

STANDARD OPERATING PROCEDURE: Oxidizers

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1.0 PURPOSE

The purpose of this standard is to provide guidelines for the safe handling of oxidizing materials. Consult the MSDS for specific information about a particular oxidizer.

2.0 DEFINITIONS

Oxidizer means a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases. In chemistry terms, it is an agent that receives electrons from a reducing agent during an oxidation-reduction reaction.

3.0 POTENTIAL HAZARDS

Inorganic Peroxides are noncombustible, but react vigorously with water to release oxygen. Reaction with organic and oxidizable substances may cause fire.

Nitrates are not combustible but enhance combustion of other substances. They give off irritating or toxic fumes (or gases) in a fire. Some nitrates may become shock sensitive when mixed with organic materials.

Organic Peroxides are unstable, highly reactive, and extremely flammable in the dry, crystalline state. They are highly sensitive to heat, friction, impact, light, and strong oxidizing and reducing agents.

Perchlorates are stable under normal conditions, but may become explosive when mixed with combustible materials.

4.0 EXPOSURE HAZARDS

4.1 Contact/Absorption

Contact with skin may cause redness, irritation, and possible burns.

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4.2 Inhalation

Inhalation may cause: respiratory tract irritation, sore throat, and possible burns; central nervous system effects such as nausea and headache; methemoglobinemia, which is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood; pulmonary edema; and death.

4.3 Ingestion

Ingestion may cause: severe gastrointestinal tract irritation with nausea, vomiting, and possible burns; severe and permanent damage to the gastrointestinal tract; methemoglobinemia; cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood); central nervous system effects; liver and kidney damage; and death.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Use chemical splash goggles for eye protection in combination with a full-length face shield for operations that present splash hazards. Thick butyl rubber, neoprene, nitrile, or polyethylene gloves may be appropriate. Check glove manufacturer for recommendations on a suitable glove for the specific chemical.

Wear a lab coat (100% cotton) and closed-toe shoes (non-fabric) with non-slip soles.

If a respirator is needed, then user must follow guidelines of the Respiratory Protection Program.

6.0 ENGINEERING AND VENTILATION CONTROLS

All procedures involving oxidizing materials must be conducted in a chemical fume hood or inert atmosphere chamber to protect against hazardous exposure.

7.0 SPECIAL HANDLING PROCEDURES

1. CONDUCT PROCEDURES IN A FUME HOOD.
2. Minimize the quantity of oxidizers stored in the work area.
3. Keep oxidizers away from combustible materials; violent reactions may occur when oxidizers are mixed with or contaminated by combustible materials (e.g., wood, paper, metal powders and sulfur).
4. Exercise due care when mixing oxidizing agents and combustible materials for research. Use very small amounts to reduce exothermia and control the reaction.

8.0 LABELING REQUIREMENTS

Label storage cabinets or areas with appropriate descriptor: OXIDIZER.

9.0 STORAGE REQUIREMENTS

1. Minimize the amount of oxidizers used and stored.
2. Store oxidizers away from organic, flammable, dehydrating, or reducing agents.
3. Do not store oxidizers in wooden cabinets or on wooden shelves.
4. Do not return unused material to the original container.
5. Provide secondary containment for strong oxidizing acids such as perchloric and chromic acid.
6. Do not use corks or rubber stoppers.

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10.0 FIRST AID

Consult MSDS of specific chemical for first aid treatment.

10.0.1 Eye/Skin Contact

1. Immediately go to the emergency shower/eye wash facility and remove all contaminated clothing.
2. Flush affected body area with water for at least **15 minutes**.
3. Do not use neutralizing chemicals, creams, abrasives, or lotions.
4. If the eyes have been contaminated, forcibly hold them open and flush for least **15 minutes**.
5. Resume flushing area with water if pain continues.

10.0.2 Inhalation

1. Move exposed person to fresh air if safe to do so.
2. If victim is breathing, loosen victim's clothing and maintain the airway.
 - a. Lay victim flat on their back.
 - b. Place one hand under the neck and lift.
 - c. With the heel of other hand on victim's forehead, rotate or tilt the head backward into maximum extension.
 - d. If additional airway opening is required, it can be achieved by thrusting the lower jaw into a jutting-out position.
3. If the victim is not breathing, contact DPS, and perform CPR (if certified) until medical assistance arrives. Be careful to avoid exposure to chemical poisoning via mouth-to-mouth resuscitation. If available, use a mouth-to-mask resuscitator.

10.0.3 Ingestion

1. Contact DPS and request medical assistance.
2. If possible, determine what material was ingested by victim.
3. If victim begins to vomit, turn head or entire body to one side to avoid choking.
4. Do not induce the victim to vomit or drink any beverage unless instructed to by qualified medical personnel.
5. If victim stops breathing, see Inhalation, step 3.

10.0.4 Injection

Contact DPS and request medical assistance.

11.0 SPILL AND ACCIDENT PROCEDURES

For all spill emergencies contact the Department of Public Safety (DPS).

In the event of a large chemical spill, follow these guidelines:

1. Notify everyone in the immediate area and the supervisor.
2. Evacuate personnel from the spill area.
3. Deny entry.
4. Alert other building occupants. NOTE: Evacuation of the building and its occupants may be necessary depending on the volume of chemical/biological material spilled and its relative hazard.
5. Notify DPS from a safe location and provide the following information:
 - a. Your name, telephone number, and location;
 - b. Type of incident, location, and time of occurrence;

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- c. Name and quantity of material involved, to the extent known;
- d. If victims are involved, relay the victim(s)' name(s) and extent of injuries, if any;
- e. If exposed to a hazardous spill, see 7.9.2 Chemical Exposure

11.1 Chemical Spill Clean-Up

Chemical spill clean-up must not be attempted if the employee does not have the proper training and experience, the necessary spill kit supplies, and personal protective equipment. Contact DPS for large chemical spill clean-up.

11.1.1 Corrosive Liquids

1. Neutralize the spill. Apply neutralizer from a spill clean-up kit to the perimeter of the spill. If a spill clean-up kit is not available, sodium bicarbonate can be used on acid spills and 2% hydrochloric acid or citric acid powder can be used to neutralize caustic spills.
2. Mix thoroughly until fizzing and evolution of gas ceases. NOTE: It may be necessary to add water to the mixture to complete the reaction. Neutralizer has a tendency to absorb acid before fully neutralizing it.
3. Check mixture with pH strips or pH paper. Ensure that the final pH is between 6 and 10.
4. Once the chemical is completely neutralized, cover with an absorbent material (e.g. paper towels, pads, etc.)
5. Collect the absorbent and place it in a Ziploc bag.
6. Label the bag, place it in the fume hood and call EH&S immediately.

11.1.2 Other Hazardous Liquids

1. Prevent the spill from spreading by depositing absorbent material such as Super Fine, sand, or vermiculite (paper towels do not control the vapor release as well as sand) at its outer edges.
2. Cover the entire spill with the absorbent by working from the edge toward the center in a circular motion.
3. Mix the absorbent until it has absorbed all of the flammable liquid.
4. Collect the absorbent and place it in a Ziploc bag.
5. Label the bag, place it in the fume hood, and call EH&S immediately.

11.1.3 Solids

1. Solid material of low toxicity may be swept onto a dust pan and deposited into a Ziploc bag. Any powder clinging to the dust pan may be wiped with a lab tissue and the tissue disposed of in the Ziploc bag. Ensure that fine powder or dust from the spilled material does not become airborne.
2. Label the bag, place it in the fume hood and call EH&S immediately.
3. If the spilled material is highly toxic, contact EH&S or Laboratory Safety.

12.0 WASTE DISPOSAL

Chemical waste is segregated into the following groups:

- Flammable/combustible solvents e.g. acetone, xylene, methanol;
- Halogenated solvents e.g. chloroform, methylene chloride;
- Nitrogenous hydrocarbon e.g. trimethylamine, diisopropylamine;
- Sulfurous hydrocarbon e.g. dimethylsulfoxide, dimethylsulfate;
- Corrosives. A separate stream must be started for each of the following:
 - Mineral acids e.g. hydrochloric acid, sulfuric acid

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- Organic acids e.g. trichloroacetic acid, formic acid
- Bases e.g. calcium oxide, sodium hydroxide
- Aqueous solutions e.g. metal salts, ethidium bromide; and
- Oils e.g. vacuum pump oil, motor oil.

1. Collect the chemical waste in appropriate containers described in the table below. Do not commingle or mix dissimilar waste streams.

Waste type	Waste container
Flammable liquids	glass bottles, steel cans, safety cans, high density plastic containers
Concentrated acids & bases	2.5 liter "acid" bottle. <i>Note: one gallon glass bottles are unacceptable for acids and bases; the high specific gravity of the substance and the thinness of one gallon glass containers increases the likelihood of container breakage.</i>
Trace contaminated solid waste	contaminated paper, gloves, etc. should be double-bagged using polyethylene bags
Aqueous solutions	glass bottles, plastic bottles, plastic cans
Broken mercury thermometers	broken thermometers without free-flowing mercury may be packaged in the same manner as trace contaminated solid waste. Broken thermometers with mercury should be contained in a glass or plastic bottle with a tight cap

2. Containers must be sealed airtight with a screw-on lid. Rubber stoppers, corks, and parafilm are not allowed. They must also be in sound condition, leak-proof, and appropriate for the waste type.
3. Do not fill liquid containers to more than 80% capacity. This is to prevent spillage on top of the container. The top and sides of the container must be free of liquid residue.
4. Solid chemical waste can be collected in plastic bags, fiber boxes or plastic containers.
5. Contact EH&S for waste pick-up at: <http://capsnet.usc.edu/EHS/HazWastePickUpForm.cfm>.

13.0 PROGRAM APPROVAL AND REVIEW

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