Sulfuric Acid

Date of Preparation: December 2003 Revision: 2

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Sulfuric Acid
Chemical Formula: H_2SO_4
Other Designations: Battery acid, dihydrogen sulfate, dipping acid, electrolyte acid, hydrogen sulfate, mattling acid, oil of vitriol.
General Use: Component of heavy-duty metal cleaners, pickles, as battery electrolyte and also in electroplating processes.

Manufacturer: Kanto Corporation, 13424 N. Woodrush Way, Portland, OR 97203
Non-Emergency Contact: Customer Service, Phone (503) 283-0405, FAX (503) 240-0409

For All Transportation Emergencies Call CHEMTREC at 1-800-424-9300

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	% by wt.
Sulfuric Acid	7664-93-9	96
De-ionized Water	7732-18-5	4

Occupational Exposure Limits

	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
Ingredient	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Sulfuric Acid	1 mg/m^3	3 mg/m^3	1 mg/m^3	3mg/m^3	1 mg/m^3	none estab.	15 mg/m^3

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Highly corrosive! Colorless, clear or brown liquid. Causes severe burns to eyes, skin, and respiratory tract. Reacts violently with water producing excessive heat. Can ignite finely divided particles. Contact with metals can evolve flammable hydrogen gas.

HMIS
H 3
F 0
R 2
PPE†
†Sec. 8

Potential Health Effects

Primary Entry Routes: Inhalation, skin and eye contact, ingestion
Target Organs: Respiratory system, eyes, skin, teeth, mucous membranes
Acute Effects
Inhalation: Vapors and mists can cause severe mucous membrane irritation and upper respiratory tract inflammation demonstrated by labored breathing, shortness of breath, and respiratory spasms. Exposure to high concentrations causes bronchitis and hemorrhagic pulmonary edema. High mist concentrations may lead to pulmonary edema due to chemical burns of the respiratory tract. Symptoms may be delayed after exposure.
Eye: Extremely corrosive to the eyes. Any contact may cause rapid tissue destruction due to severe burns causing loss of sight.
Skin: Extremely corrosive to the skin. Contact may cause rapid tissue destruction with severe burns and blistering. The mist may cause deep ulceration to body tissue.
Ingestion: Extremely corrosive and can cause severe burns to the gastrointestinal tract resulting in pain, a burning sensation, and shock or collapse. May be fatal if swallowed in quantity.
Carcinogenicity: IARC – Group 1 (strong inorganic mists containing sulfuric acid as a known carcinogen); NTP; ACGIH – Class A2, suspected human carcinogen.
Chronic Effects: Chronic bronchitis, dermatitis, erosion of tooth enamel, possible perforation of the septum, skin lesions, tracheobronchitis, inflammation of the mouth, conjunctivitis, gastritis, and increased risk of laryngeal cancer.

Section 4 - First Aid Measures

Eye Contact: Gently lift eyelids and flush immediately and continuously with copious amounts of water for at least 15 minutes. Do not allow the victim to rub or keep eyes tightly shut. Consult an ophthalmologist immediately.
Skin Contact: Rinse with flooding amounts of water, while removing contaminated clothing, for at least 15 minutes. Wash with soap and water. Seek medical attention immediately. Wash clothing before reuse.
Ingestion: If the victim is conscious, give 1-2 glasses of water or milk. Seek medical attention immediately. Never give anything by mouth to an unconscious or convulsing person. Do not induce vomiting.

Inhalation: Remove exposed person to an uncontaminated atmosphere and support breathing. If not breathing, give artificial respiration. Seek medical attention immediately.

After first aid, seek appropriate in-plant, paramedic, or community medical support.

Note to Physicians:

For acute or short-term repeated exposures to strong acids:

1. Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
2. Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.
3. Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
4. Strong acids produce a coagulation necrosis characterized by formation of a coagulum as a result of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

1. Immediate dilution of 1-2 glasses of milk or water within 30 minutes post-ingestion is recommended.
2. Do not attempt to neutralize the acid since exothermic reaction may extend the corrosive injury.
3. Be careful to avoid further vomiting since re-exposure to the acid is harmful.

SKIN:

1. Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
2. Deep second-degree burns may benefit from topical silver sulfadianzine.

EYE:

1. Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. Do not use neutralizing agents or any other additives.
2. Cycloplegic drops, antibiotic drops, vasoconstrictive agents, or artificial tears may be indicated dependent on the severity of the injury.
3. Steroid eye drops should only be administered with the approval of a consulting ophthalmologist.

Section 5 - Fire-Fighting Measures

Flash Point: Not applicable
Auto ignition Temperature: Not applicable
LEL: Not applicable
UEL: Not applicable
Flammability Classification: Nonflammable.

NFPA

Extinguishing Media: Use extinguishing media suitable for surrounding area. Water spray or fog, from a safe distance only.

General Fire Hazards/Hazardous Combustion Products: Reacts vigorously with water or steam. Heating may cause expansion or decomposition leading to violent rupture of containers. Contact with readily oxidizable organic material may cause ignition and fire. Reacts with metals producing flammable and explosive hydrogen gas. Decomposes on heating to produce acrid and toxic fumes or sulfur oxides.

Fire Incompatibility: Reacts with mild steel, galvanized steel and zinc producing hydrogen gas which may form an explosive mixture with air. Contact with readily oxidizable organic material may cause ignition and fire. Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.

Fire-Fighting Instructions: Contact fire department and tell them the location and nature of the hazard. Consider evacuation. Prevent spillage from entering drains or waterways. Use water delivered as a fine spray to control fire and keep fire-exposed containers cool. Avoid spraying water onto liquid pools. If safe to do so, remove containers from path of fire.

Fire-Fighting Equipment: Because fire produces toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full-face piece operated in pressure-demand or positive-pressure mode. Equipment should be thoroughly decontaminated after use.

Section 6 - Accidental Release Measures

Small Spills: Clean up all spills immediately. Avoid breathing vapors and contact with skin and eyes. Control personal contact by using protective equipment. Use soda ash, slaked lime, or a weak base to neutralize. Contain and absorb spill with sand, earth, inert material or vermiculite. Place in a suitable labeled container for waste disposal.

Large Spills

Do not touch the spill material. Clear area of personnel and move upwind. Contact fire department and tell them location and nature of hazard. May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Stop leak if safe to do so. Contain spill with sand, earth or vermiculite. Collect recoverable product into labeled containers for recycling. Neutralize and decontaminate residue. Wash area and prevent runoff from entering drains. After clean-up operations, decontaminate and launder all protective clothing and equipment before storing and reusing. Prevent spillage from entering drains or waterways. If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Wear protective clothing when risk of exposure occurs. Avoid generating and breathing mist. Avoid all personal contact, including inhalation. Use in a well-ventilated area. Avoid contact with incompatible materials. When handling, do not eat, drink or smoke. Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling. Observe manufacturer's storing and handling recommendations.

Recommended Storage Methods: Plastic carboy, poly-lined drum, glass carboy. Glass container is suitable for laboratory quantities. Check that containers are clearly labeled. Packaging as recommended by manufacturer. Do not use mild steel or galvanized containers.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or non-routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Colorless, oily, dense with faint acid odor.
Odor Threshold: Not applicable
Vapor Pressure: 0.133 at 146°C
Vapor Density (Air=1): 3.40
Formula Weight: 98.07
Density: 1.29 gm/cm^3
Specific Gravity (H_2O=1 at 4 °C): 1.84 at 15 °C
pH: < 1

Water Solubility: Miscible
Boiling Point: ~ 290°C (554°F)
Freezing/Melting Point Range: -1.11°C (30°F)
Decomposition Temperature: 340°C (644°F)
Viscosity: Not available
Refractive Index: Not available
Surface Tension: Not available
% Volatile: Not applicable
Evaporation Rate: Negligible

Section 10 - Stability and Reactivity

Stability: Product is considered stable under normal handling conditions.

Polymerization: Hazardous polymerization will not occur.

Storage Incompatibilities: Segregate from alkalis, nitrates, carbides, metallic sulfides, cyanides, sulfides, carbonates, other acids, halogens, oxidizing agents and chemicals readily decomposed by acids. Reacts vigorously with water and alkalis. Contact with readily oxidizable organic material may cause ignition and fire. Contact with metal may release hydrogen, a flammable and explosive gas.

Conditions to Avoid: Exposure to incompatible materials, water, heat and other reactive material.

Hazardous Decomposition Products: Thermal oxidative decomposition of mixture can produce toxic fumes of sulfur including sulfur dioxide, sulfur trioxide, hydrogen sulfide, and hydrogen gas. Sulfuric acid will react with water or steam to produce toxic and corrosive fumes.

Section 11- Toxicological Information*

Human, inhalation, TC_{Lo}: 1 mg/m^3/3 hr Mouse, inhalation, LD_{50}: 320 mg m^3/2 hr Rat, inhalation, LD_{50}: 510 mg m^3/2 hr Rat, oral, LD_{50}: 2140 mg/kg Rabbit, eye: 5 mg/30s rinse - Severe	**Chronic Effects:** Chronic bronchitis, dermatitis, corrosion of tooth enamel, skin lesions, tracheobronchitis, stomatitis, conjunctivitis and gastritis, and increased risk of laryngeal cancer. **Carcinogenicity:** IARC Group 1 **Mutagenicity:** None specified **Reproductive:** Developmental musculoskeletal system abnormalities

* See NIOSH, *RTECS (WS5600000),* for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Fish LC_{50}: 42-500 mg/L /96 hr. Algae: 10 mg/L. Daphnia EC_{50}: 29-88 mg/L/24 hr. Shrimp LC_{50}: 80-90 mg/L /48 hr. Prawn LC_{50}: 42.5 ppm/48 hr salt water.

Environmental Fate: Sulfuric acid is toxic to aquatic life due to the low pH. Small quantities of acid will be neutralized by natural alkalinity in the ecosystem.

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible or consult manufacturer for recycling options. Follow applicable federal, state, and local regulations. Recycle containers; otherwise dispose of in an authorized landfill after neutralization of chemical.

Disposal Regulations: Always dispose of material in accordance with local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101)

Shipping Name: Sulfuric acid **Hazard Class:** 8 **ID No.:** UN1830 **Packing Group:** II **Label:** 8 **Special Provisions (172.102):** A3, A7, B3, B83, B84, IB2, N34, T8, TP2, TP12	**Packaging Authorizations** **Exceptions:** 173.154 **Non-bulk Packaging:** 173.202 **Bulk Packaging:** 173.242	**Quantity Limitations** **Passenger, Aircraft, or Railcar:** 1 L **Cargo Aircraft Only:** 30 L **Vessel Stowage Requirements** **Vessel Stowage:** C **Other:** 14 **Emergency Response Guidebook # 137**

Section 15 - Regulatory Information

EPA Regulations:

EPA Hazardous Waste Number and Classification (40 CFR 261.22): D002, Characteristics of Corrosivity
CERCLA Hazardous Substance (40 CFR 302.4) listed specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112
RCRA Hazardous Waste Number and Classification (40 CFR 302.4): Not listed (wastes may be regulated)
CERCLA Reportable Quantity (RQ): 1000 lb (454 kg)
SARA 311/312 Codes: Acute, Chronic, Reactive
SARA Toxic Chemical (40 CFR 372.65): 1000 lb (454 kg)
SARA EHS (Extremely Hazardous Substance) (40 CFR 355) TPQ: 1000 lb (454 kg)
TSCA: Listed

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Listed (1 mg/m^3)

Section 16 - Other Information

Revision Notes: Revisions to Sections 3, 4, 8, 9, 14, and 15.

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