Material Safety Data Sheet

Section 1 - Product and Company Information

Product Name: Sulfuric acid 98.9969% (purity based on trace metals)
Product Number: 2309741
Brand: Aldrich Chemical
Company: Sigma-Aldrich
Address: 3000 Sproule Street
City, State, Zip, Country: SAINT LOUIS, MO 63110 US
Technical Phone: 600-325-5932
Fax: 600-325-5032

Emergency Phone: 314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name: SULFURIC ACID, >= 91%
CAS #: 7664-93-9
SARA 213: No
EC no: 231-035-5
Annex I Index Number: 016-020-00-8

Formula: H2SO4
Synonyms: Acide sulfurique (French), acidsolforico (Italian), Battery acid, BOV, Dihydrigen sulfate, Dipping acid, Electrolyte acid, Matting acid, Oil of vitriol, Schwefelsaurelosung (German), Strong inorganic acid mix containing sulfuric acid, Sulfuric acid (ACGIH/OSHA), Sulfat, Sulfur-3, Vitriol Brown Oil, Zwavelzuuroplossing (Dutch)

Section 3 - Hazards Identification

Emergency Overview: Corrosive. Causes severe burns.

HMIS Rating:
Health: 3*
Flammability: 0
Readvity: 2

NFPA Rating:
Health: 3
Flammability: 0
Readvity: 2

*additional chronic hazards present.
For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Dermal Exposure: In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

Eye Exposure: In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

Conditions of Flammability: Strong dehydrating agent which may cause ignition of finely divided materials on contact.

Autoignition Temp: N/A

Firefighting:
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emit toxic fumes under fire conditions. Contact with other material may cause fire.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill:
Evacuate area.

Procedure(s) of Personal Protection(s):
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up:
Absorb on sand or vermiculite and place in closed containers for disposal.

Section 7 - Handling and Storage

Handling:
User Exposure:
Do not breathe vapor. Do not get in eyes, on skin, or clothing. Avoid prolonged or repeated exposure.

Storage:
Suitable:
Keep tightly closed.

Incompatible Materials:
Do not allow contact with water.

Section 8 - Exposure Controls / PPE

Engineering Controls:
Safety shower and eye bath. Use only in a chemical fume hood.

Personal Protective Equipment:
Respiratory:
Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where air monitoring shows air-purifying respirators are appropriate. Use a full-face respirator with multipurpose combination (US) or type ABEK - P3 (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand:
Compatible chemical-resistant gloves.

Eye:
Chemical safety goggles.

Aldrich Chemical - 339741 Sigma-Aldrich Corporation www.sigma-aldrich.com
Section 9 - Physical/Chemical Properties

Appearance
Liquid

Molecular Weight
98.06 AMU

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>1.2</td>
<td></td>
<td>Concentration: 5 g/L</td>
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<tr>
<td>BP/VP Range</td>
<td>230°C</td>
<td>760 mmHg</td>
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<tr>
<td>MP/MP Range</td>
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<tr>
<td>Freezing Point</td>
<td>3°C</td>
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<tr>
<td>Vapor Pressure</td>
<td>1 mmHg</td>
<td>145.8°C</td>
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<tr>
<td>Vapor Density</td>
<td>&lt;0.3 g/L</td>
<td>25°C</td>
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<td>Saturated Vapor Conc.</td>
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<tr>
<td>SG/Density</td>
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<td>Bulk Density</td>
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<tr>
<td>Odor Threshold</td>
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<tr>
<td>Volatile %</td>
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<tr>
<td>VOC Content</td>
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</tr>
<tr>
<td>Water Content</td>
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<tr>
<td>Solvent Content</td>
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<tr>
<td>Evaporation Rate</td>
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<tr>
<td>Viscosity</td>
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<tr>
<td>Surface Tension</td>
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<tr>
<td>Partition Coefficient</td>
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<tr>
<td>Decomposition Temp.</td>
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<tr>
<td>Flash Point°F</td>
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</tr>
<tr>
<td>Flash Point°C</td>
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<td>Explosion Limits</td>
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<td>Flammability</td>
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<tr>
<td>Autoignition Temp.</td>
<td>N/A</td>
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</table>

Section 10 - Stability and Reactivity

Stability
Stable

Conditions to Avoid
Moisture

Materials to Avoid

Hazardous Decomposition Products
Sulfur oxides, Hydrogen sulfide gas

Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

Route of Exposure
Skin Contact
Causes severe burns.

Skin Absorption
May be harmful if absorbed through the skin.

Eye Contact
Causes severe burns.

Inhalation
Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be harmful if inhaled.

Ingestion
May be harmful if swallowed.

Target Organ(s) or System(s)
Teeth, Lungs,

Signs and Symptoms of Exposure
Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure may cause Pulmonary edema. Effects may be delayed. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

RTÉCS Number: W55600000

Toxicity Data
Oral - Rat: 2140 mg/kg (LD₅₀)
Inhalation - Rat: 510 mg/m³ (LC₅₀)
Inhalation - Mouse: 320 mg/m³ (LC₅₀)
Inhalation - Guinea pig: 18 mg/m³ (LC₅₀)

Remarks: Lungs, Thorax, or Respiratory

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Section 15 - Regulatory Information

EU Directives Classification
Symbol of Danger: C
Indication of Danger: Corrosive
Risk Statements: R: 36
Causes severe burns.

Safety Statements: S: 26; 30; 45
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Never add water to the product in case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Classification and Label Text
Indication of Danger: Corrosive
Risk Statements: Causes severe burns.

Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Never add water to the product. Wear suitable protective clothing, gloves, and eye/face protection in case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

United States Regulatory Information
SARA Listed: No

TSCA Inventory Item: Yes

Canada Regulatory Information
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.