

# PYROPHORIC AND/OR WATER REACTIVE COMPOUNDS

## Hazard Description

Pyrophoric materials have the potential to spontaneously ignite when in contact with air. Many pyrophoric materials are also water-reactive but not all water-reactive are pyrophoric. Water-reactive compounds generate heat, fire, or react violently in the presence of water. Examples of pyrophoric materials include dichloromethylsilane, white phosphorus, sodium hydride, tert-butyllithium and thiethylboron. Example water reactives include aluminum bromide, oxalyl chloride, and thionyl chloride.

## Prior to Working with Pyrophorics and Water Reactives

- Complete a research-specific laboratory risk assessment.
- Consider substituting the pyrophoric material and using a less dangerous substance.
- Do not begin unless a standard operating procedure (SOP) has been created, posted, and approved by the supervisor on the process. All workers must be trained on the SOP.
- Remove all potential sources of ignition. Water may be necessary for the quenching process. For water reactives, remove all sources of moisture.
- Check that all required materials are available in case of a spill or emergency (including the appropriate fire extinguishing agent).
- Do not begin unless all necessary materials are present for waste collection including a written quench process.
- Work with a small container of extinguishing powder present to easily put out any small fires such as small flames on needle sticks.
- Determine and implement a regular inspection cycle to ensure that pyrophoric containers remain in good condition and solvent-stored materials are adequately hydrated.

## Handling

- Working alone with pyrophoric or water-reactive materials is **prohibited**.
- Never leave pyrophoric or water-reactive materials unattended.
- Remove all flammables including paper towels, kim wipes, and solvent squirt bottles from the work area.
- Use blast shields if there is a potential explosion hazard.
- For air reactive materials: work under an inert atmosphere (e.g. argon) using a Schlenk line, in a glove box or any enclosed inert environment. If using a fumehood, work with the sash as low as possible, in between the user and the pyrophoric.
- When handling liquids:
  - If the original container contains an air-sensitive seal or cap, avoid using a needle too many times as it will decrease the effectiveness of the cap

and expose the pyrophoric to air and/or water. If the pyrophoric material requires multiple needles/puncture holes, switch the cap style to a more appropriate style such as the [Oxford Valve Cap](#).

- If transferring more than 20 ml, do not use a syringe. Use the cannula method instead.
- Dry all containers, glassware, and needles prior to use.
- Wear appropriate PPE including a fire-resistant lab coat, flame-resistant gloves, and goggles. Avoid wearing fabrics such as cotton or synthetic fibres that can catch fire or melt when ignited.
- For spills, immediately cover with an appropriate extinguishing powder such as Met-L-X or dry sand. Use non-sparking materials to collect absorbed materials and place in a plastic container for disposal. The laboratory SOP should include specific spill clean-up instructions.

## Emergency Procedures

Always review the SDS of the purchased product for manufacturer-specific recommendations. Look at SDS for other modes of exposure.

<b>Contacts</b>	
<b>Emergency: 911</b>	
UW Special Constables: 519-888-4911 or ext. 22222	
Poison Control: 1-800-268-9017	
Whenever 911 is called, if possible, UW Special Constables should also be informed to make them aware of the emergency on campus and allow them to support as needed. Ask them to meet the paramedics and direct them to the incident location.	
Inhalation	<ul style="list-style-type: none"><li>▪ Remove the individual from the contaminated area</li></ul>
Skin Contact	<ul style="list-style-type: none"><li>▪ Remove contaminated clothing and quickly but gently wipe material off skin</li><li>▪ Flush with water</li><li>▪ In case of burns, call 911 for transport to the hospital.</li></ul>
Eye Contact	<ul style="list-style-type: none"><li>▪ Flush eyes using an eyewash station for a minimum of 15 minutes. If water reactive, call 911 for transport to the hospital.</li></ul>

## Storage

Materials should be stored as per the specific manufacturer's instructions. Example storage requirements include dry and inert places, under kerosine, and away from heat/flames, oxidizers and water sources. Pyrophoric should be stored in secondary containers and in some cases in a designated cabinet. Pyrophoric that require refrigeration must be stored in a flammable rated fridge in a secure location (not the fridge door).

## Hazardous Waste

- Must be disposed of as per the [University's Hazardous Waste Standard](#).
- Pyrophoric materials in their original container and still in good condition may be brought down to ESF as is.
- For the remainder of pyrophoric materials, prior to being brought to the ESF, the material must be appropriately quenched (destroyed) by hydrolysis and/or neutralization and have

adequate time to cool down. The quenching procedure must be included in the standard operating procedures.

- If the material was originally stored in a solvent, ensure that adequate solvent is still in the bottle before bringing it to ESF. If the solvent is getting low, rehydrate the chemical with the same solvent before pickup.
- Empty bottles must be rinsed three times with a compatible solvent and then left open in a fume hood overnight to dry. The solvent must be transferred in and out of the container in an inert atmosphere using the syringe or cannula method. Solvent rinses must be disposed of as hazardous waste.
- If the container cannot be rinsed. Cap the container and dispose of it as hazardous waste.

### Resources

Bretherick L. [Bretherick's Handbook of Reactive Chemical Hazards](#). Eighth edition. (Urban PG, ed.). Elsevier; 2017.