

AU Lab Safety Sheets

Pyrophoric Chemicals Overview

The information presented in this overview is intended to provide general guidance regarding the hazards associated with pyrophoric chemicals. It is not intended to be a specific written safety procedure for your laboratory. Specific written procedures are the responsibility of the Principal Investigator. If you have any questions concerning the applicability of any items listed in this overview, contact Risk Management & Safety (RMS) at 334-740-9711, or the Principal Investigator of your laboratory.

Pyrophoric chemicals are liquids and solids that will ignite spontaneously in air at about 130 °F. Titanium dichloride and phosphorus are example of pyrophoric solids; tributylaluminum and related compounds are examples of pyrophoric liquids.

Decontamination procedures

Personnel: Wash hands and arms with soap and water immediately following any skin contact with pyrophoric chemicals.

Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures should address as a minimum the following:

- **Who to contact:** (911, RMS, and the Principal Investigator of the laboratory including evening phone number)
- The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
- The method used to alert personnel in nearby areas of potential hazards
- Special spill control materials required by the type of pyrophoric chemicals handled in the laboratory.

Eye protection

Researchers should assess the risks associated with an experiment and use the appropriate level of eye protection. Safety glasses with side shields provide the minimum protection acceptable for regular use. Chemical splash goggles or face shields should be worn when there is a risk of splashing hazardous materials.

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Eyewash

Where the eyes or body of any person may be exposed to pyrophoric chemicals, suitable facilities for quick drenching or flushing of the eyes and body are required within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

Fume Hood

Many pyrophoric chemicals release noxious or flammable gases and should be handled in a hood. In addition, some pyrophoric materials are stored under kerosene (or other flammable solvents), therefore the use of a fume hood is required to prevent the release of flammable vapors in the laboratory. Glove boxes may also be used (see Special Ventilation).

Glove (Dry) Box

Glove boxes may be used to handle pyrophoric chemicals if inert or dry atmospheres are required.

Gloves

Gloves should be worn when handling pyrophoric chemicals. Disposable nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. Lab workers should contact RMS for advice on chemical resistant glove selection when direct or prolonged contact with hazardous chemicals is anticipated.

Hazard Assessment

Hazard assessment for work involving pyrophoric chemicals should thoroughly address the issue of fire safety (including the need for Class D fire extinguishers), proper use and handling techniques, chemical toxicity, storage, and spill response. Not all risks can be eliminated from work with hazardous chemicals, but through informed risk assessment and careful risk management, laboratory safety is greatly enhanced. Do not begin work with a pyrophoric chemical unless you have been adequately trained in the proper handling and emergency procedure.

Protective Apparel

Lab coats, closed toed shoes, and long sleeved clothing should be worn when handling pyrophoric chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely. A long-sleeved fire-resistant laboratory coat, which is properly buttoned or closed, should be worn at all times when working with pyrophoric chemicals. In addition, it is recommended to wear fire-resistant clothing, such as cotton or wool, as opposed to synthetic fabrics, such as Nomex, which may be appropriate when engineering controls cannot completely eliminate the hazard. Shorts and open-toed shoes are inappropriate laboratory attire for working with pyrophorics and/or any other hazardous chemicals.

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Safety Shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of pyrophoric chemicals which pose this risk should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

Safety Shower

Where pyrophoric chemicals are used, a safety shower must be within the immediate work area. Laboratory staff must be trained on emergency shower location and operation.

Signs and Labels

All pyrophoric chemical containers must be clearly label with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

Special Storage

Pyrophoric chemicals should be stored under an atmosphere of inert gas or under kerosene, as appropriate. Do not store pyrophoric chemicals with flammable materials or in a flammable liquids storage cabinet. Store these materials away from sources of ignition. Minimize the quantities of pyrophoric chemicals stored in the laboratory.

Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container, which may cause a fire or explosion.

Special Ventilation

Always attempt to handle pyrophoric chemicals in a fume hood or glove box. If your research does not permit the handling of pyrophoric chemicals in a fume hood or glove box, you must contact the Office of Environmental Health and Radiation Safety to review the adequacy of all special ventilation.

Spill Response

Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the Material Safety Data Sheet (MSDS). This should occur prior to the use of any pyrophoric chemicals. Spill control materials for pyrophoric chemicals are designed to be inert and will not react with the reagent.

In the event of a spill, alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of pyrophoric chemicals. Turn off all ignition sources and vacate the laboratory immediately. Call for assistance.

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Auburn University categorizes spills as either simple or complicated, and lab personnel should respond to the spill according to the definitions below.

Simple Spill – Can be safely cleaned up by properly trained lab personnel, using appropriate spill cleanup materials. No immediate danger to personnel, property, or the environment.

Complicated Spill – Cannot be safely or effectively cleaned up by lab personnel due to large volume of spill, or highly hazardous characteristics of the chemical. An immediate or potential danger to personnel, property, or the environment exists. Call 911.

Vacuum Protection

Evacuated glassware can implode and eject flying glass and splatter chemicals. Vacuum work involving pyrophoric chemicals must be conducted in a fume hood or isolated in an acceptable manner.

Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. Vacuum pumps should be rated for use with pyrophoric chemicals.

Waste Disposal

All materials contaminated with pyrophoric chemicals should be disposed of as hazardous waste. Alert RMS if you generate wastes contaminated with pyrophoric chemicals.