

IDENTIFICATION

MATERIAL SAFETY DATA SHEET

NAME

Oleum

CHEMICAL FAMILY

Mineral Acid

GRADE

20% to 65%

FORMULA $x\text{SO}_3/y\text{H}_2\text{SO}_4$ **SYNONYMS**

Fuming Sulfuric Acid

Sulfuric Acid - 104.5% to 114.6%

CAS REGISTRY NO.

8014-95-7

CAS NAME

A solution of sulfur trioxide in sulfuric acid

TSCA INVENTORY STATUS

Reported/Included

ID NOS./CODES

NIOSH Registry No: WS5605000

SARA/TITLE III STATUS

See HAZARDOUS COMPONENTS and ADDITIONAL INFORMATION Sections

MANUFACTURER/DISTRIBUTOR

Du Pont Company

PRODUCT INFORMATION PHONE

(800) 441-9442

ADDRESS

Wilmington, DE 19898

MEDICAL EMERGENCY PHONE

(800) 441-3637

TRANSPORTATION EMERGENCY PHONE

CHEMTREC (800) 424-9300

PHYSICAL DATA

BOILING POINT, 760 mmHg

20% = 142°C (288°F);

65% = 58°C (137°F)

FREEZING POINT

20% = -5°C (23°F)

65% = 2°C (36°F)

SPECIFIC GRAVITY

1.9 to 2.0 at 16°C (60°F)

VAPOR PRESSURE

Oleum 20% = 2 mmHg at 25°C (77°F);

5 mmHg at 37.7°C (100°F)

Oleum 65% = 150 mmHg at 25°C (77°F);

290 mmHg at 37.7°C (100°F)

VAPOR DENSITY

app. 3 (Air = 1)

pH INFORMATION

Less than 1

SOLUBILITY IN WATER

100% (reacts violently)

FORM

Liquid

EVAPORATION RATE (Butyl Acetate=1)

20% = Less than 1; 65% = Greater than 1

COLOR

Off-white to amber

ODOR

Acrid

APPEARANCE

Fuming, cloudy, oily

HAZARDOUS COMPONENTS

<u>MATERIAL(S)</u>	<u>CAS NO.</u>	<u>APPROXIMATE %</u>
Sulfuric Acid*	7664-93-9	35-80
Sulfur Trioxide	7446-11-9	65-20

*Regulated as a Toxic Chemical under Section 313 of Title III/SARA and 40CFR Part 372.

HAZARDOUS REACTIVITY

INSTABILITY

Stable, but dangerously reactive.

INCOMPATIBILITY

Reacts violently with water to form sulfuric acid. Reacts exothermically with oxidizable and alkaline materials, organics, metallic powders, nitrates, chlorates, carbides, and cyanides.

POLYMERIZATION

Will not occur.

DECOMPOSITION

May release gaseous sulfur trioxide upon heating. May release other dangerous gases depending on reactants.

FIRE AND EXPLOSION DATA

FLASH POINT

Will not burn.

FLAMMABLE LIMITS IN AIR, % BY VOL.

LOWER Not applicable.

UPPER Not applicable.

AUTOIGNITION TEMPERATURE

Not applicable.

AUTODECOMPOSITION TEMPERATURE

Not applicable.

FIRE AND EXPLOSION HAZARDS

Strong oxidizer. Contact with other materials may cause fire. Reacts violently with water; spattering acid. Releases hazardous SO₃ fumes and H₂SO₄ mist. Leaks or spills cause dense fumes. When diluted with water, reacts with most metals to release flammable, potentially explosive hydrogen gas.

EXTINGUISHING MEDIA

Dry chemical, high expansion foam, carbon dioxide (CO₂), sand, dirt, water fog.

SPECIAL FIRE FIGHTING INSTRUCTIONS

Wear protective equipment. DO NOT get water inside any container. Cool outside of containers with water if exposed to fire. Stay upwind, avoid smoke and fumes, and evacuate affected area. Where contact with smoke and fumes cannot be avoided, wear acid-proof suit with hood, boots, gloves and breathing air supply. Run-off from fire control may cause pollution. Neutralize run-off with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas.

HEALTH HAZARD INFORMATION

PRINCIPAL HEALTH HAZARDS (Including Significant Routes, Effects, Symptoms of Overexposure, and Medical Conditions Aggravated by Exposure)

Sulfur trioxide and sulfuric acid release heat when in contact with water and may dehydrate (remove water) skin tissue. Destruction of tissue will result from direct chemical reaction with tissue, from thermal burns, and from dehydration of the tissue. Sulfur trioxide will rapidly react with moisture in air or tissue to form sulfuric acid.

Causes severe eye and skin burns. Harmful if inhaled. May cause nose, throat, and lung injury; lung injury may be delayed.

ANIMAL DATA:

Inhalation 1-hour LC₅₀: 347 ppm in rats (sulfuric acid)

Oral LD₅₀: 2140 mg/kg in rats (sulfuric acid)

Sulfur trioxide and sulfuric acid are corrosive to the skin and eyes of animals. Toxic effects in animals following ingestion, inhalation, or skin contact include corrosion or irritation of mucosal surfaces. Animal testing indicates that sulfuric acid does not have carcinogenic, mutagenic, embryotoxic, or reproductive potential.

HUMAN HEALTH EFFECTS:

Human health effects of overexposure to the liquid by eye or skin contact include eye corrosion with corneal or conjunctival ulceration or skin burns or ulceration. Ingestion of the liquid may cause severe burns to the mucous membranes of the mouth and esophagus. Repeated or prolonged contact with mists may cause eye irritation with discomfort, tearing, or blurring of vision; or skin irritation with discomfort or rash. Inhalation may cause irritation of the upper respiratory passages or erosion of dental surfaces. Higher exposures by inhalation may lead to temporary lung irritation with cough, discomfort, difficulty breathing, or shortness of breath; or possibly modest initial symptoms, followed in hours by severe shortness of breath, requiring prompt medical attention; or rapid loss of consciousness with serious lung tissue damage and pneumonitis. Gross overexposure may be fatal.

Although two epidemiology studies did suggest a possible association between sulfuric acid exposure and respiratory tract tumors, conclusions from these studies are very limited because of significant deficiencies. In one study for example, only a small number of workers was sampled, and there was exposure to other materials including diethyl sulfate, an IARC and NTP carcinogen. In the other study there was exposure to other acids, and smoking histories were ignored in the development of the study conclusion. Based on the overall weight of evidence from all human and chronic animal studies, we conclude that no causal relationship between sulfuric acid exposure and respiratory tract tumors has been shown.

Individuals with preexisting diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures.

CARCINOGENICITY

Not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

HEALTH HAZARD INFORMATION (cont'd)

EXPOSURE LIMITS

Exposure limits for oleum have not been established by OSHA, ACGIH, or Du Pont. However, the vapors react with moisture in air to form sulfuric acid. The OSHA 8-hour Time Weighted Average (TWA) and ACGIH TLV-TWA for sulfuric acid are 1 mg/m^3 . The ACGIH-STEL is 3 mg/m^3 . The Du Pont AEL 8- and 12-hour TWA is 1 mg/m^3 .

SAFETY PRECAUTIONS

Do not get in eyes, on skin, on clothing.
Avoid breathing vapor or mist.
Keep from contact with clothing and other combustible material.
Should be handled only by trained personnel.
Wash thoroughly after handling.

FIRST AID

In case of contact: Immediately (within seconds) flush eyes or skin with plenty of water (preferably cold water) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse and discard contaminated shoes.

While the patient is being transported to a medical facility, apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissue.

If inhaled: Remove to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

If swallowed: Do not induce vomiting. Give large quantities of water. Call a physician. Never give anything by mouth to an unconscious person.

NOTE TO PHYSICIAN

Continued washing of the affected area with cold or iced water will be helpful in removing the last traces of the compound. Creams or ointments should not be applied before or during the washing phase of treatment.

PROTECTION INFORMATION

GENERALLY APPLICABLE CONTROL MEASURES

Good general ventilation should be provided to keep vapor concentrations below the exposure limits. Fume scrubbers and mist eliminators may be required.

PERSONAL PROTECTIVE EQUIPMENT

Have available and wear as appropriate for exposure conditions when handling containers or operating equipment containing oleum: chemical splash goggles; full-length face shield (with chemical splash goggles worn under face shield); acid-proof gauntlet gloves, boots, and apron; long sleeve wool, acrylic, or polyester clothing; acid-proof suit and hood; and NIOSH/MSHA approved respiratory protection. In case of emergency or where there is a strong possibility of considerable exposure, wear a complete acid suit with hood, gloves, boots, and air-supplied or self-contained breathing apparatus.

DISPOSAL INFORMATION

AQUATIC TOXICITY

Oleum: no information available

Sulfuric acid: 48-hour TLM in flounder is 100-300 ppm; 96-hour LC₅₀ in bluegill sunfish is 10.5 ppm.

SPILL, LEAK OR RELEASE

Evacuate area and ventilate before reentering. If necessary to enter a contaminated area, use full protective clothing with hood and breathing air supply, life line, and "buddy" system. Small spills can be controlled by dry, nonreactive absorbent material, or dry sand. Dike larger spills and soak up with absorbant material, dry sand, or diatomaceous earth. Larger spills in open or unconfined areas can be controlled by covering the spill with chemical foam, water fog, special oils (good only to 35% oleum), or ANSUL^R SPILL-X-A Agent. Neutralize with lime or soda ash and shovel into containers for removal. Comply with Federal, State, and local regulations on reporting releases. The CERCLA Reportable Quantity is 1000 lbs.

WASTE DISPOSAL

Comply with Federal, State, and local regulations. This material may be a RCRA regulated hazardous waste upon disposal. If approved, may be neutralized with lime, soda ash, or caustic after diluting to non-fuming acid or transferred to a waste disposal contractor.

SHIPPING INFORMATION

DOT (172.101)

PROPER SHIPPING NAME

Oleum*

HAZARD CLASS

Corrosive Material

NA NO.

1831, Poison - Inhalation Hazard**

DOT LABEL(S)

Corrosive, Poison**

DOT PLACARD (TT/TC)

Corrosive, Poison**

REPORTABLE QUANTITY

1000 lb/454 kg

SHIPPING CONTAINERS

Barges, tank cars, tank trucks, drums, sample bottles.

* If shipped in containers of greater than 1000 lbs. each, the Proper Shipping Name is RQ, Oleum.

** The "Poison-Inhalation Hazard" and "Poison" statements apply only to Oleum at or above 30%.

DOT/IMO (172.102)

PROPER SHIPPING NAME

Sulfuric Acid, Fuming

HAZARD CLASS

Corrosive Material, 8
Poison - Inhalation Hazard**

UN NO.

1831

SUBSIDIARY RISK

Poison

ADDITIONAL INFORMATION AND REFERENCES

STORAGE CONDITIONS

Store in well-ventilated area, away from heat, sparks and flame. Keep containers closed. Do not allow water to enter containers because of violent reaction. Keep closure up. Never use pressure to empty drums. Do not wash out drums or use for other purposes. Do not store with incompatible materials (see Hazardous Reactivity Section).

NPCA-HMIS RATINGS

Health	3
Flammability	0
Reactivity	2
Personal Protection	-

Personal Protection rating to be supplied by user depending on use conditions.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

Product Hazard Categories:

Chronic Health	- Yes
Acute Health	- Yes
Fire Hazard	- (Yes)*
Pressure Hazard	- No
Reactivity Hazard	- Yes

Lists:

Extremely Hazardous Substance	- Yes
CERCLA Hazardous Substance	- Yes
Toxic Chemical	- (Yes)*

* Sulfuric Acid component only

*Strong oxidizer; contact with combustibles may cause fire.

CANADIAN WHMIS CLASSIFICATION

D-1A; E; F; C

For further information, see Du Pont Storage and Handling Bulletin, "Sulfur Trioxide and Oleum," and Du Pont's Data Sheet, "Sulfuric Acid and Oleum."

DATE OF LATEST REVISION/REVIEW:
PERSON RESPONSIBLE FOR MSDS:

7/90
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