

## Suggested Storage for Peroxides

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This job aid is to assist you in the use, storage, and disposal of peroxide-forming chemicals in order to minimize risks to personnel, University facilities, and the environment. It applies to all laboratories, both clinical and research.

### Common Classes of Peroxide Formers

The following are those chemicals with the ability to form peroxides that have the potential to cause explosions.

- Ethers, acetals, and ketals, especially cyclic ethers and those with primary and/or secondary alkyl groups
- Aldehydes, including acetaldehyde and benzaldehyde
- Compounds containing benzylic hydrogens
- Compounds containing allylic hydrogens, including most alkenes; vinyl and vinylidene compounds, and dienes

### Labeling

- All peroxide formers must be labeled upon receipt with the words “peroxide former”
- The date of receipt and date of opening must be prominently displayed on all containers

### Storage and Handling

- Keep the quantity of peroxide-forming chemicals to the minimum amount needed.
- Store peroxide-formers in airtight bottles, away from light and heat.
- Avoid using glass ground stoppers.
- Store certain peroxide formers, including those in List A, under nitrogen if possible.

## Suggested Storage for Peroxides

- Evaluate for peroxide formation regularly.
  - Look for signs of:
    - crystallization,
    - discoloration, and
    - stratification.
  - These are signs that the peroxide former may have become shock sensitive.
    - **Do not move the container!**
    - Call OH&S promptly at 4-2487.

### Management and Disposal of Old Containers

Older containers of peroxide-forming chemicals, or containers of unknown age or history, must be handled very carefully and should never be opened by researchers.

- Any peroxide-forming chemical with visible discoloration, crystallization or liquid stratification should be treated as potentially explosive.
- Older steel containers that have visible rust may also be extremely dangerous.



If any of these conditions are observed on a peroxide-forming chemical container or if the origin and age are unknown, **do not attempt to move or open the container.** Contact OH&SS at 2-2487 to get the container inspected and disposed of properly.

### Chemicals That Form Peroxides – Three Classes

#### Class A: Peroxide Hazard on Storage – Without Concentration

- Can form peroxides that are difficult to detect and eliminate
- Label these items with a date of receipt and date of opening
- Dispose of these items 6 months after opening or 18 months if unopened

## Suggested Storage for Peroxides

- Examples of chemicals that form explosive levels of peroxides without concentration – Class A

Butadiene	Isopropyl ether	Sodium amide
Chloroprene	Potassium amide	Tetrafluoroethylene
Divinylacetylene	Potassium Metal	Vinylidene chloride

### Class B: Hazard Due to Peroxide on Concentration

- Can undergo explosive polymerization initiated by dissolved oxygen.
- Label these items with a date of receipt and date of opening
- Dispose of these items 12 months after opening or 2 years if unopened



**For Class B:** When alcohols listed are used for purposes that do not involve heating, chemical reaction, bulk evaporation or other activities that may stress the peroxidizable material, it is not necessary to test these containers for peroxidation and may be allowed to keep for longer duration.

- Examples of chemicals that form explosive levels of peroxides upon concentration – Class B

Acetal	Diethyl ether	2-Pentanol
Acetaldehyde	Diethylene glycol dimethyl ether (diglyme)	4-Penten-1-ol
Benzyl alcohol	Dioxanes	1-Phenylethanol
2-Butanol	Ethylene glycol dimethyl ether (glyme)	2-Phenylethanol
Cumene	4-Heptanol	2-Propanol
Cyclohexanol	2-Hexanol	Tetrahydrofuran
2-Cyclohexen-1-ol	Methylacetylene	Tetrahydronaphthalene
Cyclohexene	3-Methyl-1-butanol	Vinyl ethers
Decahydronaphthalene	Methylcyclopentane	Other secondary alcohols
Diacetylene	Methyl isobutyl ketone	
Dicyclopentadiene	4-Methyl-2-pentanol	

## Suggested Storage for Peroxides

### Class C: Auto Polymerize as a Result of Peroxide Accumulation

- May explode when relatively small quantities of peroxides are formed
- Normally have an inhibitor added to the substance by the manufacturer in order to prevent peroxides from forming
- Label these items with a date of receipt and date of opening
- Dispose of inhibited items after 2 years and uninhibited items within 24 hours of use/opening
- Examples of chemicals that may autopolymerize as a result of peroxide accumulation – Class C

Acrylic acid	Methylmethacrylate	Vinyl chloride
Acrylonitrile	Styrene	Vinyl pyridine
Butadiene	Tetrafluoroethylene	Vinylidene chloride
Chloroprene	Vinyl acetate	
Chlorotrifluoroethylene	Vinyl acetylene	

### Evaluating and Testing for Peroxide Formers

**All opened containers of peroxide formers should be tested every three months for peroxides.**

- **Examine chemical for visible crystals.**
  - Peroxide crystals tend to form on the inner surfaces of the container.
  - If you do not see crystals, or if the container is metal or opaque, proceed to the next step.
  - If you do see viscous liquid or crystalline solids, do not handle the chemical any further.
  - The crystals may cause an explosion if subjected to impact or friction.
  - Immediately contact OH&S at 2-2487.
- **Determine whether it is safe to test for peroxides.**
  - If the contents of the container have evaporated to less than 10% of the original volume, you may not test for peroxides.
  - If you know the history of the chemical, you can test its contents if it is one of the following:
    - For chemicals with a low peroxide hazard, the container is opened and <2 years old or unopened and <3 years old.

## Suggested Storage for Peroxides

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- For chemicals with a medium peroxide hazard, the container opened and <1 year old or unopened and <2 years old.
- For chemicals with a high peroxide hazard, the container is opened and <6 months old or unopened and <1 year old.
- If the chemical is not safe for you to test, contact OH&S at 2-2487.

### Testing

- Use peroxide test strips to demonstrate the presence or absence of peroxides. These are available from most distributors of general chemical supplies.
- If no peroxides are detected, the **container label should be marked to indicate the absence of peroxides and the date of the test.**
- The material can then be retained for an additional three months.
  - **If peroxides are detected the Department of Occupational Health & Safety should be notified immediately!**