

## BASIC FLAMMABLE & COMBUSTIBLE LIQUIDS

### STANDARD OPERATING PROCEDURE

This Standard Operating Procedure (SOP) is for work in which flammable/combustible liquids are NOT used in operations that can generate static electricity which can act as an ignition source. This includes the pumping or pouring of solvents between metal containers. Those operations require grounding and/or bonding of the containers to prevent static buildup that can cause a fire/explosion. A different SOP template in the NJIT SOP Library should be used: **ADVANCED FLAMMABLE AND COMBUSTIBLE LIQUIDS HANDLING**

**Type of SOP:**       Process                       Hazardous Chemical                       Hazard Class

**Department:** \_\_\_\_\_ **Building:** \_\_\_\_\_ **Room #:** \_\_\_\_\_

**Principal Investigator:** \_\_\_\_\_ **Phone #:** \_\_\_\_\_

**Prepared By:** \_\_\_\_\_ **Email:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### 1. HAZARD OVERVIEW



FLAMMABLE

Flammable and combustible organic solvents are amongst the most dangerous chemicals in the lab. A measure of how ignitable a particular solvent is refers to its **flashpoint**; defined as the lowest temperature at which a material can form an ignitable mixture with air and produce a flame when a source of ignition is present. **The lower the flashpoint, the more easily the liquid can be ignited.** Most common organic solvents in the lab are readily ignited with the exception of chlorinated solvents like dichloromethane, which require more extreme conditions to burn. An organic solvent may have other hazards beyond their flammability. For example, benzene is a recognized carcinogen. Review the Safety Data Sheet for the organic solvent to determine if there are any additional hazards.

#### Classes of Flammable Liquids

(Flash Point < 100°F)

Class	Flash Point	Boiling Point	Examples
IA	Below 73°F	Below 100°F	Ethyl Ether
IB	Below 73°F	At or above 100°F	Acetone, Benzene, Toluene
IC	At or above 73°F and below 100°F		Isopropanol, Xylene

#### Classes of Combustible Liquids

(Flash Point > 100°F)

Class	Flash Point	Examples
II	100 – 139°F	Acetic acid, Cyclohexane, Mineral spirits
IIIA	140 – 199°F	Cyclohexanol, Formic acid, Nitrobenzene
IIIB	Above 200°F	Formalin, Vegetable oil

## 2. PERSONAL PROTECTIVE EQUIPMENT (PPE)

In general, workers who use flammable liquids will be issued a free fire-resistant lab coat. At minimum, safety glasses, lab coats, and gloves are required. Additional or more protective PPE may be required pending the volume, ignitability, explosivity, or unique hazards. Please refer to the NJIT Chemical Hygiene Guide and Hazard Assessment Form to determine the proper PPE for handling corrosive materials.



## 3. ENGINEERING/VENTILATION CONTROLS

All chemicals should be transferred and used in an annually certified chemical fume hood with the sash at the certified position or lower. Prior to use, the air flow indicator should be checked to ensure it is operating within specifications. Please review the NJIT Chemical Hygiene Guide and the Safe Chemical Fume Hood Use Guide for information on the proper use of a chemical fume hood and criteria for implementing engineering controls.

Chemical Fume Hood    Glovebox    Biological Safety Cabinet    Other \_\_\_\_\_

Room Location of Unit(s): \_\_\_\_\_

**Safety Shielding:** Shielding is required any time there is a significant risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of flammable liquids which pose this risk should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

**Special Ventilation:** Manipulation of flammable liquids outside of a fume hood may require special ventilation controls in order to minimize exposure and reduce the fire risk. Fume hoods provide the best protection against exposure to flammable liquids in the laboratory and are the preferred ventilation control device. If your research does not permit the handling of large quantities of flammable liquids in your fume hood, contact EHS to review the adequacy of all special ventilation.

## 4. SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

Use in an area that is properly equipped with a certified eye wash and safety shower that is available within ten seconds of travel.

Store in a tightly closed, labeled container and in a cool, dry, well-ventilated area. Segregate from incompatible materials. Repackaged chemicals must be labeled clearly. For example, squirt bottles and acid/base cleaning baths. Follow any substance-specific storage guidance provided in Safety Data Sheet.

### a. Flammable Liquid Storage Cabinets

- One or more Flammable Liquid Storage Cabinets (FLSC) are required for laboratories which store, use or handle more than 10 gallons of flammable or combustible liquids.
- Containers of flammable liquids that are one gallon and larger must be stored in a flammable-liquids storage cabinet.
- The storage of flammable and combustible liquids in a laboratory, shop, or building area

must be kept to the minimum needed for research and/or operations. FLSC are not intended for the storage of highly toxic materials, acids, bases, compressed gases, or pyrophoric chemicals.

- In most NJIT laboratories, flammable liquids storage is provided under the chemical fume hood. These cabinets are clearly marked “Flammable Storage” and are often ventilated via a stainless steel hose into the fume hood exhaust duct. Flammable liquids storage cabinets are constructed to limit the internal temperature when exposed to fire. When additional storage is needed, NFPA-approved FLSC may be purchased. All containers of flammable liquids must be stored in a FLSC when not in use. The following general requirements apply:
  - Cabinets shall be marked “Flammable - Keep Fire Away”
  - Cabinets should be kept in good condition. Doors that do not close and latch must be repaired or the cabinet must be replaced.
- Flammable liquids storage cabinets are equipped with a grounding system that can be connected to a building ground. If you are pouring from a container in the storage cabinet, and if the container being poured into is conductive then a bonding strap must be attached between them. If a bonding strap is required, please review and complete the ADVANCED FLAMMABLE AND COMBUSTIBLE LIQUIDS SOP.

#### **b. Labeling**

- All flammable liquids must be clearly labeled with the correct chemical name.
- Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.
- The label on any containers of flammable liquids should say “Flammable” and should include any other hazard information, such as “Corrosive” or “Toxic”, as applicable. *e.g. lab squirt bottles, acid/base baths*

#### **c. Heating/Open flame**

- Do not permanently store flammable liquids in chemical fume hoods or allow containers of flammable liquids in proximity to heating mantles, hot plates, or torches.
- With the exception of vacuum drying ovens, laboratory ovens rarely have any means of preventing the discharge of material volatilized within them. Thus, it should be assumed that these substances will escape into the laboratory atmosphere, but may also be present in sufficient concentration to form explosive mixtures within the oven itself. Venting the oven to an exhausted system will reduce this hazard.
- Drying ovens should not be used to dry glassware that has been rinsed with organic solvents until all of the solvent has had the opportunity to drain or evaporate at room temperature.

### **5. INCIDENTS AND ACCIDENTS**

Laboratory personnel are to report all occupational injuries or illnesses to Faculty/PI as soon as practical. The Faculty/PI and laboratory personnel must submit the required paperwork to NJIT EHS Department. See the the Emergency Response Guidelines posted in the laboratory or Emergency Procedures section of the NJIT CHG for proper procedures involving an injury, exposure, fire, or release/spill of a hazardous material.

**In the event of an emergency, DIAL 9-1-1 to activate emergency response personnel.**

## 6. SPILL AND DECONTAMINATION

Wear proper PPE. Decontaminate equipment and work surfaces using soap and water or other appropriate decontamination/cleaning solution. Dispose of all used contaminated disposables in the appropriate waste stream following the Waste Disposal Section of the NJIT CHG.

Decontamination Solution(s): \_\_\_\_\_

### **Additional Spill / Decontamination Requirements:**

## 7. WASTE DISPOSAL

Follow the practices and procedures in accordance with the NJIT Laboratory Waste Management Program to properly dispose of waste.

### **Additional Waste Disposal Requirements:**

## 8. PRIOR APPROVAL/REVIEW

## 9. DESIGNATED USE AREA

Work should be conducted in a laboratory fume hood given the volatility and flammability of most solvents.

Designated Use Area Location(s): \_\_\_\_\_

## 10. SAFETY DATA SHEETS

Location of SDS: \_\_\_\_\_

## 11. LAB-SPECIFIC INFORMATION **(required)** ([Examples](#) of appropriate content)