



Peroxide Forming Chemicals

Many ethers and similar compounds tend to react with air and light to form unstable peroxides. Some of the more common peroxide-forming chemicals include p-dioxane, ethyl ether, tetrahydrofuran, acetaldehyde, and cyclohexene. The following storage practices will help minimize hazards associated with these types of chemicals.

- ✓ Store peroxide-forming chemicals in airtight bottles or cans away from light.
- ✓ Label containers with date received and date opened.
- ✓ Discard peroxide formers 3 to 6 months after opening, depending on the chemical (see table below).
- ✓ Discard unopened containers of peroxide-forming chemicals in accordance with the manufacturer's expiration date or 18 months after the date received.

SAFE STORAGE PERIODS FOR PEROXIDE FORMERS		
Unopened chemicals from manufacturer		18 months or (expiration date)
Opened containers:		
Chemicals in Table A		3 months
Chemicals in Tables B and D		12 months
Uninhibited chemicals in Table C		24 hours
Inhibited chemicals in Table C (Do not store under an inert atmosphere)		12 months
A. Chemicals that form explosive levels of peroxides without concentration		
Butadiene	Isopropyl ether	Sodium amide (sodamide)
Chloroprene	Potassium metal	Tetrafluoroethylene
Divinylacetylene	Potassium amide	Vinylidene chloride
B. Chemicals that form explosive levels of peroxides on concentration		
Acetal	Diethyl ether	4-Methyl-2-pentanol
Acetaldehyde	Diethylene glycol dimethyl ether (diglyme)	2-Pentanol
Benzyl alcohol	Dioxanes	4-Penten-1-ol
2-Butanol	Ethylene glycol dimethyl ether	1-Phenylethanol

	(glyme)	
Cumene	4-Heptanol	2-Phenylethanol
2-Cyclohexen-1-ol	2-Hexanol	2-Propanol
Cyclohexene	Methylacetylene	Tetrahydrofuran
Decahydronaphthalene	3-Methyl-1-butanol	Tetrahydronaphthalene
Diacetylene	Methylcyclopentane	Vinyl ethers
Dicyclopentadiene	Methyl isobutyl ketone	Other secondary alcohols
C. Chemicals that may autopolymerize as a result of peroxide accumulation		
Acrylic acid ^b	Methyl methacrylate ^b	Vinyl chloride
Acrylonitrile ^b	Styrene	Vinylpyridine
Butadiene ^c	Tetrafluoroethylene ^c	Vinyladiene chloride
Chloroprene ^c	Vinyl acetate	
Chlorotrifluoroethylene	Vinylacetylene	
D. Chemicals that may form peroxides but cannot clearly be placed in sections A-C		
Acrolein	p-Chlorophenetole	4,5-Hexadien-2-yn-1-ol
Allyl ether ^d	Cyclooctened	n-Hexyl ether
Allyl ethyl ether	Cyclopropyl methyl ether	o,p-Iodophenetole
Allyl phenyl ether	Diallyl ether ^d	Isoamyl benzyl ether ^d
p-(n-Amyloxy)benzoyl chloride	p-Di-n-butoxybenzene	Isoamyl ether ^d
n-Amyl ether	1,2-Dibenzoyloxyethaned	Isobutyl vinyl ether
Benzyl n-butyl ether ^d	p-Dibenzoyloxybenzened	Isophoroned
Benzyl ether ^d	1,2-Dichloroethyl ethyl Ether	B-Isopropoxypropionitriled
Benzyl ethyl ether ^d	2,4-Dichlorophenetole	Isopropyl 2,4,5-trichloro-phenoxy- acetate
Benzyl methyl ether	Diethoxymethaned	Limonene
Benzyl 1-naphthyl ether ^d	2,2-Diethoxypropane	1,5-p-Methadiene
1,2-Bis(2-chloroethoxy) Ethane	Diethyl ethoxymethylene-Malonate	Methyl p-(n-amyl)- benzoate
Bis(2 ethoxyethyl)ether	Diethyl fumarated	4-Methyl-2-pentanone
Bis(2-(methoxyethoxy)- ethyl) ether	Diethyl acetald	n-Methylphenetole
Bis(2-chloroethyl)ether	Diethyketenef	2-Methyltetrahydrofuran
Bis(2-ethoxyethyl)adipate	m,o,p-diethoxybenzene	3-Methoxy-1-butyl acetate
Bis(2-ethoxyethyl)phthalate	1,2-Diethoxyethane	2-Methoxyethanol

Bis(2-methoxyethyl)-Carbonate	Dimethoxymethaned	3-Methoxyethyl acetate
Bis(2-methoxyethyl) ether	1,1-Dimethoxyethaned	2-Methoxyethyl vinyl ether
Bis(2-methoxyethyl) Phthalate	Dimethylketenef	Methonxy-1,3,5,7-cyclo- octa- tetraene
Bis(2-methoxymethyl) Adipate	3,3-Dimethoxypropene	B-Methoxypropionitrile
Bis(2-n-butoxyethyl) Phthalate	2,4-Dinitrophenetole	m-Nitrophenetole
Bis(2-phenoxyethyl) ether	1,3-Dioxepaned	1-Octene
Bis(4-chlorobutyl) ether	Di(1-propynyl)etherf	Oxybis(2-ethyl acetate)
Bis(chloromethyl) ethere	Di(2-propynyl)ether	Oxybis(2-ethyl benzoate)
2-Bromomethyl ethyl ether	Di-n-propoxymethaned	B,B-oxydipropionitrile
B-Bromophenetole	1,2-Epoxy-3-isopropoxy- propaned	1-Pentene
o-Bromophenetole	1,2-Epoxy-3-phenoxy- propane	Phenoxyacetyl chloride
p-Bromophenetole	p-Ethoxyacethophenone	a-Phenoxypropionyl chloride
3-Bromopropyl phenyl ether	2-Ethoxyethyl acetate	Phenyl o-propyl ether
1,3-Butadiyne	(2-Ethoxyethyl)-o-benzoyl benzoate	p-Phenylphenetone
Buten-3-yne	1-(2-Ethoxyethoxy)ethyl acetate	n-Propyl ether
tert-Butyl ethyl ether	1-Ethoxynaphthalene	n-Propyl isopropyl ether
tert-Butyl methyl ether	o,p-Ethoxyphenyl isocyanate	Sodium 8,11,14-eicosa- tetraenoate
n-Butyl phenyl ether	1-Ethoxy-2-propyne	Sodium ethoxyacetyldef
n-Butyl vinyl ether	3-Ethoxyopropionitrile	Tetrahydropyran
Chloroacetaldehyde diethylacetald	2-Ethylacrylaldehyde oxime	Triethylene glycol diacetate
2-Chlorobutadiene	2-Ethylbutanol	Triethylene glycol diprop- ionate
1-(2-Chloroethoxy)-2- phen- oxyethane	Ethyl B-ethoxypropionate	1,3,3-Trimethoxypropened
Chloroethylene	2-Ethylhexanal	1,1,2,3-Tetrachloro-1,3- butadiene
Chloromethyl methyl ethere	Ethyl vinyl ether	4-Vinyl cyclohexene
B-Chlorophenetole	Furan	Vinylene carbonate
o-Chlorophenetole	2,5-Hexadiyn-1-ol	Vinylidene chlorided

NOTES: a When stored as a liquid monomer. b Although these chemicals form peroxides, no

explosions involving these monomers have been reported. c When stored in liquid form, these chemicals form explosive levels of peroxides without concentration. They may also be stored as a gas in gas cylinders. When stored as a gas, these chemicals may autopolymerize as a result of peroxide accumulation. d These chemicals easily form peroxides and should probably be considered under Part B. e OSHA - regulated carcinogen. f Extremely reactive and unstable compound.

References: Prudent Practices in the Laboratory, National Research Council, 1995. "Review of Safety Guidelines for Peroxidizable Organic Chemicals," Chemical Health and Safety, September/October 1996.