



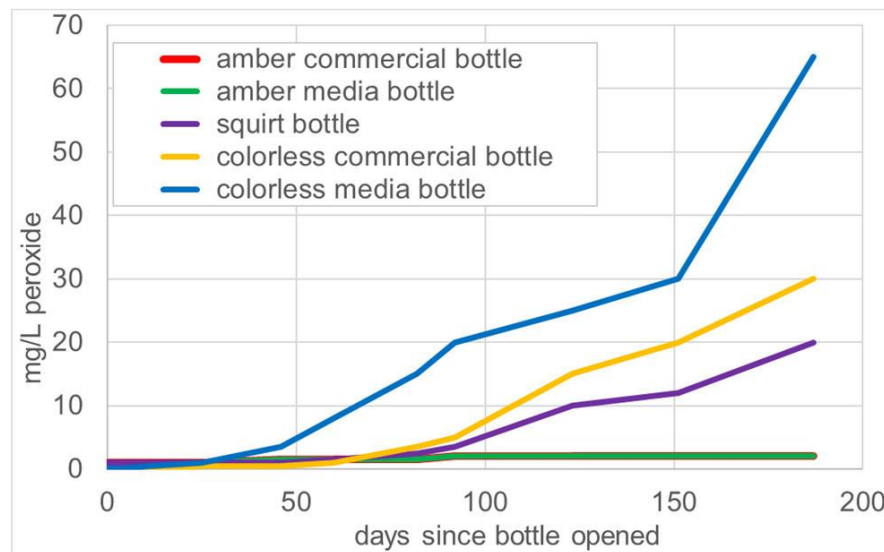
Berkeley 2006 –

- A researcher was removing solvent from an azobenzene precipitate when the flask containing the sample exploded
- Glass flew towards the researchers face and hit her safety goggles and forehead.
- She received stitches and was released from the hospital the same day.

Cause –

- The THF she was using as solvent was found to contain high levels of organic peroxides (>100 mg/L).
- Upon concentration these peroxides exploded.

Assessing Peroxide Levels:	
< 25 ppm	Considered safe for general use.
25 – 100 ppm	Not recommended for distilling or otherwise concentrating.
> 100 ppm	Avoid handling. Contact OESO at 919-684-2794 for disposal.



bottle type	age	environment	peroxide level (mg/L)
colorless glass media bottle	>1 year	on HPLC, periodically exposed to light	100
colorless glass media bottle	several months	on HPLC, constantly exposed to air, periodically exposed to light	100
white plastic bottle	16 months	sitting in hood with constant light	10–30
white plastic bottle	7 months	sitting in hood with constant light	10–25
white plastic squirt bottle	2 days (8 days)	sitting in hood with constant light	2 (3)
amber glass bottle	15 months	sitting in flammable cabinet	0.5
white plastic bottle	3 months	sitting in flammable cabinet	0.5
amber glass bottle	2 years	sitting in hood with inconsistent light	0.5

Common Peroxide Forming Chemicals*			
<i>These lists are not all-inclusive. See also U Minnesota list of peroxide-forming chemicals with CAS and structures. Any UNOPENED bottles of peroxide-formers should be submitted as waste within 18 months of receipt or by the expiration date noted on the container, whichever comes first.</i>			
Class A	<b>Chemicals that form explosive levels of peroxides without concentration</b>		
	<i>Store under inert gas if possible. Submit as waste or evaluate for peroxides within 3 months of opening.</i>		
	Butadiene (inhibited liquid monomer)	Chlorobutadiene (Chloroprene) – inhibited liquid monomer Diisopropyl Ether	Divinyl acetylene Potassium Amide Potassium Metal Sodium Amide (sodamide) Vinylidene Chloride
Class B	<b>Chemicals that form explosive levels of peroxides upon concentration</b>		
	<i>Store under inert gas if possible. Submit as waste or evaluate for peroxides within 6 - 12 months of opening.</i>		
	Acetaldehyde	Diethyl Ether	2-Phenylethanol
	Acetal	Diethylene glycol dimethyl ether (diglyme)	2-Phenylethanol
	Acetylaldehyde	Dioxanes	2-Propanol (isopropanol, IPA)
	Benzyl Alcohol	Ethylene glycol dimethyl ether (glyme)	Tetrahydrofuran
	2-Butanol		Tetrahydronaphthalene
	Cumene		Vinyl Ethers
	Cyclohexanol		Other secondary alcohols
	2-Cyclohexen-1-ol		
	Cyclohexene		
Class C	<b>Chemicals that may autopolymerize upon peroxide concentration</b>		
	<i>Without inhibitor: Submit as waste within 24 hours after synthesizing or opening. With inhibitor: Do not store under inert atmosphere (O<sub>2</sub> is required for inhibitors to work). Submit as waste or evaluate for peroxides within 12 months of opening.</i>		
	Acrylic Acid	Chlorotrifluoroethylene	Tetrafluoroethylene
	Acrylonitrile	Ethyl acrylate	Vinyl Pyridine
	Butadiene	Methyl methacrylate	Vinyl Acetate
	Chloroprene	Styrene	Vinyl Chloride

Lessons –

- Always wear PPE when working in the lab, better safe than sorry!
- Store peroxide forming chemicals (see table to right) away from light and labelled with date of purchase
- Check for peroxides on bottles older than a few months regularly (especially if recycling solvents)
- Use peroxide test strips regularly!
- Store peroxide forming chemicals in flammable cabinets away from light
- If not possible (like on top of HPLC) store in amber glass bottles
- Squirt bottles are generally used quickly enough to prevent dangerous concentrations of peroxides (especially if in an opaque plastic bottle)

<https://doi.org/10.1021/acs.oprd.2c00112>  
<https://www.safety.duke.edu/sites/default/files/GuidelinePeroxideFormers.pdf>  
<https://ehs.berkeley.edu/news/peroxide-explosion-injures-campus-researcher>