

# Standard Operating Procedure

## Sulfuric Acid

### Purpose

Sulfuric acid (alternative spelling sulphuric acid) is a highly corrosive mineral acid. The historical name of this acid is oil of vitriol. Possessing different chemical properties, the sulfuric acid has a wide range of applications including domestic acidic drain cleaner, electrolyte in lead-acid batteries and various cleaning agents. It is also a central substance in the chemical industry. Principal uses include mineral processing, fertilizer manufacturing, oil refining, wastewater processing, and chemical synthesis.

It is a diprotic acid which may show different properties depending upon its concentration. Its corrosiveness on metals, stones, skin, eyes and flesh or other materials can be mainly ascribed to its strong acidic nature and if concentrated strong dehydrating property and strong oxidizing property. Concentrated sulfuric acid can cause very serious damage upon contact as not only does it hydrolyze proteins and lipids leading to chemical burn, but also dehydrates carbohydrates posing secondary thermal burn. Permanent blindness can result if it contacts eyes. So, safety precautions should be done when using it. Moreover, it is hygroscopic which readily absorbs water vapor in air.

### Physical & Chemical Properties/Definition of Chemical Group

CAS#: 7664-93-9

Class: **Highly Corrosive**

Molecular Formula:  $\text{H}_2\text{SO}_4$

Form (physical state): Liquid

Color: Clear, colorless to slightly yellow

Boiling point: 290 °C

### Potential Hazards/Toxicity

Highly corrosive chemical. Inhalation may cause irritation to the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Contact with skin causes burns and irritation. Eye contact causes burns, irritation, a may cause blindness. Ingestion may cause permanent damage to the digestive tract

### Personal Protective Equipment (PPE)

#### Respirator Protection

Use a full-face respirator with multi-purpose combination respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).

- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
- As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EH&S. This is a regulatory requirement.

### **Hand Protection**

Viton gloves are recommended, but nitrile gloves are also acceptable.

**NOTE:** Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with hydrochloric acid.

Refer to glove selection chart from the links below:

[http://www.ansellpro.com/download/Ansell\\_8thEditionChemicalResistanceGuide.pdf](http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf)

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

### **Eye Protection**

Tightly fitting safety goggles. Face shield (8-inch minimum) is often recommended.

### **Skin and Body Protection**

Lab personnel working with the chemical need to wear full-length pants or its equivalent, closed-toe footwear with no skin being exposed, and a lab coat.

### **Hygiene Measures**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### **Engineering Controls**

Sulfuric Acid must be used in a fume hood. Avoid inhalation of vapor or mist.

### **First Aid Procedures**

#### **If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### **In case of skin contact**

Take off contaminated clothing immediately. Wash off with soap and plenty of water for 15 minutes. Take victim immediately to hospital. Consult a physician.

#### **In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**If swallowed**

Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**Special Handling and Storage Requirements****Precautions for safe handling**

Do not allow water to get into the container because of violent reaction. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Use only with adequate ventilation. Do not breathe spray or mist. Do not use with metal spatula or other metal items. Inform laundry personnel of contaminant's hazards.

**Conditions for safe storage**

Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near alkaline substances. Store protected from moisture. Ideally, sulfuric acid should be stored in isolation from all other chemicals in an approved acid or corrosives safety cabinet. Sulfuric Acid is incompatible with metals, oxidizing agents, reducing agents, bases, acrylonitrile, chlorates, finely powdered metals, nitrates, perchlorates, permanganates, epichlorohydrin, aniline, carbides, fulminates, picrates, organic materials, flammable liquids.

**Spill and Accident Procedure****Chemical Spill Dial 9-911 and 228-7864**

**Spill** – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

**Small (<1 L)** – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

**Large (>1 L)** – Dial 9-911 and EH&S at 228-7864 for assistance.

**Chemical Spill on Body or Clothes** – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

**Chemical Splash Into Eyes** – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

**Medical Emergency Dial 9-911 or 228-7864**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial 9-911 *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

**Non-Life Threatening Emergency** – Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

**Needle stick/puncture exposure** (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. Note: All needle stick/puncture exposures must be reported to EH&S at 228-7864 within 8 hours.

## Decontamination/Waste Disposal Procedure

Wearing proper PPE, please decontaminate equipment and bench tops using soap and water. Please dispose of the spent sulfuric acid and disposables contaminated with sulfuric acid as hazardous waste

*General hazardous waste disposal guidelines:*

### Label Waste

- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program <http://otp.ucop.edu/> as soon as the first drop of waste is added to the container

### Store Waste

- Store hazardous waste in closed containers, in secondary containment and in a designated location
- Double-bag dry waste using transparent bags
- Waste must be under the control of the person generating & disposing of it

### Dispose of Waste

- Dispose of regularly generated chemical waste within 90 days
- Call EH&S at 228-7864 for questions
- Empty Containers
  - Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) A list can be found at <http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf>

Prepare for transport to pick-up location

- Check on-line waste tag
- Use secondary containment

## Safety Data Sheet (SDS) Location

Online SDS can be accessed at <http://ehs.ucmerced.edu/material-safety-data-sheets>.

## Protocol/Procedure

2 uses in lab:

- 1) Add small amounts (i.e. dropwise) to lower pH of electrodeposition solution.
- 2) Mix with Nochromix in proper ratio for cleaning glassware.

## NOTE

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

- Prior to conducting any work with hydrochloric acid, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
- The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the SDS provided by the manufacturer.
- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last one year.

I have read and understand the content, requirements, and responsibilities of this SOP:

Name	Signature	Date
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