

Lab-Specific Standard Operating Procedure (LSOP)- Pyrophoric Chemicals


Principal Investigator(PI):

Building:

Lab(s) Covered by LSOP:

Department:

Lab Phone Number(s):

Chemical	GHS Pictogram	Definition
Pyrophoric Liquids & Solids		Pyrophoric liquids or solids means a liquid or solid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

Hazard Awareness

The primary hazard associated with pyrophoric chemicals is fire upon contact with air or moisture. The high level of reactivity requires pyrophorics to be handled in inert atmospheres, free of ignition sources. The danger is exacerbated by the fact that many are stored in highly flammable solvents, further increasing the risk and severity of fires. Many pyrophorics are also classified as acutely toxic, corrosive, reproductive toxicants or capable of damaging the liver, kidneys, central nervous system and other body systems. Safety data sheets will indicate the specific hazard classes for pyrophorics being used in the lab. Strict adherence to standard operating procedures must be followed to ensure health and safety.

SECTION 1. LIST PYROPHORIC CHEMICALS USED IN THE LAB *(Attach or insert more lines as necessary)*

Chemical Name	Additional Hazards

SECTION 2. ADMINISTRATIVE CONTROLS

2a.	Lab-specific safety training must be provided by the principal investigator (PI) or other qualified personnel to all researchers working with pyrophoric chemicals. Documentation of training is required.
2b.	Read the safety data sheet (SDS) for each pyrophoric chemical prior to use.
2c.	Whenever possible, find safer substitutes or reduce the quantities of pyrophoric and other hazardous chemicals being used.
2d.	Researchers must not work alone with pyrophoric chemicals.
2e.	Experiments should be performed during normal business hours (i.e., 8:00 am-5:00 pm Mon-Fri) if possible.

2f.	Multiple transfers of small volumes/quantities of pyrophoric materials are preferred over a single transfer of larger volumes/quantities.
2g.	An eyewash and safety shower must be in the immediate work area where pyrophoric chemicals are used.
2h.	Add additional administrative controls specific to the laboratory.
SECTION 3. ENGINEERING CONTROLS	
3a.	Solid pyrophoric chemicals should be handled in an inert atmosphere glove box. Inert atmosphere glove bags can be used as an alternative, if approved by the PI.
3b.	If a glove box or bag is not available, manipulation of these reagents via syringe or cannula must be conducted in a chemical fume hood, over a spill tray if possible, with the sash at the lowest working height and with sliding sash panels (if applicable) aligned to form a barrier between the researcher and the experiment.
3c.	Chemical fume hoods must be running between 80-120 linear feet/minute and tested by EHS within the last year. If the hood is not working properly, contact Facilities (486-3113) to repair the hood or EHS to retest (486-3613).
3d.	Needles must be equipped with locking mechanisms (e.g., Luer lock needles) to prevent accidental disconnection and release of reagents.
3e.	Add additional engineering controls specific to the laboratory.
SECTION 4. WORK PRACTICES	
4a.	Visually confirm that glassware is dry prior to introducing pyrophoric chemicals.
4b.	Purge air from equipment with the specified inert gas prior to introducing pyrophorics.
4c.	Inspect containers and reaction vessel septa for signs of degradation prior to use. Replace if damaged.
4d.	Do not transfer large volumes (>20 mL) using a syringe.
4e.	Only chemicals involved in the experiment should be present in the fume hood or glovebox. All non-essential combustible chemicals and materials must be removed.
4f.	PIs must determine the need for mineral oil bubblers to prevent air backflow and to release excess pressure from reagent or reaction vessels.
4g.	Ensure glassware is rated for the pressures generated during reactions
4h.	Balloons used for air-sensitive reagents are not suitable with pyrophoric chemicals.
4i.	PIs must determine if portable blast shields placed inside the fume hood must be used.
4j.	Do not return excess chemical to the original container.
4k.	Use containers with transfer septa for liquid reagents. Septa help prevent exposure to air and moisture when an inert atmosphere is not available.
4l.	Add additional work practices specific to the laboratory.
SECTION 5. PERSONAL PROTECTIVE EQUIPMENT	
5a.	At a minimum, chemical splash goggles or safety glasses that meet <i>American National Standards Institute (ANSI)</i> standard Z-87.1 must be worn when handling pyrophoric chemicals.
5b.	PIs must determine when or if full-face shields are required when working with pyrophorics.
5c.	Gloves indicated in the safety data sheet (SDS) must be worn while handling small quantities of pyrophoric chemicals. PIs must determine when heavy-duty, chemical-resistant gloves, Nomex, Kevlar or related aramid fiber gloves are required.
5d.	A fire-resistant lab coat must be worn when working with pyrophorics. Lab coats must be buttoned and fit properly to cover as much skin as possible.

5e.	Shirts, long pants and other clothing worn underneath fire-resistant lab coats should be cotton or wool. Synthetic clothing (e.g., polyester, nylon, acetate, rayon, acrylic, etc.) is not recommended.
5f.	Closed-toed footwear, which covers the entire foot, must be worn when working with pyrophorics. Leather footwear is preferable.
5g.	Add additional personal protective equipment requirements specific to the laboratory.
SECTION 6. STORAGE	
6a.	Store pyrophoric materials properly, as indicated in safety data sheets (SDSs).
6b.	Do not store pyrophoric chemicals with flammable materials, oxidizers or near water sources.
6c.	Ensure that sufficient protective solvent, oil, kerosene, or inert gas remains in the container while the material is stored.
6d.	If pyrophoric reagents are received in a specially designed shipping, storage or dispensing container, ensure that the integrity of that container is maintained.
6e.	Add additional lines for storage requirements specific to the laboratory.
SECTION 7. SPILLS AND ACCIDENTS PROCEDURES	
1.	Evacuate the laboratory.
2.	Close door(s) to lab and post a “ NO ENTRY ” sign(s) or other warning information on the door.
3.	Call 911 .
4.	Do not re-enter area until instructed to do so by UCFD or other emergency personnel.
5.	Report accident to PI/Supervisor and EHS.
SECTION 8. FIRST AID PROCEDURES	
First Aid- Eyes	<ol style="list-style-type: none"> 1. Remove contact lenses (if applicable) 2. Forcibly hold eyelids open and flush eyes under eyewash for 15 minutes 3. If pain persists after 15 minutes, dial 911 4. Keep flushing eyes until emergency personnel arrives 5. Report incident to PI/Supervisor and EHS.
First Aid- Skin	<ol style="list-style-type: none"> 1. Remove contaminated clothing (if applicable) 2. Flush affected area(s) under safety shower for 15 minutes 3. If pain persists after 15 minutes, dial 911 4. Keep rinsing affected area until emergency personnel arrives 5. Report incident to PI/Supervisor and EHS.
First Aid- Inhalation	<ol style="list-style-type: none"> 1. Move to fresh air 2. Dial 911 3. Report incident to PI/Supervisor and EHS.
First Aid- Other	Describe additional first aid procedures based on hazards.
SECTION 9A. PYROPHORIC WASTE MANAGEMENT	
1.	Any unused or unwanted reactive materials must be destroyed by transferring the materials to an appropriate reaction flask for hydrolysis and/or neutralization. Follow decontamination procedures listed in Section 10 for methods specific to the lab.

2.	Empty containers must be properly rinsed with inert, dry compatible solvents; this rinse solvent must also be neutralized or hydrolyzed. Follow decontamination procedures listed in Section 10 for methods specific to the lab/experiment.
3.	Containers with residues of pyrophoric materials must never be left open to the atmosphere.
4.	The solvent rinses used to quench residual pyrophoric chemicals must be disposed of as hazardous waste (as indicated below) and must not be mixed with incompatible waste streams.
5.	<i>Describe additional waste management procedures for pyrophoric chemicals specific to the laboratory.</i>

SECTION 9B. HAZARDOUS WASTE MANAGEMENT

1.	All hazardous wastes must be labeled with “Hazardous Waste” stickers or tags, use full chemical names to describe the waste (i.e. no chemical abbreviations or symbols), be stored in containers with tight-fitting caps or lids, and be stored alone or with other compatible chemicals.
2.	Hazardous wastes must be stored at or near a green “Satellite Accumulation Area” sign prior to disposal by EHS.

SECTION 10. DECONTAMINATION PROCEDURES (*Attach or insert steps. Add more lines as necessary.*)

Pyrophorics	<i>Describe how residual pyrophoric chemicals will be quenched after use (e.g. hydrolysis and/or neutralization procedures, etc.).</i>
Equipment	<i>Describe how equipment will be decontaminated after use (e.g. use manufacturer instructions, specifications, etc.).</i>
Glassware	<i>Describe how glassware contaminated with pyrophoric chemicals will be decontaminated after use.</i>
Work Area	<i>Describe how the work area (e.g. fume hoods, trays, etc.) will be decontaminated after use.</i>
Personal Hygiene	<i>Describe how the researchers will decontaminate after procedure.</i>

SECTION 11. SPECIFIC PROCEDURE

Optional- List or attach a copy of the steps and appropriate safety controls for procedures using pyrophoric chemicals.

SECTION 12A. APPROVAL

I have reviewed, understand and agree to follow this lab-specific standard operating procedures (LSOPs) regarding pyrophoric liquids and solids. Failure to follow the LSOP and lab-specific training guidelines for research with pyrophoric chemicals is a violation of the [University Health & Safety Policy](#) and [University Code of Conduct](#). Further approval from the PI is required if any of the following events occur:

- A change in amount (**Add quantity and/or volume**) or substitution of the chemicals in the procedure is planned
- A change in the agreed-upon experimental set-up is planned
- Signs of a failure in safety design or equipment are observed
- Signs or symptoms of a chemical exposure to any personnel are observed
- Unexpected and/or potentially dangerous experimental results occur (e.g., fire, uncontrolled buildup of heat and/or pressure, etc.)

Researcher Signature	Date	Trainer Signature	Training Date

SECTION 12B. PRINCIPAL INVESTIGATOR CERTIFICATION

I approve the contents of the lab-specific standard operating procedure listed above:

PI Signature:

Date:

**A HARD OR ELECTRONIC COPY OF EACH LAB-SPECIFIC STANDARD OPERATING PROCEDURE
MUST BE READILY AVAILBALE IN THE LAB.**