UCI Environmental Health & Safety

Standard Operating Procedure (SOP)

This Standard Operating Procedure (SOP) describes basic chemical safety information for flammable chemicals. Prior to conducting work with flammable chemicals personnel must obtain approval from their Principal Investigator (PI) and/or Supervisor and attend the appropriate laboratory safety training. The PI must complete the Lab-Specific Use Procedures section and provide their personnel with a copy of this SOP and a copy of the SDS from the manufacturer.

Flammables

Date SOP was written:	
Date SOP was approved by PI/lab supervisor:	
Principal Investigator:	
Principal Investigator Signature:	

Type of SOP: ☐ Process ☐ Hazardous Chemical [X] Hazardous Class

Purpose

The purpose of this standard operating procedure is to acquaint you with the proper and safe handling, use, storage, and disposal of flammable chemicals.

Properties & Hazards

General Hazards:

Chemicals in this band are flammable and easily catch fire. The band is generally divided into two hazard levels as follows:

Highly Hazardous

- gases which have a flammable range (LEL to UEL) of ≥12% greater in air at NTP conditions, or are ignitable at a concentration of ≤13% in air at NTP conditions
- liquids with a flashpoint <73 ºF
- solids subjected to a burn rate test where: 1) non-metals with a burn time of <45s or burn rate >2.2mm, or 2) metals with a burn time of ≤ 10 minutes

Generally Hazardous

- gases which can form a flammable mixture in air at NTP conditions
- liquids with a flashpoint ≤200 ºF

The GHS and Cal/OSHA definition of the band is described in the table below:

GHS Pictogram	UCI Hazard Level	GHS Category	GHS H-Code	Cal/OSHA Definitions
	Highly Hazardous	Aerosols (Cat.1)	H222	Flammable
		Flammable Gases (Cat.1)	H220	Flammable
		Flammable Liquids (Cat.1,2)	H224, H225	Flammable
		Flammable Solids	H228	Flammable
	Generally Hazardous	Aerosols (Cat.2, 3)	H223, H229	Flammable
		Flammable Gases (Cat.2)	H221	Flammable
		Flammable Liquids (Cat.3, 4)	H226, H227	Flammable, Combustible Liquid

Personal Protective Equipment (PPE)

Skin and Body Protection:
A flame resistant Nomex® lab coat, long pants (or equivalent) completely covering legs, and closed toed shoes must be worn. Do not wear synthetic clothing when working with flammable chemicals.

Hand Protection:
Nitrile or neoprene gloves are typically adequate for minor splashes. Thicker gloves should be used for longer operations, larger quantities, or direct contact. Consult the SDS, and/or the lab specific use section to determine whether the material or process requires alternative hand protection.
If there is a high risk of fire, fire-resistant hand protection should be worn, including a chemical resistant outer glove (neoprene) over an approved fire-resistant (Nomex®) inner glove/liner.

Eye Protection:
ANSI Z87.1-compliant safety glasses or safety goggles if a splash hazard is present.

Administrative Controls

- Never work alone with flammable chemicals.
- Review the Safety Data Sheets (SDSs) for all chemicals used in the experiment. Online SDSs can be accessed at https://www.ehs.uci.edu/sds/index.php.
- Minimize your purchases of flammable liquids to only what is needed for a reasonable amount of time. There are significant fire code restrictions on the quantities of flammable liquids allowed in use or storage within research buildings (see storage requirements below).

Engineering Controls

- All manipulations of flammable chemicals must be conducted in containment devices (e.g. fume hoods, gloveboxes, or similar devices).
- Flammable liquids burn only when their vapor is mixed with air in the appropriate concentration. Therefore, such liquids should always be handled in a fume hood to minimize the creation of flammable vapor concentrations. Dilution of flammable vapors by ventilation is an important means of avoiding flammable concentrations.
- When possible, buy glass containers, not metal drums or plastic containers of flammables.

Special Storage and Handling Requirements

Storage:
- Store flammable chemicals in flammable storage cabinets or fridges/freezers approved for flammable storage.
- Containers of flammables and storage locations must be clearly labeled.
- Store all flammables separately from incompatible materials (e.g. oxygen, oxidizing agents, reducing agents, halogens, strong acids, strong bases, perchlorates, and trimethylaluminum).
- Store away from heat, flames, sparks, temperature extremes, and direct sunlight.
- Follow any substance-specific storage guidelines outlined in the safety data sheet (SDS).
- The maximum allowable quantities for storage of flammable liquids is depend on a number of factors including the flammable class, if the building has a fire sprinkler system, and the floor of the building.
- For example, the maximum allowable quantities for the first floor are shown in the table below.

Maximum Allowable Quantities (MAQs) for the First Floor in Approved Flammable Storage Cabinets		
Flammable Class	**Sprinklered Building (gal)**	**Non-Sprinklered Buildings (gal)**
Flammable Liquid, Class 1-A	60	30
Flammable Liquid, Class 1-B	240	120
Flammable Liquid, Class 1-C	240	120
Combustible Liquid, Class II	240	120
Combustible Liquid, Class III-A	660	330
Combustible Liquid, Class III-B		12,300
Note: These amounts are the maximum allowable quantities for the first floor only, please contact EHS for the reduced quantities if chemicals are stored above or below the first floor.		

- Never use environmental rooms (e.g. cold/warm rooms) to store flammable materials. These rooms have many ignition sources and little to no outside air circulation.

Handling:

- Handle flammable chemicals in areas free of ignition sources.
    - Ignition sources include open flames, electrical equipment (e.g. motors), static electricity, hot surfaces, and incompatible materials (e.g. carbon disulfide).
- Vapors of many flammable liquids are heavier than air and are capable of traveling. Ensure there are no ignition sources below or near the work area.
- Large containers of flammable chemicals should always be grounded and bonded to the receiving container when transferring.
    - Transferring flammables between containers that are not bonded and grounded may lead to a fire due to static electricity.

Spill, Accident, and First Aid Procedures

Spills:

Refer to the spill response flowchart. Notify others in the area of the spill. Evacuate and prevent access to the location where the spill occurred. Notify your supervisor and EHS at x4-6200 immediately.

Skin or Eye Contact:

Remove contaminated clothing or contact lenses and flush the affected area with water for at least 15 minutes. Obtain medical attention immediately.

Inhalation:

Move to fresh air. Obtain medical attention immediately.

Ingestion:

Obtain medical attention immediately. (The poison control center, (800) 222-1222, is available 24 hours every day).

Fire:

Pull the fire alarm and evacuate the area. NEVER use a water or a carbon dioxide fire extinguisher, these can enhance combustion. A Class ABC fire extinguisher is recommended.

Waste Disposal Procedure

Disposal:

- Hazardous waste must be transferred to EHS for disposal within 6 months of being generated.
- Hazardous Waste Disposal
    - Text a pick up to hwp@uci.edu, EHS will pick up your waste within 1-3 days
      Or visit https://ehs.uci.edu/enviro/haz-waste/EHS

APPENDIX A:
Lab-Specific Use Procedures

The following procedures describe how the subject chemicals are used in this laboratory beyond the practices described above.

Please see the General Information for ***Hazardous Materials Standard Operating Procedure*** for specific instructions on writing lab-specific use produces.

Add a generic process/procedure on the safe use of the chemicals within this band.

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Documentation of Training

Prior to conducting any work with flammable chemicals, designated personnel must provide training to their laboratory personnel specific to the hazards and procedures involved in working with these substances.

I have read and understand the content of this SOP:

Name	Signature	Date