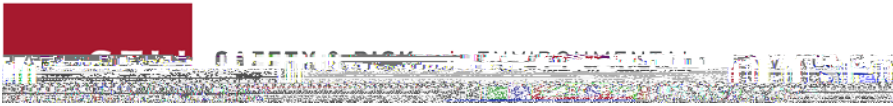


Chemical safety fact sheet: Peroxide formers

Certain common laboratory chemicals can react with atmospheric oxygen and form peroxides (i.e., compounds containing O-O bonds). Peroxides are generally unstable, oxidizing, and may ignite or explode on slight disturbance, making them some of the most hazardous substances in laboratories.

Peroxide formers are grouped into classes A, B and C, based on how peroxides are formed and/or the level of hazard.^{1,2} See Appendix A. Class A peroxide formers have potential to develop peroxides to potentially dangerous levels over time whereas Class B compounds accumulate a relatively low equilibrium concentration of peroxides and are dangerous only when concentrated by evaporation or distillation. Class C compounds includes monomers prone to free radical polymerization that on exposure to air form peroxides or other free radical sources capable of initiating violent polymerization.²

Organic compounds, particularly solvents, prone to peroxide formation usually have a free-radical inhibitor (stabilizer) added which will notably slow peroxidization. Most inhibitors for the Class C monomers require the presence of oxygen to function properly. All stabilizers are consumed over time.



Mandatory control measures

Use peroxide formers in a properly functioning chemical fume hood, if inhalation hazard is anticipated.

Wear a cotton lab coat, eye protection and properly selected gloves for your peroxide former.

Wear long pants and closed-toe shoes.

Safe handling and use

Label all peroxide formers with the date received and date opened to facilitate 'first, first-out' inventory management (see Figures 1 and 2 Science Stores label) peroxide formers kept in stock.

Purchase the smallest amount necessary and use stabilized solvents where possible.

Use unstabilized solvents immediately after opening. Do not store or retain for longer than 24 hours without adding a stabilizer or de-aerating and storing under inert atmosphere.

Stabilizers are removed by distillation or adsorption (e.g., on activated alumina or silica gel). Do not retain or store redistilled or otherwise unstabilized peroxide formers. Add a stabilizer or de-aerate and store under inert atmosphere.

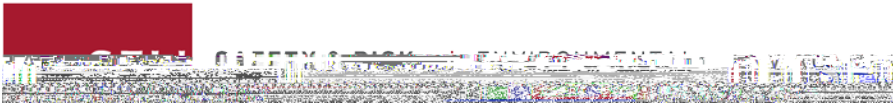
If evaporation or distillation are necessary, do not distill to dryness. Leave at least 10-20% residual bottoms.

Prior to using peroxide formers, especially before concentration (distillation) and as needed, evaluate peroxide content. Record the date and results of peroxide testing on the label (Figures 1 and 2). See **Peroxide testing**.

- Class A materials are tested within 3 months after opening.
- Class B and C materials are tested within 12 months after opening.

Light can accelerate peroxidation. Store peroxide formers in air-tight, preferably amber, bottles in a cool, dry and dark location.

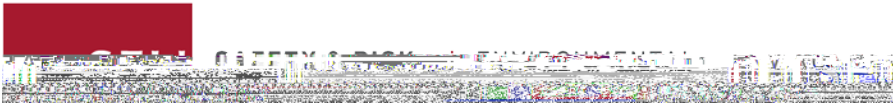
Certain compounds with polymerization inhibitors (such as Class C compounds) should not be stored under nir3 (rt)-2.9 7.004 Tc 0.006 Tw -36.87 -1.217 Td(s)-4.3 (t)-2356 (r)6 (l)-3.3 (y)3.3 (m)-9.3 (e)-6 (r)-2.8



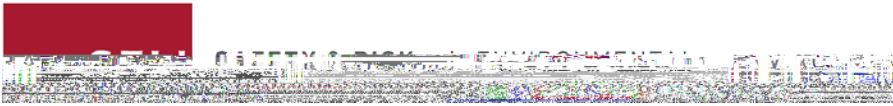
Peroxide testing

1. Verify the compound name, the date the container was opened (or received, if unopened), and the recommended storage time according to the tables in Appendix A.
2. Examine the container for visible signs of peroxide formation. Use a flashlight to provide backlight or side light. Look for discoloration, suspended or settled crystals, stratification or contamination (around the cap or in solution). If any signs are present, isolate the bottle and inform lab occupants. Contact EHS to arrange for disposal.

Warning! If a Class A peroxide former is past its expiration date or if presence of peroxides is suspected, do not open the container. Unscrewing the cap or dropping the bottle can be enough to trigger an explosion. Contact EHS (a)0.84 (nw1i)-9.ctont(E) 0 Td ()Tj EMC /LBody Tw MCID 10 >>0DC



If visible signs of peroxide formation are present or if peroxide testing suggests the concentration is >100 ppm, isolate the bottle and advise lab occupants not to handle or



Appendix A -Classes of peroxideforming chemicals

Material	Maximum storage period
Unopened container from manufacturer (all)	18 months or manufacturer's expiry date, whichever comes first. Mark container with date received and date opened.
Opened Class A	3 months (except potassium metal, see below). Store under nitrogen. Test for peroxides before use or within 3 months of opening, whichever comes first.
Opened Class B	12 months. If uninhibited, store under N ₂ . Test for peroxides before use or within 12 months of opening, whichever comes first.
Uninhibited Class C	24 hours max, under N ₂ . Add inhibitor for longer storage.
Inhibited Class C	12 months (unless also in Class A, then 3 months). Do not store under inert atmosphere, as inhibitors usually require oxygen to function. Test for peroxides before use or within 12 months of opening, whichever comes first.
Potassium metal	Highly variable aging depending on storage conditions. Visually check for crusting every 3 months.

Class A Chemicals that form explosive levels of peroxides during storage, without concentration (e.g., distillation/evaporation).*

Butadiene (liquid)	Divinyl acetylene	Potassium metal	Sodium amide
Chloroprene (liquid)	Divinyl ether	Tetrafluoroethylene (liquid)	Vinylidene chloride
Diisopropyl ether	Potassium amide		

Class B Chemicals that are a peroxide hazard upon concentration (distillation/evaporation). * A test for peroxide should be performed on Class B chemicals. (A) 4.9 (tes) 1.7 (t) 10.9 () JET 13.3 (d) .006 Tw 1.48 0.51 0.4 .7.64.7 (o) -9.6 (u) -0.8 48 0.1