

# **STANDARD OPERATING PROCEDURES (SOP) FOR REACTIVE SOLIDS**

## **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.

Reactive solids are chemicals that react vigorously with moisture and other substances. The most common reactive solids include sodium, potassium and lithium metals; acid anhydrides and acid chlorides.

## **SECURING OF GAS CYLINDERS:**

Not applicable

## **DECONTAMINATION:**

- Personnel: Wash hands and arms with soap and water immediately after handling reactive solids.
- Area: Carefully clean work area after use.

## **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, spill equipment, eye wash, fire extinguishers, etc.)
- The location and quantity of all reactive solids in the laboratory
- The method used to alert personnel in nearby areas of potential hazards
- Special first aid treatment required by the type of reactive solids material(s) handled in the laboratory

### **EYE PROTECTION:**

Eye protection in the form of safety glasses must be worn at all times when handling reactive solids. 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 reactive solids, 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 reactive solids will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases.

### **GLOVE (DRY) BOX:**

Glove boxes may be used to handle reactive solids if inert or dry atmospheres are required.

### **GLOVES:**

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

### **HAZARD ASSESSMENT:**

Hazard assessment of work involving reactive solids should address proper use and handling techniques, fire safety (including the need for Class D fire extinguishers), storage, potential peroxide formation, water and air reactivity, and waste disposal issues.

### **EHRS Notification**

Not applicable.

### **PROTECTIVE APPAREL:**

Lab coats, closed toed shoes and long sleeved clothing must be worn when handling reactive solids. 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 reactive solids 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 must be available in a nearby location where the reactive solids are used.

### **SIGNS AND LABELS:**

Containers: All reactive solids must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

### **SPECIAL STORAGE:**

Reactive solids must be stored in a cool and dry location. Keep reactive solids segregated from all other chemicals in the laboratory. Minimize the quantities of reactive solids stored in the laboratory.

Date all containers upon receipt. Potassium will form peroxides and superoxides when stored under oil at room temperature. Examine storage containers frequently. Dispose of any container that exhibits salt build up on its exterior. Dispose of all reactive solids whenever they are no longer required for current research.

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:**

Special ventilation is required if these materials are used outside of a fume hood or glove box. If your research does not permit the handling of reactive solids 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 reactive solids chemical. Spill control materials for reactive solids 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 reactive solids. 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 the Page Operator at 215-707-4545
- 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:**

Not applicable

## **WASTE DISPOSAL:**

All materials contaminated with reactive solids must be disposed of as hazardous waste. Alert the Office of Environmental Health and Radiation Safety if you generate wastes contaminated by reactive solids. These wastes may pose a flammability risk and should not remain in the laboratory overnight.