

DANGER







Osmium Tetroxide


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Osmium tetroxide is a volatile, highly toxic solid that is used as a stain for electron microscopy, and as a fixative for biological samples.

Osmium Tetroxide can be found by itself or in solutions (aqueous or another type of solvent) these solutions could have their own hazards.

Hazards	Potential Hazards	<p>Highly toxic Strong oxidizing agent</p> <ul style="list-style-type: none"> 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. According to CAMEO Osmium tetroxide is a strong oxidizing agent that will sublime (pass directly from solid to vapor and back to solid) readily at room temperature and significantly when refrigerated. OSMIUM TETROXIDE is incompatible with hydrochloric acid and easily oxidizes organic materials. Contact with other materials may cause fire For further safety information, refer to Laboratory Chemical Safety Summary for Osmium Tetroxide (PubChem), New Jersey Right to Know Fact Sheet for Osmium Tetroxide and manufacturer Safety Date Sheet (SDS) 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. 	
	Selection & Purchase	<ul style="list-style-type: none"> Use a less dangerous product than osmium tetroxide if possible, or purchase in dilute solution. Purchase a minimal amount of osmium tetroxide to do your work. Purchase in liquid form if at all possible. 	
Hazard Controls	Storage & Transport	<ul style="list-style-type: none"> Dry powders and concentrated solutions must be in sealed shatter-resistant containers, within secondary containment, during storage and transportation. 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 (HCl) as well as other acids, bases, organic materials, metals, strong reducing agents, and strong oxidizing agents. 	 
	Engineering Controls & Safety Equipment	<ul style="list-style-type: none"> Always work with osmium tetroxide in a chemical fume hood – never on an open benchtop. 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. An eyewash-drench hose must be available in the immediate area. A safety shower is highly recommended 	 

Hazard Controls -2	Work Practice Controls	<ul style="list-style-type: none"> • 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. 	
	Personal Protective Equipment (PPE)	<ul style="list-style-type: none"> • Dartmouth College has a Policy on PPE for Chemistry • Wear closed-toed shoes and clothing covering the legs. • Dartmouth College Stockrooms provide Purple Nitrile Gloves which have a thickness of 0.09-0.15 mm from Cuff to Middle Finger. • 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. Chemical-protective sleeves or wrist guards or extended-cuff gloves are recommended. • Wear chemical splash goggles (safety glasses are not sufficient). If there is risk of splash, also wear a face shield. • In cases where the arms or torso may be exposed to liquid suspensions or dry particles, wear chemical-protective sleeves or gowns. 	
Other	Emergencies & Spills	<ul style="list-style-type: none"> • For fire or potential for a fire – Pull nearest fire alarm pull station, evacuate the building and go to a safe location to dial 911. (In Borwell, Rubin and Williamson, dial 5555) • Serious injury or exposure to a hazardous material -- dial 911. <ul style="list-style-type: none"> ○ Find the nearest eyewash station or safety shower ○ Flush the contaminated area with large volumes of water ○ While flushing, remove any clothing which may have been contaminated (including shoes) ○ If the injury is to the eyes, hold the eyes open to ensure irrigation under the eyelids (15 minutes minimum) ○ Continue flushing until EMS arrives • 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. • Spill is beyond your ability to control (See Spill below) Contact EHS 603-646-1762 or after hours contact Dartmouth Safety and Security at 603-646-3333. 	

