- Store in tightly closed containers in a cool, dry, well ventilated area away from sunlight and in area with acid proof cement floor.
- Source of ignition such as smoking, open flames should be avoided near storage. The electrical fittings and equipment should be explosion proof at the site of acid handling.
- Contact of acid with metal drum may cause the release of flammable, explosive hydrogen gas, therefore, storage drums should be of stainless steel or coated with acid resistant material.
- The storage site should have a leak detection and alarm system.
- The storage area should be provided with proper fire extinguisher and facility for the emergency disposal of leaking material.

## Maintenance Crew Protection

- The crew engaged in inspection, cleaning and maintenance should be properly trained. All tank work should be done under the supervision of a foreman.
- Pipeline in or out of the tank or other apparatus should be shut of or disconnected. Ensure before entering a tank that it does not require further washing and no harmful gases or vapours are present inside.
- Person entering tank should wear protective clothings and use tools of non-sparking type.

## During spillage and disposal

- Ventilate area of spill or leak and evacuate and restrict persons not wearing protective equipment.

  Cover the area with sodium bicarbonate or soda ash/slaked lime. Shovel neutralized residues into containers for disposal or cover the spilled area with sand, ash or earth and shovel into disposal containers.
- The sand or ash absorbed with acid should be disposed off in secured sanitary landfill. Diluted acid need to be neutralized before disposing off in sewerage or water.
- Calcinated dolomite, calcium oxide and hydroxide, sodium carbonate etc. can also be used as neutralizing agents.
- Place sulfuric acid absorbed in vermiculite in sealed containers. Stay upwind and keep out of low areas.
- Use water spray to reduce vapour but do not get water inside container.
- Keep this chemical out of confined space, such as sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the explosion.
- During spill the initial isolation and protective action distances need to be considered for evacuation of people to a safer distance. For a small spill first isolate in all directions to 200 feet then protect persons 0.1 mile downwind during day time and 0.5 miles if the spill occurred during night time.
- Likewise for a large spill first isolate in all directions to 600 feet and then protect the persons 0.4 miles downwind during day time and 1.8 miles during night time.

## Transport

- The transportation of sulphuric acid should be in accordance with the Motor Vehicle Rules, 1989 (Rules 129 to 138).
- The vehicle carrying sulphuric acid should have Emergency Information Panel (EIP) * on the side and back of the body of the vehicle.
- The driver of the vehicle must have TREMCARD (Transport Emergency Card) containing safety instructions and precautionary measures . The card should have following minimum information about name and nature of chemical, protection device, spilling/fire/first aid information. Any accident or untoward incident should be immediately notified to the police, fire brigade and ERC.
- Sampling by Solid absorbent method (Silica gel, Sodium bicarbonate, Sodium carbonate and measurement by Ion Chromatography (NIOSH method no. 7903).

## Abbreviations used

| | | |
|---|---|---|
| CAS No. | - | Chemical Abstract Society Registration No. |
| UN No. | - | United Nation's No. |
| EU No. | - | European Nation's no. |
| ICSC | - | International Chemical Safety Card |
| RTECS | - | Registry of Toxic Effects of Chemical Substances |
| PEL | - | Permissible Exposure Limit |
| ADRHIN | - | Agreement for International Carriage of Dangerous goods by Road Hazard Identification No. |
| HAZCHEM | - | Hazardous Chemical |
| OSHA | - | Occupational Safety and Health Association |
| IDLH | - | Immediately Dangerous to Life and Health |
| TWA | - | Time Weighted Average |
| BIS | - | Bureau of Indian Standards |
| SAR | - | Supplied –air respirator |
| MSHA | - | Mine Safety & Health Administration |
| NIOSH | - | National Institute for Occupational Safety & Health |

**Issued On World Environment Day, 2009**

# SAFETY GUIDELINES FOR SULPHURIC ACID

**SULPHURIC ACID**

**U.N. No. :** 1830

**HAZCHEM :** 2P


**In Emergency dial:**

**Avoid contact with liquid Or mist. Stay upwind. Reacts violently with Water with splattering, Water contaminant. Wear specific protective cover and use proper chemical solution for neutralization**

## EMERGENCY INFORMATION PANEL

Emergency Response Centre

**M.P. Pollution Control Board**

Paryawaran Parisar, E-5, Arera Colony, Bhopal - 462 016 (M.P.)
Phone: +91-755-2469180, 2464428; Fax : 0755-2463742
Web : www.ercmp.nic.in, E-mail: ercmppcb@mp.nic.in

## Identification keys

- C.A.S. No. - 7664-93-9
- U.N. No. - 1830
- E.U. No. - 231-639-5
- ICSC No. - 0362
- RTECS No. - WS5600000
- ADR HI No. - 80
- HR - 3
- HAZCHEM Code - 2P
- Also know as oil of vitriol, dihydrogen sulfate, battery acid, chamber acid
- Molecular formula - $H_2SO_4$

## Exposure limits

- OSHA PEL (TWA) - 1 mg/m³
- NIOSH IDLH - 15 mg/m³
- TWA limit - 1 PPM (For skin) (8 hours exposure)
- NIOSH-REL - TWA - 1 mg/m³
- ACGIH STEL - 3 mg/m³
- BIS Limits - -

## Physical data

Colourless to dark brown, odourless, oily liquid., hygroscopic in nature.

- Conversion – 1 ppm = 4.01 mg/m³
- Solubility – Miscible with water and ethyl alcohol in all proportions.
- Melting point – 10.49 °C
- Boiling point – 340 °C
- Freezing Point – 51 °F
- Vapor density – 3.4
- Vapour pressure – Less than 0.001 mm Hg at 20 °C
- Sp. Gravity – 1.84
- Critical Temp. – 670 °C
- Surface Tension – 50 dynes/cm
- Viscosity – 25 centipoise at 25 °C

## Exposure Routes

Skin, Eyes, Inhalation, Ingestion

## Incompatibility and reactivity

- A strong acid and oxidizer. Reacts violently with water with dangerous spattering and evolution of heat.
- Reacts violently with combustible and reducing materials, bases, organic materials, chlorates, nitrates, carbides, picrates, fulminates, water, powdered metals etc. (Also refer 'Storage').
- Corrosive to most common metals forming hydrogen gas. Upon heating toxic fumes of sulfur dioxide are formed.



## Symptoms on exposure

- Non cancer.
- Skin exposure may cause severe irritation, burns and ulceration. Severe irritation to eyes, damage to cornea and blindness.
- Ingestion may cause damage to teeth, burning of mouth, throat and stomach, nausea, vomiting of blood and eroded tissues, shock and kidney damage. Death may occur from as little as one ounce.
- Inhalation may result in sneezing, hoarseness, dispnea, respiratory tract irritation, chest pain, bleeding of nose, chronic bronchitis, pneumonia etc.

## Target organs

Skin, Eyes, Teeth and Respiratory system.

## Emergency life support equipment

Compressed oxygen, forced oxygen mask, soap, water, normal saline, Ringer's lactate, Milk, D5W.

## Fire fighting

- It is non-flammable liquid but in higher concentration may cause ignition by contact with combustible materials. Poisonous gases, including sulfur oxides, are produced in fire or in contact with water.
- Contact with metals releases flammable and explosive hydrogen gas.
- From a secure location use water to cool the container/drum by spraying but no water should come in direct contact with sulfuric acid.
- Vapours are heavier than air and may collect in low lying area or travel long distance to ignition sources and flash back. Vapours in confined area may explode when exposed to fire. Containers may explode in fire.
- Approved masks and breathing apparatus should be used as respiratory protective devices. For concentration of 1-50 mg/m³, gas masks with full facepiece with acid gas canister and high efficiency particulate filter should be used.
- For a concentration range of 51-100 mg/m³, air respirator with full facepiece operated in pressure demand or other positive pressure mode may be used.
- For a concentration above 100 mg/m³ self contained breathing apparatus with a full facepiece operated in pressure demand mode or other positive pressure mode should be used.

## Protective Clothing and Equipment

- Wear protective rubber gloves, rubber high top safety boots and aprons or rubber acid suit and gas tight chemical safety goggles to prevent any reasonable probability of skin contact.
- Polythene, Teflon, Saranex, Neoprene/Natural rubber, viton are the recommended protective material.
- Do not wear contact lenses when working with this chemical. Use splash proof cemical goggles and face shield
- Use NIOSH/OSHA recommended air purifying or supplies air respiratory equipment depending on the concentration of acid.
- Firefighter's normal protective clothing (Bunker Gear) will not provide adequate protection. A full-body encapsulating chemical resistant suit with positive pressure self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) may be necessary.

## First aid

- In case of inhalation try to get fresh air or artificial respiration. Begin rescue breathing, i.e. artificial respiration, if breathing has stopped. CPR if the heart action has stopped. Immediately transport victim to an emergency care facility.
- In case of skin exposure, remove the contaminated clothes immediately, rinse skin with plenty of water or shower and wash with soap and water.
- If this chemical gets into eyes, remove any contact lenses at once and irrigate immediately for atleast 15 minutes, without interruption, with eyelids held apart. Wash the eyes further, if the irritations persists, instill 2 or 3 drops of pontocaine anaesthetic.
- In case of ingestion, rinse mount immediately. Do not induce vomiting. If the victim is conscious, administer water 250 to 300 ml to dilute the effect in the stomach then provide milk. Immediately transport victim to an emergency care facility.

## Storage

- Store in mild steel tanks, drums and glass carboys, having vent of sufficient size to maintain the tank at atmospheric pressure, placed on raised ground by two layers of acid-proof bricks inside the bund. Glass carboys should be kept in strong individual wooden crates on a bed of limestone dust or calcareous sand.
- During storage avoid contact with water, chlorates, chromates, carbides, fulminates, nitrates, picrates and powdered metals to prevent the violent reactions.