Peroxide-Forming Chemicals (PFCs)

Peroxide-forming chemicals (PFCs) are flammable organic liquids which are capable of forming potentially explosive R-O-O-R' peroxide bonds (where R = organic group) upon exposure to air or oxidizing impurities. Peroxides formed in a chemical container are particularly likely to accumulate within the threads of the screw cap, and may explode when subjected to heat, light, friction or mechanical shock (e.g. unscrewing the cap). It is particularly dangerous to allow these materials to evaporate to dryness, such as during distillation, leaving the crystals of peroxide on the surfaces of the container.

Personal Protective Equipment

Lab Coat

Flame resistant lab coat

Gloves

Nitrile or chloroprene gloves typically provide adequate protection against minor splashes. Consult with your PI or supervisor to determine whether any materials involved in your process require alternative hand protection.

Eye Protection

ANSI Z87.1-compliant safety glasses or safety goggles if a splash hazard is present

Labeling & Storage

PFCs should be stored in a flammable storage cabinet with self-closing hinges or in a refrigerator rated for flammable storage. All PFCs must be stored away from combustible materials and oxidizers and should be marked with receiving date and opening date. If the receiving and opening date is not known, promptly dispose of as hazardous waste. They should be managed in accordance with the instructions outlined in Appendix I of the Chemical and Laboratory Safety Manual. The Appendix gives important information about how long these should be stored and when you should start testing for peroxide formation. These guidelines vary depending on the class of peroxide former. Some common examples are listed below.

Class 1 PFCs form explosive peroxides after prolonged storage. These must be tested monthly for peroxides starting 3 months from opening.	• Divinyl acetylene • Divinyl ether • Isopropyl Ether	• Sodium amide • Potassium amide • Potassium metal
Class 2 PFCs readily form explosive peroxides when they become concentrated (e.g., via evaporation or distillation). Stabilizers like hydroquinone and BHT inhibit peroxide formation. However, the concentration process defeats the action of most stabilizers.	• Acetaldehyde • Cumene • Cyclohexene • Cyclopentene • Diacetylene	• Diethlyl Ether • Furan • Propyne • Methylcyclopentane • Vinyl ethers

Class 3 PFCs can autopolymerize as a result of peroxide formation.	• Acrylic acid • Butadiene • Chlorotrifluoroethylene • Methyl methacrylate	• Tetrafluoroethylene • Vinylacetylene • 2-Vinylpyridine

Engineering Controls, Equipment & Materials

Fume Hood

Use a fume hood to keep exposure as low as possible when using these chemicals. If your protocol does not permit the handling of such materials in a fume hood, contact the Office of Research Safety (ORS) to determine whether additional respiratory protection is warranted.

Cautions & Considerations

Static Electricity

When transferring flammable liquids between containers greater than 4L (1 gallon) containers should be grounded, and the source container should be bonded to the receiving container during transfer. If possible, transfer flammable chemicals from glass containers to glassware or from glass container/glassware to plastic. Transferring these types of chemicals between plastic containers or unbonded metal containers may lead to a fire hazard due to static electricity.

Housekeeping

Spills

Notify others in the area of the spill, including your supervisor. Evacuate the location where the spill occurred. Call 911 from any campus phone (or 310-825-1491 from a cell phone). Report any exposure to EH&S at 310-825-9797. Remain on-site (at a safe distance) to provide detailed information to first responders.

Decontamination

Once any standing material has been wiped away, clean contaminated surfaces with soap and water. Dispose of contaminated paper towels as solid hazardous waste.

Waste

Any waste from this chemical class should be disposed of through the UGA Hazardous Waste Program. For assistance with arranging a waste pickup, you may contact the Environmental Safety Division (ESD) at 706-542-5801. Prior to pickup, any container used to hold hazardous waste should be labeled with the following:

- "Hazardous Waste"
- chemical contents
- one or more of the following waste characteristics recognized by EPA: Ignitable, Corrosive, Reactive, or Toxic

In addition, any liquid hazardous waste must be stored in secondary containment trays until picked up by ESD.

First Aid & Emergencies

Skin or Eye Contact

Remove contaminated clothing and accessories; flush affected area with water. If symptoms persist, get medical attention.

Inhalation	Move person into fresh air. If symptoms persist, get medical attention.
Ingestion	Rinse mouth with water. If symptoms persist, get medical attention..