SAFETY DATA SHEET

SULPHURIC ACID 98%

1. Product Identification

Product form	Substance
Substance Name	SULPHURIC ACID
CAS No	7664-93-9
Formula	H2SO4
Synonyms	Battery acid / brown acid / brown oil of vitriol / Dihydrogen sulfate / dipping acid / electrolyte acid / nordhausen acid / oil of vitriol/ Sulphuric acid
BIG no	14049
Use of substance / mixture	Industrial use, Laboratory chemical, Battery: component
Emergency number	**082 571 3817**

2. Hazards Identification

Classification:
GHS-US Classification
Skin Corrosive 1A H314
Eye Damage 1 H318
Full text of H-Phrases: see section 16

GHS-US Labelling
Hazard pictograms

Signal word: Danger
Hazard statements: H314 - causes servers skin burns and eye damage
Precautionary statements: P260 – do not breath mist, vapours, spray
P264 – wash exposed skin thoroughly after handling
P280 – wear protective gloves, protective clothing, eye protection, face protection
P301, 330, 331 – IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303, 361, 353 – IF ON SKIN (or hair): remove / take off immediately all contaminated clothing.

Rinse skin with water / shower. P304, 340 – IF IN HALED: remove victim to fresh air and keep at rest in a position comfortable for breathing P305, 351, 338 – IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P310 – Immediately call a POISEN CENTER or doctor P363 – Wash contaminated clothing before reuse P405 – Store locked up P501 – Dispose of contents / container to comply with local, state and federal regulations
Other hazards not contributing to the classification: None

3. Composition

Name	Product Identifier	%	GHS – US Classification
Sulphuric Acid	CAS No 7664-93-9	40-98% m/m	Skin Corr. 1A, H314 Eye Dam. 1, H318

4. First Aid Measures

General	Check vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his/her back with legs slightly raised. Vomiting: prevent asphyxia / aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor / hospital.
Inhalation	Remove the victim into fresh air. Immediately consult a doctor.
Skin	Wash immediately with plenty of water for 15 minutes. Do not apply neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor. If burned surface >10% take victim to hospital.
Eye	Rinse immediately with plenty of water for 15 minutes. Take victim to an ophthalmologist. Do not apply neutralizing agents.
Ingestion	Rinse mouth with water. Do not induce vomiting. Do not give activated charcoal. Immediately consult a doctor. Call poison information Centre. Take the container / vomit to the doctor / hospital. Ingestion of large quantities: immediately to hospital. Do not give chemical antidote.
Symptoms after inhalation	Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE / CONTACT: corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER:

	possible laryngeal spasm / oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties.
Symptoms after skin contact	Caustic burns / corrosion of the skin
Symptoms after eye contact	Corrosion of the eye tissue. Permanent eye damage.
Symptoms after ingestion	Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric / intestinal mucosa. AFTER ABSORPTION OF HIGH QUANTITIES: Shock.
Chronic Symptoms	ON CONTINUOUS / REPEATED EXPOSURE / CONTACT: red skin, dry skin. Itching. Skin rash / inflammation. Affection / discoloration of the teeth. Inflammation / damage of the eye tissue.

5. Fire Fighting Measures

Extinguishing media:
Unsuitable extinguishing media – EXTINGUISHING MEDIA FOR SURROUNDING FIRES: water. Water spray.

Fire Hazard:
DIRECT FIRE HAZARD. Non-combustible. INDIRECT FIRE HAZARD. Reactions involving a fire hazard.
Explosion Hazard:
INDIRECT EXPLOSION HAZARD. Reactions with explosion hazards.
Reactivity:
Violent exothermic reaction with water (moisture): release of corrosive gases / vapours. Reacts on exposure to water (moisture) with (some) metals: release of highly flammable gases/ vapours (hydrogen). On heating / burning: release of toxic and corrosive gases / vapours (Sulphur oxides). Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with (strong) reducers, with organic material and with combustible materials: (increased) risk of fire / explosion.

Advice For Firefighters:
Precautionary measures fire – exposure to fire / heat: keep upwind. Exposure to fire / heat: consider evacuation. Exposure to fire / heat: seal off low-lying areas. Exposure to fire / heat: have neighborhood close doors and windows.
Firefighting instructions – cool tanks / drums with water / spray remove them into safety. When cooling / extinguishing: no water in the substance. Dilute toxic gases with water spray.
Protection during firefighting – heat / fire exposure: compressed air / oxygen apparatus.

6. Accidental Release Measures

FOR NON-EMERGENCY PERSONNEL

Protective Equipment	Gloves. Face-shield. Corrosion proof suit. Large spills in enclosed spaces: compressed air apparatus. Large spills in enclosed spaces: gas-tight suit.
Emergency Procedure	Mark the danger area. No naked flames. Keep containers closed. Avoid ingress of water in the containers. Wash contaminated clothes. Large spills in confined areas: consider evacuation. In case of hazardous reaction: keep upwind. In case of reactivity hazard: consider evacuation
FOR EMERGENCY RESPONDERS	
Protective Equipment	Equip cleanup crew with proper protection
Emergency Procedure	Stop leak if safe to do so. Ventilate area
METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP	
For Containment	Contain released substance, pump into suitable containers. Consult "Material Handling" to select material of containers. Plug the leak, cut off the supply. Dam up the liquid spill. Hazardous reaction: measure explosive gas-air mixture. Reaction: dilute combustible gas / vapour with water curtain. Take account of toxic / corrosive precipitation water. Heat exposure: dilute toxic gas / vapour with water spray.
Methods for cleaning up	Take up liquid spill into inert absorbent material, e.g.: dry sand / earth / vermiculite. Scoop absorbed substance into closing containers. Carefully collect the spill/ leftovers. Damaged / cooled tanks must be emptied. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer / competent authority. Wash clothing and equipment after handling.
ENVIRONMENTAL PRECAUTIONS	
Prevent soil and water pollution. Prevent spreading into sewers	

7. Handling & Storage

PRECAUTIONS FOR SAFE HANDLING:	
Safe Handling	Comply with legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Keep the substance free from contamination. Thoroughly clean / dry the installation before use. Do not discharge the waste into the drain. Never add water to this product. Never dilute by pouring water to the acid. Always add acid to the water. Keep away from naked flames / heat. Observe very strict hygiene – avoid contact. Keep container lightly closed. Measure the concentration in the air regularly. Carry operations in the open / under local exhaust / ventilation or with respiratory protection
Hygiene Measures	Wash hands and other exposed area with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse. Do not eat drink or smoke when using this product.

CONDITIONS FOR SAFE STORAGE & ANY INCOMPATIBILITIES	
Incompatible products	Strong bases. Metals. Combustible materials
Heat and ignition sources	KEEP SUBSTANCE AWAY FROM: heat sources.
Prohibitions on mixed storage	KEEP SUBSTANCE AWAY FROM: combustible materials, reducing agents, strong bases. Highly flammable materials, metals, cellulosic materials, organic materials, alcohols, amines and water / moisture.
Storage area	Store in a dry area. Ventilation at floor level. Keep locked up. Provide for a tub to collect spills. Unauthorized persons are not admitted. Meet the legal requirements.
Special rules on packaging	SPECIAL REQUIREMENTS: closing, dry, clean, correctly labelled, meet the legal requirements. Secure fragile packaging in solid containers.
Packaging materials	SUITABLE MATERIAL: stainless steel, carbon steel, polyethylene, glass, stoneware / porcelain. MATERIL TO AVOID: monel steel, lead, copper and zinc.

8. Exposure Control/Personal Protection

Control Parameters: Sulfuric Acid, ACS (7664-93-9)		
ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³
OSHA	OSHA PEL (TWA) (mg/m³)	1 g/m³
Exposure Controls:		
Engineering Controls	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation	
Materials for protective clothing	GIVE EXCELLENT RESISTANCE: butyl rubber, polyethylene, tetrafluoroethylene. GIVE LESS RESISTANCE: neoprene, PVC, Viton. GIVE POOR RESISTANCE: natural rubber, nitrile, rubber and PVA.	
Hand protection	Gloves	
Eye protection	Face shield	
Skin & body protection	Corrosion-proof clothing	
Respiratory protection	Gas mask with filter type E at conc. In air >exposure limit.	

9. Physical & Chemical Properties

Physical state	Liquid
Appearance	Liquid
Molecular ass	98.08 g/mol
Colour	Pure substance: colourless; Unpurified: yellow to brown

Odour	Almost odourless
Odour threshold	> 1 mg/m³
pH	No data available
Relative evaporation rate	No data available
Melting point	10 °C
Freezing point	No data available
Boiling point	288 °C
Flash point	Not applicable
Auto-ignition temperature	No data available
Decomposition temperature	> 340 °C
Flammability (solid, gas)	No data available
Vapour pressure	< 1.0 hPa
Relative vapour density	@20°C: 3.4
Relative density	1.83
Density	1.840kg/m³
Solubility	Exothermically soluble in water. Soluble in ethanol. Water: complete
Log Pow	-2.20 (estimated value)
Log Kow	No data available

10. Stability & Reactivity

Reactivity: Violent exothermic reaction with water (moisture): release of corrosive gases / vapours. Reacts on exposure to water (moisture) with (some) metals: release of high flammable gasses / vapours (hydrogen). On heating / burning: release of toxic and corrosive gases / vapours (Sulphur oxides). Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with strong reducers, with organic material and with combustible materials: increased risk of fire / explosion.
Chemical Stability: Unstable on exposure to moisture.
Possibility of hazardous reactions: Reacts violently with water. Reacts violently with (some) bases: release of heat.
Conditions to avoid: Incompatible materials. Moisture.
Incompatible Materials: Water. Strong bases. Organic compounds. Metals. Halogens. Cyanides. Combustible materials.
Hazardous Decomposition Products: Sulfur compounds

11. Toxicological Information

Sulfuric Acid, ACS (\f) 7664-93-9	
LD50 oral rat	2140 g/kg bodyweight (Rat: experimental value)
Skin corrosion / irritation Serious eye damage / irritation Respiratory or skin sensitization Germ cell mutagenicity Carcinogenicity	: causes severe skin burns and eye damage : causes serious eye damage : not classified : not classified : not classified
Sulfuric Acid, ACS (7664-93-9)	
Additional information	Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans
IARC group	1 – Carcinogenic to humans
National Toxicology Program Status	2 – Known human Carcinogens
Reproductive toxicity Specific target organ toxicity (single exposure) Specific target organ toxicity (repeated exposure) Aspiration hazard Symptoms / injuries after inhalation Symptoms / injuries after skin contact Symptoms / injuries after eye contact Symptoms / injuries after ingestion Chronic symptoms	: not classified : not classified : not classified : not classified : Dry / sore throat. Coughing. Irritation of the respiratory tract. Irrigation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE / CONTACT: corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER: possible laryngeal spasm / oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties. : Caustic burns / corrosion of the skin : Corrosion of the eye tissue. Permanent eye damage : Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric / intestinal mucosa. AFTER ABSORPTION OF HIGH QUANTITIES: shock. : ON CONTINUOUS / REPEATED EXPOSURE / CONTACT: red skin. Dry skin. Itching. Skin rash / inflammation. Affection / discoloration of the teeth. Inflammation / damage of the eye tissue.

12. Ecological Information

Toxicity	
Ecology – general	Classification concerning the environment: not applicable
Ecology – air	Not classified as dangerous for the ozone layer
Ecology – water	Mild water pollutant (surface water). Ground water pollutant. Maximum concentration in drinking water. 250 mg/l. Harmful to fishes. Harmful invertebrates. Toxic to plankton. pH shift. Inhibition of activated sludge.
Sulfuric Acid, ACS (7664-93-9)	
LC50 fishes 1	42 mg/l (96 h; Gambusia affinis)
EC50 Daphnia 1	29 mg/l (24 h; Daphnia magna)
LC50 fish 2	49 mg/l (48 h; Lepomis macrochirus)
TLM fish 1	42 mg/l (96vh; Gambusia affinis)
Threshold limit other aquatic organisms 1	6900 mg/l (24 h; Pseudomonas fluorescens)
Persistence and degradability	
Sulfuric Acid, ACS (7664-93-9)	
Persistence and degradability	Biodegradability: not applicable
Biochemical oxygen demand	Not applicable
Chemical oxygen demand	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable
Bioaccumulative potential	
Sulfuric Acid, ACS (7664-93-9)	
Log Pow	-2.20 (estimated value)
Bioaccumulative potential	Not applicable
Mobility in soil	
No additional information available	
Other adverse effects	
Effect on ozone layer	

13. Disposal Considerations

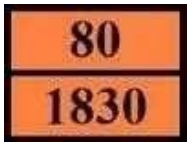
Waste disposal recommendations:
Remove waste in accordance with local and/other national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for further management of the waste.
Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals.

Recycle / reuse. Remove for Physico-chemical/biological treatment. Remove to an authorised dump (class I). Treat using the best available techniques before discharge into drains or the aquatic environment. Use appropriate containment to avoid environmental contamination.

14. Transport Information

In accordance to DOT	
Transport document description	: UN1830 Sulfuric with more than 51% acid, 8. II
UN-No (DOT)	: UN1830
DOT Proper Shipping Name	: Sulfuric acid with more than 51% acid
Department of Transportation (DOT) Hazard Classes	: 8 – Class 8 – Corrosive Material 49 CFR 173.136
Hazard labels (DOT)	: 8 – Corrosive 
Packing group (DOT)	: II – Medium Danger
DOT Special Provisions (49 CFR 172.102)	: A3 – for combination packaging. If glass inner packaging (including ampoules) are used. They must be packed with absorbent material in tightly closed metal receptacles before packing in outer packaging. : A7- steel packaging must be corrosion-resistant or have protection against corrosion. : B3 – MC 300, MC 301, MC 302, MC 303, MC 305 and MC : : 306 and DOT 406 cargo tanks and DOT 57 portable tanks are not authorised. : B83 – bottom outlets are prohibited on tank car tanks transporting sulfuric acid in concentration over 65.25 percent. : B84 – packaging must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance for sulfuric acid or spent sulfuric acid in concentration up to 65.25 percent. : IB2 – authorised IBCs: metal (31A, 31B & 31N); rigid plastics (31H1 & 31H2); composite (31HZ1). Additional requirement: only liquids with a vapour pressure less than

	or equal to 110 kPa at 50°C. (1.1 bar at 112 F), or 130 kPa at 55°C (1.3 bar at 131 F) are authorised. : N34 – aluminum construction materials are not authorisedfor any part of a packaging which is normally in contact with the hazardous material. : T8 – 4 178.274(d) Normal Prohibited. : TP2 – a. the maximum degree of filling must not exceed the degree of filling determined by the following (image) where: tr is the maximum mean bulk temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees Celsius. b. for liquids transported under ambient conditions may be calculated using the formula: (image). Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15°C (50 F) and 50°C (122 F), respectively. : TP12 – this material is considered highly corrosive to steel
DOT packaging exception (49 CFR 173.xxx)	: 154
DOT packaging Non Bulk (49 CFR 173.xxx)	: 202
DOT packaging Bulk (49 CFR 173.xxx)	: 242
DOT quantity Limitations Passenger aircraft/trail (49 CFR 173.xxx)	: 1 L
DOT quantity Limitations Cargo aircraft only (49 CFR 173.xxx)	: 30 L
DOT vessel Stowage Location	: C – The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel.
DOT vessel Stowage Other	: 14 – for metal drums, stowage permitted under deck on cargo vessels
ADR	
Transport document description	: UN1830 Sulfuric Acid, 8, II, (E)
Packing group (ADR)	: II
Class (ADR)	: 8 – Corrosive Substance
Hazard Identification number (Kemier No.)	: 80
Classification code (ADR)	: C1

Danger labels (ADR)	: 8 – Corrosive substance 
Orange plates	
Tunnel restriction code	: E
Transport by Sea	
Un-No. (IMDG)	: 1830
Class (IMDG)	: 8 – Corrosive substances
EmS-No. (1)	: F-A
EmS-No. (2)	: S-B
Air Transport	
UN-No. (IATA)	: 1830
Class (IATA)	: 8 – Corrosive
Packing group (IATA)	: II – Medium Danger

15. Regulatory Information

US Federal regulations – Sulfuric Acid. ACS (7664-93-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on the United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's list of lists	1000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	1000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
CANADA – Sulfuric Acid, ACS (7664-93-9)	
WHMIS Classification	Class E – Corrosive Material
EU-Regulations	
Classifications according to Regulation (EC) No. 1272/2008 [CLP]	
Skin Corrosion	1A, H314
Full text of H-Phrases	See section 16
Classifications according to Directive 67/548/EEC or 1999/45/EC	
C;	35

Full text of R-Phrases	See section 16
National regulations – Sulfuric Acid, ACS(7664-93-9)	
Listed on IARC (International Agency to Research on Cancer) Listed as carcinogen on NTP (National Toxicology Program)	
US State regulations	
No additional information available	

16. Other Information

Full text of H-Phrases	
Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Skin Corr. 1A	Skin corrosion/irritation, Category 1A
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage

NFPA health hazard : 3 – Short exposure could cause serious temporary or residual injury even though prompt medical attention given

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 2 – Normally unstable and readily undergo violent decomposition but do not detonate. Also: may react violently with water or may form potentially explosive mixtures with water.

NFPA specific hazard : W – Unusual reactivity with water. This indicates a potential hazard using water to fight a fire involving this material. When a compound is bother water-reactive and an oxidizer, the W/bar symbol should go in the quadrant and the OX warning is placed immediately below the NFPA diamond

HMIS III Rating

Health : 3 - Serious Hazard – major injury likely unless prompt action is taken and medical treatment is given.

Flammability : 0 – Minimal Hazard

Physical : 2 – Moderate Hazard

Personal Protection : H

The information provided with this MSDS is furnished in good faith and without warranty of any kind.

Personnel handling this material should consider this data as supplemental to other information gathered by them, and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of the materials and the safety and health of employees and customers.