

Peroxide-Forming Chemicals (PFC) - Safe Handling Precautions

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

Hazards of Peroxide-Forming Chemicals

Certain chemicals, such as diethyl ether, isopropyl ether, and tetrahydrofuran (THF), and 1,4-dioxane, can react with oxygen to form potentially explosive peroxides during use or in storage. Formation of peroxides is accelerated when PFCs are exposed to air and light. Peroxides may detonate when concentrated by evaporation or distillation, in reaction with other materials, or by exposure to heat, shock, or friction. Always read the safety data sheet (SDS) and be aware of the hazards.

- 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

A yellow label must be affixed to every container of PFC when the container arrives in the laboratory. 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 SDS directions for storage conditions.
- Consider using an inert gas blanket.

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.

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 the preferred testing method for volatile solvents.
- Purchase dip strips from ISU Chemistry Stores. Follow the instructions.
- Test containers on or before the 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 that will be used in a distillation or extraction, regardless of age. Do not concentrate if any level of peroxide is found.
- Dispose of the material when level exceeds 100 ppm.

Personal Protective Equipment

- Eye Protection - safety glasses with side shields (minimum); splash goggles must be worn for work with corrosive liquids.
- Gloves – must be appropriate for the material, as recommended by the manufacturer.
- Clothing - laboratory coat; consider using fire resistant clothing.

Handling Precautions

- Conduct all work with PFCs in a chemical fume hood, glovebox, or other appropriate containment device. 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.
- Do not use metal implements or metal-containing stir bars with PFCs – metal contamination can lead to explosive decomposition.

NEVER DISTILL PFCs TO DRYNESS!

Disposal

[Contact EH&S](#) for disposal of unwanted PFCs and/or if the peroxide level exceeds 100 ppm.

Spill Management

Clean up small spills according to the safety data sheet. If the spill is larger than the lab's capability to remediate, evacuate to a safe location and call for assistance.

- 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.

Further Information

- [Potentially Explosive Chemicals \(PECs\): Guidelines for Safe Storage and Handling](#)
- [Most Common Peroxide Formers on ISU Campus](#)