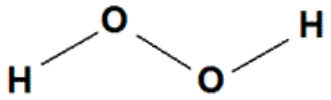
Peroxide-forming Chemicals

Identification, management and handling

What are Peroxides?

- Chemicals that can react with oxygen
- A compound containing an oxygen-oxygen single bond
- They are useful catalysts



HYDROGEN PEROXIDE

BUT – Peroxides can be EXPLOSIVE!!!

Classes of Peroxides

- Severe Peroxide Hazard (Group 1)
  - Becomes explosive when exposed to water in the air
  - Order in small amounts and dispose of 3 months after opening
- Concentration Hazard
  - Become explosive upon concentration (evaporation, distillation)
- Shock and Heat Sensitive
  - Become explosive when exposed to shock or heat
- Potential Peroxide-forming chemicals
  - Have the potential to become explosive
  - Dispose of 12 months after opening or conduct 6-monthly peroxide tests

What to look for

- Precipitate formations are dangerous and warn of peroxide formation
  - Crystals
  - Cloudiness
  - String-like formations
  - Stratification

- **DO NOT PICK UP OR SHAKE** bottles containing potential peroxide-forming chemicals

What can happen

This bottle is **Isopropyl ether** formed crystallised peroxide while sitting on a shelf

Safe detonation resulted in a crater in the ground approximately 1m wide and 50cm deep

If you suspect Peroxide formation

- Inspect the contents of bottles prior to opening. Check the bottom of the bottle and around the lid
- If crystals have formed **DO NOT OPEN**
- The friction of opening this bottle will detonate the peroxide crystals
- **The result could be an explosion and serious injury**

If you suspect Peroxide formation – do:

- If you suspect peroxides have formed: **DO NOT OPEN** the container!

- Report it immediately to a technical officer or laboratory supervisor

Managing peroxide-formers

See the information sheet for peroxide-forming compounds.

1. Label & date bottle upon arrival
2. If unopened discard after 18 months or stamped expiration date - whichever comes first.
3. After opening test and record results on label every 6 months
4. Undated bottles to be discarded

Managing peroxide-formers (continued)

- Only order small amounts of peroxide-formers for immediate use rather than bulk amounts for storage
- Store in tightly sealed, dark amber glass containers
- Inspect container for signs of peroxide formation prior to
- opening
- Avoid distillation of peroxide-formers
  - Pre-test any potential peroxide-formers for peroxide formation immediately before distillation
  - Most explosions occur when peroxides are distilled to dryness

Initial screening – verify:

- Identity of chemical
- Date last opened (or if unopened, date received) is known and is within the recommended safe storage period per guidance in Appendix A of information pamphlet
- Evaporation of the chemical is known or estimated to be less than 10%
- Container shows no visible discoloration, liquid stratification, or crystallization (around the cap or in solution)

CAUTION: Never try to force open a rusted or stuck cap on a container of a peroxide-forming chemical.

- If any items above cannot be verified, the container should be considered unsafe and should not be disturbed

Testing for Peroxide formation

- Potential peroxide-formers must be tested every 6 months with ‘peroxide detection strips’ (see local technical staff for strips)
- If concentration is over 10ppm and there are no other signs of peroxide formation the chemical must be disposed of through regular chemical waste channels

- **Severe peroxide hazard (Group 1) chemicals must be disposed of 3 months after opening**
- **Do not test old bottles, or bottles that you suspect contain peroxides**

Using Peroxide test strips

- Put on PPE
- Carefully inspect the bottle for signs of peroxides
- Pour a small amount of chemical into a beaker
- Immerse the strip into the liquid for 1 second
  - For **organic solvents** gently fan the strip for up to 30 seconds to evaporate the solvent
  - For **aqueous solutions** allow the excess to run off via the long edge of the strip onto paper towel for 5 seconds
- Determine which colour field the strip matches on the test kit
- Read off the corresponding result
- Record the result on the container

Chemicals that form Peroxides

Group 1 – dispose after 3 months

Butadiene (liquid monomer)

Chloroprene (liquid monomer)

Divinylacetylene (DVA)

Di-iso-butyl ether

Ethyl vinyl ether

Isobutyl ether

Isopropyl ether (Diisopropyl ether)

Potassium amide

Potassium metal

Sodium amide (sodamide)

Tetrafluoroethylene (liquid monomer)

Vinylidene chloride (1,1-dichloroethylene)

Common Group 2 chemicals – test every 6 months

All ethers (e.g. diethyl ether)

Propan-2-ol (aka 2-propanol & isopropanol)

Dioxane

Tetrahydrofuran

Picric acid

Acetaldehyde

Cyclohexanol

Cyclohexene

You need to identify all chemicals within your work area that can form peroxides. Check the MSDS for Risk phrase 19 (R19) or AUH019 for GHS-classified chemicals

Summary

Treat peroxide-forming chemicals with **extreme caution**

If in doubt ask for assistance

Thank you for your attention