



Laboratory Standard Operating Procedure for:

## Water-Sensitive Chemicals

***Principal Investigator (PI) Approval is Required Prior to Performing this Procedure***

### Description

*This standard operating procedure outlines the handling and use of water-sensitive chemicals. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling water-sensitive chemicals.*

Water-sensitive chemicals are those that react violently with water. The alkali metals such as sodium, potassium and lithium react with water to produce heat and flammable hydrogen gas, which can ignite or combine explosively with atmospheric oxygen.

### Potential Hazards

Water-sensitive chemicals are materials which react violently with water to produce heat and flammable or toxic gas. Consider that these materials may present other hazards such as corrosivity, teratogenicity, peroxide formation, or systemic effects.

See the Department of Transportation's list of Water Reactive Materials which Produce Toxic Gases when spilled in water. Some classes of pyrophoric materials are listed below.

<i>Some Classes of Water Reactive Chemicals</i>	<i>Examples of class</i>
Grignard reagents	RMgX
Alkali metals	Li, Na, K
Alkali metal amides	
Alkali metal hydrides	Lithium aluminum hydride
Metal alkyls	Lithium and aluminum alkyls
Halides of nonmetals	BCl <sub>3</sub> , BF <sub>3</sub> , PCl <sub>3</sub> , PCl <sub>5</sub> , SiCl <sub>4</sub> , S <sub>2</sub> Cl <sub>2</sub>
Inorganic acid halides	POCl <sub>3</sub> , SOCl <sub>2</sub> , SO <sub>2</sub> Cl <sub>2</sub>
Anhydrous metal halides	AlCl <sub>3</sub> , AlBr <sub>3</sub> , TiCl <sub>4</sub> , ZrCl <sub>4</sub> , SnCl <sub>4</sub>
Organic acid halides and anhydrides of low molecular weight	

### Engineering Controls

Many water-sensitive chemicals will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases. A glove box may be used to handle water-sensitive chemicals when a dry atmosphere is required. A safety shower and eyewash must be available and accessible when working with water-sensitive chemicals.

## Work Practice Controls

- Before working with these compounds, read and follow the SDS and other reference material carefully.
- Purchase minimal amounts of water-sensitive materials.
- Have a class D fire extinguisher accessible for emergency use.
- Set up a designated area for storage and work with water-sensitive chemicals.
- Before conducting the actual procedure, always perform a dry run (without the water-sensitive material) to identify and resolve possible safety hazards.
- Work within sight and/or hearing of at least one other person who is familiar with the hazards and written procedures.
- Never work alone with extremely hazardous materials/operations.

## Personal Protective Equipment

- Wear a fully buttoned, flame-resistant lab coat (Nomex material or equivalent) with sleeves extended to the wrists, closed toe shoes, long pants, safety goggles and standard nitrile laboratory gloves.
- Leather or Kevlar gloves are recommended over nitrile gloves (for fire protection).
- If large quantities will be used, a chemical-resistant apron is also required. Note that personal clothing should not be of a type that may ignite (such as polyester or nylon).

## Transportation and Storage

- Store in a cool, dry location (never under a sink), off the floor, in a water-tight secondary container.
- Store alkali metals under mineral oil to prevent reaction with moisture in the air.

## Waste Disposal

Because most spent, unused and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. ***Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers.*** Contact EHS at (313) 593-0921 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to EHS's [Hazardous Waste webpage](#) for more information.

## Exposures/Unintended Contact



***If the employee is in need of emergency medical attention, call 911 immediately.***



Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the [Illness and Injury Report Form](#). Follow the directions on the WorkConnections website [Forms Instructions](#) to obtain proper medical treatment and follow-up.

Complete the [EHS Laboratory Incident and Near-Miss Report](#) form.

### **TREATMENT FACILITIES:**

#### **Midwest Medical Center -- *Campus Employees (including student employees)***

Mon-Fri 7:30 am - 4:30 pm

9301 Middlebelt Road

Romulus, MI 48174

Phone: 734-941-1000

After hours - go to:

#### **Midwest Medical Center**

Open 24/7

4700 Schaefer

Dearborn, MI 48126

Phone: 313-581-2600

#### **Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)***

19401 Hubbard Drive

Dearborn, MI 48126

Phone: 313-928-8278

Click [here](#) for more information.

### **Spill Procedure**

Please refer to SDSs for specific guidelines for responding to spills. If uncertain, contact OSEH for assistance and/or 911 for assistance. The following spill procedures may not apply to all reactive chemicals.

- When a spill occurs, ***personal safety should always come first.***
- Alert and clear everyone in the immediate area where the spill occurred.
- Open outside windows, if possible.
- Use proper personal protective equipment as indicated above.
- Do not flush with water or bring in contact with moisture.
- Pick-up and dispose of as hazardous waste without creating aerosols.
- Collect contaminated materials and place in suitable, tightly closed container. Contact EHS (313) 593-4914 for proper disposal.

A **minor (small) chemical spill** is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. A **major/large chemical spill** requires active assistance from emergency personnel.

#### **Additional Spill Links:**

- [Chemical Spill Control Information](#)

Report all emergencies, suspicious activity, injuries, spills, and fires to Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn [Emergency Alert System](#).

### Training of personnel

All person are required to attend initial (first-time) training in class (go to <http://www.umd.umich.edu/training/> to register). Refresher training can be completed via [MyLINC](#), the **Comprehensive Laboratory Safety** session (**BLS009** or *equivalent*). Furthermore, all personnel shall read and fully adhere to this SOP when handling water-sensitive chemicals.

### Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Principal Investigator \_\_\_\_\_

Revision Date \_\_\_\_\_