

SOP

Pyrophoric and Water Reactive Solid Materials

Purdue University
Applicable rooms:

Physics Department
All PRIME Lab areas

PRIME Lab

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INTRODUCTION

Under the GHS, a chemical is said to be "pyrophoric" if a small quantity of the material will ignite within 5 minutes after coming into contact with atmospheric oxygen

The GHS classification "substances and mixtures which, in contact with water, emit flammable gases" includes those that will emit flammable gases due to moisture in the air. In some cases, the evolution of flammable gas is directly followed by fire which is why these materials were commonly considered 'pyrophoric.'

Fire and explosion are serious concerns when working with these materials. Special precautions for safe handling of water-reactive materials will depend on the specific material, and the conditions of use and storage. Examples of water-reactives include alkali and alkaline earth metals (e.g. Li, Na, K, Ca, Mg), metal hydrides, some metal and nonmetal chlorides (e.g. SiCl₄, PCl₃, AlCl₃), calcium carbide, acid halides and acid anhydrides.

Examples of pyrophoric solids would be very fine metal powders (e.g. Fe, Pb, Ni, Pt, Al, Mg)

HAZARDS

May cause fires or explosions if contacted by water or air
Can cause severe burns to skin and eyes
Can cause severe respiratory and digestive tract burns
May produce toxic gasses upon reaction with water
Reaction with water may produce corrosive byproducts

PROCEDURES

- 1 Read and understand the MSDS or SDS for any chemicals to be used before starting work.
- 2 Containers and equipment used for storage and processing of these materials should be compatible with the material and its reaction products..
- 3 Remove nonessential items from the work area, particularly flammable materials.
- 4 Minimize the amount of material used
- 5 Some materials will react with some common "inert" gasses like nitrogen, so choose an appropriate inert gas for the material being used
- 6 Do not return excess chemical to the original container. Small amounts of impurities introduced into the container may cause a fire or explosion.
- 7 Some reactive metals are packaged, shipped, and stored under oil or kerosene. Ensure that sufficient protective liquid remains in the container while the material is stored
- 8 Appropriate PPE and engineering controls must be used
- 9 Work in an area that is well away from sinks and other water sources.
- 10 When handling Cs oven containing Cs, do not point outlet tube at yourself or others

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MINIMUM PPE REQUIREMENTS

- 1 A fire extinguisher must be located near the work area
- 2 Skin cover to throat/wrists/ankles including required lab coat which must be fire retardant
- 3 Closed shoes
- 4 Chemical resistant gloves appropriate for the material used
- 5 Eye protection
 - None required while working inside a glove box
 - Outside of glove box but contained in Cs oven - Safety glasses with side shields
 - Outside of glove box and not contained - Safety goggles
 - If disposing of very small quantities in water, add a face shield.
- 6 Work in a glove box in an inert atmosphere whenever possible
- 7 Any additional requirements of hazard certification in room where work is done

STORAGE

- 1 Store in a cool dry place away from sources of water.
- 2 Store separately from materials from other hazard classes
- 3 Segregation may be achieved by distance or secondary containment
- 4 These materials should be stored in an inert atmosphere or, in some cases immersed in a liquid such as mineral oil or kerosene.

DISPOSAL

- 1 All chemical waste must be handled as specified in chapter 7 of the CHP
- 2 Very small quantities of Cs left in the Cs oven may be disposed of by reacting with water.
- 3 All hazardous chemical waste must be placed in appropriate closed containers
- 4 Containers must be properly labeled immediately
- 5 Most acids or bases may not be disposed of in the sink
- 6 REM will provide for disposal of all waste chemicals

EMERGENCY PROCEDURES

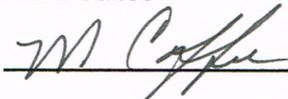
- 1 Spills should be handled as specified in chapter 8 of the CHP and the MSDS of SDS
 - Skin or eye contact should have any possible material brushed from affected area and then washed
- 2 with water using an emergency shower or eye wash for at least 15 minutes unless otherwise indicated in MSDS or SDS.
- 3 Skin or eye contact should continue to be treated as specified in the MSDS or SDS
- 4 For any eye injury or significant other injuries Purdue EMS should be called immediately.
- 5 All injuries must be treated as specified in section 6.7 of the CHP
- 6 Do not use water, or water containing foams as a fire extinguishing agent.

APPROVAL

PI

Marc Caffee

Signature:



Date:

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