





## LABORATORY SAFETY GUIDELINE

### Osmium Tetroxide [CAS No. 20816-12-0]

All users of Osmium tetroxide and Osmium tetroxide solutions should review this document. Osmium tetroxide is a strong oxidizer that will sublime (pass directly from solid to gas) at room temperature and when refrigerated. Osmium tetroxide is classified as a particularly hazardous substance under the OSHA Lab Standard due to its highly toxicity. Acute exposure can cause severe eye damage, blindness, dermatitis or lung/kidney damage, can cause reproductive toxicity in animals. Inhalation of vapors can cause shortness of breath, coughing, headache, and nausea as well as chemical burns to the respiratory tract. Consequently, labs must have a written SOP. Office of Research Safety Affairs does not require acutely toxic materials to be locked up, but your lab should consider security and access controls to limit accessibility of this compound.

	Highly toxic through skin contact, inhalation, and ingestion.
	Acute central nervous system (CNS) and cardiovascular effects. Irritation to eyes, skin, and respiratory tract. Chronic exposure may result in liver and kidney damage. Repeated exposure may cause damage to the spleen.
	Irritant (skin and eye), respiratory track irritant
	Oxidizer

#### PRECAUTIONS

##### Before starting work:

- Purchase a liquid formulation of OsO<sub>4</sub> whenever possible.
- Purchase a minimal amount of osmium tetroxide to do your work
- Review manufacture's Safety Data Sheet (SDS) and additional chemical information when planning to work with this material. A written experimental protocol that includes safety information must be available.
- Make sure you are familiar with general emergency response procedures prior to handling this material.
- Identify the location of the nearest eyewash and shower and verify that they are accessible.
- Allocate **designated areas** within the lab for the handling and storage of OsO<sub>4</sub>. Inform lab personnel of the locations of this designated area and the potential for contamination. OsO<sub>4</sub> must only be handled in designated areas.
- Ensure another person familiar with emergency response procedures is in the area and notified about the handling of OsO<sub>4</sub>.

##### Storage considerations:

- OsO<sub>4</sub> must be stored within sealed glass containers. Containers should be sealed with parafilm. Primary container must be stored within a sealed, shatter resistant secondary container for storage or transportation.  
**NOTE: Osmium tetroxide can penetrate plastic**

- OsO<sub>4</sub> should be kept in a refrigerator
- OsO<sub>4</sub> must be stored separately from hydrochloric acid and other acids, bases, organic materials, metals, strong reducing agents, and strong oxidizing agents.
- OsO<sub>4</sub> in combination with HCl will form poisonous chlorine gas.
- If weighing OsO<sub>4</sub> powder and the balance cannot be located in the chemical fume hood, tar a container then add the powdered OsO<sub>4</sub> to the container in the chemical fume hood (NOT a biosafety cabinet) and seal the container before returning to the balance to weigh the powder.

## DURING WORK

### CAUTION

The OSHA permissible Exposure Limit is 0.002 mg/m<sup>3</sup>

- Always work with Osmium tetroxide in a chemical fume hood.
- Use a less dangerous product than osmium tetroxide if possible, or purchase prepared solutions of this agent.
- Verify proper operation of chemical fume hood by checking the airflow meter prior to handling OsO<sub>4</sub>.
- Post a caution sign in at the fume hood when osmium tetroxide is present or is being handled.
- A designated work is required where Osmium tetroxide is handled
  - Line work surfaces with plastic-backed absorbent pads
  - Keep corn oil on hand to use for decontamination and in case of a spill- it deactivates osmium tetroxide.
  - Keep containers closed as much as possible.
  - Chemical fume hood sash positioned as low as possible.
  - Work at least 10cm into the fume hood.
  - Ensure rear fume hood baffles are not obstructed with stored materials.
- AVOID CONTACT! Wear appropriate PPE including:
  - Two pairs of standard nitrile laboratory gloves and a fully buttoned lab coat with sleeves extending to the wrists should be worn when handling osmium tetroxide. Change gloves regularly ( at least every two hours) and wash hands at the time of the glove change. Wash hands immediately after work with any concentration of osmium tetroxide.
  - Chemical-protective sleeves or wrist guards, or extended-cuff gloves, are recommended.
  - Wear chemical splash goggles (safety glasses are not sufficient). If there is a risk of splash, also wear a face shield.
  - Wear a cuffed lab coat with sleeves tucked into the gloves.

### After completing the work:

- The user is responsible for the collection, tagging and disposal of waste. Osmium tetroxide waste, including contaminated debris, pure solid or unneeded solutions, should be disposed of as soon as possible and in accordance with the university's procedures.
- All osmium tetroxide containing materials and contaminated materials are to be considered "Hazardous Waste" upon completion of an experiment. Liquid waste must be stored in a heavy-duty glass or plastic container and solid waste should be stored in a wide mouth plastic container. Waste containers must be labeled "Hazardous waste" and a University waste tag must be affixed to the outside of the container. Dispose of collected waste by emailing [labsafety@uthsc.edu](mailto:labsafety@uthsc.edu) to schedule a pickup.
- OsO<sub>4</sub> must be deactivated when work is done. Deactivated OsO<sub>4</sub> must be handled as hazardous waste.
- A 2% solution of OsO<sub>4</sub> will be fully deactivated by two-times the volume of corn oil. (Corn oil is preferred because of its high percentage of unsaturated bonds.)
- Pour the corn oil into the OsO<sub>4</sub> solution and wait for the oil to turn completely black. To test if osmium tetroxide is fully neutralized hold a piece of filter paper soaked in corn oil over the solution. Blackening of the filter paper indicates that OsO<sub>4</sub> is still present and more corn oil must be added.
- All lab ware that has contacted OsO<sub>4</sub> must be decontaminated by rinsing or dipping in corn oil or aqueous solutions of sodium sulfide or sodium sulfite before removing it from the hood.
- Wash hands and forearms thoroughly with soap and water before leaving the lab.

## EMERGENCY PROCEDURES

Medical attention is available through Occupational Health for any exposure

Occupational exposures include: aerosol exposure/inhalation, ingestion, accidental injection, and tissue/transplacental absorption.

### First Aid

#### SKIN CONTACT

- For skin exposure to the chemical or the solutions: Use copious quantities of water to rinse off contaminated area
- Call Campus Police at (8-4444) they will contact emergency services and direct them to your location.

#### EYE CONTACT

- For eye or face exposures to the chemical or the solutions: Use the eyewash, flush eyes for 15-minutes while hold eyelid open and away from exposed eye.
- Remove contact lenses if present and easy to do.
- Call Campus Police at (8-4444) they will contact emergency services and direct them to your location

#### INHALATION

- Immediately move to fresh air.
- Call Campus Police at (8-4444) they will contact emergency services and direct them to your location

#### INGESTION

- Do not induce vomiting.
- Call Campus Police at (8-4444) they will contact emergency services and direct them to your location and the Poison Control Center: 1 (800) 222-1222 on a land line phone for medical assistance.

***After receiving first aid report all injuries or exposures to Corvel by calling 1.866.245.8588***

## SPILL RESPONSE

### **For a small spill (powder or <5 mL solution within a chemical fume hood):**

- Soak kitty litter or similar absorbent material in corn oil and cover the spill with the mixture. Corn oil acts as a neutralizer for osmium tetroxide and will turn black upon contact. After the spill has been absorbed, scoop up the material and dispose of it in a plastic bag. Next, wipe down the area with more corn oil followed by soap and water to decontaminate. Place all contaminated debris (absorbent material, paper towels, gloves, etc.) in one bag, seal and label with Hazardous Waste tag. Email labsafety@uthsc.edu for a waste pickup.

### **For large spills in the fume hood or any which occur outside a fume hood:**

Evacuate the area and call the Campus Police at (8-4444 off hours) to report the spill chemical spill. They will contact Research Safety Affairs. Be prepared to provide information including: the building and room number where the spill occurred, the type of material spilled, the approximate volume of the spill, your name and a phone number where you can be reached for additional information.

- Remain in a safe location until Office of Research Safety Affairs or other response personnel arrive

## TRAINING OF PERSONNEL

All personnel are required to complete the UTHSC Laboratory Safety course session either in-person or on-line.

Training on lab-specific procedures and the hazards of osmium tetroxide is required for all personnel working with this material, and the training must be documented. The user must demonstrate competency and familiarity regarding the safe handling and use of this material prior to purchase. Training must include:

- Review of current SDS
- Review of this SOP

All personnel shall read and fully adhere to the laboratory-specific SOP, and shall document that document that they have read it by signing and dating this SOP.



**CAUTION**



Osmium Tetroxide  
In Use

*Vapors are corrosive to eyes and  
skin. May cause kidney or liver*