

Standard Operating Procedure (SOP)



OSMIUM TETROXIDE

Effective Date: 8/23/2013

Revised Date: 8/23/2013

INTRODUCTION

This SOP applies to Osmium tetroxide.

- Osmium tetroxide is highly toxic and may cause death by inhalation, ingestion and/or skin absorption.
- Osmium tetroxide is a strong oxidizer that will sublime (pass directly from solid to vapor and back to solid) readily at room temperature and significantly when refrigerated.

GENERAL LAB RULES

1. No eating, drinking, smoking, handling contact lenses, or applying cosmetics in the laboratory.
2. Persons shall wear buttoned lab coat, long pants, safety glasses or goggles and appropriate gloves when working with hazardous chemicals.
3. Mouth pipetting is prohibited; mechanical pipetting devices are to be used at all times.
4. All procedures are performed carefully to minimize the creation of splashes or aerosols.
5. Wash hands
 - after handling chemicals materials,
 - after removing gloves, and
 - before leaving the laboratory.

Additional Lab Specific Rules Here

POTENTIAL HAZARDS

- Osmium tetroxide is a strong oxidizer that will sublime (pass directly from solid to vapor and back to solid) readily at room temperature and significantly when refrigerated.
- 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

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reproductive toxicity in animals; this substance has not been shown to be carcinogenic or to show reproductive or developmental toxicity in humans.

HEALTH HAZARDS

- **Inhalation:** May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
- **Skin:** May be fatal if absorbed through skin. Causes skin burns.
- **Eyes:** Causes eye burns.
- **Ingestion:** May be fatal if swallowed.
- 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.

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 pair of disposable nitrile gloves when working with OSMIUM TETROXIDE. Change gloves at least every two hours.
- 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.

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WORK PRACTICES

- All OSMIUM TETROXIDE work shall be done in the laboratory fume hood.
- If 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 sublimates and the BSC is not designed to prevent exposure to vapors.
- Use a less dangerous product than osmium tetroxide if possible, or purchase in 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 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.

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SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

- Osmium tetroxide powder and concentrated solutions should be stored in a location that is secure (no unauthorized access).
- Osmium tetroxide can penetrate plastic, so should be stored in a sealed glass container (such as a vacuum-type blood collection tube), and placed inside a secondary container.
- Osmium tetroxide should be kept in a refrigerator, and should be stored separately from hydrochloric acid as well as other acids, bases, organic materials, metals, strong reducing agents, and strong oxidizing agents. Keep container tightly closed in a dry and well-ventilated place.
- Recommended storage temperature: 2 - 8 °C

Additional Lab Specific Special Handling/Storage Procedures



WASTE DISPOSAL

- 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 PROCEDURES

Emergency Numbers:

Fire and Medical Emergencies	x5911 (911 on cell phone)
Environmental Health and Safety	x3427
Hillcrest Urgent Care (employees)	336-760-8999
Student Health (students only)	x5218
Poison Control	800-222-1222

 WAKE FOREST UNIVERSITY	Standard Operating Procedure (SOP)		
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FIRST AID			
<ol style="list-style-type: none"> 1. If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Call x5911 for medical assistance. 2. In case of skin contact: Take off contaminated clothing and shoes immediately. Wash off in safety shower for at least 15 minutes. Call x5911 for medical assistance. 3. In case of eye contact: Rinse thoroughly with plenty of water at eyewash for at least 15 minutes and call x5911 for medical assistance. 4. If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Call x5911 for medical assistance. 5. Call x5911 and describe the extent of injuries. 6. Report all accidental exposures to EHS and Human Resources (employees) or Student Health (students). 7. Complete an online injury/illness report if there is an over-exposure to the chemical or if there is an accident involving the chemical. 			
SPILL AND ACCIDENT PROCEDURES			
<ul style="list-style-type: none"> • Contaminated containers and equipment may be decontaminated by dipping in corn oil before removing 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. • For cleaning up a small spill (<2 ml) of osmium tetroxide solution (or powder if confined to a chemical fume hood), cover the spill with corn oil-soaked kitty litter, then scoop up the material and place it in a plastic bag. After spill has been absorbed, wipe down area again with corn-oil, then soap and water solution to decontaminate. Call x3427 for removal. • If 2mL or more of OSMIUM TETROXIDE is spilled evacuate area immediately and contact x3427. 			