

Standard Operating Procedure

Cadmium Sulfate

Purpose

Cadmium sulfate is an acute and chronic toxin. Contains cadmium, which is carcinogenic dependent on duration and exposure level. Very harmful if inhaled, swallowed or in contact with the skin or eyes. Can also be fatal if inhaled or ingested. Exposure can cause damage to the respiratory tract, kidneys, liver, and central nervous system.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 10124-36-4

Class: **Toxic, carcinogenic**

Molecular Formula: CdSO₄

Form (physical state): crystalline solid

Color: White

Boiling point: 1750°C

Potential Hazards/Toxicity

Cadmium and cadmium compounds are acute toxins. Cadmium sulfate has an LD₅₀ oral toxicity of 280 mg/kg [rat]. Very harmful if inhaled, ingested, or in contact with the skin. Cadmium is most efficiently absorbed through the respiratory tract, and may produce irritation, cough, headache, or metallic taste. Severe exposures can produce shortness of breath, chest pain, and flu-like symptoms noting that inhalation symptoms can be delayed for up to 24 hours. Severe inhalation and ingestion can result in pulmonary edema, liver and kidney damage and death. Redness and pain can result from skin contact.

Cadmium is a known carcinogen and imposes a possible risk of impaired fertility and harm to unborn child.

Cadmium and cadmium compounds are also chronic toxins. Minor but repeated exposure to cadmium may result in cumulative poisoning effects such as bone softening, increased blood pressure, kidney damage, anemia, pulmonary fibrosis, emphysema, and respiratory tract damage. Cadmium is a cancer hazard, with increased prostate and lung cancer. **Cadmium has a permissible exposure limit (PEL) of 5 ug/m³.** NOTE: People with pre-existing skin or eye conditions or blood, prostate, liver, kidney or respiratory problems may be more sensitive to cadmium.

Cadmium is very toxic to aquatic organisms and long-term effects in aquatic environments. Do not expose to the environment, do not empty into drains.

Personal Protective Equipment (PPE)

Respirator Protection

A dust respirator is suggested when working with cadmium sulfate.

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

Gloves must be worn, nitrile gloves are recommended.

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

OR

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

OR

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

OR

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

Eye Protection

ANSI approved properly fitting safety glasses or chemical splash goggles.

Skin and Body Protection

Flame resistant lab coats must be worn and be appropriately sized for the individual and buttoned to their full length. Laboratory coat sleeves must be of sufficient length to prevent skin exposure while wearing gloves. Lab personnel should also wear full length pants, or equivalent, and close-toed shoes. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

Hygiene Measures

Wash thoroughly and immediately after handling. Remove any contaminated clothing and wash before reuse.

Engineering Controls

Handle using a chemical fume hood with good ventilation and electrically grounded lines and equipment.

First Aid Procedures**If inhaled**

Move into the fresh air immediately and give oxygen. If not breathing give artificial respiration. Seek medical attention immediately.

In case of skin contact

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash any contaminated clothing before reuse. Thoroughly clean shoes before reuse. Seek medical attention immediately.

In case of eye contact

Check for and remove any contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Seek immediate medical attention and continue eye rinse during transport to hospital.

If swallowed

Do NOT induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

Special Handling and Storage Requirements

To keep contamination to a minimum, all work with cadmium should be done in a designated area with secondary containment and proper labeling. Wash hands thoroughly after handling. Minimize the generation and accumulation of dust. Avoid contact with eyes, skin, and clothing. Keep containers tightly closed. Store in a cool, dry and well-ventilated area away from incompatible substances.

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

Using proper personal protective equipment as outlined above, decontaminate equipment and bench tops using soap and water and properly dispose of all cadmium chemical and contaminated disposables as hazardous waste following the guidelines below.

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

Prepare electrodeposition solutions with cadmium sulfate concentrations between 1×10^{-4} and 1 M, with total volume less than 50 mL.

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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