

**SAN DIEGO STATE UNIVERSITY
ENVIRONMENTAL HEALTH & SAFETY DEPT.**

CLASSES OF PEROXIDIZABLE CHEMICALS

A. Chemicals that form explosive levels of peroxides without concentration

| | | | |
|--------------------------|------------------|----------------------------------|---------------------|
| Butadiene ^a | Divinylacetylene | Tetrafluoroethylene ^a | Vinylidene chloride |
| Chloroprene ^a | Isopropyl ether | | |

B. Chemicals that form explosive levels of peroxides on concentration

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

C. Chemicals that may autopolymerize as a result of peroxide accumulation

| | | | |
|----------------------------|----------------------------------|----------------|----------------------|
| Acrylic acid ^b | Chlorotrifluoroethylene | Vinyl acetate | Vinyladiene chloride |
| Acrylonitrile ^b | Methyl methacrylate ^b | Vinylacetylene | |
| Butadiene ^c | Styrene | Vinyl chloride | |
| Chloroprene ^c | Tetrafluoroethylene ^c | Vinylpyridine | |

D. Chemicals that may form peroxides but cannot clearly be placed in sections A-C

| | | | |
|--------------------------------------|---|---|------------------------------------|
| Acrolein | tert-Butyl methyl ether | Di(1-propynyl) ether ^f | 4-Methyl-2-pentanone |
| Allyl ether ^d | n-Butyl phenyl ether | Di(2-propynyl) ether | n-Methylphenetole |
| Allyl ethyl ether | n-Butyl vinyl ether | Di-n-propoxymethane ^d | 2-Methyltetrahydrofuran |
| Allyl phenyl ether | Chloroacetaldehyde-diethylacetal ^d | 1,2-Epoxy-3-isopropoxy-propane ^d | 3-Methoxy-1-butyl acetate |
| p-(n-Amyloxy)benzoyl-chloride | 2-Chlorobutadiene | 1,2-Epoxy-3-phenoxy-propane | 2-Methoxyethanol |
| n-Amyl ether | 1-(2-Chloroethoxy)-2-phenoxyethane | Ethoxyacetophenone | 3-Methoxyethyl acetate |
| Benzyl n-butyl ether ^d | | 1-(2-Ethoxyethoxy)ethyl-acetate | 2-Methoxyethyl vinyl ether |
| Benzyl ether ^d | Chloroethylene | 2-Ethoxyethyl acetate | Methoxy-1,3,5,7-cycloocta-tetraene |
| Benzyl ethyl ether ^d | Chloromethyl methyl ether ^e | (2-Ethoxyethyl)-o-benzoyl-benzoate | β-Methoxypropionitrile |
| Benzyl methyl ether | β-Chlorophenetole | 1-Ethoxynaphthalene | m-Nitrophenetole |
| Benzyl 1-naphthyl ether ^d | o-Chlorophenetole | o,p-Ethoxyphenyl isocyanate | 1-Octene |
| 1,2-Bis(2-chloroethoxy)-ethane | p-Chlorophenetole | | |
| Bis(2-ethoxyethyl) ether | Cyclooctene ^d | 1-Ethoxy-2-propyne | Oxybis(2-ethyl acetate) |
| Bis(2-(methoxyethoxy)-ethyl) ether | Cyclopropyl methyl ether | 3-Ethoxypropionitrile | Oxybis(2-ethyl benzoate) |
| Bis(2-chloroethyl) ether | Diallyl ether ^d | 2-Ethylacrylaldehyde oxime | β,β-Oxydipropionitrile |
| Bis(2-ethoxyethyl)-adipate | p-Di-n-butoxybenzene | 2-Ethylbutanol | 1-Pentene |
| Bis(2-ethoxyethyl)-phthalate | 1,2-Dibenzoyloxyethane ^d | β-ethoxypropionate | Phenoxyacetyl chloride |
| Bis(2-methoxyethyl)-carbonate | p-Dibenzoyloxybenzene ^d | 2-Ethylhexanal | â-Phenoxypropionyl chloride |
| Bis(2-methoxyethyl)-ether | 1,2-Dichloroethyl ethyl ether | Ethyl vinyl ether | Phenyl o-propyl ether |
| Bis(2-methoxyethyl)-phthalate | 2,4-Dichlorophenetole | Furan | p-Phenylphenetone |
| Bis(2-methoxymethyl)-adipate | Diethoxymethane ^d | 2,5-Hexadiyn-1-ol | n-Propylether |
| Bis(2-n-butoxyethyl)-phthalate | 2,2-Diethoxypropane | 4,5-Hexadien-2-yn-1-ol | n-Propyl isopropyl ether |
| | Diethyl ethoxymethylenemalonate | n-Hexyl ether | Sodium 8,11,14-eicosa |

D. Chemicals that may form peroxides but cannot clearly be placed in sections A-C

| | | | |
|--------------------------------------|----------------------------------|---|--------------------------------------|
| Bis(2-phenoxyethyl)-ether | Diethyl fumarate ^d | o,p-Iodophenetole | tetraenoate |
| Bis(4-chlorobutyl) ether | Diethyl acetal ^d | Isoamyl benzyl ether ^d | Sodium ethoxyacetylides ^f |
| Bis(chloromethyl) ether ^e | Diethylketene ^f | Isoamyl ether ^d | Tetrahydropyran |
| 2-Bromomethyl-ethyl ether | m,o,p-Diethoxybenzene | Isobutyl vinyl ether | Triethylene glycol diacetate |
| β-Bromophenetole | 1,2-Diethoxyethane | Isophorone ^d | Triethylene glycol dipropionate |
| o-Bromophenetole | Dimethoxymethane ^d | p-Isopropoxypropionitrile ^d | 1,3,3-Trimethoxypropene ^d |
| p-Bromophenetole | 1,1-Dimethoxyethane ^d | Isopropyl 2,4,5-trichlorophenoxyacetate | 1,1,2,3-Tetrachloro-1,3-butadiene |
| 3-Bromopropyl-phenyl ether | Dimethylketene ^f | | |
| 1,3-Butadiyne | 3,3-Dimethoxypropene | Limonene | 4-Vinyl cyclohexene |
| Buten-3-yne | 2,4-Dinitrophenetole | 1,5-p-Methadiene | Vinylencarbonate |
| tert-Butyl ethyl ether | 1,3-Dioxepane ^d | Methyl p-(n-amyloxy)benzoate | Vinylidene chloride ^d |

^a When stored as a liquid monomer

^b Although these chemicals form peroxides, no explosions involving these monomers

^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.

Safe Storage Period for Peroxide Forming Chemicals

| Description | Period |
|---|------------------------|
| Unopened chemicals from manufacturer | 18 months |
| Opened containers | |
| Chemicals in Part A | 3 months |
| Chemicals in Parts B and D | 12 months |
| Uninhibited chemicals in Part C | 24 hours |
| Inhibited chemicals in Part C | 12 months ^a |

^a Do not store under inert atmosphere, oxygen required for inhibitor to function.

Sources: Kelly, Richard J., Chemical Health & Safety, American Chemical Society, 1996, Sept, 28-36