

SULPHURIC ACID

PRODUCT IDENTIFICATION

Chemical Name and Synonyms: Sulphuric acid; Oil of vitriol
Chemical Family: Inorganic acid
Chemical Formula: H₂SO₄
Product Use: Laboratory reagent
Manufacturers Name and Address: Caledon Laboratories Ltd. 40
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HAZARDOUS INGREDIENTS OF MATERIALS

Ingredients, %, TLV Units, CAS No: Sulphuric acid, > 95, 1 mg/m³,
7664-93-9

PHYSICAL DATA

Physical State: Liquid
Odour and Appearance: Clear, colourless, oily liquid which may
have a sharp odour, especially if heated
Odour Threshold (ppm): 1 mg/m³ (detection); 1 mg/m³ to 3 mg/m³
(irritation) Poor warning properties; irritation and detection above
TLV.
Vapour Pressure (mm Hg): 0.3 mm Hg at 25 °C
Vapour Density (Air = 1): 3.4
Evaporation Rate: Very low
Boiling Point (degrees C): 327 °C (98 %)
Freezing Point (degrees C): -2 °C (98 %)
pH: < 2 (dilute solutions)
Specific Gravity: 1.8437
Coefficient of Water/Oil distribution: Not available.

SHIPPING DESCRIPTION

UN: 1830
T.D.G. Class: 8
Pkg. Group: II

REACTIVITY DATA

Chemical Stability: Stable at normal temperatures. Decomposes at
340 °C into sulphur trioxide and water. Very hygroscopic.

Incompatibility with other substances: Contact with organic
materials may cause fire and explosion. Contact with metals may
form toxic and flammable sulphur dioxide and hydrogen gases. Many
substances and classes of substance react with concentrated
sulphuric acid (a powerful oxidizing desiccant) with varying degrees
of violence. These include acetone/nitric acid, acetonitrile/SO₃,
acrylonitrile, alkyl nitrates, BrF₃, copper, 2-cyanopropan-2-ol, cyclo-
pentadiene, metal acetylides or carbides, metal chlorates and
perchlorates, nitramide, nitric acid/organic matter, nitric acid/toluene,
nitrobenzene, nitromethane, p-nitrotoluene, permanganates,
phosphorus, phosphorus trioxide, potassium, sodium, sodium
carbonate. Dilution of sulphuric acid with water is vigorously
exothermic; always add acid to water to avoid local boiling; violent or
explosive reactions with acetaldehyde, benzyl alcohol at 180 °C,
1-chloro-2,3-epoxypropane, p-chloronitro- benzene/SO₃,
2-cyano-4-nitro-benzenediazonium hydrogensulphate,
1,3-diazidobenzene, p-dimethylamino benzaldehyde, hexalithium
disilicide, H₂O₂, NaBH₄, 1,2,4,5-tetrazine or ZnI₂. In many of these
reactions, the exothermic dehydrating action of H₂SO₄ augments its
oxidizing action. Very corrosive to most metals including cast iron,
stainless steel, brass, aluminum, titanium, nickel and some alloys.
Attacks most plastics; only Teflon is resistant. Oxidizes, dehydrates
or sulphonates most organic compounds.

Reactivity: Avoid high temperatures, all incompatible materials,
generation of mist or vapour. Mix with water very carefully - heat
evolution will cause severe spattering. Always add acid to water,
never the reverse.

Hazardous Decomposition Products: SO_x, sulphuric acid vapours,
flammable hydrogen gas.

FIRE AND EXPLOSION DATA

Flammability: Does not burn, but heat of reaction may ignite many
other materials on contact. Reacts with most metals to release highly
flammable/explosive hydrogen gas.

Extinguishing Media: Use appropriate media to extinguish the
surrounding supporting fire. Use water to cool containers, absorb
heat, and disperse vapours. Do not allow water to come in direct
contact with acid. Fight fire from a safe distance and from upwind.
Firefighters must wear specialized protective clothing (full body
encapsulating chemical resistant suit) and positive-pressure full
face-piece self-contained breathing apparatus.

Flash Point (Method Used): Not applicable.

Autoignition Temperature: Not applicable.

Upper Flammable Limit (% by volume): Not applicable.

Lower Flammable Limit (% by volume): Not applicable.

Hazardous Combustion Products: SO_x, sulphuric acid vapours,
flammable/explosive hydrogen gas.

Sensitivity to Impact: None identified.

TOXICOLOGICAL PROPERTIES AND HEALTH DATA**Toxicological Data:**

LD50: (oral, rat) 2,140 mg/kg

LC50: (rat) 510 mg/m³/2h

Effects of Acute Exposure to Product:

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Inhaled: Corrosive. Extremely destructive to tissue of respiratory tract. May cause increased pulmonary resistance, cough, shortness of breath. Severe overexposure can cause severe damage to lungs, pulmonary edema, respiratory collapse, and death. Symptoms (shortness of breath, frothy sputum, cyanosis) may be delayed until hours or days after exposure. Even short term exposure, if severe, can result in permanent lung damage.

In contact with skin: Corrosive. Severity of injury depends on the concentration and duration of exposure. Can cause severe irritation, brownish yellow stains, pain, burns and permanent scarring. Repeated exposure to dilute solutions may cause irritation, redness, pain, drying and cracking of the skin.

In contact with eyes: Corrosive. Severity of injury depends on concentration and duration of exposure. Can cause severe irritation, swelling, burns and permanent corneal damage, including blindness.

Ingested: May be fatal if swallowed. Causes severe burning and pain in the mouth, throat and abdomen. Vomiting, diarrhea and stricture or perforation of the esophagus and stomach lining may occur. Aspiration may occur during ingestion or vomiting, and can cause serious lung damage, pulmonary edema, and death.

Effects of Chronic Exposure to Product: Chronic exposure to low concentrations can cause dermatitis and conjunctivitis, etching of the teeth, perforation of the nasal septum. Chronic inhalation can cause bronchial hyperreactivity, nasal congestion, tracheobronchitis.

Carcinogenicity: Mists containing sulphuric acid considered carcinogenic to humans (ACGIH, IARC, NTP). Positive association between development of upper respiratory cancer, especially laryngeal cancer, and exposure to conc. sulphuric acid in workers at a chemical refinery.

Teratogenicity: Concentrated sulphuric acid has produced embryotoxicity in animal testing.

Reproductive Effects: No human data. No effects in mice or rabbits

Mutagenicity: Insufficient information available.

Synergistic Products: None known.

PREVENTIVE MEASURES

Engineering Controls: Corrosion-resistant exhaust ventilation, separate from other ventilation systems.

Respiratory Protection: Use only in a chemical fumehood. Up to 15 mg/m³ - NIOSH/MSHA approved full face-piece chemical cartridge respirator with acid gas cartridges and high-efficiency particulate filter, or continuous-flow supplied-air respirator. For higher or unknown concentrations, as in fire or spill conditions, full face-piece supplied-air respirator with auxiliary positive-pressure self-contained breathing apparatus or full face-piece, positive-pressure self-contained breathing apparatus.

Skin Protection: Butyl rubber, polyethylene, Teflon, Viton, Saranex, Responder, Barricade, CPF3, 4H, Trelchem HPS, Tychem 10000 gloves. Other impervious clothing, apron, sleeves, coverall, boots sufficient to prevent contact.

Other Personal Protective Equipment: Safety showers and eye wash fountains in storage and handling area.

Leak and Spill Procedure: Evacuate area. Eliminate all sources of ignition. Cleanup crew must be thoroughly trained in the hazards of this product and its safe use, and must wear protective respiratory equipment and impervious clothing sufficient to prevent inhalation of mists, fumes or vapours, and contact. Stop the discharge if possible and contain by constructing barriers. Keep away from all combustible materials. Avoid contact with water. Keep from entering sewers or waterways. Absorb on sand or vermiculite and place in closed containers for disposal, reclamation or neutralization. Contaminated absorbent may pose the same hazards as the chemical; treat with caution. After thorough cleanup, ventilate area and wash site with copious amounts of running water.

Waste Disposal: Follow all federal, provincial, and local regulations for disposal.

Handling Procedures and Equipment: CORROSIVE, TOXIC.

Persons working with this product must be thoroughly trained in its hazards and its safe use, and must wear appropriate protective equipment and clothing. Do not work alone with this product. When diluting, always add acid to water, slowly, while stirring carefully. Use the smallest amount possible for the purpose in a designated area with adequate ventilation. Avoid all contact with liquid or vapours. Keep work area clean and free of any combustible or incompatible materials. Keep away from all sources of heat and ignition. Caution - empty containers may contain hazardous residues; treat with caution.

Storage Requirements: Store in suitable, labelled containers, in a dry, well-ventilated area out of direct sunlight. Store away from incompatible and combustible materials and all ignition sources. Store at temperatures above freezing. The material attacks many forms of rubber, coatings and plastics, store in appropriate containers that are resistant. Keep tightly closed. Storage area should be constructed of non-combustible materials and have raised sills, with trenching to safe area. Protect from damage, and inspect frequently for signs of damage or leaking.

FIRST AID MEASURES

Specific Measures:

Eyes: IMMEDIATELY FLUSH EYES with gently running water for thirty to sixty (30 to 60) minutes, holding eyelids open while flushing. Take care not to flush contaminated water into the unaffected eye. Wear gloves to prevent contact during first aid procedures. Get medical attention immediately.

Skin: IMMEDIATELY remove contaminated clothing (including shoes, watches, belts, and rings) and flush the exposed area with running water for at least twenty to thirty (20-30) minutes. Place victim under a deluge shower if the exposure is extensive. Wear protective gloves to avoid contact. Completely clean folds, creases, groin, under fingernails. Get medical attention immediately. Discard contaminated clothing, shoes, leather goods.

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Inhalation: IMMEDIATELY remove to fresh air (caution must be used by rescuers to avoid exposure to the contaminating fumes). Give oxygen for breathing difficulty. If breathing has stopped give artificial respiration and GET MEDICAL ATTENTION IMMEDIATELY. Avoid contact by using mouth guards or shields.

Stay with casualty until medical help arrives. If severe exposure is suspected hospitalization and observation for 72 hours for delayed onset of pulmonary edema is advised.

Ingestion: Do not induce vomiting. If casualty is alert and not convulsing, rinse mouth with water and give 1 to 2 glasses of water or milk to dilute material. IMMEDIATELY OBTAIN MEDICAL ATTENTION. If spontaneous vomiting occurs; have casualty lean forward with head down to avoid breathing in of vomitus, rinse mouth thoroughly and administer 1 to 2 glasses of water or milk.

REFERENCES USED

Budavari: The Merck Index, 12th ed., 1997

CCINFO disc: MSDSs, March 2007

Royal Society of Chemistry: Chemical Safety Data Sheets, Vol. 3, 1990

Sax, Lewis: Hawleys Condensed Chemical Dictionary, 11th ed., 1987

Suppliers Material Safety Data Sheets:

ADDITIONAL INFORMATION

Date Issued: 10-Mar-89

Revision: Mar 2013

Proposed WHMIS Designation: D1A; D2A; E

Prepared by: Caledon Laboratories Ltd. (905) 877-0101