

ORGANIC PEROXIDES AND SELF-REACTIVE CHEMICALS

STANDARD OPERATING PROCEDURE

Type of SOP: Process Hazardous Chemical Hazard Class

Department: _____ Building: _____ Room #: _____

Principal Investigator: _____ Phone #: _____

Prepared By: _____ Email: _____ Date: _____

1. HAZARD OVERVIEW



EXPLOSIVE



FLAMMABLE

Chemicals in this class are thermally unstable and may undergo exothermic self-accelerating decomposition. They may also be explosive, burn rapidly, be sensitive to impact or friction, or react dangerously with other substances. Therefore, all chemicals in this band are considered highly hazardous.

Organic peroxides can be obtained via:

- A. Purchase or synthesis like benzoyl peroxide, or
- B. Occur spontaneously when certain chemicals are
 - Stored for prolonged periods;
 - Concentrated through distillation, evaporation, or air exposure; or
 - A result of polymerization.

This SOP only covers organic peroxides and other self-reactive materials that are purchased or synthesized. Organic peroxides that spontaneously form (e.g. ethers) are addressed in a separate NJIT SOP titled "Peroxide-Forming Chemicals".

Hazard Level	GHS Category	GHS H-Code	OSHA Definitions
Highly Hazardous	Organic Peroxides (Types A,B,C,D,E,F)	H240, H241, H242	Organic Peroxide
	Self-Reactive Substances (Types A,B,C,D,E,F)	H240, H241, H242	Unstable (reactive)
Generally Hazardous	All chemicals in this band are considered highly hazardous.		

2. PERSONAL PROTECTIVE EQUIPMENT (PPE)

At minimum, safety glasses, lab coats, and gloves are required. Additional or more protective PPE may be required. Please refer to the NJIT Chemical Hygiene Guide and Hazard Assessment Form to determine the proper PPE for handling corrosive materials.



SAFETY GLASSES



SAFETY GOGGLES



FACE SHEILD



LAB COAT



APRON



GLOVES



RESPIRATOR

3. ENGINEERING/VENTILATION CONTROLS

- In general, it is preferable to perform all work with hazardous chemicals in a fume hood. Sash height should be kept as low as possible to avoid the escape of vapors, gases and particulates.
- Supplemental equipment such as blast shields should be used when working with chemicals or processes that may result in explosions or pressure releases.
- Consider the use of a glove box, toxic gas cabinet or other local exhaust in order to further contain hazards as appropriate.

Please review the NJIT Chemical Hygiene Guide and the Safe Chemical Fume Hood Use Guide for information on the proper use of a chemical fume hood and criteria for implementing engineering controls.

Chemical Fume Hood Glovebox Biological Safety Cabinet Other _____

Room Location of Unit(s): _____

4. SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

- Be sure to review the Safety Data Sheet (SDS) for all chemicals to be used in the experiment.
- Do not work alone with these high hazard substances. At least one other person must be present in the same laboratory when any work involving hazardous chemicals is being conducted.
- Eliminate the hazardous material, substitute for a less hazardous material when possible, or purchase organic peroxides that contain stabilizing diluents.
- Design your experiment to use the least amount of material possible to achieve the desired result.
- Verify your experimental set-up and procedure prior to use. Be familiar with the Safety Data Sheets for all chemicals in use. Assess the hazards to ensure that appropriate controls are in place to minimize risk and address emergency shut-down procedures as appropriate.
- Consult with the Faculty/PI and EHS if the work involves procedure scale-up or other large quantities, or if there are any questions regarding appropriate safety procedures.

Hazard Class-Specific Practices:

- All work with organic peroxide chemicals must be carried out in a fume hood with the addition of a blast shield.
- Avoid heat, flames, sparks, and other sources of ignition. Avoid shock or friction. Protect from physical damage.
- Use containers and tools/supplies/equipment made from non-metal materials and which are compatible with the peroxides used. Keep them very clean to avoid contamination.
- Glass containers with screw-cap lids or glass stoppers may not be acceptable for some organic peroxides, especially those sensitive to friction and grinding.
- Do not store organic peroxides that give off gas as they decompose in a tightly sealed, non-vented container. The buildup of gas pressure could rupture it. These peroxides are shipped in containers with specially vented caps. Use no other type of cap for containers of these organic peroxides. The vent caps relieve the normal buildup of gas pressure that could shatter an

unvented container. Check vent caps regularly to ensure that they are working properly. Keep vented containers in an upright position.

- If a water-based formulation freezes, do not chip or grind it to break up lumps of material, or heat it to thaw it out. Follow the chemical supplier's instructions.
- Dilute organic peroxides strictly in according to the chemical supplier's instructions. Using the wrong solvent or a contaminated solvent could cause an explosion. For example, methyl ethyl ketone peroxide and cyclohexanone peroxide may explode if they are mixed with acetone, a common solvent. Using reclaimed solvents of uncertain composition can also be hazardous. They may contain dangerous concentrations of contaminants that are incompatible with the organic peroxide.
- Filtering friction- or shock-sensitive chemicals with materials and devices that produce heat, such as sintered glass filters, can also be hazardous. If the reactivity is not known but must be done, conduct these activities as if the organic peroxide is an explosive.
- Do not let combustible solids such as paper towels and lab coats become contaminated with organic peroxides. Should this happen, immediately soak and rinse with water to remove the organic peroxide.
- Additional information regarding the safe handling and use of oxidizers can be found at: Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards (section 6.G. Working with Highly Reactive or Explosive Chemicals - http://www.nap.edu/openbook.php?record_id=4911&page=51)

5. INCIDENTS AND ACCIDENTS

Absorb spillages with sand, earth or other non-combustible material. Collect the spill-sand mixture in an appropriate waste container then clean the surface using a suitable cleaning agent. Please review the SDS or verify with the manufacturer suitable cleaning agents for the specific hazard class and chemical.

Laboratory personnel are to report all occupational injuries or illnesses to Faculty/PI as soon as practical. The Faculty/PI and laboratory personnel must submit the required paperwork to NJIT EHS Department. See the Emergency Response Guidelines posted in the laboratory or Emergency Procedures section of the NJIT CHG for proper procedures involving an injury, exposure, fire, or release/spill of a hazardous material.

In the event of an emergency, DIAL 9-1-1 to activate emergency response personnel.

6. SPILL AND DECONTAMINATION

Wear proper PPE. Please review the SDS or verify with the manufacturer or EHS a suitable cleaning/decontamination agent for the specific hazard class and chemical. Dispose of all used contaminated disposables in the appropriate waste stream following the Waste Disposal Section of the NJIT CHG.

Decontamination Solution(s): _____

Additional Spill / Decontamination Requirements:

7. WASTE DISPOSAL

Follow the practices and procedures in accordance with the NJIT Laboratory Waste Management Program to properly dispose of waste.

Additional Waste Disposal Requirements:

8. PRIOR APPROVAL/REVIEW

9. DESIGNATED USE AREA

Designated Use Area Location(s): _____

10. SAFETY DATA SHEETS

Location of SDS: _____

11. LAB-SPECIFIC INFORMATION (required) ([Examples](#) of appropriate content)