

NSU Peroxide Forming Chemicals

Peroxide forming chemicals are a group of chemicals that can form shock-sensitive explosive peroxide crystals when exposed to atmospheric oxygen. A peroxide is a chemical that contains a peroxy (O-O) unit with the chemical formula of $O_2 - ^2$. These crystals form over time, and can develop within the container itself, around the opening of the lid, or even unseen between the lid and the threads of the bottle. These crystals can explode if subjected to mechanical shock, intense light, rapid changes in temperature, or heat. Peroxide former chemicals must be tested periodically to prevent hazardous conditions from arising and ensure safe handling of these materials.

Peroxide formers must be tested every 6 months if opened or yearly if unopened, using Peroxide Testing Strips. Presently, peroxide levels up to 25 ppm are widely used as the threshold for safe usage, and chemicals between 25-100 ppm should not be distilled or concentrated. Over 100 ppm means the container should avoid being handled and get disposed of through EHS immediately.

<25 ppm	Considered safe for general use
25-100 ppm	Not recommended for distilling or concentrating
>100 ppm	Avoid handling and contact EHS for safe disposal immediately

If there is any question about the age or state of a peroxide forming chemical, contact EHS for assistance or immediately dispose of it as hazardous waste through EHS.

Class A – Severe Peroxide Hazard

Currently, none of NSU's chemicals fall under this category.

Class B - Concentration Hazard

Require external energy for spontaneous decomposition. Form explosive peroxides when distilled, evaporated or otherwise concentrated.

Dispose after 12 months if unopened / check before distillation or every 6 months

Bromoacetaldehyde Diethyl Acetal	Diethyl ether (Ethyl ether)	Cyclohexene
Benzaldehyde	Benzyl alcohol	Cyclopentene
2-Butanol (sec-butanol)	Dioxanes	Methyl Ethyl Ketone (MEK)
Triethylene glycol dimethyl ether	Cyclohexanol	2-Propanol (isopropanol)
Bis(2-methoxyethyl) Ether	Cyclohexanone	
	Tetrahydrofuran (THF)	

Class C - Shock and Heat Sensitive

Highly reactive and can auto-polymerize as a result of internal peroxide accumulation. The peroxides formed in these reactions are extremely shock- and heat-sensitive.

Dispose after 12 months if unopened / check every 6 months of opening

Acrylic acid	Butadiene (sulfone) solid
Methyl methacrylate	Styrene

Class D - Potential Peroxide Forming Chemicals

May form peroxides but cannot be clearly categorized in Class A, B, or C.

Dispose after 12 months if unopened / check every 6 months of opening

1-Octane	Isoamyl alcohol (isopentyl)
2,2-Dimethoxypropane	tert-Butyl methyl ether
2-furaldehyde (furfural)	

Sources:

- Clark, Donald E. (2000). Peroxides and Peroxide Forming Compounds. Retrieved April 10th, 2022 from https://safety.fsu.edu/safety_manual/supporting_docs/Peroxides%20in%20depth%20discussion.pdf
- Peroxide-Forming Chemicals (April 2020). WCMC EHS. Retrieved April 10th, 2022 from https://ehs.weill.cornell.edu/sites/default/files/peroxide_formers.pdf
- Berkeley University – EHS: [Guidelines for PEC 11/15](#)
- MIT – EHS: [EHS_0042A.pdf](#)
- Weil Cornell Medicine – EHS: [WCMC EHS](#)
- UC Santa Cruz – EHS: [Classification List of Peroxide Forming Chemicals](#)
- Sigma Aldrich: [Peroxide Forming Solvents](#)
- University of Colorado at Boulder – EHS: [University Campus \(Standard, Policy, Guideline, Protocol,](#)