

FLAMMABLE LIQUIDS

STANDARD OPERATING PROCEDURE (SOP)

Type of SOP: Process Hazardous Chemical Hazardous Class

Fill out this form completely, print and place it with your laboratory-specific Chemical Hygiene Plan. All personnel who are subject to the requirements of this SOP must review and sign the training record at the back of this SOP.

Date SOP Written: 11/20/2013 Approval Date: _____

SOP Prepared by: CHEMISTRY

DMDECKER, SAFETY MANAGER

SOP Reviewed and Approved by (name/signature): PI

Department: _____

Principal Investigator: _____ Phone: _____

Lab Manager/
Safety Coordinator: _____ Phone: _____

Emergency Contact(s): _____ Phone: _____

Location(s) Building: _____ Lab
Covered by SOP: Room #(s): _____ Phone: _____

1. HAZARD OVERVIEW

Briefly describe the process or type of process that involves the use of hazardous chemical(s) in this laboratory. This process may be described in general terms, such as “extraction” and “distillation” or in more detailed terms, such as “spectrophotometer analysis of cholesterol extraction.” A more comprehensive process description is required in Element 12. If “Process” doesn’t apply to your laboratory, then proceed to element 2.

Flammable liquids are used in the laboratory in a wide variety of ways, principally as a solvent or reaction vehicle. The greatest hazard, working with flammable (and combustible) liquids is fire. Flammable liquids are defined by their flash point – the temperature at which the liquid gives off enough vapor to ignite. The lower the flash point – the greater the risk of ignition and fire. Below is

a table with flash points for common flammable liquids. For purposes of this SOP, flammable and combustible liquids are treated the same, with similar risk of fire (dependent on flash point).

Common name	<u>CAS Number</u>	<u>Flash point</u>
Acetone	67-64-1	-17 °C (1 °F)
Biodiesel	n/a mixture	>130 °C (266 °F)
Dimethyl ether	115-10-6	-41 °C (-42 °F)
Diesel	n/a mixture	>62 °C (144 °F)
Ethanol	64-17-5	12.8 °C (55.0 °F)
Diethyl ether	60-29-7	-45 °C (-49 °F)
Gasoline	n/a mixture	<-40 °C (-40 °F)
Jet fuel	n/a mixture	>38 °C (100 °F)
Kerosene (paraffin oil)	n/a mixture	>38–72 °C (100–162 °F)
Methanol	67-56-1	11 °C (52 °F)
Nitromethane	75-52-5	35 °C (95 °F)
Vegetable oil (canola)	n/a mixture	

Source: Wikipedia

Many flammable liquids are also toxic by inhalation and some are readily absorbed through the skin. Toluene is an example of this – toxic by inhalation, has reproductive effects and is absorbed through the skin. Proper use of engineering controls (fume hood), PPE and attention to hygiene is important when working with these materials.

Some alcohols are commonly mixed with water, particularly ethanol and isopropanol. A good rule of thumb is that

Some flammable liquids are also peroxide-forming chemicals. Diethyl ether and tetrahydrofuran (THF) are common examples. Refer to the appropriate peroxide-former SOP for advice.

2. HAZARDOUS CHEMICAL(S)/CLASS OF HAZARDOUS CHEMICAL(S)

For each process, list or attach the hazardous chemical(s) and the expected by-product(s) produced. List the chemical(s) or class of chemical(s). Please list signs and symptoms of exposure.

(Insert list of flammable liquids covered by this SOP)

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Discuss the personal protective equipment and hygiene practices used with each process, class of chemicals or individual chemical. Personal protective equipment includes gloves, laboratory coats/coveralls or aprons, safety spectacles, goggles or face-shields, and air-purifying respirators. Include the type of gloves needed for each phase of the process. If laboratory coats, eye protection, or respirators are required indicate when and why. If you think that your process may require respirator use, contact EH&S for assistance.

Eye Protection

1. ANSI-compliant safety glasses with side shields, or chemical splash goggles.
2. When pouring a quantity of flammable liquid out of a large container (4 liters or more), goggles must be worn.

Skin Protection

1. Lab coat preferably made of anti-static material, long pants, closed-toe and closed-heel shoes. Refer to UC Davis Policy and Procedure Manual 290-50, Protective Clothing and Equipment (<http://manuals.ucdavis.edu/ppm/290/290-50.pdf>). A flame retardant lab coat may be required, if quantities in use are large (> 4 liters) or if the activities include the use of flammable liquids in the presence of an open flame or ignition source.
2. Non-synthetic clothing should be worn.
3. Handle with appropriate chemical-resistant gloves. Nitrile gloves are the common default but may not be sufficiently protective.

Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with flammable liquids.

Refer to glove selection chart from the links below:

<http://www.allsafetyproducts.biz/page/74172>

<http://www.showabestglove.com/site/default.aspx>

<http://www.mapaglove.com/>

Additional PPE may be required if procedures or processes present additional risk. It is the responsibility of the Principal Investigator to ensure that any additional PPE requirements are identified and communicated to research staff. Contact EH&S for consultation.

Hygiene Measures

Avoid contact with skin, eyes, and clothing. Wash hands before breaks and after handling.

4. ENGINEERING/VENTILATION CONTROLS

Describe engineering controls designed to reduce employee exposures to hazardous chemicals, such as fume hoods, snorkels, aerosol suppression devices, or safety features on equipment.

All activities involving the use of flammable liquids should be carried out in a certified chemical fume hood with the sash closed to the lowest practical position.

5. SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

Describe storage requirements for hazardous chemicals in your laboratory. Include restricted access plans, ventilation systems used, and special containment devices, etc. Describe safe methods of transporting chemicals, such as double containment and using a University vehicle to transport chemicals.

Storage Requirements

Store flammable liquids in a flammable liquid storage cabinet. Ten gallons may be stored outside the cabinet but this is not recommended.

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or fail catastrophically if exposed to heat.

Avoid contact with oxidizing agents and alkali metals such as sodium and potassium.

Do not store flammable liquids in proximity to pyrophoric or water reactive materials. Segregate these materials as much as possible.

Minimize your purchases to only what is needed in a reasonable amount of time. Use small quantities whenever possible.

Secondary containers must be labeled clearly. Also, follow any substance-specific storage guidance provided in Safety Data Sheet documentation.

Monitor your inventory closely to assure that you have tight control over your material.

Wash hands and arms with soap and water after handling.

6. SPILL AND INCIDENT PROCEDURES

Indicate how spills or incidents should be handled and by whom (See SafetyNet 13).

If there is an unusual or unexpected occurrence when using this material(s), the occurrence must be documented and discussed with the Principal Investigator or Lab Supervisor and others who might be using the material(s). Unusual or unexpected occurrences might include a fire, explosion, sudden rise or drop in temperature, increased rate of gas evolution, color change, phase change, or separation into layers.

Spill

Chemical Spill - Dial 911 and EH&S at (530) 752-1493 for assistance.

Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

Small (<1 L) – Proceed only if injury to yourself or others is unlikely and it is neither an emergency nor likely to become an emergency. If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

Large (>1 L) – Dial 911 and EH&S at (530) 752-1493 for assistance.

First Aid

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. Notify supervisor and EH&S at (530) 752-1493 immediately.

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. Notify supervisor and EH&S at (530) 752-1493 immediately.

Medical Emergency - Dial 911 and EH&S (530) 752-1493

Life-Threatening Emergency, After Hours, Weekends And Holidays – Dial 911 Note: All serious injuries must be reported to EH&S at (530) 752-1493 within 8 hours.

Non-Life Threatening Emergency – Go to the Occupational Health Services, (530) 752-6051 in the Cowell Building. Hours: M - F, 8:00 a.m. to 5:00 p.m. At all other times report to the Sutter Davis Emergency Room at (530) 757-5111. Note: All serious injuries must be reported to EH&S at (530) 752-1493 within 8 hours.

7. WASTE DISPOSAL

Describe waste disposal procedures for these chemicals.

Flammable liquids shall not be disposed down the sink. All waste must be disposed through the EH&S Hazardous Waste Program.

Label all waste with the chemical contents and the appropriate hazard warning.

General hazardous waste disposal guidelines:

Store hazardous waste in closed containers, in secondary containment, and in a designated location.

Double-bag dry waste using transparent bags.

Waste must be under the control of the person generating and disposing it.

1. Affix a completed hazardous waste label on all waste containers as soon as the first drop of waste is added to the container, <http://safetyservices.ucdavis.edu/ps/hmhwm>
2. Dispose of regularly generated chemical waste according to the UC Davis waste disposal policy and procedures. <http://safetyservices.ucdavis.edu/ps/hmhwm/iwm/cw/accumulationTime>
3. Request a waste pick-up on-line: <http://safetyapps.ucdavis.edu/EHS/wasterequest/index.cfm>

8. PRIOR APPROVAL/REVIEW REQUIRED

Discuss the circumstances under which a particular laboratory operation, procedure, or activity will require prior approval from the PI or laboratory supervisor. Describe the circumstances under which this SOP will have to be reviewed by PI/lab supervisor – scale up, temperature/pressure change that might cause the reaction to proceed more quickly, change in reactants that might result in increased hazards, etc.

All work with flammable liquids requires the following prior to beginning work:

1. Must have documented Chemical and Laboratory Safety training and specific training on the techniques and processes to be used.
2. Must read the relevant Safety Data Sheet.
3. Must demonstrate competence to perform work.
4. When there are any changes to procedures, personnel, equipment, or when an incident or near-miss occurs, a review of this SOP and reapproval is required.

9. DECONTAMINATION

Discuss decontamination procedures for equipment and glassware. Include controlled areas (e.g., glove boxes, restricted access hoods, perchloric/hot acid fume hoods, or designated portions of the laboratory) in your discussion.

Decontaminate work space with 70-75% ethanol. Wash hands and arms with soap and water after finished. Contaminated pipet tips, Eppendorf tubes, and gloves should be discarded as hazardous waste disposal procedures.

10. DESIGNATED AREA

Indicate the designated area for your laboratory. A designated area must be considered for work with "particularly hazardous substances" or chemical carcinogens. The entire laboratory, fume hood, or a portion of the laboratory may be considered as a designated area.

Establish a designated area for the use of flammable liquids.

11. SAFETY DATA SHEETS AND OTHER RESOURCES

ChemWatch is the safety data sheet application provided by University of California, Office of the President. If other sites or SDS resources are used, please describe. Include applicable SafetyNet(s) or journal citation(s), specific to this process.

Online SDS can be accessed at: <http://safetyservices.ucdavis.edu/ps/cls/msds>

12. DETAILED PROTOCOL

Insert or attach a copy of your specific laboratory procedures for the process, hazardous chemical, or hazard class.

All lab workers who will be using this material(s) must review this SOP and sign the associated training sheet. Lab workers must have specific training on the proper handling of this material(s) and understand the hazards.

Lab workers using this material(s) must demonstrate competence to the Principal Investigator or designee by being able to 1) identify the hazards and list any particularly hazardous handling techniques (use of a Schlenk line, rotary evaporation, cannula transfer, extremes of pressure or temperature, etc.), 2) list the foreseeable emergency situations, 3) describe the proper response to the emergency situations, and 4) know the control measures to minimize the risks.

When working in the lab, a laboratory worker must:

1. Not work alone (if you are alone in the laboratory, leave),
2. Be cognizant of all of the SDS and safety information presented in this document,
3. Find/follow a literature experimental procedure describing the use of this reagent covered by this SOP in a related chemical transformation. If a pertinent literature protocol cannot be found, the researcher MUST discuss the planned experiment with the PI (or designee) prior to using this reagent,
4. Not deviate from the literature experimental protocol mentioned in (3) in either temperature or pressure without PRIOR APPROVAL from the PI (or designee),

5. Follow all related SOPs in the laboratory SOP bank (PPE, syringe techniques, waste disposal, etc. as appropriately modified by any specific information in the SDS information presented in this document),
6. Employ (< quantity) of this reagent in any given reaction (larger quantities REQUIRE the approval of PI or designee), and
7. Discuss ALL issues or concerns regarding this reagent with the PI prior to its use.

I HAVE READ AND UNDERSTOOD THIS SAFETY DOCUMENT

TOPIC: Flammable liquids SOP DATE: _____

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