MATERIAL SAFETY DATA SHEET

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Version 2.11

Section 1 - Product and Company Information

Product Name	SULFURIC ACID, 99.999% (PURITY BASED ON TRACE METALS)
Product Number	339741
Brand	ALDRICH
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
SULFURIC ACID, >= 51%	7664-93-9	No

Formula	H2SO4
Synonyms	Acide sulfurique (French) * Acido solforico (Italian) * Battery acid * BOV * Dihydrogen sulfate * Dipping acid * Electrolyte acid * Mattling acid * Oil of vitriol * Schwefelsaeureloesungen (German) * Strong inorganic acid mists containing sulfuric acid * Sulfuric acid (ACGIH:OSHA) * Sulphuric acid * Vitriol Brown Oil * Zwavelzuuroplossingen (Dutch)
RTECS Number:	WS5600000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Corrosive.

Causes severe burns.

HMIS RATING

HEALTH: 3*

FLAMMABILITY: 0

REACTIVITY: 2

NFPA RATING

HEALTH: 3

FLAMMABILITY: 0

REACTIVITY: 2

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

Do not induce vomiting. If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

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.

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Noncombustible. Use extinguishing media appropriate to surrounding fire conditions.
Unsuitable: Do not use water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits 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 PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Ventilate area and wash spill site after material pickup is complete. 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, on 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 risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose 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.
Other: Faceshield (8-inch minimum).

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	3 MG/M3
USA	ACGIH	TWA	0.2 MG/M3
USA	MSHA Standard-air	TWA	1 MG/M3
USA	OSHA.	PEL	8H TWA 1 MG/M3
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	1 MG/M3

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	3 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance — Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	98.08 AMU	
pH	1.2	Concentration: 5 g/l
BP/BP Range	290 °C	760 mmHg
MP/MP Range	N/A	
Freezing Point	3 °C	
Vapor Pressure	1 mmHg	145.8 °C
Vapor Density	< 0.3 g/l	25 °C
Saturated Vapor Conc.	N/A	
SG/Density	1.84 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	

Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	21 Pas	25 °C
Surface Tension	55.1 mN/m	20 °C
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water:Soluble.	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.
Conditions to Avoid: Moisture. Do not allow water to enter container.
Materials to Avoid: Bases, Halides, Organic materials Incompatible with carbides, chlorates, fulminates, nitrates, picrates, cyanides, alkali halides, zinc iodide, permanganates, hydrogen peroxide, azides, perchlorates, nitromethane, phosphorous, and nitrites. Violent reaction with: cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, and phosphorous(III) oxide, Finely powdered metals

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Sulfur oxides, Hydrogen sulfide gas.

HAZARDOUS POLYMERIZATION

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: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed. Ingestion can cause immediate burning pain in the mouth, throat, abdomen; severe swelling of the larynx and skeletal paralysis affecting the ability to breathe, circulatory shock and convulsions.

TARGET ORGAN(S) OR SYSTEM(S)

Lungs. Teeth.

SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Pulmonary edema. Effects may be delayed. Exposure may cause: Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and

vomiting. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

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 Respiration:Other changes.

IRRITATION DATA

Eyes
Rabbit
0.25 mg
Remarks: Severe irritation effect

Eyes
Rabbit
5 mg
30S
Remarks: Rinsed

CHRONIC EXPOSURE - CARCINOGEN
Result: The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic to humans (group 1).

IARC CARCINOGEN LIST

Rating: Group 1

NTP CARCINOGEN LIST

Rating: Known to be carcinogenic.

ACGIH CARCINOGEN LIST

Rating: A2

CHRONIC EXPOSURE - TERATOGEN

Species: Rabbit

Dose: 20 MG/M3/7H
Route of Application: Inhalation
Exposure Time: (6-18D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - MUTAGEN

Species: Hamster
Dose: 4 MMOL/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Sulfuric acid [with more than 51 percent acid]
UN#: 1830
Class: 8
Packing Group: Packing Group II
Hazard Label: Corrosive
PIH: Not PIH

IATA
Proper Shipping Name: Sulphuric acid
IATA UN Number: 1830
Hazard Class: 8
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: C
Indication of Danger: Corrosive.
R: 35
Risk Statements: Causes severe burns.
S: 26-30-45
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Never add water to this 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 this 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 or packing slip for additional terms and conditions of sale.