

## Peroxide-Forming Chemicals (PFC) - Safe Handling Precautions

All laboratory personnel should complete [Laboratory Safety – Core Concepts Training](#).

### Hazards of Potentially Explosive Chemicals

Chemicals such as ethyl and isopropyl ether, tetrahydrofuran (THF), and 1,4-dioxane can form potentially explosive peroxides during use or in storage. Other chemicals such as picric acid and other di- and tri-nitro compounds are also potentially explosive. Always read the safety data sheet (SDS) and be aware of the hazards. The SDS provided by the manufacturer will disclose if a particular chemical is or is likely to become a PFC.

- Some chemicals are unstable in storage. They react with the oxygen in air to form hazardous compounds, called peroxides.
- Certain peroxides may explode with exposure to shock, heat, or sparks. They may also react violently with other chemicals.
- Once peroxides have formed, the container can explode when moved or opened, causing serious injury or death.
- Discoloration, layering, and formation of crystals in stored liquids are all indications that a serious hazard may exist. Do not disturb containers of PFCs that exhibit these characteristics.

### Labeling

Labels are available at [Chemistry Stores](#), (515) 294-0203 or by calling EH&S at (515) 294-5359.

### Proper Storage

- Purchase only the amount you expect to use within a six-month period or less.
- Apply yellow peroxide warning label upon receipt, and record the date on it. Test opened containers every six months.
- Avoid exposure to light, air, and heat. Follow label directions for storage conditions. Consider using an inert gas blanket.

### Testing for Peroxides

It is the user's responsibility to ensure his/her safety by assessing each bottle before use.

**IMPORTANT!** Never test containers of unknown age or origin. Undated bottles may contain concentrated peroxides, or peroxides may have crystallized in the cap threads, which may explode when opening the bottle for testing.

- Dip strips are preferred for testing method for volatile solvents.
- Purchase dip strips from ISU Chemistry Stores. Follow the instructions.
- Test containers on or before their expiration date, or within one year of receipt.
- Test opened containers every six months.
- Always record your results on the PFC warning label.
- Test or re-test any PFC which will be used in a distillation or extraction, regardless of age. Do not concentrate if **any** level of peroxide is found.
- Dispose of reagent or treat peroxides when level exceeds 100 ppm

**WARNING! MAY FORM EXPLOSIVE PEROXIDES  
THIS CHEMICAL HAS A LIMITED SHELF LIFE**

Store in tightly closed original container. Avoid exposure to light, air or heat.  
If any crystals, discoloration, or layering are visible, do not open.  
Contact ISU EH&S (515) 294-5359 or AL ESH&A (515) 294-2153 for assistance.

Date received \_\_\_\_\_ Date opened \_\_\_\_\_

**PEROXIDE TEST RESULTS**  
(If peroxides are present DO NOT DISTILL before treating)

**Mandatory Testing Interval - 6 months**

Date \_\_\_\_\_ Result \_\_\_\_\_ Initials \_\_\_\_\_  
Date \_\_\_\_\_ Result \_\_\_\_\_ Initials \_\_\_\_\_

Do not use chemical if greater than 100 ppm of peroxide are detected.

### **Personal Protection Equipment**

- Eye Protection - safety glasses with side shields (minimum); chemical goggles.
- Gloves - nitrile, latex, neoprene laminate, or as recommended by the manufacturer.
- Clothing - laboratory coat; consider using fire resistant clothing.

### **Handling Precautions**

- Conduct all work in a laboratory hood. Use blast shields where appropriate.
- A nearly-empty bottle is more likely to be hazardous than a full one.
- If evaporation, extraction, or distillation is required, test first and monitor progress carefully.

**NEVER DISTILL TO DRYNESS!**

### **Disposal**

[Contact EH&S](#) for disposal of unwanted hazardous materials.

### **Spill Management**

Personal protective equipment (PPE) requirements for spill response may be greater than those for routine handling. Evacuate to a safe location and call for help if adequate PPE is not available.

- Get assistance with large spills by calling 911 and EH&S (515) 294-5359.
- Notify your supervisor of any spill that has occurred.
- [Contact EH&S](#) for disposal of spill materials.

### **Chemical Hygiene Plan**

The Iowa State University [Laboratory Safety Manual](#) serves as the campus-wide Chemical Hygiene Plan. Research activities in laboratories must adhere to the safety requirements defined in the Laboratory Safety Manual.

### **References**

- [Potentially Explosive Chemicals \(PECs\): Guidelines for Safe Storage and Handling](#)