



1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Oleum

Synonyms: Fuming Sulfuric Acid, Pyrosulfuric Acid, Disulfuric Acid, Dithionic acid, Sulfuric acid, mixture with sulfur trioxide

Product Use: Used in the manufacture of organic sulfonates, fibers and explosives.

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2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Hazardous Ingredients</u>	<u>% by Wt.</u>	<u>CAS Number</u>
Sulfuric Acid	63-100%	7664-93-9
Sulfur Trioxide	0-37%	7446-11-9

3. HAZARD INFORMATION

EMERGENCY OVERVIEW:

Danger! Extremely corrosive. Causes severe eye and skin burns. Harmful if inhaled. May cause nose, throat, and lung injury; lung injury may be delayed. Reacts violently with water. Concentrated Sulfuric Acid will react with many organic materials and may cause fire due to the heat of reaction. Not flammable, but reacts with most metals to form explosive hydrogen gas. Read the entire MSDS for a more thorough evaluation of the hazards.

Oleum is a colorless to amber, clear to slightly cloudy, oily liquid.

**National Fire Protection Association (NFPA) Rating
Hazardous Materials Identification System (HMIS) Rating**

	NFPA	HMIS	4 = Extreme/Severe
Health	3	3	3 = High/Serious
Fire	0	0	2 = Moderate
Reactivity	2	2	1 = Slight
Special	W		0 = Minimum
Personal		C	W = Water Reactive
Protection			

3. HAZARD INFORMATION (continued)

	ACGIH (TLV)	OSHA (PEL)	NIOSH (REL)
Sulfuric Acid	1 mg/m ³ (TWA) 3 mg/m ³ (STEL) A2 (Notations) refers to sulfuric acid contained in strong inorganic acid mists; suspected human carcinogen	1 mg/m ³ (TWA)	1 mg/m ³ (TWA)

POTENTIAL HEALTH EFFECTS:**Exposure Limits:**

Eye Contact: Immediate pain, severe burns and corneal damage, which may result in permanent blindness.

Skin Contact: Causes burns, and brownish or yellow stains. Concentrated solutions may cause second or third degree burns with severe necrosis. Prolonged and repeated exposure to dilute solutions may cause irritation, redness, pain and drying and cracking of the skin.

Inhalation: Causes respiratory irritation and at high concentrations may cause severe injury, burns, or death. Effects of exposure may be delayed.

Ingestion: Causes severe irritation or burns of the mouth, throat, and esophagus.

Existing Medical Conditions Possibly Aggravated By Exposure: Skin irritation may be aggravated in individuals with existing skin lesions. Breathing of vapors or sprays (mists) may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.

Carcinogenicity: Strong inorganic acid mists containing sulfuric acid (Occupational exposures): Proven (Human, Group 1, IARC); Suspected (Human Group A2, ACGIH) ; Group 3 (NTP) ; Classification not applicable to sulfuric acid and sulfuric acid solutions.

4. FIRST AID MEASURES

General: Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential. **SPEED IS ESSENTIAL. OBTAIN IMMEDIATE MEDICAL ATTENTION.**

Skin contact: Flush skin with running water for a **minimum** of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention **IMMEDIATELY**. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.

While the patient is being transported to a medical facility, apply compresses of cold water. If medical treatment must be delayed, immerse the affected area in cold water.

Discard heavily contaminated clothing and shoes in a manner, which limits further exposure. Otherwise, wash clothing separately before reuse.

Eye contact: Immediately flush eyes with running water for a **minimum** of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention **IMMEDIATELY**. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.

Inhalation: Move victim to fresh air. If breathing is difficult, give oxygen. Please note: Symptoms may be delayed; prompt medical attention may be required. Give artificial respiration **ONLY** if breathing has stopped. Do not use mouth-to-mouth method 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. Give Cardiopulmonary Resuscitation (CPR) if there is no pulse **AND** no breathing. Obtain medical attention **IMMEDIATELY**.

Ingested: DO NOT INDUCE VOMITING. If victim is alert and not convulsing, rinse mouth and give ½ to 1 glass of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. **IMMEDIATELY** contact local poison control centre. Vomiting may need to be induced but should be directed by a physician or a poison control centre. **IMMEDIATELY** transport victim to an emergency facility.

Note to Physicians: This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed. Following exposure the patient should be kept under medical review for at least 48 hours as delayed pneumonitis may occur. **DO NOT** attempt to neutralize the acid with weak bases since the reaction will produce heat that may extend the corrosive injury

5. FIRE AND EXPLOSION DATA

Flash Point (method): Not applicable. Not combustible

Flammable Limits (Lower): Not applicable.

Flammable Limits (Upper): Not applicable.

Auto Ignition Temperature: Not applicable.

Combustion and Thermal Decomposition Products: Oxides of Sulfur

Fire and Explosion Hazards: Not flammable but highly reactive. Strong dehydrating agent, which may cause ignition of finely divided combustible materials on contact. Reacts violently with water with evolution of heat can react with organic materials explosively (See Section 10). Reacts with many metals to liberate hydrogen gas which can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage. Oxides of sulfur may be produced in fire.

Fire Fighting Instructions: Wear a NIOSH approved self-contained breathing apparatus if vapors or mists are present and full protective clothing. For fighting fires in close proximity to spill or vapors, use acid-resistant personal protective equipment. Evacuate personnel to a safe area. Prevent unauthorized entry to fire area. Dike area to contain runoff and prevent contamination of water sources. Neutralize runoff with lime, soda ash or other suitable neutralizing agents (see Deactivating Chemicals, Section 6). Cool containers that are exposed to flame with streams of water until fire is out.

NOTE: Also see "Section 10 - Stability and Reactivity"

6. ACCIDENTAL RELEASE MEASURES

Steps to be taken in the event of a spill or leak: Remove all ignition sources (no smoking, flares, sparks or flames). Ventilate area. Use appropriate Personal Protection Equipment. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Stop or reduce leak if safe to do so.

Evacuation: Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas.

Small Spills: Cover with DRY earth, sand or other non-combustible material. Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

Large Spills: Prevent liquid from entering sewers or waterways. Dike with inert material (sand, earth, etc.). Collect into containers for reclamation or disposal only if container is suitable to withstand the material. Consider in situ neutralization and disposal. Anhydrous sodium sulfate is useful to treat spills of oleum. It reacts with the liquid to contain and solidify the spill and suppress the fume. Ensure adequate decontamination of tools and equipment following clean up. Comply with Federal, Provincial/State and local regulations on reporting releases.

Waste Disposal Methods: Dispose of waste material at an approved waste treatment/disposal facility, in accordance with applicable regulations. Do not dispose of waste with normal garbage or to sewer systems.

- Note:
- Clean-up material may be a RCRA Hazardous Waste on disposal.
 - Spills are subject to CERCLA reporting requirements: RQ = 1000 lbs.

7. HANDLING AND STORAGE

Handling: Wear appropriate Personal Protection Equipment. Do not breathe sprays or mists. Do not ingest. Do not get in eyes, on skin or on clothing. Keep ignition sources away from sulfuric acid storage, handling and transportation equipment. Locate safety shower and eyewash station close to chemical handling area. Use **EXTREME** care when diluting with water. **Always add acid to water.** CAUTION: Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage. **Carbon steel storage tanks must be vented.** People working with this chemical should be properly trained regarding its hazards and its safe use.

Storage: If stored in non-reactive container, keep container tightly closed. Metal and, specifically carbon steel, storage tanks must be vented due to hydrogen release as noted above.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. The most effective measures are the total enclosure of processes and the mechanization of handling procedures to prevent all personal contact with sulfuric acid or oleum. Electrical installations should be protected against the corrosive action of acid vapors.

Respiratory Protection: A NIOSH/MSHA approved air-purifying respirator equipped with acid gas/fume, dust, and mist cartridges for concentrations up to 10 mg/m³. An air-supplied respirator if concentrations are higher or unknown.

Skin Protection: Impervious (i.e., neoprene, PVC) gloves, coveralls, boots and/or other acid resistant protective clothing.

Eye Protection: Tight-fitting chemical goggles and face shield.

Other Personal Protective Equipment: Where there is a danger of spilling or splashing, acid resistant aprons or suits should be worn. Trouser legs should be worn outside (not tucked in) rubber boots. Safety showers and eyewash fountains should be installed in storage and handling areas. Impervious gas tight overall body protection may be required depending on exposure.

Pictograms**EXPOSURE GUIDELINES:****HAZARDOUS INGREDIENT(S):****Sulfuric Acid:**

ACGIH TLV
ACGIH STEL
OSHA PEL
NIOSH REL

1 mg/m³ (TWA) 8 hours
3 mg/m³ 15 minutes
1 mg/m³ (TWA) 8 hours
1 mg/m³ (TWA) 10 hours

9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight: 178.14

Physical State: Fuming liquid.

Appearance and Odor: Clear to amber, heavy, oily liquid, which may have a sharp, choking odor.

Odor Threshold: < 1 mg/m³.

Boiling Point (% SO₃): 0%: 290°C(554°F), 10%:175°C(347°F); 20%: 140°C(284°F); 25%: 130°C(266°F); 37%: 100°C(212°F)

Melting/Freezing Point: 0%: 10.4°C(50.7°F), 10%: -2°C(28.4°F); 20%: 1°C(33.8°F); 25%: 14°C(57.2°F); 7%: 32°C (89.6°F)

Vapor Pressure at 20°C (68°F): 0%: 0.0035 mmHg; 10%: 0.4 mmHg; 20%: 1.1 mmHg; 25%: 2.9 mmHg, 37%: 47.8 mmHg

Specific Gravity at 4°C (39°F): 0%: 1.83; 10%: 1.880; 20%: 1.916; 25%: 1.935; 37%: 1.976

Vapor Density at 20°C (68°F): 2.8 (Air = 1.0)

Bulk Density: Not applicable (see specific gravity)

Evaporation Rate: 0.56 g/m²/s at 30°C (86°F), 16 km/hr wind speed.

Solubility: Miscible in all proportions in water. **Reacts violently with water.**

pH: 0.3 (1N solution at 25°C/78°F)

10. STABILITY AND REACTIVITY

Stability: The product is stable under normal conditions.

Conditions to Avoid: Keep away from heat and sources of ignition. Avoid temperatures, which may have a negative effect on the materials of construction used in equipment.

Materials to Avoid: Contact with organic materials (such as chlorates, carbides, fulminates and picrates) may cause fire and explosions. Contact with metals may produce flammable hydrogen gas. Do NOT add water to the oleum.

Hazardous Decomposition or Combustion Products: Toxic gases and vapors (e.g. sulfur trioxide, sulfur dioxide, and sulfuric acid vapors/mists) may be released.

Hazardous Polymerization: Will not occur.

Corrosivity: The product is corrosive.

11. TOXICOLOGICAL INFORMATION

Toxicological Data: Oleum: LC₅₀ (inhalation, rat) = 347 ppm for 1 hrs

Sulfuric Acid: LD₅₀ (oral, rat) = 2140 mg/kg
LC₅₀ (inhalation, rat) = 510 mg/m³ for 2 hrs
Skin effects (rabbit): Severe irritation
Eye effects (rabbit): Severe irritation

Carcinogenicity Data: The International Agency for Research on Cancer (IARC) has concluded that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to man, causing cancer of the larynx (the voice box). Although no direct link has been established between exposure to sulfuric acid, itself, and cancer in man, exposure to any mist or aerosol during the use of this product should be avoided See Section 3: Hazard Information, regarding Potential Health Effects (Long Term Exposure) for further discussion.

The National Toxicology Program (NTP) does not classify sulfuric acid or strong inorganic acid mists as known (or reasonably anticipated to be) human carcinogens.

Reproductive Effects: Slightly embryotoxic in rabbits (a minor, rare skeletal variation). The animals were exposed to 5 and 20 mg/m³ for 7 hrs/day throughout pregnancy. Slight maternal toxicity was present at the highest dose in both species.

Mutagenicity Data: Cytogenic analysis (hamster) ovaries 4 mmol/L

Teratogenicity Data: Not teratogenic in mice and rabbits.

Synergistic Materials: None known

12. ECOLOGICAL INFORMATION

Ecotoxic Effects: Harmful to aquatic life in very low concentrations. May be dangerous if it enters water intake; Fish toxicity; 2.8 µg/L 96 hrs LC50 Rainbow trout.

Products of Degradation: These products are sulphur oxides (SO₂, SO₃)

Toxicity of the Products of Degradation: The products of degradation are more toxic than the original product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Cleaned up material may be a hazardous waste as defined by Resource Conservation and Recovery Act (RCRA) on disposal due to the corrosivity characteristic. DO NOT flush to surface water or sanitary sewer system. Waste must be disposed of in accordance with federal, state, provincial and local environmental control regulations.

14. TRANSPORT INFORMATION

U.S. (Under DOT)

Shipping Name: Sulfuric acid, fuming (for oleum containing less than 30% free sulfur trioxide)

Hazard Class or Division: 8

Product Identification No. (PIN): UN 1831

Packing Group: I

Label(s): 8 (Corrosive)

Shipping Name: Sulfuric acid, fuming (for oleum containing 30% or more free sulfur trioxide)

Hazard Class or Division: 8 (6.1)

Product Identification No. (PIN): UN 1831

Packing Group: I

Poison: Inhalation Hazard Zone B

Label(s): 8 (Corrosive), 6.1 (Poison – Inhalation Hazard Zone B).

RQ = 1000 pounds (454 kg)

ER Guide: 137

Canada (Under TDG)

Shipping Name: Sulphuric acid, fuming

Classification(s): Class 8 (6.1)

Product Identification No. (PIN): UN 1831

Packing Group: I

15. REGULATORY INFORMATION

U.S.A.
SARA Title III HAZARD CATEGORIES AND LISTS
Product Hazard Categories

Acute (Immediate) Health:	Yes
Chronic (Delayed) Health:	Yes
Fire:	No
Reactivity:	Yes
Sudden Release of Pressure:	No

Lists

Extremely Hazardous Substance (40 CFR 355, SARA Title III Section 302)	Yes
CERCLA Hazardous Substance (40 CFR 302.4)	Yes
Toxic Chemical (40 CFR 372.65, SARA Title III Section 313)	Yes

15. REGULATORY INFORMATION (continued)

Reportable Quantity (RQ) under U.S. EPA CERCLA: RQ=1000 lb / 454 kg

TSCA Inventory Status: Reported/Included

Right-To-Know: Illinois, Massachusetts, New Jersey, Pennsylvania

Other Regulations/Legislation which apply to this product: New Jersey Special Health Hazard Substance List and Environmental Hazardous Substance; Minnesota, Florida, Rhode Island Hazardous Substance ; California Director's List of Hazardous Substances; Massachusetts Extraordinarily Hazardous Substance List

CANADA

Workplace Hazardous Materials Information System (WHMIS)

WHMIS Classification(s): Class D1A - Very Toxic
Class D2B – Suspected Human Carcinogen
Class E - Corrosive

WHMIS Health Effects Index: Acute Lethality - very toxic – immediate
Materials Causing Other Toxic Effects- Chronic
Corrosive to animal skin

WHMIS Ingredient Disclosure List: Confirmed A; Meets criteria for disclosure at 1% or greater.

National Pollutant Release Inventory (NPRI): Included

EUROPEAN

EEC CLASSIFICATION: C, R 35

EINECS: 231-639-5

16. OTHER INFORMATION

Additional Information and References

1. CHEMLIST, American Chemical Society, Nov 1999.
2. DOSE, Royal Society of Chemistry, Aug 1999
3. Enviro-TIPS Manual, "Sulphuric Acid and Oleum", Environment Canada, February 1984.
4. **Hazardous Substances Data Bank**, through "CCINFO disc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, (2007).
5. **RTECS-Registry of Toxic Effects of Chemical Substances**, On-line search, Canadian Centre for Occupational Health and Safety RTECS database, Doris V. Sweet, Ed., National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, Entry Update/Aug1999.
6. Sax, N.I., "Dangerous Properties of Industrial Materials", 7th Edition (1989)
7. Transportation of Dangerous Goods Act and Regulations, Canadian Centre for Occupational Health and Safety, Aug 1999.
8. Transport Of Hazardous Materials (49CFR), Canadian Centre for Occupational Health and Safety, Aug 1999.
9. Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, 2006.



16. OTHER INFORMATION (continued)

Legend:

CAS #	- Chemical Abstracts Service Registry Number
CERCLA	- Comprehensive Environmental Response, Compensation, and Liability Act
CFR	- Code of Federal Regulations
DOT	- Department of Transportation
EPA	- Environmental Protection Agency
LC ₅₀	- The concentration of material in air expected to kill 50% of a group of test animals
LD ₅₀	- Lethal Dose expected to kill 50% of a group of test animals
LEL	- Lower Explosive Limit
MSHA	- Mine Safety and Health Administration
NIOSH	- National Institute for Occupational Safety and Health
PEL	- Permissible Exposure Limit
PVC	- Polyvinyl chloride
RCRA	- Resource Conservation and Recovery Act
SARA	- Superfund Amendments and Reauthorization Act of the U.S. EPA
STEL	- Short Term Exposure Limit
TDG	- Transportation of Dangerous Goods Act/Regulations
TLV	- Threshold Limit Value
TSCA	- Toxic Substances Control Act
TWA	- Time-Weighted Average
UEL	- Upper Explosive Limit

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