Laboratory Standard Operating Procedure for:

Flammables and Combustibles

Description

This standard operating procedure outlines the handling and use of flammable and combustible materials. 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 flammable and combustible materials.

Flammable and combustible liquids can burn and are classified, or grouped, as either flammable or combustible by their flashpoints. Flammable liquids will ignite and burn easily at normal working temperatures. Combustible liquids have the ability to burn at temperatures that are usually above working temperatures. Flammable liquids have a flashpoint below 37.8°C (100°F) while Combustible liquids have a flashpoint at or above 37.8°C (100°F) and below 93.3°C (200°F).

Potential Hazards

Flammability - **Check Safety Data Sheet of the material for other hazards.**

Definitions –

- Flammable gas – a gas that, at 68°F or less and standard pressure, forms a flammable mixture with air at a concentration of 13% by volume or less OR that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.
- Flammable liquid – a liquid having a flash point below 100°F.
- Flammable solid – a solid, other than a blasting agent or explosive, that (1) has an ignition temperature below 212°F, or (2) is capable of causing a fire through friction, absorption of moisture, or spontaneous chemical change, or (3) burns so vigorously and persistently as to create a serious hazard.
- Combustible liquid – a liquid having a flash point at or above 100°F.

Engineering Controls

Work in a chemical fume hood if air concentrations above 10% of the lower flammable limit may be reached, if the chemical is irritating to the eyes and respiratory system, and/or is toxic by inhalation.

Work Practice Controls

- Alert others in your lab of the materials you will be working with.
- Review SDSs before working with material.
- Know the location of the nearest fire extinguisher before beginning work.
- Use in the smallest practical quantities for the experiment being performed.
- Avoid using ignition sources (Bunsen burners, hot plates, electrical equipment with frayed or cracked wiring, etc.) and/or creating static electricity in areas where highly flammable chemicals are used.
- Ensure proper grounding. Be sure to ground metal containers when transferring flammable liquids.
- Keep containers of flammable chemicals closed at all times when not in use to prevent accumulation of flammable vapor concentrations.

Personal Protective Equipment

- Wear nitrile laboratory gloves, lab coat (flame-resistant lab coats for handling large volumes), safety glasses, clothing that minimizes exposed skin, and close-toed shoes for all work with flammables. If working with flammable liquids that may splash, wear chemical splash goggles.
- If a flammable liquid is also toxic, check glove guide for appropriate gloves and/or minimize glove contact with the liquid.
- Avoid wearing flammable clothing (such as many synthetics) when working with flammable materials.

Gloving Material	Advantages and Disadvantages
BUTYL RUBBER	Good for ketones and esters Poor for gasoline and aliphatic, aromatic, and halogenated hydrocarbons Expensive Only available as re-useable Poor touch sensitivity
NEOPRENE	Good for acids, bases, alcohols, fuels, peroxides, hydrocarbons, and phenc Poor for halogenated and aromatic hydrocarbons
VITON	Good for chlorinated and aromatic solvents Low surface tension repels most liquids Good resistance to cuts and abrasions Poor for ketones Expensive Only available as re-useable Poor touch sensitivity
VINYL - Polyvinyl Alcohol (PVA)	Good for aromatic and chlorinated solvents Poor for water-based solutions (dissolves in water) Avoid: Contact with water or water-based solutions, water solubles Only available as re-useable Poor touch sensitivity

Transportation and Storage

- Flammable chemicals should be stored in appropriate areas within the laboratory and away from any potentially incompatible materials.
- Transport flammables in secondary containment, preferably a polyethylene or solvent bottle carrier.
- Suitable fire control devices (such as fire extinguishers) must be available at locations where flammable or combustible liquids are stored.
- Open flames shall not be permitted in flammable liquid storage areas. Flammable and combustible liquids must not be stored in a manner that hinders safe egress.
- If large quantities (>60 gallons) of flammable or combustible liquids are stored, a specially-designed storage room may be required.
- Store these materials in a separate room from water-reactives.

- Flammable and combustible liquids may be stored in a flammable storage cabinet. All such storage cabinets must meet NFPA 30 requirements.
- Flammable liquids shall not be stored in unapproved or residential-type refrigerators.
- Secondary containment is recommended for liquids.
- Avoid storing on the floor.

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.*** 

- If skin contact occurs, immediately remove contaminated clothing and rinse with water for at least 15 minutes.
- For eye exposures, immediately rinse eyes with copious amounts of water for at least 15 minutes, while occasionally lifting upper and lower lids, then promptly seek medical attention.
- If large amounts of vapors are inhaled, move person to fresh air immediately and seek medical attention.
- If ingested, seek medical attention immediately.

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:

Concentra Allen Park -- *Campus Employees (including student employees)*
Mon-Fri 8:00 am - 5:00 pm
17500 Federal Drive, Suite 750
Allen Park, MI 48101
Phone: 313-982-1370

After hours - go to:

Concentra
Open 24/7
11700 Metro Airport, Center Drive, Suite 104
Romulus, MI 48174
Phone: 734-955-7000

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

When a spill occurs, ***personal safety should always come first***. Alert and clear everyone in the immediate area where the spill occurred.

A **minor (small) chemical spill** is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel, i.e., less than 1 gallon or 3.5 liters. A **major/large chemical spill** requires active assistance from emergency personnel.

Spill Response Steps:

MINOR CHEMICAL SPILL

- Alert people in immediate area of spill.
- Turn off ignition and heat sources. Don't light Bunsen burners or turn on other switches.
- Open outside windows, if possible.
- Wear protective equipment, including safety goggles, gloves and long-sleeve lab coat.
- Avoid breathing vapors from spill.
- Confine spill to as small an area as possible.
- **Do not wash spill down the drain**.
- Use appropriate spill kits/sorbents to absorb spill. Collect contaminated materials and residues and place in container and contact EHS (313) 593-0921 for proper disposal.
- Clean spill area with water.

MAJOR CHEMICAL SPILL

- Attend to injured or contaminated persons and remove them from exposure.
- Alert people in the laboratory to evacuate.
- If appropriate turn off ignition and heat sources. Don't light Bunsen burners or turn on other switches.
- **Call Public Safety at (313) 593-5333 or 911 from a campus phone immediately for assistance.**
- Close doors to affected area.
- Post warnings to keep people from entering the area.
- Have person available that has knowledge of incident and laboratory to assist emergency personnel.

Additional Spill Information 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 flammable and combustible materials.

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

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? ☐ **YES** ☐ **NO**

Principal Investigator _____ **Revision Date** _____