

3. Oxidizers

Standard operating procedures (SOP) are intended to provide you with general guidance on how to safely work with a specific class of chemical or hazard. This SOP is generic in nature. It addresses the use and handling of substances by hazard class only. In some instances multiple SOPs may be applicable for a specific chemical (i.e., both the SOPs for flammable liquids and carcinogens would apply to benzene). If you have questions concerning the applicability of any item listed in this procedure, contact Vanderbilt Environmental Health and Safety (2-2057) or the Principal Investigator of your laboratory. Specific written procedures are the responsibility of the principal investigator.

If compliance with all the requirements of this standard operating procedure is not possible, the principal investigator must develop a written procedure that will be used in its place. This alternate procedure must provide the same level of protection as the SOP it replaces. Vanderbilt Environmental Health and Safety is available to provide guidance during the development of alternate procedures.

Oxidizing chemicals are materials that promote combustion or spontaneously evolve oxygen at room temperature or with slight heating. This class of chemicals includes peroxides, chlorates, perchlorates, nitrates, and permanganates. Strong oxidizers are capable of forming explosive mixtures when mixed with combustible, organic or easily oxidized materials. Examples of strong oxidizers are listed at the end of this SOP.

Training:

All Vanderbilt employees who work with hazardous chemicals must be apprised of the hazards of chemicals present in their work area. This training must be provided before initial assignment and before new exposure situations. Before a lab worker may begin work with Oxidizers they must be trained on the lab specific Standard Operating Procedure for these materials.

The primary factors that lab workers need to be trained on in regard to oxidizers are how oxidizers react with other materials, the identity and location of oxidizers in the lab, the proper measure to handle and store oxidizers and measures to be used to clean up spills of oxidizers.

Securing of gas cylinders:

See Appendix O, section 10

Decontamination procedures:

Personnel: Wash hands and arms with soap and water immediately after handling oxidizing chemicals.

Area: Carefully clean work area after use. Paper towels or similar materials contaminated with strong oxidizing chemicals may pose a fire risk. Pay particular attention to any combustible materials – wood, cloth, paper, etc. when working with oxidizers. Spills or any type of exposure could result in combustion and fire. Keep working areas free of combustible materials.

Designated area:

Not applicable

Emergency procedure:

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures should address as a minimum the following:

- Who to contact: University police, VEHS, and the Principal investigator of the laboratory including evening phone number
- The location of all safety equipment (showers, spill equipment, eye wash, fire extinguishers, etc.)
- The method used to alert personnel in nearby areas of potential hazards
- Special first aid treatment required by the type of oxidizing chemical material(s) handled in the laboratory (Student Health Clinic or Occupational Health Clinic should be consulted for first aid procedures.)

Eye protection:

Eye protection in the form of safety glasses must be worn at all times when handling oxidizing chemicals. Ordinary (street) prescription glasses do not provide adequate protection and cannot pass the rigorous test for industrial safety glasses. Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn. (goggles, face shields, etc.)

Eyewash:

Where the eyes or body of any person may be exposed to oxidizing chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

Glove (dry) box:

Not applicable

Gloves:

Gloves should be worn when handling oxidizing chemicals. Nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. However, when larger quantities are handled or regular contact is involved more protective gloves should be used. Lab workers should contact VEHS for advice on chemical resistant glove selection when direct or prolonged contact with hazardous chemicals is anticipated. A glove assessment chart can be found in Appendix H.

Hazard assessment:

Hazard assessment should address proper use and handling techniques, fire safety, storage, and waste disposal issues.

Lab hood:

The use of certain concentrations of perchloric acid must be performed in a fume hood equipped with wash down facilities. Contact Vanderbilt Environmental Health and Safety at 322-2057 for fume hood requirements.

Labels:

All oxidizing chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas or abbreviations are not acceptable.

Notification:

You should notify Vanderbilt Environmental Health and Safety prior to the initial use of perchloric acid.

Protective apparel:

Appropriate lab attire (lab coats, closed-toe shoes and long-sleeved clothing) should be worn when handling oxidizing chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely.

Safety shielding:

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of oxidizing chemicals, which pose this risk, should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

Safety shower:

A safety shower should be available in a nearby location where the oxidizing chemicals are used.

Special storage:

Oxidizers should be stored in a cool and dry location. Keep oxidizers segregated from all other chemicals in the laboratory. Minimize the quantities of strong oxidizers stored in the laboratory. Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container, which may cause a fire or explosion.

Special ventilation:

The use of certain concentrations of perchloric acid must be performed in a fume hood equipped with wash down facilities. Contact Vanderbilt Environmental Health and Safety for fume hood requirements.

Spill response:

Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any oxidizing chemicals. Spill control materials for oxidizers are designed to be inert and will not react with the reagent. Never use paper towels or other inappropriate materials, which are combustible. The waste materials generated during spill cleanup may pose a flammability risk and should not remain in the laboratory overnight unless it is stored in an appropriate container.

In the event of a spill, alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of oxidizing chemicals. Vacate the laboratory immediately and call for assistance.

- Vanderbilt University Police Department (VUPD) 1-1911 or 322-2745.
Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

Vacuum protection:

Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving oxidizing chemicals must be conducted in a fume hood, glove box or isolated in an acceptable manner.

If volatile materials are involved, mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood.

Waste disposal:

All oxidizing chemicals pose a fire hazard and should be disposed of as hazardous waste. Questions regarding waste disposal should be directed to Vanderbilt Environmental Health and Safety (VEHS). This department can also assist you in minimizing waste generation.

Examples of Strong Oxidizers	CAS #
Ammonium perchlorate	7790-98-9
Ammonium permanganate	13446-10-1
Barium peroxide	1304-29-6
Bromine	7726-95-6
Calcium chlorate	10137-74-3
Calcium hypochlorite	7778-54-3
Chlorine trifluoride	7790-91-2
Chromic acid	7738-94-5
Chromium trioxide (Chromic anhydride)	7738-94-5
Dibenzoyl peroxide	94-36-0
Dinitrogen trioxide	10544-73-7
Fluorine	7782-41-4
Hydrogen peroxide	7722-84-1
Magnesium peroxide	1335-26-8
Perchloric acid	7601-90-3
Potassium bromate	7758-01-2
Potassium chlorate	3811-04-9
Potassium peroxide	17014-71-0
Propyl nitrate	627-13-4
Sodium chlorate	7775-09-9
Sodium chlorite	7758-19-2
Sodium perchlorate	7601-89-0
Sodium peroxide	1313-60-6

Source: CRC Handbook of Laboratory Safety, 3rd edition.