

STANDARD OPERATING PROCEDURES (SOP) FOR PYROPHORIC CHEMICALS

INTRODUCTION:

Standard operating procedures (SOP) are intended to provide you with general guidance on how to safely work with a specific class of chemical or hazard. This SOP is generic in nature. It addresses the use and handling of substances by hazard class only. In some instances multiple SOPs may be applicable for a specific chemical (i.e., both the SOPs for flammable liquids and carcinogens would apply to benzene). If you have questions concerning the applicability of any items listed in this procedure contact the Office of Environmental Health and Radiation Safety (EHRS) at 215-707-2520 or the Principal Investigator of your laboratory. Specific written procedures are the responsibility of the principal investigator.

If compliance with all the requirements of this standard operating procedure is not possible, the principal investigator must develop a written procedure that will be used in its place. This alternate procedure must provide the same level of protection as the SOP it replaces. The Office of Environmental Health and Radiation Safety is available to provide guidance during the development of alternate procedures.

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.

SECURING OF GAS CYLINDERS:

Not applicable

DECONTAMINATION PROCEDURES:

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

DESIGNATED AREA:

Not applicable

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: (University police, and Office of Environmental Health and Radiation Safety, 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:

Eye protection in the form of safety glasses must be worn at all times when handling pyrophoric chemicals. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

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 must be provided 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 must 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 be also be used (see special ventilation).

GLOVE (DRY) BOX:

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

GLOVES:

Gloves must be worn when handling pyrophoric chemicals. Disposable latex or nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. Lab workers should contact OEHS 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 must be 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.

EHRS NOTIFICATION:

Not applicable

PROTECTIVE APPAREL:

Lab coats, closed toed shoes and long sleeved clothing must be worn when handling pyrophoric chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely.

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 must 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:

A safety or drench shower should be available in a nearby location where the pyrophoric chemicals are used.

SIGNS AND LABELS:

Containers: All pyrophoric chemicals must be clearly labeled 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. This must 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 major spill of pyrophoric chemicals. Turn off all ignition sources and vacate the laboratory immediately. Call for assistance.

- Office of Environmental Health & Radiation Safety at 215-707-2520
- After hours, Contact Page Operator at 215-204-4545
- Campus Police at 215-204-1234. This is a 24 hour service.

Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

VACUUM PROTECTION:

Evacuated glassware can implode and eject flying glass, and splattered 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 must be disposed of as hazardous waste. Alert the Office of Environmental Health and Radiation Safety if you generate wastes contaminated with pyrophoric chemicals. These wastes may pose a flammability risk and should not remain in the laboratory overnight.