes, leeches, and biodegrades when released to soil. TERRESTRIAL FATE: If released on soil, acetone will both volatilize and leach into the ground. Acetone readily biodegrades and there is evidence suggesting that it biodegrades fairly rapidly in soils. AQUATIC FATE: If released into water, acetone will probably biodegrade. It is readily biodegradable in screening tests, although data from natural water are lacking. It will also be lost due to volatilization (estimated half-life 20 hr from a model river). Adsorption to sediment should not be significant.

Physical: ATMOSPHERIC FATE: In the atmosphere, acetone will be lost by photolysis and reaction with photochemically produced hydroxyl radicals. Half-life estimates from these combined processes are 79 and 13 days in January and June, respectively, for an overall annual average of 22 days. Therefore considerable dispersion should occur. Being miscible in water, wash out by rain should be an important removal process. This process has been confirmed around Lake Shinsei-ko in Japan. There acetone was found in the air and rain as well as the lake.

Other: No information available.
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**
CAS# 67-64-1: waste number U002 (Ignitable waste).

### Section 14 - Transport Information

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<td><strong>UN Number:</strong></td>
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<td><strong>Packing Group:</strong></td>
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</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 67-64-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
CAS# 67-64-1: 40 CFR 799.5000

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 67-64-1: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 67-64-1: immediate, fire.

**Section 313**
No chemicals are reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 67-64-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
XI F

Risk Phrases:
R 11 Highly flammable.
R 36 Irritating to eyes.
R 66 Repeated exposure may cause skin dryness or cracking.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 67-64-1: 0

Canada - DSL/NDSL
CAS# 67-64-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 67-64-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/26/1999
Revision #19 Date: 10/22/2007

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MATERIAL SAFETY DATA SHEET
Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: ACETYLENE

SYNONYMS: Ethine; Ethyne
CHEMICAL FAMILY: Alkane (hydrocarbon)
FORMULA: C₂H₂

PRODUCT USE:
For chemical synthesis, manufacture of carbon black, welding, cutting, and for general analytical or synthetic chemical uses.

MANUFACTURED/SUPPLIED FOR:
ADDRESS: 9101-LBJ-FREEWAY-SUITE-800
DALLAS, TX-75243

EMERGENCY PHONE:
CHEMTREC: 1-800-424-9300
BUSINESS PHONE:
General MSDS Information: 1-972/301-5200
Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
<th>EXPOSURE LIMITS IN AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TLV ppm</td>
</tr>
<tr>
<td>Acetylene</td>
<td>74-86-2</td>
<td>&gt;98-99.6% Simple Asphyxiant</td>
<td>NE</td>
</tr>
<tr>
<td>Maximum Impurities</td>
<td>&lt;2-.4%</td>
<td>None of the trace impurities in this product contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.</td>
<td>NE</td>
</tr>
</tbody>
</table>

NE = Not Established  
C = Ceiling Limit  
See Section 16 for Definitions of Terms Used.

NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.
3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, flammable gas, with a garlic-like odor, that is dissolved in acetone. Acetylene poses an extreme fire hazard when accidentally released. The main health hazard associated with a release of Acetylene is asphyxiation by displacement of oxygen. Acetylene is lighter than air, and may spread long distances. Distant ignition and flashback are possible. Flame or high temperature impinging on a localized area of the cylinder of this product can cause the cylinder to rupture violently without activating the cylinder’s relief devices. Acetylene is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Provide adequate fire protection during emergency response situations. Acetylene may decompose explosively at elevated temperatures and pressures.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: Acetylene, at concentration below the LEL of 2.5% (25000 ppm), is essentially non-toxic. At higher concentrations, Acetylene has anesthetic effects. Symptoms of over-exposure to such high concentrations may include drowsiness, dizziness, and a general feeling of weakness.

High concentrations of this gas can cause an oxygen-deficient environment. It should be noted that before suffocation could occur, the lower flammability limit of Acetylene in air would be exceeded; possibly causing an oxygen-deficient and explosive atmosphere. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

<table>
<thead>
<tr>
<th>CONCENTRATION</th>
<th>SYMPTOM OF EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-16% Oxygen:</td>
<td>Breathing and pulse rate increased, muscular coordination slightly disturbed.</td>
</tr>
<tr>
<td>10-14% Oxygen:</td>
<td>Emotional upset, abnormal fatigue, disturbed respiration.</td>
</tr>
<tr>
<td>6-10% Oxygen:</td>
<td>Nausea and vomiting, collapse or loss of consciousness.</td>
</tr>
<tr>
<td>Below 6%:</td>
<td>Convulsive movements, possible respiratory collapse, and death.</td>
</tr>
</tbody>
</table>

OTHER POTENTIAL HEALTH EFFECTS: Acetylene is generally non-irritating to the skin and eyes. Acetylene is dissolved in a solvent, usually acetone. Any skin or eye contact with the solvent may be slightly irritating to contaminated skin or eyes.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to Acetylene may cause the following health effects:

ACUTE: The most significant hazard associated with this product is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to Acetylene.

TARGET ORGANS: Respiratory system, central nervous system.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant clothing should be worn. Adequate fire protection must be provided during rescue situations.
4. FIRST-AID MEASURES (Continued)

Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

SKIN and EYE EXPOSURE: If contact is made with the solvent, flush area for 15 minutes with water.

Victim(s) must be taken for medical attention. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable to a flammable gas.

AUTOIGNITION TEMPERATURE @ 1 atmosphere: 305 °C (581°F)

FLAMMABLE LIMITS (in air by volume, %):

- Lower (LEL): 2.5%
- Upper (UEL): 82.0%

FIRE EXTINGUISHING MATERIALS: Extinguish fires of this gas by shutting-off the source of the gas, if possible. Use water spray to cool fire-exposed cylinders, structures and equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may decompose and produce toxic gases including carbon monoxide and carbon dioxide. Acetylene is extremely flammable and can readily form explosive mixtures with air over a very wide range. An explosion hazard exists in confined spaces when the gas is released. An explosive decomposition of pure acetylene can occur under certain conditions of elevated pressure, temperature and container size.

DANGER! Fires impinging (direct flame) on the outside surface of cylinders of Acetylene can be very dangerous. Direct flame exposure on the cylinder wall can cause a violent rupture of the cylinder, releasing the contents into a massive fireball and explosion of released Acetylene. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the cylinders. For fires in large areas, use unmanned hose holder or monitor nozzles to apply water on those cylinders involved as well as surrounding cylinders to keep them cool. If this is not possible, withdraw from area and allow fire to burn.

- Explosion Sensitivity to Static Discharge: Static discharge may cause this product to ignite explosively, if released.

SPECIAL FIRE-FIGHTING PROCEDURES: The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder or piping system. If possible, stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the still-leaking Acetylene could explosively re-ignite without warning and cause extensive damage, injury, or fatality. In this case, increase ventilation (in enclosed areas) to prevent flammable or explosive mixture formation. Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for cylinder rupture, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of cylinders and exposures, evacuate the area. The North American Emergency Response Guidebook (Guide #116) recommends 0.5 miles.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel. Adequate fire protection must be provided. Minimum Personal Protective Equipment should be Level B: fire-retardant protective clothing, gloves and Self-Contained Breathing Apparatus. Use only non-sparking tools and equipment.

If possible, close the Acetylene cylinder valve to stop the leak. If this does not stop the release (or if it is not possible to safely reach the cylinder valve), allow the gas to release in-place, or move the cylinder to a safe area, away from ignition sources. Extreme caution should be used when moving a leaking cylinder of Acetylene.

Monitor the surrounding area for oxygen and combustible gas levels. Combustible gas concentrations must be below 10% of the LEL (2.5%), and the oxygen content above 19.5% before entry of personnel into the area, without Self-Contained Breathing Apparatus and protective equipment.

THIS IS AN EXTREMELY FLAMMABLE GAS. Protection of all personnel and the area must be maintained.
7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this product could occur without any significant warning symptoms.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright (with valve-protection cap in place) and firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Keep storage area clear of materials which can burn. Do not allow area where cylinders are stored to exceed 52 °C (125 °F). Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage. Post “No Smoking or Open Flames” signs in storage or use areas.

In the United States, cylinders of Acetylene stored inside buildings at locations of use must be limited to a total capacity of 2500 ft³ (70m³). In Canada, the limit is for a total capacity of 2160 ft³ (60m³) in non-sprinklered buildings and 6130 ft³ (170 m³) in buildings with sprinkler systems. After these quantities are exceeded, a special room must be built for the storage of Acetylene. The installation of leak detection and alarms for storage areas of Acetylene must be considered.

Storage areas must meet national electrical codes for Class 1 Hazardous Areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers).

Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours. Isolate from other incompatible chemicals (refer to Section 10, Stability and Reactivity).

It is important to note that Acetylene, in its free state, under pressure, may decompose violently. The higher the pressure, the smaller the initial force necessary to cause a reaction. Therefore, never use Acetylene outside the cylinder at pressures in excess of 15 psig. If pressures exceeding this limit are utilized, special explosion and fire safety precautions must be implemented.

Keep the smallest amount on-site as is necessary. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

Use non-sparking ventilation systems, approved vapor-tight or explosion-proof equipment, and appropriate electrical systems. Electrical equipment used in gas-handling operations, or located in storage areas, should be non-sparking or explosion proof. Use a check valve in the discharge line to prevent hazardous backflow. Never tamper with pressure relief devices in valves and cylinders.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Use piping and equipment adequately designed to withstand pressures to be encountered. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Do not “crack” valve open before connecting it, since ignition may occur. Leak check system with leak detection solution, never with flame. Immediately contact the supplier if there are any difficulties associated with operating cylinder valve. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings, doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc on a compressed gas cylinder or make a cylinder part of an electric circuit.

After Use: Close valve after each use and when empty. Replace valve protection cap. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT cylinders designed for acetylene storage. Earth-ground and bond all piping systems and equipment associated with this product.

For welding and brazing operations, refer to ANSI Z-49.1 “Safety in Welding and Cutting” and OSHA safety regulations for welding, cutting, and brazing (29 CFR 1910.252). In addition, see the National Fire Protection Association (NFPA) publication 51 Oxygen Fuel Gas Welding and Cutting.
7. HANDLING and USE (Continued)

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper connections, DO NOT USE ADAPTERS:

<table>
<thead>
<tr>
<th>THREADED:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 50 cubic feet (1.39 m³)</td>
<td>CGA 510</td>
</tr>
<tr>
<td>Alternate:</td>
<td>CGA 300</td>
</tr>
<tr>
<td>Between 35 and 75 cubic feet (2.08 m³)</td>
<td>CGA 520</td>
</tr>
<tr>
<td>Approximately 10 cubic feet (280 L)</td>
<td>CGA 200</td>
</tr>
<tr>
<td>Canada - Over 50 cubic feet</td>
<td>CGA 415</td>
</tr>
</tbody>
</table>

PIN-INDEXED YOKE: Not Applicable.
ULTRA HIGH INTEGRITY: Not Applicable.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge Acetylene-handling equipment with inert gas (i.e. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Provide natural or explosion-proof ventilation adequate to ensure Acetylene does not reach its lower flammability limit of 2.5%. Local exhaust ventilation is preferred, because it prevents gas dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of Acetylene and the presence of potentially explosive air-gas mixtures.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% (air-purifying respirators will not function) or during emergency response to a release of this product. During an emergency situation, before entering the area, check for flammable gas level as well as oxygen-deficient atmospheres. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: Wear leather gloves when handling cylinders of this product. Otherwise, wear glove protection appropriate to the specific operation for which this product is used. Wear Solvex or neoprene gloves if operations could lead to a potential exposure to the solvent.

BODY PROTECTION: Use body protection appropriate for task. Cotton clothing is recommended for use to prevent static electric build-up. Safety shoes are recommended when handling cylinders.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 0°C (32°F), 1 atm: 0.07314 lb/ft³ (1.1716 kg/m³)
BOILING POINT @ 10 psig: -75°C (-103°F)
FREEZING/MELTING POINT @ 10 psig: -82.2°C (-116.3°F)
SPECIFIC GRAVITY OF LIQUID @ -80°C (-112°F): 0.613
SPECIFIC GRAVITY OF GAS @ 0°C (32°F) (air = 1): 0.906
SOLUBILITY IN WATER, vol/vol @ 0°C (32°F) and 1 atm: 1.7
EVAPORATION RATE (nBuAc = 1): Not applicable.
SPECIFIC VOLUME OF GAS @ 21.1°C (70°F) 1 atm: 14.7 ft³/lb (0.918 m³/kg)
VAPOR PRESSURE @ 21.1°C (70°F): 635 psig (4378 kPa)
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.
APPEARANCE AND COLOR: Colorless gas. Acetylene of 100% purity is odorless, but commercial purity has a garlic-like odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): Commercial purity Acetylene has a garlic-like odor that may be a warning property. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.
10. STABILITY and REACTIVITY

STABILITY: Acetylene is stable at standard temperatures and pressures. Gaseous acetylene may decompose violently at elevated temperatures and pressures. Acetylene must not be used above pressure greater than 15 psig. The higher the pressure, the more likely it is for a reaction to occur.

DECOMPOSITION PRODUCTS: Carbon and hydrogen. When ignited in the presence of oxygen, carbon monoxide and carbon dioxide will be generated.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Acetylene is not compatible with the following materials: Strong oxidizers (i.e. chlorine, bromine pentfluoride, oxygen, oxygen difluoride, and nitrogen trifluoride); calcium hypochlorite; various heavy metals (copper, silver, mercury, brass with a copper content exceeding 65%) and the salts of these metals; halogens (bromine, chlorine, iodine, fluoride); hydrides (i.e. sodium hydride, cesium hydride); ozone; perchloric acid; potassium.

HAZARDOUS POLYMERIZATION: Can occur when heated or under pressure.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for Acetylene.

TCLo (inhalation, human) = 20 pph; central nervous system, respiratory system effects.

LCLo (inhalation, human) = 500,000 ppm/5 minutes

Other data pertaining to the effects of Acetylene inhalation on humans are as follows:

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000 ppm</td>
<td>Intoxication (drowsiness, dizziness, giddiness).</td>
</tr>
<tr>
<td>200,000 ppm</td>
<td>Severe intoxication.</td>
</tr>
<tr>
<td>300,000 ppm</td>
<td>Loss of coordination.</td>
</tr>
<tr>
<td>350,000 ppm</td>
<td>Unconsciousness after 5 minutes of exposure.</td>
</tr>
</tbody>
</table>

Effects on Short-Term Inhalation: Animals have shown tolerance to 10% Acetylene. In studies with dogs, cats, and rabbits, Acetylene acts as an anesthetic at 20% exposure. Recovery occurs if the oxygen level is maintained. In an oxygen-deficient environment, death may occur after 5-10 minutes. Rodents exposed to 25, 50, and 80 percent Acetylene in oxygen for 1-2 hours daily (93 hours total exposure), evidenced no weight change or cellular damage. Mixtures of 80% Acetylene/20% oxygen caused a rise in blood pressure in an exposed cat.

SUSPECTED CANCER AGENT: Acetylene is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: This product is not irritating; however, contact with the solvent can be slightly irritating to contaminated skin or eyes.

SENSITIZATION TO THE PRODUCT: Acetylene is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Acetylene on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for Acetylene.

Embryotoxicity: No embryotoxic effects have been described for Acetylene.

Teratogenicity: No teratogenicity effects have been described for Acetylene.

Reproductive Toxicity: No reproductive toxicity effects have been described for Acetylene.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to Acetylene.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Acetylene.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary; treat symptoms; reduce or eliminate exposure.
12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Acetylene will be dissipated rapidly in well-ventilated areas. The following environmental data are available for acetylene.

ACETYLENE: Water Solubility = 100 vol./100 vol. at 18 EC. Acetylene is not expected to be harmful to aquatic life. Only moderately toxic to fish. Volatility and low solubility suggest it would be rare for water to become critically polluted from accidental releases. Acetylene is biodegraded through various plant and bacterial systems by inactivating atmospheric acetylene through their nitrogen-fixing mechanisms.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments and the anesthetic properties of Acetylene at high concentrations of exposure. No adverse effect is anticipated to occur to plant-life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on Acetylene’s effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Air Liquide. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Acetylene, dissolved
HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1001
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Flammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 116
MARINE POLLUTANT: Acetylene is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

NOTE: Shipment of compressed gas cylinders which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301 (b)).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: Acetylene is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

SARA THRESHOLD PLANNING QUANTITY: Not applicable.
TSCA INVENTORY STATUS: Acetylene is listed on the TSCA Inventory.
CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS:
- Acetylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds.
- Depending on specific operations involving the use of this product, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Acetylene is not listed in Appendix A, however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lbs (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.
- Acetylene does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Acetylene is listed in Table 3 as a Regulated Substance in quantities of 10,000 lbs (4,553 kg) or greater, per 40 CFR, Part 68, of the Risk Management for Chemical Accidental Release Prevention.

OTHER CANADIAN REGULATIONS: Acetylene is categorized as a Controlled Product, Hazard Classes A, B1, F as per the Controlled Product Regulations.
15. REGULATORY INFORMATION (Continued)

STATE REGULATORY INFORMATION: Acetylene is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Acetylene.
California - Permissible Exposure Limits for Chemical Contaminants: Acetylene.
Florida - Substance List: Acetylene.
Illinois - Toxic Substance List: Acetylene.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Acetylene.
Missouri - Employer Information/Toxic Substance List: Acetylene.
New Jersey - Right to Know Hazardous Substance List: Acetylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Rhode Island - Hazardous Substance List: Acetylene.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: No.
Wisconsin - Toxic and Hazardous Substances: No.

CALIFORNIA PROPOSITION 65: Acetylene is not on the California Proposition 65 lists.

16. OTHER INFORMATION

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about acetylene can be found in the following pamphlets and videos published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5th floor, Chantilly, VA 20151-2923: (703) 788-2700.

G-1  "Acetylene"
G-1.1 "Commodity Specification for Acetylene"
P-1 "Safe Handling of Compressed Gases in Containers"
SB-4 "Handling Acetylene Cylinders in Fire Situations"
SB-8 "Use of Oxy-fuel Gas Welding and Cutting Apparatus"
AV-9 "Handling Acetylene Cylinders in Fire Situations"
    "Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

This Material Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide’s knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.
# Material Safety Data Sheet
## Alcohol denatured with IPA and MeOH MSDS

### Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>Alcohol denatured with IPA and MeOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog Codes:</td>
<td>SLA4474, SLA1282</td>
</tr>
<tr>
<td>CAS#:</td>
<td>Mixture.</td>
</tr>
<tr>
<td>RTECS:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>TSCA:</td>
<td>TSCA 8(b) inventory: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol</td>
</tr>
<tr>
<td>CI#:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Synonym:</td>
<td>Chemical Name: Alcohol, Denatured with IPA and Methanol</td>
</tr>
<tr>
<td>Chemical Name:</td>
<td>Alcohol, Denatured with IPA and Methanol</td>
</tr>
<tr>
<td>Chemical Formula:</td>
<td>C2-H5-OH</td>
</tr>
</tbody>
</table>

**Contact Information:**
Sciencelab.com, Inc.
14025 Smith Rd.
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### Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl alcohol 200 Proof</td>
<td>64-17-5</td>
<td>90</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>67-63-0</td>
<td>5</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>67-56-1</td>
<td>5</td>
</tr>
</tbody>
</table>

**Toxicological Data on Ingredients:**
- Ethyl alcohol 200 Proof: ORAL (LD50): Acute: 7060 mg/kg [Rat.]. 3450 mg/kg [Mouse]. VAPOR (LC50): Acute: 20000 ppm 8 hours [Rat]. 39000 mg/m 4 hours [Mouse]. Isopropyl alcohol: ORAL (LD50): Acute: 5045 mg/kg [Rat]. 3600 mg/kg [Mouse]. 6410 mg/kg [Rabbit]. DERMAL (LD50): Acute: 12800 mg/kg [Rabbit]. Methyl alcohol: ORAL (LD50): Acute: 5628 mg/kg [Rat.]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

**Potential Chronic Health Effects:**


DEVELOPMENTAL TOXICITY: Classified Development toxin [PROVEN] [Ethyl alcohol 200 Proof]. Classified Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE] [Ethyl alcohol 200 Proof].

Classified Reproductive system/toxin/female, Development toxin [POSSIBLE] [Isopropyl alcohol].

Classified Reproductive system/toxin/leash, Reproductive system/toxin/male [POSSIBLE] [Methyl alcohol].

The substance is toxic to blood, the reproductive system, liver, upper respiratory tract, skin, eyes, central nervous system (CNS).

The substance may be toxic to kidneys, lungs, brain, peripheral nervous system, gastrointestinal tract. Repeated or prolonged exposure to the substance can produce target organs damage.

---

**Section 4: First Aid Measures**

**Eye Contact:**
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

**Skin Contact:**
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

**Serious Inhalation:**
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

---

**Section 5: Fire and Explosion Data**

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** The lowest known value is 363°C (685.4°F) (Ethyl alcohol 200 Proof).

**Flash Points:** CLOSED CUP: Between -18°C (0°F) and 23°C (73°F).

**Flammable Limits:** The greatest known range is LOWER: 6% UPPER: 36.5% (Methyl alcohol)

**Products of Combustion:** These products are carbon oxides (CO, CO2).

**Fire Hazards in Presence of Various Substances:**
Highly flammable in presence of open flames and sparks, of heat.
Flammable in presence of combustible materials.
Slightly flammable to flammable in presence of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

**Special Remarks on Fire Hazards:**
Containers should be grounded. CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME Vapor may travel considerable distance to source of ignition and flash back. (Ethyl alcohol 200 Proof)

**Special Remarks on Explosion Hazards:**
Ethanol has an explosive reaction with the oxidized coating around potassium metal.
Ethanol ignites and then explodes on contact with acetic anhydride + sodium hydrosulfate (ignites and may explode), disulfuric acid + nitric acid, phosphorous(III) oxide platinum, potassium-tert-butoxide+ acids.
Ethanol forms explosive products in reaction with the following compound: ammonia + silver nitrate (forms silver nitride and silver fulminate), iodine + phosphorus (forms ethane iodide), magnesium perchlorate (forms ethyl perchlorate), mercuric nitrate, nitric acid + silver (forms silver fulminate) silver nitrate (forms ethyl nitrate) silver(l) oxide + ammonia or hydrazine (forms silver nitride and silver fulminate), sodium (evolves hydrogen gas).
(Ethyl alcohol 200 Proof)

---

**Section 6: Accidental Release Measures**

**Small Spill:**
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**Large Spill:**
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

---

**Section 7: Handling and Storage**

**Precautions:**
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

**Storage:**
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 23°C (73.4°F).

---

**Section 8: Exposure Controls/Personal Protection**

**Engineering Controls:**
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their
respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
Ethyl alcohol 200 Proof
TWA: 1000 (ppm) from ACGIH (TLV) [United States] [1999]
TWA: 1000 (ppm) from OSHA (PEL) [United States]
TWA: 1900 (mg/m3) from OSHA (PEL) [United States]
TWA: 1000 (ppm) from NIOSH
TWA: 1000 (ppm) [United Kingdom (UK)]
TWA: 1920 (mg/m3) [United Kingdom (UK)]
TWA: 1000 STEL: 1250 (ppm) [Canada]
Isopropyl alcohol
TWA: 983 STEL: 1230 (mg/m3) [Australia]
TWA: 200 STEL: 400 (ppm) from ACGIH (TLV) [United States] [1999]
TWA: 980 STEL: 1225 (mg/m3) from NIOSH
TWA: 400 STEL: 500 (ppm) from NIOSH
TWA: 400 STEL: 500 (ppm) [United Kingdom (UK)]

### Section 9: Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Physical state and appearance:</th>
<th>Liquid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor:</td>
<td>Alcohol like.</td>
</tr>
<tr>
<td>Taste:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Molecular Weight:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Color:</td>
<td>Clear Colorless.</td>
</tr>
<tr>
<td>pH (1% soln/water):</td>
<td>Not available.</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>The lowest known value is 64.5°C (148.1°F) (Methyl alcohol). Weighted average: 78°C (172.4°F)</td>
</tr>
<tr>
<td>Melting Point:</td>
<td>May start to solidify at -88.5°C (-127.3°F) based on data for: Isopropyl alcohol. Weighted average: -112°C (-169.6°F)</td>
</tr>
<tr>
<td>Critical Temperature:</td>
<td>The lowest known value is 235°C (455°F) (Isopropyl alcohol).</td>
</tr>
<tr>
<td>Specific Gravity:</td>
<td>Weighted average: 0.79 (Water = 1)</td>
</tr>
<tr>
<td>Vapor Pressure:</td>
<td>The highest known value is 13.3 kPa (@ 20°C) (Methyl alcohol). Weighted average: 6.01 kPa (@ 20°C)</td>
</tr>
<tr>
<td>Vapor Density:</td>
<td>The highest known value is 2.07 (Air = 1) (Isopropyl alcohol). Weighted average: 1.59 (Air = 1)</td>
</tr>
<tr>
<td>Volatility:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Odor Threshold:</td>
<td>The highest known value is 100 ppm (Ethyl alcohol 200 Proof) Weighted average: 97.15 ppm</td>
</tr>
<tr>
<td>Water/Oil Dist. Coeff.:</td>
<td>The product is equally soluble in oil and water.</td>
</tr>
</tbody>
</table>

Dispersion Properties: See solubility in water, methanol, diethyl ether, n-octanol, acetone.

Solubility:
Easily soluble in cold water, hot water, n-octanol.
Soluble in methanol, diethyl ether, acetone.

---

Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess Heat, ignition sources, incompatible materials

**Incompatibility with various substances:**
Reactive with oxidizing agents, acids, alkalis, moisture.
Slightly reactive to reactive with metals.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**
Ethanol rapidly absorbs moisture from the air.
Can react vigorously with oxidizers.
The following oxidants have been demonstrated to undergo vigorous/explosive reaction with ethanol: barium perchlorate, bromine pentfluoride, calcium hypochlorite, chloryl perchlorate, chromium trioxide, chromyl chloride, dioxygen difluoride, disulphur difluoride, fluorine nitrate, hydrogen peroxide, iodine heptafluoride, nitric acid nitrosyl perchlorate, perchloric acid permanganic acid, peroxodisulfuric acid, potassium dioxoacetic acid, potassium perchlorate, potassium permanganate, ruthenium(VIII) oxide, silver perchlorate, silver perioxide, uranium hexafluoride, uranyl perchlorate.

Ethanol reacts violently/explodes with the following compounds: acetyl bromide (evolves hydrogen bromide), acetyl chloride, aluminum, sesquibromide ethylate, ammonium hydroxide & silver oxide, chlorate, chromic anhydride, cyanuric acid + water, dichloromethane + sulfuric acid + nitrate (or) nitrite, hydrogen peroxide +

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

---

Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation.

**Toxicity to Animals:**
Acute oral toxicity (LD50): 3450 mg/kg [Mouse]. (Ethyl alcohol 200 Proof).
Acute dermal toxicity (LD50): 12800 mg/kg [Rabbit]. (Isopropyl alcohol).

**Chronic Effects on Humans:**
CARCINOGENIC EFFECTS: Classified PROVEN by State of California Proposition 65 [Ethyl alcohol 200 Proof].
Classified A4 (Not classifiable for human or animal.) by ACGIH [Ethyl alcohol 200 Proof].
Classified A4 (Not classifiable for human or animal.) by IARC [Isopropyl alcohol].

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Ethyl alcohol 200 Proof].
Mutagenic for bacteria and/or yeast. [Ethyl alcohol 200 Proof].
Mutagenic for mammalian somatic cells. [Methyl alcohol].
Mutagenic for bacteria and/or yeast. [Methyl alcohol].

TERATOGENIC EFFECTS: Classified PROVEN for human [Ethyl alcohol 200 Proof].
Classified POSSIBLE for human [Methyl alcohol].

DEVELOPMENTAL TOXICITY: Classified Development toxin [PROVEN] [Ethyl alcohol 200 Proof].
Classified Reproductive system/toxin/female, Reproductive system/toxin/males [POSSIBLE] [Ethyl alcohol 200 Proof].
Classified Reproductive system/toxin/female, Development toxin [POSSIBLE] [Isopropyl alcohol].
Reproductive system/toxin/female, Reproductive system/toxin/male [POSSIBLE] [Methyl alcohol].

Contains material which may cause damage to the following organs: kidneys, lungs, brain, peripheral nervous system, gastrointestinal tract.

**Other Toxic Effects on Humans:**
Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**
May affect genetic material (mutagenic)
Causes adverse reproductive effects and birth defects (teratogenic), based on moderate to heavy consumption.
May cause cancer based on animal data.
Human: passes through the placenta, excreted in maternal milk. (Ethyl alcohol 200 Proof)

**Special Remarks on other Toxic Effects on Humans:**

**Acute potential health effects:**
Skin: causes skin irritation
Eyes: causes eye irritation
Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea, and alterations in gastric secretions. May affect the brain, behavior/central nervous system (central nervous system depression - amnesia, headache, muscular incoordination, excitation, mild euphoria, slurred speech, drowsiness, staggering gait, fatigue, changes in mood/personality, excessive talking, dizziness, ataxia, somnolence, coma/narcosis, hallucinations, distorted perceptions, general anesthetic), peripheral nervous system (spastic paralysis), vision (diplopia).
Moderately toxic and narcotic in high concentrations. May also affect metabolism, blood, liver, respiration (dyspnea), and endocrine system. Contains Methanol, which may cause blindness if swallowed
May affect respiratory tract, cardiovascular(cardiac arrhythmias, hypotension), and urinary systems.
Inhalation: May cause irritation of the respiratory tract and affect brain, behavior/central nervous system with symptoms similar to ingestion.

**Chronic Potential Health Effects:**
Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic reaction.
Ingestion: Prolonged or repeated ingestion will have similar effects as acute ingestion. It may also affect the brain.

---

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

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**Section 13: Disposal Considerations**

**Waste Disposal:**
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

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**Section 14: Transport Information**

**DOT Classification:** CLASS 3: Flammable liquid.
**Identification:** Denatured Alcohol (Ethyl alcohol 200 Proof) UNNA: 1987 PG: II

**Special Provisions for Transport:** Not available.

---

### Section 15: Other Regulatory Information

**Federal and State Regulations:**
- Connecticut hazardous material survey: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- Illinois toxic substances disclosure to employee act: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- Illinois chemical safety act: Methyl alcohol
- New York release reporting list: Methyl alcohol
- Rhode Island RTK hazardous substances: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- Pennsylvania RTK: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- Florida: Ethyl alcohol 200 Proof; Isopropyl alcohol
- Massachusetts RTK: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- Massachusetts spill list: Ethyl alcohol 200 Proof; Methyl alcohol
- New Jersey: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- New Jersey spill list: Isopropyl alcohol; Methyl alcohol
- Louisiana spill reporting: Methyl alcohol
- California Director's List of Hazardous Substances: Ethyl alcohol 200 proof; Isopropyl alcohol; Methyl alcohol
- TSCA 8(b) inventory: Ethyl alcohol 200 Proof; Isopropyl alcohol; Methyl alcohol
- TSCA 4(a) final testing order: Isopropyl alcohol
- TSCA 8(a) IUR: Isopropyl alcohol
- TSCA 8(d) H and S data reporting: Isopropyl alcohol: Effective date: 12/15/86 Sunset Date: 12/15/96
- TSCA 12(b) one time export: Isopropyl alcohol
- SARA 313 toxic chemical notification and release reporting: Isopropyl alcohol 5%; Methyl alcohol 5%
- CERCLA: Hazardous substances: Methyl alcohol: 5000 lbs. (2268 kg);


**Other Classifications:**

**WHMIS (Canada):**
- CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
- CLASS D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**
- R11- Highly flammable.
- R36- Irritating to eyes.
- S7- Keep container tightly closed.
- S16- Keep away from sources of ignition - No smoking.
- S24/25- Avoid contact with skin and eyes.
- S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

**HMIS (U.S.A.):**

- **Health Hazard:** 2
- **Fire Hazard:** 3
- **Reactivity:** 0
- **Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

---
Health: 0
Flammability: 3
Reactivity: 0
Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 03:38 PM

Last Updated: 10/09/2005 03:38 PM

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Material Safety Data Sheet
Ammonium hydroxide water solution, >5.7N but < 14N NH4OH (>10% but <25% as ammonia, NH3)

ACC# 01260

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ammonium hydroxide water solution, >5.7N but < 14N NH4OH (>10% but <25% as ammonia, NH3)

**Catalog Numbers:** AC390070000, AC390070010, AC390070025, S70663MF, A470-1, A470-250, A470-500, A512-4, A512-500

**Synonyms:** Ammonium hydrate; Ammonia solution; Ammonia water; Aqueous ammonia; Aqua ammonia.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>76-90</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7664-41-7</td>
<td>Ammonia</td>
<td>10-24</td>
<td>231-635-3</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.

**Danger!** Causes eye and skin burns. Causes digestive and respiratory tract burns. Harmful if swallowed.

**Target Organs:** Eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Lachrymator (substance which increases the flow of tears).

**Skin:** Causes severe skin irritation. Causes skin burns. May cause deep, penetrating ulcers of the skin. Contact with the skin may cause staining, inflammation, and thickening of the skin.

**Ingestion:** Harmful if swallowed. May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. Causes throat constriction, vomiting, convulsions, and shock.

**Inhalation:** Effects may be delayed. Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma.

**Chronic:** Prolonged inhalation may cause respiratory tract inflammation and lung damage. Prolonged or repeated exposure may cause corneal damage and the development of cataracts and glaucoma.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: After inhalation exposure, observe for 24 to 72 hours as pulmonary edema may be delayed.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Ammonium hydroxide itself is non-combustible. However concentrated ammonia solutions may give off ammonia vapours. Ammonia gas is generally not considered a serious fire or explosion hazard because ammonia/air mixtures are difficult to ignite. A relatively high concentration of ammonia gas must be present in order for ignition to occur. However, a large and intense energy source may cause ignition and/or explosion in a confined space.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not available.

**Autoignition Temperature:** 651 deg C (1,203.80 deg F)

**Explosion Limits, Lower:** 15%

**Upper:** 28%

**NFPA Rating:** (estimated) Health: 3; Flammability: 1; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Neutralize spill with a weak acid such as vinegar or acetic acid. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Approach spill from upwind.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Do not breathe vapor. Use only with adequate ventilation.

**Storage:** Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Isolate from oxidizing materials and acids. Walls, floors, shelving, fittings, lighting and ventilation systems in storage area should be made from carbon steel or stainless steel which do not react with ammonium hydroxide.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Ammonia: No OSHA Vacated PELs are listed for this chemical. Ammonium hydroxide: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: strong odor - ammonia-like
pH: 13.6
Vapor Pressure: > 112.5 mm Hg @ 20 deg C
Vapor Density: 0.59 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 27 deg C
Freezing/Melting Point: -34.9 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density: 0.92
Molecular Formula: NH₄OH
Molecular Weight: 35.04

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Ammonium hydroxide is actually a solution of ammonia in water. Therefore the flammable properties of ammonia apply.
Conditions to Avoid: High temperatures, confined spaces, Ammonia solutions are corrosive to copper, zinc, aluminum and their alloys.
Incompatibilities with Other Materials: Strong oxidizing agents, acids, acrolein, halogens, mercury, hypochlorite, silver nitrate, acrylic acid, dimethyl sulfate, silver oxide.
Hazardous Decomposition Products: Nitrogen oxides (NOx) and ammonia (NH3).
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 7664-41-7: BO0875000
CAS# 1336-21-6: BQ9625000
LD50/LC50:
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
CAS# 7664-41-7:
- Inhalation, mouse: LC50 = 4230 ppm/1H;
- Inhalation, mouse: LC50 = 4600 mg/m3/2H;
- Inhalation, rabbit: LC50 = 7 gm/m3/1H;
- Inhalation, rat: LC50 = 2000 ppm/4H;
- Inhalation, rat: LC50 = 18600 mg/m3/5M;
- Inhalation, rat: LC50 = 7040 mg/m3/30M;
- Skin, rat: LD50 = 112000 mg/m3/15M;
- Skin, rat: LD50 = 71900 mg/m3/30M;
- Skin, rat: LD50 = 4840 mg/m3/60M;

CAS# 1336-21-6:
- Draize test, rabbit, eye: 250 ug Severe;
- Draize test, rabbit, eye: 44 ug Severe;
- Oral, rat: LD50 = 350 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7664-41-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 1336-21-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.008 mg/L; 24 Hr.; Unspecified
Fish: Fathead Minnow: LC50 = 8.2 mg/L; 96 Hr.; Unspecified
Fish: Bluegill/Sunfish: LC50 = 0.024-0.093 mg/L; 48 Hr.; Unspecified
Water flea Daphnia: EC50 =0.66 mg/L; 48 Hr.; 22 degrees C

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
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<td><strong>Packing Group:</strong></td>
<td>III</td>
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</tr>
</tbody>
</table>
US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7664-41-7 is listed on the TSCA inventory.
CAS# 1336-21-6 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7664-41-7: 100 lb final RQ; 45.4 kg final RQ
CAS# 1336-21-6: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7664-41-7: 500 lb TPQ

SARA Codes
CAS # 1336-21-6: immediate, delayed.

Section 313
This material contains Ammonia (CAS# 7664-41-7, 10-24%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7664-41-7 is listed as a Hazardous Substance under the CWA. CAS# 1336-21-6 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7664-41-7 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7664-41-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 1336-21-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
C

Risk Phrases:
R 34 Causes burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice
immediately (show the label where possible).

**WGK (Water Danger/Protection)**
- CAS# 7732-18-5: No information available.
- CAS# 7664-41-7: 2
- CAS# 1336-21-6: 2

**Canada - DSL/NDSL**
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7664-41-7 is listed on Canada's DSL List.
- CAS# 1336-21-6 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D1B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and
the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 7664-41-7 is listed on the Canadian Ingredient Disclosure List.
- CAS# 1336-21-6 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 6/22/1999  
**Revision #10 Date:** 5/24/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Ammonium nitrate

ACC# 01290

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ammonium nitrate

**Catalog Numbers:** AC205860000, AC205860010, AC205861000, AC205865000, AC423350000, AC423350010, AC423350250, S70708, S70711, S707111, S93123, S93124, A676-212, A676-500, S75244, XXA676100LB

**Synonyms:** Nitric acid, ammonium salt; Norway saltpeter.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6484-52-2</td>
<td>Ammonium nitrate</td>
<td>&gt; 98</td>
<td>229-347-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white to gray to brown solid.

**Danger!** Strong oxidizer. Contact with other material may cause a fire. Causes eye, skin, and respiratory tract irritation. May cause methemoglobinemia. Hygroscopic (absorbs moisture from the air). Ammonium nitrate when contaminated with oil, charcoal, or other organic materials should be considered an explosive capable of detonation by combustion or by explosion of adjacent explosive materials.

**Target Organs:** Blood, respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation.

**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood.

**Inhalation:** Causes respiratory tract irritation. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, tachycardia, dyspnea (labored breathing), and death. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown blood. Inhalation can cause systemic acidosis and methemoglobinemia.

**Chronic:** May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. May cause digestive tract disturbances.

Section 4 - First Aid Measures
**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Absorption of this product into the body may cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Moderate degrees of cyanosis need to be treated only by supportive measures: bed rest and oxygen inhalation. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. Cleansing of the entire contaminated area of the body is of utmost importance.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. May explode under confinement and high temperatures, especially if contaminated.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use flooding quantities of water as spray.

**Flash Point:** Not available.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 2; Special Hazard: OX

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep away from heat, sparks and flame. Keep from contact with clothing and other combustible materials. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Avoid breathing dust. Inform laundry personnel of contaminant’s hazards. Avoid localized heating of ammonium nitrate, potentially leading to development of high temperature areas. Ensure that ammonium nitrate is not exposed to strong shock waves from explosives. Avoid low pH (acidic) conditions.

**Storage:** Do not store near combustible materials. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from acids. Keep away from reducing agents. Avoid storage on wood floors.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Ammonium nitrate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** solid

**Appearance:** white to gray to brown

**Odor:** odorless

**pH:** 5.4 (0.1 M solution)

**Vapor Pressure:** Negligible.

**Vapor Density:** Not available.

**Evaporation Rate:** Negligible.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** 169 deg C

**Decomposition Temperature:** 210 deg C

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.725 @ 25°C

**Molecular Formula:** NH4NO3

**Molecular Weight:** 80.04

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. Risk of explosion if heated under confinement. Deliquescent (tending to absorb atmospheric water vapor and become liquid).

**Conditions to Avoid:** Dust generation, contamination, heating in a confined space.

**Incompatibilities with Other Materials:** Strong reducing agents, strong acids, finely powdered metals, organic matter, chlorides, combustible materials.

**Hazardous Decomposition Products:** Oxides of nitrogen.

**Hazardous Polymerization:** Has not been reported.

---

**Section 11 - Toxicological Information**

**RTECS#:**

**CAS# 6484-52-2:** BR9050000

**LD50/LC50:**

**CAS# 6484-52-2:**

- Oral, rat: LD50 = 2217 mg/kg;

**Carcinogenicity:**
CAS# 6484-52-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No data available.

**Teratogenicity:** No data available.

**Reproductive Effects:** No data available.

**Mutagenicity:** No data available.

**Neurotoxicity:** No data available.

**Other Studies:**

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

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<td><strong>Packing Group:</strong></td>
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</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 6484-52-2 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 6484-52-2: immediate, fire, reactive.

**Section 313**
- This material contains Ammonium nitrate (listed as Water Dissociable Nitrate Compounds), > 98%, (CAS# 6484-52-2) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 6484-52-2 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**
**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- XI O

**Risk Phrases:**
- R 36/37/38 Irritating to eyes, respiratory system and skin.
- R 8 Contact with combustible material may cause fire.
- R 9 Explosive when mixed with combustible material.

**Safety Phrases:**
- S 17 Keep away from combustible material.
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
- CAS# 6484-52-2: 1

**Canada - DSL/NDSL**
CAS# 6484-52-2 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of C, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 6484-52-2 is not listed on the Canadian Ingredient Disclosure List.

**Section 16 - Additional Information**

**MSDS Creation Date:** 12/12/1997
**Revision #6 Date:** 5/16/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Ammonium nitrate

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ammonium nitrate  
**Catalog Numbers:** AC205860000, AC205860010, AC205861000, AC205865000, AC423350000, AC423350010, AC423350250, S70708, S70711, S707111, S93123, S93124, A676-212, A676-500, S75244, XXA676100LB  
**Synonyms:** Nitric acid, ammonium salt; Norway saltpeter.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6484-52-2</td>
<td>Ammonium nitrate</td>
<td>&gt; 98</td>
<td>229-347-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white to gray to brown solid.  
**Danger!** Strong oxidizer. Contact with other material may cause a fire. Causes eye, skin, and respiratory tract irritation. May cause methemoglobinemia. Hygroscopic (absorbs moisture from the air). Ammonium nitrate when contaminated with oil, charcoal, or other organic materials should be considered an explosive capable of detonation by combustion or by explosion of adjacent explosive materials.  
**Target Organs:** Blood, respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye irritation.  
**Skin:** Causes skin irritation.  
**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood.  
**Inhalation:** Causes respiratory tract irritation. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, tachycardia, dyspnea (labored breathing), and death. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown blood. Inhalation can cause systemic acidosis and methemoglobinemia.  
**Chronic:** May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. May cause digestive tract disturbances.

Section 4 - First Aid Measures
**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Absorption of this product into the body may cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Moderate degrees of cyanosis need to be treated only by supportive measures: bed rest and oxygen inhalation. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. Cleansing of the entire contaminated area of the body is of utmost importance.

---

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. May explode under confinement and high temperatures, especially if contaminated.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use flooding quantities of water as spray.

**Flash Point:** Not available.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Explosion Limits, Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 2; Special Hazard: OX

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep away from heat, sparks and flame. Keep from contact with clothing and other combustible materials. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Avoid breathing dust. Inform laundry personnel of contaminant’s hazards. Avoid localized heating of ammonium nitrate, potentially leading to development of high temperature areas. Ensure that ammonium nitrate is not exposed to strong shock waves from explosives. Avoid low pH (acidic) conditions.

**Storage:** Do not store near combustible materials. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from acids. Keep away from reducing agents. Avoid storage on wood floors.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Ammonium nitrate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** solid

**Appearance:** white to gray to brown

**Odor:** odorless

**pH:** 5.4 (0.1 M solution)

**Vapor Pressure:** Negligible.

**Vapor Density:** Not available.

**Evaporation Rate:** Negligible.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** 169 deg C

**Decomposition Temperature:** 210 deg C

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.725 @ 25°C

**Molecular Formula:** NH4NO3

**Molecular Weight:** 80.04

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. Risk of explosion if heated under confinement. Deliquescent (tending to absorb atmospheric water vapor and become liquid).

**Conditions to Avoid:** Dust generation, contamination, heating in a confined space.

**Incompatibilities with Other Materials:** Strong reducing agents, strong acids, finely powdered metals, organic matter, chlorides, combustible materials.

**Hazardous Decomposition Products:** Oxides of nitrogen.

**Hazardous Polymerization:** Has not been reported.

---

**Section 11 - Toxicological Information**

**RTECS#:**

**CAS# 6484-52-2:** BR9050000

**LD50/LC50:**

**CAS# 6484-52-2:**

| Oral, rat | LD50 = 2217 mg/kg |

**Carcinogenicity:**
CAS# 6484-52-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No data available.
**Teratogenicity:** No data available.
**Reproductive Effects:** No data available.
**Mutagenicity:** No data available.
**Neurotoxicity:** No data available.
**Other Studies:**

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

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<td>UN1942</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 6484-52-2 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 6484-52-2: immediate, fire, reactive.

**Section 313**

This material contains Ammonium nitrate (listed as Water Dissociable Nitrate Compounds), > 98%, (CAS# 6484-52-2) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 6484-52-2 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- XI O

**Risk Phrases:**
- R 36/37/38 Irritating to eyes, respiratory system and skin.
- R 8 Contact with combustible material may cause fire.
- R 9 Explosive when mixed with combustible material.

**Safety Phrases:**
- S 17 Keep away from combustible material.
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
- CAS# 6484-52-2: 1

**Canada - DSL/NDSL**
- CAS# 6484-52-2 is listed on Canada's DSL List.

**Canada - WHMIS**
- This product has a WHMIS classification of C, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 6484-52-2 is not listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 12/12/1997
**Revision #6 Date:** 5/16/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Ammonium bifluoride MSDS

**Section 1: Chemical Product and Company Identification**

<table>
<thead>
<tr>
<th><strong>Product Name:</strong> Ammonium bifluoride</th>
<th><strong>Contact Information:</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Catalog Codes:</strong> SLA3118</td>
<td>Sciencelab.com, Inc.</td>
</tr>
<tr>
<td><strong>CAS#: 1341-49-7</strong></td>
<td>14025 Smith Rd.</td>
</tr>
<tr>
<td><strong>RTECS:</strong> BQ9200000</td>
<td>Houston, Texas 77396</td>
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<tr>
<td><strong>TSCA:</strong> TSCA 8(b) inventory: Ammonium bifluoride</td>
<td><strong>US Sales:</strong> 1-800-901-7247</td>
</tr>
<tr>
<td><strong>CI#: Not available.</strong></td>
<td><strong>International Sales:</strong> 1-281-441-4400</td>
</tr>
<tr>
<td><strong>Synonym:</strong></td>
<td>CHEMTREC (24HR Emergency Telephone), call:</td>
</tr>
<tr>
<td><strong>Chemical Formula:</strong> NH₄F.HF</td>
<td>1-800-424-9300</td>
</tr>
<tr>
<td></td>
<td><strong>International CHEMTREC, call:</strong> 1-703-527-3887</td>
</tr>
<tr>
<td></td>
<td><strong>For non-emergency assistance, call:</strong> 1-281-441-4400</td>
</tr>
</tbody>
</table>

**Section 2: Composition and Information on Ingredients**

<table>
<thead>
<tr>
<th><strong>Composition:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>Ammonium bifluoride</td>
</tr>
</tbody>
</table>

**Toxicological Data on Ingredients:** Ammonium bifluoride LD50: Not available. LC50: Not available.

**Section 3: Hazards Identification**

**Potential Acute Health Effects:**
Extremely hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Very hazardous in case of skin contact (corrosive). Slightly hazardous in case of skin contact (permeator). The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the
eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

### Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Serious Skin Contact:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Serious Inhalation:**
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

**Ingestion:**
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.
Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Corrosive solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as acids.
May corrode glass. Store in an appropriate container.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 2.5
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 57.05 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: Decomposes.

Melting Point: 125.6°C (258.1°F)
Critical Temperature: Not available.
Specific Gravity: 1.5 (Water = 1)
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Volutility: Not available.
Odor Threshold: Not available.
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties: See solubility in water.
Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Not available.
Incompatibility with various substances: Reactive with acids.
Corrosivity: Corrosive in presence of glass.
Special Remarks on Reactivity: Not available.
Special Remarks on Corrosivity: Not available.
Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
LD50: Not available.
LC50: Not available.
Chronic Effects on Humans: Causes damage to the following organs: lungs, mucous membranes.
Other Toxic Effects on Humans:
Extremely hazardous in case of skin contact (irritant), of ingestion, .
Very hazardous in case of skin contact (corrosive).
Hazardous in case of eye contact (corrosive), of inhalation (lung corrosive).
Slightly hazardous in case of skin contact (permeator).
Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Not available.
Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

Section 13: Disposal Considerations

**Waste Disposal:**

Section 14: Transport Information

**DOT Classification:** Class 8: Corrosive material

**Identification:** : Ammonium Hydrogen Fluoride UNNA: UN1727 PG: II

**Special Provisions for Transport:** Not available.

Section 15: Other Regulatory Information

**Federal and State Regulations:**
Pennsylvania RTK: Ammonium bifluoride
Massachusetts RTK: Ammonium bifluoride
TSCA 8(b) inventory: Ammonium bifluoride
CERCLA: Hazardous substances.: Ammonium bifluoride


**Other Classifications:**

**WHMIS (Canada):** CLASS E: Corrosive solid.

**DSCL (EEC):** R34- Causes burns.

**HMIS (U.S.A.):**

- **Health Hazard:** 3
- **Fire Hazard:** 0
- **Reactivity:** 0
- **Personal Protection:** j

**National Fire Protection Association (U.S.A.):**

- **Health:** 3
- **Flammability:** 0
- **Reactivity:** 0
Specific hazard:

Protective Equipment:
Gloves.
Synthetic apron.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:17 AM

Last Updated: 10/11/2005 11:17 AM

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Material Safety Data Sheet  
Antimony

ACC# 01610  

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Antimony  
**Catalog Numbers:** S75044, S79906, S79906-1, S799061, S93130, A845 500, A845-500, A845500  
**Synonyms:** Stibium; antimony regulus  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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<td>7440-36-0</td>
<td>ANTIMONY</td>
<td>&gt;=99.5</td>
<td>231-146-5</td>
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</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: silver white solid.  
**Warning!** Causes eye, skin, and respiratory tract irritation. Harmful if inhaled or swallowed. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause blood abnormalities. May cause cardiac disturbances. Inhalation of fumes may cause metal-fume fever.  
**Target Organs:** Kidneys, liver, cardiovascular system.

**Potential Health Effects**  
**Eye:** Causes eye irritation. May cause conjunctivitis.  
**Skin:** Causes skin irritation. Chronic exposure may cause dizziness, dry throat, sleepiness, anorexia, and nausea. Chronic inhalation may result in liver, kidney, and cardiac changes.  
**Ingestion:** May cause severe digestive tract irritation with abdominal pain, nausea, vomiting and diarrhea. May cause slow pulse, low blood pressure, shallow breathing, and  
**Inhalation:** Dust is irritating to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.  
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may cause dizziness, dry throat, sleepiness, anorexia, and nausea. Chronic inhalation may result in liver, kidney, and cardiac changes.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

---

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will burn in a fire. Dust can be an explosion hazard when exposed to heat or flame. Bulk metal is combustible in air at high temperatures.

**Extinguishing Media:** DO NOT USE WATER, CO2, OR FOAM DIRECTLY ON FIRE ITSELF. Use dry sand, graphite powder, dry sodium chloride-based extinguishers.

**Flash Point:** Not applicable.

**Autoignition Temperature:** 626 deg F (330.00 deg C)

**Explosion Limits, Lower:** 0.42 oz/ft³

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Instability: 0

---

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

---

Section 7 - Handling and Storage

**Handling:** Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes. Keep away from heat, sparks and flame. Avoid ingestion and inhalation.

**Storage:** Keep away from heat and flame. Do not store in direct sunlight. Store in a cool, dry, well-ventilated area away from incompatible substances. Tarnishes in moist air.

---

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTIMONY</td>
<td>0.5 mg/m³ TWA</td>
<td>0.5 mg/m³ TWA 50 mg/m³ IDLH</td>
<td>0.5 mg/m³ TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** ANTIMONY: 0.5 mg/m³ TWA

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or
Section 9 - Physical and Chemical Properties

**Physical State:** Solid  
**Appearance:** silver white  
**Odor:** none reported  
**pH:** Not available.  
**Vapor Pressure:** Negligible.  
**Vapor Density:** Not available.  
**Evaporation Rate:** Negligible.  
**Viscosity:** Not available.  
**Boiling Point:** 1635 deg C  
**Freezing/Melting Point:** 630 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Insoluble in water.  
**Specific Gravity/Density:** 6.684  
**Molecular Formula:** Sb  
**Molecular Weight:** 121.71

Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.  
**Conditions to Avoid:** Incompatible materials, ignition sources, moisture.  
**Incompatibilities with Other Materials:** Incompatible with ammonium nitrate, bromine, bromine trifluoride, bromoazide, chloric acid, chlorine, chlorine monoxide, chlorine trifluoride, fluorine, iodine, nitric acid, potassium nitrate, potassium permanganate, potassium peroxide, sodium nitrate, and sodium peroxide.  
**Hazardous Decomposition Products:** Stibine fumes.  
**Hazardous Polymerization:** Has not been reported.

Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 7440-36-0:** CC4025000  
**LD50/LC50:**  
**CAS# 7440-36-0:**  
  - Oral, rat: LD50 = 7 gm/kg;  

**Carcinogenicity:**  
**CAS# 7440-36-0:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** Present evidence in humans is inconclusive regarding an increased risk of lung cancer and reproductive disorders from antimony exposure.  
**Teratogenicity:** No data available.  
**Reproductive Effects:** No data available.  
**Mutagenicity:** No data available.  
**Neurotoxicity:** No data available.  
**Other Studies:**

Section 12 - Ecological Information
Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

Section 14 - Transport Information

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<th>Canada TDG</th>
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<tr>
<td><strong>Shipping Name:</strong></td>
<td>ANTIMONY POWDER</td>
<td>ANTIMONY POWDER</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td>6.1</td>
<td>6.1</td>
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<tr>
<td><strong>UN Number:</strong></td>
<td>UN2871</td>
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</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7440-36-0 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- CAS# 7440-36-0: Effective 10/4/82, Sunset 10/4/92

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7440-36-0: 5000 lb final RQ (no reporting of releases of this hazardous substance is required)

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS# 7440-36-0: immediate, delayed.

**Section 313**
- This material contains ANTIMONY (CAS# 7440-36-0, >=99.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 7440-36-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-36-0 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7440-36-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
  XN N
Risk Phrases:
  R 20/22 Harmful by inhalation and if swallowed.
  R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
  S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
  CAS# 7440-36-0: No information available.

Canada - DSL/NDSL
  CAS# 7440-36-0 is listed on Canada's DSL List.

Canada - WHMIS
  This product has a WHMIS classification of D1B. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
  CAS# 7440-36-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/26/1998
Revision #4 Date: 6/23/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Antimony Reference Standard Solution

ACC# 01705

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Antimony Reference Standard Solution  
**Catalog Numbers:** SA450-100, SA450-500  
**Synonyms:** None known.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>93.01</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7647-01-0</td>
<td>Hydrogen chloride</td>
<td>6.8</td>
<td>231-595-7</td>
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<tr>
<td>10025-91-9</td>
<td>Antimony trichloride</td>
<td>0.19</td>
<td>233-047-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.  
**Danger!** Causes eye and skin burns. May be absorbed through intact skin. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns.  
**Target Organs:** Respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye burns. Vapors cause eye irritation. May cause chemical conjunctivitis and corneal damage.  
**Skin:** Causes skin burns. May be absorbed through the skin in harmful amounts. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.  
**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.  
**Inhalation:** Causes chemical burns to the respiratory tract. May cause pulmonary edema and severe respiratory disturbances. Aspiration may lead to pulmonary edema. May cause systemic effects.  
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).  
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes.
Storage: Keep container closed when not in use. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Antimony trichloride</td>
<td>0.5 mg/m3 TWA (listed under Antimony)</td>
<td>0.5 mg/m3 TWA (as Sb) (listed under Antimony)</td>
<td>0.5 mg/m3 TWA (listed under Antimony)</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Hydrogen chloride: No OSHA Vacated PELs are listed for this chemical. Antimony trichloride: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: Acidic
Vapor Pressure: 14 mm Hg @ 20 deg C
Vapor Density: 0.7
Evaporation Rate: >1 (ether=1)
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Soluble in water.
Specific Gravity/Density: 1.0
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Incompatible materials, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 7647-01-0: MW4025000; MW4031000
CAS# 10025-91-9: CC4900000
LD50/LC50:
CAS# 7732-18-5:
   Oral, rat: LD50 = >90 mL/kg;
   Inhalation, mouse: LC50 = 50 mg/m3 IDLH
   Inhalation, mouse: LC50 = 20487 mg/m3/5M;
CAS# 7647-01-0:
   Inhalation, mouse: LC50 = 1108 ppm/1H;
   Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m³/30M;
Inhalation, mouse: LC50 = 8300 mg/m³/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m³/30M;
Inhalation, rat: LC50 = 7004 mg/m³/30M;
Inhalation, rat: LC50 = 45000 mg/m³/30M;
Inhalation, rat: LC50 = 8300 mg/m³/30M;
Oral, rabbit: LD50 = 900 mg/kg;

CAS# 10025-91-9:
Oral, rat: LD50 = 525 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10025-91-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name</td>
<td>HYDROCHLORIC ACID</td>
<td></td>
</tr>
<tr>
<td>Hazard Class</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>UN Number</td>
<td>UN1789</td>
<td>No information available.</td>
</tr>
<tr>
<td>Packing Group</td>
<td>II</td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 10025-91-9 is listed on the TSCA inventory.
**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
- CAS# 10025-91-9: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
- CAS# 7647-01-0: 500 lb TPQ (gas only)

**SARA Codes**
- CAS # 7647-01-0: immediate.
- CAS # 10025-91-9: immediate, delayed, reactive.

**Section 313**
This material contains Hydrogen chloride (CAS# 7647-01-0, 6.8%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
This material contains Antimony trichloride (listed as Antimony), 0.19%, (CAS# 10025-91-9) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
- CAS# 10025-91-9 (listed as Antimony compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. CAS# 10025-91-9 is listed as a Hazardous Substance under the CWA. CAS# 10025-91-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 10025-91-9 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
CAS# 7647-01-0 is considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 10025-91-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Antimony), Minnesota, (listed as Antimony compounds), Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- C

**Risk Phrases:**
- R 34 Causes burns.

**Safety Phrases:**

**WGK (Water Danger/Protection)**
- CAS# 7732-18-5: No information available.
- CAS# 7647-01-0: 1
- CAS# 10025-91-9: 2

**Canada - DSL/NDSL**
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7647-01-0 is listed on Canada's DSL List.
- CAS# 10025-91-9 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
- CAS# 10025-91-9 is listed on the Canadian Ingredient Disclosure List.

**Section 16 - Additional Information**

**MSDS Creation Date:** 9/30/1997  
**Revision #7 Date:** 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
ARGON - Ar MSDS

PAGE 1 OF 6

AIR LIQUIDE

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: ARGON

SYNONYMS: Not applicable.

CHEMICAL FAMILY NAME: Inert Gas

FORMULA: Ar

DOCUMENT NUMBER: 10016

PRODUCT USE: Inerting, welding and general analytical or synthetic chemical uses.

MANUFACTURED/SUPPLIED FOR:

ADDRESS: 9101-LBJ-FREEWAY, SUITE 800

DALLAS, TX-75243

EMERGENCY PHONE: CHEMTREC: 1-800-424-9300

BUSINESS PHONE:

General MSDS Information 1-972/301-5200

Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
<th>EXPOSURE LIMITS IN AIR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH</td>
<td>OSHA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TLV ppm</td>
<td>STEL ppm</td>
</tr>
<tr>
<td>Argon</td>
<td>7440-37-1</td>
<td>99.98%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Impurities</td>
<td></td>
<td>&lt;0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are no specific exposure limits for Argon. Argon is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.

None of the trace impurities in Argon contribute significantly to the hazards associated with the product. All hazard information pertinent to Argon has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalents standards.

NE = Not Established  C = Ceiling Limit  See Section 16 for Definitions of Terms Used.

NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.
3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Argon is a colorless, odorless gas. The main health hazard associated with releases of this gas is asphyxiation, by displacement of oxygen.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas is by inhalation.

INHALATION: High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses.

Under some circumstances of over-exposure, death may occur, due to the displacement of oxygen. The following effects associated with various levels of oxygen are as follows:

<table>
<thead>
<tr>
<th>CONCENTRATION</th>
<th>SYMPTOM OF EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-16% Oxygen:</td>
<td>Breathing and pulse rate increased, muscular coordination slightly disturbed.</td>
</tr>
<tr>
<td>10-14% Oxygen:</td>
<td>Emotional upset, abnormal fatigue, disturbed respiration.</td>
</tr>
<tr>
<td>6-10% Oxygen:</td>
<td>Nausea and vomiting, collapse or loss of consciousness.</td>
</tr>
<tr>
<td>Below 6%:</td>
<td>Convulsive movements, possible respiratory collapse, and death.</td>
</tr>
</tbody>
</table>

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to Argon may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to Argon.

TARGET ORGANS: Respiratory system.

4 FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO ARGON WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus should be worn.

Remove victim(s) to fresh air, as quickly as possible. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Only trained personnel should administer supplemental oxygen.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):
- Lower (LEL): Not applicable.
- Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable, inert gas. Use extinguishing media appropriate for surrounding fire.
5. FIRE-FIGHTING MEASURES Continued)

UNUSUAL FIRE AND EXPLOSION HAZARDS: Argon does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Static Discharge: Not Sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Minimum Personal Protective Equipment should be: Level B: Self-Contained Breathing Apparatus. Locate and seal the source of the leaking gas. Allow the gas, which is heavier than air, to dissipate. Monitor the surrounding area for oxygen levels. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

If leaking incidentally from the cylinder or its valve, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Argon could occur without any significant warning symptoms, due to oxygen deficiency.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Keep storage area clear of materials which can burn. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage.

Use a check valve or other protective device in the discharge line to prevent hazardous backflow. Never tamper with pressure relief valves and cylinders.

Keep the smallest amount necessary on-site at any one time. Full and empty cylinders should be segregated. Use a first-in, first-out inventory systems to prevent full containers from being stored for long periods of time.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used.

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Immediately contact the supplier if there are any difficulties associated with operating cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of an electric circuit.

After Use: Close main cylinder valve. Replace valve protection cap. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers designed for gas storage. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For welding and brazing operations, refer to ANSI Z-49.1 “Safety in Welding and Cutting” and OSHA safety regulations for welding, cutting, and brazing (29 CFR 1910.252). In addition, see the National Fire Protection Association (NFPA) publication 51 Oxygen Fuel Gas Welding and Cutting.
7. HANDLING and USE (Continued)

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper CGA connections, DO NOT USE ADAPTERS:

<table>
<thead>
<tr>
<th>THREADED:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3000 psig</td>
<td>CGA 580</td>
<td></td>
</tr>
<tr>
<td>3001-5500 psig</td>
<td>CGA 680</td>
<td></td>
</tr>
<tr>
<td>5501-7500 psig</td>
<td>CGA 677</td>
<td></td>
</tr>
</tbody>
</table>

PIN-INDEXED YOKE: Not Applicable

ULTRA HIGH INTEGRITY: 0-3000 psig 718

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents chemical dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Argon. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: Wear glove protection appropriate to the specific operation for which Argon is used.

BODY PROTECTION: Use body protection appropriate for task. Safety shoes are recommended when handling cylinders.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.103 lbs/cu ft (1.650 kg/m³)

BOILING POINT @ 1 atm: -185.9 °C (-302°F)

FREEZING/MELTING POINT @ 10 psig: -189.2 °C (-308.9 °F)

SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F): 1.38

SOLUBILITY IN WATER vol/vol @ 0°C (32°F); and 1 atm: 0.065 molec

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: Not applicable. Odorless.

VAPOR PRESSURE @ 21.1°C (70°F) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

APPEARANCE AND COLOR: Argon is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of Argon.

10. STABILITY and REACTIVITY

STABILITY: Normally stable, inert gas.

DECOMPOSITION PRODUCTS: None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: None. Argon is an inert gas.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following data are for Argon:

Standard animal toxicity values are not available. Male rats were exposed for 6 days to 20% oxygen and 80% Argon at 1 atmosphere ambient pressure. No significant changes in blood cell counts or bone marrow were observed. Other animal studies concern the deficiency of (hypoxia) or the narcotic effects of various pressures of Argon, the effects of increased Argon pressures on the central nervous system and decompression sickness.
11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: Argon is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Not applicable.

SENSITIZATION OF PRODUCT: Argon is not a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects Argon on the human reproductive system.

Mutagenicity: Argon is not expected to cause mutagenic effects in humans.

Embryotoxicity: Argon is not expected to cause embryotoxic effects in humans.

Teratogenicity: Argon is not expected to cause teratogenic effects in humans.

Reproductive Toxicity: Argon is not expected to cause adverse reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions may be aggravated by over-exposure to Argon.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Argon.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Argon occurs naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on Argon’s effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Air Liquide. Do not dispose of locally.

For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Argon, compressed

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1006

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 121

MARINE POLLUTANT: Argon is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged.

NOTE: Shipment of compressed gas cylinders which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301(b).
15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: Argon is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

SARA Threshold Planning Quantity: Not applicable.

TSCA INVENTORY STATUS: Argon is listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITIES (RQ): Not applicable.

CALIFORNIA PROPOSITION 65: Argon is not on the California Proposition 65 lists.

STATE REGULATORY INFORMATION: Argon is covered under the following specific State regulations:

- Alaska - Designated Toxic and Hazardous Substances: Argon.
- California - Permissible Exposure Limits for Chemical Contaminants: Argon.
- Florida - Substance List: Argon.
- Kansas - Section 302/313 List: No.
- Massachusetts - Substance List: Argon.
- Missouri - Employer Information/Toxic Substance List: Argon.
- New Jersey - Right to Know Hazardous Substance List: Argon.
- North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
- Pennsylvania - Hazardous Substance List: Argon.
- Rhode Island - Hazardous Substance List: Argon.
- Texas - Hazardous Substance List: No.
- West Virginia - Hazardous Substance List: No.
- Wisconsin - Toxic and Hazardous Substances: No.

OTHER FEDERAL REGULATIONS:
- Argon does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Argon is not listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Accidental Release.
- Argon is not subject to the reporting requirements of Section 112(r) of the Clean Air Act.
- Argon is not listed in Appendix A as a highly hazardous chemical, per 29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals.

OTHER CANADIAN REGULATIONS: Argon is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about Argon can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5th floor, Chantilly, VA 20151-2923. Telephone: (703) 788-2700.

G-11.1 "Commodity Specification for Argon"
P-1 "Safe Handling of Compressed Gases in Containers"
P-9 "Inert Gases—Argon, Nitrogen, and Helium"
P-14 "Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres"
SB-2 "Oxygen Deficient Atmospheres"
AV-1 "Safe Handling and Storage of Compressed Gases"
"Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302
Fax on Demand: 1-800/231-1366

AIR LIQUEIDE

This Material Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to Argon. To the best of Air Liquide’s knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If Argon is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.
Material Safety Data Sheet
Arsenic, reference standard solution 1000 ppm in 7% nitric acid

ACC# 02025

Section 1 - Chemical Product and Company Identification

MSDS Name: Arsenic, reference standard solution 1000 ppm in 7% nitric acid
Catalog Numbers: SA449-100, SA449-500
Synonyms: None.
Company Identification:
    Fisher Scientific
    1 Reagent Lane
    Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>92-93</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>7</td>
<td>231-714-2</td>
</tr>
<tr>
<td>1327-53-3</td>
<td>Arsenic trioxide</td>
<td>&lt;1</td>
<td>215-481-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid.


Target Organs: Lungs, eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes eye burns.

Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin. Exposure to arsenic compounds may produce hyperpigmentation of the skin and hyperkeratoses of plantar and palmar surfaces as well as both primary irritation and sensitization types. Concentrated nitric acid dyes human skin yellow on contact.

Ingestion: Causes gastrointestinal tract burns. May cause perforation of the digestive tract. Ingestion of arsenical compounds may cause burning of the lips, throat constriction, swallowing difficulties, severe abdominal pain, severe nausea, projectile vomiting, and profuse diarrhea. Ingestion of arsenic compounds can produce convulsions, coma, and possibly death within 24 hours.

Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Inhalation of arsenic compounds may lead to irritation of the respiratory tract and to possible nasal perforation. Long-term exposure to arsenic compounds may produce impairment of peripheral circulation.

Chronic: Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. Arsenic trioxide can cause cancer in humans. Other long term effects include: anemia, liver and kidney damage. Chronic exposure to arsenical dust may cause shortness of breath, nausea, chest pains, and garlic odor.

Section 4 - First Aid Measures
**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes. May react with metal surfaces to form flammable and explosive hydrogen gas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Concentrated nitric acid is a strong oxidizer and contact with other material may cause fire.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

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**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation. Approach spill from upwind. Use water spray to cool and disperse vapors and protect personnel.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Discard contaminated shoes. Do not use with metal spatula or other metal items.

**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store away from alkalies.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. See 29CFR 1910.1018 for regulatory requirements pertaining to all occupational exposures to inorganic arsenic.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
</table>

---
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m³ TWA Arsenic trioxide: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Physical State: Liquid
Appearance: Colorless
Odor: None reported
pH: Acidic
Vapor Pressure: 14 mm Hg @ 20 deg C
Vapor Density: 0.7
Evaporation Rate: >1 (Ether=1)
Viscosity: Not available.
Boiling Point: 100 deg C
Freezing/Melting Point: 0 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available.

Chemical Stability: Stable under normal temperatures and pressures. The yellow color is due to release of nitrogen dioxide on exposure to light.
Conditions to Avoid: High temperatures, light, confined spaces.
Incompatibilities with Other Materials: Metals, reducing agents, strong bases.
Hazardous Decomposition Products: Nitrogen oxides, oxides of arsenic.
Hazardous Polymerization: Has not been reported.

Section 9 - Physical and Chemical Properties

Section 10 - Stability and Reactivity

Section 11 - Toxicological Information
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 1327-53-3: CG3325000

LD50/LC50:
CAS# 7732-18-5:
   Oral, rat: LD50 = >90 mL/kg;

CAS# 7697-37-2:
   Inhalation, rat: LC50 = 260 mg/m3/30M;
   Inhalation, rat: LC50 = 130 mg/m3/4H;
   Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 1327-53-3:
   Oral, mouse: LD50 = 20 mg/kg;
   Oral, rabbit: LD50 = 20190 ug/kg;
   Oral, rat: LD50 = 10 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 1327-53-3:
   • ACGIH: A1 - Confirmed Human Carcinogen (listed as 'Arsenic, inorganic compounds').
   • California: carcinogen, initial date 2/27/87 (listed as Arsenic, inorganic compounds).
   • NTP: Known carcinogen (listed as Arsenic, inorganic compounds).
   • IARC: Group 1 carcinogen

Epidemiology: Epidemiological studies have demonstrated evidence of a causal relationship between environmental, occupational, and medicinal exposure of humans to inorganic arsenic and cancer of the skin and lungs.

Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>Shipping Name</th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
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<td>NITRIC ACID SOLUTION</td>
<td>NITRIC ACID SOLUTION</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 1327-53-3 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
CAS# 1327-53-3: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ
CAS# 1327-53-3: 100 lb lower threshold TPQ; 10000 lb upper threshold TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.
CAS # 1327-53-3: immediate, delayed.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 7%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
This material contains Arsenic trioxide (listed as Arsenic, inorganic compounds), <1%, (CAS# 1327-53-3) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 1327-53-3 (listed as Arsenic, inorganic compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 1327-53-3 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 1327-53-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 1327-53-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Arsenic, inorganic compounds), Massachusetts.

California Prop 65
WARNING: This product contains Arsenic trioxide, listed as 'Arsenic, inorganic compounds', a chemical known to the state of California to cause cancer. WARNING: This product contains Arsenic trioxide, listed as 'Arsenic (inorganic oxides)', a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:  
C

Risk Phrases:  
R 34 Causes burns.

Safety Phrases:  
S 23 Do not inhale gas/fumes/vapour/spray.  
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S 36 Wear suitable protective clothing.  
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)  
CAS# 7732-18-5: No information available.  
CAS# 7697-37-2: 1  
CAS# 1327-53-3: 3

Canada - DSL/NDSL  
CAS# 7732-18-5 is listed on Canada's DSL List.  
CAS# 7697-37-2 is listed on Canada's DSL List.  
CAS# 1327-53-3 is listed on Canada's DSL List.

Canada - WHMIS  
This product has a WHMIS classification of E, D2A.  
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List  
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.  
CAS# 1327-53-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/30/1997  
Revision #8 Date: 10/26/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Ascarite(II), 8-20 Mesh, CO2 Absorbent

ACC# 97179

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ascarite(II), 8-20 Mesh, CO2 Absorbent
**Catalog Numbers:** AC208080000, AC208081000, AC208085000
**Synonyms:** Sodium Hydroxide-coated Silica.
**Company Identification:**
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01
**For emergencies in the US, call CHEMTREC:** 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td>90-95</td>
<td>215-185-5</td>
</tr>
<tr>
<td>7631-86-9</td>
<td>Silica, amorphous</td>
<td>5-10</td>
<td>231-545-4</td>
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<tr>
<td>81133-20-2</td>
<td>Ascarite(II)</td>
<td>unlisted</td>
<td></td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: brown granules.

**Danger!** Causes burns by all exposure routes.
**Target Organs:** Respiratory system, gastrointestinal system, eyes, skin.

**Potential Health Effects**

Eye: Causes eye burns.
Skin: Causes skin burns.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns.
Inhalation: Causes chemical burns to the respiratory tract.
Chronic: No information found.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
**Ingestion:** Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
**Notes to Physician:** Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use foam, dry chemical, or carbon dioxide. Do NOT get water inside containers.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: N/A

Upper: N/A

NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use with adequate ventilation. Use only in a chemical fume hood.

Storage: Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not expose to air. Store protected from moisture. Store under an inert atmosphere.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Use only under a chemical fume hood.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide</td>
<td>2 mg/m³ Ceiling</td>
<td>10 mg/m³ IDLH</td>
<td>2 mg/m³ TWA</td>
</tr>
<tr>
<td>Silica, amorphous</td>
<td>none listed</td>
<td>6 mg/m³ TWA 3000 mg/m³ IDLH</td>
<td>none listed</td>
</tr>
<tr>
<td>Ascarite(II)</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Sodium hydroxide: No OSHA Vacated PELs are listed for this chemical. Silica, amorphous: No OSHA Vacated PELs are listed for this chemical. Ascarite(II): No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.
Physical State: Granules  
Appearance: brown  
Odor: odorless  
\( \text{pH} \): Not available.  
Vapor Pressure: Not available.  
Vapor Density: Not available.  
Evaporation Rate: Not available.  
Viscosity: Not available.  
Boiling Point: Not available.  
Freezing/Melting Point: Not available.  
Decomposition Temperature: Not available.  
Solubility: Insoluble.  
Specific Gravity/Density: Not available.  
Molecular Formula: Not available.  
Molecular Weight: Not available.  

Section 9 - Physical and Chemical Properties

Section 10 - Stability and Reactivity

Chemical Stability: Hygroscopic: absorbs moisture or water from the air.  
Conditions to Avoid: Incompatible materials, exposure to air, excess heat, exposure to moist air or water.  
Incompatibilities with Other Materials: Strong acids, strong oxidizing agents.  
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.  
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:  
CAS# 1310-73-2: WB4900000  
CAS# 7631-86-9: EU8655000; VV7565000  
CAS# 81133-20-2 unlisted.  
LD50/LC50:  
CAS# 1310-73-2:  
Draize test, rabbit, eye: 400 ug Mild;  
Draize test, rabbit, eye: 1% Severe;  
Draize test, rabbit, eye: 50 ug/24H Severe;  
Draize test, rabbit, eye: 1 mg/24H Severe;  
Draize test, rabbit, skin: 500 mg/24H Severe;  

CAS# 7631-86-9:  
Draize test, rabbit, eye: 25 mg/24H Mild;  

CAS# 81133-20-2:  

Carcinogenicity:  
CAS# 1310-73-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 7631-86-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 81133-20-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
Epidemiology: No information available.
**Teratogenicity:** No information available.
**Reproductive Effects:** No information available.
**Mutagenicity:** No information available.
**Neurotoxicity:** No information available.
**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.
**Environmental:** No information available.
**Physical:** No information available.
**Other:** Do not empty into drains.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
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<td>CORROSIVE SOLID NOS (SODIUM HYDROXIDE)</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
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<td><strong>UN Number:</strong></td>
<td>UN3262</td>
<td>UN1759</td>
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<td><strong>Packing Group:</strong></td>
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</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 1310-73-2 is listed on the TSCA inventory.
- CAS# 7631-86-9 is listed on the TSCA inventory.
- CAS# 81133-20-2 is not listed on the TSCA inventory. It is for research and development use only.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 1310-73-2: immediate, reactive.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 1310-73-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7631-86-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 81133-20-2 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**
**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
C

**Risk Phrases:**
R 34 Causes burns.

**Safety Phrases:**
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**WGK (Water Danger/Protection)**
CAS# 1310-73-2: 1
CAS# 7631-86-9: 0
CAS# 81133-20-2: No information available.

**Canada - DSL/NDSL**
CAS# 1310-73-2 is listed on Canada's DSL List.
CAS# 7631-86-9 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of E.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7631-86-9 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 4/30/1998  
**Revision #4 Date:** 6/07/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Barium chloride dihydrate

ACC# 02371

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Barium chloride dihydrate

**Catalog Numbers:** AC423450000, AC423450050, AC423455000, S71245, S712451, B33-10, B33-50, B34-10, B34-100, B34-3, B34-500, S71248R

**Synonyms:** Barium dichloride dihydrate.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100

Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10326-27-9</td>
<td>Barium chloride dihydrate</td>
<td>&gt; 99</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.

**Warning!** Harmful if swallowed. Causes eye and skin irritation. Causes severe respiratory tract irritation. May cause lung damage. May cause cardiac disturbances. May cause kidney damage.

**Target Organs:** Kidneys, heart, respiratory system, muscles, cardiovascular system.

**Potential Health Effects**

**Eye:** Contact produces irritation, tearing, and burning pain. May cause conjunctivitis.

**Skin:** Causes skin irritation. Prolonged contact with the skin, especially if the skin is wet or moist, causes necrosis.

**Ingestion:** Harmful if swallowed. May cause kidney damage. The barium ion is a muscle poison causing stimulation and then paralysis. Initial symptoms are gastrointestinal, including nausea, vomiting, colic, and diarrhea, followed by myocardial and general muscular stimulation with tingling in the extremities. Barium chloride affects the muscles (especially the smooth muscles of the cardiovascular and respiratory systems), causes salivation, tingling of the mouth or face, convulsions, numbness, muscle paralysis, respiratory failure, slow pulse rate, pulmonary edema, irregular heart beat, potassium deficiency in the blood.

**Inhalation:** Causes respiratory tract irritation. May cause effects similar to those described for ingestion.

**Chronic:** Chronic exposure may cause effects similar to those of acute exposure.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.

**Notes to Physician:** Do NOT use mouth-to-mouth resuscitation.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale.

**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium chloride dihydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Barium chloride anhydrous</td>
<td>none listed</td>
<td>0.5 mg/m3 TWA (as Ba) 50 mg/m3 IDLH</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Barium chloride dihydrate: No OSHA Vacated PELs are listed for this chemical. Barium chloride anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or
other symptoms are experienced.

Section 9 - Physical and Chemical Properties

**Physical State:** Solid  
**Appearance:** white  
**Odor:** odorless  
**pH:** 5-8 (5% soln)  
**Vapor Pressure:** Negligible.  
**Vapor Density:** Not applicable.  
**Evaporation Rate:** Negligible.  
**Viscosity:** Not available.  
**Boiling Point:** 1560 deg C  
**Freezing/Melting Point:** 962 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** 59% @ 100°C  
**Specific Gravity/Density:** 3.86  
**Molecular Formula:** BaCl2.2H2O  
**Molecular Weight:** 244.28

Section 10 - Stability and Reactivity

**Chemical Stability:** Stable.  
**Conditions to Avoid:** Dust generation, excess heat.  
**Incompatibilities with Other Materials:** Incompatible with bromine trifluoride and 2-furan percarboxylic acid (explodes at room temperature). Reacts violently with sulfuric acid.  
**Hazardous Decomposition Products:** Hydrogen chloride, chlorine.  
**Hazardous Polymerization:** Has not been reported.

Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 10326-27-9:** CQ8751000  
**CAS# 10361-37-2:** CQ8750000  
**LD50/LC50:**  
Not available.  
**CAS# 10361-37-2:**  
- Oral, mouse: LD50 = 150 mg/kg;  
- Oral, rat: LD50 = 118 mg/kg;  
- Oral, rat: LD50 = 397 mg/kg;  

**Carcinogenicity:**  
**CAS# 10326-27-9:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 10361-37-2:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** No information found  
**Mutagenicity:** No information found  
**Neurotoxicity:** No information found  
**Other Studies:**
Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Barium chloride accumulates in plants when it exceeds calcium and magnesium levels in soil.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
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<td>BARIUM COMPOUNDS NOS (BARIUM CHLORIDE DIHYDRATE)</td>
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<tr>
<td>Hazard Class:</td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN1564</td>
<td>UN1564</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
- CAS# 10326-27-9 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
- CAS# 10361-37-2 is listed on the TSCA inventory.

Health & Safety Reporting List
- None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
- None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
- None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
- None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
- None of the chemicals in this product have a TPQ.

SARA Codes
- CAS # 10361-37-2: immediate, delayed.

Section 313
- This material contains Barium chloride dihydrate (listed as Barium compounds, n.o.s.), > 99%, (CAS# 10326-27-9) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
- This material contains Barium chloride anhydrous (listed as Barium compounds, n.o.s.), -%, (CAS# 10361-37-2) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 10326-27-9 can be found on the following state right to know lists: New Jersey, (listed as Barium compounds, n.o.s.), Pennsylvania, (listed as Barium compounds, n.o.s.).
CAS# 10361-37-2 can be found on the following state right to know lists: New Jersey, (listed as Barium compounds, n.o.s.), Pennsylvania, (listed as Barium compounds, n.o.s.).

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
T
Risk Phrases:
R 25 Toxic if swallowed.
R 20 Harmful by inhalation.

Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 10326-27-9: 1
CAS# 10361-37-2: 1

Canada - DSL/NDSL
CAS# 10361-37-2 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 10326-27-9 is not listed on the Canadian Ingredient Disclosure List.
CAS# 10361-37-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/23/1999
Revision #7 Date: 2/28/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Bismuth reference standard solution 1000 ppm

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Bismuth reference standard solution 1000 ppm  
**Catalog Numbers:** SB163-100, SB163-500  
**Synonyms:** None.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>92.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>7.0</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-69-9</td>
<td>Bismuth</td>
<td>0.1</td>
<td>231-177-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.  
**Danger!** Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Corrosive to metal.  
**Target Organs:** Eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause chemical conjunctivitis and corneal damage.  
**Skin:** Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.  
**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.  
**Inhalation:** Effects may be delayed. May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. May cause systemic effects.  
**Chronic:** Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).  
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while
removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes. **Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. **Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask. **Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. **Extinguishing Media:** For small fires, use water spray, dry chemical, carbon dioxide or chemical foam. **Flash Point:** Not applicable. **Autoignition Temperature:** Not applicable. **Explosion Limits, Lower:** Not available. **Upper:** Not available. **NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Use with adequate ventilation. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. **Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. **Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m³ TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m³ TWA</td>
</tr>
<tr>
<td>Bismuth</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5
Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: >1 (ether=1)
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Soluble in water.
Specific Gravity/Density: 1.1
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable.
Conditions to Avoid: Incompatible materials.
Incompatibilities with Other Materials: Not available.
Hazardous Decomposition Products: Nitrogen oxides, bismuth oxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#
CAS# 7732-18-5: ZC0110000
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 7440-69-9: EB2600000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 7697-37-2:
  Inhalation, rat: LC50 = 260 mg/m3/30M;
  Inhalation, rat: LC50 = 130 mg/m3/4H;
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;
CAS# 7440-69-9:
Oral, mouse: LD50 = 10 gm/kg;
Oral, rat: LD50 = 5000 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-69-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information
No information available.

Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
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<td>Shipping Name</td>
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<td>Hazard Class</td>
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<td>UN Number</td>
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<td>Packing Group</td>
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</tbody>
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Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7440-69-9 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
- CAS# 7697-37-2: immediate, delayed, fire.
- CAS# 7440-69-9: immediate, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 7.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
- CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-69-9 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
- C

Risk Phrases:
- R 34 Causes burns.

Safety Phrases:
- S 23 Do not inhale gas/fumes/vapour/spray.
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 36 Wear suitable protective clothing.
- S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
- CAS# 7732-18-5: No information available.
- CAS# 7697-37-2: 1
- CAS# 7440-69-9: No information available.

Canada - DSL/NDSL
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7697-37-2 is listed on Canada's DSL List.
- CAS# 7440-69-9 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
- CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
Section 16 - Additional Information

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Buffer Solution, pH 1.00

ACC# 41133

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Buffer Solution, pH 1.00  
**Catalog Numbers:** SB140-500  
**Synonyms:** Potassium chloride / Hydrochloric acid.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>99.46</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>0.35</td>
<td>231-211-8</td>
</tr>
<tr>
<td>7647-01-0</td>
<td>Hydrochloric acid</td>
<td>0.16</td>
<td>231-595-7</td>
</tr>
<tr>
<td>50-00-0</td>
<td>Formaldehyde</td>
<td>0.02</td>
<td>200-001-8</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methyl alcohol</td>
<td>0.01</td>
<td>200-659-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Warning!** Causes eye irritation. May cause skin and respiratory tract irritation.  
**Target Organs:** Eyes.

**Potential Health Effects**

- **Eye:** Causes eye irritation.  
- **Skin:** May cause skin irritation.  
- **Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea.  
- **Inhalation:** May cause respiratory tract irritation. Formaldehyde may cause asthmatic symptoms by acting as an immunological sensitizer.  
- **Chronic:** Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged exposure may cause eye irritation.

Section 4 - First Aid Measures

- **Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
- **Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.  
- **Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. 

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist.

Storage: Store in a cool, dry place. Keep container closed when not in use. Do not store in metal containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>0.3 ppm Ceiling</td>
<td>0.016 ppm TWA 20 ppm IDLH</td>
<td>0.75 ppm TWA; 0.5 ppm Action Level; 0.75 ppm TWA; 2 ppm STEL (Irritant and potential cancer hazards - see 29 CFR 1910.1048)</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>200 ppm TWA; 250 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route</td>
<td>200 ppm TWA; 260 mg/m3 TWA 6000 ppm IDLH</td>
<td>200 ppm TWA; 260 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Potassium chloride: No OSHA
Vacated PELs are listed for this chemical. Hydrochloric acid: No OSHA Vacated PELs are listed for this chemical.

Formaldehyde: 3 ppm TWA (unless specified in 1910.1048) Methyl alcohol: 200 ppm TWA; 260 mg/m3 TWA

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** none reported

**pH:** 1.00

**Vapor Pressure:** Not available.

**Vapor Density:** 0.7 (air=1)

**Evaporation Rate:** >1 (Ether=1)

**Viscosity:** Not available.

**Boiling Point:** 212 deg F

**Freezing/Melting Point:** 32 deg F

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.0

**Molecular Formula:** Mixture

**Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Excess heat.

**Incompatibilities with Other Materials:** Metals, strong bases.

**Hazardous Decomposition Products:** Irritating and toxic gases.

**Hazardous Polymerization:** Has not been reported.

---

### Section 11 - Toxicological Information

**RTECS#:**

**CAS# 7732-18-5:** ZC0110000

**CAS# 7447-40-7:** TS8050000

**CAS# 7647-40-7:** MW4025000; MW4031000

**CAS# 50-00-0:** LP8925000

**CAS# 67-56-1:** PC1400000

**LD50/LC50:**

**CAS# 7732-18-5:**

- Oral, rat: LD50 = >90 mL/kg;

**CAS# 7447-40-7:**

- Draize test, rabbit, eye: 500 mg/24H Mild;
- Oral, mouse: LD50 = 1500 mg/kg;
- Oral, rat: LD50 = 2600 mg/kg;
CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m3/30M;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m3/5M;
Inhalation, rat: LC50 = 7004 mg/m3/30M;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;

CAS# 50-00-0:
Draize test, rabbit, eye: 750 ug/24H Severe;
Draize test, rabbit, eye: 750 ug Severe;
Draize test, rabbit, eye: 10 mg Severe;
Draize test, rabbit, eye: 37% Severe;
Draize test, rabbit, skin: 2 mg/24H Severe;
Draize test, rabbit, skin: 50 mg/24H Moderate;
Inhalation, mouse: LC50 = 454 mg/m3/4H;
Inhalation, mouse: LC50 = 505 mg/m3/2H;
Inhalation, rat: LC50 = 203 mg/m3;
Inhalation, rat: LC50 = 578 mg/m3/2H;
Inhalation, rat: LC50 = 250 ppm/2H;
Oral, mouse: LD50 = 42

CAS# 67-56-1:
Draize test, rabbit, eye: 40 mg Moderate;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, rabbit: LC50 = 81000 mg/m3/14H;
Inhalation, rat: LC50 = 64000 ppm/4H;
Oral, mouse: LD50 = 7300 mg/kg;
Oral, rabbit: LD50 = 14200 mg/kg;
Oral, rat: LD50 = 5600 mg/kg;
Skin, rabbit: LD50 = 15800 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 50-00-0:
- ACGIH: A2 - Suspected Human Carcinogen
- California: carcinogen, initial date 1/1/88 (gas)
- NTP: Suspect carcinogen
- IARC: Group 1 carcinogen

CAS# 67-56-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information
Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series:
- CAS# 50-00-0: waste number U122.
- CAS# 67-56-1: waste number U154 (Ignitable waste).

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
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<td>Not Regulated</td>
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<tr>
<td>Hazard Class:</td>
<td></td>
<td></td>
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<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7447-40-7 is listed on the TSCA inventory.
- CAS# 7647-01-0 is listed on the TSCA inventory.
- CAS# 50-00-0 is listed on the TSCA inventory.
- CAS# 67-56-1 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
- CAS# 50-00-0: 100 lb final RQ; 45.4 kg final RQ
- CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
- CAS# 7647-01-0: 500 lb TPQ (gas only)
- CAS# 50-00-0: 500 lb TPQ

SARA Codes
- CAS # 7447-40-7: immediate.
- CAS # 7647-01-0: immediate.
- CAS # 50-00-0: immediate, delayed.
- CAS # 67-56-1: immediate, fire.

Section 313
This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 0.35%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373. Hydrochloric acid is not at a high enough concentration to be reportable under Section 313. Formaldehyde is not at a high enough concentration to be reportable under Section 313. Methyl alcohol is not at a high enough concentration to be reportable under Section 313.
Clean Air Act:
    CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
    CAS# 50-00-0 is listed as a hazardous air pollutant (HAP).
    CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).
    This material does not contain any Class 1 Ozone depletors.
    This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. CAS# 50-00-0 is listed as a Hazardous Substance under the CWA.
    None of the chemicals in this product are listed as Priority Pollutants under the CWA.
    None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
    CAS# 7647-01-0 is considered highly hazardous by OSHA. CAS# 50-00-0 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
    CAS# 50-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
    CAS# 67-56-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Formaldehyde, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 50-00-0: 40 æg/day NSRL

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
    Not available.
Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)
    CAS# 7732-18-5: No information available.
    CAS# 7447-40-7: 1
    CAS# 7647-01-0: 1
    CAS# 50-00-0: 2
    CAS# 67-56-1: 1

Canada - DSL/NDSL
    CAS# 7732-18-5 is listed on Canada's DSL List.
    CAS# 7447-40-7 is listed on Canada's DSL List.
    CAS# 7647-01-0 is listed on Canada's DSL List.
    CAS# 50-00-0 is listed on Canada's DSL List.
    CAS# 67-56-1 is listed on Canada's DSL List.

Canada - WHMIS
    This product has a WHMIS classification of D2B.
    This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
    CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.
    CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
    CAS# 50-00-0 is listed on the Canadian Ingredient Disclosure List.
    CAS# 67-56-1 is listed on the Canadian Ingredient Disclosure List.
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Buffer Solution, pH 2.00

ACC# 03481

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Buffer Solution, pH 2.00  
**Catalog Numbers:** S799281, SB96-1, SB96-20, SB96-500  
**Synonyms:** None.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

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<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>99.43</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>0.4</td>
<td>231-211-8</td>
</tr>
<tr>
<td>7647-01-0</td>
<td>Hydrochloric acid</td>
<td>0.10</td>
<td>231-595-7</td>
</tr>
<tr>
<td>50-00-0</td>
<td>Formaldehyde</td>
<td>0.05</td>
<td>200-001-8</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methyl alcohol</td>
<td>0.02</td>
<td>200-659-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Caution!** May cause eye irritation.  
**Target Organs:** Eyes.

**Potential Health Effects**  
**Eye:** May cause eye irritation.  
**Skin:** May cause mild skin irritation.  
**Ingestion:** May cause irritation of the digestive tract.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** Prolonged or repeated skin contact may cause irritation.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.  
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed.

Storage: Store in a cool, dry place. Keep container closed when not in use. Do not store in metal containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
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<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>0.3 ppm Ceiling</td>
<td>0.016 ppm TWA 20 ppm IDLH</td>
<td>0.75 ppm TWA; 0.5 ppm Action Level; 0.75 ppm TWA; 2 ppm STEL (Irritant and potential cancer hazard - see 29 CFR 1910.1048)</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>200 ppm TWA; 250 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route</td>
<td>200 ppm TWA; 260 mg/m3 TWA 6000 ppm IDLH</td>
<td>200 ppm TWA; 260 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Potassium chloride: No OSHA Vacated PELs are listed for this chemical. Hydrochloric acid: No OSHA Vacated PELs are listed for this chemical. Formaldehyde: 3 ppm TWA (unless specified in 1910.1048) Methyl alcohol: 200 ppm TWA; 260 mg/m3 TWA
Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.
**Skin:** Wear appropriate gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to minimize contact with skin.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid
**Appearance:** clear, colorless
**Odor:** odorless
**pH:** 2.00
**Vapor Pressure:** Not available.
**Vapor Density:** 0.7
**Evaporation Rate:** 1.0
**Viscosity:** Not available.
**Boiling Point:** 212 deg F
**Freezing/Melting Point:** 32 deg F
**Decomposition Temperature:** Not available.
**Solubility:** Soluble in water
**Specific Gravity/Density:** 1.0
**Molecular Formula:** Mixture
**Molecular Weight:** Not available.

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.
**Conditions to Avoid:** None reported.
**Incompatibilities with Other Materials:** Metals.
**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**
- CAS# 7732-18-5: ZC0110000
- CAS# 7447-40-7: TS8050000
- CAS# 7647-01-0: MW4025000; MW4031000
- CAS# 50-00-0: LP8925000
- CAS# 67-56-1: PC1400000

**LD50/LC50:**
- CAS# 7732-18-5:
  - Oral, rat: LD50 = >90 mL/kg;
- CAS# 7447-40-7:
  - Draize test, rabbit, eye: 500 mg/24H Mild;
  - Oral, mouse: LD50 = 1500 mg/kg;
  - Oral, rat: LD50 = 2600 mg/kg;
- CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m3/30M;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m3/5M;
Inhalation, rat: LC50 = 7004 mg/m3/30M;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;

CAS# 50-00-0:
Draize test, rabbit, eye: 750 ug/24H Severe;
Draize test, rabbit, eye: 750 ug Severe;
Draize test, rabbit, eye: 10 mg Severe;
Draize test, rabbit, skin: 2 mg/24H Severe;
Draize test, rabbit, skin: 50 mg/24H Moderate;
Inhalation, mouse: LC50 = 454 mg/m3/4H;
Inhalation, mouse: LC50 = 505 mg/m3/2H;
Inhalation, rat: LC50 = 203 mg/m3;
Inhalation, rat: LC50 = 578 mg/m3/2H;
Inhalation, rat: LC50 = 250 ppm/2H;
Oral, mouse: LD50 = 42

CAS# 67-56-1:
Draize test, rabbit, eye: 40 mg Moderate;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, rabbit: LC50 = 81000 mg/m3/14H;
Inhalation, rat: LC50 = 64000 ppm/4H;
Oral, mouse: LD50 = 7300 mg/kg;
Oral, rabbit: LD50 = 14200 mg/kg;
Oral, rat: LD50 = 5600 mg/kg;
Skin, rabbit: LD50 = 15800 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 50-00-0:
• ACGIH: A2 - Suspected Human Carcinogen
• California: carcinogen, initial date 1/1/88 (gas)
• NTP: Suspect carcinogen
• IARC: Group 1 carcinogen

CAS# 67-56-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**
- CAS# 50-00-0: waste number U122.
- CAS# 67-56-1: waste number U154 (Ignitable waste).

---

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
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<td><strong>UN Number:</strong></td>
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<td><strong>Packing Group:</strong></td>
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---

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7447-40-7 is listed on the TSCA inventory.
- CAS# 7647-01-0 is listed on the TSCA inventory.
- CAS# 50-00-0 is listed on the TSCA inventory.
- CAS# 67-56-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
- CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
- CAS# 7647-01-0: 500 lb TPQ (gas only)
- CAS# 50-00-0: 500 lb TPQ

**SARA Codes**
- CAS # 7447-40-7: immediate.
- CAS # 7647-01-0: immediate.
- CAS # 50-00-0: immediate, delayed.
- CAS # 67-56-1: immediate, fire.

**Section 313**
- This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 0.4%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
- Hydrochloric acid is not at a high enough concentration to be reportable under Section 313.
- Formaldehyde is not at a high enough concentration to be reportable under Section 313.
- Methyl alcohol is not at a high enough concentration to be reportable under Section 313.

**Clean Air Act:**
- CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
CAS# 50-00-0 is listed as a hazardous air pollutant (HAP).
CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. CAS# 50-00-0 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
CAS# 7647-01-0 is considered highly hazardous by OSHA. CAS# 50-00-0 is considered highly hazardous by OSHA.

**STATE**
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 50-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 67-56-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
WARNING: This product contains Formaldehyde, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 50-00-0: 40 æg/day NSRL

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 7447-40-7: 1
CAS# 7647-01-0: 1
CAS# 50-00-0: 2
CAS# 67-56-1: 1

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7447-40-7 is listed on Canada's DSL List.
CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 50-00-0 is listed on Canada's DSL List.
CAS# 67-56-1 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of Not controlled..
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 67-56-1 is listed on the Canadian Ingredient Disclosure List.

**Section 16 - Additional Information**

**MSDS Creation Date:** 6/07/1999
**Revision #6 Date:** 9/22/2006
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet  
Buffer Solution (Acetate) pH 4.00

ACC# 03485

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Buffer Solution (Acetate) pH 4.00  
**Catalog Numbers:** SB85-1  
**Synonyms:** None  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-19-7</td>
<td>Acetic acid</td>
<td>47.8</td>
<td>200-580-7</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>28.0</td>
<td>231-791-2</td>
</tr>
<tr>
<td>127-09-3</td>
<td>Sodium acetate</td>
<td>24.4</td>
<td>204-823-8</td>
</tr>
<tr>
<td>50-00-0</td>
<td>Formaldehyde</td>
<td>0.05</td>
<td>200-001-8</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methyl alcohol</td>
<td>0.02</td>
<td>200-659-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Danger!** Causes eye and skin burns. Causes digestive and respiratory tract burns. May be harmful if absorbed through the skin.  
**Target Organs:** Teeth, eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause chemical conjunctivitis.  
**Skin:** Causes skin burns. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May be harmful if absorbed through the skin.  
**Ingestion:** Causes gastrointestinal tract burns. May cause gastric disturbances and electrolytic imbalance.  
**Inhalation:** May cause allergic respiratory reaction. Causes chemical burns to the respiratory tract. Can produce delayed pulmonary edema.  
**Chronic:** Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Chronic exposure may cause effects similar to those of acute exposure.

Section 4 - First Aid Measures

**Eyes:** Get medical aid. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Wash clothing before reuse. Discard contaminated shoes.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td>10 ppm TWA; 15 ppm STEL</td>
<td>10 ppm TWA; 25 mg/m3 TWA 50 ppm IDLH</td>
<td>10 ppm TWA; 25 mg/m3 TWA</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium acetate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>0.3 ppm Ceiling</td>
<td>0.016 ppm TWA 20 ppm IDLH</td>
<td>0.75 ppm TWA; 0.5 ppm Action Level; 0.75 ppm TWA; 2 ppm STEL (Irritant and potential cancer hazard - see 29 CFR 1910.1048)</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Acetic acid: 10 ppm TWA; 25 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical. Sodium acetate: No OSHA Vacated PELs are listed for this chemical. Formaldehyde: 3 ppm TWA (unless specified in 1910.1048) Methyl alcohol: 200 ppm TWA; 260 mg/m3 TWA

Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: none reported
pH: 4.00
Vapor Pressure: Not available.
Vapor Density: 0.7
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density: 1.0-1.2
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, acetic anhydride, ammonium nitrate, chlorine trifluoride, nitric acid, permanganates, sodium hydroxide, sodium peroxide, hydrogen peroxide, acetaldehyde, chlorosulfonic acid, oleum, potassium hydroxide, bromine pentafluoride, perchloric acid, chromic anhydride, potassium tert-butoxide, ethyleneimine, 2-aminoethanol, ethylene dianime, phosphorus trichloride, phosphorus isocyanate, diallyl methyl carbinol + ozone, nitric acid + acetone, xylene, chromic acid.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 64-19-7: AF1225000
CAS# 7732-18-5: ZC0110000
CAS# 127-09-3: AJ4300010
CAS# 50-00-0: LP8925000
CAS# 67-56-1: PC1400000

LD50/LC50:
CAS# 64-19-7:
  - Draize test, rabbit, skin: 50 mg/24H Mild;
  - Inhalation, mouse: LC50 = 5620 ppm/1H;
  - Oral, rat: LD50 = 3310 mg/kg;
  - Skin, rabbit: LD50 = 1060 uL/kg;

CAS# 7732-18-5:
  - Oral, rat: LD50 = >90 mL/kg;

CAS# 127-09-3:
  - Draize test, rabbit, eye: 10 mg Mild;
  - Draize test, rabbit, skin: 500 mg/24H Mild;
  - Inhalation, rat: LC50 = >30 gm/m3/1H;
  - Oral, mouse: LD50 = 6891 mg/kg;
  - Oral, rat: LD50 = 3530 mg/kg;
  - Skin, rabbit: LD50 = >10 gm/kg;

CAS# 50-00-0:
  - Draize test, rabbit, eye: 750 ug/24H Severe;
  - Draize test, rabbit, eye: 750 ug Severe;
  - Draize test, rabbit, eye: 10 mg Severe;
  - Draize test, rabbit, eye: 37% Severe;
  - Draize test, rabbit, skin: 2 mg/24H Severe;
  - Inhalation, mouse: LC50 = 454 mg/m3/4H;
  - Inhalation, mouse: LC50 = 505 mg/m3/2H;
  - Inhalation, rat: LC50 = 203 mg/m3;
  - Inhalation, rat: LC50 = 578 mg/m3/2H;
  - Inhalation, rat: LC50 = 250 ppm/2H;
  - Oral, mouse: LD50 = 42

CAS# 67-56-1:
  - Draize test, rabbit, eye: 40 mg Moderate;
  - Draize test, rabbit, eye: 100 mg/24H Moderate;
  - Draize test, rabbit, skin: 20 mg/24H Moderate;
  - Inhalation, rabbit: LC50 = 81000 mg/m3/14H;
  - Inhalation, rat: LC50 = 64000 ppm/4H;
  - Oral, mouse: LD50 = 7300 mg/kg;
  - Oral, rabbit: LD50 = 14200 mg/kg;
  - Oral, rat: LD50 = 5600 mg/kg;
  - Skin, rabbit: LD50 = 15800 mg/kg;

Carcinogenicity:
CAS# 64-19-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 127-09-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 50-00-0:
  - ACGIH: A2 - Suspected Human Carcinogen
  - California: carcinogen, initial date 1/1/88 (gas)
  - NTP: Suspect carcinogen
  - IARC: Group 1 carcinogen

CAS# 67-56-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
**Epidemiology:** No data available.

**Teratogenicity:** No data available.

**Reproductive Effects:** No data available.

**Mutagenicity:** No data available.

**Neurotoxicity:** No data available.

**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:**
- Fish: Bluegill/Sunfish: LC50 = 75 mg/L; 96 Hr; CAS# 64-19-7: Unspecified
- Fish: Goldfish: LC50 = 423 mg/L; 24 Hr; CAS# 64-19-7: Unspecified
- Water flea Daphnia: EC50 = 32-47 mg/L; 24-48 Hr; CAS# 64-19-7: Unspecified
- Bacteria: Phytobacterium phosphoreum: EC50 = 8.86-11 mg/L; 5,15,25 min; CAS# 64-19-7: Microtox test
- Fish: Fathead Minnow: LC50 = 88 mg/L; 96 Hr; CAS# 64-19-7: Static bioassay @ 18-22°C
- Fish: Pseudomonas putida:

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**
- CAS# 50-00-0: waste number U122.
- CAS# 67-56-1: waste number U154 (Ignitable waste).

### Section 14 - Transport Information

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<tr>
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</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 64-19-7 is listed on the TSCA inventory.
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 127-09-3 is listed on the TSCA inventory.
- CAS# 50-00-0 is listed on the TSCA inventory.
- CAS# 67-56-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 64-19-7: 5000 lb final RQ; 2270 kg final RQ  
CAS# 50-00-0: 100 lb final RQ; 45.4 kg final RQ  
CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ  

**SARA Section 302 Extremely Hazardous Substances**  
CAS# 50-00-0: 500 lb TPQ

**SARA Codes**  
CAS # 64-19-7: immediate, delayed, fire.  
CAS # 50-00-0: immediate, delayed.  
CAS # 67-56-1: immediate, fire.

**Section 313**  
Formaldehyde is not at a high enough concentration to be reportable under Section 313.  
Methyl alcohol is not at a high enough concentration to be reportable under Section 313.  
No chemicals are reportable under Section 313.

**Clean Air Act:**  
CAS# 50-00-0 is listed as a hazardous air pollutant (HAP).  
CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).  
This material does not contain any Class 1 Ozone depletors.  
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**  
CAS# 64-19-7 is listed as a Hazardous Substance under the CWA. CAS# 50-00-0 is listed as a Hazardous Substance under the CWA.  
None of the chemicals in this product are listed as Priority Pollutants under the CWA.  
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**  
CAS# 50-00-0 is considered highly hazardous by OSHA.

**STATE**  
CAS# 64-19-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.  
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.  
CAS# 127-09-3 is not present on state lists from CA, PA, MN, MA, FL, or NJ.  
CAS# 50-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.  
CAS# 67-56-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**  
WARNING: This product contains Formaldehyde, a chemical known to the state of California to cause cancer.  
California No Significant Risk Level: CAS# 50-00-0: 40 æg/day NSRL

**European/International Regulations**  
**European Labeling in Accordance with EC Directives**  
**Hazard Symbols:**  
C

**Risk Phrases:**  
R 34 Causes burns.

**Safety Phrases:**  
S 23 Do not inhale gas/fumes/vapour/spray.  
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**WGK (Water Danger/Protection)**  
CAS# 64-19-7: 1  
CAS# 7732-18-5: No information available.  
CAS# 127-09-3: 1  
CAS# 50-00-0: 2  
CAS# 67-56-1: 1

**Canada - DSL/NDSL**  
CAS# 64-19-7 is listed on Canada's DSL List.  
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 127-09-3 is listed on Canada's DSL List.
CAS# 50-00-0 is listed on Canada's DSL List.
CAS# 67-56-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 64-19-7 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 67-56-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/22/1999
Revision #6 Date: 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Buffer Solution pH 7.4

ACC# 41135

Section 1 - Chemical Product and Company Identification

MSDS Name: Buffer Solution pH 7.4
Catalog Numbers: NC9851915, SB110-1, SB110-500
Synonyms: None
Company Identification:
   Fisher Scientific
   1 Reagent Lane
   Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>99.0</td>
<td>231-791-2</td>
</tr>
<tr>
<td>64-02-8</td>
<td>Tetrasodium EDTA</td>
<td>&lt;1.0</td>
<td>200-573-9</td>
</tr>
<tr>
<td>7758-11-4</td>
<td>Dipotassium phosphate</td>
<td>&lt;1</td>
<td>231-834-5</td>
</tr>
<tr>
<td>7778-77-0</td>
<td>Potassium phosphate monobasic</td>
<td>&lt;1.0</td>
<td>231-913-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available liquid.

Caution! May cause eye, skin, and respiratory tract irritation. This is expected to be a low hazard for usual industrial handling.

Target Organs: None.

Potential Health Effects
Eye: May cause mild eye irritation.
Skin: May cause skin irritation. Low hazard for usual industrial handling.
Ingestion: Low hazard for usual industrial handling. May cause gastric disturbances and electrolytic imbalance.
Inhalation: May cause respiratory tract irritation. Low hazard for usual industrial handling.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Get medical aid. Gently lift eyelids and flush continuously with water.
Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.
Ingestion: Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
Notes to Physician: Treat symptomatically and supportively.
General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Avoid contact with eyes. Keep container tightly closed.

Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Good general ventilation should be sufficient to control airborne levels.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Tetrasodium EDTA</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Dipotassium phosphate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium phosphate monobasic</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Tetrasodium EDTA: No OSHA Vacated PELs are listed for this chemical. Dipotassium phosphate: No OSHA Vacated PELs are listed for this chemical. Potassium phosphate monobasic: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: not available
Odor: none reported
pH: 7.4 @ 25°C
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Soluble in water.
Specific Gravity/Density: 1.0
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable.
Conditions to Avoid: None reported.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: None.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 64-02-8: AH5075000
CAS# 7758-11-4 unlisted.
CAS# 7778-77-0: TC6615500
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 64-02-8:
  Draize test, rabbit, eye: 1900 ug;
  Draize test, rabbit, eye: 100 mg/24H Moderate;
  Draize test, rabbit, skin: 500 mg/24H Moderate;

CAS# 7758-11-4:

CAS# 7778-77-0:
  Skin, rabbit: LD50 = >4640 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 64-02-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7758-11-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7778-77-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available. 
Neurotoxicity: No data available. 
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information reported.
Physical: No information available.
Other: None.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>Not Regulated</td>
<td></td>
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<tr>
<td>Hazard Class:</td>
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<td></td>
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<tr>
<td>UN Number:</td>
<td></td>
<td></td>
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<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 64-02-8 is listed on the TSCA inventory.
CAS# 7758-11-4 is listed on the TSCA inventory.
CAS# 7778-77-0 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 64-02-8: immediate.
CAS # 7778-77-0: immediate.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 64-02-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7758-11-4 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7778-77-0 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
   Not available.
Risk Phrases:
Safety Phrases:
   S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
   CAS# 7732-18-5: No information available.
   CAS# 64-02-8: 2
   CAS# 7758-11-4: 1
   CAS# 7778-77-0: 1

Canada - DSL/NDSL
   CAS# 7732-18-5 is listed on Canada's DSL List.
   CAS# 64-02-8 is listed on Canada's DSL List.
   CAS# 7758-11-4 is listed on Canada's DSL List.
   CAS# 7778-77-0 is listed on Canada's DSL List.

Canada - WHMIS
   Not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 10/21/1997
Revision #4 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Buffer Solution pH 9.00

ACC# 41120

Section 1 - Chemical Product and Company Identification

MSDS Name: Buffer Solution pH 9.00  
Catalog Numbers: S79928-8, SB114-1, SB114-20, SB114-500  
Synonyms: None  
Company Identification:  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>99.17</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>0.4</td>
<td>231-211-8</td>
</tr>
<tr>
<td>10043-35-3</td>
<td>Boric acid (H3BO3)</td>
<td>0.3</td>
<td>233-139-2</td>
</tr>
<tr>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td>0.1</td>
<td>215-185-5</td>
</tr>
<tr>
<td>64-02-8</td>
<td>Tetrasodium EDTA</td>
<td>0.03</td>
<td>200-573-9</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available liquid.  
Caution! May cause eye, skin, and respiratory tract irritation.  
Target Organs: None.

Potential Health Effects  
Eye: May cause eye irritation.  
Skin: May cause skin irritation.  
Ingestion: May cause irritation of the digestive tract.  
Inhalation: May cause respiratory tract irritation.  
Chronic: Not available.

Section 4 - First Aid Measures

Eyes: Get medical aid. Gently lift eyelids and flush continuously with water.  
Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.  
Ingestion: Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.  
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.  
Notes to Physician: Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.  
**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

Section 7 - Handling and Storage

**Handling:** Use with adequate ventilation. Avoid contact with eyes. Keep container tightly closed. Avoid ingestion and inhalation.  
**Storage:** Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Good general ventilation should be sufficient to control airborne levels.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Boric acid (H3BO3)</td>
<td>2 mg/m3 TWA (inhaleable fraction, listed under Borate compounds, inorganic); 6 mg/m3 STEL (inhaleable fraction, listed under Borate compounds, inorganic)</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>2 mg/m3 Ceiling</td>
<td>10 mg/m3 IDLH</td>
<td>2 mg/m3 TWA</td>
</tr>
<tr>
<td>Tetrasodium EDTA</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Potassium chloride: No OSHA Vacated PELs are listed for this chemical. Boric acid (H3BO3): No OSHA Vacated PELs are listed for this chemical. Sodium hydroxide: No OSHA Vacated PELs are listed for this chemical. Tetrasodium EDTA: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.  
**Skin:** Wear appropriate gloves to prevent skin exposure.  
**Clothing:** Wear appropriate protective clothing to minimize contact with skin.  
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid  
**Appearance:** not available  
**Odor:** none reported  
**pH:** 9.00  
**Vapor Pressure:** Not available.  
**Vapor Density:** 0.7  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 212 deg F  
**Freezing/Melting Point:** 32 deg F  
**Decomposition Temperature:** Not available.  
**Solubility:** Soluble in water.  
**Specific Gravity/Density:** Not available.  
**Molecular Formula:** Mixture  
**Molecular Weight:** Not available.

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable.  
**Conditions to Avoid:** None reported.  
**Incompatibilities with Other Materials:** There is no information for any incompatibilities for this substance.  
**Hazardous Decomposition Products:** Irritating and toxic gases.  
**Hazardous Polymerization:** Has not been reported.

**Section 11 - Toxicological Information**

**RTECS#:**  
**CAS# 7732-18-5:** ZC0110000  
**CAS# 7447-40-7:** TS8050000  
**CAS# 10043-35-3:** ED4550000; ED4560000  
**CAS# 1310-73-2:** WB4900000  
**CAS# 64-02-8:** AH5075000  
**LD50/LC50:**  
**CAS# 7732-18-5:**  
Oral, rat: LD50 = >90 mL/kg;  

**CAS# 7447-40-7:**  
Draize test, rabbit, eye: 500 mg/24H Mild;  
Oral, mouse: LD50 = 1500 mg/kg;  
Oral, rat: LD50 = 2600 mg/kg;  

**CAS# 10043-35-3:**  
Oral, mouse: LD50 = 3450 mg/kg;  
Oral, rat: LD50 = 2660 mg/kg;  
Oral, rat: LD50 = 2500 mg/kg;  

**CAS# 1310-73-2:**  
Draize test, rabbit, eye: 400 ug Mild;  
Draize test, rabbit, eye: 1% Severe;
Draize test, rabbit, eye: 50 ug/24H Severe;  
Draize test, rabbit, eye: 1 mg/24H Severe;  
Draize test, rabbit, skin: 500 mg/24H Severe;  

CAS# 64-02-8:  
Draize test, rabbit, eye: 1900 ug;  
Draize test, rabbit, eye: 100 mg/24H Moderate;  
Draize test, rabbit, skin: 500 mg/24H Moderate;  

Carcinogenicity:  
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 10043-35-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 1310-73-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 64-02-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

Epidemiology: No data available.  
Teratogenicity: No data available.  
Reproductive Effects: No data available.  
Mutagenicity: No data available.  
Neurotoxicity: No data available.  
Other Studies:  

Section 12 - Ecological Information  
Ecotoxicity: No data available. No information available.  
Environmental: No information reported.  
Physical: No information available.  
Other: None.  

Section 13 - Disposal Considerations  
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.  
RCRA P-Series: None listed.  
RCRA U-Series: None listed.  

Section 14 - Transport Information  

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name</td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td>Hazard Class</td>
<td></td>
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<tr>
<td>UN Number</td>
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<td>Packing Group</td>
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<td></td>
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</tbody>
</table>

Section 15 - Regulatory Information  

US FEDERAL  
TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7447-40-7 is listed on the TSCA inventory.
CAS# 10043-35-3 is listed on the TSCA inventory.
CAS# 1310-73-2 is listed on the TSCA inventory.
CAS# 64-02-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 7447-40-7: immediate.
- CAS # 10043-35-3: immediate, delayed.
- CAS # 1310-73-2: immediate, reactive.
- CAS # 64-02-8: immediate.

**Section 313**
This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 0.4%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 10043-35-3 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 1310-73-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 64-02-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**

**WGK (Water Danger/Protection)**
- CAS# 7732-18-5: No information available.
- CAS# 7447-40-7: 1
- CAS# 10043-35-3: 1
- CAS# 1310-73-2: 1
- CAS# 64-02-8: 2
Canada - DSL/NDSL

CAS# 7732-18-5 is listed on Canada’s DSL List.
CAS# 7447-40-7 is listed on Canada's DSL List.
CAS# 10043-35-3 is listed on Canada’s DSL List.
CAS# 1310-73-2 is listed on Canada's DSL List.
CAS# 64-02-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of Not controlled.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 10043-35-3 is listed on the Canadian Ingredient Disclosure List.
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #4 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Buffer Solution pH 10

ACC# 41118

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Buffer Solution pH 10
**Catalog Numbers:** AC258600000, AC258600010, AC258605000, S79929-2, SB116-1, SB116-10, SB116-20, SB116-500
**Synonyms:** None
**Company Identification:** Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.8</td>
<td>231-791-2</td>
</tr>
<tr>
<td>6381-92-6</td>
<td>Disodium ethylenediaminetetraacetate dihydrate</td>
<td>1.0</td>
<td>unlisted</td>
</tr>
<tr>
<td>584-08-7</td>
<td>Potassium carbonate</td>
<td>0.6</td>
<td>209-529-3</td>
</tr>
<tr>
<td>12228-88-5</td>
<td>Potassium Borate</td>
<td>0.4</td>
<td>unlisted</td>
</tr>
<tr>
<td>1310-58-3</td>
<td>Potassium hydroxide</td>
<td>0.2</td>
<td>215-181-3</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.

**Caution!** May cause irritation.
**Target Organs:** None.

**Potential Health Effects**
**Eye:** May cause eye irritation.
**Skin:** May cause mild skin irritation.
**Ingestion:** Low hazard for usual industrial handling. May cause gastric disturbances and electrolytic imbalance.
**Inhalation:** May cause respiratory tract irritation. Low hazard for usual industrial handling.
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Get medical aid. Gently lift eyelids and flush continuously with water.
**Skin:** Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.
**Ingestion:** Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible.

Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation.

Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Good general ventilation should be sufficient to control airborne levels. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Disodium ethylenediaminetetraacetate dihydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium carbonate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium Borate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium hydroxide</td>
<td>2 mg/m3 Ceiling</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Disodium ethylenediaminetetraacetate dihydrate: No OSHA Vacated PELs are listed for this chemical. Potassium carbonate: No OSHA Vacated PELs are listed for this chemical. Potassium Borate: No OSHA Vacated PELs are listed for this chemical. Potassium hydroxide: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear butyl rubber gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: A NIOSH/MSHA approved or European Standard EN 149 air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: odorless
pH: 10
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: >1.0 (Ether=1)
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: soluble
Specific Gravity/Density: Not available.
Molecular Formula: Solution
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable.
Conditions to Avoid: None reported.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: None.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 6381-92-6: AH4410000
CAS# 584-08-7: TS7750000
CAS# 12228-88-5 unlisted.
CAS# 1310-58-3: TT2100000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 6381-92-6:

CAS# 584-08-7:
  Oral, mouse: LD50 = 2570 mg/kg;
  Oral, rat: LD50 = 1870 mg/kg;

CAS# 12228-88-5:

CAS# 1310-58-3:
Draize test, rabbit, skin: 50 mg/24H Severe; Oral, rat: LD50 = 273 mg/kg;

**Carcinogenicity:**
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 6381-92-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 584-08-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 12228-88-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 1310-58-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** No information found

**Other Studies:**

---

**Section 12 - Ecological Information**

**Ecotoxicity:** No data available. No information available.

**Environmental:** No information reported.

**Physical:** No information available.

**Other:** None.

---

**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

---

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th>Shipping Name:</th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class:</td>
<td>Not Regulated</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 6381-92-6 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40 CFR 720.3(u)(2)).
- CAS# 584-08-7 is listed on the TSCA inventory.
- CAS# 12228-88-5 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40 CFR 720.3(u)(2)).
- CAS# 1310-58-3 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-58-3: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 6381-92-6: immediate.
CAS # 584-08-7: immediate.
CAS # 1310-58-3: immediate, reactive.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 1310-58-3 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 6381-92-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 584-08-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 12228-88-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 1310-58-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
Not available.

Risk Phrases:

Safety Phrases:
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 6381-92-6: 2
CAS# 584-08-7: 1
CAS# 12228-88-5: No information available.
CAS# 1310-58-3: 1

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 6381-92-6 is listed on Canada's DSL List.
CAS# 584-08-7 is listed on Canada's DSL List.
CAS# 1310-58-3 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of Not controlled.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 584-08-7 is listed on the Canadian Ingredient Disclosure List.
- CAS# 1310-58-3 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 2/24/1999  
**Revision #7 Date:** 9/21/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Cadmium reference standard solution 1000 ppm

ACC# 03792

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Cadmium reference standard solution 1000 ppm  
**Catalog Numbers:** SC118-100, SC118-500  
**Synonyms:** None.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-43-9</td>
<td>Cadmium</td>
<td>0.1</td>
<td>231-152-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.  
**Target Organs:** Kidneys, liver, respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** May cause irreversible eye injury.  
**Skin:** Causes skin irritation.  
**Ingestion:** May cause irritation of the digestive tract.  
**Inhalation:** Causes respiratory tract irritation.  
**Chronic:** Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. Cadmium and compounds may cause lung, liver and kidney damage and lung and prostate cancer in humans.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.  
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Destroy contaminated shoes.  
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.  
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not
breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Neutralize spill with sodium bicarbonate. Use water spray to disperse the gas/vapor.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get on skin or in eyes. Do not ingest or inhale.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. See 29CFR 1910.1027 for regulations applying to all occupational exposures to cadmium and cadmium compounds, in all forms.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.01 mg/m3 TWA; 0.002 mg/m3 TWA (respirable fraction)</td>
<td>9 mg/m3 IDLH (dust and fume)</td>
<td>5 æg/m3 TWA; 0.1 mg/m3 TWA (fume, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.2 mg/m3 TWA (dust, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.3 mg/m3 Ceiling (fume, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.6 mg/m3 Ceiling</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA. Cadmium: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: ~0.5
Vapor Pressure: 14 mm Hg @16C
Vapor Density: 0.7
Evaporation Rate: >1 (ether=1)
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Completely soluble in water
Specific Gravity/Density: 1.0
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials.
Incompatibilities with Other Materials: Nitric acid reacts with over 150 chemical combinations. Refer to NFPA fire Protection Guide for specifics. Reacts explosively with organic materials and combustible materials. Cadmium is incompatible with ammonium nitrate, hydrazoic acid, tellurium and zinc, ammonia, sulfur, selenium, and nitryl fluoride.
Hazardous Decomposition Products: Oxides of nitrogen, toxic cadmium oxide fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information
RTECS#:
CAS# 7732-18-5: ZC0110000
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 7440-43-9: EU9800000

LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 7697-37-2:
  Inhalation, rat: LC50 = 260 mg/m3/30M;
  Inhalation, rat: LC50 = 130 mg/m3/4H;
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 7440-43-9:
  Inhalation, rat: LC50 = 25 mg/m3/30M;
  Oral, mouse: LD50 = 890 mg/kg;
  Oral, rat: LD50 = 2330 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-43-9:
  - ACGIH: A2 - Suspected Human Carcinogen
  - California: carcinogen, initial date 10/1/87
  - NTP: Known carcinogen
  - IARC: Group 1 carcinogen

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effect: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>No information available.</td>
</tr>
</tbody>
</table>
US FEDERAL

TSCA
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7697-37-2 is listed on the TSCA inventory.
- CAS# 7440-43-9 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
- CAS# 7440-43-9: 10 lb final RQ (no reporting of releases of this hazardous substance is required)

SARA Section 302 Extremely Hazardous Substances
- CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
- CAS# 7697-37-2: immediate, delayed, fire.
- CAS# 7440-43-9: immediate, delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Cadmium is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:
- CAS# 7440-43-9 (listed as Cadmium compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 7440-43-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-43-9 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-43-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Cadmium, a chemical known to the state of California to cause cancer. WARNING: This product contains Cadmium, a chemical known to the state of California to cause male reproductive toxicity.
California No Significant Risk Level: CAS# 7440-43-9: 0.05 æg/day NSRL (inhalation)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
- Not available.

Risk Phrases:
- R 37/38 Irritating to respiratory system and skin.
R 41 Risk of serious damage to eyes.

**Safety Phrases:**
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7440-43-9: No information available.

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7440-43-9 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D2A, E, D2B. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-43-9 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 9/30/1997  
**Revision #5 Date:** 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
MATERIAL SAFETY DATA SHEET
Essentially Similar to U.S. Department of Labor Form OSHA
Revised 03/10/05
HMIS Health-1 Flammability-4 Reactivity-0

SECTION I-Product Information

Manufacturer: A.V.W. Inc.
24 Hour Emergency Phone Number: 800-424-9300
Product Name: Blow Off Air Duster ---8 oz, 3.75 oz, Air Duster in Spanish

SECTION II-Hazardous Ingredients

Petroleum Hydrocarbon CAS# 68476-86-8

SECTION III-Physical Data

Melting Point: -189.9 C
Boiling Point: -105 C
Auto Ignition Temperature: 426-537 C
Vapor Pressure: 14.5 – 26.0 KPA
Specific Gravity: (water=1) 0.530 – 0.560
Water Solubility: No
Appearance: Petroleum liquefied gas. Gas at normal temperature and pressure.

SECTION IV-Fire and Explosion Hazard Data

Flash Point: -120 C EXTREMELY FLAMMABLE LEVEL 3 AEROSOL
Extinguishing Media: Carbon Dioxide, Dry chemical or foam
Special Fire Fighting Procedures: Dress in a special gown that can resist high temperature.
Unusual Fire and Explosion: Highly explosive and inflammable.
Inflammability Limits: LSI: 8.5 LII: 1.9

SECTION V-Health Hazard and First Aid

TLV: 800 ppm
Carcinogen: No
Acute Chronic Health Effects: Excessive exposure may cause irritation to upper respiratory tract. Excessive exposure may cause carboxyhemoglobinemia, thereby impairing the blood’s ability to transport oxygen.
Effects of Overexposure:
Eyes- May cause burn and pain, inhalation may cause drowsiness.
Skin- May cause burn.
Inhalation- Narcotic and death on high concentrations.
Ingestion: Is a gas.
First Aid:
Eyes- Flush with water for 15 minutes. If irritation persists, get medical attention.
Skin- Wash with affected areas with plenty of water and soap. Get medical attention.
Inhalation- Move to fresh air. Get medical attention.

SECTION VI-Reactivity Data

Stability: Stable X
Conditions to Avoid: Avoid open flames, welding arcs, or other high temperature sources, which induce thermal decomposition and fire. Do not use in closed areas.

Incompatibility: All possible ignition sources, strong oxidizers, caustics, chemically active metals.

SECTION VII-Spill or Leak Procedures

The product is a gas on a normal temperature and pressure. Waste disposal methods: Incinerate on an adequate place according with local laws.

SECTION VIII-Special Protection Information

Respiratory Protection: Use the product in a well-ventilated area.
Protective Gloves: Neoprene
Eye Protection: Use Safety glasses
Other Protective Equipment: Use gowns and shoes that do not generate static electricity.

SECTION IX-Special Precautions

Precautions in handling and storing: Keep away from heat and ignition sources. Do not store containers at temperatures above 120 F.
Material Safety Data Sheet
Chloride Standard - 0.5mg/ml MSDS

Section 1: Chemical Product and Company Identification

**Product Name:** Chloride Standard - 0.5mg/ml

**Catalog Codes:** SLC4216

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Sodium chloride; Water

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

**Contact Information:**

- Sciencelab.com, Inc.
  14025 Smith Rd.
  Houston, Texas 77396

- US Sales: 1-800-901-7247
  International Sales: 1-281-441-4400

- Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium chloride</td>
<td>7647-14-5</td>
<td>0.0824</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>99.9</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients:

Section 3: Hazards Identification


**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

Section 4: First Aid Measures
**Eye Contact:** Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used.

**Skin Contact:** No known effect on skin contact, rinse with water for a few minutes.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

---

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**
- Risks of explosion of the product in presence of mechanical impact: Not available.
- Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

---

### Section 6: Accidental Release Measures

**Small Spill:**
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

---

### Section 7: Handling and Storage

**Precautions:** No specific safety phrase has been found applicable for this product.

**Storage:**
No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be
sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

**Personal Protection:** Safety glasses. Lab coat.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Not available.

**pH (1% soln/water):** Neutral.

**Boiling Point:** The lowest known value is 100°C (212°F) (Water).

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** The only known value is 1 (Water = 1) (Water).

**Vapor Pressure:** The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatile:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is much more soluble in water.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol.

**Solubility:**
- Easily soluble in cold water, hot water.
- Partially soluble in methanol.
- Insoluble in diethyl ether, n-octanol.

### Section 10: Stability and Reactivity Data

---

p. 3
**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Not considered to be corrosive for metals and glass.

**Special Remarks on Reactivity:** Explodes in presence of bromine trifluoride. (Sodium chloride)

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Not available.

**Toxicity to Animals:**
- LD50: Not available.
- LC50: Not available.

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:** Non-corrosive for skin. Non-sensitizer for skin. Non-permeator by skin. Non-hazardous in case of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Material is irritating to mucous membranes and upper respiratory tract. (Sodium chloride)

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).
Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Sodium chloride; Water

Other Regulations: Not available or of its ingredients

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
This product is not classified according to the EU regulations.

HMIS (U.S.A.):

Health Hazard: 0
Fire Hazard: 0
Reactivity: 0

Personal Protection: a

National Fire Protection Association (U.S.A.):

Health: 0
Flammability: 0
Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable.
Lab coat.
Not applicable.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:58 AM

Last Updated: 10/10/2005 12:58 AM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even
if ScienceLab.com has been advised of the possibility of such damages.
Material Safety Data Sheet
Chromium Reference Standard Solution

ACC# 05012

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Chromium Reference Standard Solution  
**Catalog Numbers:** SC192-100, SC192-500, SLN2360  
**Synonyms:** None  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>99.8</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7778-50-9</td>
<td>Potassium dichromate</td>
<td>0.2</td>
<td>231-906-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: orange liquid.

**Warning!** Causes eye and skin irritation and possible burns. Causes digestive and respiratory tract irritation with possible burns. May cause allergic skin reaction. May cause cancer in humans. May cause liver and kidney damage. May cause dermatitis.  
**Target Organs:** Kidneys, liver.

**Potential Health Effects**

**Eye:** Causes eye irritation and possible burns.  
**Skin:** May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Exposure may cause irritation and possible burns. Prolonged skin contact may cause injury especially if the skin is abraded.  
**Ingestion:** May cause kidney damage. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.  
**Inhalation:** May cause liver and kidney damage. May cause ulceration and perforation of the nasal septum if inhaled in excessive quantities. Causes respiratory tract irritation with possible burns.  
**Chronic:** Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. May cause respiratory tract cancer. May cause liver and kidney damage. Chronic inhalation may cause nasal septum ulceration and perforation.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

---

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Runoff from fire control or dilution water may cause pollution.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Non-flammable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use only in a well-ventilated area. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

**Storage:** Do not store near combustible materials. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>5 æg/m3 TWA (listed under Chromium (VI) compounds).0.1 mg/m3 Ceiling (as CrO3, applies to any operations or sectors for which the H exavalent Chromium standard [29 CFR 1910.1026] is stayed or is othe</td>
</tr>
<tr>
<td>Potassium dichromate</td>
<td>0.05 mg/m3 TWA (as Cr) (listed under Chromium (VI))</td>
<td>0.001 mg/m3 TWA (as Cr) (listed under Chromates).15 mg/m3 IDLH (as Cr(VI)) (listed</td>
<td></td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Potassium dichromate: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** orange

**Odor:** none reported

**pH:** ~7

**Vapor Pressure:** 14 mm Hg @20°C

**Vapor Density:** 0.7

**Evaporation Rate:** >1 (ether=1)

**Viscosity:** Not available.

**Boiling Point:** 212 deg F

**Freezing/Melting Point:** 32 deg F

**Decomposition Temperature:** Not available.

**Solubility:** Soluble in water.

**Specific Gravity/Density:** 1.0

**Molecular Formula:** Solution

**Molecular Weight:** Not available.

Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Incompatible materials, combustible materials, reducing agents, flammable materials.

**Incompatibilities with Other Materials:** Potassium dichromate reacts explosively with hydrazine and hydroxylamine. acid+TNT, and hydroxylamine. Explosively reacts with acetic anhydride.

**Hazardous Decomposition Products:** No data available.

**Hazardous Polymerization:** Has not been reported.

Section 11 - Toxicological Information

**RTECS#:**

**CAS# 7732-18-5:** ZC0110000

**CAS# 7778-50-9:** HX7680000

**LD50/LC50:**

**CAS# 7732-18-5:**

Oral, rat: LD50 = >90 mL/kg;
CAS# 7778-50-9:
- Draize test, rabbit, eye: 140 mg Severe;
- Oral, mouse: LD50 = 190 mg/kg;
- Oral, rat: LD50 = 25 mg/kg;
- Skin, rabbit: LD50 = 14 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7778-50-9:
- ACGIH: A1 - Confirmed Human Carcinogen (listed as 'Chromium (VI) compounds- water soluble').
- California: carcinogen, initial date 2/27/87 (listed as Chromium (VI) compounds).
- NTP: Known carcinogen (listed as Chromium (VI) compounds).
- IARC: Group 1 carcinogen

Epidemiology: Increased incidences of respiratory cancer has been found in chromium (VI) workers.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Mutagenicity: Mutation data reported.
Neurotoxicity: No information reported
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Potassium dichromate has a high potential to affect some aquatic organisms and secondary waste treatment microorganisms. It is expected to have a high potential to affect the germination and growth of some plants. Acute aquatic effects: 48-hour LC50; Golden orfe(minnow): 224ng/L 48-hour LC50; Mosquito fish: 420 mg/L 24-hour LC50; Water flea: 1.4 mg/L. 24-hour EC50(immobilization); waterflea: 0.89ng/L
Environmental: Potassium dichromate has a moderate potential to biconcentrate. to cause an adverse environmental effect.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
US FEDERAL

TSCA
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7778-50-9 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
CAS# 7778-50-9: Section 6 (see 40 CFR 749.68)

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7778-50-9: 10 lb final RQ; 4.54 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS# 7778-50-9: delayed.

Section 313
This material contains Potassium dichromate (listed as Chromium (VI) compounds), 0.2%, (CAS# 7778-50-9) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7778-50-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7778-50-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Chromium (VI) compounds- water soluble), Massachusetts.

California Prop 65
WARNING: This product contains Potassium dichromate, listed as `Chromium (VI) compounds', a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
Not available.

Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7778-50-9: 3

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7778-50-9 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A, D2B. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7778-50-9 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 4/29/1998  
**Revision #5 Date:** 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Cobalt atomic absorption standard solution, 1 mg/ml Co in 2% HNO3

ACC# 75495

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Cobalt atomic absorption standard solution, 1 mg/ml Co in 2% HNO3  
**Catalog Numbers:** AC195920000, AC195921000, AC195925000  
**Synonyms:** None.  
**Company Identification:**  
Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410  
For information in North America, call: 800-ACROS-01  
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-48-4</td>
<td>Cobalt</td>
<td>0.1</td>
<td>231-158-0</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear pink liquid.  
**Danger!** May cause severe eye irritation and possible injury. Causes skin and respiratory tract irritation. May cause blood abnormalities. May cause cardiac disturbances. May cause central nervous system effects. May cause kidney damage. Corrosive to metal.  
**Target Organs:** Blood, kidneys, central nervous system, respiratory system, cardiovascular system, blood forming organs, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause chemical conjunctivitis and corneal damage.  
**Skin:** Causes skin irritation.  
**Ingestion:** May cause irritation of the digestive tract. May cause kidney damage. May cause systemic toxicity with acidosis. May cause cardiac disturbances. May cause central nervous system effects. May cause blood abnormalities.  
**Inhalation:** Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause kidney damage. May cause blood changes. May cause cardiac abnormalities. Exposure may produce metabolic acidosis.  
**Chronic:** Effects may be delayed. May cause kidney damage.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).  
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.  
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce
vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. **Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask. **Notes to Physician:** Administration of Sodium bicarbonate may be of value to treat acidosis.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will react with water to form toxic and corrosive fumes. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes. Runoff from fire control or dilution water may cause pollution. **Extinguishing Media:** For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. **Flash Point:** Not applicable. **Autoignition Temperature:** Not applicable. **Explosion Limits, Lower:** Not available. **Upper:** Not available. **NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. **Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. **Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.02 mg/m3 TWA</td>
<td>0.05 mg/m3 TWA (dust and fume) 20 mg/m3 TWA (dust and fume)</td>
<td>0.1 mg/m3 TWA (dust and fume)</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Cobalt: 0.05 mg/m3 TWA (dust and fume)

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid

**Appearance:** clear pink

**Odor:** None reported.

**pH:** Not available.

**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** Not available.

**Decomposition Temperature:** Not available.

**Solubility:** miscible

**Specific Gravity/Density:** Not available.

**Molecular Formula:** Solution

**Molecular Weight:** Not available.

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Incompatible materials, excess heat, strong oxidants.

**Incompatibilities with Other Materials:** Oxidizing agents.

**Hazardous Decomposition Products:** Nitrogen oxides, irritating and toxic fumes and gases, nitrogen.

**Hazardous Polymerization:** Has not been reported.

---

**Section 11 - Toxicological Information**

**RTECS#:**

**CAS# 7732-18-5:** ZC0110000

**CAS# 7697-37-2:** QU5775000; QU5900000

**CAS# 7440-48-4:** GF8750000; GF8850000; GG0375000

**LD50/LC50:**

**CAS# 7732-18-5:**

- Oral, rat: LD50 = >90 mL/kg;

**CAS# 7697-37-2:**

- Inhalation, rat: LC50 = 260 mg/m3/30M;
- Inhalation, rat: LC50 = 130 mg/m3/4H;
- Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

**CAS# 7440-48-4:**
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-48-4:
- **ACGIH**: A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California**: carcinogen, initial date 7/1/92 (powder)
- **NTP**: Not listed.
- **IARC**: Group 2B carcinogen

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series**: None listed.
**RCRA U-Series**: None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name</strong></td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>NITRIC ACID</td>
</tr>
<tr>
<td><strong>Hazard Class</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number</strong></td>
<td>UN3264</td>
<td>UN2031</td>
</tr>
<tr>
<td><strong>Packing Group</strong></td>
<td>III</td>
<td>II</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7440-48-4 is listed on the TSCA inventory.

**Health & Safety Reporting List**
CAS# 7440-48-4: Effective 6/1/87, Sunset 6/1/97

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.
CAS # 7440-48-4: immediate, delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Cobalt is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-48-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Cobalt, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 37/38 Irritating to respiratory system and skin.
R 41 Risk of serious damage to eyes.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7440-48-4: 1

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7440-48-4 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List

CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-48-4 is listed on the Canadian Ingredient Disclosure List.

MSDS Creation Date: 9/02/1997
Revision #6 Date: 3/22/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet  
Cobalt(II) sulfate heptahydrate

ACC# 05370

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Cobalt(II) sulfate heptahydrate  
**Catalog Numbers:** S79974, S799741, C386-500  
**Synonyms:** Cobalt sulfate heptahydrate; Cobalt(II) sulfate (1:1) heptahydrate.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10026-24-1</td>
<td>Cobalt sulfate heptahydrate</td>
<td>100</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: red-pink solid.  
**Warning!** Causes respiratory tract irritation. Causes eye and skin irritation. May be harmful if swallowed. May cause cancer based on animal studies. Potential cancer hazard.  
**Target Organs:** No data found.

**Potential Health Effects**  
**Eye:** Causes eye irritation.  
**Skin:** Prolonged and/or repeated contact may cause irritation and/or dermatitis. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed.  
**Inhalation:** Causes respiratory tract irritation.  
**Chronic:** Cobalt compounds may cause cancer based upon animal studies.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.  
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.  
**Notes to Physician:** Treat symptomatically and supportively.
**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

---

**Section 5 - Fire Fighting Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Use only in a well-ventilated area. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation.

**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt sulfate heptahydrate</td>
<td>0.02 mg/m3 TWA (as Co) (listed under Cobalt, inorganic compounds).</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Cobalt sulfate anhydrous</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Cobalt sulfate heptahydrate: No OSHA Vacated PELs are listed for this chemical. Cobalt sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: red-pink
Odor: none reported
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 788 deg F
Freezing/Melting Point: 206 deg F
Decomposition Temperature: 788 deg F
Solubility: 60.4% (3 C)
Specific Gravity/Density: 1.948 @ 25C
Molecular Formula: CoSO4.7H2O
Molecular Weight: 281.0846

Chemical Stability: Stable.
Conditions to Avoid: Dust generation, moisture.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: Oxides of sulfur.
Hazardous Polymerization: Has not been reported.

Section 10 - Stability and Reactivity

Section 11 - Toxicological Information

RTECS#:
CAS# 10026-24-1: GG3200000
CAS# 10124-43-3: GG3100000
LD50/LC50:
CAS# 10026-24-1:
  Oral, rat: LD50 = 582 mg/kg;

CAS# 10124-43-3:
  Oral, mouse: LD50 = 584 mg/kg;
  Oral, rat: LD50 = 424 mg/kg;

Carcinogenicity:
CAS# 10026-24-1:
  - ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans (listed as 'Cobalt, inorganic compounds').
  - California: carcinogen, initial date 6/2/00
  - NTP: Not listed.
  - IARC: Group 2B carcinogen

CAS# 10124-43-3:
- **ACGIH**: Not listed.
- **California**: carcinogen, initial date 5/20/05
- **NTP**: Suspect carcinogen
- **IARC**: Group 2B carcinogen

**Epidemiology**: IARC Group 2B: Proven animal carcinogenic substance of potential relevance to humans. IARC Group 2B: No data available on human carcinogenicity, however sufficient evidence of carcinogenicity in animals.

**Teratogenicity**: No information found

**Reproductive Effects**: No information found

**Mutagenicity**: No information found

**Neurotoxicity**: No information found

**Other Studies**:

---

### Section 12 - Ecological Information

**Ecotoxicity**: No data available. No information available.

**Environmental**: No information found.

**Physical**: No information found.

**Other**: No information available.

---

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series**: None listed.

**RCRA U-Series**: None listed.

---

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th><strong>US DOT</strong></th>
<th><strong>Canada TDG</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name</strong></td>
<td>Please contact Fisher Scientific for shipping information</td>
</tr>
<tr>
<td><strong>Hazard Class</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Canada TDG</strong></td>
<td>No information available.</td>
</tr>
</tbody>
</table>

---

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 10026-24-1 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).

CAS# 10124-43-3 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 10026-24-1: immediate, delayed.

**Section 313**
This material contains Cobalt sulfate heptahydrate (listed as Cobalt compounds), 100%, (CAS# 10026-24-1) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
CAS# 10026-24-1 (listed as Cobalt compounds) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 10026-24-1 can be found on the following state right to know lists: New Jersey, (listed as Cobalt compounds), Pennsylvania, (listed as Cobalt compounds), Minnesota, (listed as Cobalt, inorganic compounds).
CAS# 10124-43-3 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Cobalt sulfate heptahydrate, a chemical known to the state of California to cause cancer. WARNING: This product contains Cobalt sulfate anhydrous, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**
**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
T N

**Risk Phrases:**
R 22 Harmful if swallowed.
R 42/43 May cause sensitization by inhalation and skin contact.
R 49 May cause cancer by inhalation.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**
S 22 Do not breathe dust.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**
CAS# 10026-24-1: No information available.
CAS# 10124-43-3: 2

**Canada - DSL/NDSL**
CAS# 10124-43-3 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 10026-24-1 is not listed on the Canadian Ingredient Disclosure List.
- CAS# 10124-43-3 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 11/05/1998  
**Revision #8 Date:** 3/15/2007  

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Conductivity Calibration Standard 10Solution MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>Conductivity Calibration Standard 10Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog Codes:</td>
<td>SLC4288</td>
</tr>
<tr>
<td>CAS#:</td>
<td>Mixture.</td>
</tr>
<tr>
<td>RTECS:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>TSCA:</td>
<td>TSCA 8(b) inventory: Potassium chloride; Water</td>
</tr>
<tr>
<td>CI#:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Synonym:</td>
<td>Conductivity Calibration Standard 10 Solution</td>
</tr>
<tr>
<td>Chemical Name:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Chemical Formula:</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: 1-800-901-7247
International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium chloride</td>
<td>7447-40-7</td>
<td>0-10</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>90-100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients:

Section 3: Hazards Identification

Potential Acute Health Effects:
Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion. Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to blood, cardiovascular system. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human
## Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

**Skin Contact:**
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

**Serious Skin Contact:** Not available.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:** Non-explosive in presence of open flames and sparks, of shocks.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** May result in explosion with potassium permanganate and sulfuric acid. (Potassium chloride)

## Section 6: Accidental Release Measures

**Small Spill:**
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**
Poisonous liquid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep locked up. Do not ingest. Do not breathe gas/fumes/vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection: Safety glasses. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.
Odor: Not available.
Taste: Not available.
Molecular Weight: Not applicable.
Color: Clear Colorless.

pH (1% soln/water): Neutral.
Boiling Point: The lowest known value is 100°C (212°F) (Water).
Melting Point: Not available.
Critical Temperature: Not available.
Specific Gravity: Weighted average: 1.03 (Water = 1)
Vapor Pressure: The highest known value is 2.3 kPa (@ 20°C) (Water).
Vapor Density: The highest known value is 0.62 (Air = 1) (Water).
Volutility: Not available.
Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is much more soluble in water.
**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:**
Easily soluble in cold water, hot water.  
Very slightly soluble in methanol, n-octanol.

---

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**
Hygroscopic.  
Incompatible with KMnO4, H2SO4, BrF3, and BrCl3. May react violently with BrF3. (Potassium chloride)

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

---

### Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact.

**Toxicity to Animals:** Acute oral toxicity (LD50): 30000 mg/kg (Mouse) (Calculated value for the mixture).

**Chronic Effects on Humans:** Contains material which may cause damage to the following organs: blood, cardiovascular system.

**Other Toxic Effects on Humans:**  
Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.  
Non-permeator by skin.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Passes through the placental barrier in animal. (Potassium chloride)

**Special Remarks on other Toxic Effects on Humans:**
Acute Potential Health Effects:  
Skin: May cause skin irritation.  
Eyes: May cause eye irritation.  
Inhalation: Inhalation of vapor or mist may cause respiratory tract irritation.  
Ingestion: May cause digestive tract irritation with nausea, vomiting, diarrhea.  

Chronic Potential Health Effects:  
Skin: May cause dermatitis.  
Eyes: May cause conjunctivitis.  
Inhalation: May cause respiratory tract irritation.

---

### Section 12: Ecological Information
Ecotoxicity: Not available.

BOD5 and COD: Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

---

**Section 13: Disposal Considerations**

**Waste Disposal:**
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

---

**Section 14: Transport Information**

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

---

**Section 15: Other Regulatory Information**

**Federal and State Regulations:** TSCA 8(b) inventory: Potassium chloride; Water


**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):**
This product is not classified according to the EU regulations.
Not applicable.

**HMIS (U.S.A.):**
- Health Hazard: 1
- Fire Hazard: 0
- Reactivity: 0
- Personal Protection: a

**National Fire Protection Association (U.S.A.):**
- Health: 1
- Flammability: 0
- Reactivity: 0
### Specific hazard:

### Protective Equipment:
- Not applicable.
- Lab coat.
- Not applicable.
- Safety glasses.

### Section 16: Other Information

<table>
<thead>
<tr>
<th>References</th>
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<tr>
<td>Other Special Considerations</td>
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<tr>
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<td>Last Updated</td>
<td>10/09/2005 04:58 PM</td>
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Material Safety Data Sheet
Conductivity Calibration Standard 100 Solution MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>Conductivity Calibration Standard 100 Solution</th>
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<tr>
<td>Catalog Codes:</td>
<td>SLC1495</td>
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<tr>
<td>CAS#:</td>
<td>Mixture.</td>
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<td>TSCA:</td>
<td>TSCA 8(b) inventory: Potassium chloride or Sodium Chloride; Water</td>
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<tr>
<td>Cl#:</td>
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<tr>
<td>Synonym:</td>
<td>Conductivity Calibration Standard 100 Solution</td>
</tr>
<tr>
<td>Chemical Name:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Chemical Formula:</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium chloride</td>
<td>7447-40-7</td>
<td>0-10</td>
</tr>
<tr>
<td>This conductivity calibration may contain</td>
<td>7647-14-5</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>90-100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Sodium Chloride in place of Potassium Chloride) Potassium chloride: ORAL (LD50): Acute: 2500 mg/kg [Guinea pig]. 2600 mg/kg [Rat]. 1500 mg/kg [Mouse]. Sodium chloride: ORAL (LD50): Acute: 3000 mg/kg [Rat.]. 4000 mg/kg [Mouse]. DERMAL (LD50): Acute: &gt;10000 mg/kg [Rabbit]. DUST (LC50): Acute: &gt;42000 mg/m 1 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Non-corrosive for skin. Non-permeator by skin.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. (for
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. (for solution with Sodium Chloride)
The substance may be toxic to blood, cardiovascular system.
Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

**Skin Contact:**
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

**Serious Skin Contact:** Not available.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:**
May result in explosion with potassium permanganate and sulfuric acid. (Potassium chloride)
Electrolysis of sodium chloride in presence of nitrogenous compounds to produce chlorine may lead to formation of explosive nitrogen trichloride.
Potentially explosive reaction with dichloromaleic anhydride + urea. (Sodium Chloride)
Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/vapor/spray. If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Neutral.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.03 (Water = 1)

Vapor Pressure: The highest known value is 2.3 kPa (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).
**Volatile:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is much more soluble in water.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:**
- Easily soluble in cold water, hot water.
- Very slightly soluble in methanol, n-octanol.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**
- Hygroscopic.
- Incompatible with KMnO4, H2SO4, BrF3, and BrCl3. May react violently with BrF3. (Potassium chloride)

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

### Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact.

**Toxicity to Animals:** Acute oral toxicity (LD50): 30000 mg/kg (Mouse) (Calculated value for the mixture with Potassium Chloride).

**Chronic Effects on Humans:**
Contains material which may cause damage to the following organs: blood, cardiovascular system. (Potassium Chloride)

**MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

**DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE]. (Sodium Chloride)

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**
- Passes through the placental barrier in animal. (Potassium chloride)
- May cause adverse reproductive effects (fetotoxicity, abortion, maternal effects) by intraplacental route.
- May affect genetic material (mutagenic)
Special Remarks on other Toxic Effects on Humans:

Actute Potential Health Effects:

Skin: May cause skin irritation
Eye: May cause eye irritation.

Inhalation: May cause respiratory tract irritation. Low hazard for usual industrial handling
Ingestion: May affect behavior (coma, change in motor activity), metabolism, blood (change in clotting factor, electrolytic imbalance), cardiovascular, respiratory and gastrointestinal (irritation of GI tract, nausea, vomiting) systems.

(Potassium chloride)

Acute Potential Health Effects:

Skin: May cause skin irritation.
Eyes: Causes eye irritation.

Ingestion: Ingestion of large quantities can irritate the stomach (as in overuse of salt tablets) with nausea and vomiting. May affect behavior (muscle spasticity/contraction, somnolence), sense organs, metabolism, and cardiovascular system. Continued exposure may produce dehydration, internal organ congestion, and coma. Inhalation: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Potassium chloride or Sodium chloride; Water


Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).
DSCL (EEC):
This product is not classified according to the EU regulations.
Not applicable.

HMIS (U.S.A.):

Health Hazard: 1
Fire Hazard: 0
Reactivity: 0
Personal Protection: a

National Fire Protection Association (U.S.A.):

Health: 1
Flammability: 0
Reactivity: 0
Specific hazard:

Protective Equipment:
Not applicable.
Lab coat.
Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:58 PM
Last Updated: 10/09/2005 04:58 PM

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Material Safety Data Sheet  
Conductivity Calibration Standard 1000Solution MSDS

Section 1: Chemical Product and Company Identification

**Product Name:** Conductivity Calibration Standard 1000Solution  
**Catalog Codes:** SLC2287  
**CAS#:** Mixture.  
**RTECS:** Not applicable.  
**TSCA:** TSCA 8(b) inventory: Potassium chloride or Sodium Chloride; Water  
**CI#:** Not available.  
**Synonym:** Conductivity Calibration Standard 1000 Solution  
**Chemical Name:** Not applicable.  
**Chemical Formula:** Not applicable.  

**Contact Information:**  
Sciencelab.com, Inc.  
14025 Smith Rd.  
Houston, Texas 77396  
US Sales: 1-800-901-7247  
International Sales: 1-281-441-4400  
Order Online: ScienceLab.com  
CHEMTREC (24HR Emergency Telephone), call:  
1-800-424-9300  
International CHEMTREC, call: 1-703-527-3887  
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

**Composition:**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
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<tbody>
<tr>
<td>Potassium chloride</td>
<td>7447-40-7</td>
<td>0-10</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>7647-14-5</td>
<td>0-10</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>90-100</td>
</tr>
</tbody>
</table>

**Toxicological Data on Ingredients:**  
Potassium chloride: ORAL (LD50): Acute: 2500 mg/kg [Guinea pig], 2600 mg/kg [Rat], 1500 mg/kg [Mouse].  
Sodium chloride: ORAL (LD50): Acute: 3000 mg/kg [Rat.], 4000 mg/kg [Mouse].  
DERMAL (LD50): Acute: &gt;10000 mg/kg [Rabbit].  
DUST (LC50): Acute: &gt;42000 mg/m 1 hours [Rat].

Section 3: Hazards Identification

**Potential Acute Health Effects:**  
Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.  
Non-corrosive for skin. Non-permeator by skin.

**Potential Chronic Health Effects:**  
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. (for solution with sodium chloride)

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. (for solution with Sodium Chloride)
The substance may be toxic to blood, cardiovascular system.
Repeated or prolonged exposure to the substance can produce target organs damage.

---

Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

**Skin Contact:**
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

**Serious Skin Contact:** Not available.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

---

Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:**
May result in explosion with potassium permanganate and sulfuric acid. (Potassium chloride)
Electrolysis of sodium chloride in presence of nitrogenous compounds to produce chlorine may lead to formation of explosive nitrogen trichloride.
Potentially explosive reaction with dichloromaleic anhydride + urea. (Sodium Chloride)
Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. If ingested, seek medical advice immediately and show the container or the label.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection: Safety glasses. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Neutral.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.03 (Water = 1)

Vapor Pressure: The highest known value is 2.3 kPa (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).
VOLATILITY: Not available.

ODOR THRESHOLD: Not available.

WATER/OIL DIST. COEFF.: The product is much more soluble in water.

IONICITY (IN WATER): Not available.

DISPERSION PROPERTIES: See solubility in water.

SOLUBILITY:
Easily soluble in cold water, hot water.
Very slightly soluble in methanol, n-octanol.

SECTION 10: STABILITY AND REACTIVITY DATA

STABILITY: The product is stable.

INSTABILITY TEMPERATURE: Not available.

CONDITIONS OF INSTABILITY: Incompatible materials

INCOMPATIBILITY WITH VARIOUS SUBSTANCES: Slightly reactive to reactive with oxidizing agents, acids.

CORROSIVITY: Non-corrosive in presence of glass.

SPECIAL REMARKS ON REACTIVITY:
Hygroscopic.
Incompatible with KMnO4, H2SO4, BrF3, and BrCl3. May react violently with BrF3. (Potassium chloride)
Hygroscopic.
Reacts with most nonnoble metals such as iron or steel, building materials (such as cement)
Sodium chloride is rapidly attacked by bromine trifluoride.
Violent reaction with lithium. (Sodium Chloride)

SPECIAL REMARKS ON CORROSIVITY: Not available.

POLYMERIZATION: Will not occur.

SECTION 11: TOXICOLOGICAL INFORMATION

ROUTE OF ENTRY: Absorbed through skin. Eye contact.

TOXICITY TO ANIMALS: Acute oral toxicity (LD50): 30000 mg/kg (Mouse) (Calculated value for the mixture with Potassium Chloride).

CHRONIC EFFECTS ON HUMANS:
Contains material which may cause damage to the following organs: blood, cardiovascular system.
(Potassium Chloride)
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. (Sodium Chloride)

OTHER TOXIC EFFECTS ON HUMANS: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

SPECIAL REMARKS ON TOXICITY TO ANIMALS: Not available.

SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS:
Passes through the placental barrier in animal. (Potassium chloride)
May cause adverse reproductive effects (fetotoxicity, abortion, maternal effects) by intraplacental route.
May affect genetic material (mutagenic)
Special Remarks on other Toxic Effects on Humans:

Sodium Chloride

Acute Potential Health Effects:

Skin: May cause skin irritation
Eye: May cause eye irritation.
Inhalation: May cause respiratory tract irritation. Low hazard for usual industrial handling
Ingestion: May affect behavior (coma, change in motor activity), metabolism, blood (change in clotting factor, electrolytic imbalance), cardiovascular, respiratory and gastrointestinal (irritation of GI tract, nausea, vomiting) systems.

Potassium chloride

Acute Potential Health Effects:

Skin: May cause skin irritation.
Eyes: Causes eye irritation.
Ingestion: Ingestion of large quantities can irritate the stomach (as in overuse of salt tablets) with nausea and vomiting. May affect behavior (muscle spasticity/contraction, somnolence), sense organs, metabolism, and cardiovascular system. Continued exposure may produce dehydration, internal organ congestion, and coma.
Inhalation: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Potassium chloride or Sodium Chloride; Water


Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).
DSCL (EEC):
This product is not classified according
to the EU regulations.
Not applicable.

HMIS (U.S.A.):
  Health Hazard: 1
  Fire Hazard: 0
  Reactivity: 0
  Personal Protection: a

National Fire Protection Association (U.S.A.):
  Health: 1
  Flammability: 0
  Reactivity: 0
  Specific hazard:

Protective Equipment:
Not applicable.
Lab coat.
Wear appropriate respirator when
ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:58 PM

Last Updated: 10/09/2005 04:58 PM

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Material Safety Data Sheet
Conductivity Calibration Standard 10,000 Solution MSDS

Section 1: Chemical Product and Company Identification

Product Name: Conductivity Calibration Standard 10,000 Solution
Catalog Codes: SLC4078
CAS#: Mixture.
RTECS: Not applicable.
TSCA: TSCA 8(b) inventory: Potassium chloride or Sodium Chloride Water
CI#: Not available.
Synonym: Conductivity Calibration Standard 10000 Solution
Chemical Name: Not applicable.
Chemical Formula: Not applicable.
Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
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Section 2: Composition and Information on Ingredients

Composition:

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<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
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<tbody>
<tr>
<td>Potassium chloride</td>
<td>7447-40-7</td>
<td>0-10</td>
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<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>7647-14-5</td>
<td>0-10</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>90-100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Potassium chloride: ORAL (LD50): Acute: 2500 mg/kg [Guinea pig], 2600 mg/kg [Rat]. 1500 mg/kg [Mouse]. Sodium chloride: ORAL (LD50): Acute: 3000 mg/kg [Rat.], 4000 mg/kg [Mouse]. DERMAL (LD50): Acute: >10000 mg/kg [Rabbit]. DUST (LC50): Acute: >42000 mg/m 1 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Non-corrosive for skin.

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. (for solution with sodium chloride) TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. (for solution with
Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

**Serious Skin Contact:** Not available.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:** Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** May result in explosion with potassium permanganate and sulfuric acid. (Potassium chloride) Electrolysis of sodium chloride in presence of nitrogenous compounds to produce chlorine may lead to formation of explosive nitrogen trichloride. Potentially explosive reaction with dichloromaleic anhydride + urea. (Sodium Chloride)

Section 6: Accidental Release Measures

**Small Spill:** Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.
## Section 7: Handling and Storage

**Precautions:** Do not ingest. Do not breathe gas/fumes/vapor/spray. If ingested, seek medical advice immediately and show the container or the label.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:** Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

**Personal Protection:** Safety glasses. Lab coat.

**Personal Protection in Case of a Large Spill:** Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Clear Colorless.

**pH (1% soln/water):** Neutral.

**Boiling Point:** The lowest known value is 100°C (212°F) (Water).

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** Weighted average: 1.03 (Water = 1)

**Vapor Pressure:** The highest known value is 2.3 kPa (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is much more soluble in water.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Easily soluble in cold water, hot water. Very slightly soluble in methanol, n-octanol.

## Section 10: Stability and Reactivity Data
Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Slightly reactive to reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Hygroscopic. Incompatible with KMnO4, H2SO4, BrF3, and BrCl3. May react violently with BrF3. (Potassium chloride) Hygroscopic. Reacts with most nonnoble metals such as iron or steel, building materials (such as cement) Sodium chloride is rapidly attacked by bromine trifluoride. Violent reaction with lithium. (Sodium Chloride)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact.

Toxicity to Animals: Acute oral toxicity (LD50): 30000 mg/kg (Mouse) (Calculated value for the mixture with Potassium Chloride).

Chronic Effects on Humans: Contains material which may cause damage to the following organs: blood, cardiovascular system. (Potassium Chloride) MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. (Sodium Chloride)

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. (Potassium chloride) May cause adverse reproductive effects (fetotoxicity, abortion, maternal effects) by intraplacental route. May affect genetic material (mutagenic) (Sodium Chloride)

Special Remarks on other Toxic Effects on Humans: Acute Potential Health Effects: Skin: May cause skin irritation. Eye: May cause eye irritation. Inhalation: May cause respiratory tract irritation. Low hazard for usual industrial handling. Ingestion: May affect behavior (coma, change in motor activity), metabolism, blood (change in clotting factor, electrolytic imbalance), cardiovascular, respiratory and gastrointestinal (irritation of GI tract, nausea, vomiting) systems. (Potassium chloride) Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: Causes eye irritation. Ingestion: Ingestion of large quantities can irritate the stomach (as in overuse of salt tablets) with nausea and vomiting. May affect behavior (muscle spasticity/contraction, somnolence), sense organs, metabolism, and cardiovascular system. Continued exposure may produce dehydration, internal organ congestion, and coma. Inhalation: Material is irritating to mucous membranes and upper respiratory tract. (Sodium Chloride)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.
Section 13: Disposal Considerations

Waste Disposal: Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Potassium chloride or Sodium Chloride; Water


Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): This product is not classified according to the EU regulations. Not applicable.

HMIS (U.S.A.):
- Health Hazard: 1
- Fire Hazard: 0
- Reactivity: 0
- Personal Protection: a

National Fire Protection Association (U.S.A.):
- Health: 1
- Flammability: 0
- Reactivity: 0
- Specific hazard:

Protective Equipment: Not applicable. Lab coat. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 01:00 AM

Last Updated: 11/30/2005 07:33 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we
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Material Safety Data Sheet
Copper atomic absorption standard solution, 1 mg/ml Cu in 2% HNO3

ACC# 27709

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Copper atomic absorption standard solution, 1 mg/ml Cu in 2% HNO3
**Catalog Numbers:** AC195930000, AC195931000, AC195935000
**Synonyms:** None.

**Company Identification:**
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-50-8</td>
<td>Copper</td>
<td>0.1</td>
<td>231-159-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

**Appearance:** Clear liquid.

**Danger:** May cause severe eye irritation and possible injury. Causes skin and respiratory tract irritation. Corrosive to metal.

**Target Organs:** Eyes.

**Potential Health Effects**

**Eye:** May cause chemical conjunctivitis and corneal damage.

**Skin:** Causes skin irritation.

**Ingestion:** May cause irritation of the digestive tract.

**Inhalation:** Causes respiratory tract irritation.

**Chronic:** Exposure to high concentrations of nitric acid vapor may cause pneumonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial
respiration using oxygen and a suitable mechanical device such as a bag and a mask.  
**Notes to Physician:** Administration of Sodium bicarbonate may be of value to treat acidosis.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will react with water to form toxic and corrosive fumes. Vapors may accumulate in confined spaces Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes. Runoff from fire control or dilution water may cause pollution. **Extinguishing Media:** For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. **Storage:** Keep container closed when not in use. Store in a cool, dry area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Copper</td>
<td>0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist, as Cu)</td>
<td>1 mg/m3 TWA (dust and mist) 100 mg/m3 IDLH (dust, fume and mist)</td>
<td>0.1 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist)</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Copper: 0.1 mg/m3 TWA (fume, dusts, mists as Cu)  
**Personal Protective Equipment**
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid
**Appearance:** Clear
**Odor:** None reported.
**pH:** Not available.
**Vapor Pressure:** Not available.
**Vapor Density:** Not available.
**Evaporation Rate:** Not available.
**Viscosity:** Not available.
**Boiling Point:** Not available.
**Freezing/Melting Point:** Not available.
**Decomposition Temperature:** Not available.
**Solubility:** miscible
**Specific Gravity/Density:** Not available.
**Molecular Formula:** Solution
**Molecular Weight:** Not available.

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.
**Conditions to Avoid:** Excess heat.
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases.
**Hazardous Decomposition Products:** Nitrogen oxides, oxides of copper.
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**
- CAS# 7732-18-5: ZC0110000
- CAS# 7697-37-2: QU5775000; QU5900000
- CAS# 7440-50-8: GL5325000; GL7440000; GL7590000

**LD50/LC50:**
- **CAS# 7732-18-5:**
  - Oral, rat: LD50 = >90 mL/kg;
- **CAS# 7697-37-2:**
  - Inhalation, rat: LC50 = 260 mg/m3/30M;
  - Inhalation, rat: LC50 = 130 mg/m3/4H;
  - Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

**Carcinogenicity:**
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-50-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found

**Neurotoxicity:** No information found

**Other Studies:**

---

**Section 12 - Ecological Information**

No information available.

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**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

---

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>NITRIC ACID</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN3264</td>
<td>UN2031</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
<td>II</td>
</tr>
</tbody>
</table>

---

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7697-37-2 is listed on the TSCA inventory.
- CAS# 7440-50-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
- CAS# 7440-50-8: 5000 lb final RQ (no reporting of releases of this hazardous substance is required)

**SARA Section 302 Extremely Hazardous Substances**
- CAS# 7697-37-2: 1000 lb TPQ

**SARA Codes**
- CAS # 7697-37-2: immediate, delayed, fire.
CAS # 7440-50-8: immediate, delayed, fire.

**Section 313**
This material contains Nitric acid (CAS# 7697-37-2, 2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Copper is not at a high enough concentration to be reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 7440-50-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-50-8 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
CAS# 7697-37-2 is considered highly hazardous by OSHA.

**STATE**
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-50-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
XI

**Risk Phrases:**
R 37/38 Irritating to respiratory system and skin.
R 41 Risk of serious damage to eyes.

**Safety Phrases:**
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7440-50-8: 0

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7440-50-8 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D2B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-50-8 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 9/02/1997
**Revision #6 Date:** 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of
merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Copper (II) Sulfate Anhydrous

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Copper (II) Sulfate Anhydrous  
**Catalog Numbers:** S93223, S93224, S93225, C495-500  
**Synonyms:** Copper monosulfate; Cupric sulfate; Cupric sulfate anhydrous; Sulfuric acid, copper(2+) salt (1:1).  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7758-98-7</td>
<td>Copper(II) sulfate</td>
<td>&gt;97</td>
<td>231-847-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: light gray powder.  
**Warning!** Harmful if swallowed. Causes eye and skin irritation and possible burns. Causes digestive and respiratory tract irritation with possible burns. Hygroscopic (absorbs moisture from the air). Severe marine pollutant.  
**Target Organs:** Blood, kidneys, liver.

**Potential Health Effects**  
**Eye:** Exposure to particulates or solution may cause conjunctivitis, ulceration, and corneal abnormalities. Causes eye irritation and possible burns.  
**Skin:** Causes skin irritation and possible burns.  
**Ingestion:** Harmful if swallowed. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns. Ingestion of large amounts of copper salts may cause bloody stools and vomit, low blood pressure, jaundice and coma. Ingestion of copper compounds may produce systemic toxic effects to the kidney and liver and central nervous excitation followed by depression.  
**Inhalation:** May cause ulceration and perforation of the nasal septum if inhaled in excessive quantities. Causes respiratory tract irritation with possible burns.  
**Chronic:** May cause liver and kidney damage. May cause anemia and other blood cell abnormalities. Individuals with Wilson's disease are unable to metabolize copper. Thus, copper accumulates in various tissues and may result in liver, kidney, and brain damage. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects. Chronic copper poisoning in man is recognized in the form of Wilson's disease.

Section 4 - First Aid Measures
**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Individuals with Wilson's disease are more susceptible to chronic copper poisoning.

**Antidote:** The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Substance is noncombustible.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. U.S. regulations require reporting spills and releases to soil, water and air in excess of reportable quantities.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper(II) sulfate</td>
<td>none listed</td>
<td>1 mg/m3 TWA (as Cu, except Copper fume) (listed under Copper compounds, n.o.s.).</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Copper(II) sulfate: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: light gray
Odor: Odorless
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not applicable.
Evaporation Rate: Negligible.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: 200 deg C
Decomposition Temperature: 560 deg C
Solubility: Soluble.
Specific Gravity/Density: 3.6
Molecular Formula: CuO4S
Molecular Weight: 159.61

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: High temperatures, dust generation, exposure to moist air or water.
Incompatibilities with Other Materials: Aqueous solution of copper(2+) sulfate is an acid. Incompatible with strong bases, hydroxylamine, magnesium.
Hazardous Decomposition Products: Oxides of sulfur, copper fumes.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 7758-98-7: GL8800000
LD50/LC50:
CAS# 7758-98-7:
  Oral, mouse: LD50 = 369 mg/kg;
  Oral, mouse: LD50 = 87 mg/kg;
  Oral, rat: LD50 = 300 mg/kg;
  Oral, rat: LD50 = 960 mg/kg;

Carcinogenicity: CAS# 7758-98-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: See actual entry in RTECS for complete information.
Reproductive Effects: See actual entry in RTECS for complete information.
**Mutagenicity:** See actual entry in RTECS for complete information.

**Neurotoxicity:** No information found

**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** Fish: Rainbow trout: LC50 = 0.1-2.5 mg/L; 96 Hr; Unspecified
Fish: Bluegill/Sunfish: LC50 = 0.6 mg/L; 48 Hr; 15 mg/L CaCO3
Fish: Bluegill/Sunfish: LC50 = 45.0 mg/L; 48 Hr; 132 mg/L CaCO3
In soil, copper sulfate is partly washed down to lower levels, partly bound by soil components, and partly oxidatively transformed. Copper has a strong affinity for hydrous iron and manganese oxides, clays, carbonate minerals, and organic matter. Sorption to these materials ... suspended in the water column & in the bed sediments, results in relative enrichment of the solid phase and reduction in dissolved levels.

**Environmental:** Copper is accumulated by plants and animals, but it does not appear to biomagnify from plants to animals. This lack of biomagnification appears common with heavy metals. In air, copper aerosols (in general) have a residence time of 2 to 10 days in an unpolluted atmosphere and 0.1 to > 4 days in polluted, urban areas.

**Physical:** No evidence was found to indicate that there is any biotransformation process for copper compounds which would have a significant bearing on the fate of copper in aquatic environments.

**Other:** Has fungicidal properties.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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</thead>
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<td>UN3077</td>
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<td>III</td>
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<td>SUBSTANCES, SOLID, N.O.S.</td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7758-98-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7758-98-7: 10 lb final RQ; 4.54 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 7758-98-7: immediate.

**Section 313**
This material contains Copper(II) sulfate (listed as Copper compounds, n.o.s.), >97%, (CAS# 7758-98-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7758-98-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 7758-98-7 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 7758-98-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**
**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
XN N

**Risk Phrases:**
R 22 Harmful if swallowed.
R 36/38 Irritating to eyes and skin.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**
S 22 Do not breathe dust.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

**WGK (Water Danger/Protection)**
CAS# 7758-98-7: 2

**Canada - DSL/NDSL**
CAS# 7758-98-7 is listed on Canada’s DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D1B, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7758-98-7 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 7/09/1999

**Revision #6 Date:** 5/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of
merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium chloride solution saturated at 20°C

ACC# 40141

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium chloride solution saturated at 20°C  
**Catalog Numbers:** S60038, SP138-500  
**Synonyms:** Electrode Refill Solution for Calomel or Double Junction Electrodes.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>70.2</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>29.8</td>
<td>231-211-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.  
**Caution!** May cause eye irritation.  
**Target Organs:** None.

**Potential Health Effects**  
**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. May cause gastric disturbances and electrolytic imbalance.  
**Inhalation:** May cause respiratory tract irritation. Low hazard for usual industrial handling.  
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.  
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.  
**Notes to Physician:** Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will not burn.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

Section 7 - Handling and Storage

**Handling:** Avoid prolonged or repeated contact with skin. Avoid contact with eyes.

**Storage:** Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** There are no special ventilation requirements.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Potassium chloride: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** colorless

**Odor:** none reported

**pH:** Not available.

**Vapor Pressure:** 14 mm Hg

**Vapor Density:** 0.7
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 14 deg F
Decomposition Temperature: Not available.
Solubility: Soluble in water
Specific Gravity/Density: 1.2
Molecular Formula: KCl solution
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: No specific conditions to avoid noted.
Incompatibilities with Other Materials: May react violently with bromine trifluoride. May result in explosion with potassium permanganate and sulfuric acid.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, potassium fume.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 7447-40-7: TS8050000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 7447-40-7:
  Draize test, rabbit, eye: 500 mg/24H Mild;
  Oral, mouse: LD50 = 1500 mg/kg;
  Oral, rat: LD50 = 2600 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US
EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
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<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

#### US FEDERAL

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7447-40-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 7447-40-7: immediate.

**Section 313**
This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 29.8%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depleters.
- This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**
Hazard Symbols: 
Not available.

Risk Phrases:

Safety Phrases: 
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection) 
CAS# 7732-18-5: No information available. 
CAS# 7447-40-7: 1

Canada - DSL/NDSL 
CAS# 7732-18-5 is listed on Canada's DSL List. 
CAS# 7447-40-7 is listed on Canada's DSL List.

Canada - WHMIS 
This product has a WHMIS classification of D2B. 
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and 
the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List 
CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/30/1997
Revision #5 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of 
merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users 
should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for 
any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever 
arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Electrode Storage Solution

ACC# 40052

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Electrode Storage Solution  
**Catalog Numbers:** BP2418-1, S60039, SE40-1  
**Synonyms:** None.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>98.4</td>
<td>231-791-2</td>
</tr>
<tr>
<td>877-24-7</td>
<td>Potassium hydrogen phthalate</td>
<td>1</td>
<td>212-889-4</td>
</tr>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>0.6</td>
<td>231-211-8</td>
</tr>
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</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Caution!** May cause eye and skin irritation. May cause respiratory and digestive tract irritation. This is expected to be a low hazard for usual industrial handling.  
**Target Organs:** None.

**Potential Health Effects**  
**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Low hazard for usual industrial handling.  
**Inhalation:** May cause respiratory tract irritation. Low hazard for usual industrial handling.  
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.  
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid if irritation or symptoms occur.  
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration.
If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will not burn. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation.

**Storage:** Store in a cool, dry place.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

#### Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium hydrogen phthalate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Potassium hydrogen phthalate: No OSHA Vacated PELs are listed for this chemical. Potassium chloride: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

### Section 9 - Physical and Chemical Properties
**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** odorless

**pH:** Not available.

**Vapor Pressure:** 14 mm Hg @20 deg C

**Vapor Density:** 0.7

**Evaporation Rate:** >1

**Viscosity:** Not available.

**Boiling Point:** 100 deg C

**Freezing/Melting Point:** 0 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Miscible with water.

**Specific Gravity/Density:** 1

**Molecular Formula:** Mixture

**Molecular Weight:** Not available.

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Excess heat.

**Incompatibilities with Other Materials:** None reported.

**Hazardous Decomposition Products:** None.

**Hazardous Polymerization:** Will not occur.

---

**Section 11 - Toxicological Information**

**RTECS#:**
- CAS# 7732-18-5: ZC0110000
- CAS# 877-24-7: CZ4326000
- CAS# 7447-40-7: TS8050000

**LD50/LC50:**
- CAS# 7732-18-5:
  - Oral, rat: LD50 = >90 mL/kg;
  - 

- CAS# 877-24-7:
  - Dermal, guinea pig: LD50 = >1 gm/kg;
  - Oral, rat: LD50 = >3200 mg/kg;
  - 

- CAS# 7447-40-7:
  - Draize test, rabbit, eye: 500 mg/24H Mild;
  - Oral, mouse: LD50 = 1500 mg/kg;
  - Oral, rat: LD50 = 2600 mg/kg;
  - 

**Carcinogenicity:**
- CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
- CAS# 877-24-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
- CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** No information found
Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
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<tr>
<td><strong>UN Number:</strong></td>
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</tr>
<tr>
<td><strong>Packing Group:</strong></td>
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<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 877-24-7 is listed on the TSCA inventory.
- CAS# 7447-40-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 877-24-7: immediate.
- CAS # 7447-40-7: immediate.

**Section 313**
This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 0.6%, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 877-24-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**
S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 877-24-7: No information available.
CAS# 7447-40-7: 1

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 877-24-7 is listed on Canada's DSL List.
CAS# 7447-40-7 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of Not controlled..
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 4/27/1999
**Revision #4 Date:** 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Iron (III) Chloride Anhydrous

ACC# 09740

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Iron (III) Chloride Anhydrous  
**Catalog Numbers:** AC169430000, AC169430010, AC169430025, AC169430050, AC410550000, AC410550050, AC410555000, S71934, S93238, I89-500  
**Synonyms:** Ferric chloride; Iron (III) chloride; Iron sesquichloride; Iron trichloride  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7705-08-0</td>
<td>Iron (III) chloride</td>
<td>95-100</td>
<td>231-729-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: dark gray to black or brown powder.  
**Danger!** Causes burns by all exposure routes. Harmful if swallowed. May cause liver and kidney damage. May cause adverse reproductive effects based upon animal studies.  
**Target Organs:** Kidneys, liver, cardiovascular system.

**Potential Health Effects**  
**Eye:** Causes eye burns.  
**Skin:** Causes skin burns.  
**Ingestion:** Harmful if swallowed. Causes gastrointestinal tract burns.  
**Inhalation:** Causes chemical burns to the respiratory tract.  
**Chronic:** Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed.  
**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.  
**Ingestion:** Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.  
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
**Notes to Physician:** Treat symptomatically and supportively.  
**Antidote:** The use of Deferoxamine as a chelating agent should be determined only by qualified medical personnel.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.  
**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or chemical foam.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical fume hood. Keep from contact with moist air and steam.  
**Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Store protected from moisture.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Use only under a chemical fume hood.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (III) chloride</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Iron (III) chloride: No OSHA Vacated PELs are listed for this chemical.  
**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.  
**Skin:** Wear appropriate protective clothing to prevent skin exposure.  
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.  
**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms
Section 9 - Physical and Chemical Properties

**Physical State:** Powder  
**Appearance:** dark gray to black or brown  
**Odor:** odorless  
**pH:** 2.0 (0.1M aq. sol.)  
**Vapor Pressure:** 1 hPa @20 deg C  
**Vapor Density:** 5.61  
**Evaporation Rate:** Negligible  
**Viscosity:** Not available.  
**Boiling Point:** 316 deg C @760mmHg  
**Freezing/Melting Point:** 300 deg C (decom)  
**Decomposition Temperature:** 200 deg C  
**Solubility:** 920 g/l (20°C)  
**Specific Gravity/Density:** 2.9 (water=1)  
**Molecular Formula:** Cl₃Fe  
**Molecular Weight:** 162.206

Section 10 - Stability and Reactivity

**Chemical Stability:** Hygroscopic: absorbs moisture or water from the air.  
**Conditions to Avoid:** Incompatible materials, dust generation, excess heat, exposure to moist air or water.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, alkali metals, allyl chloride, ethylene oxide, potassium, sodium.  
**Hazardous Decomposition Products:** Hydrogen chloride, oxides of iron.  
**Hazardous Polymerization:** Has not been reported

Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 7705-08-0:** LJ9100000  
**LD₅₀/LC₅₀:**  
**CAS# 7705-08-0:**  
- Oral, mouse: LD₅₀ = 200 mg/kg;  
- Oral, rat: LD₅₀ = 316 mg/kg;  

**Carcinogenicity:**  
**CAS# 7705-08-0:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.  
**Mutagenicity:** Mutagenic effects have occurred in experimental animals.  
**Neurotoxicity:** No information found  
**Other Studies:**

Section 12 - Ecological Information
Ecotoxicity: Water flea Daphnia: TLm = 15 ppm; 96 Hr; fresh water
Fish: Striped bass: LC50 = 6 mg/L; 24-96 Hr; Static bioassay (as iron)
Fish: Striped bass: LC50 = 4 mg/L; 24-96 Hr; Static bioassay (as iron) No data available.
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name</td>
<td>FERRIC CHLORIDE, ANHYDROUS</td>
<td>FERRIC CHLORIDE ANHYDROUS</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN1773</td>
<td>UN1773</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7705-08-0 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7705-08-0: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 7705-08-0: immediate.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7705-08-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7705-08-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.
California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

C

Risk Phrases:

R 22 Harmful if swallowed.
R 34 Causes burns.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 28 After contact with skin, wash immediately with...
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7705-08-0: 1

Canada - DSL/NDSL

CAS# 7705-08-0 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, F.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7705-08-0 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/07/1999
Revision #8 Date: 6/05/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Ferric sulfate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ferric sulfate
Catalog Codes: SLF1315, SLF1828
CAS#: 10028-22-5
RTECS: NO8505000
TSCA: TSCA 8(b) inventory: Ferric sulfate
Cl#: Not available.
Synonym:
Chemical Formula: Fe2(SO4)3.xH2O

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric sulfate</td>
<td>10028-22-5</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Ferric sulfate LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.
Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

---

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

---

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

---

Section 7: Handling and Storage

Precautions:
Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory
equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes

**Storage:**
No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:**
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
TWA: 1 CEIL: 2 (mg/m3)
Consult local authorities for acceptable exposure limits.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 399.98 g/mole

**Color:** Not available.

**pH (1% soln/water):** Not available.

**Boiling Point:** Not available.

**Melting Point:** Decomposes. (480°C or 896°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 3.097 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.
Dispersion Properties: Not available.

Solubility: Not available.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**
- LD50: Not available.
- LC50: Not available.

**Chronic Effects on Humans:** The substance is toxic to lungs, mucous membranes.

**Other Toxic Effects on Humans:**
- Very hazardous in case of ingestion.
- Hazardous in case of skin contact (irritant), of inhalation.
- Slightly hazardous in case of skin contact (permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.
Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).
Identification: Not available. NA9121 PG: III
Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Ferric sulfate
Massachusetts RTK: Ferric sulfate
TSCA 8(b) inventory: Ferric sulfate
CERCLA: Hazardous substances: Ferric sulfate


Other Classifications:
WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
DSCL (EEC): R36/38- Irritating to eyes and skin.
HMIS (U.S.A.):
  Health Hazard: 2
  Fire Hazard: 0
  Reactivity: 0
  Personal Protection: E

National Fire Protection Association (U.S.A.):
  Health: 2
  Flammability: 0
  Reactivity: 0
  Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.
Material Safety Data Sheet
Iron(II) ammonium sulfate solution

ACC# 40058

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Iron(II) ammonium sulfate solution  
**Catalog Numbers:** SF47  
**Synonyms:** Ammonium ferrous sulfate; Iron ammonium sulfate; Ferrous ammonium sulfate hexahydrate.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>63.5</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7783-85-9</td>
<td>Ferrous ammonium sulfate hexahydrate</td>
<td>35</td>
<td>unlisted</td>
</tr>
<tr>
<td>7664-93-9</td>
<td>Sulfuric acid</td>
<td>1.5</td>
<td>231-639-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Caution!** May cause severe skin irritation and possible burns. May cause severe respiratory and digestive tract irritation with possible burns. May cause liver damage. May cause cardiac disturbances.  
**Target Organs:** Liver, cardiovascular system.

**Potential Health Effects**  
**Eye:** May cause eye irritation and possible burns.  
**Skin:** May cause skin irritation.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver damage. May cause burns to the digestive tract. May cause cardiovascular effects including low blood pressure and shock.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** Not available.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.  
**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.  
**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.  
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Deferoxamine as a chelating agent should be determined only by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Combustion generates toxic fumes.
Extinguishing Media: For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.
Flash Point: None.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: None.
Upper: None.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Store protected from light. Store protected from air.
Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Ferrous ammonium sulfate hexahydrate</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>0.2 mg/m3 TWA (thoracic fraction)</td>
<td>1 mg/m3 TWA 15 mg/m3 IDLH</td>
<td>1 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Ferrous ammonium sulfate hexahydrate: No OSHA Vacated PELs are listed for this chemical. Sulfuric acid: 1 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid  
**Appearance:** clear, colorless  
**Odor:** none reported  
**pH:** Not available  
**Vapor Pressure:** Not available  
**Vapor Density:** Not available  
**Evaporation Rate:** Not available  
**Viscosity:** Not available  
**Boiling Point:** Not available  
**Freezing/Melting Point:** Not available  
**Decomposition Temperature:** Not available  
**Solubility:** Not available  
**Specific Gravity/Density:** 1.1  
**Molecular Formula:** H8FEN2O8S2  
**Molecular Weight:** 164.0646

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, light, exposure to air, temperatures above 100°C.  
**Incompatibilities with Other Materials:** Strong bases, strong oxidizers, light, air.  
**Hazardous Decomposition Products:** Oxides of nitrogen, oxides of sulfur, ammonia and/or derivatives.  
**Hazardous Polymerization:** Has not been reported

**Section 11 - Toxicological Information**

**RTECS#:**
- CAS# 7732-18-5: ZC0110000  
- CAS# 7783-85-9: BR6500000  
- CAS# 7664-93-9: WS5600000  

**LD50/LC50:**
- CAS# 7732-18-5:  
  - Oral, rat: LD50 = >90 mL/kg;  
- CAS# 7783-85-9:  
  - Oral, rat: LD50 = 3250 mg/kg;  
- CAS# 7664-93-9:  
  - Draize test, rabbit, eye: 250 ug Severe;  
  - Inhalation, mouse: LC50 = 320 mg/m3/2H;  
  - Inhalation, mouse: LC50 = 320 mg/m3;  
  - Inhalation, rat: LC50 = 510 mg/m3/2H;  
  - Inhalation, rat: LC50 = 510 mg/m3;  
  - Oral, rat: LD50 = 2140 mg/kg;  

**Carcinogenicity:**
- CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
- CAS# 7783-85-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
- CAS# 7664-93-9:
- ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)
- California: carcinogen, initial date 3/14/03 (listed as Strong inorganic acid mists containing sulfuric acid).
- NTP: Known carcinogen (listed as Strong inorganic acid mists containing s).
- IARC: Group 1 carcinogen

**Epidemiology:** No information available.
**Teratogenicity:** No information available.
**Reproductive Effects:** No information available.
**Mutagenicity:** No information available.
**Neurotoxicity:** No information available.
**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.
**Environmental:** No information reported.
**Physical:** No information available.
**Other:** None.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>SULFURIC ACID</td>
<td>CORROSIVE LIQUID NOS (SULFURIC ACID)</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN1830</td>
<td>UN1760</td>
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<tr>
<td><strong>Packing Group:</strong></td>
<td>II</td>
<td>III</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7783-85-9 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
- CAS# 7664-93-9 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7664-93-9: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
CAS# 7664-93-9: 1000 lb TPQ

**SARA Codes**
CAS # 7664-93-9: immediate, delayed, reactive.

**Section 313**
This material contains Sulfuric acid (CAS# 7664-93-9, 1.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7783-85-9 can be found on the following state right to know lists: California, (listed as Iron salts (soluble)), Pennsylvania, (listed as Iron salts (soluble)), Minnesota, (listed as Iron salts (soluble)).
CAS# 7664-93-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
WARNING: This product contains Sulfuric acid, listed as 'Strong inorganic acid mists contain', a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 7783-85-9: No information available.
CAS# 7664-93-9: 2

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7664-93-9 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7783-85-9 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.
CAS# 7664-93-9 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 9/02/1997
**Revision #4 Date:** 6/22/2006
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Iron(II) ammonium sulfate hexahydrate

Section 1 - Chemical Product and Company Identification

MSDS Name: Iron(II) ammonium sulfate hexahydrate
Catalog Numbers: AC201370010, AC201370250, AC201375000, AC318300000, AC423720030, AC423725000, S80014, S800141, S93245, I77-212, I77-500
Synonyms: Ferrous ammonium sulfate hexahydrate; Ammonium iron(2+) sulfate hexahydrate; Mohr's salt.
Company Identification:
  Fisher Scientific
  1 Reagent Lane
  Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7783-85-9</td>
<td>Iron(II) ammonium sulfate hexahydrate</td>
<td>&gt;98.5</td>
<td>unlisted</td>
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</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: light green crystals.
Warning! Causes eye, skin, and respiratory tract irritation. Light sensitive. Air sensitive.
Target Organs: Liver, cardiovascular system.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause cardiac disturbances.
Inhalation: Causes respiratory tract irritation.
Chronic: Chronic exposure may cause liver damage.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Wash mouth out with water. Get medical aid if irritation or symptoms occur.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear. Do NOT use mouth-to-
mouth resuscitation.

**Notes to Physician:** Treat symptomatically and supportively.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

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### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

**Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron(II) ammonium sulfate hexahydrate</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
<tr>
<td>Ferrous ammonium sulfate anhydrous</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Iron(II) ammonium sulfate hexahydrate: No OSHA Vacated PELs are listed for this chemical. Ferrous ammonium sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

- **Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
- **Skin:** Wear appropriate protective gloves to prevent skin exposure.
- **Clothing:** Wear appropriate protective clothing to prevent skin exposure.
- **Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.
Physical State: Crystals
Appearance: light green
Odor: odorless
pH: 3-5 (5% aq soln)
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: 100 deg C (dec)
Decomposition Temperature: 100-110 deg C
Solubility: 269 g/l @ 20°C
Specific Gravity/Density: 1.865
Molecular Formula: H20FeN2O14S2
Molecular Weight: 392.13

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Slowly oxidized by atmospheric oxygen. Deliquescent (tending to absorb atmospheric water vapor and become liquid). Slowly effloresces (loses water molecules of hydration) on exposure to air.

Conditions to Avoid: Light, dust generation, excess heat, prolonged exposure to air.

Incompatibilities with Other Materials: Strong oxidizing agents, strong acids.

Hazardous Decomposition Products: Oxides of sulfur, nitrogen oxides (NOx) and ammonia (NH3), oxides of iron.

Hazardous Polymerization: Has not been reported

RTECS#: 
CAS# 7783-85-9: BR6500000
CAS# 10045-89-3: WS5890000

LD50/LC50:
CAS# 7783-85-9:
  Oral, rat: LD50 = 3250 mg/kg;

CAS# 10045-89-3:

Carcinogenicity:
CAS# 7783-85-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10045-89-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:
US FEDERAL

TSCA
- CAS# 7783-85-9 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
- CAS# 10045-89-3 is listed on the TSCA inventory.

Health & Safety Reporting List
- None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
- None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
- None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
- None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- CAS# 10045-89-3: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
- None of the chemicals in this product have a TPQ.

Section 313
- No chemicals are reportable under Section 313.

Clean Air Act:
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depleters.
- This material does not contain any Class 2 Ozone depleters.

Clean Water Act:
- CAS# 10045-89-3 is listed as a Hazardous Substance under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
- None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
- CAS# 7783-85-9 can be found on the following state right to know lists: California, (listed as Iron salts (soluble)), Pennsylvania, (listed as Iron salts (soluble)), Minnesota, (listed as Iron salts (soluble)).
CAS# 10045-89-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI

Risk Phrases:

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 7783-85-9: No information available.
CAS# 10045-89-3: 1

Canada - DSL/NDSL

CAS# 10045-89-3 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7783-85-9 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.
CAS# 10045-89-3 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 6/22/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Iron(II) sulfate heptahydrate

ACCU 09870

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Iron(II) sulfate heptahydrate  
**Catalog Numbers:** S74260, S74262, S93247, S93248, I146-10, I146-3, I146-3LC, I146-500, I149-3, NC9654173, XXI146150KG  
**Synonyms:** Green vitrol; Ferrous sulfate heptahydrate; Iron protosulfate.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7782-63-0</td>
<td>Iron(II) sulfate heptahydrate</td>
<td>&gt;99</td>
<td>unlisted</td>
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</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: blue-green solid.  
**Caution!** May cause eye and skin irritation. May cause respiratory tract irritation. May be harmful if swallowed. Air sensitive. Moisture sensitive.  
**Target Organs:** Liver, gastrointestinal system, eyes, skin, mucous membranes.

**Potential Health Effects**  
**Eye:** May cause mild eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. May be harmful if swallowed. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation. G.I. disturbances (e.g., gastric distress, colic, constipation, diarrhea) may occur if swallowed. In children, ingestion of large quantities of ferrous sulfate may cause vomiting, vomiting of blood, liver damage, rapid heart rate, peripheral vascular collapse.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** Repeated exposure may increase iron levels in the liver, spleen and lymphatic system. Damage may occur in the spleen and liver. Oral doses of 960 mg/kg given intermittently over a 9 week period produced jaundice in

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.  
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.  
**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.  
**Storage:** Do not store in direct sunlight. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron(II) sulfate heptahydrate</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
<tr>
<td>Ferrous sulfate anhydrous</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>1 mg/m3 TWA (as Fe) (listed under Iron salts (soluble)).</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Iron(II) sulfate heptahydrate: No OSHA Vacated PELs are listed for this chemical. Ferrous sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.  
**Personal Protective Equipment**  
**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.  
**Skin:** Wear appropriate protective clothing to prevent skin exposure.  
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.  
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use
a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Solid  
**Appearance:** blue-green  
**Odor:** odorless  
**pH:** 3-5 (5% aq. sol.)  
**Vapor Pressure:** Not available.  
**Vapor Density:** Not available.  
**Evaporation Rate:** Negligible.  
**Viscosity:** Not available.  
**Boiling Point:** 300 deg C  
**Freezing/Melting Point:** 64 deg C  
**Decomposition Temperature:** > 300 deg C  
**Solubility:** 48.6g/100g water at 50°C  
**Specific Gravity/Density:** 1.898  
**Molecular Formula:** FeSO₄·7H₂O  
**Molecular Weight:** 278.01

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. FeSO₄·7H₂O oxidizes in moist air forming a brown coating of basic ferric sulfate. Aqueous solutions are oxidized slowly by air when cold, rapidly when hot; rate of oxidation increased by addition of base or exposure to light.  
**Conditions to Avoid:** Light, dust generation, moisture, excess heat, prolonged exposure to air.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, bases, lead acetate, silver salts, lime water, carbonates, potassium tartrate, gold salts, potassium iodide, sodium borate, sodium tartrate, tannin.  
**Hazardous Decomposition Products:** Oxides of sulfur, oxides of iron.  
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 7782-63-0: NO8510000  
**CAS#** 7720-78-7: NO8500000  
**LD₅₀/LC₅₀:**  
**CAS#** 7782-63-0:  
  Oral, mouse: LD₅₀ = 1520 mg/kg;  
  Oral, rabbit: LD₅₀ = 533 mg/kg;  

**CAS#** 7720-78-7:  
  Oral, mouse: LD₅₀ = 680 mg/kg;  
  Oral, rat: LD₅₀ = 319 mg/kg;  
  Oral, rabbit: LD₅₀ = 2778 mg/kg;  
For Iron(II) sulfate (1:1), heptahydrate (CAS = 7782-63-0); Oral rat LDLo: 1389 mg/kg; Oral rabbit LDLo: 2778 mg/kg.; For Iron(II) sulfate anhydrous (CAS = 7720-78-7); Child Oral LDLo: 435 mg/kg Coma, BP lowering not characterized in autonomic section, jaundice.  
**Carcinogenicity:**  
**CAS#** 7782-63-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS#** 7720-78-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
**Epidemiology:** No information available.

**Teratogenicity:** No information available.

**Reproductive Effects:** See actual entry in RTECS for complete information.

**Mutagenicity:** See actual entry in RTECS for complete information.

**Neurotoxicity:** No information available.

**Other Studies:**

---

**Section 12 - Ecological Information**

No information available.

---

**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

---

**Section 14 - Transport Information**

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<th></th>
<th>US DOT</th>
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<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**

CAS# 7782-63-0 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).  

CAS# 7720-78-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

CAS# 7782-63-0: 1000 lb final RQ (listed under Ferrous sulfate); 454 kg final RQ (listed under Ferrous sulfate);  7720-78-7: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 7782-63-0: immediate.

CAS # 7720-78-7: immediate.

**Section 313**

No chemicals are reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7782-63-0 is listed as a Hazardous Substance under the CWA. CAS# 7720-78-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7782-63-0 can be found on the following state right to know lists: California, (listed as Iron salts (soluble)), Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.
CAS# 7720-78-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 22 Harmful if swallowed.
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.

WGK (Water Danger/Protection)
CAS# 7782-63-0: No information available.
CAS# 7720-78-7: 1

Canada - DSL/NDSL
CAS# 7720-78-7 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7782-63-0 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.
CAS# 7720-78-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/04/1997
Revision #7 Date: 9/14/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Glycerin

ACC# 10440

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Glycerin  
**Catalog Numbers:** S71228, S71229, S74606, S74606-1, S746061, S93251, S93252, BP229-1, BP229-4, BPG33-1LC, G153-1, G153-4, G30-20, G30-200, G30-4, G31-1, G31-20, G31-200, G31-4, G31-500, G34-20, G34-200, G34-4, G36-20, G37-20, G37-200, G37-4, NC9117583, NC9453572, NC9484773, NC9573811, NC9707289, XXBP22920LI  
**Synonyms:** Glycerol; 1,2,3-Propanetriol; Glycyl alcohol; 1,2,3-Trihydroxypropane; Glycerine.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-81-5</td>
<td>Glycerin</td>
<td>100</td>
<td>200-289-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: Clear liquid.  
**Caution!** May cause eye, skin, and respiratory tract irritation. This is expected to be a low hazard for usual industrial handling.  
**Target Organs:** No data found.

**Potential Health Effects**

**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation. Low hazard for usual industrial handling.  
**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. Low hazard for usual industrial handling. May cause headache.  
**Inhalation:** Low hazard for usual industrial handling. Inhalation of a mist of this material may cause respiratory tract irritation.  
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medical aid.  
**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.  
**Ingestion:** Never give anything by mouth to an unconscious person. Do NOT induce vomiting. If conscious and...
alert, rinse mouth and drink 2-4 cupfuls of milk or water. Get medical aid if irritation or symptoms occur.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** 193 deg C ( 379.40 deg F)

**Autoignition Temperature:** 400 deg C ( 752.00 deg F)

**Explosion Limits, Lower:** 1.1

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 1; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Wash clothing before reuse.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. No special precautions indicated.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerin</td>
<td>10 mg/m3 TWA</td>
<td>none listed</td>
<td>15 mg/m3 TWA (total); 5 mg/m3 TWA (respirable fraction)</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Glycerin: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** Clear  
**Odor:** Faint odor  
**pH:** Not available.  
**Vapor Pressure:** 0.0025 mm Hg @ 5  
**Vapor Density:** 3.17 (H2O=1)  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 290 deg C  
**Freezing/Melting Point:** 20 deg C  
**Decomposition Temperature:** 290 deg C  
**Solubility:** Miscible in water. Insol. in chloroform.  
**Specific Gravity/Density:** 1.2610 g/cm³ @ 20°C  
**Molecular Formula:** C₃H₈O₃  
**Molecular Weight:** 92.05

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable.  
**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat.  
**Incompatibilities with Other Materials:** Oxidizing agents, strong acids, acetic anhydride, isocyanates, aliphatic amines, potassium permanganate, caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide).  
**Hazardous Decomposition Products:** Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.  
**Hazardous Polymerization:** Will not occur.

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 56-81-5: MA8050000  
**LD₅₀/LC₅₀:**  
**CAS#** 56-81-5:  
- Draize test, rabbit, eye: 126 mg Mild;  
- Draize test, rabbit, eye: 500 mg/24H Mild;  
- Draize test, rabbit, skin: 500 mg/24H Mild;  
- Inhalation, rat: LC₅₀ = 570 mg/m³/1H;  
- Oral, mouse: LD₅₀ = 4090 mg/kg;  
- Oral, rabbit: LD₅₀ = 27 gm/kg;  
- Oral, rat: LD₅₀ = 12600 mg/kg;  
- Skin, rabbit: LD₅₀ = 10 gm/kg;  

**Carcinogenicity:**  
**CAS#** 56-81-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** No information available.  
**Teratogenicity:** No information available.  
**Reproductive Effects:** No information available.
**Mutagenicity:** No information available.

**Neurotoxicity:** No information available.

**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** No data available. Cas# 56-81-5: LC50 (96 Hr.) rainbow trout = 50-67 mg/L; 12 degrees CLC50 (96 Hr.) goldfish = >5000 mg/L

**Environmental:** No information available.

**Physical:** No information available.

**Other:** No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not Regulated</td>
<td>Not Regulated</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

- CAS# 56-81-5 is listed on the TSCA inventory.

**Health & Safety Reporting List**

- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

- None of the chemicals in this product have a TPQ.

**SARA Codes**

- CAS # 56-81-5: delayed.

**Section 313**

- No chemicals are reportable under Section 313.

**Clean Air Act:**

- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 56-81-5 can be found on the following state right to know lists: Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
Not available.
Risk Phrases:
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 56-81-5: 0

Canada - DSL/NDSL
CAS# 56-81-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of Not controlled.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 7/20/1999
Revision #7 Date: 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
EMERGENCY OVERVIEW

Appearance: gold powder.

**Warning!** Causes eye, skin, and respiratory tract irritation. Light sensitive. Hygroscopic (absorbs moisture from the air). May cause adverse reproductive effects based upon animal studies. The toxicological properties of this material have not been fully investigated.

**Target Organs:** Respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.

**Inhalation:** Causes respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Can produce delayed pulmonary edema.

**Chronic:** Adverse reproductive effects have been reported in animals.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Store protected from light. Wash clothing before reuse.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold(III) chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Gold(III) chloride: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

**Physical State:** Powder
**Appearance:** brown - gold  
**Odor:** Not available.  
**pH:** Not available.  
**Vapor Pressure:** Not available.  
**Vapor Density:** Not available.  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** Not available.  
**Freezing/Melting Point:** 254 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Not available.  
**Specific Gravity/Density:** Not available.  
**Molecular Formula:** AuCl₃  
**Molecular Weight:** 303.32

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.  
**Conditions to Avoid:** Incompatible materials, light, dust generation, excess heat, exposure to moist air or water.  
**Incompatibilities with Other Materials:** Moisture, ammonia, amines.  
**Hazardous Decomposition Products:** Irritating and toxic fumes and gases, oxides of chlorine.  
**Hazardous Polymerization:** Has not been reported

### Section 11 - Toxicological Information

**RTECS#:**

**CAS# 13453-07-1:** MD5420000  
**LD50/LC50:** Not available.

**Carcinogenicity:**

CAS# 13453-07-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.  
**Mutagenicity:** Mutagenic effects have occurred in experimental animals.  
**Neurotoxicity:** No information found  
**Other Studies:**

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.  
**RCRA P-Series:** None listed.  
**RCRA U-Series:** None listed.
CAS# 13453-07-1 is listed on the TSCA inventory. Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 13453-07-1 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
XI

Risk Phrases:
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37 Wear suitable gloves.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice.
immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger/Protection)
   CAS# 13453-07-1: 2

Canada - DSL/NDSL
   CAS# 13453-07-1 is listed on Canada's DSL List.

Canada - WHMIS
   This product has a WHMIS classification of D2A, D2B.
   This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and
   the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
   CAS# 13453-07-1 is listed on the Canadian Ingredient Disclosure List.

<table>
<thead>
<tr>
<th>Section 16 - Additional Information</th>
</tr>
</thead>
</table>

**MSDS Creation Date:** 6/14/1999
**Revision #4 Date:** 10/20/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of
merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users
should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for
any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever
arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Hexane

ACC# 10951

Section 1 - Chemical Product and Company Identification

MSDS Name: Hexane

Synonyms: n-Hexane; Hexyl hydride; Dipropyl; normal-Hexane; Hex.

Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>110-54-3</td>
<td>Hexane (contains a mixture of isomers)</td>
<td>100</td>
<td>203-777-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless liquid.

Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. Breathing vapors may cause drowsiness and dizziness. Causes eye, skin, and respiratory tract irritation. May be harmful if absorbed through the skin. Aspiration hazard if swallowed. Can enter lungs and cause damage. Possible risk of impaired fertility. Long-term exposure may cause damage to the nervous system of the extremities (the hands, arms, legs and feet). Dangerous for the environment.

Target Organs: Central nervous system, respiratory system, eyes, skin, peripheral nervous system, testes.

Potential Health Effects
Eye: Causes mild eye irritation.
Skin: Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. Causes irritation with burning pain, itching, and redness. Absorbed through the skin. There have been no reports of skin sensitization in people occupationally exposed to n-hexane. Skin sensitization was not observed in a maximization test using 25
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression. Inhalation: Causes respiratory tract irritation. Exposure produces central nervous system depression. Vapors may cause dizziness or suffocation. n-Hexane vapor concentrations can become so high that oxygen is displaced, especially in confined spaces. Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. Prolonged or repeated exposure may cause adverse reproductive effects. Chronic exposure may cause visual disturbances. Laboratory experiments have resulted in mutagenic effects. Peripheral neuropathy symptoms include: muscular weakness, paresthesia, numbing of the hands, feet, legs and arms, unsteadiness, and difficulty in walking and standing. Repeated exposure may cause nervous system abnormalities with muscle weakness and damage, motor incoordination, and sensation disturbances. Chronic exposure produces peripheral neuropathy.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a least 15 minutes. Get medical aid. 
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively. For ingestion, the stomach should be intubated, aspirated, and lavaged with a slurry of activated charcoal—protect the airway from aspiration of gastric contents. Monitor arterial blood gases in cases of severe aspiration.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. May accumulate static electrical charges, and may cause ignition of its own vapors. Extremely flammable liquid and vapor. Vapor may cause flash fire. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire.
Extinguishing Media: Use dry chemical, carbon dioxide, or appropriate foam. Solid streams of water may be ineffective and spread material. Water may be ineffective because it will not cool material below its flash point.
Flash Point: -7.6 to -15 deg
Autoignition Temperature: 225 deg C (437.00 deg F)
Explosion Limits, Lower: 1.2 vol %
Upper: 7.7 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Use only non-sparking tools and equipment.

Section 7 - Handling and Storage
Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist.

Storage: Keep away from heat and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexane (contains a mixture of isomers)</td>
<td>50 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous route</td>
<td>50 ppm TWA; 180 mg/m3 TWA 1100 ppm IDLH</td>
<td>500 ppm TWA; 1800 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Hexane (contains a mixture of isomers): 50 ppm TWA; 180 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear colorless
Odor: gasoline-like
pH: Not available.
Vapor Pressure: 151 mm Hg @ 25 deg C
Vapor Density: 2.97(Air = 1)
Evaporation Rate: Not available.
Viscosity: 0.31 mPas 20 deg C
Boiling Point: 62 - 69 deg C @ 760 mmHg
Freezing/Melting Point: -95 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density: 0.678
Molecular Formula: C6H14
Molecular Weight: 86.18

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat, electrical sparks, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 110-54-3: MN9275000
LD50/LC50:
CAS# 110-54-3:
- Draize test, rabbit, eye: 10 mg Mild;
- Inhalation, mouse: LC50 = 150000 mg/m3/2H;
- Inhalation, rat: LC50 = 48000 ppm/4H;
- Inhalation, rat: LC50 = 627000 mg/m3/3M;
- Oral, rat: LD50 = 25 gm/kg;

Carcinogenicity:
CAS# 110-54-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Occupational polineuropathy has resulted from hexane exposures as low as 500 ppm, but the minimum levels of n-hexane that are neurotoxic in humans haven't been established. Nearly continuous exposure of animals at 250 ppm has caused neurotoxic effects.

Teratogenicity: No evidence of teratogenicity or embryotoxicity in animal studies with hexane. Fetotoxicity has been observed in the presence of maternal toxicity.

Reproductive Effects: Severe testicular damage has been observed in rats exposed to hexane at concentrations which have produced other significant toxicity. Although subneurotoxic doses of its principle toxic metabolite, 2,5-hexanedione, can induce progressive testicular toxicity in rats, there have been no reports of human sterility or other reproductive toxicity associated with n-hexane exposures.

Mutagenicity: Positive results (chromosomal damage in the bone marrow cells) obtained for rats exposed by inhalation to n-hexane.

Neurotoxicity: n-Hexane is a mild irritant and CNS depressant in acute exposure, but its principal effects are damage to the sensory and motor peripheral nerves, particularly in chronic exposure.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Estimated BCF values = 2.24 and 2.89. These values suggest that hexane will show low bioconcentration in aquatic organisms. Estimated Koc value = 4.11. This product will show slight soil mobility and is expected to rapidly volatilize from moist surface soils.

Environmental: Terrestrial: Volatilization and adsorption are expected to be the most important fate processes. Aquatic: Photolysis or hydrolysis are not expected to be important. Atmospheric: Expected to exist entirely in the vapor phase in ambient air, expected half life 2.8 days. Expected to biodegrade but not bioconcentrate.

Physical: No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.
US FEDERAL

TSCA
  CAS# 110-54-3 is listed on the TSCA inventory.

Health & Safety Reporting List
  None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
  None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
  None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
  None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
  CAS# 110-54-3: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
  None of the chemicals in this product have a TPQ.

SARA Codes
  CAS# 110-54-3: immediate, delayed, fire.

Section 313
  This material contains Hexane (contains a mixture of (CAS# 110-54-3, 100%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:
  CAS# 110-54-3 is listed as a hazardous air pollutant (HAP).
  This material does not contain any Class 1 Ozone depletors.
  This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
  None of the chemicals in this product are listed as Hazardous Substances under the CWA.
  None of the chemicals in this product are listed as Priority Pollutants under the CWA.
  None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
  None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
  CAS# 110-54-3 can be found on the following state right to know lists: New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
  California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
  XN F N

Risk Phrases:
  R 11 Highly flammable.
  R 38 Irritating to skin.
R 48/20 Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R 62 Possible risk of impaired fertility.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 65 Harmful: may cause lung damage if swallowed.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.
S 36/37 Wear suitable protective clothing and gloves.
S 9 Keep container in a well-ventilated place.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.
S 62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

WGK (Water Danger/Protection)
CAS# 110-54-3: 1

Canada - DSL/NDSL
CAS# 110-54-3 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 110-54-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/03/1999
Revision #13 Date: 5/02/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Section 1 - Chemical Product and Company Identification

MSDS Name: Methyl Isobutyl Ketone
Catalog Numbers: M213-1, M213-20, M213-200, M213-4, NC9652550, XX213200LI
Synonyms: Isobutyl methyl ketone; Methyl isobutyl ketone; Hexone; Isopropylacetone; MIBK; 4-Methyl-2-pentanone.

Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>108-10-1</td>
<td>Methyl isobutyl ketone</td>
<td>&gt;98.5</td>
<td>203-550-1</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 14 deg C.

Warning! Flammable liquid and vapor. Causes eye and respiratory tract irritation. Prolonged or repeated contact may dry the skin and cause irritation. May cause central nervous system depression. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. May form explosive peroxides. May cause liver damage.

Target Organs: Central nervous system, liver, respiratory system, eyes, skin.

Potential Health Effects

Eye: Contact produces irritation, tearing, and burning pain. Vapors cause eye irritation.
Skin: Prolonged and/or repeated contact may cause irritation and/or dermatitis. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.
Ingestion: May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Exposure produces central nervous system depression. May cause liver abnormalities.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. This material has caused kidney effects in male rats which are not considered relevant to humans.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid
if irritation develops and persists. Wash clothing before reuse.

**Ingestion:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** Water may be ineffective. In case of fire, use carbon dioxide, dry chemical powder or appropriate foam.

**Flash Point:** 14 deg C (57.20 deg F)

**Autoignition Temperature:** 448 deg C (838.40 deg F)

**Explosion Limits, Lower:** 1.2% @ 93°C

**Upper:** 8.0% @ 93°C

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 0

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### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor or mist.

**Storage:** Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

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### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl isobutyl ketone</td>
<td>50 ppm TWA; 75 ppm STEL</td>
<td>50 ppm TWA; 205 mg/m3 TWA</td>
<td>100 ppm TWA; 410 mg/m3</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Methyl isobutyl ketone: 50 ppm TWA; 205 mg/m³ TWA

Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: Sweet, camphor-like.
PH: Not available.
Vapor Pressure: 19.9 mm Hg @ 25 deg C
Vapor Density: 3.45 (air=1)
Evaporation Rate: 1.6 (butyl acetate=1)
Viscosity: 0.61 cps @ 20 deg C
Boiling Point: 117 deg C @ 760 mmHg
Freezing/Melting Point: -84 deg C
Decomposition Temperature: Not available.
Solubility: Moderately Soluble.
Specific Gravity/Density: 0.80 g/cm³
Molecular Formula: C₆H₁₂O
Molecular Weight: 100.16

Section 10 - Stability and Reactivity

Chemical Stability: Under normal storage conditions, peroxidizable compounds can form and accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation.
Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, strong bases.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS # 108-10-1: SA9275000
LD₅₀/LC₅₀:
CAS # 108-10-1:
  Draize test, rabbit, eye: 40 mg Severe;
  Draize test, rabbit, eye: 100 µL/24H Moderate;
  Draize test, rabbit, skin: 500 mg/24H Mild;
  Inhalation, mouse: LC₅₀ = 23300 mg/m³;
  Inhalation, mouse: LC₅₀ = 23300 mg/m³;
  Inhalation, rat: LC₅₀ = 100 gm/m³;
  Oral, mouse: LD₅₀ = 1900 mg/kg;
  Oral, mouse: LD₅₀ = 2850 mg/kg;
  Oral, rat: LD₅₀ = 2080 mg/kg;
Oral, rat: LD50 = 4600 mg/kg;

Carcinogenicity:
CAS# 108-10-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: One animal study showed that MIBK was not teratogenic, embryotoxic or fetotoxic at exposures which did not cause maternal toxicity.
Reproductive Effects: One unverifiable animal study showed changes in the testis in mice exposed dermally to MIBK for four months.
Mutagenicity: Most mutagenicity tests have produced negative results.
Neurotoxicity: MIBK was not considered to be neurotoxic when male rats were exposed to 1500 ppm MIBK (contaminated with 3% methyl n-butyl ketone) for up to 5 months (6 hours/day, 5 days/week).
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 505 mg/L; 96 Hr.; Flow through; 25 degrees C, pH 7.5Fish: Goldfish: LC50 = 460 mg/L; 24 Hr.; UnspecifiedWater flea Daphnia: EC50 = 4280.0 mg/L; 24 Hr.; UnspecifiedAlgae: EC50 = 400 mg/L; 96 Hr.; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 79.6 mg/L; 5 minutes; Microtox test No data available.
Environmental: In soil, substance will undergo direct photolysis, volatilization, or aerobic biodegradation. Substance is highly mobile and may also leach to groundwater. In water, substance will undergo direct photolysis and volatilization. Bioaccumulation is not highly predicted. In air, substance will react with hydroxyl radicals or undergo direct photolysis.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 108-10-1: waste number U161 (Ignitable waste).

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>Shipping Name:</th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHYL ISOBUTYL KETONE</td>
<td>3</td>
<td>No information available.</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN1245</td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td>II</td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 108-10-1 is listed on the TSCA inventory.

Health & Safety Reporting List
CAS# 108-10-1: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
CAS# 108-10-1: 40 CFR 799.5000

Section 12b
CAS# 108-10-1: Section 4 (applies only to those companies that signed an Enforceable Consent Ag

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 108-10-1: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS# 108-10-1: immediate, delayed, fire, reactive.

Section 313
This material contains Methyl isobutyl ketone (CAS# 108-10-1, >98.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:
CAS# 108-10-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 108-10-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F

Risk Phrases:
R 11 Highly flammable.
R 36/37 Irritating to eyes and respiratory system.
R 20 Harmful by inhalation.
R 66 Repeated exposure may cause skin dryness or cracking.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 108-10-1: 1

Canada - DSL/NDSL
CAS# 108-10-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of B2.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 108-10-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Hydrochloric Acid 0.01 to 2.5N

ACC# 40067

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Hydrochloric Acid 0.01 to 2.5N  
**Catalog Numbers:** AC124210000, AC124210010, S70041-2, S71944, S74855, S74856, S748561, S74856MF, S80036, S80039, S93259, A485-20, A485-212, A485-4, EMHX0607-1, FLSA4820LC, GILHYDCHLOR, LC153305, NC9158330, NC9193346, NC9668809, NC9691487, NC9751601, S70041-3, SA431-500, SA50-1, SA50-20, SA50-4, SA52-20, SA52-500, SA54-1, SA54-10, SA54-20, SA54-4, SA55, SA60-1, SA62-1, SA814-10, SA814-20, SA814-4, XX41704L, XX4200LI, XXAVENHCLNF1LI, XXHCL0.5N200LI, XXSA50200LI, XXSLN4426200, XXSLNALL0200  
**Synonyms:** Chlorohydric acid; Hydrogen chloride; Muriatic acid; Spirits of salt; Hydrochloride.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>&gt;89.1</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7647-01-0</td>
<td>Hydrochloric acid</td>
<td>.04-9.12</td>
<td>231-595-7</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless to slight yellow clear liquid.  
**Warning!** May cause eye, skin, and respiratory tract irritation. Corrosive to metal.  
**Target Organs:** No data found.

**Potential Health Effects**  
**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** May cause irritation of the digestive tract. May cause circulatory system failure.  
**Inhalation:** May cause respiratory tract irritation. Exposure to the mist and vapor may erode exposed teeth.  
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. Repeated exposure to low concentrations of HCl vapor or mist may cause bleeding of nose and gums. Chronic bronchitis and gastritis have also been reported.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Do NOT use sodium bicarbonate in an attempt to neutralize the acid. Treat symptomatically and supportively.

**Antidote:** Do NOT use oils or ointments in eye.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Containers may explode when heated.

**Extinguishing Media:** Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 1

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Large spills may be neutralized with dilute alkaline solutions of soda ash (sodium carbonate, Na2CO3), or lime (calcium oxide, CaO). Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Use with adequate ventilation. Contents may develop pressure upon prolonged storage. Avoid contact with eyes, skin, and clothing. Do not breathe dust, mist, or vapor. Keep container tightly closed. Avoid ingestion and inhalation. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.

**Storage:** Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates). Store away from alkalies.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Hydrochloric acid: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear neoprene or polyvinyl chloride gloves to prevent exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: colorless to slight yellow
Odor: strong, pungent
pH: 0.10 (1.0N soln)
Vapor Pressure: 160 mm Hg @ 20 deg C
Vapor Density: 1.26 (air=1)
Evaporation Rate: >1(N-butyl acetate = 1)
Viscosity: Not available.
Boiling Point: 81.5 - 110 deg C @ 760 mmHg
Freezing/Melting Point: -17 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density: 1.16 (water=1)
Molecular Formula: HCl
Molecular Weight: 36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Excess heat.
Incompatibilities with Other Materials: Acetates, acetic anhydride, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, calcium phosphide, cesium acetylene carbide, cesium carbide, chlorosulfonic acid, 1,1-difluoroethylene, ethylene diamine, ethyleneimine, fluorine, lithium silicides, magnesium boride, mercuric sulfate, oleum, perchloric acid, potassium permanganate, beta-propiolactone, propylene oxide, rubidium acetylene carbide, rubidium carbide, sodium, sodium hydroxide, sulfuric acid, uranium phosphide, vinyl acetate, zinc, metal oxides, aluminum, amines, carbonates, iron, steel, copper alloys, copper, alkali metals, bases, strong oxidizing agents.
Hazardous Decomposition Products: Hydrogen chloride.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 7647-01-0: MW4025000; MW4031000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 7647-01-0:
  Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m3/30M;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m3/5M;
Inhalation, rat: LC50 = 7004 mg/m3/30M;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: Female rats were exposed to 450 mg/m3 of HCl for 1 hour either prior to mating or on day 9 of pregnancy. Developmental effects were observed in the offspring. However, this exposure caused toxic effects, including mortality, in the mothers.
Reproductive Effects: No information found
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3.6 mg/L; 48 Hr; Lethal (unspecified)
Fish: Bluegill/Sunfish: LD50; 96 Hr; pH 3.0-3.5

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>HYDROCHLORIC ACID SOLUTION</td>
<td>HYDROCHLORIC ACID SOLUTION</td>
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<tr>
<td>Hazard Class:</td>
<td>8</td>
<td>8</td>
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<tr>
<td>UN Number:</td>
<td>UN1789</td>
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<tr>
<td>Packing Group:</td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL
TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7647-01-0 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
CAS# 7647-01-0: 500 lb TPQ (gas only)

**SARA Codes**
CAS # 7647-01-0: immediate.

**Section 313**
This material contains Hydrochloric acid (CAS# 7647-01-0, .04-9.12%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depleters.
This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
CAS# 7647-01-0 is considered highly hazardous by OSHA.

**STATE**
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**
S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
CAS# 7732-18-5: No information available.
CAS# 7647-01-0: 1

**Canada - DSL/NDSL**
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7647-01-0 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 4/14/1999
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Hydrofluoric acid, 47-51%

ACC# 11171

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Hydrofluoric acid, 47-51%


**Synonyms:** Fluohydric acid; Fluoric acid; Hydrofluoric acid solution; HFA; Etching acid; Fluorohydric acid; Hydrogen fluoride in aqueous solution.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>49-53</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7664-39-3</td>
<td>Hydrofluoric acid</td>
<td>47-51</td>
<td>231-634-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: fuming liquid.

**Danger!** May be fatal if inhaled, absorbed through the skin or swallowed. Both liquid and vapor can cause severe burns to all parts of the body. Specialized medical treatment is required for any exposure to HF. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Long-term exposure may cause bone and joint changes. Will attack glass and any silicon-containing material. Corrosive to metal. Before using this product, make sure that personal protective equipment and engineering controls are used and operating, and also that first aid treatments and procedures are available and understood.

**Target Organs:** Lungs, teeth, eyes, skin, bone, mucous membranes.

**Potential Health Effects**

**Eye:** Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Solutions as dilute as 2% or lower may cause burns.

**Skin:** May be fatal if absorbed through the skin. Causes severe burns with delayed tissue destruction. Substance is rapidly absorbed through the skin. Penetration may continue for several days. Causes severe tissue necrosis and bone destruction. Both liquid and vapor can cause severe burns, which may not be immediately painful or visible. Solutions as dilute as 2% or lower may cause burns. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia, hypomagnesemia, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, and death. Burns caused by weak hydrofluoric acid may go unnoticed for several hours. Therefore, first aid procedures must be followed if any contact is suspected.

**Ingestion:** Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. Human fatalities have been reported from acute poisoning. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia (depletion of calcium in the blood), hypomagnesemia, hyperkalemia, metabolic...
Section 4 - First Aid Measures

**Eyes:** Do NOT allow victim to rub eyes or keep eyes closed. Spills of HF should be flushed until medical attention arrives. SPEEDY ACTION IS CRITICAL! GET MEDICAL ATTENTION IMMEDIATELY! If a physician is not immediately available, apply one or two drops of 0.5% tetracaine hydrochloride solution followed by a second irrigation until medical attention arrives. Tetracaine hydrochloride will provide ocular anesthesia for 20 min. to an hour.

**Skin:** Discard contaminated clothing in a manner which limits further exposure. Destroy contaminated shoes. Spills of HF should be flushed until medical attention arrives. SPEEDY ACTION IS CRITICAL! GET MEDICAL ATTENTION IMMEDIATELY. If available, after thorough washing (PREFERRED METHOD), a 2.5% calcium gluconate gel should be continuously massaged into the burned area, or the burned area should be immersed in a solution of 0.2% iced aqueous benzethonium chloride. Immersion may also be done with 0.13% iced aqueous Benzalkonium chloride. If immersion is not practical, towels should be soaked with one of the aforementioned solutions and used as compresses for the burned area. Ideally compresses should be changed every two minutes. It is suggested that a certain quantity of either prepared solution or the calcium gluconate be kept on hand at all times. These should be replaced annually if not previously used. Before using HF, make sure the solutions, gels and first aid attendant are available in case of exposure.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. SPEED IS ESSENTIAL. A DOCTOR MUST BE NOTIFIED AT ONCE.

**Inhalation:** SPEED IS ESSENTIAL, OBTAIN MEDICAL AID IMMEDIATELY. POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Calcium gluconate, 2.5% in normal saline may be given by nebulizer with oxygen.

**Notes to Physician:** Due to delayed and persistent symptoms, observe patient closely for 48 hours. Prompt action is essential in all cases of contact. Irrigate eyes with 1% calcium gluconate in normal saline for 1 to 2 hours to prevent or lessen corneal damage. For burns of large skin areas, for ingestion & inhalation exposure, severe systemic effects may occur. Monitor & correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia & hyperkalemia. For inhalation exposures, treat as chemical pneumonia.

**Antidote:** Always have calcium gluconate gel on hand. The use of infiltration therapy and intraarterial therapy for hydrofluoric acid burns resulting from concentrations greater than 20% should be made by qualified medical personnel. Calcium gluconate may be administered intravenously slowly to bind to the fluoride ion. This administration needs to be monitored under the supervision of a physician.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Reacts with most metals to form highly flammable hydrogen gas which can form explosive mixtures with air. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 1

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind. Remove ignition sources since flammable hydrogen gas may be generated by reactions with metals. Spills may produce white fumes of HF gas. Rapid dilution of the spill with water will reduce the amount of fumes given off. Carefully neutralize the dilute spill with lime slurry, soda ash, limestone, caustic soda or other alkaline material.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use caution when opening. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection. Do not put even dilute solutions of hydrofluoric acid in glass containers. Always add the acid to water, never the reverse. Never work alone with this chemical.  
**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal or glass containers. Inspect periodically for damage or evidence of leaks or corrosion. Store in approved containers only. Diking of storage containers is recommended.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use a corrosion-resistant ventilation system. If closed handling systems are not feasible, use local exhaust ventilation such as a fumehood (sash should not be glass). Keep the fumehood sash as low as possible.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrofluoric acid</td>
<td>0.5 ppm TWA (as F); 2 ppm Ceiling (as F)</td>
<td>3 ppm TWA; 2.5 mg/m3 TWA 30 ppm IDLH</td>
<td>3 ppm TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Hydrofluoric acid: 3 ppm TWA (as F)  
**Personal Protective Equipment**  
**Eyes:** Wear chemical splash goggles and face shield.  
**Skin:** Wear butyl rubber gloves, apron, and/or clothing.  
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.  
**Respirators:** Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid
**Appearance**: colorless - fuming  
**Odor**: strong, pungent - irritating odor - penetrating odor  
**pH**: < 2.0  
**Vapor Pressure**: 27 mm Hg @ 21 deg C (49%)  
**Vapor Density**: 2.21 (Air=1).  
**Evaporation Rate**: Not available.  
**Viscosity**: Not available.  
**Boiling Point**: 105 deg C  
**Freezing/Melting Point**: -35 deg C  
**Decomposition Temperature**: Not available.  
**Solubility**: Soluble.  
**Specific Gravity/Density**: 1.175 @ 15.5°C  
**Molecular Formula**: HF  
**Molecular Weight**: 20.01

### Section 10 - Stability and Reactivity

**Chemical Stability**: Stable at room temperature in closed containers under normal storage and handling conditions. Hydrogen fluoride tends to associate by means of hydrogen bonds to form polymers in both the liquid and gaseous states, but this polymerization is not hazardous.  
**Conditions to Avoid**: Excess heat, confined spaces.  
**Incompatibilities with Other Materials**: Metals, strong oxidizing agents, strong bases, acetic anhydride, alcohols, amines, Glass, concrete and other silicon-bearing materials will yield silicon tetrafluoride gas in contact with HFA. Pressure build up from this process has been known to blow up glass containers, Carbonates, sulfides, and cyanides will yield toxic gases such as carbon dioxide, hydrogen sulfide, and hydrogen cyanide.  
**Hazardous Decomposition Products**: Hydrogen fluoride gas.  
**Hazardous Polymerization**: Has not been reported.

### Section 11 - Toxicological Information

**RTECS#**:  
**CAS# 7732-18-5**: ZC0110000  
**CAS# 7664-39-3**: MW7875000  
**LD50/LC50**:  
**CAS# 7732-18-5**:  
Oral, rat: LD50 = >90 mL/kg;  
**CAS# 7664-39-3**:  
Inhalation, mouse: LC50 = 342 ppm/1H;  
Inhalation, mouse: LC50 = 5000 mg/m3/5M;  
Inhalation, mouse: LC50 = 270 mg/m3/60M;  
Inhalation, rat: LC50 = 1276 ppm/1H;  
Inhalation, rat: LC50 = 1100 mg/m3/60M;  
Human LCLo inhalation: 50 ppm/30M. Inhalation LC50 (mouse): 170 ppm/4H.  
**Carcinogenicity**:  
**CAS# 7732-18-5**: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 7664-39-3**: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology**: Epidemiological study by Derryberry et al. indicates a threshold for minimal increases(Grade I) in bone density caused by fluoride (fluorosis) is below 3.38 mg/m3 of fluoride (4.3 ppm HF). Grade I fluorosis results in no medically recognized dysfunction.Well-defined incidents of fluorosis are associated with intake levels of 20 mg/d in adults. In children, 4 mg fluoride/d can produce mottling of the teeth.  
**Teratogenicity**: No information available.  
**Reproductive Effects**: See actual entry in RTECS for complete information.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information available.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Fish (fresh water) 60 ppm lethal (time period not specified).
Environmental: No information available.
Physical: No information available.
Other: Log P (oct) = 0.23 (estimated)

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series:

Section 14 - Transport Information

<table>
<thead>
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<th>US DOT</th>
<th>Canada TDG</th>
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<td>HYDROFLUORIC ACID</td>
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<td>Hazard Class:</td>
<td>8</td>
<td>8(6.1)(9.2)</td>
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<td>Packing Group:</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7664-39-3 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7664-39-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7664-39-3: 100 lb TPQ

SARA Codes

Section 313
This material contains Hydrofluoric acid (CAS# 7664-39-3, 47-51%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 7664-39-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7664-39-3 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7664-39-3 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7664-39-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
T+ C
Risk Phrases:
R 26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
R 35 Causes severe burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 7/9 Keep container tightly closed and in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7664-39-3: 1

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7664-39-3 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1A, E, D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7664-39-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/12/1999
Revision #15 Date: 10/22/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Hydrogen Peroxide 20-40%

ACC# 11189

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Hydrogen Peroxide 20-40%

**Catalog Numbers:** S74876, S748761, S74879, S74882, S93262, H323-500, H325-100, H325-30GAL, H325-4, H325-4LC, H325-500, H325-500LC, H3254LC, H327-200, H327-500, NC9352771, P170-500, XXH325PD12LI

**Synonyms:** Carbamide Peroxide; Hydrogen Dioxide; Peroxide; Hydroperoxide; Urea Peroxide; Hydrogen Peroxide 100 Volumes.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>60-80</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7722-84-1</td>
<td>Hydrogen peroxide</td>
<td>20-40</td>
<td>231-765-0</td>
</tr>
<tr>
<td>12058-66-1</td>
<td>Disodium stannate</td>
<td>&lt;100 ppm</td>
<td>235-030-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

**Danger!** Strong oxidizer. Contact with other material may cause a fire. Eye contact may result in permanent eye damage. Corrosive. Causes eye and skin irritation and possible burns. May be harmful if swallowed. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause blood abnormalities. Light sensitive. May cause central nervous system effects.

**Target Organs:** Blood, central nervous system.

**Potential Health Effects**

**Eye:** Contact with liquid is corrosive to the eyes and causes severe burns. Contact with the eyes may cause corneal damage.

**Skin:** Causes severe skin irritation and possible burns. May cause discoloration, erythema (redness), swelling, and the formation of papules and vesicles (blisters).

**Ingestion:** Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distention, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.

**Inhalation:** Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.
**Section 4 - First Aid Measures**

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with other material may cause fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.

**Extinguishing Media:** Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.

**Flash Point:** Noncombustible

**Autoignition Temperature:** Noncombustible

**Explosion Limits, Lower:** 40 vol %

**Upper:** 100 vol %

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1; Special Hazard: OX

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Flush spill area with water. Provide ventilation. Do not get water inside containers. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Store protected from light. Discard contaminated shoes. Unused chemicals should not be returned to the
Rinse empty drums and containers thoroughly with water before discarding. **Storage:** Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store protected from light. Keep away from alkalies, oxidizable materials, finely divided metals, alcohols, and permanganates. Store only in light-resistant containers fitted with a safety vent.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Hydrogen peroxide</td>
<td>1 ppm TWA</td>
<td>1 ppm TWA; 1.4 mg/m3 TWA; 75 ppm IDLH</td>
<td>1 ppm TWA; 1.4 mg/m3 TWA</td>
</tr>
<tr>
<td>Disodium stannate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Hydrogen peroxide: 1 ppm TWA; 1.4 mg/m3 TWA Disodium stannate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear butyl rubber gloves, apron, and/or clothing.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus (positive-pressure mode).

Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** slight acid odor

**pH:** 3.3 (30% solution)

**Vapor Pressure:** 23 mm Hg @ 30C

**Vapor Density:** 1.10

**Evaporation Rate:** >=1.0 (Butyl acetate=1)

**Viscosity:** 1.25 cP

**Boiling Point:** 108 deg C @ 760 mmHg

**Freezing/Melting Point:** -33 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Miscible in water.

**Specific Gravity/Density:** 1.1-1.2 (30-50%)

**Molecular Formula:** Solution

**Molecular Weight:** Not available.

Section 10 - Stability and Reactivity

**Chemical Stability:** Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.

**Conditions to Avoid:** Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.

**Incompatibilities with Other Materials:** Strong oxidizing agents, strong reducing agents, acetic acid, acetic
anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, mercuration chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.

**Hazardous Decomposition Products:** Oxygen, hydrogen gas, water, heat, steam.

**Hazardous Polymerization:** Will not occur.

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**RTECS#:**

**CAS# 7732-18-5: ZC0110000**

**CAS# 7722-84-1: MX0887000; MX0888000; MX0890000; MX0899000; MX0899500; MX0900000**

**CAS# 12058-66-1: JN6345000**

**LD50/LC50:**

**CAS# 7732-18-5:**
- Oral, rat: LD50 = >90 mL/kg;

**CAS# 7722-84-1:**
- Draize test, rabbit, eye: 1 mg Severe;
- Inhalation, rat: LC50 = 2 gm/m3/4H;
- Inhalation, rat: LC50 = 2000 mg/m3;
- Oral, mouse: LD50 = 2000 mg/kg;
- Oral, rabbit: LD50 = 820 mg/kg;
- Oral, rat: LD50 = 1518 mg/kg;
- Oral, rat: LD50 = 910 mg/kg;
- Oral, rat: LD50 = 376 mg/kg;
- Oral, rat: LD50 = 4050 mg/kg;
- Skin, rat: LD50 = 3 gm/kg;
- Skin, rat: LD50 = 4060 mg/kg;

**CAS# 12058-66-1:**
- Oral, mouse: LD50 = 2132 mg/kg;
- Oral, rat: LD50 = 3457 mg/kg;
- Oral, rat: LD50 = 1232 mg/kg (35% H2O2); Oral, rat: LD50 = 841 mg/kg (60%)

**Carcinogenicity:**

**CAS# 7732-18-5:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**CAS# 7722-84-1:**
- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

**CAS# 12058-66-1:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** No information found

**Mutagenicity:** **CAS# 7722-84-1** Mutation in Microorganisms: Salmonella typhimurium = 100 ug/plate.; Hyman, embryo = 50 umol/L.; Cytogenetic Analysis: Human, embryo = 20 umol/L. Mutation in Mammalian Somatic Cells: Hamster, lung = 1mmol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

**Ecotoxicity:** Fish: Carp: LC50 = 42 mg/L; 48 Hr; Unspecified
Fish: Fathead Minnow: LC50 = 16.4 mg/L; 96 Hr; Fresh water
Fish: Fathead Minnow: NOEC = 5 mg/L; 96 Hr; Fresh water
Water flea Daphnia: EC50 = 2.4 mg/L; 48 Hr; Fresh water
Fish: Channel catfish: LC50 = 37.4 mg/L; 96 Hr; Fresh water
No data available.

**Environmental:** Rain washout is expected due to condensation of hydrogen peroxide on contact with water droplets. In the atmosphere, indirect photodissociation is predicted with a half-life of 10 to 20 hours. Non-significant evaporation and adsorption from water surfaces and soil/sediments is expected. Rapid and considerable aerobic biodegradation was determined with a half-life < 1 minute (biological treatment sludge) and 0.3 to 2 days (fresh water). Hydrogen peroxide is non-bioaccumulable.

**Physical:** No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS</td>
<td>HYDROGEN PEROXIDE AQUEOUS SOLN</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>5.1</td>
<td>5.1(8)</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN2014</td>
<td>UN2014</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7722-84-1 is listed on the TSCA inventory.
CAS# 12058-66-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
CAS# 7722-84-1: 1000 lb TPQ (concentration >52%)

**SARA Codes**
CAS # 7722-84-1: immediate, fire.

Section 313  No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7722-84-1 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 12058-66-1 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
O C

Risk Phrases:
R 34 Causes burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:
S 28 After contact with skin, wash immediately with...
S 3 Keep in a cool place.
S 36/39 Wear suitable protective clothing and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7722-84-1: 0
CAS# 12058-66-1: No information available.

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7722-84-1 is listed on Canada's DSL List.
CAS# 12058-66-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of C, E, F.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7722-84-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/21/1999
Revision #10 Date: 7/19/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever
arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Iron atomic absorption standard solution, 1 mg/ml Fe in 2% HNO3

ACC# 30108

Section 1 - Chemical Product and Company Identification

MSDS Name: Iron atomic absorption standard solution, 1 mg/ml Fe in 2% HNO3
Catalog Numbers: AC196050000, AC196051000, AC196055000
Synonyms: None.
Company Identification:
   Acros Organics N.V.
   One Reagent Lane
   Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td></td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7439-89-6</td>
<td>Iron</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid.

Danger! May cause severe eye irritation and possible injury. Causes skin and respiratory tract irritation. May cause blood abnormalities. May cause central nervous system effects. May cause cardiac disturbances. May cause kidney damage. Corrosive to metal.

Target Organs: Blood, kidneys, central nervous system, cardiovascular system, blood forming organs, eyes.

Potential Health Effects
Eye: Causes eye burns. May cause chemical conjunctivitis and corneal damage.
Skin: Causes skin irritation.
Ingestion: May cause kidney damage. May cause systemic toxicity with acidosis. May cause cardiac disturbances. May cause central nervous system effects. May cause blood abnormalities.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause kidney damage. Aspiration may lead to pulmonary edema. May cause blood changes. May cause cardiac abnormalities. Exposure may produce metabolic acidosis.
Chronic: Effects may be delayed. May cause kidney damage.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask. 

Notes to Physician: Administration of Sodium bicarbonate may be of value to treat acidosis.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will react with water to form toxic and corrosive fumes. Vapors may accumulate in confined spaces Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes. Runoff from fire control or dilution water may cause pollution.

Extinguishing Media: For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out.

Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes.

Storage: Keep container closed when not in use. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Iron</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Iron: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment
**Eyes:** Wear chemical splash goggles.
**Skin:** Wear appropriate protective gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

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**Section 9 - Physical and Chemical Properties**

- **Physical State:** Liquid
- **Appearance:** Clear
- **Odor:** None reported.
- **pH:** Not available.
- **Vapor Pressure:** Not available.
- **Vapor Density:** Not available.
- **Evaporation Rate:** Not available.
- **Viscosity:** Not available.
- **Boiling Point:** Not available.
- **Freezing/Melting Point:** Not available.
- **Decomposition Temperature:** Not available.
- **Solubility:** Miscible
- **Specific Gravity/Density:** Not available.
- **Molecular Formula:** Solution
- **Molecular Weight:** Not available.

---

**Section 10 - Stability and Reactivity**

- **Chemical Stability:** Stable under normal temperatures and pressures.
- **Conditions to Avoid:** Incompatible materials, excess heat, oxidizers.
- **Incompatibilities with Other Materials:** Oxidizing agents.
- **Hazardous Decomposition Products:** Nitrogen oxides, irritating and toxic fumes and gases, nitrogen.
- **Hazardous Polymerization:** Has not been reported.

---

**Section 11 - Toxicological Information**

- **RTECS#:**
  - CAS# 7732-18-5: ZC0110000
  - CAS# 7697-37-2: QU5775000; QU5900000
  - CAS# 7439-89-6: NO4565500; NO8225000

- **LD50/LC50:**
  - CAS# 7732-18-5:
    - Oral, rat: LD50 = >90 mL/kg;
  - CAS# 7697-37-2:
    - Inhalation, rat: LC50 = 260 mg/m3/30M;
    - Inhalation, rat: LC50 = 130 mg/m3/4H;
    - Inhalation, rat: LC50 = 67 ppm(NO2)/4H;
  - CAS# 7439-89-6:
    - Oral, rat: LD50 = 30 gm/kg;
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7439-89-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
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<tbody>
<tr>
<td>Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7439-89-6 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.
CAS # 7439-89-6: immediate, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7439-89-6 can be found on the following state right to know lists: California.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XI

Risk Phrases:
R 37/38 Irritating to respiratory system and skin.
R 41 Risk of serious damage to eyes.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7439-89-6: 0

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7439-89-6 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever
arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Lanthanum(III) oxide

ACC# 00832

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Lanthanum(III) oxide  
**Catalog Numbers:** AC193290000, AC193290050, AC193291000, AC199160000, AC199160050, AC199162500, AC413020000, AC413020050, AC413021000, AC413022500, O3357-250  
**Synonyms:** Lanthanum sesquioxide; Lanthanum trioxide; Lanthanum oxide; Lanthana.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1312-81-8</td>
<td>Lanthanum oxide</td>
<td>&gt;91</td>
<td>215-200-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white to off-white powder.  
**Warning!** Causes eye irritation.  
**Target Organs:** Eyes.

**Potential Health Effects**  
**Eye:** Causes mild eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** May cause irritation of the digestive tract.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.  
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.  
**Notes to Physician:** Treat symptomatically and supportively.
**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

---

**Section 5 - Fire Fighting Measures**

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**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes. Keep container tightly closed. Avoid breathing dust.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanthanum oxide</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Lanthanum oxide: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Protective garments not normally required.

**Clothing:** Protective garments not normally required.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** Powder

**Appearance:** white to off-white

**Odor:** odorless
pH: Not available.  
Vapor Pressure: Negligible.  
Vapor Density: Not available.  
Evaporation Rate: Negligible.  
Viscosity: Not available.  
Boiling Point: 4200 deg C  
Freezing/Melting Point: 2315 deg C  
Decomposition Temperature: Not available.  
Solubility: Insoluble.  
Specific Gravity/Density: 6.51 g/cm3  
Molecular Formula: La2O3  
Molecular Weight: 325.81

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. Absorbs carbon dioxide from the air.  
**Conditions to Avoid:** Dust generation, prolonged exposure to air.  
**Incompatibilities with Other Materials:** Acids.  
**Hazardous Decomposition Products:** Lanthanum carbonate.  
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**
CAS# 1312-81-8: OE5330000  
**LD50/LC50:**
CAS# 1312-81-8:  
Draize test, rabbit, eye: 100 mg Mild;  
Oral, mouse: LD50 = 2450 mg(La)/kg;  
Oral, rat: LD50 = >8500 mg(La)/kg;  

**Carcinogenicity:**
CAS# 1312-81-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

**Epidemiology:** No information available.  
**Teratogenicity:** No information available.  
**Reproductive Effects:** No information available.  
**Mutagenicity:** No information available.  
**Neurotoxicity:** No information available.  
**Other Studies:**

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.  
**RCRA P-Series:** None listed.
RCRA U-Series: None listed.

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name</td>
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<td>Not Regulated</td>
</tr>
<tr>
<td>Hazard Class</td>
<td></td>
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<tr>
<td>UN Number</td>
<td></td>
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<tr>
<td>Packing Group</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
- CAS# 1312-81-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 1312-81-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
- California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- XI

**Risk Phrases:**
- R 36 Irritating to eyes.

**Safety Phrases:**
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 39 Wear eye/face protection.
WGK (Water Danger/Protection)
   CAS# 1312-81-8: No information available.
Canada - DSL/NDSL
   CAS# 1312-81-8 is listed on Canada's DSL List.
Canada - WHMIS
   This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 7/16/1998
Revision #5 Date: 5/18/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Lead Oxide Yellow

ACC# 12680

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Lead Oxide Yellow
**Catalog Numbers:** S75102, L71-212, S75101, ZZL7121219
**Synonyms:** Lead monooxide, Lead protoxide, Litharge; Lead(II) oxide; C.I. 77577; C.I. Pigment Yellow 46; Lead oxide yellow; Plumbous oxide.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1317-36-8</td>
<td>Lead monooxide</td>
<td>&gt;99</td>
<td>215-267-0</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: red or yellow.

**Caution!** May be harmful if inhaled. May cause eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation. May cause kidney damage. May cause central nervous system effects. This product contains lead, a chemical known to the state of California to cause male reproductive effects.

**Target Organs:** Blood, kidneys, central nervous system, reproductive system.

**Potential Health Effects**

**Eye:** May cause eye irritation.

**Skin:** May cause skin irritation.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. Ingestion of large amounts may cause CNS depression. Ingestion of large quantities may cause severe hemolytic anemia and hemoglobinuria.

**Inhalation:** May cause respiratory tract irritation. May cause effects similar to those described for ingestion. May be harmful if inhaled.

**Chronic:** Prolonged or repeated exposure may cause adverse reproductive effects. Chronic exposure may cause visual disturbances.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** The use of a metal chelator should be determined only by qualified medical personnel.

---

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** N/A

**Upper:** N/A

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Use only with adequate ventilation. Avoid breathing dust.

**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead monooxide</td>
<td>0.05 mg/m3 TWA (as Pb) (listed under Lead, inorganic compounds).</td>
<td>0.050 mg/m3 TWA (as Pb) (listed under Lead compounds).</td>
<td>50 æg/m3 TWA (as Pb) (listed under Lead, inorganic compounds).50 æg/m3 TWA (as Pb); 30 æg/m3 Action Level (as Pb. Poison - see 29 CFR 1910.10 25) (listed under Lead, inorganic compounds).</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Lead monooxide: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face
protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** Refer to 29 CFR1910.1025 for regulations on respiratory protection required during exposure to lead and lead compounds.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Crystals  
**Appearance:** red or yellow  
**Odor:** None reported  
**pH:** Strong base  
**Vapor Pressure:** 10 mm Hg @ 1085°C  
**Vapor Density:** Not available.  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 1470 deg C  
**Freezing/Melting Point:** 886 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Insoluble.  
**Specific Gravity/Density:** 9.53  
**Molecular Formula:** PbO  
**Molecular Weight:** 223.19

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.  
**Conditions to Avoid:** Dust generation, excess heat.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, hydrogen peroxide, lithium carbide, perchloric acid, powdered aluminum, hydrogen trisulfide.  
**Hazardous Decomposition Products:** Irritating and toxic fumes and gases, lead/lead oxides.  
**Hazardous Polymerization:** Has not been reported

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### Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 1317-36-8:** OG1750000  
**LD50/LC50:**  
**CAS# 1317-36-8:**  
  
  - Draize test, rabbit, skin: 100 mg/24H Mild;  

**Carcinogenicity:**  
**CAS# 1317-36-8:**  
- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans (listed as 'Lead, inorganic compounds').  
- **California:** carcinogen, initial date 10/1/92 (listed as Lead compounds).  
- **NTP:** Suspect carcinogen (listed as Lead compounds).  
- **IARC:** Group 2A carcinogen (listed as Lead, inorganic compounds).
Epidemiology: No information available.
Teratogenicity: Lead has been shown to cause teratogenic effects.
Reproductive Effects: Lead has been shown to cause reproductive effects.
Mutagenicity: No information available.
Neurotoxicity: Lead has been shown to cause neurotoxic effects.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
</tr>
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<tbody>
<tr>
<td>Shipping Name:</td>
<td>OXIDIZING SOLID, N.O.S.</td>
<td>OXIDIZING SOLID NOS (LEAD OXIDE)</td>
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<td>Hazard Class:</td>
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<td>Packing Group:</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS # 1317-36-8 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 1317-36-8: immediate, delayed.

Section 313
This material contains Lead monooxide (listed as Lead, inorganic compounds), >99%, (CAS# 1317-36-8) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 1317-36-8 (listed as Lead compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 1317-36-8 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 1317-36-8 can be found on the following state right to know lists: California, (listed as Lead compounds), New Jersey, (listed as Lead, inorganic compounds), New Jersey, (listed as Lead compounds), Pennsylvania, (listed as Lead compounds), Minnesota, (listed as Lead, inorganic compounds), Massachusetts.

California Prop 65
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Lead monooxide, listed as `Lead compounds', a chemical known to the state of California to cause cancer. WARNING: This product contains Lead monooxide, listed as `Lead, inorganic compounds', a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
T N
Risk Phrases:
R 20/22 Harmful by inhalation and if swallowed.
R 33 Danger of cumulative effects.
R 61 May cause harm to the unborn child.
R 62 Possible risk of impaired fertility.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)
CAS# 1317-36-8: 1

Canada - DSL/NDSL
CAS# 1317-36-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 1317-36-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/28/1999
Revision #6 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Lead Oxide Yellow

ACC# 12680

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Lead Oxide Yellow  
**Catalog Numbers:** S75102, L71-212, S75101, ZZL7121219  
**Synonyms:** Lead monooxide, Lead protoxide, Litharge; Lead(II) oxide; C.I. 77577; C.I. Pigment Yellow 46; Lead oxide yellow; Plumbous oxide.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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</thead>
<tbody>
<tr>
<td>1317-36-8</td>
<td>Lead monooxide</td>
<td>&gt;99</td>
<td>215-267-0</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: red or yellow.  
**Caution!** May be harmful if inhaled. May cause eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation. May cause kidney damage. May cause central nervous system effects. This product contains lead, a chemical known to the state of California to cause male reproductive effects.  
**Target Organs:** Blood, kidneys, central nervous system, reproductive system.

**Potential Health Effects**

**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. Ingestion of large amounts may cause CNS depression. Ingestion of large quantities may cause severe hemolytic anemia and hemoglobinuria.  
**Inhalation:** May cause respiratory tract irritation. May cause effects similar to those described for ingestion. May be harmful if inhaled.  
**Chronic:** Prolonged or repeated exposure may cause adverse reproductive effects. Chronic exposure may cause visual disturbances.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** The use of a metal chelator should be determined only by qualified medical personnel.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** N/A

**Upper:** N/A

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Use only with adequate ventilation. Avoid breathing dust.

**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead monooxide</td>
<td>0.05 mg/m3 TWA (as Pb)</td>
<td>0.050 mg/m3 TWA (as Pb)</td>
<td>50 æg/m3 TWA (as Pb) (listed under Lead, inorganic compounds). 50 æg/m3 TWA (as Pb); 30 æg/m3 Action Level (as Pb. Poison - see 29 CFR 1910.10 25) (listed under Lead, inorganic compounds).</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Lead monooxide: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face
protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** Refer to 29 CFR1910.1025 for regulations on respiratory protection required during exposure to lead and lead compounds.

### Section 9 - Physical and Chemical Properties

**Physical State:** Crystals

**Appearance:** red or yellow

**Odor:** None reported

**pH:** Strong base

**Vapor Pressure:** 10 mm Hg @ 1085C

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** 1470 deg C

**Freezing/Melting Point:** 886 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Insoluble.

**Specific Gravity/Density:** 9.53

**Molecular Formula:** PbO

**Molecular Weight:** 223.19

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Dust generation, excess heat.

**Incompatibilities with Other Materials:** Strong oxidizing agents, hydrogen peroxide, lithium carbide, perchloric acid, powdered aluminum, hydrogen trisulfide.

**Hazardous Decomposition Products:** Irritating and toxic fumes and gases, lead/lead oxides.

**Hazardous Polymerization:** Has not been reported

### Section 11 - Toxicological Information

**RTECS#:**

**CAS# 1317-36-8:** OG1750000

**LD50/LC50:**

**CAS# 1317-36-8:**
- Draize test, rabbit, skin: 100 mg/24H Mild;

**Carcinogenicity:**

**CAS# 1317-36-8:**

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans (listed as 'Lead, inorganic compounds').
- **California:** carcinogen, initial date 10/1/92 (listed as Lead compounds).
- **NTP:** Suspect carcinogen (listed as Lead compounds).
- **IARC:** Group 2A carcinogen (listed as Lead, inorganic compounds).
### Epidemiology:
No information available.

### Teratogenicity:
Lead has been shown to cause teratogenic effects.

### Reproductive Effects:
Lead has been shown to cause reproductive effects.

### Mutagenicity:
No information available.

### Neurotoxicity:
Lead has been shown to cause neurotoxic effects.

### Other Studies:

#### Section 12 - Ecological Information
No information available.

#### Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

#### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name</strong></td>
<td>OXIDIZING SOLID, N.O.S.</td>
<td>OXIDIZING SOLID NOS (LEAD OXIDE)</td>
</tr>
<tr>
<td><strong>Hazard Class</strong></td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>UN Number</strong></td>
<td>UN1479</td>
<td>UN1479</td>
</tr>
<tr>
<td><strong>Packing Group</strong></td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

#### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 1317-36-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 1317-36-8: immediate, delayed.

**Section 313**
- This material contains Lead monooxide (listed as Lead, inorganic compounds), >99%, (CAS# 1317-36-8) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- CAS# 1317-36-8 (listed as Lead compounds) is listed as a hazardous air pollutant (HAP).
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
  None of the chemicals in this product are listed as Hazardous Substances under the CWA.
  None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 1317-36-8 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
  None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
  CAS# 1317-36-8 can be found on the following state right to know lists: California, (listed as Lead compounds), New Jersey, (listed as Lead, inorganic compounds), New Jersey, (listed as Lead compounds), Pennsylvania, (listed as Lead compounds), Minnesota, (listed as Lead, inorganic compounds), Massachusetts.

California Prop 65
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Lead monooxide, listed as `Lead compounds', a chemical known to the state of California to cause cancer. WARNING: This product contains Lead monooxide, listed as `Lead, inorganic compounds', a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
  T N
Risk Phrases:
  R 20/22 Harmful by inhalation and if swallowed.
  R 33 Danger of cumulative effects.
  R 61 May cause harm to the unborn child.
  R 62 Possible risk of impaired fertility.
  R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
  S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  S 53 Avoid exposure - obtain special instructions before use.
  S 60 This material and its container must be disposed of as hazardous waste.
  S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
  CAS# 1317-36-8: 1
Canada - DSL/NDSL
  CAS# 1317-36-8 is listed on Canada's DSL List.
Canada - WHMIS
  This product has a WHMIS classification of D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List
  CAS# 1317-36-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/28/1999
Revision #6 Date: 9/26/2007
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Lead atomic absorption standard solution, 1 mg/ml Pb in 2% HNO3

ACC# 07289

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Lead atomic absorption standard solution, 1 mg/ml Pb in 2% HNO3

**Catalog Numbers:** AC196070000, AC196071000, AC196075000

**Synonyms:** None.

**Company Identification:**
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2.0</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>Lead metal</td>
<td>0.1</td>
<td>231-100-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.

**Danger!** May cause severe eye irritation and possible injury. May cause harm to the unborn child. Causes skin and respiratory tract irritation. Cancer suspect agent. May cause central nervous system effects. Danger of cumulative effects. Corrosive to metal.

**Target Organs:** Blood, kidneys, central nervous system, eyes, reproductive system.

**Potential Health Effects**

Eye: Causes severe eye burns. May cause irreversible eye injury.

Skin: Causes skin irritation.

Ingestion: May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.

Inhalation: Causes respiratory tract irritation.

Chronic: Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. May cause liver and kidney damage. May cause anemia and other blood cell abnormalities. May cause digestive tract and cardiac disturbances. Repeated exposure may cause central nervous system damage. Chronic ingestion may cause neurological symptoms. Chronic exposure to lead may result in plumbism which is characterized by lead line in gum, headache, muscle weakness, mental changes.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.  
**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible.  
**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use water fog, dry chemical, carbon dioxide, or regular foam.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Flush spill area with water. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not get on skin or in eyes. Do not ingest or inhale. Wash clothing before reuse.  
**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Lead metal</td>
<td>0.05 mg/m3 TWA</td>
<td>0.050 mg/m3 TWA 100 mg/m3 IDLH</td>
<td>50 æg/m3 PEL (as Pb); 30 æg/m3 Action Level (as Pb. Poison - see 29 CFR 1910.10 25)</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Lead metal: No OSHA Vacated PELs are listed for this chemical.  
**Personal Protective Equipment**  
**Eyes:** Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: odorless
pH: Acidic
Vapor Pressure: Not available.
Vapor Density: >1.0
Evaporation Rate: >1.0 (ether=1)
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Soluble in water.
Specific Gravity/Density: >1.0
Molecular Formula: Mixture
Molecular Weight: Not available

---

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Contact with water, alkaline materials.
Hazardous Decomposition Products: Nitrogen oxides.
Hazardous Polymerization: Has not been reported

---

Section 11 - Toxicological Information

RTECS#:
CAS# 7732-18-5: ZC0110000
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 7439-92-1: OF7525000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

  Inhalation, rat: LC50 = 260 mg/m3/30M;
  Inhalation, rat: LC50 = 130 mg/m3/4H;
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 7697-37-2:

CAS# 7439-92-1:
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7439-92-1:
  - **ACGIH**: A3 - Confirmed animal carcinogen with unknown relevance to humans
  - **California**: carcinogen, initial date 10/1/92
  - **NTP**: Suspect carcinogen
  - **IARC**: Group 2A carcinogen (listed as Lead, inorganic compounds).

Epidemiology: There are several reports that certain lead compounds administered to animals in high doses are carcinogenic, primarily producing renal tumors. Salts demonstrating carcinogenicity in animals are usually soluble salts.

Teratogenicity: No information available.

Reproductive Effects: Reproductive effects have occurred in experimental animals.

Mutagenicity: No information available.

Neurotoxicity: No information available.

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series**: None listed.

**RCRA U-Series**: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name</strong></td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>NITRIC ACID</td>
</tr>
<tr>
<td><strong>Hazard Class</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number</strong></td>
<td>UN3264</td>
<td>UN2031</td>
</tr>
<tr>
<td><strong>Packing Group</strong></td>
<td>III</td>
<td>II</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7697-37-2 is listed on the TSCA inventory.
- CAS# 7439-92-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
- CAS# 7439-92-1: 10 lb final RQ (no reporting of releases of this hazardous substance is required)

SARA Section 302 Extremely Hazardous Substances
- CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
- CAS # 7697-37-2: immediate, delayed, fire.
- CAS # 7439-92-1: immediate, delayed.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Lead metal is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:
- CAS# 7439-92-1 (listed as Lead compounds) is listed as a hazardous air pollutant (HAP).
  This material does not contain any Class 1 Ozone depletors.
  This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
- CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
  CAS# 7439-92-1 is listed as a Priority Pollutant under the Clean Water Act.
- CAS# 7439-92-1 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
- CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 7439-92-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Lead metal, a chemical known to the state of California to cause cancer.
WARNING: This product contains Lead metal, a chemical known to the state of California to cause male reproductive toxicity.

California No Significant Risk Level: CAS# 7439-92-1: 15 æg/day NSRL (oral)

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
- T N

Risk Phrases:
- R 33 Danger of cumulative effects.
- R 37/38 Irritating to respiratory system and skin.
- R 41 Risk of serious damage to eyes.
- R 61 May cause harm to the unborn child.
- R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 37/39 Wear suitable gloves and eye/face protection.
- S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
- S 53 Avoid exposure - obtain special instructions before use.
- S 60 This material and its container must be disposed of as hazardous waste.
- S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.
WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7439-92-1: No information available.

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7439-92-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7439-92-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/29/1999
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Light's Solution, for ORP, APHA MSDS

Section 1: Chemical Product and Company Identification

Product Name: Light's Solution, for ORP, APHA
Catalog Codes: SLL1813
CAS#: Mixture.
RTECS: Not applicable.
TSCA: TSCA 8(b) inventory: Ferrous ammonium sulfate hexahydrate; Sulfuric acid; Water
CI#: Not applicable.
Synonym: Ferrous-Ferric Ammonium Sulfate
Chemical Name: Light's Solution, for ORP, APHA
Chemical Formula: Not applicable.

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric ammonium sulfate dodecahydrate</td>
<td>7783-83-7</td>
<td>4.8</td>
</tr>
<tr>
<td>Ferrous ammonium sulfate hexahydrate</td>
<td>7783-85-9</td>
<td>3.9</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>7664-93-9</td>
<td>5.6</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>85.7</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Ferric ammonium sulfate dodecahydrate LD50: Not available. LC50: Not available. Ferrous ammonium sulfate hexahydrate: ORAL (LD50): Acute: 3250 mg/kg [Rat]. Sulfuric acid: ORAL (LD50): Acute: 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 255 ppm 4 hour(s) [Rat.].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive). Slightly hazardous in case of eye contact (irritant), of ingestion, of inhalation (lung irritant). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

Potential Chronic Health Effects:
Hazardous in case of eye contact (irritant), of ingestion.
Slightly hazardous in case of skin contact (irritant), of inhalation.
Non-corrosive for skin. Non-sensitizer for skin. Non-permeator by skin.
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, liver, lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.
Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

### Section 6: Accidental Release Measures

**Small Spill:**
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

**Large Spill:**
Corrosive liquid.
Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**
Keep locked up Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with skin Never add water to this product Wear suitable protective clothing If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

**Storage:**
May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package. Corrosive materials should be stored in a separate safety storage cabinet or room.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
Ferric ammonium sulfate dodecahydrate
TWA: 1 (mg/m3) from ACGIH

Ferrous ammonium sulfate hexahydrate
TWA: 1 (mg/m3) from ACGIH

Sulfuric acid

p. 3
Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: Not applicable.

Color: Not available.

pH (1% soln/water): Acidic.

Boiling Point: The lowest known value is 100°C (212°F) (Water). Weighted average: 111.65°C (233°F)

Melting Point: May start to solidify at 10.49°C (50.9°F) based on data for: Sulfuric acid.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.05 (Water = 1)

Vapor Pressure: The highest known value is 17.535 mm of Hg (@ 20°C) (Water). Weighted average: 16.46 mm of Hg (@ 20°C)

Vapor Density: The highest known value is 3.4 (Air = 1) (Sulfuric acid). Weighted average: 0.79 (Air = 1)

Volutility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is much more soluble in water.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Easily soluble in cold water, hot water.
Insoluble in methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Reactive with metals, alkalis.
Slightly reactive to reactive with organic materials, acids.

Corrosivity:
Corrosive in presence of steel, of aluminum, of zinc, of copper.
Slightly corrosive to corrosive in presence of stainless steel(304), of stainless steel(316).
Non-corrosive in presence of glass.
**Special Remarks on Reactivity:** Reacts violently with water especially when water is added to the product. (Sulfuric acid)

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

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**Section 11: Toxicological Information**

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. (Sulfuric acid).
Acute toxicity of the vapor (LC50): 255 ppm 4 hour(s) [Rat.]. (Sulfuric acid).

**Chronic Effects on Humans:**
The substance is toxic to kidneys, liver, lungs, mucous membranes.
The substance is not toxic to blood.

**Other Toxic Effects on Humans:**
Very hazardous in case of skin contact (corrosive).
Slightly hazardous in case of ingestion, of inhalation (lung irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

---

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

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**Section 13: Disposal Considerations**

**Waste Disposal:**

---

**Section 14: Transport Information**

**DOT Classification:**
CLASS 8: Corrosive liquid.
CLASS 6.1: Poisonous material.

**Identification:** Sulfuric Acid, Solution (Sulfuric acid) : UN2796 PG: II

**Special Provisions for Transport:** Not available.
Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Ferrous ammonium sulfate hexahydrate; Sulfuric acid; Water


Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
CLASS E: Corrosive liquid.

DSCL (EEC): R34- Causes burns.

HMIS (U.S.A.):
Health Hazard: 3
Fire Hazard: 0
Reactivity: 0
Personal Protection: g

National Fire Protection Association (U.S.A.):
Health: 3
Flammability: 0
Reactivity: 0
Specific hazard:
Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:45 AM

Last Updated: 10/10/2005 12:45 AM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.
Material Safety Data Sheet
Manganese(II) sulfate monohydrate

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Manganese(II) sulfate monohydrate  
**Catalog Numbers:** AC205900000, AC205900010, AC205905000, AC423910000, AC423910050, AC423915000, S80071-2, S93409, M113-3, M113-500, M114-12, M114-212, M114-500, M114SAM1, M114SAM2, M114SAM3, M115-12, M115-212, M115-500  
**Synonyms:** Manganese(2+) sulfate, monohydrate; Manganous sulfate monohydrate; Sulfuric acid, manganese (2+) salt (1:1), monohydrate; Manganese, monosulfate, monohydrate.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10034-96-5</td>
<td>Manganese(II) sulfate monohydrate</td>
<td>&gt;98</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: pink solid.  
**Warning!** Harmful if inhaled or swallowed. May cause eye, skin, and respiratory tract irritation. May cause lung damage. May cause central nervous system effects. Hygroscopic (absorbs moisture from the air).  
**Target Organs:** Central nervous system, lungs, reproductive system.

**Potential Health Effects**  
**Eye:** May cause mild eye irritation.  
**Skin:** May cause skin irritation. Low hazard for usual industrial handling.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea.  
**Inhalation:** May cause respiratory tract irritation. The lowest exposure concentration of manganese at which early effects on the CNS and the lungs may occur is still unknown. However, once neurological signs are present, they tend to continue and worsen after exposure ends.  
**Chronic:** Chronic inhalation or ingestion may result in manganism characterized by neurological symptoms such as headache, apathy, and weakness of the legs, followed by psychosis and neurological symptoms similar to those of Parkinson's disease. May impair fertility. Other chronic effects from inhaling high amounts of manganese include an increased incidence of cough and bronchitis and susceptibility to infectious lung disease.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Remove contaminated clothing and shoes.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will not burn.

Extinguishing Media: For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

Storage: Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese(II) sulfate monohydrate</td>
<td>0.2 mg/m3 TWA (as Mn) (listed under Manganese, inorganic compounds).</td>
<td>1 mg/m3 TWA (as Mn) (listed under Manganese compounds, n.o.s.).500 mg/m3 IDLH (as Mn) (listed under Manganese compounds, n.o.s.).</td>
<td>5 mg/m3 Ceiling (as Mn) (listed under Manganese compounds, n.o.s.).</td>
</tr>
<tr>
<td>Manganese(II) sulfate anhydrous</td>
<td>0.2 mg/m3 TWA (as Mn) (listed under Manganese, inorganic compounds).</td>
<td>1 mg/m3 TWA (as Mn) (listed under Manganese compounds, n.o.s.).500 mg/m3 IDLH (as Mn) (listed under Manganese compounds, n.o.s.).</td>
<td>5 mg/m3 Ceiling (as Mn) (listed under Manganese compounds, n.o.s.).</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Manganese(II) sulfate monohydrate: No OSHA Vacated PELs are listed for this chemical. Manganese(II) sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear impervious gloves.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: pink

Odor: odorless

pH: 3-3.5 (50 g/l @ 20°C)

Vapor Pressure: Not available.

Vapor Density: Not available.

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 850 deg C

Freezing/Melting Point: 700 deg C

Decomposition Temperature: 850 deg C

Solubility: Completely soluble in water.

Specific Gravity/Density: 3.25 g/cm³

Molecular Formula: MnSO₄·H₂O

Molecular Weight: 169.02

Section 10 - Stability and Reactivity

Chemical Stability: Stable.

Conditions to Avoid: Dust generation, moisture, confined spaces.

Incompatibilities with Other Materials: Can react with strong acid, strong oxidizing agents, powdered metals; may react violently with hydrogen peroxide.

Hazardous Decomposition Products: Oxides of sulfur, oxides of manganese.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS 10034-96-5: OP0893500

CAS# 7785-87-7: OP1050000

LD₅₀/LC₅₀: Not available.

CAS# 7785-87-7:

Oral, mouse: LD₅₀ = 2330 mg/kg;
Oral, rat: LD₅₀ = 2150 mg/kg;

Carcinogenicity:

CAS# 10034-96-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 7785-87-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: The U.S. EPA stated that epidemiological studies of inorganic manganese compounds in humans
indicate effects on the respiratory system at levels below 1 mg/m³.

**Teratogenicity:** No data available.

**Reproductive Effects:** Men exposed to manganese dusts showed a decrease in fertility.

**Mutagenicity:** No data available.

**Neurotoxicity:** Manganese is neurotoxic.

**Other Studies:**

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>NOT REGULATED FOR DOMESTIC TRANSPORT</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 10034-96-5 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40 CFR 720.3(u)(2)).

CAS# 7785-87-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 10034-96-5: delayed.

CAS # 7785-87-7: delayed.

**Section 313**

This material contains Manganese(II) sulfate monohydrate (listed as Manganese compounds, n.o.s.), >98%, (CAS# 10034-96-5) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
This material contains Manganese(II) sulfate anhydrous (listed as Manganese compounds, n.o.s.), -%, (CAS# 7785-87-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
CAS# 10034-96-5 (listed as Manganese compounds, n.o.s.) is listed as a hazardous air pollutant (HAP).
CAS# 7785-87-7 (listed as Manganese compounds, n.o.s.) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depleters.
This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 10034-96-5 can be found on the following state right to know lists: California, (listed as Manganese compounds, n.o.s.), New Jersey, (listed as Manganese compounds, n.o.s.), Pennsylvania, (listed as Manganese compounds, n.o.s.), Minnesota, (listed as Manganese compounds, n.o.s.).
CAS# 7785-87-7 can be found on the following state right to know lists: California, (listed as Manganese compounds, n.o.s.), New Jersey, (listed as Manganese compounds, n.o.s.), Pennsylvania, (listed as Manganese compounds, n.o.s.), Minnesota, (listed as Manganese compounds, n.o.s.).

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
XN N

**Risk Phrases:**
R 48/20/22 Harmful : danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**
S 22 Do not breathe dust.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**
CAS# 10034-96-5: 1
CAS# 7785-87-7: 1

**Canada - DSL/NDSL**
CAS# 7785-87-7 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 10034-96-5 (listed as Manganese compounds, n.o.s.) is listed on the Canadian Ingredient Disclosure List.
CAS# 7785-87-7 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 9/02/1997
**Revision #4 Date:** 6/22/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for
any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet  
Mercury(II) chloride

ACC# 13800

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Mercury(II) chloride  
**Catalog Numbers:** S80074, M155I-100, M155I-3, M155I-50, M155I-500, M156I-100, M156I-50, M156I-500  
**Synonyms:** Calochlor; Corrosive mercury chloride; Corrosive sublimate; Mercury bichloride; Mercury perchloride; Mercury(II) chloride; Mercuric chloride.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7487-94-7</td>
<td>Mercury(II) chloride</td>
<td>&gt;99.5</td>
<td>231-299-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white crystals.  
**Danger!** May be fatal if swallowed. May be fatal if absorbed through the skin. Causes severe eye and skin irritation with possible burns. Causes digestive and respiratory tract irritation with possible burns. May impair fertility. May cause harm to the unborn child. Harmful if inhaled. May cause allergic skin reaction. May cause kidney damage. May cause central nervous system effects. Light sensitive. Severe marine pollutant.  
**Target Organs:** Kidneys, central nervous system, reproductive system.

**Potential Health Effects**

**Eye:** Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes severe eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.  
**Skin:** May be fatal if absorbed through the skin. Causes severe skin irritation and possible burns. May cause allergic contact dermatitis.  
**Ingestion:** May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause muscle tremor and impaired motor function. May cause cardiac disturbances. Symptoms of acute mercury salt poisoning include nausea, vomiting, bloody diarrhea, foul taste, loosened teeth, circulatory collapse, peripheral neurological disease, and kidney damage requiring dialysis.  
**Inhalation:** May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause gastrointestinal effects including gum and mouth inflammation, jaw necrosis, and loosening of the teeth. May cause burns to the respiratory tract. Acute exposure to high concentrations of mercury vapors may cause severe respiratory tract irritation.  
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion. May cause reproductive and fetal effects. Chronic ingestion may cause accumulation of mercury in body tissues. Laboratory experiments have resulted in mutagenic effects. May be rapidly transferred across the placenta and cause adverse fetal effects. Chronic mercury poisoning involves kidney damage, visual defects, tremor, and severe psychological changes. The brain is the critical organ...
Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** POISON material. If swallowed, get medical aid immediately. Only induce vomiting if directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

**Antidote:** The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Substance is noncombustible.

**Extinguishing Media:** Use water fog, dry chemical, carbon dioxide or alcohol type foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 4; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Store protected from light. Use only with adequate ventilation. Extreme care should always be taken to prevent skin and gastrointestinal absorption because these routes of entry can greatly increase the total body burden and are often overlooked in occupational settings.

**Storage:** Store in a tightly closed container. Keep away from food and drinking water. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light.
**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury(II) chloride</td>
<td>0.025 mg/m³ TWA (as Hg) (listed under Mercury inorganic compounds). Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Mercury inorganic compounds).</td>
<td>0.05 mg/m³ TWA (vapor, except organo alkyls, as Hg) (listed under Mercury compounds). 10 mg/m³ IDLH (as Hg, except organo(alkyl) compounds) (listed under Mercury compounds).</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Mercury(II) chloride: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**Section 9 - Physical and Chemical Properties**

**Physical State:** Crystals

**Appearance:** white

**Odor:** odorless

**pH:** 4.7

**Vapor Pressure:** slightly volatile @RT

**Vapor Density:** Not available.

**Evaporation Rate:** Negligible.

**Viscosity:** Not applicable.

**Boiling Point:** 300 deg C

**Freezing/Melting Point:** 277 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 5.44 at 25°C

**Molecular Formula:** HgCl₂

**Molecular Weight:** 271.50

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Light, dust generation, excess heat.

**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases, ammonia, copper, iron, silver salts, potassium, antimony, sodium, lead, hypophosphites, formates, sulfites, phosphates, albumin, gelatin, alkalies, alkaloid salts, lime water, arsenic, bromides, borax, carbonates, reduced iron, infusions of cinchona, columbo, oak bark or senna, tannic acid, metallic halides, vegetable astringents.

**Hazardous Decomposition Products:** Mercury/mercury oxides, chloride fumes.

**Hazardous Polymerization:** Will not occur.
Section 11 - Toxicological Information

RTECS#:  
CAS# 7487-94-7: OV9100000

LD50/LC50:  
CAS# 7487-94-7:  
- Draize test, rabbit, eye: 50 ug/24H Severe;  
- Draize test, rabbit, skin: 500 mg/24H Severe;  
- Oral, mouse: LD50 = 6 mg/kg;  
- Oral, rat: LD50 = 1 mg/kg;  
- Skin, rat: LD50 = 41 mg/kg.

Carcinogenicity:  
CAS# 7487-94-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: See entry in the Documentation of the Threshold Limit Values and Biological Exposure Indices issued by ACGIH.

Teratogenicity: Mercuric chloride has been embryotoxic, fetotoxic, and teratogenic in experimental animals, and has affected fertility in male mice. Inorganic mercury has been implicated in male impotence, menstrual disorders, and spontaneous abortions in humans.

Reproductive Effects: Data clearly indicate that mercury can affect both male & female reproductive outcomes. It has not been possible to unequivocally determine a safe exposure level for protection of reproduction function in either male or female workers, particularly since many studies didn't adequately evaluate dermal exposure. Those planning to have children should keep their exposure to mercury as low as possible by engineering controls, personal protective equipment for skin & respiratory tract, & good personal hygiene.

Mutagenicity: Micronucleus Test: Human, Lymphocyte = 5 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 2 umol/L.; Cytogenetic Analysis: Human, HeLa cell = 10 mg/L.; Cytogenetic Analysis: Human, Lymphocyte = 2 umol/L.

Neurotoxicity: Refer to Patty’s Industrial Hygiene and Toxicology for specific nervous system abnormalities.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.903 mg/L; 24 Hr; UnspecifiedFish: Fathead Minnow: LC50 = 0.037 mg/L; 48 Hr; UnspecifiedFish: Bluegill/Sunfish: LC50 = 0.16 mg/L; 96 Hr; Static at 13.5-16.2°C (pH 7.1-7.3)Water flea Daphnia: LC50 = 0.093 mg/L; 48 Hr; Unspecified No data available.

Physical: Mercury can be accumulated from water by many organisms (up to 10,000 fold).

Environmental: Compound decomposes to metallic mercury when in contact with organic matter and sunlight.

Other: None.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>Shipping Name:</th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>MERCURIC CHLORIDE</td>
<td></td>
<td>MERCURIC CHLORIDE</td>
</tr>
</tbody>
</table>
US FEDERAL

TSCA
  CAS# 7487-94-7 is listed on the TSCA inventory.

Health & Safety Reporting List
  None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
  None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
  None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
  None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
  None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
  CAS# 7487-94-7: 500 lb lower threshold TPQ; 10000 lb upper threshold T PQ

SARA Codes
  CAS # 7487-94-7: immediate, delayed.

Section 313
  This material contains Mercury(II) chloride (listed as Mercury compounds), >99.5%, (CAS# 7487-94-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
  CAS# 7487-94-7 (listed as Mercury compounds) is listed as a hazardous air pollutant (HAP).
  This material does not contain any Class 1 Ozone depleters.
  This material does not contain any Class 2 Ozone depleters.

Clean Water Act:
  None of the chemicals in this product are listed as Hazardous Substances under the CWA.
  None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 7487-94-7 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
  None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
  CAS# 7487-94-7 can be found on the following state right to know lists: California, (listed as Mercury compounds), New Jersey, Pennsylvania, Massachusetts.

California Prop 65
WARNING: This product contains Mercury(II) chloride, listed as `Mercury compounds', a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
  T+ C N

Risk Phrases:
  R 28 Very toxic if swallowed.
  R 34 Causes burns.
  R 48/24/25 Toxic : danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
  R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
Section 16 - Additional Information

**MSDS Creation Date:** 6/15/1999  
**Revision #6 Date:** 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Methanol

ACC# 14280

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Methanol
**Synonyms:** Carbinol; Methyl alcohol; Methyl hydroxide; Monohydroxymethane; Wood alcohol; Wood naptha; Wood spirits; Columbian spirits; Methanol.

**Company Identification:**
- Fisher Scientific
- 1 Reagent Lane
- Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-56-1</td>
<td>Methanol</td>
<td>&gt; 99</td>
<td>200-659-6</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: APHA: 10 max clear liquid. Flash Point: 12 deg C.

**Danger!** Poison! May be fatal or cause blindness if swallowed. Vapor harmful. Flammable liquid and vapor. Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye, skin, and respiratory tract irritation. May cause central nervous system depression. Cannot be made non-poisonous.

**Target Organs:** Eyes, nervous system, optic nerve.
**Potential Health Effects**

**Eye:** May cause painful sensitization to light. Methanol is a mild to moderate eye irritant. Inhalation, ingestion or skin absorption of methanol can cause significant disturbances in vision, including blindness.

**Skin:** Causes moderate skin irritation. May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. Methanol can be absorbed through the skin, producing systemic effects that include visual disturbances.

**Ingestion:** May be fatal or cause blindness if swallowed. Aspiration hazard. Cannot be made non-poisonous. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause cardiopulmonary system effects.

**Inhalation:** Methanol is toxic and can very readily form extremely high vapor concentrations at room temperature. Inhalation is the most common route of occupational exposure. At first, methanol causes CNS depression with nausea, headache, vomiting, dizziness and incoordination. A time period with no obvious symptoms follows (typically 8-24 hrs). This latent period is followed by metabolic acidosis and severe visual effects which may include reduced reactivity and/or increased sensitivity to light, blurred, doubled and/or snowy vision, and blindness. Depending on the severity of exposure and the promptness of treatment, survivors may recover completely or may have permanent blindness, vision disturbances and/or nervous system effects.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may cause effects similar to those of acute exposure. Methanol is only very slowly eliminated from the body. Because of this slow elimination, methanol should be regarded as a cumulative poison. Though a single exposure may cause no effect, daily exposures may result in the accumulation of a harmful amount. Methanol has produced fetotoxicity in rats and teratogenicity in mice exposed by inhalation to high concentrations that did not produce significant maternal toxicity.

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**Section 4 - First Aid Measures**

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Effects may be delayed.

**Antidote:** Ethanol may inhibit methanol metabolism.

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**Section 5 - Fire Fighting Measures**

**General Information:** Ethanol may inhibit methanol metabolism. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water.

**Flash Point:** 12 deg C (53.60 deg F)

**Autoignition Temperature:** 455 deg C (851.00 deg F)

**Explosion Limits, Lower:** 6.0 vol %

**Upper:** 31.00 vol %

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0
**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid use in confined spaces.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Keep containers tightly closed.

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td>200 ppm TWA; 250 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route</td>
<td>200 ppm TWA; 260 mg/m³ TWA 6000 ppm IDLH</td>
<td>200 ppm TWA; 260 mg/m³ TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Methanol: 200 ppm TWA; 260 mg/m³ TWA

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear butyl rubber gloves, apron, and/or clothing.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**Section 9 - Physical and Chemical Properties**

**Physical State:** Clear liquid

**Appearance:** clear, colorless - APHA: 10 max

**Odor:** alcohol-like - weak odor

**pH:** Not available.

**Vapor Pressure:** 128 mm Hg @ 20 deg C

**Vapor Density:** 1.11 (Air=1)

**Evaporation Rate:** 5.2 (Ether=1)

**Viscosity:** 0.55 cP 20 deg C

**Boiling Point:** 64.7 deg C @ 760 mmHg
**Freezing/Melting Point:** -98 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:**miscible  
**Specific Gravity/Density:** .7910 g/cm3 @ 20°C  
**Molecular Formula:** CH4O  
**Molecular Weight:** 32.04

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** High temperatures, ignition sources, confined spaces.  
**Incompatibilities with Other Materials:** Oxidizing agents, reducing agents, acids, alkali metals, potassium, sodium, metals as powders (e.g. hafnium, raney nickel), acid anhydrides, acid chlorides, powdered aluminum, powdered magnesium.  
**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, formaldehyde.  
**Hazardous Polymerization:** Will not occur.

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 67-56-1: PC1400000**  
**LD50/LC50:**  
**CAS# 67-56-1:**  
- Draize test, rabbit, eye: 40 mg Moderate;  
- Draize test, rabbit, eye: 100 mg/24H Moderate;  
- Draize test, rabbit, skin: 20 mg/24H Moderate;  
- Inhalation, rabbit: LC50 = 81000 mg/m3/14H;  
- Inhalation, rat: LC50 = 64000 ppm/4H;  
- Oral, mouse: LD50 = 7300 mg/kg;  
- Oral, rabbit: LD50 = 14200 mg/kg;  
- Oral, rat: LD50 = 5600 mg/kg;  
- Skin, rabbit: LD50 = 15800 mg/kg;  

Human LDLo Oral: 143 mg/kg; Human LDLo Oral: 428 mg/kg; Human TClO Inhalation; 300 ppm caused visual field changes & headache; Monkey LDLo Skin: 393 mg/kg. Methanol is significantly less toxic to most experimental animals than humans, because most animal species metabolize methanol differently. Non-primate species do not ordinarily show symptoms of metabolic acidosis or the visual effects which have been observed in primates and humans.  
**Carcinogenicity:**  
**CAS# 67-56-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.**  

**Epidemiology:** No information found  
**Teratogenicity:** There is no human information available. Methanol is considered to be a potential developmental hazard based on animal data. In animal experiments, methanol has caused fetotoxic or teratogenic effects without maternal toxicity.  
**Reproductive Effects:** See actual entry in RTECS for complete information.  
**Mutagenicity:** See actual entry in RTECS for complete information.  
**Neurotoxicity:** ACGIH cites neuropathy, vision and CNS under TLV basis.  
**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: 29.4 g/L; 96 Hr; LC50 (unspecified)Fish: Goldfish: 250 ppm; 11 Hr; resulted in deathFish: Rainbow trout: 8000 mg/L; 48 Hr; LC50 (unspecified)Fish: Rainbow trout: LC50 = 13-68 mg/L; 96
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**
CAS# 67-56-1: waste number U154 (Ignitable waste).

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**Section 14 - Transport Information**

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<th>Canada TDG</th>
</tr>
</thead>
<tbody>
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<td>METHANOL</td>
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<tr>
<td><strong>Hazard Class:</strong> 3</td>
<td>3</td>
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<tr>
<td><strong>UN Number:</strong> UN1230</td>
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<td><strong>Packing Group:</strong> II</td>
<td>II</td>
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<tr>
<td><strong>Additional Info:</strong> FLASHPOINT 11 C</td>
<td></td>
</tr>
</tbody>
</table>

---

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
CAS# 67-56-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 67-56-1: immediate, fire.

**Section 313**
This material contains Methanol (CAS# 67-56-1, > 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 67-56-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
T F

Risk Phrases:
R 11 Highly flammable.
R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 39/23/24/25 Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 7 Keep container tightly closed.

WGK (Water Danger/Protection)
CAS# 67-56-1: 1

Canada - DSL/NDSL
CAS# 67-56-1 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of B2, D1B, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 67-56-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/21/1999
Revision #16 Date: 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet  
Molybdenum, powder, 99.99%, - 200 mesh

ACC# 00944

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Molybdenum, powder, 99.99%, - 200 mesh  
**Catalog Numbers:** AC193540000, AC193541000  
**Synonyms:**  

**Company Identification:**  
Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01  
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7439-98-7</td>
<td>Molybdenum, powder</td>
<td>99.99%</td>
<td>231-107-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: gray or dark gray powder.  
**Warning!** Flammable solid. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause central nervous system effects. May cause blood abnormalities.  
**Target Organs:** Blood, central nervous system, lungs.

**Potential Health Effects**  
**Eye:** May cause lacrimation (tearing), blurred vision, and photophobia. May cause chemical conjunctivitis and corneal damage.  
**Skin:** May cause skin irritation and possible burns.  
**Ingestion:** May cause anemia, leukopenia (reduction in the number of white blood cells in the blood), and thrombocytopenia. May cause headache, fever, nausea, abdominal pain, muscle pain and bloody urine.  
**Inhalation:** Olfactory fatigue may occur. When inhaled as a dust or fume, may cause benign pneumoconiosis. Can produce delayed pulmonary edema.  
**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.  
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.  
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dust can be an explosion hazard when exposed to heat or flame. Flammable solid. May burn rapidly with flare burning effect. May re-ignite after fire is extinguished. Runoff to sewer may create fire or explosion hazard.

Extinguishing Media: Do NOT use water directly on fire. For large fires, use water spray, fog or regular foam. Contact professional fire-fighters immediately. For small fires, use dry chemical, carbon dioxide, sand, earth, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Sweep up, then place into a suitable container for disposal. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all sources of ignition.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum, powder</td>
<td>10 mg/m³ TWA (inhalable fraction); 3 mg/m³ TWA (respirable fraction)</td>
<td>5000 mg/m³ IDLH</td>
<td>15 mg/m³ TWA (total dust)</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Molybdenum, powder: 10 mg/m³ TWA

Personal Protective Equipment

Eyes: Wear safety glasses and chemical goggles if splashing is possible. Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements.
or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**Section 9 - Physical and Chemical Properties**

- **Physical State:** Powder
- **Appearance:** gray or dark gray
- **Odor:** None reported.
- **pH:** Not available.
- **Vapor Pressure:** Not available.
- **Vapor Density:** Not available.
- **Evaporation Rate:** Not available.
- **Viscosity:** Not available.
- **Boiling Point:** 4825 deg C @ 760.00mm Hg
- **Freezing/Melting Point:** 2622 deg C
- **Decomposition Temperature:** 400 deg C
- **Solubility:** insoluble
- **Specific Gravity/Density:** 10.28 g/L
- **Molecular Formula:** Mo
- **Molecular Weight:** 95.94

**Section 10 - Stability and Reactivity**

- **Chemical Stability:** Stable under normal temperatures and pressures.
- **Conditions to Avoid:** Incompatible materials, ignition sources, dust generation, excess heat, strong oxidants.
- **Incompatibilities with Other Materials:** Strong oxidizing agents, chlorine trifluoride, fluorine, lead dioxide, nitric acid, sulfuric acid.
- **Hazardous Decomposition Products:** Irritating and toxic fumes and gases.
- **Hazardous Polymerization:** Has not been reported.

**Section 11 - Toxicological Information**

- **RTECS#:**
- **CAS# 7439-98-7:** QA4680000
- **LD50/LC50:** Not available.

- **Carcinogenicity:**
  - **CAS# 7439-98-7:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.

- **Epidemiology:** No information found
- **Teratogenicity:** Teratogenic effects have occurred in experimental animals.
- **Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.
- **Mutagenicity:** No information found
- **Neurotoxicity:** No information found
- **Other Studies:**

**Section 12 - Ecological Information**

No information available.

**Section 13 - Disposal Considerations**
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>METAL POWDERS, FLAMMABLE, N.O.S.</td>
<td>METAL POWDERS FLAMMABLE NOS (MOLYBDENUM)</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>4.1</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN3089</td>
<td>UN3089</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7439-98-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7439-98-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**
- California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Risk Phrases:
R 11 Highly flammable.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.

WGK (Water Danger/Protection)
CAS# 7439-98-7: No information available.

Canada - DSL/NDSL
CAS# 7439-98-7 is listed on Canada’s DSL List.

Canada - WHMIS
This product has a WHMIS classification of B4, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7439-98-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Nickel atomic absorption standard solution, 1 mg/ml Ni in 2% HNO3

ACC# 76017

Section 1 - Chemical Product and Company Identification

MSDS Name: Nickel atomic absorption standard solution, 1 mg/ml Ni in 2% HNO3
Catalog Numbers: AC196150000, AC196151000, AC196155000
Synonyms: None.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2.0</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-02-0</td>
<td>Nickel</td>
<td>0.1</td>
<td>231-111-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: green to blue liquid.


Target Organs: Respiratory system, eyes, skin.

Potential Health Effects
Eye: Contact with eyes may cause severe irritation, and possible eye burns. May cause chemical conjunctivitis.
Skin: Causes skin irritation. Causes "nickel itch" which is a dermatitis resulting from sensitization to nickel, which is characterized by skin eruptions, followed by discrete ulcers that may discharge and become crusted, or by eczema.

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: Causes respiratory tract irritation. Can produce delayed pulmonary edema.
Chronic: Effects may be delayed. Symptoms of overexposure to nickel can cause sensitization, dermatitis, allergic asthma and pneumonitis.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Flash Point: Not available.

Autoignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation. Wash clothing before reuse.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Nickel</td>
<td>1.5 mg/m3 TWA (inhalable fraction)</td>
<td>0.015 mg/m3 TWA 10 mg/m3 IDLH</td>
<td>1 mg/m3 TWA</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Nickel: 1 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.
**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid  
**Appearance:** green to blue  
**Odor:** None reported.  
**pH:** Not available.  
**Vapor Pressure:** Not available.  
**Vapor Density:** >1.0  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** Not available.  
**Freezing/Melting Point:** Not available.  
**Decomposition Temperature:** Not available.  
**Solubility:** miscible  
**Specific Gravity/Density:** Not available.  
**Molecular Formula:** Solution  
**Molecular Weight:** Not available.

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.  
**Conditions to Avoid:** Incompatible materials, excess heat.  
**Incompatibilities with Other Materials:** Oxidizing agents.  
**Hazardous Decomposition Products:** Nitrogen oxides, irritating and toxic fumes and gases, nitrogen.  
**Hazardous Polymerization:** Has not been reported.

**Section 11 - Toxicological Information**

**RTECS#:**  
**CAS# 7732-18-5:** ZC0110000  
**CAS# 7697-37-2:** QU5775000; QU5900000  
**CAS# 7440-02-0:** QR5950000; QR6126100; QR6555000; QR7120000  
**LD50/LC50:**  
**CAS# 7732-18-5:**  
Oral, rat: LD50 = >90 mL/kg;  
**CAS# 7697-37-2:**  
Inhalation, rat: LC50 = 260 mg/m3/30M;  
Inhalation, rat: LC50 = 130 mg/m3/4H;  
Inhalation, rat: LC50 = 67 ppm(NO2)/4H;  
**CAS# 7440-02-0:**

**Carcinogenicity:**  
**CAS# 7732-18-5:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 7697-37-2:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 7440-02-0:**  
- **ACGIH:** Not listed.  
- **California:** carcinogen, initial date 10/1/89
- **NTP**: Suspect carcinogen
- **IARC**: Group 1 carcinogen (listed as Nickel compounds).

**Epidemiology**: An increased incidence of lung and nasal cavity cancers has been noted among women in nickel smelters and refineries. Epidemiological studies have shown an increased incidence of cancers among nickel refinery workers. IARC Group 2B: No data available on human carcinogenicity, however sufficient evidence of carcinogenicity in animals.

**Teratogenicity**: No information found

**Reproductive Effects**: No information found

**Mutagenicity**: No information found

**Neurotoxicity**: No information found

**Other Studies**:

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series**: None listed.

**RCRA U-Series**: None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name</strong></td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>NITRIC ACID</td>
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<tr>
<td><strong>Hazard Class</strong></td>
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<td>8</td>
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<tr>
<td><strong>UN Number</strong></td>
<td>UN3264</td>
<td>UN2031</td>
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<tr>
<td><strong>Packing Group</strong></td>
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</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7440-02-0 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ  
CAS# 7440-02-0: 100 lb final RQ (no reporting of releases of this hazardous substance is required)

**SARA Section 302 Extremely Hazardous Substances**
CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.
CAS # 7440-02-0: immediate, delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Nickel is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:
CAS# 7440-02-0 (listed as Nickel compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 7440-02-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-02-0 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-02-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains Nickel, a chemical known to the state of California to cause cancer. California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 37/38 Irritating to respiratory system and skin.
R 40 Limited evidence of a carcinogenic effect.
R 41 Risk of serious damage to eyes.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7440-02-0: No information available.

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7440-02-0 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-02-0 is listed on the Canadian Ingredient Disclosure List.
Section 16 - Additional Information

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Section 1 - Chemical Product and Company Identification

**MSDS Name:** Nitric acid, red fuming  
**Catalog Numbers:** AC611225000, A202-212, A202-500  
**Synonyms:** RFNA; Red fuming nitric acid. (Fuming nitric acid is defined as concentrated nitric acid containing dissolved nitrogen dioxide.)  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>&gt;90</td>
<td>231-714-2</td>
</tr>
<tr>
<td>10102-44-0</td>
<td>Nitrogen dioxide</td>
<td>&gt;6</td>
<td>233-272-6</td>
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<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>&lt;5</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: yellow to brown-red liquid.  
**Danger!** Causes severe eye and skin burns. Causes severe digestive and respiratory tract burns. Strong oxidizer. Contact with other material may cause a fire. May be fatal if inhaled. Acute pulmonary edema or chronic obstructive lung disease may occur from inhalation of the vapors of nitric acid. Check internal container upon receipt. Bottles should be vented periodically to relieve pressure.  
**Target Organs:** Lungs, eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes severe eye burns. May cause irreversible eye injury.  
**Skin:** Exposure of the skin to the liquid or concentrated vapor produces severe and penetrating burns. Concentrated nitric acid dyes human skin yellow on contact.  
**Ingestion:** Causes gastrointestinal tract burns. May cause perforation of the digestive tract.  
**Inhalation:** Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema. Many human deaths from pulmonary edema, induced by the inhalation of high concentrations of nitrogen dioxide have been reported. There were at least 90 deaths prior to 1920 and over 60 between 1930 and 1956. The incidence of chronic effects from long exposures at low concentrations of NO2 is less well defined. (Doc of TLV)  
**Chronic:** Exposure to high concentrations of nitric acid vapor may cause pneumonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors. Monkeys exposed to nitrogen dioxide at 10 ppm for 1 month or at 5 ppm for 2 months showed a marked decrease in resistance to infections.
Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

**Notes to Physician:** Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. Use water spray to keep fire-exposed containers cool. Vapors may accumulate in confined spaces. Contact with metals may evolve flammable hydrogen gas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 4; Flammability: 0; Instability: 1; Special Hazard: OX

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind. Use water spray to cool and disperse vapors and protect personnel.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep from contact with clothing and other combustible materials. Discard contaminated shoes. Do not use with metal spatula or other metal items. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection. Always add the acid to water, never the reverse.

**Storage:** Do not store near combustible materials. Do not store in direct sunlight. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store away from alkalies. Bottles should be vented periodically in order to overcome pressure buildup. Separate from organic materials. Avoid storage on wood floors. Shelves and floor material should be non-combustible and acid-resistant. Inspect periodically for damage or evidence of leaks or corrosion. This material may darken during storage due to photochemical reactions. Keep this bottle in a cool place and remove cap carefully to avoid spurting.

Section 8 - Exposure Controls, Personal Protection
**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.

### Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
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</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>3 ppm TWA; 5 ppm STEL</td>
<td>20 ppm IDLH</td>
<td>5 ppm Ceiling; 9 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Nitrogen dioxide: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles and face shield.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** yellow to brown-red

**Odor:** suffocating odor - strong odor - acrid odor

**pH:** Not available.

**Vapor Pressure:** 62 mm Hg @ 25 deg C

**Vapor Density:** 2.2 (air=1)

**Evaporation Rate:** Not available.

**Viscosity:** 0.761 cP 25 deg C

**Boiling Point:** 122 deg C

**Freezing/Melting Point:** -42 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Freely Soluble.

**Specific Gravity/Density:** 1.5

**Molecular Formula:** HNO3 and NO2

**Molecular Weight:** 63.02

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures. May decompose when exposed to light. Turns reddish-brown on exposure to light. Darkens on exposure to light.

**Conditions to Avoid:** Light, excess heat, confined spaces.

**Incompatibilities with Other Materials:** Incompatible with many substances, alcohols, aldehydes, combustible materials, cyanides, metal powders, reducing agents, strong bases, organic solvents, turpentine, charcoal, Nitric acid reacts with over 150 chemicals. Reacts explosively with organic materials and combustible materials..

**Hazardous Decomposition Products:** Nitrogen oxides.

**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information
RTECS#: 
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 10102-44-0: QW9800000
CAS# 7732-18-5: ZC0110000

LD50/LC50:
CAS# 7697-37-2:
  Inhalation, rat: LC50 = 260 mg/m3/30M;
  Inhalation, rat: LC50 = 130 mg/m3/4H;
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 10102-44-0:
  Inhalation, mouse: LC50 = 1000 ppm/10M;
  Inhalation, mouse: LC50 = 800 mg/m3/25M;
  Inhalation, mouse: LC50 = 900 mg/m3/2H;
  Inhalation, rabbit: LC50 = 315 ppm/15M;
  Inhalation, rabbit: LC50 = 60 mg/m3/15M;
  Inhalation, rabbit: LC50 = 12 mg/m3/15M;
  Inhalation, rat: LC50 = 88 ppm/4H;
  Inhalation, rat: LC50 = 220 mg/m3/1H;
  Inhalation, rat: LC50 = 310 mg/m3/30M;
  Inhalation, rat: LC50 = 790 mg/m3/5M;

CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10102-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: Nitric acid effects on newborn: biochemical and metabolic, Oral-rat TDLo=2345 mg/kg (female 18D post). Fetotoxicity: Stunted fetus, Oral-rat TDLo=21150 mg/kg (female 1-21D post).
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: CAS# 10102-44-0: waste number P078.
RCRA U-Series: None listed.

Section 14 - Transport Information
US FEDERAL

TSCA
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 10102-44-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ  CAS# 10102-44-0: 10 lb final RQ (Releases to the air in amounts less than 1000 pounds per 24 hour

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ  CAS# 10102-44-0: 100 lb TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, >90%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 10102-44-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA. CAS# 10102-44-0 is considered highly hazardous by OSHA.

STATE
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 10102-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
O C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:
S 23 Do not inhale gas/fumes/vapour/spray.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 7697-37-2: 1
CAS# 10102-44-0: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 10102-44-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E, C, D1A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 10102-44-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 8/10/1998
Revision #9 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Section 1 - Chemical Product and Company Identification

**MSDS Name:** Oxalic acid dihydrate  
**Catalog Numbers:** AC129600000, AC129600010, AC129601000, AC388100000, AC423150000, AC423150010, AC423150050, S80113, A218-3, A218-500, A219-250, A219-3, A219-50, A219-500, A219J500, NC9443441, NC9667432  
**Synonyms:** Ethanedioic acid dihydrate.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6153-56-6</td>
<td>Oxalic acid dihydrate</td>
<td>&gt;99</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white powder.  
**Danger!** Causes burns by all exposure routes. Harmful if swallowed, inhaled, or absorbed through the skin. Possible risk of harm to the unborn child. May cause kidney damage.  
**Target Organs:** Kidneys, heart, eyes, skin, brain, nerves, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye burns. May result in corneal injury. Causes redness and pain.  
**Skin:** Harmful if absorbed through the skin. Causes severe skin irritation and possible burns. Rare chemical burns may occur from oxalic acid and may cause hypocalcemia. Gangrene has occurred in the hands of people working with oxalic acid solutions without rubber gloves. The skin lesions are characterized by cracking of the skin and the development of slow-healing ulcers. The skin may be bluish in color, and the nails brittle and yellow.  
**Ingestion:** Causes gastrointestinal tract burns. Oxalic acid is toxic because of its acidic and chelating properties. It is especially toxic when ingested. As little as 5 grams (71 mg/kg) may be fatal. Ulcerations of the mouth, vomiting of blood, and rapid appearance of shock, convulsions, twitching, tetany, and cardiovascular collapse may occur following ingestion of oxalic acid or its soluble salts. Oxalic acid can bind calcium to form calcium oxalate which is insoluble at physiological pH. Calcium oxalate thus formed might precipitate in the kidney tubules and the brain. Hypocalcemia secondary to calcium oxalate formation might disturb the function of the heart and nerves.  
**Inhalation:** Causes chemical burns to the respiratory tract. Inhalation of oxalic acid dust or vapor produces irritation of the respiratory tract, protein in the urine, nosebleed, ulceration of the mucous membranes, headache, nervousness, cough, vomiting, emaciation, back pain (due to kidney injury), and weakness.  
**Chronic:** Inhalation of oxalic acid dust or mist over a long period of time might result in weight loss and respiratory tract inflammation. Rats administered oxalic acid at 2.5 and 5% in the diet for 70 days developed depressed thyroid function and weight loss. A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.
**Section 4 - First Aid Measures**

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** Intravenous administration of calcium gluconate or calcium chloride may be required if hypocalcemia or hypocalcemic tetany occur.

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or alcohol-resistant foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 1; Instability: 0

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Discard contaminated shoes. Use only with adequate ventilation.

**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances.

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxalic acid dihydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Oxalic acid dihydrate: No OSHA Vacated PELs are listed for this chemical. Oxalic acid, anhydrous: 1 mg/m³ TWA

Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: white
Odor: odorless
pH: 1.3 (0.1M soln)
Vapor Pressure: .92 mm Hg @ 60 deg C
Vapor Density: 4.62
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not applicable.
Freezing/Melting Point: 101 deg C
Decomposition Temperature: Not available.
Solubility: Moderately Soluble. 1g/7ml
Specific Gravity/Density: 1.653 @ 18.5°C
Molecular Formula: C2H2O4.2H2O
Molecular Weight: 126.04

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, mercury, hypochlorite, silver, strong alkalies, chlorites, furfuryl alcohol.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, formic acid.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 6153-56-6 unlisted.
CAS# 144-62-7: RO2450000
LD50/LC50:
Not available.

CAS# 144-62-7:
  Draize test, rabbit, eye: 250 ug/24H Severe;
  Draize test, rabbit, skin: 500 mg/24H Mild;
  Oral, rat: LD50 = 7500 mg/kg;
Carcinogenicity:
CAS# 6153-56-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 144-62-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.

Teratogenicity: No information found
Reproductive Effects: Oxalic acid caused kidney damage in fetal sheep and rats and disturbed the estrus cycle in rats. Increased sperm abnormalities were seen in the second generation of mice administered 0.2% oxalic acid in the drinking water.
Mutagenicity: No information found
Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: LC50 = 4000 mg/L; 24 Hr.; Static Conditions
Fish: Mosquito Fish: LC50 = 1350 mg/L; 24 Hr.; Static Conditions
No data available.

Environmental: An estimated Koc value of 5 for oxalic acid indicates high mobility in soil and oxalic acid has been detected in groundwater. Several screening studies and grab sample tests indicate that under aerobic and anaerobic conditions, oxalic acid will readily biodegrade in aquatic ecosystems. Based on an experimental Henry's Law constant of 1.4X10-10 atm-m3/mole at 25°C, oxalic acid is expected to be essentially nonvolatile from water. Adsorption to sediment and bioconcentration in aquatic organisms may not be important fate process for oxalic acid.

Physical: Oxalic acid in the ambient atmosphere may react slowly with OH radicals, but it is removed rapidly by photolysis; the daytime persistence of oxalic acid is not expected to exceed a few hours. Based on its high water solubility, removal from air via wet deposition is likely to occur. Oxalic acid may also be removed from air via dry deposition with 11% of the total deposition being dry deposition.

Other: Based on an average experimental water solubility of 220,000 mg/L at 25°C and a regression derived equation, the BCF for oxalic acid can be estimated to be approximately 0.6 and therefore should not be expected to bioconcentrate in aquatic organisms.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

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<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
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<tbody>
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<td>CORROSIVE SOLIDS, TOXIC, N.O.S.</td>
<td>CORROSIVE SOLIDS, TOXIC, N.O.S.</td>
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<tr>
<td>Hazard Class:</td>
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<tr>
<td>UN Number:</td>
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<td>UN2923</td>
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<td>Packing Group:</td>
<td>III</td>
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</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL
TSCA
CAS# 6153-56-6 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
CAS# 144-62-7 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 6153-56-6: immediate, delayed.
CAS # 144-62-7: immediate, delayed.

Section 313
None of the chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 6153-56-6 can be found on the following state right to know lists: Pennsylvania.
CAS# 144-62-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
C

Risk Phrases:
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 35 Causes severe burns.
R 63 Possible risk of harm to the unborn child.

Safety Phrases:
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 6153-56-6: 1
CAS# 144-62-7: 1

Canada - DSL/NDSL
CAS# 144-62-7 is listed on Canada's DSL List.
Canada - WHMIS

This product has a WHMIS classification of E, D1B. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 144-62-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #14 Date: 6/07/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Phenolphthalein Solutions, Alcoholic, 0.5%

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Phenolphthalein Solutions, Alcoholic, 0.5%
**Catalog Numbers:** NC9489605, NC9828490, SLN6685, SP50-1, SP819
**Synonyms:** Phenolphthalein Indicator Solution
**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>49-55</td>
<td>231-791-2</td>
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<tr>
<td>67-63-0</td>
<td>Isopropyl alcohol</td>
<td>44-50</td>
<td>200-661-7</td>
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<td>77-09-8</td>
<td>Phenolphthalein</td>
<td>0.55</td>
<td>201-004-7</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid. Flash Point: 71 deg F.

**Warning! Flammable liquid and vapor.** Causes eye, skin, and respiratory tract irritation. May cause allergic skin reaction. May be absorbed through intact skin. May cause central nervous system depression. May cause cancer based on animal studies. May form explosive peroxides. May cause kidney damage. May cause adverse reproductive effects based upon animal studies. May cause reproductive and fetal effects.

**Target Organs:** Kidneys, central nervous system.

**Potential Health Effects**

**Eye:** Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury.

**Skin:** May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause irritation with pain and stinging, especially if the skin is abraded.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.

**Inhalation:** Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. Inhalation of vapor may cause respiratory tract irritation.

**Chronic:** Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause defatting and dermatitis. Prolonged or repeated exposure may cause adverse reproductive effects. May cause kidney injury. May cause cancer according to animal studies. May cause allergic skin reaction in some individuals.
Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.

**Notes to Physician:** Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. This chemical poses an explosion hazard. May form explosive peroxides. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.

**Flash Point:** 71 e deg F (21.67 deg C)

**Autoignition Temperature:** 750 deg F (398.89 deg C)

**Explosion Limits, Lower:** 2.0
**Upper:** 12.7

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Keep container closed when not in use. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection
**Engineering Controls:** Good general ventilation should be sufficient to control airborne levels. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

### Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>200 ppm TWA; 400 ppm STEL</td>
<td>400 ppm TWA; 980 mg/m3 TWA 2000 ppm IDLH</td>
<td>400 ppm TWA; 980 mg/m3 TWA</td>
</tr>
<tr>
<td>Phenolphthalein</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Isopropyl alcohol: 400 ppm TWA; 980 mg/m3 TWA Phenolphthalein: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

**Eyes:** Wear safety glasses and chemical goggles if splashing is possible. Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** colorless

**Odor:** alcohol-like

**pH:** Not available.

**Vapor Pressure:** 40 mm Hg

**Vapor Density:** 2.1

**Evaporation Rate:** 2.88 (Butyl Acetate=1)

**Viscosity:** Not available.

**Boiling Point:** 83 deg C

**Freezing/Melting Point:** -89 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Soluble in water.

**Specific Gravity/Density:** 0.7855

**Molecular Formula:** Mixture

**Molecular Weight:** Not available.

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable. This material may be sensitive to peroxide formation.

**Conditions to Avoid:** This material may be sensitive to peroxide formation, incompatible materials, ignition sources, excess heat.

**Incompatibilities with Other Materials:** Oxidizing agents, Isopropanol is susceptible to autoxidation and therefore should be classified as peroxidizable.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, acrid smoke and fumes.

**Hazardous Polymerization:** Will not occur.

### Section 11 - Toxicological Information
RTECS#:
CAS# 7732-18-5: ZC0110000
CAS# 67-63-0: NT8050000
CAS# 77-09-8: SM8380000

LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 67-63-0:
  Draize test, rabbit, eye: 100 mg Severe;
  Draize test, rabbit, eye: 10 mg Moderate;
  Draize test, rabbit, eye: 100 mg/24H Moderate;
  Draize test, rabbit, skin: 500 mg Mild;
  Inhalation, mouse: LC50 = 53000 mg/m3;
  Inhalation, rat: LC50 = 16000 ppm/8H;
  Inhalation, rat: LC50 = 72600 mg/m3;
  Oral, mouse: LD50 = 3600 mg/kg;
  Oral, mouse: LD50 = 3600 mg/kg;
  Oral, rabbit: LD50 = 6410 mg/kg;
  Oral, rat: LD50 = 5045 mg/kg;
  Oral, rat: LD50 = 5000 mg/kg;
  Skin, rabbit: LD50 = 12800

CAS# 77-09-8:

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 67-63-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 77-09-8:
  • ACGIH: Not listed.
  • California: carcinogen, initial date 5/15/98
  • NTP: Suspect carcinogen
  • IARC: Group 2B carcinogen

Epidemiology: The NTP reported that there was clear evidence of carcinogenic activity in male rats based on the markedly increased incidences of benign pheochromocytoma of the adrenal medulla and others. There was clear evidence in mice based on the increased incidences of histiocytic sarcoma and malignant lymphoma of thymic origin. There was also clear evidence in female mice based on the increased incidences of histiocytic sarcoma, malignant lymphomas, and benign sex-cord stromal tumors of the ovary.

Teratogenicity: No information available.

Reproductive Effects: No information available.

Mutagenicity: Significant increases in chromosomal aberrations were observed after treatment of cultured Chinese hamster ovary cells with phenolphthalein in the presence of S9. Frequencies of micronucleated erythrocytes were noted in male and female feeding studies.

Neurotoxicity: No information available.

Other Studies:

Ecotoxicity: No data available. Cas# 67-63-0:LC50 (96Hr.) Fathead Minnow = 94900-10400 mg/L; Flow-through conditionLC50 (96 Hr.) Fathead Minnow = 61200-65500 mg/L; Flow-through condition.

Environmental: Cas# 67-63-0: TERRESTRIAL FATE: When spilled on soil, isopropanol will both evaporate quickly and leach into the ground due to its high vapor pressure and low adsorption to soil. Degradation in soil and groundwater has not been determined. If soil degradation is not rapid, it is apt to leach into the groundwater.

AQUATIC FATE: When released into water, isopropyl alcohol will volatilize (estimated half-life approximately 5.4
days) and may biodegrade. Although it is readily degradable in a number of laboratory tests, no data on its degradability in natural waters.

**Physical:** Cas# 67-63-0: ATMOSPHERIC FATE: When released into the atmosphere, isopropanol will photodegrade with an estimated half-life ranging from one to several days. Due to its solubility in water, rainout may be significant.

**Other:** No information available.

---

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

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### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>ISOPROPANOL SOLUTION</td>
<td>ISOPROPANOL SOLUTION</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
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<td>3</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN1219</td>
<td>UN1219</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

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### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 67-63-0 is listed on the TSCA inventory.
- CAS# 77-09-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- CAS# 67-63-0: Effective 12/15/86, Sunset 12/15/96

**Chemical Test Rules**
- CAS# 67-63-0: 40 CFR 799.2325

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 67-63-0: immediate, delayed, fire.
- CAS # 77-09-8: immediate.

**Section 313**
This material contains Isopropyl alcohol (CAS# 67-63-0, 44-50%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depleters.
- This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 67-63-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 77-09-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
WARNING: This product contains Phenolphthalein, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- F

**Risk Phrases:**
- R 11 Highly flammable.

**Safety Phrases:**
- S 16 Keep away from sources of ignition - No smoking.
- S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
- CAS# 7732-18-5: No information available.
- CAS# 67-63-0: 1
- CAS# 77-09-8: 1

**Canada - DSL/NDSL**
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 67-63-0 is listed on Canada's DSL List.
- CAS# 77-09-8 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 67-63-0 is listed on the Canadian Ingredient Disclosure List.

### Section 16 - Additional Information

**MSDS Creation Date:** 7/27/1999
**Revision #5 Date:** 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Product Identification

Product ID: AA252 PHOPHOROUS AA STANDARD
MSDS Date: 08/31/1995
FSC: 6850
NIIN: 00D004121
MSDS Number: BXXZV

Responsible Party

Company Name: SPECTRUM CHEMICAL MFG CORP.
Address: 14422 SOUTH SAN PEDRO STREET
City: GARDENA
State: CA
ZIP: 90248-2027
Country: US
Info Phone Num: 310-516-8000
Emergency Phone Num: 310-516-8000 (CHEMTREC 800-424-9300)
Preparer's Name: E. BRULL
CAGE: 63415

Contractor Identification

Company Name: SPECTRUM LABORATORY PRODUCTS INC
Address: 14422 S SAN PEDRO ST
Box: City: GARDENA
State: CA
ZIP: 90248-2027
Country: US
Phone: 310-516-8000 / FAX: 310-516-9843
CAGE: 63415

Composition/Information on Ingredients

Ingred Name: PHOSPHOROUS (YELLOW) (SARA 302/313) (CERCLA)
CAS: 7723-14-0
RTECS #: TH3500000
Fraction by Wt: 0.1%
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 0.1 MG/M3
ACGIH TLV: 0.02 PPM; 9495
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Ingred Name: WATER
CAS: 7732-18-5
RTECS #: ZC0110000
Fraction by Wt: 99.9%
Other REC Limits: NONE RECOMMENDED

Hazards Identification

Routes of Entry: Inhalation: YES  Skin: YES  Ingestion: YES

Reports of Carcinogenicity: NTP: NO  IARC: NO  OSHA: NO

Health Hazards Acute and Chronic: ACUTE: INHALATION OF VAPOR/MIST MAY CAUSE RESPIRATORY IRRITATION, TISSUE DAMAGE. CONTACT MAY SKIN AND EYE BURNS, SEVERE IRRITATION. CAN BE FATAL IF INHALED OR INgested. MAY BE HARMFUL IF INgested. CHR ONIC: PROLONGED OR REPEATED EXPOSURE MAY CAUSE RESPIRATORY IRRITATION, SKIN BURNS/ULCERATIONS, EYE IRRITATION.

Explanation of Carcinogenicity: NO INGREDIENT OF A CONCENTRATION OF 0.1% OR GREATER IS LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN.

Effects of Overexposure: INHALED—COUGHING, CHOKING, SHORTNESS OF BREATH. INGESTED—SEVERE GI TRACT IRRITATION, BURNS TO MUCOUS MEMBRANES OF MOUTH & THROAT. EYES-PAIN, BURNING/STINGING SENSATION, REDNESS, BLURRED VISION. SKIN—EDNESS, BURNS, PAIN OR DISCOMFORT.

Medical Cond Aggravated by Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: EYES - CHECK FOR & REMOVE CONTACT LENSES. SEEK MEDICAL ATTENTION. DO NOT USE EYE OINTMENT. SKIN - REMOVE CONTAMINATED CLOTHES. RINSE WITH LOTS OF WATER. NEUTRALIZE WITH DILUTE SODIUM CARBONATE. GET MEDICAL ATTENTION. INHALED - REMOVE TO FRESH AIR. SEEK IMMEDIATE MEDICAL ATTENTION. GIVE ARTIFICIAL RESPIRATION OR GIVE OXYGEN AS NEEDED. INGESTED - DO NOT INDUCE VOMITING! IF CONSCIOUS, GIVE WATER. GET MEDICAL AID.

Fire Fighting Measures

Flash Point: NON-FLAMMABLE
Extinguishing Media: NON-FLAMMABLE. DLA-HMIS: USE MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures: NONE SPECIFIED BY MANUFACTURER. DLA-HMIS: WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR.
Unusual Fire/Explosion Hazard: EXTREMELY EXPLOSIVE ON PRESENCE OF REDUCING MATERIALS, OF COMBUSTIBLE MATERIALS, OF ORGANIC MATERIALS.

Accidental Release Measures

Spill Release Procedures: WEAR APPROPRIATE PERSONAL PROTECTIVE GEAR. ABSORB WITH INERT MATERIAL AND PUT SPILLED MATERIAL IN AN APPROPRIATE WASTE DISPOSAL. IF NEEDED - NEUTRALIZE RESIDUE WITH DILUTE SOLUTION OF SODIUM CARBONATE.
Neutralizing Agent: DILUTE SOLUTION OF SODIUM CARBONATE.

Handling and Storage

Handling and Storage Precautions: STORE IN A METALLIC OR COATED FIBERBOARD DRUM USING A STRONG POLYETHYLENE INNER PACKAGE. STORE AWAY FROM INCOMPATIBLE MATERIALS.
Other Precautions: KEEP LOCKED UP. KEEP CONTAINER DRY. KEEP AWAY FROM SOURCES OF IGNITION. KEEP AWAY FROM COMBUSTIBLE MATERIALS. DO NOT INGEST. DO NOT BREATHE GAS, FUMES, VAPOR OR SPRAY. AVOID CONTACT WITH EYES, SKIN & CLOTHES. NEVER ADD WATER TO THIS PRODUCT.

Exposure Controls/Personal Protection

Respiratory Protection: IF ENGINEERING CONTROLS FAIL OR NON-Routine USE OR AN EMERGENCY OCCURS; WEAR AN MSHA/NIOHS APPROVED RESPIRATOR OR AN AIR-SUPPLIED RESPIRATOR OR SCBA, AS REQUIRED. USE IN ACCORDANCE WITH 29 CFR 1910.134 AND MANUFACTURER'S RECOMMENDATIONS.
Ventilation: USE ADEQUATE MECHANICAL VENTILATION OR LOCAL EXHAUST TO MAINTAIN EXPOSURE BELOW TLV(S).
Protective Gloves: PVC, NEOPRENE.
Eye Protection: SAFETY GLASSES/ CHEMICAL SPLASH GOGGLES.
Other Protective Equipment: FULL SUIT. BOOTS. DLA-HMIS: EYE WASH STATION & SAFETY SHOWER.

Physical/Chemical Properties

HCC: C3
Boiling Pt: B.P. Text: 212F, 100C
Vapor Pres: 17.535
Vapor Density: 0.62
Spec Gravity: 1.01
Solubility in Water: COMPLETE
Appearance and Odor: CLEAR LIQUID.
Stability and Reactivity Data

Stability Indicator/Materials to Avoid: YES
REDUCING AGENTS, COMBUSTIBLE MATERIALS, ORGANIC MATERIALS, METALS, ALKALIS, ACIDS.
Stability Condition to Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products: NONE SPECIFIED BY MANUFACTURER.

Disposal Considerations

Waste Disposal Methods: RECYCLE TO PROCESS, IF POSSIBLE. DISPOSE OF IAW LOCAL, STATE AND FEDERAL REGULATIONS. SARA 313; PHOSPHOROUS; CERCLA REPORTING; PHOSPHOROUS; CAL PROP 65; NONE; PA RTK & MASS RTK/EHS/MSL: PHOPHOROUS. DSCL(ECC): 41, 42.

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Material Safety Data Sheet
Potassium chloride

ACC# 19310

Section 1 - Chemical Product and Company Identification

MSDS Name: Potassium chloride
Synonyms: KCl.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7447-40-7</td>
<td>Potassium chloride</td>
<td>99+</td>
<td>231-211-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white solid.
Caution! May cause eye, skin, and respiratory tract irritation. Hygroscopic (absorbs moisture from the air).
Target Organs: None known.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. Low hazard for usual industrial handling.
Ingestion: May cause irritation of the digestive tract. Low hazard for usual industrial handling.
Inhalation: May cause respiratory tract irritation. Low hazard for usual industrial handling.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medical aid.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: Do not induce vomiting. Get medical aid if irritation or symptoms occur.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
Notes to Physician: Treat symptomatically and supportively.
General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Use with adequate ventilation.

Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium chloride</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Potassium chloride: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: white

Odor: odorless

pH: Not available.

Vapor Pressure: Not available.

Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 1420 deg C @ 760 mmHg
Freezing/Melting Point: 770 deg C
Decomposition Temperature: Not available.
Solubility: 340 g/L (20°C)
Specific Gravity/Density: 1.987
Molecular Formula: KCl
Molecular Weight: 74.54

Section 10 - Stability and Reactivity

Chemical Stability: Hygroscopic: absorbs moisture or water from the air.
Conditions to Avoid: Incompatible materials, dust generation, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Bromine trifluoride, strong oxidizing agents, strong acids, sulfuric acid, potassium permanganate.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, potassium fume.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7447-40-7: TS8050000
LD50/LC50:
CAS# 7447-40-7: 
  - Draize test, rabbit, eye: 500 mg/24H Mild;
  - Oral, mouse: LD50 = 1500 mg/kg;
  - Oral, rat: LD50 = 2600 mg/kg;

Carcinogenicity: 
CAS# 7447-40-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: Unscheduled DNA Synthesis: Oral, rat = 1500 ug/kg.; Mutation in Microorganisms = Mouse, Lymphocyte = 2048 mg/L.; DNA Damage = Hamster, Ovary = 260 mmol/L.; Cytogenetic Analysis: Hamster, Lung = 12 gm/L.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name: Not regulated.</td>
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<tr>
<td>Hazard Class:</td>
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<tr>
<td>UN Number:</td>
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<td>Packing Group:</td>
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</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7447-40-7 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 7447-40-7: immediate.

**Section 313**
- This material contains Potassium chloride (listed as Water Dissociable Nitrate Compounds), 99+, (CAS# 7447-40-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7447-40-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
- California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Risk Phrases:
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 7447-40-7: 1

Canada - DSL/NDSL
CAS# 7447-40-7 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7447-40-7 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/15/1999
Revision #8 Date: 10/10/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium Iodide, 1.0N

ACC# 91597

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium Iodide, 1.0N  
**Catalog Numbers:** SP821-1, SP821-4, SP821-500  
**Synonyms:** None  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>83.4</td>
<td>231-791-2</td>
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<tr>
<td>7681-11-0</td>
<td>Potassium iodide</td>
<td>16.6</td>
<td>231-659-4</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid.  
**Caution!** May cause eye, skin, and respiratory tract irritation. This substance has caused adverse reproductive and fetal effects in animals.  
**Target Organs:** Thyroid.

**Potential Health Effects**  
**Eye:** Causes eye irritation.  
**Skin:** May cause skin irritation. May cause skin irritation.  
**Ingestion:** Causes gastrointestinal irritation with nausea, vomiting and diarrhea.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** Chronic exposure can lead to iodism characterized by headache, excess salivation, nasal discharge, conjunctivitis, laryngitis, bronchitis, stomatitis, enlarged submaxillary glands, and skin rashes. Chronic ingestion of iodides during pregnancy has resulted in fetal death, severe goiter, and cretinoid appearance of the newborn.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.  
**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration.
If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear. **Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.  
**Extinguishing Media:** For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.  
**Flash Point:** Non-flammable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

### Section 7 - Handling and Storage

**Handling:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.  
**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate ventilation to keep airborne concentrations low.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Potassium iodide</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Potassium iodide: No OSHA Vacated PELs are listed for this chemical.  
**Personal Protective Equipment**  
**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.  
**Skin:** Wear appropriate protective gloves to prevent skin exposure.  
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.  
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** clear, colorless
Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, light, moisture.
Incompatibilities with Other Materials: Potassium iodide is incompatible with salts of alkaloids, chloral hydrate, calomel(mercurous chloride), potassium chlorate, metallic salts, tartaric and other acids, bromine trifluoride, and fluorine perchlorate.
Hazardous Decomposition Products: Hydrogen iodide, oxides of potassium, iodine.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#
CAS# 7732-18-5: ZC0110000
CAS# 7681-11-0: TT2975000
LD50/LC50:
CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

CAS# 7681-11-0:

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7681-11-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Potassium iodide has been shown to produce fetotoxicity in newborns.
Teratogenicity: Iodine salts can cause deformity, illness, and death of a fetus.
Reproductive Effects: Adverse reproductive effects have occurred in humans. Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Potassium iodide is expected to cause little oxygen depletion in aquatic systems. It has a moderate potential to affect aquatic organisms.
Environmental: No information available.
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
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</thead>
<tbody>
<tr>
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<td>No information available.</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
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<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7681-11-0 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 7681-11-0: immediate, delayed.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7681-11-0 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- Not available.

**Risk Phrases:**

**Safety Phrases:**

**WGK (Water Danger/Protection)**
- CAS# 7732-18-5: No information available.
- CAS# 7681-11-0: 1

**Canada - DSL/NDSL**
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7681-11-0 is listed on Canada's DSL List.

**Canada - WHMIS**
- This product has a WHMIS classification of Not controlled..

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 7681-11-0 is listed on the Canadian Ingredient Disclosure List.

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**Section 16 - Additional Information**

**MSDS Creation Date:** 7/07/2000

**Revision #5 Date:** 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium oxalate monohydrate

ACC# 19494

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium oxalate monohydrate  
**Catalog Numbers:** AC207710000, AC207710250, AC207715000, AC424020000, AC424025000, S76795, S80143, S93341, NC9053387, NC9203574, NC9337009, NC9428364, P273-250, P273-500, XXP2732.5KG, XXP27320KG  
**Synonyms:** Oxalic acid, dipotassium salt, monohydrate; Ethanedioic acid, dipotassium salt, monohydrate; Dipotassium oxalate monohydrate.  
**Company Identification:** Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6487-48-5</td>
<td>Potassium oxalate monohydrate</td>
<td>&gt; 99</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white crystals.  
**Warning!** Harmful if swallowed. Causes eye, skin, and respiratory tract irritation. Harmful if absorbed through the skin. May cause kidney damage. Hygroscopic (absorbs moisture from the air).  
**Target Organs:** Kidneys, heart, eyes, skin, brain, nerves, mucous membranes.

**Potential Health Effects**

Eye: Causes eye irritation.  
Skin: Harmful if absorbed through the skin. Oxalate is an irritant and may cause dermatitis. Skin lesions begin with epithelial cracking and the formation of slow-healing ulcers. The fingers may appear cyanotic.  
Ingestion: Ulcerations of the mouth, vomiting of blood, and rapid appearance of shock, convulsions, twitching, tetany, and cardiovascular collapse may occur following ingestion of oxalic acid or its soluble salts. Systemic effects may be due to formation of calcium oxalate which is insoluble at physiological pH and can be deposited in the brain and kidney tubules. Resultant hypocalcemia might disturb the function of the heart and nerves. Mean lethal dose for oxalates in adults is estimated at 10 - 30 grams (143 - 428 mg/kg).  
Inhalation: Inhalation of oxalic acid dust or vapor produces irritation of the respiratory tract, protein in the urine, nosebleed, ulceration of the mucous membranes, headache, nervousness, cough, vomiting, emaciation, back pain (due to kidney injury), and weakness.  
Chronic: Inhalation of oxalic acid dust or mist over a long period of time might result in weight loss and respiratory tract inflammation. Rats administered oxalic acid at 2.5 and 5% in the diet for 70 days developed depressed thyroid function and weight loss. A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.
Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** Intravenous administration of calcium gluconate or calcium chloride may be required if hypocalcemia or hypocalcemic tetany occur.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing dust.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture. Oxalates slowly corrode steel.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium oxalate monohydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>


OSHA Vacated PELs: Potassium oxalate monohydrate: No OSHA Vacated PELs are listed for this chemical. Potassium oxalate anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Crystals

**Appearance:** white

**Odor:** odorless

**pH:** neutral in solution

**Vapor Pressure:** Negligible.

**Vapor Density:** Negligible.

**Evaporation Rate:** Negligible.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** 356 deg C

**Decomposition Temperature:** Not available.

**Solubility:** 364 g/L @ 20°C

**Specific Gravity/Density:** 2.13

**Molecular Formula:** C2O4K2.H2O

**Molecular Weight:** 184.24

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Dust generation, moisture, excess heat, Oxalates slowly corrode steel.

**Incompatibilities with Other Materials:** Strong oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, formic acid, dipotassium oxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS# 6487-48-5 unlisted.**

**CAS# 583-52-8: RO2885000**

**LD50/LC50:**

Not available.

Not available.

**CAS# 583-52-8: Woman LDLo - Oral: 1 gm/kg. Published data indicated arrhythmias including changes in conduction), shock, and gastrointestinal changes. Mean lethal dose for oxalates in adults is estimated at 10-30 grams (143-428 mg/kg).**

**Carcinogenicity:**

**CAS# 6487-48-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.**

**CAS# 583-52-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.**
Epidemiology: A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.

Reproductive Effects: Oxalic acid caused kidney damage in fetal sheep and rats and disturbed the estrus cycle in rats. Increased sperm abnormalities were seen in the second generation of mice administered 0.2% oxalic acid in the drinking water.

Mutagenicity: No information found

Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
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<th>US DOT</th>
<th>Canada TDG</th>
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<td>Shipping Name</td>
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<td>TOXIC SOLID, ORGANIC, NOS(Potassium oxal</td>
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<td>Hazard Class</td>
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<td>UN Number</td>
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<tr>
<td>Packing Group</td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 6487-48-5 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
CAS# 583-52-8 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 6487-48-5: immediate, delayed.
CAS # 583-52-8: immediate, delayed.
Section 313: No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 6487-48-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 583-52-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN

Risk Phrases:
R 21/22 Harmful in contact with skin and if swallowed.

Safety Phrases:
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 6487-48-5: 1
CAS# 583-52-8: No information available.

Canada - DSL/NDSL
CAS# 583-52-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 5/11/1998
Revision #4 Date: 5/31/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium Permanganate Solutions, 0.1N-.5N

ACC# 40155

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium Permanganate Solutions, 0.1N-.5N  
**Catalog Numbers:** NC9257853, NC9728338, SP288-1, SP288-4, XXKPERMSN20L, XXSP28820L  
**Synonyms:** None  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7722-64-7</td>
<td>Potassium permanganate</td>
<td>.316-1.5</td>
<td>231-760-3</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>Balance</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: purple liquid.  
**Caution!** May cause eye, skin, and respiratory tract irritation. May cause kidney damage.  
**Target Organs:** Kidneys.

**Potential Health Effects**  
**Eye:** May cause eye irritation.  
**Skin:** May cause skin irritation. May cause skin discoloration.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage.  
**Inhalation:** May cause respiratory tract irritation.  
**Chronic:** May cause kidney damage.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.  
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.  
**Notes to Physician:** Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

**General Information:** During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Provide ventilation. Clean up residual material by washing area with a 2-5% solution of soda ash.

Section 7 - Handling and Storage

**Handling:** Use with adequate ventilation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation. Wash clothing before reuse.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium permanganate</td>
<td>0.2 mg/m3 TWA (as Mn) (listed under Manganese, inorganic compounds).</td>
<td>1 mg/m3 TWA (as Mn) (listed under Manganese compounds, n.o.s.).</td>
<td>5 mg/m3 Ceiling (as Mn) (listed under Manganese compounds, n.o.s.).</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Potassium permanganate: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid  
**Appearance:** purple  
**Odor:** none reported  
**pH:** Not available.  
**Vapor Pressure:** 14 mm Hg  
**Vapor Density:** 0.7  
**Evaporation Rate:** >1 (ether=1)  
**Viscosity:** Not available.  
**Boiling Point:** 212 deg F  
**Freezing/Melting Point:** 32 deg F  
**Decomposition Temperature:** Not available.  
**Solubility:** Not available.  
**Specific Gravity/Density:** 1.0  
**Molecular Formula:** Mixture  
**Molecular Weight:** Not available.

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** High temperatures, incompatible materials.  
**Incompatibilities with Other Materials:** Potassium permanganate explodes on contact with some acids such as acetic acid, concentrated hydrochloric acid, and formaldehyde, ammonium nitrate, dimethylformamide. Forms sensitive explosive mixtures with ammonium perchlorate, titanium, arsenic, phosphorus, slag wool, and sulfur. React with reducing agents.  
**Hazardous Decomposition Products:** Oxides of potassium, oxides of magnesium.  
**Hazardous Polymerization:** Has not been reported.

**Section 11 - Toxicological Information**

**RTECS#:**  
**CAS# 7722-64-7:** SD6475000  
**CAS# 7732-18-5:** ZC0110000  
**LD50/LC50:**  
**CAS# 7722-64-7:**  
- Oral, mouse: LD50 = 2157 mg/kg;  
- Oral, mouse: LD50 = 750 mg/kg;  
- Oral, rat: LD50 = 750 mg/kg;  

**CAS# 7732-18-5:**  
- Oral, rat: LD50 = >90 mL/kg;

**Carcinogenicity:**  
**CAS# 7722-64-7:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 7732-18-5:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

**Epidemiology:** No information available.  
**Teratogenicity:** No information available.  
**Reproductive Effects:** No information available.  
**Mutagenicity:** No information available.  
**Neurotoxicity:** No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
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<td>Not Regulated</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td></td>
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<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7722-64-7 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7722-64-7: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 7722-64-7: immediate, delayed, fire.

Section 313
This material contains Potassium permanganate (listed as Manganese compounds, n.o.s.), .316-1.5%, (CAS# 7722-64-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 7722-64-7 (listed as Manganese compounds, n.o.s.) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7722-64-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 7722-64-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Manganese compounds, n.o.s.), Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**
**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
Not available.

**Risk Phrases:**

**Safety Phrases:**
S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
CAS# 7722-64-7: 2
CAS# 7732-18-5: No information available.

**Canada - DSL/NDSL**
CAS# 7722-64-7 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

**Canada - WHMIS**
not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
CAS# 7722-64-7 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 1/26/1999
**Revision #6 Date:** 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium sulfate

ACC# 19590

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium sulfate  
**Catalog Numbers:** AC205940000, AC205945000, AC207770000, AC207775000, AC424210000, AC424210010, AC424220000, AC424220010, AC424220250, S75191, S80147, S80147-1, S93343, S93344, NC9179989, P304-10, P304-3, P304-500, P305-500, P306-300LB  
**Synonyms:** Dipotassium sulfate; Potassium sulfate (2:1); Sulfuric acid, dipotassium salt.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7778-80-5</td>
<td>Potassium sulfate</td>
<td>&gt;99</td>
<td>231-915-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.  
**Caution!** May cause eye and respiratory tract irritation. This is expected to be a low hazard for usual industrial handling.  
**Target Organs:** None.

**Potential Health Effects**  
**Eye:** Dust may cause mechanical irritation.  
**Skin:** Low hazard for usual industrial handling.  
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Potassium sulfate has been used as a cathartic.  
**Inhalation:** Inhalation of dust may cause respiratory tract irritation.  
**Chronic:** Not expected to be a chronic hazard.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.  
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.  
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.  
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible. Decomposes at high temperatures, resulting in toxic and corrosive products.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

**Storage:** Store in a cool, dry place. Keep container closed when not in use.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium sulfate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Potassium sulfate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Glove protection is not normally required.

**Clothing:** Protective garments not normally required.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

**Physical State:** Solid

**Appearance:** white

**Odor:** Odorless

**pH:** ~ 7 (aq soln)
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 1689 deg C @ 760 mmHg
Freezing/Melting Point: 1067 deg C
Decomposition Temperature: Not available.
Solubility: 110 g/l (20°C)
Specific Gravity/Density: 2.66 g/cm3
Molecular Formula: K2O4S
Molecular Weight: 174.26

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: No significant incompatibilities identified with common materials and contaminants.
Hazardous Decomposition Products: Oxides of sulfur, oxides of potassium.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7778-80-5: TT5900000
LD50/LC50:
CAS# 7778-80-5:
Oral, mouse: LD50 = 6600 mg/kg;
Oral, rat: LD50 = 6600 mg/kg;

Carcinogenicity:
CAS# 7778-80-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: This chemical has no biological oxygen demand, and it will not cause oxygen depletion in aquatic systems. It has a low potential to affect aquatic systems. If diluted with water, this chemical released directly or indirectly into the environment is not expected to have a significant impact.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification. **RCRA P-Series:** None listed. **RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>Shipping Name:</th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class:</td>
<td>Not regulated</td>
<td>Not Regulated</td>
</tr>
<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 7778-80-5 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**Section 313**

No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 7778-80-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

Not available.

**Risk Phrases:**

**Safety Phrases:**
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 7778-80-5: 1

Canada - DSL/NDSL
CAS# 7778-80-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of Not controlled..
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #7 Date: 6/06/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Potassium thiocyanate

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Potassium thiocyanate

**Catalog Numbers:**
- AC196580000, AC196580025, AC196582500, AC196585000, AC377430000, AC377430025, AC377431000, AC377432500, AC377435000, AC424230000, AC424230050, AC424235000, S71230, S712301, S75192, S77756, NC9083422, NC9143438, NC9176709, NC9500039, NC9668442, NC9729090, NC9791271, NC9791937, NC9945820, NC9947676, P317-100, P317-500, S71230-1, XXP317100LB, XXP31710KGS, XXP31712KG, XXP3171KKG

**Synonyms:** Thiocyanic acid, potassium salt; Potassium rhodanide; Potassium sulfocyanate.

**Company Identification:**
- Fisher Scientific
  - 1 Reagent Lane
  - Fair Lawn, NJ 07410

**For information, call:** 201-796-7100

**Emergency Number:** 201-796-7100

**For CHEMTREC assistance, call:** 800-424-9300

**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>333-20-0</td>
<td>Potassium thiocyanate</td>
<td>98-100</td>
<td>206-370-1</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless or white crystals.

**Warning!** Harmful to aquatic organisms; may cause long-term adverse effects in the aquatic environment. Harmful if swallowed, inhaled, or absorbed through the skin. Contact with acids liberates toxic gas.

**Target Organs:** Central nervous system, cardiovascular system, thyroid, skin.

**Potential Health Effects**

**Eye:** Causes redness and pain.

**Skin:** May cause skin irritation. Harmful if absorbed through the skin.

**Ingestion:** Harmful if swallowed. May cause irritation of the digestive tract. May cause headache. May cause nausea and vomiting.

**Inhalation:** Harmful if inhaled. May cause respiratory tract irritation. Prolonged exposure may result in dizziness and general weakness.

**Chronic:** Prolonged absorption of thiocyanates may produce various skin eruptions, running nose, dizziness, cramps, nausea and vomiting.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while
removing contaminated clothing and shoes.

**Ingestion:** Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not available.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 1

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**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

---

**Section 7 - Handling and Storage**

**Handling:** Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood.

**Storage:** Store in a cool, dry place. Store in a tightly closed container. Keep away from acids. Store protected from moisture. Store protected from light.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium thiocyanate</td>
<td>none listed</td>
<td>none listed</td>
<td>5 mg/m3 TWA (listed under Cyanide anion).</td>
</tr>
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</table>

**OSHA Vacated PELs:** Potassium thiocyanate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Section 9 - Physical and Chemical Properties

**Physical State:** Crystals  
**Appearance:** colorless or white  
**Odor:** odorless  
**pH:** 5.3-8.7 (5% soln)  
**Vapor Pressure:** < 1 hPa @ 20 deg C  
**Vapor Density:** No data  
**Evaporation Rate:** Negligible  
**Viscosity:** No data  
**Boiling Point:** 500 deg C  
**Freezing/Melting Point:** 170-179 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Soluble.  
**Specific Gravity/Density:** 1.886  
**Molecular Formula:** KSCN  
**Molecular Weight:** 97.18

Section 10 - Stability and Reactivity

**Chemical Stability:** Moisture sensitive. Light sensitive.  
**Conditions to Avoid:** Incompatible materials, light, dust generation, moisture, excess heat.  
**Incompatibilities with Other Materials:** Acids, strong oxidizing agents, strong bases.  
**Hazardous Decomposition Products:** Hydrogen cyanide, carbon monoxide, oxides of nitrogen, oxides of sulfur, carbon dioxide, cyanide fumes, oxides of potassium.  
**Hazardous Polymerization:** Will not occur.

Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 333-20-0: XL1925000  
**LD50/LC50:**  
**CAS# 333-20-0:**  
Oral, mouse: LD50 = 594 mg/kg;  
Oral, mouse: LD50 = 590 mg/kg;  
Oral, rat: LD50 = 854 mg/kg;  

Human oral TDLo: 428 mg/kg, toxic psychosis, hallucinations, distorted perceptions, gastritis.; Human oral LDLo: 80 mg/kg, hallucinations, distorted perceptions, convulsions, muscle weakness; Rabbit oral LDLo: 500 mg/kg; Guinea pig oral LDLo: 600 mg/kg; Frog oral LDLo: 300 mg/kg.  
**Carcinogenicity:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.  
**Mutagenicity:** No information found  
**Neurotoxicity:** No information found  
**Other Studies:**

Section 12 - Ecological Information
Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: Biodegradable. Do not empty into drains.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
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<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not Regulated.</td>
<td>Not Regulated.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 333-20-0 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 333-20-0: immediate, delayed.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 333-20-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 333-20-0 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 333-20-0 can be found on the following state right to know lists: California, (listed as Cyanides, inorganic salts), New Jersey, (listed as Cyanide anion), New Jersey, (listed as Cyanides, inorganic salts), Pennsylvania,
California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 32 Contact with acids liberates very toxic gas.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 13 Keep away from food, drink and animal feeding stuffs.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 333-20-0: No information available.

Canada - DSL/NDSL

CAS# 333-20-0 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 333-20-0 (listed as Cyanides, inorganic salts) is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #8 Date: 6/19/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE
Containing the Following Component in Nitrogen Balance Gas:
Propane < 6.5%

SYNONYMS: Not Applicable
CHEMICAL FAMILY NAME: Not Applicable
FORMULA: Not Applicable

Document Number: 50050 AL-E
Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE: Calibration of Monitoring and Research Equipment

MANUFACTURED/SUPPLIED FOR:
ADDRESS: 9101 LBJ Freeway – Suite 800
Dallas, TX 75243-1920

EMERGENCY PHONE: CHEMTREC: 1-800-424-9300
BUSINESS PHONE: General MSDS Information 1-972-301-52000
Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
<th>EXPOSURE LIMITS IN AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH-TLV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA</td>
</tr>
<tr>
<td>Propane</td>
<td>74-98-6</td>
<td>&lt; 6.5 %</td>
<td>NIC = 1000</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>Balance</td>
<td>There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.</td>
</tr>
</tbody>
</table>

NE = Not Established. NIC = Notice of Intended Change. See Section 16 for Definitions of Terms Used.

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This is a colorless, odorless gas mixture. Releases of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas mixture is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. It should be noted that before adverse health effects or suffocation could occur, the lower flammability limit of Propane in air may be exceeded; possibly causing an explosive atmosphere as well as an oxygen-deficient environment. If this gas mixture is released in a small, poorly-ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN | OBSERVED EFFECT
--- | ---
12-16% Oxygen: | Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen: | Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen: | Nausea, vomiting, collapse, or loss of consciousness.
Below 6%: | Convulsive movements, possible respiratory collapse, and death.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this product, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. The most significant hazard associated with this gas mixture when it contains less than 19.5% oxygen is the potential for exposure to oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, unconsciousness, and death. The skin of a victim of over-exposure may have a blue color.

CHRONIC: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

TARGET ORGANS: ACUTE: Respiratory system, eyes. CHRONIC: Heart, cardiovascular system, central nervous system, reproductive system.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

- HEALTH HAZARD: (BLUE) 1
- FLAMMABILITY HAZARD: (RED) 0
- PHYSICAL HAZARD: (YELLOW) 0

PROTECTIVE EQUIPMENT

See Section 8

For Routine Industrial Use and Handling Applications
4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Makeup and eyewear, if worn, must be equipped with an appropriate filter or lens. If released material enters the eyes, do not rub the eyes. Seek medical attention.

No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after exposure, seek medical attention. Take a copy of the label and the MSDS to a physician or other health professional with victim(s).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to this gas mixture.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary; treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS [in air by volume, %]: Lower (LEL): Not applicable. Upper (UEL): Not applicable.

Note: The flammable range for Propane in air is 2.2-9.5%; however, in a Nitrogen Balance gas, this range is altered and this specific gas mixture is non-flammable.

FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heart of the fire.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Oxygen. Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES and HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify the cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE and HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C (70°F)). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders from physical damage. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.

SPECIAL PRECAUTIONS for HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE of CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tag-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION and ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this gas mixture in well-ventilated areas. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect if the levels of Propane exceed 10% of the LEL (2.2%); as well as the concentration of Oxygen in the atmosphere.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Maintain Propane levels below 50% of the TLV (TLV = 1000 ppm) and oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection when Propane levels exceed 50% of the TLV (TLV = 1000 ppm), oxygen levels are below 19.5%, or during emergency response to a release of this gas mixture. During an emergency situation, before entering the area, check the concentration of Propane and Oxygen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard 294.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Wear leather gloves when handling cylinders. Chemically resistant gloves should be worn when using this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: No special protection is needed under normal circumstances of use. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ft³ (1.153 kg/m³)
FREEZING/MELTING POINT @ 10 psig: -345.8°F (-210°C)
SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906
SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023
EVAPORATION RATE (n[equivalent]=1): Not applicable
VAPOR PRESSURE @ 70°F (21.1°C) (psig): Not applicable
COEFFICIENT WATER/ROIL DISTRIBUTION: Not applicable

The following information is for this gas mixture.

APPEARANCE, ODOR and COLOR: This gas mixture is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this gas mixture. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

NON-FLAMMABLE GAS MIXTURE MSDS - 50050 EFFECTIVE DATE: JANUARY 1, 2005
10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The Propane component of this gas mixture will thermally decompose into carbon monoxide and Carbon Dioxide. Nitrogen does not decompose, per se, but may react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this product). Lithium reacts slowly with Nitrogen at ambient temperatures. Propane is incompatible with strong oxidizers (i.e. chlorine, bromine perfluorooxide, oxygen difluoride, and nitrogen tetroxide).

HAZARD POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicity data are available for the components of this product:

PROPANE:
Effects on Short-Term Inhalation: Guinea-pigs breathing 5.5% propane by volume developed tremors after 5 minutes. Nausea, retching, and stupor were observed when animals were exposed for 35-120 minutes. All the animals survived a two-hour exposure and had no significant tissue damage. A gas concentration of 69% did not cause anaesthesia, but depressed the blood pressure of cats. Inhalation of 10 percent propane by mice and 15% by dogs caused weak cardiac sensitization. Presumably, all of these effects are reversible when exposure ceases. In primates, 10% propane caused some change in heart function. At 20% there was aggravation of these symptoms and respiratory depression.

PROPANE (Continued):
Effects of Long-Term Inhalation: No toxicity or abnormalities were observed when monkeys were exposed to approximately 750 ppm for 90 days. Similar results were obtained when monkeys were exposed to an aerosol spray containing 65% propane and isobutane.

NITROGEN: There are no specific toxicity data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

Suspected Cancer Agent: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

Irritancy of Product: Contact with rapidly expanding gases can be irritating to exposed skin and eyes.

Sensitization to the Product: The components of this gas mixture are not known to cause human skin or respiratory sensitization.

Reproductive Toxicity Information: Listed below is information concerning the effects of this gas mixture and its components on the human reproductive system.

Mutagenicity: The components of this gas mixture are not reported to cause mutagenic effects in humans.

Embryotoxicity: The components of this gas mixture are not reported to cause embryotoxic effects.

Teratogenicity: The components of this gas mixture are not reported to cause teratogenic effects in humans.

Reproductive Toxicity: The components of this gas mixture are not reported to cause adverse reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generations. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

Biological Exposure Indices (BEIs): Currently, Biological Exposure Indices (BEIs) have not been determined for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

Environmental Stability: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this gas mixture.

Nitrogen: Water Solubility = 2.4 volumes water at 0°C and 1.6 volumes Nitrogen/100 volumes water at 20°C.

Effect of Material on Plants or Animals: No evidence is currently available on the effects of this gas mixture on plant and animal life.

Effect of Chemical on Aquatic Life: No evidence is currently available on the effects of this gas mixture on aquatic life.

13. DISPOSAL CONSIDERATIONS

Preparing Wastes for Disposal: Preparing Wastes for Disposal: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesirable residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

This Gas Mixture is Hazardous as Defined by 49 CFR 172.101 by the U.S. Department of Transportation.

Proper Shipping Name: Compressed gases, n.o.s. (Propane, Nitrogen)

Hazard Class Number and Description: 2.2 (Non-Flammable Gas)

UN Identification Number: UN 1956

Packing Group: Not applicable.

DOT Label(s) Required: Class 2.2 (Non-Flammable Gas)


Marine Pollutant: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

Special Shipping Information: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

Transport Canada Transportation of Dangerous Goods Regulations: This gas is considered as Dangerous Goods, per regulations of Transport Canada.

Proper Shipping Name: Compressed gases, n.o.s. (Propane, Nitrogen)

Hazard Class Number and Description: 2.2 (Non-Flammable Gas)

UN Identification Number: UN 1956

Packing Group: Not applicable.

Hazard Label: Class 2.2 (Non-Flammable Gas)

Special Provisions: None

Explosive Limit and Limited Quantity Index: 0.12

ERAP Index: None

Passenger Carrying Ship Index: None

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index: 75


Note: Shipment of compressed gas cylinders via Public Passenger Road Vehicle is a violation of Canadian law (Transport Canada Transportation of Dangerous Goods Act, 1992).

15. REGULATORY INFORMATION

Additional U.S. Regulations: U.S. SARA Reporting Requirements: The components of this gas mixture are not subject to the reporting requirements of Sections 302, 304, and 313 of Title Ill of the Superfund Amendments and Reauthorization Act.

U.S. SARA Threshold Planning Quantity: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. TSCA Inventory Status: The components of this gas mixture are listed on the TSCA Inventory.

U.S. CERCLA Reportable Quantity (RQ): Not applicable.
**15. REGULATORY INFORMATION (Continued)**

**ADDITIONAL U.S. REGULATIONS (continued):**

- Propane is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 lb (454 kg). Due to the small size of the cylinder for this mixture, this regulation should not apply.
- The regulations of the Process Safety Management of Highly Hazardous Chemicals (29 CFR 1910.119) are not applicable to this gas mixture.
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Nitrogen is not listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Propane is listed under this regulation in Table 3, as a Regulated Substance (Flammable Substance), in quantities of 10,000 lb (4,554 kg) or greater. Due to the small size of the cylinder for this mixture, this regulation should not apply.

**U.S. STATE REGULATORY INFORMATION:**

<table>
<thead>
<tr>
<th>State</th>
<th>Substance List</th>
<th>Nitrogen, Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Designated Toxic and Hazardous Substances:</td>
<td>Nitrogen, Propane</td>
</tr>
<tr>
<td>California</td>
<td>Permissible Exposure Limits for Chemical Contaminants:</td>
<td>Nitrogen, Propane</td>
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<td>Missouri</td>
<td>Employer Information/Toxic Substances List</td>
<td>Nitrogen, Propane</td>
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<td>New Jersey</td>
<td>Right to Know Hazardous Substances List</td>
<td>Nitrogen, Propane</td>
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<td>North Dakota</td>
<td>List of Hazardous Chemicals, Reportable Quantities:</td>
<td>Nitrogen, Propane</td>
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<tr>
<td>Pennsylvania</td>
<td>Hazardous Substance List</td>
<td>Nitrogen, Propane</td>
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<tr>
<td>Rhode Island</td>
<td>Hazardous Substance List</td>
<td>Propane</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Toxic and Hazardous Substances:</td>
<td>Propane</td>
</tr>
</tbody>
</table>

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):**

No component of this gas mixture is on the California Prop 65 lists.

**ADDITIONAL CANADIAN REGULATIONS:**

- **CANADIAN DSEL/DSEL INVENTORY STATUS:** The components of this gas mixture are listed on the DSL Inventory.
- **CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this gas mixture are not on the CEPA Priorities Substances Lists.
- **CANADIAN WHMIS REGULATIONS:** This gas mixture is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

**16. OTHER INFORMATION**

**INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS**

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. Air Liquide America will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

**MIXTURES:** When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5th Floor, Chantilly, VA 20151-2923. Telephone: (703) 788-2700.

- **P-1** "Safe Handling of Compressed Gases in Containers"
- **AV-1** "Safe Handling and Storage of Compressed Gases"
- **"Handbook of Compressed Gases"

**PREPARED BY:**

CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
619/670-0609
Fax on Demand: 1-800/231-1366

**AIR LIQUEIDE**

This Material Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this gas mixture. To the best of Air Liquide’s knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.
Material Safety Data Sheet
Quinhydrone MSDS

Section 1: Chemical Product and Company Identification

Product Name: Quinhydrone
Catalog Codes: SLQ1018
CAS#: 106-34-3
RTECS: VA4550000
TSCA: TSCA 8(b) inventory: Quinhydrone
CI#: Not available.
Synonym: 2,5-Cyclohexadiene–1,4-dione complex with 1,4-benzenediol (1:1)
Chemical Name: Not available.
Chemical Formula: C6H6O2.C6H4O2

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinhydrone</td>
<td>106-34-3</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Quinhydrone: ORAL (LD50): Acute: 225 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.
Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:**
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** These products are carbon oxides (CO, CO2).

**Fire Hazards in Presence of Various Substances:** Not available.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

Section 6: Accidental Release Measures

**Small Spill:**
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

---

**Section 7: Handling and Storage**

**Precautions:**
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

**Storage:**
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

---

**Section 8: Exposure Controls/Personal Protection**

**Engineering Controls:**
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:**
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

---

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Solid. (Powdered solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 218.21 g/mole

**Color:** Green. Metallic.

**pH (1% soln/water):** Not available.

**Boiling Point:** Decomposes.

**Melting Point:** 173°C (343.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.4 (Water = 1)

**Vapor Pressure:** Not applicable.
**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

**Section 11: Toxicological Information**

**Routes of Entry:** Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 225 mg/kg [Rat].

**Chronic Effects on Humans:** The substance is toxic to lungs, mucous membranes.

**Other Toxic Effects on Humans:** Very hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: May decompose in the presence of light. May decompose on exposure to moist air and water.

Section 13: Disposal Considerations
Waste Disposal:

Section 14: Transport Information
DOT Classification: Not a DOT controlled material (United States).
Identification: Not applicable.
Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information
Federal and State Regulations: TSCA 8(b) inventory: Quinhydrone


Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):
Health Hazard: 2
Fire Hazard: 1
Reactivity: 0
Personal Protection: E

National Fire Protection Association (U.S.A.):
Health: 2
Flammability: 1
Reactivity: 0
Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an
approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

### Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:20 PM

**Last Updated:** 10/09/2005 06:20 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.
Material Safety Data Sheet
Selenium atomic absorption standard solution, 1 mg/ml se in 10% hcl

ACC# 29800

Section 1 - Chemical Product and Company Identification

MSDS Name: Selenium atomic absorption standard solution, 1 mg/ml se in 10% hcl
Catalog Numbers: AC196280000, AC196281000, AC196285000
Synonyms:
Company Identification:
    Acros Organics N.V.
    One Reagent Lane
    Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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<tr>
<td>7647-01-0</td>
<td>Hydrogen chloride</td>
<td>10.0</td>
<td>231-595-7</td>
</tr>
<tr>
<td>7782-49-2</td>
<td>Selenium</td>
<td>&lt;1.0</td>
<td>231-957-4</td>
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<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>Balance</td>
<td>231-791-2</td>
</tr>
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</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid.


Target Organs: None known.

Potential Health Effects

Eye: Causes eye burns. May cause irreversible eye injury.
Skin: Causes skin burns. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: Causes gastrointestinal tract burns.
Inhalation: May cause severe respiratory tract irritation and possible burns.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.
Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Selenium</td>
<td>0.2 mg/m3 TWA</td>
<td>0.2 mg/m3 TWA 1 mg/m3 IDLH</td>
<td>0.2 mg/m3 TWA</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Hydrogen chloride: No OSHA Vacated PELs are listed for this chemical. Selenium: 0.2 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties
Physical State: Liquid
Appearance: Clear
Odor: Not available.

pH: Not available.

Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.

Solubility: Miscible with water
Specific Gravity/Density: Not available.
Molecular Formula: Not applicable.
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials.

Incompatibilities with Other Materials: Alcohols and glycols (e.g. butyl alcohol, ethanol, methanol, ethylene glycol), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, formaldehyde), amides (e.g. butyramide, diethyltoluamide, dimethyl formamide), amines (aliphatic and aromatic, e.g. dimethyl amine, propylamine, pyridine, triethylamine), azo, diazo, and hydrazines (e.g. dimethyl hydrazine, hydrazine, methyl hydrazine), carbamates (e.g. carbamate, carbofuran), caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), cyanides (e.g. potassium cyanide, sodium cyanide), dithiocarbamates (e.g. ferbam, mane, metham, thiram), esters (e.g. butyl acetate, ethyl acetate, propyl formate), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), fluorides (inorganic, e.g. ammonium fluoride, calcium fluoride, cesium fluoride), halogenated organics (e.g. dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (e.g. acetone, acetonitrile, MEK, MIBK), mercaptans and other organic sulfides (e.g. butyl mercaptan, carbon disulfide, methanethiol), metals (alkali and alkaline, e.g. cesium, potassium, sodium), metals as powders (e.g. hafnium, raney nickel), metals as non-powders (e.g. brass, bronze, iron), metals and metal compounds (toxic, e.g. beryllium, lead acetate, nickel carbonyl, tetraethyl lead), nitriles (e.g. potassium nitride, sodium nitride), nitrides (e.g. acetonitrile, methyl cyanide), hydrocarbons (aliphatic, unsaturated, e.g. cyclopentene, ethylene, heptene), peroxides and hydroperoxides (organic, e.g. acetyl peroxide, benzoyl peroxide, butyl peroxide, methyl ethyl ketone peroxide), phenols and cresols (e.g. carbolic acid, cresote, cresol, phenol, resorcinol), organophosphates, phosphothioates (e.g. methylparathion, parathion, phorate, thionazin), sulfides (inorganic, e.g. ferric sulfide, lead sulfide, sodium sulfide), epoxides (e.g. butyl glycidyl ether), combustible and flammable materials (e.g.).

Hazardous Decomposition Products: Hydrogen chloride.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7647-01-0: MW4025000; MW4031000
CAS# 7782-49-2: VS7700000
CAS# 7732-18-5: ZC0110000

LD50/LC50:
CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m3/30M;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m3/5M;
Inhalation, rat: LC50 = 7004 mg/m3/30M;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;

CAS# 7782-49-2:
  Oral, rat: LD50 = 6700 mg/kg;

CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

**Carcinogenicity:**
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7782-49-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** Hydrochloric acid has been shown to produce fetotoxicity in the fetus or embryo of laboratory animals. Specific developmental abnormalities include homeostasis. Available animal data are insufficient to allow an evaluation of the carcinogenicity of selenium compounds.

**Teratogenicity:** No data available.
**Reproductive Effects:** No data available.
**Mutagenicity:** No data available.
**Neurotoxicity:** No data available.
**Other Studies:**

---

**Section 12 - Ecological Information**

No information available.

**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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<td><strong>Shipping Name:</strong></td>
<td>TOXIC LIQUIDS, ORGANIC, N.O.S.</td>
<td>TOXIC LIQUID ORGANIC NOS (SELENIUM)</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
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<td>6.1</td>
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<tr>
<td><strong>UN Number:</strong></td>
<td>UN2810</td>
<td>UN2810</td>
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<td><strong>Packing Group:</strong></td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**
CAS# 7647-01-0 is listed on the TSCA inventory. 
CAS# 7782-49-2 is listed on the TSCA inventory. 
CAS# 7732-18-5 is listed on the TSCA inventory.

**Health & Safety Reporting List** 
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules** 
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b** 
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule** 
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs** 
CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances** 
CAS# 7647-01-0: 500 lb TPQ

**SARA Codes**
CAS # 7647-01-0: immediate.

**Section 313**
This material contains Hydrogen chloride (CAS# 7647-01-0, 10.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373. 
This material contains Selenium (CAS# 7782-49-2, <1.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors. 
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. 
CAS# 7782-49-2 is listed as a Priority Pollutant under the Clean Water Act. 
CAS# 7782-49-2 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
CAS# 7647-01-0 is considered highly hazardous by OSHA.

**STATE**
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7782-49-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

- T

**Risk Phrases:**
  - R 23/25 Toxic by inhalation and if swallowed.
  - R 33 Danger of cumulative effects.
  - R 36/37/38 Irritating to eyes, respiratory system and skin.

**Safety Phrases:**
  - S 20/21 When using do not eat, drink or smoke.
  - S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  - S 37/39 Wear suitable gloves and eye/face protection.
  - S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  - S 28A After contact with skin, wash immediately with plenty of water
WGK (Water Danger/Protection)
   CAS# 7647-01-0: 1  
   CAS# 7782-49-2: 2  
   CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
   CAS# 7647-01-0 is listed on Canada's DSL List.  
   CAS# 7782-49-2 is listed on Canada's DSL List.  
   CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
   This product has a WHMIS classification of D1B, E.
   This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
   CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.  
   CAS# 7782-49-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 8/26/1998
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Silicon Atomic Absorption Standard Solution, 1 mg/ml Si in 2 wt.% NaOH

ACC# 01814

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Silicon Atomic Absorption Standard Solution, 1 mg/ml Si in 2 wt.% NaOH  
**Catalog Numbers:** AC196290000, AC196291000  
**Synonyms:** None.  
**Company Identification:**  
Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410  
For information in North America, call: 800-ACROS-01  
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td>2.0</td>
<td>215-185-5</td>
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<tr>
<td>7440-21-3</td>
<td>Silicon</td>
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<td>231-130-8</td>
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<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>Balance</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless clear liquid.  
**Danger!** Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns.  
May cause severe digestive tract irritation with possible burns.  
**Target Organs:** Respiratory system.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause chemical conjunctivitis and corneal damage.  
**Skin:** Causes skin burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.  
**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.  
**Inhalation:** May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects.  
**Chronic:** Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** Get medical aid. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).  
**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.  
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Treat symptomatically and supportively.

---

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Discard contaminated shoes.

**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal containers.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide</td>
<td>2 mg/m3 Ceiling</td>
<td>10 mg/m3 IDLH</td>
<td>2 mg/m3 TWA</td>
</tr>
<tr>
<td>Silicon</td>
<td>10 mg/m3 TWA</td>
<td>10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)</td>
<td>15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Sodium hydroxide: No OSHA Vacated PELs are listed for this chemical. Silicon: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction) Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** Clear liquid

**Appearance:** Colorless

**Odor:** Slight aromatic odor

**pH:** Not available.

**Vapor Pressure:** Not available.

**Vapor Density:** >1.0

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** > 100 deg C

**Freezing/Melting Point:** Not available.

**Decomposition Temperature:** Not available.

**Solubility:** Miscible with water

**Specific Gravity/Density:** 1.0200g/cm³

**Molecular Formula:** Solution

**Molecular Weight:** Not available.

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Incompatible materials, excess heat.

**Incompatibilities with Other Materials:** Oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

**Hazardous Polymerization:** Has not been reported

---

**Section 11 - Toxicological Information**

**RTECS#:**

**CAS# 1310-73-2:** WB4900000

**CAS# 7440-21-3:** VW0400000

**CAS# 7732-18-5:** ZC0110000

**LD50/LC50:**

**CAS# 1310-73-2:**

- Draize test, rabbit, eye: 400 ug Mild;
- Draize test, rabbit, eye: 1% Severe;
- Draize test, rabbit, eye: 50 ug/24H Severe;
- Draize test, rabbit, eye: 1 mg/24H Severe;
- Draize test, rabbit, skin: 500 mg/24H Severe;

**CAS# 7440-21-3:**

- Draize test, rabbit, eye: 3 mg Mild;
- Oral, rat: LD50 = 3160 mg/kg;
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 1310-73-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-21-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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<tbody>
<tr>
<td>Shipping Name:</td>
<td>SODIUM HYDROXIDE SOLUTION</td>
<td>No information available.</td>
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<tr>
<td>Hazard Class:</td>
<td>8</td>
<td></td>
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<tr>
<td>UN Number:</td>
<td>UN1824</td>
<td></td>
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<tr>
<td>Packing Group:</td>
<td>II</td>
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</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 1310-73-2 is listed on the TSCA inventory.
CAS# 7440-21-3 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 1310-73-2: immediate, reactive.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 1310-73-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-21-3 can be found on the following state right to know lists: California, (listed as Silica, amorphous), New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
C
Risk Phrases:
R 34 Causes burns.

Safety Phrases:
S 25 Avoid contact with eyes.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water.

WGK (Water Danger/Protection)
CAS# 1310-73-2: 1
CAS# 7440-21-3: No information available.
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
CAS# 1310-73-2 is listed on Canada's DSL List.
CAS# 7440-21-3 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-21-3 (listed as Silica, amorphous) is listed on the Canadian Ingredient Disclosure List.
MSDS Creation Date: 9/02/1997
Revision #7 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Catalog Number:</th>
<th>5918, 5920, E-150, P-608</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Identity:</td>
<td>POTASSIUM CHLORIDE SOLUTIONS, 3 - 4 Molar, Saturated With Silver Chloride</td>
</tr>
<tr>
<td>Manufacturer's Name:</td>
<td>RICCA CHEMICAL COMPANY LLC</td>
</tr>
<tr>
<td>CAGE Code:</td>
<td>4TCW6</td>
</tr>
<tr>
<td>Emergency Contact(24 hr) -- CHEMTREC®</td>
<td>Domestic: 800-424-9300</td>
</tr>
<tr>
<td></td>
<td>International: 703-527-3887</td>
</tr>
<tr>
<td>Address:</td>
<td>448 West Fork Dr</td>
</tr>
<tr>
<td></td>
<td>Arlington, TX 76012</td>
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<tr>
<td>Telephone Number For Information:</td>
<td>817-461-5601</td>
</tr>
<tr>
<td>Date Prepared:</td>
<td>4/6/99</td>
</tr>
<tr>
<td>Revision:</td>
<td>5</td>
</tr>
<tr>
<td>Last Revised:</td>
<td>07/10/2006</td>
</tr>
<tr>
<td>Date Printed:</td>
<td>10/30/2007 3:02:16 pm</td>
</tr>
</tbody>
</table>

Section 2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Registry #</th>
<th>Concentration</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
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</thead>
<tbody>
<tr>
<td>Potassium Chloride</td>
<td>7447-40-7</td>
<td>20-30</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Water, Deionized</td>
<td>7732-18-5</td>
<td>Balance</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Silver Nitrate</td>
<td>7761-88-8</td>
<td>&lt; 0.1</td>
<td>Not Available</td>
<td>0.1 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1 mg/m3</td>
<td>0.1 mg/m3</td>
</tr>
</tbody>
</table>

Section 3: Hazard Identification

Emergency Overview: Non-flammable, non-toxic, non-corrosive. Does not present any significant health hazards. Wash areas of contact with water.

Target Organs: eyes, skin

Eye Contact: May cause slight irritation.

Inhalation: Not likely to be hazardous by inhalation.

Skin Contact: May cause slight irritation.

Ingestion: Large quantity may cause stomach upset.

Chronic Effects/Carcinogenicity: None

IARC - No.
NTP - No.
OSHA - No.
Reproductive Information: Reproductive effects cited in ‘Registry of Toxic Effects of Chemical Substances’ for Silver Nitrate.


Section 4: First Aid Measures - In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.

Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Ingestion: Dilute with water or milk. Call a physician if necessary.

Section 5: Fire Fighting Measures


LFL: Not Available. UFL: Not Available.

Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Fire & Explosion Hazards: Not considered to be a fire or explosion hazard.

Fire Fighting Instructions: Use normal procedures/instructions.

Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6: Accidental Release Measures

Absorb with suitable inert material (vermiculite, dry sand, etc) and place in a chemical waste container for proper disposal. Do not flush to sewer. Dispose of in accordance with local regulations.

Section 7: Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage. Store above 20°C to prevent crystallization. If crystallization does occur, warm gently in a hot water bath and agitate occasionally to redissolve.

Safety Storage Code: General

Section 8: Exposure Control/Personal Protection

Engineering Controls: No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: Normal room ventilation is adequate.

Skin Protection: Chemical resistant gloves.

Eye Protection: Safety glasses or goggles.

Section 9: Physical and Chemical Properties

**Appearance:** Clear, colorless liquid

**Odor:** Odorless

**Solubility in Water:** Infinite

**Specific Gravity:** Approximately 1.13-1.17

**pH:** Not Available.

**Boiling Point(°C):** Approximately 100

**Melting Point(°C):** Approximately 0

**Vapor Pressure:** Not Applicable.

Section 10: Stability and Reactivity

**Chemical Stability:** Stable under normal conditions of use and storage.

**Incompatibility:** Bromine Trifluoride, Potassium Permanganate plus Sulfuric Acid.

**Hazardous Decomposition Products:** Toxic fumes of nitrogen oxides may be emitted when heated to decomposition. Oxides of potassium

**Hazardous Polymerization:** Will not occur.
Section 11. Toxicological Information
LD50, Oral, Rat: (Potassium Chloride) 2600 mg/kg, details of toxic effects not reported other than lethal dose value; Iritation (Potassium Chloride): eye, rabbit (500mg/24 hr mild); LD50, Oral, Rat: (Silver Nitrate) 1173 mg/kg, behavioral, respiratory and gastrointestinal effects noted. Silver Nitrate is investigated as a tumorigen.

Section 12. Ecological Information
Ecotoxicological Information: No information found.
Chemical Fate Information: No information found.

Section 13. Disposal Considerations
Absorb with suitable material and dispose of in accordance with local regulations. Do not flush to sewer. Dispose of in a RCRA approved waste disposal facility. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information
Part Numbers:

This product is not regulated.

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)
OSHA Status: The above items either do not contain any specifically hazardous material or the potentially hazardous material is present in such low concentration that the items do not present any immediate threat to health and safety. These items do not meet the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of a hazardous material.
TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.
Sara Title III:
Section 302 Extremely Hazardous Substances: Not Applicable.
Section 311/312 Hazardous Catagories: No
Section 313 Toxic Chemicals: Not Applicable.
California: None Reported.
Pennsylvania: Silver Nitrate is listed as an Environmental Hazard on the state's Hazardous Substances List.
RCRA Status: D011
CERCLA Reportable Quantity: Silver Nitrate - 1 pounds.

WHMIS: Not Applicable.

Section 16. Other Information
POTASSIUM CHLORIDE SOLUTIONS, 3 - 4 Molar, Saturated With Silver Chloride

MSDS

NFPA Ratings:

- Health: 1
- Flammability: 0
- Reactivity: 0

Special Notice Key: None

HMSI Ratings:

- Health: 1
- Flammability: 0
- Reactivity: 0

Protective Equipment: B (Protective Eyewear, Gloves)

Rev 1, 7-31-2000: Reformatted from WordPerfect® to Microsoft Word®; (Section 1) Revised emergency telephone number to CHEMTREC® 800-424-9300; (Section 3) added mutation data citation; (Section 7) Added safety storage code; (Section 11) added tumorigen data, expanded LD50 information; (Section 15) added Florida and Pennsylvania references.

Rev 2, 10-09-2001: Reformatted to electronic data format.

Rev 3, 04-25-2003: (Section 1) added Solutions Plus catalog number P069732.

Rev 4, 03-30-2005: (Section 1) removed SpectroPure catalog number SP069732 and Solutions Plus catalog number P069732.

Rev 5, 07-10-2006: (Section 1) added Red Bird catalog number P-608.

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.
Material Safety Data Sheet
Silver nitrate

ACC# 20810

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Silver nitrate

**Catalog Numbers:** AC197680000, AC197680050, AC197680250, AC197681000, AC197685000, AC419350000, AC419350500, AC419351000, AC419352500, AC419355000, AC419360000, AC419360250, AC419361000, AC419365000, S73068, S73069, S78171, S78171, S78172, S78173, BP2546-100, BP2546-25, BP2546-500, S181-100, S181-25, S181-500, S181-500LC, S486-100, S486-500

**Synonyms:** Nitric acid, silver salt.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7761-88-8</td>
<td>Silver nitrate</td>
<td>&gt; 99</td>
<td>231-853-9</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.

**Danger!** Strong oxidizer. Contact with other material may cause a fire. Causes burns by all exposure routes. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Target Organs:** Eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye burns.

**Skin:** Causes skin burns. May be harmful if absorbed through the skin.

**Ingestion:** Causes gastrointestinal tract burns. May be harmful if swallowed. Ingestion of soluble silver salts may cause argyria, characterized by permanent blue-gray pigmentation of the skin, mucous membranes, and eyes. Lethal dose for humans is 2 grams, or about 28.6 mg/kg.

**Inhalation:** Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma.

**Chronic:** May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. This malady results from the accumulation of silver in the body.

Section 4 - First Aid Measures
**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

**Ingestion:** Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use flooding quantities of water as spray.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 1; Instability: 2; Special Hazard: OX

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**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use with adequate ventilation. Keep from contact with clothing and other combustible materials. Inform laundry personnel of contaminant’s hazards.

**Storage:** Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Avoid storage on wood floors.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver nitrate</td>
<td>0.01 mg/m³ TWA (as Ag) (listed under Silver soluble compounds)</td>
<td>0.01 mg/m³ TWA (as Ag) (listed under Silver soluble compounds).10 mg/m³ IDLH (as Ag) (listed under Silver</td>
<td>0.01 mg/m³ TWA (as Ag) (listed under Silver soluble compounds).</td>
</tr>
</tbody>
</table>
OSHA Vacated PELs: Silver nitrate: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective clothing to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** Solid

**Appearance:** white

**Odor:** odorless

**pH:** ~ 6 (aq soln)

**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** 433 deg C

**Freezing/Melting Point:** 212 deg C

**Decomposition Temperature:** 440 deg C

**Solubility:** Soluble.

**Specific Gravity/Density:** 4.35

**Molecular Formula:** AgNO₃

**Molecular Weight:** 169.87

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Becomes gray or grayish-black on exposure to light in the presence of organic matter.

**Conditions to Avoid:** Heating to decomposition, excess light, contamination.

**Incompatibilities with Other Materials:** Strong reducing agents, strong bases, alcohols, ammonia, hydrogen peroxide, acetylene, organic matter, charcoal.

**Hazardous Decomposition Products:** Nitrogen oxides, oxygen, oxides of silver.

**Hazardous Polymerization:** Will not occur.

---

**Section 11 - Toxicological Information**

**RTECS#:**

**CAS# 7761-88-8:** VW4725000

**LD50/LC50:**

**CAS# 7761-88-8:**

- Draize test, rabbit, eye: 1 mg Severe;
- Draize test, rabbit, eye: 10 mg Moderate;
- Oral, mouse: LD50 = 50 mg/kg;
- Oral, rat: LD50 = 1173 mg/kg;

Lethal oral dose for humans estimated at 28.6 mg/kg.

**Carcinogenicity:**

**CAS# 7761-88-8:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: See actual entry in RTECS for complete information. Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: See actual entry in RTECS for complete information. Mutagenic effects have occurred in experimental animals. Mutation in microorganisms:
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
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<td>SILVER NITRATE</td>
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<td>Hazard Class:</td>
<td>5.1</td>
<td>5.1</td>
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<tr>
<td>UN Number:</td>
<td>UN1493</td>
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<tr>
<td>Packing Group:</td>
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<td>II</td>
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</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
  CAS# 7761-88-8 is listed on the TSCA inventory.
Health & Safety Reporting List
  None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
  None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
  None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
  None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
  CAS# 7761-88-8: 1 lb final RQ; 0.454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
  None of the chemicals in this product have a TPQ.
SARA Codes
  CAS # 7761-88-8: immediate, delayed, fire.
Section 313
This material contains Silver nitrate (listed as Silver compounds), > 99%, (CAS# 7761-88-8) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- CAS# 7761-88-8 is listed as a Hazardous Substance under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 7761-88-8 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7761-88-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Silver soluble compounds), Massachusetts.

**California Prop 65**
- California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- O C N

**Risk Phrases:**
- R 34 Causes burns.
- R 8 Contact with combustible material may cause fire.
- R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
- S 60 This material and its container must be disposed of as hazardous waste.
- S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**
- CAS# 7761-88-8: 3

**Canada - DSL/NDSL**
- CAS# 7761-88-8 is listed on Canada's DSL List.

**Canada - WHMIS**
- This product has a WHMIS classification of C, E, D1A.
- This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 7761-88-8 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 5/17/1999  
**Revision #11 Date:** 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Silver nitrate solution 0.1N, about 1.7%

ACC# 88029

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Silver nitrate solution 0.1N, about 1.7%

**Catalog Numbers:** S78169, SS72-1, SS72-20, SS72-4, SS72-500

**Synonyms:** None.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>98.3</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7761-88-8</td>
<td>Silver nitrate</td>
<td>1.7</td>
<td>231-853-9</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.

**Warning!** Causes respiratory tract irritation. Causes eye and skin irritation. Blue-gray permanent discoloration of the skin, conjunctiva, and internal organs, known as argyria or argyrosis, results from chronic exposure to silver or silver salts.

**Target Organs:** Blood, eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye irritation.

**Skin:** Causes skin irritation. May cause skin discoloration.

**Ingestion:** Causes gastrointestinal irritation with nausea, vomiting and diarrhea.

**Inhalation:** Causes respiratory tract irritation.

**Chronic:** May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. This malady results from the accumulation of silver in the body.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid. Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear. Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dried product residue is a strong oxidizer. Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Flash Point: Not applicable. Autoignition Temperature: Not applicable. Explosion Limits, Lower: Not available. Upper: Not available. NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8. Spills/Leaks: Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust.

Section 7 - Handling and Storage

Handling: Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Use with adequate ventilation. Do not allow to dry on clothing. Drying on clothing or other combustible materials may cause fire. Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Silver nitrate</td>
<td>0.01 mg/m3 TWA (as Ag) (listed under Silver soluble compounds).</td>
<td>0.01 mg/m3 TWA (as Ag) (listed under Silver soluble compounds).10 mg/m3 IDLH (as Ag) (listed under Silver soluble compounds).</td>
<td>0.01 mg/m3 TWA (as Ag) (listed under Silver soluble compounds).</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Silver nitrate: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Skin: Wear appropriate protective gloves to prevent skin exposure. Clothing: Wear appropriate protective clothing to prevent skin exposure. Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use
a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: Not available.
Vapor Pressure: 14 mm Hg @ 20 C
Vapor Density: 0.7
Evaporation Rate: >1 (ether=1)
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Completely soluble in water.
Specific Gravity/Density: 1.0-1.1
Molecular Formula: Solution
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Evaporating to near dryness.
Incompatibilities with Other Materials: Silver nitrate is incompatible with acetylene, ammonium hydroxide, aziridine, calcium carbide, ethanol, ethanol and nitric acid, ethylene hydroperoxide, hydrogen peroxide, magnesium arsenic, and cuprous acetylide.
Hazardous Decomposition Products: Nitrogen oxides, oxides of silver.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 7732-18-5: ZC0110000
CAS# 7761-88-8: VW4725000
LD50/LC50:
CAS# 7732-18-5:
   Oral, rat: LD50 = >90 mL/kg;
.
CAS# 7761-88-8:
   Draize test, rabbit, eye: 1 mg Severe;
   Draize test, rabbit, eye: 10 mg Moderate;
   Oral, mouse: LD50 = 50 mg/kg;
   Oral, rat: LD50 = 1173 mg/kg;
.
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7761-88-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology: No data available.
Teratogenicity: No data available.
Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>Not regulated as a hazardous material</td>
<td>No information available.</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7761-88-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7761-88-8: 1 lb final RQ; 0.454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 7761-88-8: immediate, delayed, fire.

**Section 313**
- This material contains Silver nitrate (listed as Silver compounds), 1.7%, (CAS# 7761-88-8) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
CAS# 7761-88-8 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 7761-88-8 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7761-88-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Silver soluble compounds), Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
Not available.
Risk Phrases:
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7761-88-8: 3

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7761-88-8 is listed on Canada's DSL List.

Canada - WHMIS
not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7761-88-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #4 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Silver atomic absorption standard solution 1 mg/ml Ag in 0.5N HNO3

ACC# 22768

Section 1 - Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>MSDS Name:</th>
<th>Silver atomic absorption standard solution 1 mg/ml Ag in 0.5N HNO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog Numbers:</td>
<td>AC1963000000, AC196301000, AC196305000</td>
</tr>
<tr>
<td>Synonyms:</td>
<td>None.</td>
</tr>
<tr>
<td>Company Identification:</td>
<td>Acros Organics N.V.</td>
</tr>
<tr>
<td></td>
<td>One Reagent Lane</td>
</tr>
<tr>
<td></td>
<td>Fair Lawn, NJ 07410</td>
</tr>
<tr>
<td>For information in North America, call:</td>
<td>800-ACROS-01</td>
</tr>
<tr>
<td>For emergencies in the US, call CHEMTREC:</td>
<td>800-424-9300</td>
</tr>
</tbody>
</table>

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>96.75</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>3.15</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-22-4</td>
<td>Silver</td>
<td>0.1</td>
<td>231-131-3</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

Danger! May cause severe eye irritation and possible injury. Causes skin and respiratory tract irritation. Corrosive to metal.

Target Organs: Eyes.

Potential Health Effects

Eye: Contact with eyes may cause severe irritation, and possible eye burns.
Skin: Causes skin irritation.
Ingestion: May cause irritation of the digestive tract.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not available.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** N/A

**Upper:** N/A

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation. Wash clothing before reuse.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Silver</td>
<td>0.1 mg/m3 TWA</td>
<td>0.01 mg/m3 TWA (dust) 10 mg/m3 IDLH (dust)</td>
<td>0.01 mg/m3 TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Silver: 0.01 mg/m3 TWA

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
**Section 9 - Physical and Chemical Properties**

**Physical State:** Liquid  
**Appearance:** clear, colorless  
**Odor:** None reported.  
**pH:** Not available.  
**Vapor Pressure:** Not available.  
**Vapor Density:** Not available.  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** Not available.  
**Freezing/Melting Point:** Not available.  
**Decomposition Temperature:** Not available.  
**Solubility:** miscible  
**Specific Gravity/Density:** Not available.  
**Molecular Formula:** Solution  
**Molecular Weight:** Unknown

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.  
**Conditions to Avoid:** Incompatible materials, excess heat, oxidizers.  
**Incompatibilities with Other Materials:** Alkali metals, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, organic materials, amines.  
**Hazardous Decomposition Products:** Nitrogen oxides, irritating and toxic fumes and gases, nitrogen, silver fumes.  
**Hazardous Polymerization:** Has not been reported.

**Section 11 - Toxicological Information**

**RTECS#:**  
**CAS # 7732-18-5:** ZC0110000  
**CAS # 7697-37-2:** QU5775000; QU5900000  
**CAS # 7440-22-4:** VW3500000  
**LD50/LC50:**  
**CAS # 7732-18-5:**  
  Oral, rat: LD50 = >90 mL/kg;  
**CAS # 7697-37-2:**  
  Inhalation, rat: LC50 = 260 mg/m3/30M;  
  Inhalation, rat: LC50 = 130 mg/m3/4H;  
  Inhalation, rat: LC50 = 67 ppm(NO2)/4H;  
**CAS # 7440-22-4:**

**Carcinogenicity:**  
**CAS # 7732-18-5:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS # 7697-37-2:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS # 7440-22-4:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.
Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.</td>
<td>NITRIC ACID</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN3264</td>
<td>UN2031</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
<td>II</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7440-22-4 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ CAS# 7440-22-4: 1000 lb final RQ (no reporting of releases of this hazardous substance is requir

SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ

SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.
CAS # 7440-22-4: delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 3.15%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Silver is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
- CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
- CAS# 7440-22-4 is listed as a Priority Pollutant under the Clean Water Act.
- CAS# 7440-22-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
- CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 7440-22-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
- California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
- XI

Risk Phrases:
- R 37/38 Irritating to respiratory system and skin.
- R 41 Risk of serious damage to eyes.

Safety Phrases:
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
- CAS# 7732-18-5: No information available.
- CAS# 7697-37-2: 1
- CAS# 7440-22-4: 0

Canada - DSL/NDSL
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7697-37-2 is listed on Canada's DSL List.
- CAS# 7440-22-4 is listed on Canada's DSL List.

Canada - WHMIS
- This product has a WHMIS classification of D2B, E.
- This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
- CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
- CAS# 7440-22-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 11/09/1998
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Sodium carbonate

AC# 21080

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium carbonate  
**Catalog Numbers:** AC123670000, AC123670010, AC123670025, AC206800000, AC206800010, AC206800025, AC207760000, AC207765000, AC207810000, AC207810010, AC424280000, AC424285000, S71987, S71987-1, S78416, S784161, S78419, S93359, S93360, BP357-1, NC9296359, NC9391348, NC9391843, NC9644731, S261-10, S263-1, S263-10, S263-3, S263-50, S263-500, S263-50LC, S495-500  
**Synonyms:** Crystal carbonate; Disodium carbonate; Sal soda; Soda ash; Washing soda; Soda, calcined.  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>497-19-8</td>
<td>Sodium carbonate anhydrous</td>
<td>100</td>
<td>207-838-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white powder.  
**Warning!** Harmful if inhaled. May cause eye and skin irritation with possible burns. May cause respiratory tract irritation. Hygroscopic (absorbs moisture from the air).  
**Target Organs:** Eyes, skin.

**Potential Health Effects**  
**Eye:** May result in corneal injury. Contact with eyes may cause severe irritation, and possible eye burns.  
**Skin:** Contact with skin causes irritation and possible burns, especially if the skin is wet or moist.  
**Ingestion:** May cause irritation of the digestive tract.  
**Inhalation:** Harmful if inhaled. May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema.  
**Chronic:** Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.  
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.  
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give
anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Runoff from fire control or dilution water may cause pollution.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 1

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid ingestion and inhalation.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Good general ventilation should be sufficient to control airborne levels. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carbonate anhydrous</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Sodium carbonate anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves and clothing to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: white
Odor: odorless
pH: 11.6 (solution)
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 1600 deg C
Freezing/Melting Point: 851 deg C
Decomposition Temperature: 400 deg C
Solubility: Soluble.
Specific Gravity/Density: 2.53
Molecular Formula: Na₂CO₃
Molecular Weight: 105.99

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Decomposed by acids with effervescence, evolution of carbon dioxide.
Conditions to Avoid: Dust generation, excess heat, moist air.
Incompatibilities with Other Materials: Acids, aluminum.
Hazardous Decomposition Products: Carbon dioxide, toxic fumes of sodium oxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: 
CAS# 497-19-8: VZ4050000
LD₅₀/LC₅₀: 
CAS# 497-19-8:
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, eye: 50 mg Severe;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, mouse: LC₅₀ = 1200 mg/m³/2H;
Inhalation, rat: LC₅₀ = 2300 mg/m³/2H;
Oral, mouse: LD₅₀ = 6600 mg/kg;
Oral, mouse: LD₅₀ = 6600 mg/kg;
Oral, rat: LD₅₀ = 4090 mg/kg;

Carcinogenicity: 
CAS# 497-19-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:
**Ecotoxicity:** Fish: Bluegill/Sunfish: LC50 = 320 mg/L; 96 Hr.; Static Conditions

**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

---

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not regulated</td>
<td>Not Regulated</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
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<td><strong>UN Number:</strong></td>
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<td><strong>Packing Group:</strong></td>
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</tr>
</tbody>
</table>

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**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**

CAS# 497-19-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 497-19-8: immediate.

**Section 313**

No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 497-19-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols:
  XI

Risk Phrases:
  R 36 Irritating to eyes.

Safety Phrases:
  S 22 Do not breathe dust.
  S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

WGK (Water Danger/Protection)
  CAS# 497-19-8: 1

Canada - DSL/NDSL
  CAS# 497-19-8 is listed on Canada's DSL List.

Canada - WHMIS
  This product has a WHMIS classification of D2B.
  This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
  CAS# 497-19-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/12/1999
Revision #5 Date: 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Sodium Hydroxide Solution 0.01 N to 2 N

ACC# 40177

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium Hydroxide Solution 0.01 N to 2 N

**Catalog Numbers:** GILHYD20, NC9031649, NC9400712, NC9493480, NC9500142, SS272-1, SS272-20, SS274-1, SS274-4, SS276-1, SS276-20, SS276-20LC, SS276-4, XXLC2430720LI

**Synonyms:** Caustic soda; Lye.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>96-99.96</td>
<td>231-791-2</td>
</tr>
<tr>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td>0.04-4.0</td>
<td>215-185-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: Clear liquid.

**Danger!** Eye contact may result in permanent eye damage. Causes burns by all exposure routes. Corrosive to aluminum.

**Target Organs:** Eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause lacrimation (tearing), blurred vision, and photophobia. May cause chemical conjunctivitis and corneal damage.

**Skin:** Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause systemic effects.

**Inhalation:** Irritation may lead to chemical pneumonitis and pulmonary edema. Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. Causes chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. May cause systemic effects.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Contact with metals may evolve flammable hydrogen gas.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use only with adequate ventilation. Do not breathe spray or mist.

**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from metals. Keep away from flammable liquids. Keep away from organic halogens.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>2 mg/m3 Ceiling</td>
<td>10 mg/m3 IDLH</td>
<td>2 mg/m3 TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Sodium hydroxide: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.
**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** Clear

**Odor:** none reported

**pH:** Alkaline

**Vapor Pressure:** 14 mm Hg

**Vapor Density:** >1.0

**Evaporation Rate:** Not available.

**Viscosity:** >1 (ether=1)

**Boiling Point:** 212 deg F

**Freezing/Melting Point:** 32 deg F

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.0

**Molecular Formula:** NaOH

**Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.

**Conditions to Avoid:** Excess heat.

**Incompatibilities with Other Materials:** Metals, acids, aluminum, zinc, tin.

**Hazardous Decomposition Products:** Toxic fumes of sodium oxide.

**Hazardous Polymerization:** Will not occur.

---

### Section 11 - Toxicological Information

**RTECS#:**

CAS# 7732-18-5: ZC0110000

CAS# 1310-73-2: WB4900000

**LD50/LC50:**

CAS# 7732-18-5:

- Oral, rat: LD50 = >90 mL/kg;

CAS# 1310-73-2:

- Draize test, rabbit, eye: 400 ug Mild;
- Draize test, rabbit, eye: 1% Severe;
- Draize test, rabbit, eye: 50 ug/24H Severe;
- Draize test, rabbit, eye: 1 mg/24H Severe;
- Draize test, rabbit, skin: 500 mg/24H Severe;

**Carcinogenicity:**

CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 1310-73-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information
No information available.

Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
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<tr>
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<tr>
<td>Hazard Class</td>
<td>8</td>
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<td>UN Number</td>
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<td>Packing Group</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 1310-73-2 is listed on the TSCA inventory.

Health & Safety Reporting List
- None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
- None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
- None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
- None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
- CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
- None of the chemicals in this product have a TPQ.

SARA Codes
- CAS # 1310-73-2: immediate, reactive.

Section 313
- No chemicals are reportable under Section 313.

Clean Air Act:
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 1310-73-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
C
Risk Phrases:
R 34 Causes burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 1310-73-2: 1

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 1310-73-2 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #9 Date: 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium Hypochlorite Solution, 4-6%

**Catalog Numbers:** S801831, CRNSS2904, NC9828282, SS290-1, SS290-4

**Synonyms:** None

**Company Identification:**
- Fisher Scientific
- 1 Reagent Lane
- Fair Lawn, NJ 07410

**For information, call:** 201-796-7100

**Emergency Number:** 201-796-7100

**For CHEMTREC assistance, call:** 800-424-9300

**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>94.21</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7681-52-9</td>
<td>Sodium hypochlorite</td>
<td>4-6.0</td>
<td>231-668-3</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: clear light yellow green liquid.

**Warning!** Causes eye and skin irritation and possible burns.

**Target Organs:** Eyes, skin, mucous membranes.

**Potential Health Effects**

**Eye:** May cause irreversible eye injury. Causes eye irritation and possible burns.

**Skin:** May cause severe irritation and possible burns.

**Ingestion:** Causes severe digestive tract burns with abdominal pain, vomiting, and possible death.

**Inhalation:** May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema.

**Chronic:** Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion. Human systemic effects by ingestion: somnolence, blood pressure lowering, corrosive to skin, nausea or

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Not combustible, but if involved in a fire, decomposes to produce hydrogen chloride.

**Extinguishing Media:** Cool containers with flooding quantities of water until well after fire is out. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid breathing dust, mist, or vapor. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Discard contaminated shoes.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium hypochlorite</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Sodium hypochlorite: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements
or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** clear light yellow green  
**Odor:** chlorine-like  
**pH:** Not available.  
**Vapor Pressure:** 14 mm Hg  
**Vapor Density:** Not available.  
**Evaporation Rate:** >1 (ether=1)  
**Viscosity:** Not available.  
**Boiling Point:** Decomposes.  
**Freezing/Melting Point:** 32 deg F  
**Decomposition Temperature:** Not available.  
**Solubility:** Soluble in water.  
**Specific Gravity/Density:** 1.1  
**Molecular Formula:** NaOHCl  
**Molecular Weight:** 75.4492

### Section 10 - Stability and Reactivity

**Chemical Stability:** Sodium hypochlorite solutions decompose slowly at normal temperatures releasing low concentrations of corrosive chlorine gas. Decomposition is influenced by temperature, concentration, pH, ionic strength, exposure to light and the presence of metals.  
**Conditions to Avoid:** Incompatible materials, light, combustible materials, heat.  
**Incompatibilities with Other Materials:** Strong acids, strong reducing agents, amines, ammonium salts, metals, methanol, phenylacetonitrile, formic acid, ammonia.  
**Hazardous Decomposition Products:** Hydrogen chloride, chlorine, sodium oxide.  
**Hazardous Polymerization:** Has not been reported.
**Mutagenicity:** No information found.
**Neurotoxicity:** No information found.
**Other Studies:**

**Ecotoxicity:** No data available. No information available.
**Environmental:** No information found.
**Physical:** No information found.
**Other:** No information available.

### Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.
**Physical:** No information found.
**Other:** No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>HYPOCHLORITE SOLUTIONS</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>8</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN1791</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7681-52-9 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
CAS# 7681-52-9: 100 lb final RQ; 45.4 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 7681-52-9: immediate.

**Section 313**
No chemicals are reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7681-52-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7681-52-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XI
Risk Phrases:
 R 31 Contact with acids liberates toxic gas.
 R 36/38 Irritating to eyes and skin.

Safety Phrases:
 S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 S 37/39 Wear suitable gloves and eye/face protection.
 S 50A Do not mix with acids.

WGK (Water Danger/Protection)
 CAS# 7732-18-5: No information available.
 CAS# 7681-52-9: 2

Canada - DSL/NDSL
 CAS# 7732-18-5 is listed on Canada's DSL List.
 CAS# 7681-52-9 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7681-52-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/28/1998
Revision #7 Date: 3/15/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Sodium oxalate

ACC# 21450

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium oxalate

**Catalog Numbers:** AC207720000, AC207720050, AC207721000, AC207725000, AC270540000, AC270540010, AC270540050, S80189, S801891, S93375, BP353-500, S487-500

**Synonyms:** Ethanedioic acid, disodium salt; Oxalic acid, disodium salt; Disodium oxalate; Sodium oxalate.

**Company Identification:**
- Fisher Scientific
- 1 Reagent Lane
- Fair Lawn, NJ 07410

**For information, call:** 201-796-7100

**Emergency Number:** 201-796-7100

**For CHEMTREC assistance, call:** 800-424-9300

**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>62-76-0</td>
<td>Sodium oxalate</td>
<td>&gt; 99.5</td>
<td>200-550-3</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.

**Warning!** Harmful if swallowed. Causes eye, skin, and respiratory tract irritation. May cause kidney damage. Hygroscopic (absorbs moisture from the air).

**Target Organs:** Kidneys, heart, eyes, skin, brain, nerves, mucous membranes.

**Potential Health Effects**

**Eye:** Causes eye irritation. May result in corneal injury.

**Skin:** Oxalate is an irritant and may cause dermatitis. Skin lesions begin with epithelial cracking and the formation of slow-healing ulcers. The fingers may appear cyanotic.

**Ingestion:** Ulcerations of the mouth, vomiting of blood, and rapid appearance of shock, convulsions, twitching, tetany, and cardiovascular collapse may occur following ingestion of oxalic acid or its soluble salts. Systemic effects may be due to formation of calcium oxalate which is insoluble at physiological pH and can be deposited in the brain and kidney tubules. Resultant hypocalcemia might disturb the function of the heart and nerves. Mean lethal dose for oxalates in adults is estimated at 10 - 30 grams (143 - 428 mg/kg).

**Inhalation:** Inhalation of oxalic acid dust or vapor produces irritation of the respiratory tract, protein in the urine, nosebleed, ulceration of the mucous membranes, headache, nervousness, cough, vomiting, emaciation, back pain (due to kidney injury), and weakness.

**Chronic:** Inhalation of oxalic acid dust or mist over a long period of time might result in weight loss and respiratory tract inflammation. Rats administered oxalic acid at 2.5 and 5% in the diet for 70 days developed depressed thyroid function and weight loss. A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.

Section 4 - First Aid Measures
**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

**Antidote:** Intravenous administration of calcium gluconate or calcium chloride may be required if hypocalcemia or hypocalcemic tetany occur.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Instability: 0

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing dust.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture. Oxalates slowly corrode steel.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium oxalate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Sodium oxalate: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face
protection regulations in 29 CFR 1910.133 or European Standard EN166.
**Skin:** Wear appropriate protective gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.
**Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

### Section 9 - Physical and Chemical Properties

**Physical State:** Solid  
**Appearance:** white  
**Odor:** odorless  
**pH:** Neutral in solution.  
**Vapor Pressure:** Negligible.  
**Vapor Density:** Not applicable.  
**Evaporation Rate:** Negligible.  
**Viscosity:** Not available.  
**Boiling Point:** Decomposes  
**Freezing/Melting Point:** 250 - 270 deg C  
**Decomposition Temperature:** 250 - 270 deg C  
**Solubility:** Moderately soluble in water.  
**Specific Gravity/Density:** 2.34 (water=1)  
**Molecular Formula:** C2O4Na2  
**Molecular Weight:** 134

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** High temperatures, dust generation, moisture, Oxalates slowly corrode steel.  
**Incompatibilities with Other Materials:** Strong oxidizing agents.  
**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, sodium oxide, formic acid.  
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 62-76-0: KI1750000**  
**LD50/LC50:**  
**CAS# 62-76-0:**  
  Oral, mouse: LD50 = 5094 mg/kg;  
  Oral, rat: LD50 = 11160 mg/kg;  

Mean lethal dose for oxalates in adults is estimated at 10-30 grams (143-428 mg/kg).  
**Carcinogenicity:**  
**CAS# 62-76-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.**  

**Epidemiology:** A study of railroad car cleaners in Norway who were heavily exposed to oxalic acid solutions and vapors revealed a 53% prevalence of urolithiasis (the formation of urinary stones), compared to a rate of 12% among unexposed workers from the same company.  
**Teratogenicity:** No information found  
**Reproductive Effects:** Oxalic acid caused kidney damage in fetal sheep and rats and disturbed the estrus cycle in rats. Increased sperm abnormalities were seen in the second generation of mice administered 0.2% oxalic acid in the drinking water.  
**Mutagenicity:** No information found  
**Neurotoxicity:** No information found
Other Studies:

### Section 12 - Ecological Information

No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
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<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>TOXIC SOLIDS, ORGANIC, N.O.S.</td>
<td>Toxic Solid, Organic, N.O.S.</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN2811</td>
<td>UN2811</td>
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<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
<td>III</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS # 62-76-0 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 62-76-0: immediate, delayed.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 62-76-0 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
  XN
Risk Phrases:
  R 21/22 Harmful in contact with skin and if swallowed.

Safety Phrases:
  S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
  CAS# 62-76-0: 1

Canada - DSL/NDSL
  CAS# 62-76-0 is listed on Canada's DSL List.

Canada - WHMIS
  This product has a WHMIS classification of D1B.
  This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/02/1999
Revision #14 Date: 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Sodium sulfate decahydrate

ACC# 57150

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium sulfate decahydrate
**Catalog Numbers:** AC125010000, AC394310000, AC611615000, S93382, S414-12, S414-212, S414-250LB, S414-500, S419-500
**Synonyms:** Disodium sulfate decahydrate; Disodium sulphate decahydrate; Sulfuric acid, disodium salt, decahydrate; Glauber's salt.
**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7727-73-3</td>
<td>Sodium sulfate decahydrate</td>
<td>99+</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.

**Caution!** May cause eye, skin, and respiratory tract irritation. The toxicological properties of this material have not been fully investigated.

**Target Organs:** None known.

**Potential Health Effects**

**Eye:** May cause eye irritation.

**Skin:** May cause skin irritation. May be harmful if absorbed through the skin.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

**Inhalation:** May cause respiratory tract irritation. May be harmful if inhaled.

**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medical aid.

**Skin:** Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

**Ingestion:** Do not induce vomiting. Get medical aid if irritation or symptoms occur.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

**Notes to Physician:** Treat symptomatically and supportively.
**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

**Flash Point:** Not available.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 1

**Section 5 - Fire Fighting Measures**

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

**Section 7 - Handling and Storage**

**Handling:** Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

**Storage:** Store in a cool, dry place. Store in a tightly closed container.

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium sulfate decahydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium sulfate anhydrous</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Sodium sulfate decahydrate: No OSHA Vacated PELs are listed for this chemical. Sodium sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**Section 9 - Physical and Chemical Properties**

**Physical State:** Solid

**Appearance:** white

**Odor:** odorless

**pH:** 6 - 7.5 (aq soln)
**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** 32.4 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:** 1.46

**Molecular Formula:** Na2SO4.10H2O

**Molecular Weight:** 322.19

---

**Section 10 - Stability and Reactivity**

**Chemical Stability:** Readily effloresces (loses water molecules of hydration) on exposure to air.

**Conditions to Avoid:** Incompatible materials, dust generation, exposure to air.

**Incompatibilities with Other Materials:** Aluminum.

**Hazardous Decomposition Products:** Oxides of sulfur, sodium oxide.

**Hazardous Polymerization:** Will not occur.

---

**Section 11 - Toxicological Information**

**RTECS#:**

CAS# 7727-73-3: unlisted.

CAS# 7757-82-6: WE1650000

**LD50/LC50:**

Not available.

CAS# 7757-82-6:

  Oral, mouse: LD50 = 5989 mg/kg;

**Carcinogenicity:**

CAS# 7727-73-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 7757-82-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** Equivocal tumorigenic data by RTECS criteria: tumorigenic effects in experimental animals. See actual RTECS entry for complete information.

**Teratogenicity:** Oral, mouse: TDLo = 14 gm/kg (female 8-12 day(s) after conception) Effects on Newborn - other neonatal measures or effects.; Parenteral, mouse: TDLo = 60 mg/kg (female 8 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus) and Specific Developmental Abnormalities - musculoskeletal system.

**Reproductive Effects:** No information found

**Mutagenicity:** Mutagenic effects have occurred in experimental animals.

**Neurotoxicity:** No information found

**Other Studies:**

---

**Section 12 - Ecological Information**

**Ecotoxicity:** Fish: Bluegill/Sunfish: LC50 = 12,750 ppm; 96 Hr; Static bioassay

Water flea Daphnia: LC50 = 4547 mg/L; 96 Hr

UnspecifiedFish: Fathead Minnow: LC50 = 13,500-14,000 mg/L; 24 - 96 Hr

UnspecifiedFish: Mosquito Fish: LC50 = 17,500 mg/L; 96 Hr

Unspecified This chemical is not expected to cause oxygen depletion in aquatic systems. It has a low potential to affect aquatic organisms and is expected to have a low potential to affect secondary waste treatment microorganisms.
Environmental: Sodium sulfate may persist indefinitely in the environment, but is not likely to show bioaccumulation or food chain contamination effects. If diluted with water, this chemical released directly or indirectly into the environment is not expected to have a significant impact.

Physical: No information available.

Other: This chemical is not likely to bioconcentrate.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
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</thead>
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<tr>
<td>Shipping Name:</td>
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<td>Not Regulated</td>
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<tr>
<td>Hazard Class:</td>
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<td>UN Number:</td>
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<tr>
<td>Packing Group:</td>
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<td></td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7727-73-3 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).
CAS# 7757-82-6 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 7727-73-3: Not controlled.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- Not available.

**Risk Phrases:**

**Safety Phrases:**
- S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
- CAS# 7727-73-3: No information available.
- CAS# 7757-82-6: 0

**Canada - DSL/NDSL**
- CAS# 7757-82-6 is listed on Canada's DSL List.

**Canada - WHMIS**
- This product has a WHMIS classification of Not controlled.
- This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

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**Section 16 - Additional Information**

**MSDS Creation Date:** 11/20/1998  
**Revision #6 Date:** 10/02/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Sodium thiosulfate solutions 0.025N to 1N

ACC# 40182

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sodium thiosulfate solutions 0.025N to 1N

**Catalog Numbers:** GILSODTH20, NC9512524, NC9516449, NC9638291, NC9738502, NC9745421, S78930-5, SS364-1, SS364-20, SS364-4, SS368-1, SS368-4, SS368-20, SS36820001, SS370-1, SS371-1, SS817-1, SS817-20, SS817-4, SS817-500, XXSODTHIO20L

**Synonyms:** None.

**Company Identification:**
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>76-99.4</td>
<td>231-791-2</td>
</tr>
<tr>
<td>10102-17-7</td>
<td>Sodium thiosulfate, pentahydrate</td>
<td>0.6-22.9</td>
<td>unlisted</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless liquid.

**Caution!** May cause eye, skin, and respiratory tract irritation. This is expected to be a low hazard for usual industrial handling.

**Target Organs:** None.

**Potential Health Effects**

**Eye:** May cause mild eye irritation.

**Skin:** May cause skin irritation.

**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation.

**Inhalation:** May cause respiratory tract irritation. Low hazard for usual industrial handling.

**Chronic:** No information found.

Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Antidote: None reported.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

Section 7 - Handling and Storage

Handling: Avoid prolonged or repeated contact with skin. Avoid ingestion and inhalation. Use with adequate ventilation.
Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Sodium thiosulfate, pentahydrate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Sodium thiosulfate, pentahydrate: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: Not available.
Vapor Pressure: 14 mm Hg
Vapor Density: Not available.
Evaporation Rate: >1 (ether=1)
Viscosity: Not available.
Boiling Point: 212 deg F
Freezing/Melting Point: 32 deg F
Decomposition Temperature: Not available.
Solubility: Completely soluble in water.
Specific Gravity/Density: 1.0-1.1
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable.
Conditions to Avoid: Excess heat.
Incompatibilities with Other Materials: Sodium thiosulfate violently reacts with sodium nitrite. It is also incompatible with strong oxidizers, acids.
Hazardous Decomposition Products: Hydrogen sulfide, sodium oxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:  
CAS# 7732-18-5: ZC0110000
CAS# 10102-17-7: WE6660000
LD50/LC50:  
CAS# 7732-18-5:  
   Oral, rat: LD50 = >90 mL/kg;  
   .
CAS# 10102-17-7:  
   .

Carcinogenicity:  
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10102-17-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
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<td>Not Regulated</td>
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<tr>
<td>Hazard Class:</td>
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<td>UN Number:</td>
<td></td>
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<tr>
<td>Packing Group:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

#### US FEDERAL

**TSCA**
- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 10102-17-7 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
- None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 10102-17-7 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
- California No Significant Risk Level: None of the chemicals in this product are listed.

#### European/International Regulations

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Risk Phrases:

Safety Phrases:
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 10102-17-7: 0

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 10102-17-7 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of Not controlled.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 6/08/1998
Revision #7 Date: 1/23/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Tin (II) Chloride Dihydrate

ACC# 21850

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Tin (II) Chloride Dihydrate  
**Catalog Numbers:** AC196800000, AC196800050, AC196805000, AC222460000, AC222660000, AC222661000, AC222665000, AC424480000, AC424480050, AC424485000, AC9544168, AC9544192, AC424485, AC4244810, S80206, S802061, S93386, T142-100, T142-3, T142-500, T142500LC, T163-250, T163-500  
**Synonyms:** Stannous chloride dihydrate; Stannochlor; Stannous chloride dihydrate  
**Company Identification:**  
Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
For information, call: 201-796-7100  
Emergency Number: 201-796-7100  
For CHEMTREC assistance, call: 800-424-9300  
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10025-69-1</td>
<td>Tin (II) Chloride Dihydrate</td>
<td>&gt;98</td>
<td>unlisted</td>
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Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: colorless to white solid.  
**Danger!** Causes eye and skin burns. Causes digestive and respiratory tract burns. Harmful if swallowed. May cause blood abnormalities. May cause liver and kidney damage. Moisture sensitive.  
**Target Organs:** Respiratory system, eyes, skin.

**Potential Health Effects**

**Eye:** Causes eye burns.

**Skin:** Causes skin burns. Causes redness and pain. May be harmful if absorbed through the skin.

**Ingestion:** Harmful if swallowed. Causes gastrointestinal tract burns. Exposure may cause anemia and other blood abnormalities. May cause headache, nausea, fatigue, and dizziness. Inorganic tin salts may cause systemic effects on the central nervous system, heart and liver.

**Inhalation:** Irritation may lead to chemical pneumonitis and pulmonary edema. Causes chemical burns to the respiratory tract. May cause effects similar to those described for ingestion. May be harmful if inhaled.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage. Adverse reproductive effects have been reported in animals. Chronic exposure may cause effects similar to those of acute exposure.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid. Do NOT allow victim to rub eyes or keep eyes closed.

**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing...
contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes. **Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately. **Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask. **Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. **Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. **Flash Point:** Not applicable. **Autoignition Temperature:** Not applicable. **Explosion Limits, Lower:** Not available. **Upper:** Not available. **NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use with adequate ventilation. Discard contaminated shoes. **Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Store protected from moisture.

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. **Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
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</thead>
<tbody>
<tr>
<td>Tin (II) Chloride Dihydrate</td>
<td>2 mg/m3 TWA (as Sn, except Tin hydride) (listed under Tin inorganic compounds).</td>
<td>2 mg/m3 TWA (as Sn, except Tin oxide) (listed under Tin inorganic compounds).</td>
<td>2 mg/m3 TWA (as Sn, except oxides) (listed under Tin inorganic compounds).</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Tin (II) Chloride Dihydrate: No OSHA Vacated PELs are listed for this chemical. **Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. **Skin:** Wear appropriate protective clothing to prevent skin exposure. **Clothing:** Wear appropriate protective clothing to minimize contact with skin. **Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements.
Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: colorless to white
Odor: odorless
pH: Not available.
Vapor Pressure: Negligible.
Vapor Density: Not applicable.
Evaporation Rate: negligible
Viscosity: Not available.
Boiling Point: decomposes
Freezing/Melting Point: 100 deg F
Decomposition Temperature: Not available.
Solubility: decomposes in water
Specific Gravity/Density: 2.7
Molecular Formula: SnCl2.2H2O
Molecular Weight: 225.6228

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May decompose on exposure to moist air or water. Moisture sensitive.
Conditions to Avoid: Moisture, heating to decomposition.
Incompatibilities with Other Materials: Metals, strong oxidizing agents, strong reducing agents, strong acids, strong bases, bromine trifluoride, ethylene oxide, potassium, hydrogen peroxide, sodium, moisture, calcium carbide, hydrazine hydrate, organic nitrates.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, tin/tin oxides.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#: 
CAS# 10025-69-1: XP8850000
LD50/LC50: 
CAS# 10025-69-1:
   Oral, rat: LD50 = 2274.6 mg/kg;
   Oral, rat: LD50 = 700
Carcinogenicity: 
CAS# 10025-69-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: Oral, rat: TDL0 = 3 gm/kg (female 7-12 day(s) after conception) Effects on Embryo or Fetus - fetal death.; Oral, rat: TDL0 = 3 gm/kg (female 7-12 day(s) after conception) Specific Developmental Abnormalities - craniofacial (including nose and tongue).
Reproductive Effects: Oral, rat: TDL0 = 3 gm/kg (female 7-12 day(s) after conception) Maternal Effects - other effects and Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants). Reproductive - Effects on Embryo or Fetus - fetal death
Mutagenicity: DNA Damage: Human, Leukocyte = 10 umol/L.; DNA Damage: Hamster, Ovary = 50 umol/L.
Neurotoxicity: No information found
Other Studies:
Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.
**RCRA U-Series:** None listed.

Section 14 - Transport Information

<table>
<thead>
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<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
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<tbody>
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<td>CORROSIVE SOLIDS, N.O.S.</td>
<td>CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Tin II chloride dihydrate)</td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN1759</td>
<td>UN3260</td>
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<td><strong>Packing Group:</strong></td>
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Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS # 10025-69-1 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.

**SARA Codes**
CAS # 10025-69-1: immediate, delayed.

**Section 313**
No chemicals are reportable under Section 313.

**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
CAS# 10025-69-1 can be found on the following state right to know lists: Minnesota, (listed as Tin inorganic compounds).

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 22 Harmful if swallowed.
R 34 Causes burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 10025-69-1: No information available.

Canada - DSL/NDSL
None of the chemicals in this product are listed on the DSL or NDSL list.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 10025-69-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/25/1999
Revision #6 Date: 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Starch Indicator Solution Stabilized

ACC# 40185

Section 1 - Chemical Product and Company Identification

MSDS Name: Starch Indicator Solution Stabilized
Catalog Numbers: S79009, NC9655551, NC9745731, NC9807563, SS408-1, SS408-4, XX88801LI, XXMAR7701833
Synonyms: None
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
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<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
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</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>98.8</td>
<td>231-791-2</td>
</tr>
<tr>
<td>64-19-7</td>
<td>Acetic acid</td>
<td>&lt;1.0</td>
<td>200-580-7</td>
</tr>
<tr>
<td>9005-25-8</td>
<td>Starch</td>
<td>&lt;0.1</td>
<td>232-679-6</td>
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</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid.
Caution! May cause respiratory tract irritation. May cause skin irritation. May cause eye irritation. May cause digestive tract irritation. This is expected to be a low hazard for usual industrial handling.
Target Organs: None.

Potential Health Effects
Eye: May cause mild eye irritation.
Skin: May cause skin irritation.
Ingestion: Ingestion of large amounts may cause gastrointestinal irritation.
Inhalation: Low hazard for usual industrial handling. May cause respiratory tract irritation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing Media: For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

Section 7 - Handling and Storage

Handling: Avoid prolonged or repeated contact with skin. Avoid ingestion and inhalation. Use with adequate ventilation.

Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>10 ppm TWA; 15 ppm STEL</td>
<td>10 ppm TWA; 25 mg/m³ TWA; 50 ppm IDLH</td>
<td>10 ppm TWA; 25 mg/m³ TWA</td>
</tr>
<tr>
<td>Starch</td>
<td>10 mg/m³ TWA</td>
<td>10 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable dust)</td>
<td>15 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Acetic acid: 10 ppm TWA; 25 mg/m³ TWA Starch: 15 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties
**Physical State:** Liquid  
**Appearance:** colorless  
**Odor:** none reported  
**pH:** Not available.  
**Vapor Pressure:** 14 mm Hg  
**Vapor Density:** 0.7  
**Evaporation Rate:** >1 (ether=1)  
**Viscosity:** Not available.  
**Boiling Point:** 212 deg F  
**Freezing/Melting Point:** 32 deg F  
**Decomposition Temperature:** Not available.  
**Solubility:** Soluble in water.  
**Specific Gravity/Density:** 1.0  
**Molecular Formula:** Mixture  
**Molecular Weight:** Not available.

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable.  
**Conditions to Avoid:** None reported.  
**Incompatibilities with Other Materials:** None reported.  
**Hazardous Decomposition Products:** None.  
**Hazardous Polymerization:** Has not been reported.

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 7732-18-5:** ZC0110000  
**CAS# 64-19-7:** AF1225000  
**CAS# 9005-25-8:** GM5090000  
**LD50/LC50:**  
**CAS# 7732-18-5:**  
Oral, rat: LD50 = >90 mL/kg;  
**CAS# 64-19-7:**  
Draize test, rabbit, skin: 50 mg/24H Mild;  
Inhalation, mouse: LC50 = 5620 ppm/1H;  
Oral, rat: LD50 = 3310 mg/kg;  
Skin, rabbit: LD50 = 1060 uL/kg;  
**CAS# 9005-25-8:**  
...  
**Carcinogenicity:**  
**CAS# 7732-18-5:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 64-19-7:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**CAS# 9005-25-8:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** No information found  
**Teratogenicity:** No information found  
**Reproductive Effects:** No information found  
**Mutagenicity:** No information found
**Neurotoxicity:** No information found

**Other Studies:**

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**Section 12 - Ecological Information**

No information available.

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**Section 13 - Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

---

**Section 14 - Transport Information**

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
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<td><strong>Shipping Name:</strong></td>
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<tr>
<td><strong>Hazard Class:</strong></td>
<td></td>
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<tr>
<td><strong>UN Number:</strong></td>
<td></td>
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<tr>
<td><strong>Packing Group:</strong></td>
<td></td>
</tr>
</tbody>
</table>

---

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**

CAS# 7732-18-5 is listed on the TSCA inventory.

CAS# 64-19-7 is listed on the TSCA inventory.

CAS# 9005-25-8 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

CAS# 64-19-7: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS# 64-19-7: immediate, delayed, fire.

**Section 313**

No chemicals are reportable under Section 313.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**

CAS# 64-19-7 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
- CAS# 64-19-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 9005-25-8 can be found on the following state right to know lists: Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
- Not available.
Risk Phrases:
Safety Phrases:
- S 24/25 Avoid contact with skin and eyes.
- S 7 Keep container tightly closed.
HGK (Water Danger/Protection)
- CAS# 7732-18-5: No information available.
- CAS# 64-19-7: 1
- CAS# 9005-25-8: 0

Canada - DSL/NDSL
- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 64-19-7 is listed on Canada's DSL List.
- CAS# 9005-25-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of Not controlled..
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 64-19-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #6 Date: 10/03/2005
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
EMERGENCY OVERVIEW

Appearance: colorless liquid.

**Danger!** Causes irritation and possible burns by all routes of exposure. Cancer hazard. Concentrated sulfuric acid reacts violently with water and many other substances under certain conditions. Contact with metals may evolve flammable hydrogen gas. May cause lung damage.

**Target Organs:** Lungs, respiratory system, teeth, eyes, skin.

**Potential Health Effects**

**Eye:** May cause irreversible eye injury. Causes eye irritation and possible burns. The severity of injury depends on the concentration of the solution and the duration of exposure.

**Skin:** Causes skin irritation and possible burns. The severity of injury depends on the concentration of the solution and the duration of exposure.

**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes digestive tract irritation with possible burns.

**Inhalation:** Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects. Causes respiratory tract irritation with possible burns.

**Chronic:** Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Effects may be delayed. Workers chronically exposed to sulfuric acid mists may show various lesions of the skin, tracheobronchitis, stomatitis, conjunctivitis, or gastritis. Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans.
**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

**Antidote:** Do NOT use oils or ointments in eye.

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**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Substance is noncombustible. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas.

**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use carbon dioxide or dry chemical. Most foams will react with the material and release corrosive/toxic gases.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

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**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes.

**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store near alkaline substances.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

OSHA Vacated PELs: Sulfuric acid: 1 mg/m³ TWA  Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.
Skin: Wear neoprene gloves, apron, and/or clothing.
Clothing: Wear neoprene gloves, apron, and/or clothing.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: none reported
pH: <1.0
Vapor Pressure: Not available.
Vapor Density: >1.0
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Not available.
Specific Gravity/Density: >1.0
Molecular Formula: Mixture
Molecular Weight: Not available

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Sulfuric acid reacts vigorously, violently or explosively with many organic and inorganic chemicals and with water.
Conditions to Avoid: Mechanical shock, incompatible materials, metals, excess heat, combustible materials, organic materials, oxidizers, amines, bases.
Incompatibilities with Other Materials: Metals, strong oxidizing agents, strong reducing agents, bases, chlorates, finely powdered metals, iron, nitrates, nitrites, perchlorates, permanganates, phosphorus, potassium chlorates, steel, zinc, hydrogen peroxide, cesium acetylene carbide, cyanides (e.g. potassium cyanide, sodium cyanide), nitromethane, phosphorus trioxide, azides, iodides, benzene, carbides, fulminates, picrates, organic materials, mercuric nitride, strong dehydrating agents, alkali halides, cyclopentadiene, cyclopentanone oxime, nitroaryl amines, lithium silicides, trihydroxydiamino phosphate.
Hazardous Decomposition Products: Carbon monoxide, oxides of sulfur, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:  
CAS# 7664-93-9: WS5600000  
CAS# 7732-18-5: ZC0110000  
LD50/LC50:
CAS# 7664-93-9:
- Draize test, rabbit, eye: 250 ug Severe;
- Inhalation, mouse: LC50 = 320 mg/m3/2H;
- Inhalation, mouse: LC50 = 320 mg/m3;
- Inhalation, rat: LC50 = 510 mg/m3/2H;
- Inhalation, rat: LC50 = 510 mg/m3;
- Oral, rat: LD50 = 2140 mg/kg;

CAS# 7732-18-5:
- Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 7664-93-9:
- ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)
- California: carcinogen, initial date 3/14/03 (listed as Strong inorganic acid mists containing sulfuric acid).
- NTP: Known carcinogen (listed as Strong inorganic acid mists containing s).
- IARC: Group 1 carcinogen

CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This suggests a possible relationship between carcinogenesis and inhalation of sulfuric acid mist.

Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: There are no mutagenicity studies specifically of sulfuric acid. However, there are established effects of reduced pH in mutagenicity testing, as would be caused by sulfuric acid. These effects are an artifact of low pH.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 49 mg/L; 48Hr; CAS# 7664-93-9: TLm (tap water @ 20C)Fish: Bluegill/Sunfish: 24.5 ppm; 48Hr; CAS# 7664-93-9: TLm (fresh water) No data available.
Environmental: CAS# 7664-93-9 Sulfuric acid reacts with calcium and magnesium in water to form sulfate salts. During transport through the soil, sulfuric acid can dissolve some of the soil material, in particular carbonate-based materials.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>SULFURIC ACID</td>
</tr>
</tbody>
</table>
### US FEDERAL

**TSCA**
- CAS# 7664-93-9 is listed on the TSCA inventory.
- CAS# 7732-18-5 is listed on the TSCA inventory.

**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- CAS# 7664-93-9: 1000 lb final RQ; 454 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**
- CAS# 7664-93-9: 1000 lb TPQ

**SARA Codes**
- CAS # 7664-93-9: immediate, delayed, reactive.

**Section 313**
This material contains Sulfuric acid (CAS# 7664-93-9, 0.49-12.3%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
  - None of the chemicals in this product are listed as Priority Pollutants under the CWA.
  - None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**
- CAS# 7664-93-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
- CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Sulfuric acid, listed as `Strong inorganic acid mists contain', a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

### European/International Regulations

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- XI

**Risk Phrases:**
- R 36/38 Irritating to eyes and skin.

**Safety Phrases:**
- S 26 In case of contact with eyes, rinse immediately with plenty of
water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
- CAS# 7664-93-9: 2
- CAS# 7732-18-5: No information available.

**Canada - DSL/NDSL**
- CAS# 7664-93-9 is listed on Canada's DSL List.
- CAS# 7732-18-5 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of C, D1A, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**
- CAS# 7664-93-9 is listed on the Canadian Ingredient Disclosure List.

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 6/25/1999  
**Revision #6 Date:** 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Tellurium Atomic Absorption Standard Solution, 1 mg/ml Te in 2% KOH

ACC# 74479

Section 1 - Chemical Product and Company Identification

MSDS Name: Tellurium Atomic Absorption Standard Solution, 1 mg/ml Te in 2% KOH
Catalog Numbers: AC196340000, AC196341000, AC196345000
Synonyms: None Known.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

Forinformation in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
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<td>1310-58-3</td>
<td>Potassium Hydroxide</td>
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<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>Balance</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: not available liquid.


Target Organs: Central nervous system, cardiovascular system.

Potential Health Effects

Eye: Causes severe eye burns. May cause irreversible eye injury. Contact may cause ulceration of the conjunctiva and cornea. Eye damage may be delayed.

Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin.

Ingestion: Harmful if swallowed. May cause circulatory system failure. May cause perforation of the digestive tract. May cause cardiac disturbances. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause central nervous system effects.

Inhalation: Harmful if inhaled. Irritation may lead to chemical pneumonitis and pulmonary edema. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. May cause cardiac abnormalities.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact may cause conjunctivitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.
**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Treat symptomatically and supportively.

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### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water with caution and in flooding amounts. Contact with moisture or water may generate sufficient heat to ignite nearby combustible materials.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1; Special Hazard: -W-

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

---

### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Do not allow water to get into the container because of violent reaction. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from water. Keep away from metals. Keep away from flammable liquids. Keep away from organic halogens.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

#### Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium Hydroxide</td>
<td>2 mg/m3 Ceiling</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Tellurium</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Potassium Hydroxide: No OSHA Vacated PELs are listed for this chemical. Tellurium: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

### Section 9 - Physical and Chemical Properties

- **Physical State:** Liquid
- **Appearance:** not available
- **Odor:** None reported.
- **pH:** Not available.
- **Vapor Pressure:** Not available.
- **Vapor Density:** Not available.
- **Evaporation Rate:** Not available.
- **Viscosity:** Not available.
- **Boiling Point:** Not available.
- **Freezing/Melting Point:** Not available.
- **Decomposition Temperature:** Not available.
- **Solubility:** miscible
- **Specific Gravity/Density:** Not available.
- **Molecular Formula:** Solution
- **Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

- **Chemical Stability:** Stable. Stable under normal temperatures and pressures. Readily absorbs carbon dioxide and moisture from the air and deliquesces (to absorb atmospheric water vapor and become liquid).

**Conditions to Avoid:** Incompatible materials, moisture, contact with water, acids, metals.

**Incompatibilities with Other Materials:** Generates large amounts of heat when in contact with water and may steam and splatter. Reacts with chlorine dioxide, nitrobenzene, nitromethane, nitrogen trichloride, peroxidized tetrahydrofuran, 2,4,6-trinitrotoluene, bromoform+ crown ethers, acids alcohols, sugars, germanium cyclopentadiene, maleic dicarbide. Corrosive to metals such as aluminum, tin, and zinc to cause formation of flammable hydrogen gas.

**Hazardous Decomposition Products:** Oxides of potassium.

**Hazardous Polymerization:** Has not been reported.

---

### Section 11 - Toxicological Information

- **RTECS#:**
  - CAS# 1310-58-3: TT2100000
  - CAS# 7732-18-5: ZC0110000

- **LD50/LC50:**
  - CAS# 1310-58-3:
    - Draize test, rabbit, skin: 50 mg/24H Severe;
    - Oral, rat: LD50 = 273 mg/kg;

  - CAS# 7732-18-5:
    - Oral, rat: LD50 = >90 mL/kg;

- **Carcinogenicity:**
  - CAS# 1310-58-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
  - CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

### Section 12 - Ecological Information

Ecotoxicity: Fish: Mosquito Fish: LC50 = 80.0 mg/L; 24 Hr.; Unspecified No data available.
Environmental: No information found.
Physical: No information found.
Other: No information available.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th></th>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name</td>
<td>POTASSIUM HYDROXIDE, SOLUTION</td>
<td>POITASSIUM HYDROXIDE SOLUTION</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN1814</td>
<td>UN1814</td>
</tr>
<tr>
<td>Packing Group</td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

TSCA
CAS# 1310-58-3 is listed on the TSCA inventory.
Tellurium is not listed on the TSCA inventory. It is for research and development use only.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-58-3: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 1310-58-3: immediate, reactive.
Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 1310-58-3 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 1310-58-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XI C
Risk Phrases:
R 35 Causes severe burns.
R 36/38 Irritating to eyes and skin.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 2 Keep out of reach of children.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 27 Take off immediately all contaminated clothing.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 1310-58-3: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
CAS# 1310-58-3 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 1310-58-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Thiourea

ACC# 23420

Section 1 - Chemical Product and Company Identification

MSDS Name: Thiourea
Catalog Numbers: S80225, T101-100, T101-212, T101-212LC, T101-3, T101-500
Synonyms: Thiocarbamide; Thiourea; Isothiourea; Thiocarbonic acid diamide; Sulourea.
Company Identification:
   Fisher Scientific
   1 Reagent Lane
   Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>62-56-6</td>
<td>Thiourea</td>
<td>&gt;99</td>
<td>200-543-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white crystals.

Warning! Harmful if swallowed. Causes respiratory tract irritation. May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies. This substance has caused adverse reproductive and fetal effects in animals.

Target Organs: Blood, liver, bone marrow, thyroid, reproductive system.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: Harmful if swallowed. May cause severe irritation of the digestive tract. May cause anemia, leukopenia (reduction in the number of white blood cells in the blood), and thrombocytopenia. May cause bone marrow depression.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause cancer according to animal studies. May cause reproductive and fetal effects. Prolonged or repeated exposure may cause thyroid damage. Chronic exposure may cause liver damage. Laboratory experiments have resulted in mutagenic effects. Thiourea has an antithyroid effect and it is possible that fetal goiter might be produced by sufficient maternal exposure to this agent. Thiourea was teratogenic in rats exposed to a 0.2% solution as drinking water.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.
Skin: In case of contact, immediately flush skin with soap and plenty of water. Remove contaminated clothing and
shoes. Get medical aid if symptoms occur. Wash clothing before reuse. 
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid. 
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. 
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Dusts may be an explosion hazard if mixed with air at critical proportions and in the presence of an ignition source. 
**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam. 
**Flash Point:** Not available. 
**Autoignition Temperature:** 440 deg C (824.00 deg F) 
**Explosion Limits, Lower:** Not available. 
**Upper:** Not available. 
**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8. 
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid breathing dust. 
**Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. 

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiourea</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Thiourea: No OSHA Vacated PELs are listed for this chemical. 

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. 
**Skin:** Wear appropriate protective clothing to prevent skin exposure. 
**Clothing:** Wear appropriate protective gloves to prevent skin exposure. 
**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements
Section 9 - Physical and Chemical Properties

**Physical State:** Crystals  
**Appearance:** white  
**Odor:** odorless  
**pH:** Not available.  
**Vapor Pressure:** 2.5 mm Hg @ 25 deg C  
**Vapor Density:** 2.6  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** Decomposes.  
**Freezing/Melting Point:** 176 - 178 deg C  
**Decomposition Temperature:** > 180 deg C  
**Solubility:** Soluble.  
**Specific Gravity/Density:** 1.405  
**Molecular Formula:** CH₄N₂S  
**Molecular Weight:** 76.12

Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures. Polymerization may occur upon heating.  
**Conditions to Avoid:** Mechanical shock, dust generation, excess heat.  
**Incompatibilities with Other Materials:** Oxidizing agents, strong acids, strong bases, acrolein, nitric acid, hydrogen peroxide, acrylaldehyde.  
**Hazardous Decomposition Products:** Nitrogen oxides, carbon monoxide, oxides of sulfur, carbon dioxide.  
**Hazardous Polymerization:** May occur.

Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 62-56-6:** YU2800000  
**LD50/LC50:**  
**CAS# 62-56-6:**  
- Draize test, rabbit, eye: 14%;  
- Oral, rat: LD50 = 125 mg/kg;  

**Carcinogenicity:**  
**CAS# 62-56-6:**  
- ACGIH: Not listed.  
- California: carcinogen, initial date 1/1/88  
- NTP: Suspect carcinogen  
- IARC: Not listed.

**Epidemiology:** No data available.  
**Teratogenicity:** Oral, rat: TDLo = 240 mg/kg (female 12 day(s) after conception) Specific Developmental Abnormalities - Central Nervous System and musculoskeletal system.; Oral, rat: TDLo = 1400 mg/kg (female 16-22 day(s) after conception) Specific Developmental Abnormalities - Endocrine system.  
**Reproductive Effects:** Oral, rat: TDLo = 1 gm/kg (female 12 day(s) after conception) = Fertility - post-
implantation mortality (e.g. dead and/or resorbed implants per total number of implants); Oral, hamster: TDLo = 22400 mg/kg (female 10 week(s) pre-mating) Maternal Effects - uterus, cervix, vagina and other effects.; Oral, domestic mammal: TDLo = 9 gm/kg (male 90 day(s) pre-mating) Paternal Effects - spermatogenesis (incl. genetic material, sperm morphology, motility, and count) and other effects on male

**Mutagenicity:** DNA Inhibition: Human, Fibroblast = 60 mmol/L.; DNA Inhibition: Human, Lymphocyte = 20 mmol/L.; DNA Inhibition: Human, HeLa cell = 140 mmol/L.; Morphological Transformation: Rat, Embryo = 100 mg/L.; DNA Damage: Rat, Liver = 30 mmol/L.; Mutation in Mammalian Somatic Cells: Hamster, Lung = 10 mmol/L.

**Neurotoxicity:** No information found

**Other Studies:**

### Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: LC50 > 600 mg/L; 96 Hr; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 3400 mg/L; 15 min; Microtox testWater flea Daphnia: LC50 = 1.8 mg/L; Unspecified; Unspecified If released to water, thiourea will react with hydroxyl radicals in sunlit natural waters with an estimated half-life of 171 days. Hydrolysis, volatilization, adsorption to sediments, and bioconcentration are not expected to be important aquatic fate processes. Thiourea appears to be generally resistant to aquatic biodegradation as demonstrated by various standard biodegradation tests.

**Environmental:** If released to soil, thiourea may degrade by both chemical and microbial degradation, although elevated levels of thiourea may suppress microflora activity for extended periods of time. In one soil degradation study, thiourea persisted for periods in excess of 15 weeks. It is expected to be highly mobile in soil and susceptible to leaching. If released to the atmosphere, thiourea may be associated with particulate matter suggesting potential importance of wet and dry deposition. Thiourea existing as free vapor-phase is expected to react with photochemically-produced hydroxyl radicals.

**Physical:** No information available.

**Other:** Testicular toxicity of thiourea has been demonstrated in fish exposed to concentrations of 300 ppm.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**


### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>TOXIC SOLIDS, ORGANIC, N.O.S.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>6.1</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN2811</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>III</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 62-56-6 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 62-56-6: 10 lb final RQ; 4.54 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS # 62-56-6: immediate, delayed.

Section 313
This material contains Thiourea (CAS# 62-56-6, >99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 62-56-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Thiourea, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 62-56-6: 10 æg/day NSRL

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN N

Risk Phrases:
R 22 Harmful if swallowed.
R 40 Limited evidence of a carcinogenic effect.
R 63 Possible risk of harm to the unborn child.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 62-56-6: 2

Canada - DSL/NDSL
CAS# 62-56-6 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1B, D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 62-56-6 is listed on the Canadian Ingredient Disclosure List.
Section 16 - Additional Information

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Tin Atomic Absorption Standard Solution 1 mg/ml Sn in 20% HCl

ACC# 44266

Section 1 - Chemical Product and Company Identification

MSDS Name: Tin Atomic Absorption Standard Solution 1 mg/ml Sn in 20% HCl
Catalog Numbers: AC196390000, AC196395000
Synonyms: None.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7647-01-0</td>
<td>Hydrogen chloride</td>
<td>20.0</td>
<td>231-595-7</td>
</tr>
<tr>
<td>7440-31-5</td>
<td>Tin</td>
<td>&lt; 1</td>
<td>231-141-8</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>Balance</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.
Danger! Corrosive. Causes eye and skin burns. Harmful if swallowed. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause central nervous system effects.
Target Organs: Central nervous system.

Potential Health Effects
Eye: Causes eye burns. May cause irreversible eye injury.
Skin: Causes skin burns. Prolonged and/or repeated contact may cause irritation and/or dermatitis.
Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. Ingested inorganic tin exhibits only moderate toxicity due to poor absorption and rapid tissue turnover. Ingestion of large amounts may cause gastrointestinal irritation, nausea, cramps, vomiting and diarrhea. May interfere with various enzyme systems.
Inhalation: Irritation may lead to chemical pneumonitis and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. Causes sore throat, coughing, shortness of breath, and dental corrosion. When inhaled as a dust or fume, may cause benign pneumoconiosis.
Chronic: Repeated skin contact may cause dermatitis with dark pigmentation of the skin.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire. If water is the only media available, use in flooding amounts.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use with adequate ventilation. Discard contaminated shoes.

**Storage:** Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Tin</td>
<td>2 mg/m3 TWA</td>
<td>2 mg/m3 TWA 100 mg/m3 IDLH</td>
<td>2 mg/m3 TWA</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Hydrogen chloride: No OSHA Vacated PELs are listed for this chemical. Tin: 2 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.
**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to minimize contact with skin.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** clear, colorless  
**Odor:** practically odorless  
**pH:** Not available.  
**Vapor Pressure:** Not available.  
**Vapor Density:** >1.0  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** Not available.  
**Freezing/Melting Point:** Not available.  
**Decomposition Temperature:** Not available.  
**Solubility:** miscible  
**Specific Gravity/Density:** Not available.  
**Molecular Formula:** Solution  
**Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, excess heat.  
**Incompatibilities with Other Materials:** Strong acids, strong bases, strong oxidizing agents, strong reducing agents.  
**Hazardous Decomposition Products:** Hydrogen chloride, tin/tin oxides.  
**Hazardous Polymerization:** Has not been reported.

---

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 7647-01-0: MW4025000; MW4031000  
**CAS#** 7440-31-5: XP7320000  
**CAS#** 7732-18-5: ZC0110000  
**LD50/LC50:**  
**Inhalation, mouse:** LC50 = 1108 ppm/1H;  
**Inhalation, mouse:** LC50 = 20487 mg/m3/5M;  
**Inhalation, mouse:** LC50 = 3940 mg/m3/30M;  
**Inhalation, mouse:** LC50 = 8300 mg/m3/30M;  
**Inhalation, rat:** LC50 = 3124 ppm/1H;  
**Inhalation, rat:** LC50 = 60938 mg/m3/5M;  
**Inhalation, rat:** LC50 = 7004 mg/m3/30M;  
**Inhalation, rat:** LC50 = 45000 mg/m3/5M;  
**Inhalation, rat:** LC50 = 8300 mg/m3/30M;  
**Oral, rabbit:** LD50 = 900 mg/kg;
CAS# 7440-31-5:  

CAS# 7732-18-5:  
Oral, rat: LD50 = >90 mL/kg;  

Carcinogenicity:  
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 7440-31-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

Epidemiology: No information found  
Teratogenicity: No information found  
Reproductive Effects: No information found  
Mutagenicity: No information found  
Neurotoxicity: No information found  
Other Studies:  

Section 12 - Ecological Information  
No information available.  

Section 13 - Disposal Considerations  
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.  
RCRA P-Series: None listed.  
RCRA U-Series: None listed.  

Section 14 - Transport Information  
<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>HYDROCHLORIC ACID</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>UN1789</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>II</td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information  
US FEDERAL  
TSCA  
CAS# 7647-01-0 is listed on the TSCA inventory.  
CAS# 7440-31-5 is listed on the TSCA inventory.  
CAS# 7732-18-5 is listed on the TSCA inventory.  

Health & Safety Reporting List  
None of the chemicals are on the Health & Safety Reporting List.  

Chemical Test Rules  
None of the chemicals in this product are under a Chemical Test Rule.  

Section 12b  
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
CAS# 7647-01-0: 500 lb TPQ

SARA Codes
CAS # 7647-01-0: immediate.

Section 313
This material contains Hydrogen chloride (CAS# 7647-01-0, 20.0%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7647-01-0 is considered highly hazardous by OSHA.

STATE
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-31-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
C
Risk Phrases:
R 34 Causes burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 7647-01-0: 1
CAS# 7440-31-5: No information available.
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 7440-31-5 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-31-5 is listed on the Canadian Ingredient Disclosure List.
Section 16 - Additional Information

MSDS Creation Date: 7/02/1999
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Urea

ACC# 24680

Section 1 - Chemical Product and Company Identification

**MSDS Name:** Urea  
**Synonyms:** Carbamide resin; Carbamimidic acid; Carbonyl diamide; Carbonyldiamine;Isourea  
**Company Identification:** Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410  
**For information, call:** 201-796-7100  
**Emergency Number:** 201-796-7100  
**For CHEMTREC assistance, call:** 800-424-9300  
**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>57-13-6</td>
<td>Urea</td>
<td>&gt;98</td>
<td>200-315-5</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

**EMERGENCY OVERVIEW**

Appearance: white solid.  
**Caution!** May cause eye, skin, and respiratory tract irritation.  
**Target Organs:** None known.

**Potential Health Effects**

**Eye:** May cause eye irritation. Causes redness and pain.  
**Skin:** May cause skin irritation. Causes redness and pain. May be harmful if absorbed through the skin.  
**Ingestion:** Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause cardiac disturbances. May be harmful if swallowed.  
**Inhalation:** May cause respiratory tract irritation. May be harmful if inhaled.  
**Chronic:** Prolonged or repeated exposure may cause adverse reproductive effects.

Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.  
**Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.  
**Ingestion:** Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Treat symptomatically and supportively.

---

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or chemical foam.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 1; Flammability: 0; Instability: 0

---

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

---

**Section 7 - Handling and Storage**

**Handling:** Use with adequate ventilation. Minimize dust generation and accumulation. Avoid breathing dust, mist, or vapor. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

**Storage:** Store in a cool, dry place. Store in a tightly closed container.

---

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Urea: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective clothing to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA’s 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

---

**Section 9 - Physical and Chemical Properties**

**Physical State:** Solid

**Appearance:** white
**Odor:** ammonia-like  
**pH:** 7.5-9.5 (10% aq. solution)  
**Vapor Pressure:** 1.25 mm Hg @ 25 deg C  
**Vapor Density:** Not available.  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** decomposes  
**Freezing/Melting Point:** 131-135 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Soluble.  
**Specific Gravity/Density:** 1.335  
**Molecular Formula:** CH4N2O  
**Molecular Weight:** 60.06

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, dust generation, temperatures above 130°C.  
**Incompatibilities with Other Materials:** Sodium hypochlorite, calcium hypochlorite, sodium nitrate, nitrosyl perchlorate, strong oxidizing agents, dichromates, liquid chlorine, nitrates, permanganates, chromyl chloride.  
**Hazardous Decomposition Products:** Carbon monoxide, oxides of nitrogen, carbon dioxide, ammonia.  
**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 57-13-6:** YR6250000  
**LD50/LC50:**  
**CAS# 57-13-6:**  
- Oral, mouse: LD50 = 11 gm/kg;  
- Oral, rat: LD50 = 8471 mg/kg;  

**Carcinogenicity:**  
**CAS# 57-13-6:** Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** Oral, rat: TDLo = 821 gm/kg/1Y-C (Tumorigenic - neoplastic by RTECS criteria - Blood - tumors and Blood - lymphoma, including Hodgkin's disease).; Oral, mouse: TDLo = 394 gm/kg/1Y-C (Tumorigenic - Carcinogenic by RTECS criteria - Blood - tumors and Blood - lymphoma, including Hodgkin's disease).  
**Teratogenicity:** No information available.  
**Reproductive Effects:** Intraplacental, woman: TDLo = 1400 mg/kg (female 16 week(s) after conception) Fertility - abortion.; Intraplacental, woman: TDLo = 1600 mg/kg (female 16 week(s) after conception) Fertility - abortion.  
**Mutagenicity:** DNA Inhibition: Human, Lymphocyte = 600 mmol/L.; Cytogenetic Analysis: Human, Leukocyte = 50 mmol/L.; DNA Damage: Mouse, Lymphocyte = 628 mmol/L.; Mutation in Mammalian Somatic Cells: Mouse, Lymphocyte = 265 mmol/L.  
**Neurotoxicity:** No information available.  
**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Bacteria: Phytobacterium phosphoreum: EC50 = 23914 mg/L; 5 min; Microtox test If released to water, urea can degrade readily through biotic hydrolysis as demonstrated by various screening studies. The presence of naturally-occurring phytoplankton increases the degradation rate because phytoplankton use urea as a nitrogen source and because urea is decomposed by phytoplankton photosynthesis. In phytoplankton-rich waters,
Degradation occurs much faster in sunlight than in the dark. Abiotic hydrolysis of urea occurs very slowly in relation to biotic hydrolysis. **Environmental:** If released to the atmosphere, urea will degrade rapidly in the vapor-phase by reaction with photochemically produced hydroxyl radicals (half-life of 9.6 hr). If released to soil, urea is hydrolyzed to ammonium through soil urease activity (the basis of its use as a fertilizer). The rate of hydrolysis can be fast (24 hr); however, a number a variables (such as increasing the pellet size of the fertilizer) can decrease the degradation rate from days to weeks. **Physical:** No information found. **Other:** Do not empty into drains.

### Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification. **RCRA P-Series:** None listed. **RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong></td>
<td>Not Regulated.</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>Not Regulated.</td>
</tr>
<tr>
<td><strong>UN Number:</strong></td>
<td>Not Regulated.</td>
</tr>
<tr>
<td><strong>Packing Group:</strong></td>
<td>Not Regulated.</td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
- CAS # 57-13-6 is listed on the TSCA inventory.

**Health & Safety Reporting List**
- None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**
- None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
- None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**
- None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
- None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**
- None of the chemicals in this product have a TPQ.

**SARA Codes**
- CAS # 57-13-6: immediate.

**Section 313**
- No chemicals are reportable under Section 313.

**Clean Air Act:**
- This material does not contain any hazardous air pollutants.
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**
- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 57-13-6 can be found on the following state right to know lists: Minnesota.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
- Not available.

**Risk Phrases:**

**Safety Phrases:**
- S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
- CAS# 57-13-6: 1

**Canada - DSL/NDSL**
- CAS# 57-13-6 is listed on Canada's DSL List.

**Canada - WHMIS**
- This product has a WHMIS classification of D2B, D2A.
- This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

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**Section 16 - Additional Information**

**MSDS Creation Date:** 5/28/1999
**Revision #7 Date:** 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Yttrium atomic absorption standard solution, 1 mg/ml Y in 2% HNO3

ACC# 37848

Section 1 - Chemical Product and Company Identification

MSDS Name: Yttrium atomic absorption standard solution, 1 mg/ml Y in 2% HNO3
Catalog Numbers: AC196450000, AC196455000
Synonyms: None.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>Water</td>
<td>97.9</td>
<td>231-791-2</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>Nitric acid</td>
<td>2</td>
<td>231-714-2</td>
</tr>
<tr>
<td>7440-65-5</td>
<td>Yttrium</td>
<td>0.1</td>
<td>231-174-8</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

Danger! May cause severe eye irritation and possible injury. Causes skin and respiratory tract irritation. Corrosive to metal.
Target Organs: Eyes.

Potential Health Effects
Eye: Contact may cause severe eye irritation and possible eye damage.
Skin: Causes skin irritation.
Ingestion: May cause irritation of the digestive tract.
Inhalation: Causes respiratory tract irritation.
Chronic: Exposure to high concentrations of nitric acid vapor may cause pneuomonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial
**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may accumulate in confined spaces. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Contact with water forms corrosive vapors. Non-combustible substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes. Runoff from fire control or dilution water may cause pollution.

**Extinguishing Media:** Do NOT get water inside containers. For large fires, use water spray, fog or alcohol-resistant foam. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out.

**Flammable Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

**Section 6 - Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

**Section 7 - Handling and Storage**

**Handling:** Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Use with adequate ventilation. Wash clothing before reuse. Discard contaminated shoes.

**Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm TWA; 4 ppm STEL</td>
<td>2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH</td>
<td>2 ppm TWA; 5 mg/m3 TWA</td>
</tr>
<tr>
<td>Yttrium</td>
<td>1 mg/m3 TWA</td>
<td>1 mg/m3 TWA 500 mg/m3 IDLH</td>
<td>1 mg/m3 TWA</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Yttrium: 1 mg/m3 TWA
Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** None reported.

**pH:** Not available.

**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** Not available.

**Freezing/Melting Point:** Not available.

**Decomposition Temperature:** Not available.

**Solubility:** miscible

**Specific Gravity/Density:** Not available.

**Molecular Formula:** Solution

**Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. May discolor on exposure to light.

**Conditions to Avoid:** Excess heat.

**Incompatibilities with Other Materials:** Alcohols, alkali metals, amines, brass, copper, copper alloys, finely powdered metals, galvanized iron, organic materials.

**Hazardous Decomposition Products:** Nitrogen oxides, irritating and toxic fumes and gases, nitrogen gas.

**Hazardous Polymerization:** Has not been reported.

---

### Section 11 - Toxicological Information

**RTECS#:**

CAS# 7732-18-5: ZC0110000

CAS# 7697-37-2: QU5775000; QU5900000

CAS# 7440-65-5: ZG2980000

**LD50/LC50:**

CAS# 7732-18-5:
- Oral, rat: LD50 = >90 mL/kg;

CAS# 7697-37-2:
- Inhalation, rat: LC50 = 260 mg/m3/30M;
- Inhalation, rat: LC50 = 130 mg/m3/4H;
- Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

CAS# 7440-65-5:
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-65-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name:</td>
<td>NITRIC ACID</td>
</tr>
<tr>
<td>Hazard Class:</td>
<td>8</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN2031</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>II</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7440-65-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ
SARA Codes
CAS # 7697-37-2: immediate, delayed, fire.

Section 313
This material contains Nitric acid (CAS# 7697-37-2, 2%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7440-65-5 can be found on the following state right to know lists: New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XI
Risk Phrases:
R 37/38 Irritating to respiratory system and skin.
R 41 Risk of serious damage to eyes.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1
CAS# 7440-65-5: No information available.

Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7440-65-5 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-65-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #6 Date: 3/16/2007
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
EMERGENCY OVERVIEW

Appearance: Not available.

**Danger!** Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. The toxicological properties of this material have not been fully investigated.

**Target Organs:** No data found.

**Potential Health Effects**

**Eye:** Causes eye burns. May cause chemical conjunctivitis and corneal damage.

**Skin:** Causes skin burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

**Ingestion:** May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May be harmful if swallowed. May cause systemic effects.

**Inhalation:** Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects.

**Chronic:** Effects may be delayed.

Section 4 - First Aid Measures

**Eyes:** Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

**Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.  
**Notes to Physician:** Treat symptomatically and supportively.

---

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.  
**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use extinguishing media most appropriate for the surrounding fire.  
**Flash Point:** Not applicable.  
**Autoignition Temperature:** Not applicable.  
**Explosion Limits, Lower:** Not available.  
**Upper:** Not available.  
**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

---

### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.  
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

---

### Section 7 - Handling and Storage

**Handling:** Use only in a well-ventilated area. Avoid breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes.  
**Storage:** Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

---

### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.  
**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Chloride</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
<tr>
<td>Zinc</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
<tr>
<td>Water</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** Hydrogen Chloride: No OSHA Vacated PELs are listed for this chemical. Zinc: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.  
**Personal Protective Equipment**  
**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face
protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

---

### Section 9 - Physical and Chemical Properties

**Physical State:** Clear liquid  
**Appearance:** Not available.  
**Odor:** odorless  
**pH:** Not available.  
**Vapor Pressure:** Not available.  
**Vapor Density:** Not available.  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 100 deg C  
**Freezing/Melting Point:** Not available.  
**Decomposition Temperature:** Not available.  
**Solubility:** miscible with water  
**Specific Gravity/Density:** 1.0100g/cm³  
**Molecular Formula:** Solution  
**Molecular Weight:** Not available.

---

### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.  
**Conditions to Avoid:** Incompatible materials, excess heat.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases, alkali metals, aluminum, amines, copper, copper alloys.  
**Hazardous Decomposition Products:** Hydrogen chloride, irritating and toxic fumes and gases.  
**Hazardous Polymerization:** Has not been reported.

---

### Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 7647-01-0:** MW4025000; MW4031000  
**CAS# 7440-66-6:** ZG8600000  
**CAS# 7732-18-5:** ZC0110000  
**LD50/LC50:**  
**CAS# 7647-01-0:**  
Inhalation, mouse: LC50 = 1108 ppm/1H;  
Inhalation, mouse: LC50 = 20487 mg/m³/5M;  
Inhalation, mouse: LC50 = 3940 mg/m³/30M;  
Inhalation, mouse: LC50 = 8300 mg/m³/30M;  
Inhalation, rat: LC50 = 3124 ppm/1H;  
Inhalation, rat: LC50 = 60938 mg/m³/5M;  
Inhalation, rat: LC50 = 7004 mg/m³/30M;  
Inhalation, rat: LC50 = 45000 mg/m³/5M;  
Inhalation, rat: LC50 = 8300 mg/m³/30M;  
Oral, rabbit: LD50 = 900 mg/kg;
CAS# 7440-66-6:

CAS# 7732-18-5:
  Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 7647-01-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7440-66-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Hydrochloric acid has been shown to produce fetotoxicity in the fetus or embryo of laboratory animals. Specific developmental abnormalities include homeostsis.

Teratogenicity: No information found

Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.

Mutagenicity: No information found

Neurotoxicity: No information found

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
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<th>US DOT</th>
<th>Canada TDG</th>
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<tbody>
<tr>
<td>Shipping Name:</td>
<td>HYDROCHLORIC ACID</td>
<td>HYDROCHLORIC ACID SOLUTION</td>
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<tr>
<td>Hazard Class:</td>
<td>8</td>
<td>8</td>
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<tr>
<td>UN Number:</td>
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<tr>
<td>Packing Group:</td>
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<td>II</td>
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</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 7440-66-6 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
  None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
  CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
  CAS# 7440-66-6: 1000 lb final RQ (no reporting of releases of this hazardous substance is requir

SARA Section 302 Extremely Hazardous Substances
  CAS# 7647-01-0: 500 lb TPQ

SARA Codes
  CAS # 7647-01-0: immediate.
  CAS # 7440-66-6: immediate.

Section 313
  This material contains Hydrogen Chloride (CAS# 7647-01-0, 2.0%), which is subject to the reporting
  requirements of Section 313 of SARA Title III and 40 CFR Part 373.
  This material contains Zinc (CAS# 7440-66-6, <1.0%), which is subject to the reporting requirements of Section
  313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
  CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
  This material does not contain any Class 1 Ozone depletors.
  This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
  CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
  CAS# 7440-66-6 is listed as a Priority Pollutant under the Clean Water Act.
  CAS# 7440-66-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:
  CAS# 7647-01-0 is considered highly hazardous by OSHA.

STATE
  CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania,
  Minnesota, Massachusetts.
  CAS# 7440-66-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania,
  Massachusetts.
  CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
  California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
  C

Risk Phrases:
  R 34 Causes burns.

Safety Phrases:
  S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)
  CAS# 7647-01-0: 1
  CAS# 7440-66-6: 0
  CAS# 7732-18-5: No information available.

Canada - DSL/NDSL
  CAS# 7647-01-0 is listed on Canada's DSL List.
  CAS# 7440-66-6 is listed on Canada's DSL List.
  CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS
  This product has a WHMIS classification of E.
  This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and
  the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
  CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 7440-66-6 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

**MSDS Creation Date:** 9/02/1997  
**Revision #5 Date:** 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
Material Safety Data Sheet
Zobell's Solution MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name: Zobell's Solution</th>
<th>Contact Information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog Codes: SLZ1141</td>
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<tr>
<td>CAS#: Mixture.</td>
<td></td>
</tr>
<tr>
<td>RTECS: Not applicable.</td>
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<tr>
<td>TSCA: TSCA 8(b) inventory: No products were found.</td>
<td></td>
</tr>
<tr>
<td>Cl#: Not available.</td>
<td></td>
</tr>
<tr>
<td>Synonym: Zobell's Solution</td>
<td></td>
</tr>
<tr>
<td>Chemical Name: Zobell's Solution</td>
<td></td>
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<tr>
<td>Chemical Formula: Not applicable.</td>
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</tr>
</tbody>
</table>

Section 2: Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium chloride</td>
<td>7447-40-7</td>
<td>1</td>
</tr>
<tr>
<td>Potassium ferricyanide</td>
<td>13746-66-2</td>
<td>1</td>
</tr>
<tr>
<td>Potassium ferrocyanide trihydrate</td>
<td>14459-95-1</td>
<td>1</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>97</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Potassium chloride: ORAL (LD50): Acute: 2500 mg/kg [Guinea pig], 2600 mg/kg [Rat]. 2715 mg/kg [Mouse]. Potassium ferricyanide: ORAL (LD50): Acute: 2970 mg/kg [Mouse]. Potassium ferrocyanide trihydrate: ORAL (LD50): Acute: 6400 mg/kg [Rat], 5000 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant). Slightly hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation. Non-corrosive for skin. Non-sensitizer for skin.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to blood, lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate. Finish cleaning by
spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Neutralize the residue with a dilute solution of sodium carbonate. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

### Section 7: Handling and Storage

**Precautions:**
Do not ingest. Do not breathe gas/fumes/vapour/spray. Avoid contact with eyes. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label.

**Storage:**
No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**
Splash goggles. Lab coat.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
Not available.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Dark.

**pH (1% soln/water):** Acidic.

**Boiling Point:** The lowest known value is 100°C (212°F) (Water).

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** Weighted average: 1.01 (Water = 1)

**Vapor Pressure:** The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).
**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

---

**Section 11: Toxicological Information**

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 2500 mg/kg [Guinea pig]. (Potassium chloride).

**Chronic Effects on Humans:** The substance is toxic to blood, lungs, mucous membranes.

**Other Toxic Effects on Humans:**
Slightly hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.
Non-corrosive for skin. Non-sensitizer for skin.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Passes through the placental barrier in animal. (Potassium chloride)

**Special Remarks on other Toxic Effects on Humans:** Not available.

---

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may
Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 9: Miscellaneous hazardous material.
Identification: Not available. (Potassium ferricyanide): Not available. PG: III
Special Provisions for Transport: Marine Pollutant (Potassium ferricyanide)

Section 15: Other Regulatory Information

Federal and State Regulations: No products were found.


Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
This product is not classified according to the EU regulations.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable.
Lab coat.
Wear appropriate respirator when ventilation is inadequate.
Splash goggles.
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:34 PM

Last Updated: 10/10/2005 12:34 PM

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