OSMIUM TETROXIDE

Effective Date: 8/23/2013  
Revised Date: 10/10/2022

Introduction

➢ This SOP applies to Osmium tetroxide.
➢ Osmium tetroxide is highly toxic and may cause death by inhalation, ingestion and/or skin absorption.

POTENTIAL HAZARDS

➢ It is highly toxic (LD50 oral [rat] 14 mg/kg) – ingesting very small amounts can cause death. It is also a severe eye and respiratory irritant – acute exposure can cause severe eye damage, even blindness, or chemical burns to the respiratory tract. It can also cause dermatitis or lung or kidney damage.
➢ The OSHA Permissible Exposure Limit is 0.002 mg/m³, and the ACGIH Threshold Limit Value is 0.0002 ppm over 8 hours or 0.0006 ppm over 15 minutes.
➢ Chronic exposure to osmium tetroxide can result in accumulation of osmium compounds in the liver and kidney and damage to these organs. Osmium tetroxide has been reported to cause reproductive toxicity in animals; this substance has not been shown to be carcinogenic or to show reproductive or developmental toxicity in humans.

Health Hazards

HEALTH HAZARD INFORMATION

Signal word: Danger

Hazard statement(s):

H300 Fatal if swallowed.
H310 Fatal in contact with skin.
H330 Fatal if inhaled.
H314 Causes severe skin burns and eye damage.

Personal Protective Equipment

EYE PROTECTION

➢ Goggles or face shields shall be worn during operations in which OSMIUM TETROXIDE might contact the eyes (e.g., through vapors or splashes of solution).
➢ Adequate safety glasses must meet the requirements of the Practice for Occupational Education Eye and Face Protection (ANSI Z87.1-1989) and must be equipped with side shields.

HAND PROTECTION

➢ Use 2 pairs of disposable nitrile gloves when working with OSMIUM TETROXIDE. Change gloves at least every two hours.
# Standard Operating Procedure (SOP)

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- Laboratory personnel should thoroughly wash hands with soap and water before and immediately upon removal of gloves.

### LAB COATS, ETC.
- Button lab coats, closed toed shoes, long pants and long sleeved clothing shall be worn when handling OSMIUM TETROXIDE. Protective clothing shall be worn to prevent any possibility of skin contact with OSMIUM TETROXIDE.

### Work Practices
- All OSMIUM TETROXIDE work shall be done in the laboratory fume hood.
- If the fume hood is not functioning, do not proceed with work. Call x4255 immediately for repair.
- Use of a Biological Safety Cabinet for working with osmium tetroxide is not appropriate because it sublimes and the BSC is not designed to prevent exposure to vapors.
- Use a less dangerous product than osmium tetroxide if possible, or purchase a dilute solution.
- *Laboratory-specific written procedures are required for work with osmium tetroxide, including a designated work area.*
- Purchase a minimal amount of osmium tetroxide to do your work.
- Purchase in liquid form if at all possible.
- Keep corn oil on hand to use for decontamination and in case of a spill – it deactivates osmium tetroxide.
- Set up a designated area for work with osmium tetroxide and suspensions thereof, and label it with the following wording: **DANGER: Osmium Tetroxide in use. Oxidizing Agent, Severe Irritant, Causes Eye Damage, Toxic to Liver and Kidney, Authorized Personnel Only.**
- Line work surfaces with plastic-backed absorbent pads.
- Keep containers closed as much as possible.
- If weighing osmium tetroxide powder and the balance cannot be located in a chemical fume hood, tare a container then add the powdered osmium tetroxide to the container in a chemical fume hood (NOT a Biological Safety Cabinet) and seal the container before returning to the balance to weigh the powder.
- Change gloves regularly (at least every two hours) and wash hands at the time of the glove change.
- Wash hands thoroughly immediately after working with any concentration of osmium tetroxide.
- Contaminated containers and equipment may be decontaminated by dipping in corn oil before removing it from the hood. The corn oil will turn black. Paper soaked with corn oil may be used to test if the osmium tetroxide is fully neutralized – if the paper blackens, osmium tetroxide is still present and more corn oil should be added.
Contaminated work surfaces may be decontaminated with corn oil or an aqueous solution of sodium sulfite, followed by a cleaning with detergent and water.

**Special Handling Procedures and Storage Requirements**

- Excess OSMIUM TETROXIDE and all waste material containing OSMIUM TETROXIDE must be placed in a glass container labeled with the following “HAZARDOUS WASTE OSMIUM TETROXIDE”.
- Contact EHS at x3427 for hazardous waste removal.

**Emergency Numbers**

<table>
<thead>
<tr>
<th>Emergency Numbers:</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire and Medical Emergencies</td>
<td>x5911 (911 on cell phone)</td>
</tr>
<tr>
<td>Environmental Health and Safety</td>
<td>x3427</td>
</tr>
<tr>
<td>FastMed Urgent Care (employees)</td>
<td>(336) 714-4616</td>
</tr>
<tr>
<td>Student Health (students only)</td>
<td>x5218</td>
</tr>
</tbody>
</table>
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Poison Control  
800-222-1222

First Aid

<table>
<thead>
<tr>
<th>Swallowed:</th>
<th>Give water (if conscious). URGENT MEDICAL ATTENTION.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye:</td>
<td>Wash with running water (minimum 15 mins). Medical attention.</td>
</tr>
<tr>
<td>Skin:</td>
<td>Flood body with water. Remove contaminated clothing. Wash with water</td>
</tr>
<tr>
<td>Inhaled:</td>
<td>Fresh air. Rest, keep warm. If breath shallow, give oxygen. Medical attention.</td>
</tr>
<tr>
<td>Advice To Doctor:</td>
<td>Treat symptomatically.</td>
</tr>
</tbody>
</table>

Spill and Accident Procedure

➢ Keep corn oil on hand to use for decontamination and in case of a spill – it deactivates osmium tetroxide.
➢ Contaminated containers and equipment may be decontaminated by dipping in corn oil before removing it from the hood. The corn oil will turn black. Paper soaked with corn oil may be used to test if the osmium tetroxide is fully neutralized – if the paper blackens, osmium tetroxide is still present and more corn oil should be added.
➢ Contaminated work surfaces may be decontaminated with corn oil or an aqueous solution of sodium sulfite, followed by a cleaning with detergent and water.

MINOR SPILLS

1. Clean up all spills immediately.
2. No smoking, naked lights, ignition sources.
3. Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.
4. Avoid breathing dust or vapours and all contact with skin and eyes.
5. Control personal contact with the substance, by using protective equipment.
6. Contain and absorb spill with dry sand, earth, inert material or vermiculite.
7. DO NOT use sawdust as fire may result.
8. Scoop up solid residues and seal in labelled drums for disposal.