



## Guidance Document

### Peroxide-Forming Chemicals

Some chemicals can form peroxides under normal storage conditions. Some of the peroxide chemicals are unstable, especially when dried or concentrated, and can explode violently when subjected to heat, light or mechanical shock. In addition, some of the inadvertently formed peroxides can initiate other unexpected violent reactions (e.g. polymerizations) with other chemicals.

When possible and practical for your work, purchase chemicals that have inhibitors added by the manufacturer. Label peroxide-forming chemicals with date received and date opened.

Store peroxide-formers in airtight opaque containers with screw caps. Consider oxygen exclusion methods such as purging with inert gas or sealing containers with parafilm.

Inspect containers for signs of peroxide formation. Do not open a container which has crystals or a visible cloudiness. Call EHS to come remove it. The friction caused by opening a lid can cause an explosion.

Liquids can be tested for presence of peroxide. This is especially important prior to distillation. Most explosions of peroxide forming chemicals occur when a material is distilled to dryness. Peroxide test kits are available from chemical vendors. Contact EHS for additional guidance.

#### Classification Table for Peroxide-Forming Chemicals

**Class I:** Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation. These chemicals can spontaneously decompose, becoming

explosive after exposure to air with concentration. Discard unopened containers within 3 months. Opened containers should be tested for peroxides every 2 months.

Acrylic acid	Tetrafluoroethylene
Acrylonitrile	Vinyl acetate
1,3-Butadiene	Vinyl acetylene
Chlorobutadiene (chloroprene)	Vinyl chloride
Chlorotrifluoroethylene	Vinyl pyridine
Methyl methacrylate	Vinylidene chloride
Styrene	

**Class II:** The following chemicals are a peroxide hazard upon concentration (distillation/evaporation). A test for peroxide should be performed if concentration is intended or suspected. Discard unopened containers within 6 months. Opened containers should be tested for peroxides every 2 months.

Acetal	Diethylene glycol dimethyl ether (diglyme)	Isopropyl alcohol
Acetaldehyde	Diethyl ether	Isopropyl propyl ether
Acrylamide	Diethyl fumarate	Isopropyl vinyl ether
Allyl ethyl ether	Diethylketene	2-Isopropylacrylaldehyde oxime
Allyl phenyl ether	2,3-Dihydrofuran	Isovaleraldehyde
Allyl vinyl ether	2,3-Dihydropyran	Limonene
1-Allyloxy-2,3-epoxypropane	1,1-Dimethoxyethane	1,5-p-Mentadiene
Benzyl-1-naphthyl ether	1,2-Dimethoxyethane	Methoxy-1,3,5,7-cyclooctatetraene
Benzyl butyl ether	2,2-Dimethoxypropane	1-Methoxyethanol
Benzyl ethyl ether	3,3-Dimethoxypropane	2-Methoxyethyl vinyl ether
Bis(2-ethoxyethyl ether	2,2-Dimethyl-1,3-dioxolane	Methyl acetylene

Bis(2-ethoxymethyl)ether	2,6-Dimethyl-1,4-dioxane	Methyl cyclopentane
2-Butanol	1,3-Dioxane	4-Methyl-1,3-dioxane
Buten-3-yne	1,4-Dioxane	2-(1-Methylheptyl)-4,6-dinitrophenyl ether
Butyl ethyl ether	1,2-Dioxep-5-ene	Methylisobutyl ketone
Butyl formate	1,3-Dioxol-4-yl-2-one	2,3-Methyl-2-methylene butanal
Butyl vinyl ether	Dipropoxymethane	4-Methyl-2-pentanone
1-Chloro-2,2-diethoxyethane	Dipropylether	2-Methyltetrahydrofuran
2-Chloroacrylnitrile	Di(2-propynyl)ether	Methyl vinyl ether
2-Chloroethyl vinyl ether	1,2-Epoxy-3-isopropoxy propane	2-Penten-4-yn-3-ol
Cinnamaldehyde	1-Ethoxy-2-propyne	$\alpha$ -Pentylcinnamaldehyde
Crotonaldehyde	2-Ethoxyethanol	2-Propanol
Cumene	2-Ethyl butanal	Propionaldehyde
Cyclohexene	Ethyl isopropyl ether	2-Propyne-1-thiol
Cyclooctene	Ethyl propenyl ether	Sodium 5,8,11,14-eicosatetraenoate
Cyclopentene	Ethyl vinyl ether	Sodium ethoxyacetylde
Cyclopropyl methyl ether	2-Ethylacryladehyde oxime	1,1,2,3-Tetrachloro-1,3-butadiene
Diacetylene	Ethylene glycol dimethyl ether (glyme)	Tetrahydrofuran
Decahydronaphthalene	2-Ethylhexanal	Tetrahydronaphthalene
Decalin	2-Ethylhexyl vinyl ether	Tetrahydropyran
Diallyl ether	2-Furaldehyde	Tetralin
Dibenzyl ether	Furan	Tridecanal
p-Dibenzyloxybenzene	4,5-Hexadien-2-yl-1-ol	1,3,3-Trimethoxypropene
1,2-DiBenzyoxyethane	2,4-Hexadienal	3,3,5-Trimethyl-2-cyclohexen-1-one

Dibutyl ether	2,5-Hexadiyn-1-ol	4-Vinylcyclohexene
Dicyclopentadiene	2-Hexanal	Vinyl ethers
1,1-Diethoxyethane	Indole-2-carboxyaldehyde	
1,2-Diethoxyethane	Isobutyl vinyl ether	
Diethoxymethane	Isobutyraldehyde	
3,3-Diethoxypropene	Isopropoxypropionitrile	

Class III: Peroxides derived from the following compounds may explode without concentration.

Organic	Inorganic
Divinyl ether	Potassium metal
Divinyl acetylene	Potassium amide
Isopropyl ether	Sodium amide (sodamide)
Vinylidene chloride	

NOTE: Lists are illustrative but not exhaustive.

*From Prudent Practices in the Laboratory, National Academy Press, 1995 and other sources.*