

SAFETY ALERT

Dangers of: **Pyrophoric Materials, Water-reactive materials and Pressurized Glassware**



Incident

During the week of July 18, 2012, **trimethyl aluminum** was released and caused a secondary fire in a lab.

Approximately 5-10 ml of trimethyl aluminum in a reaction flask, under vacuum, was being cooled by a liquid nitrogen, ethylene glycol and water bath, when the glass failed and flames went shooting around the room. These flames ignited combustible materials within the vicinity. Starting a secondary fire.

Fortunately, this incident caused minimal damage and there were no injuries.

How did this happen?

Factors that may have contributed to this incident include:

- The experiment was performed in an open lab space as opposed to being shielded by portable shielding, fume hood or glove box.
- Laboratory glassware failed while under vacuum pressure.
 - The Pyrophoric material was also water-reactive and in close proximity to water.
- Combustible materials were present in the area of the pyrophoric release.

What has the affected party done to address the hazards?

- The group has agreed to switch to metal reaction vessels and use a non-aqueous coolant for baths when using water reactive materials.

How can researchers reduce hazards and protect their lab when using pyrophorics?

Take a minute to re-evaluate your procedures to verify:

- Barriers (e.g. portable shielding, fume hood or glove box) isolate the process from personnel
- Pyrophoric materials are kept in an inert atmosphere
- PPE is utilized and sufficient to protect workers from burns in the event of a release.
- If a container failed, No Combustible or Aqueous materials are within the expected release area
- Appropriate containers are chosen for the experimental conditions
 - Glassware condition is difficult to determine.
 - if utilized, has a barrier between pressurized glass and personnel
 - Remember glassware is brittle and has a tendency to fail under stress from pressure, temperature or bumps. Consider a less brittle material i.e. stainless steel
 - Stainless steel has the disadvantage that it is difficult to determine the condition and quantity of contents
 - Establish labeling and cleaning protocols so residues are not forgotten nor inadvertently mixed with an incompatible material.
- Personnel knows emergency procedures and equipment (exit routes, eye wash, shower, fire extinguisher etc)

For more information DEHS has an expanded guidance document for pyrophoric materials