UCI Environmental Health & Safety

Standard Operating Procedure (SOP)

This Standard Operating Procedure (SOP) describes basic chemical safety information for handling hazardous materials. In addition to this document always review the band specific SOPs and SDS for each chemical prior to work. Prior to working with hazardous materials personnel must obtain approval from their Principal Investigator (PI) and/or Supervisor and complete the appropriate laboratory safety training. The PI must provide their personal with a copy of this SOP.

General Information for Hazardous Materials

Date SOP was approved by PI/lab supervisor:	
Principal Investigator:	
Principal Investigator Signature:	
Internal Lab Safety Coordinator/Lab Manager:	
Lab Phone:	
Office Phone:	
Emergency Contact: *(Name and Phone Number)*	
Location(s): *(Building/Room Number)*	
Department	

Purpose

The purpose of this standard operating procedure is to acquaint you with the proper and safe handling, use, storage and disposal of hazardous materials. This standard operating procedure provides general information about hazardous materials and should be used as a supplemental resource along with a specific band or chemical SOP.

Subject Chemicals used in this Laboratory

Refer to the banded chemical inventory for a list of all chemicals in the laboratory and the banded SOPs that apply. In addition, refer to the SDS for chemical-specific properties to supplement information provided in each SOP (e.g., chemical properties, special hazards, handling).

Administrative Controls

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP:

- Be sure to review and be familiar with the Safety Data Sheet (SDS) for all chemicals to be used in the experiment.
- Never work alone. At least one other person must be present in the same laboratory when any work involving hazardous chemicals is being done.
- Eliminate or substitute for a less hazardous material when possible.
- Design your experiment to use the least amount of material possible to achieve the desired result.
- Verify your experimental set-up and procedure prior to use. Assess the hazards to ensure that appropriate controls are in place to minimize risk and address emergency shut-down procedures as appropriate.
- Consult your PI if the work involves procedure scale-up, procedural changes, or if you have any questions or concerns regarding appropriate safety procedures.

Engineering Controls

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP:

- Preferably all work with hazardous chemicals should be done in a fume hood. The sash height should be kept as low as possible to avoid the escape of vapors, gases and particulates.
- Blast shields and face shields should be used when working with chemicals or processes that may result in explosions or pressure releases.
- Consider the use of a glovebox, toxic gas cabinet or other local exhaust in order to further contain hazards as appropriate.

Personal Protective Equipment (PPE)

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP.

Respiratory Protection

Respiratory protection is generally not required for lab research, provided the appropriate engineering controls are employed.

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EHS. This is a regulatory requirement. If you think that your process may require respirator use, contact EHS for assistance (https://ehs.uci.edu/ih/respiratory-protection.php).

Respirators should be used only under special circumstances such as:

- Performance of an unusual operation that cannot be conducted under the fume hood or biosafety cabinet.
- Weighing powdered chemicals or microbiological media outside a glovebox or other protective enclosure.
- Monitoring indicates exposures cannot be controlled by engineering or administrative controls.
- As required by a specific laboratory protocol or as defined by applicable regulations.
- If an individual has developed a sensitivity/allergy to specific chemicals.

Hand Protection

Disposable nitrile gloves provide sufficient protection for most routine lab operations involving small quantities. Disposable gloves should be changed if liquid is splashed onto them. Disposable gloves are not appropriate for longer operations or operations using larger quantities.

For longer operations, or operations using larger quantities, use thicker gloves made from a material appropriate for the specific chemical in use (e.g., natural rubber, butyl, neoprene, nitrile, PVA, Nomex®, leather). When working chemicals or processes that increase the risk of exposure to fire, use hand protection appropriate to both the risk of chemical exposure and the risk from fire. Gloves must be inspected prior to use for signs of wear or damage. Such gloves should be disposed of through EHS.

Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with any chemical residues on the surface. Wash and dry hands after use.

For additional information on selection of glove material, review the specific chemical Safety Data Sheet. Consult with your preferred glove manufacturer's website to ensure that the gloves you plan on using are compatible with a specific chemical substance. (For example: https://www.thermofishersci.in/lit/Kimberly%20Clark%20Nitrile%20Gloves%20Chemical%20Resistance%20Guide.pdf)

Eye Protection

Use ANSI Z87.1-compliant safety glasses with side shields or tightly fitting safety goggles whenever working in the laboratory.

Skin and Body Protection
Long pants (or equivalent) completely covering your legs, closed toed-shoes, and a lab coat must be worn whenever working in the laboratory. Flame resistant Nomex® lab coats should be used when working with flammable chemicals or processes with a risk of fire. Lab coats sleeves should be fully extended to the wrists and kept buttoned or snapped closed at all times. Avoid wearing synthetic clothing.

Hygiene Measures
Wash hands immediately and thoroughly after handling chemicals. Any contaminated clothing should be disposed of or washed before reuse.

First Aid Procedures

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP.

Consult the Safety Data Sheet (SDS) for specific first aid procedures of the subject chemical. General first aid procedures for hazardous chemicals are provided below.

If inhaled
Move to fresh air. Seek medical attention. Notify supervisor and EHS at x46200 immediately.

In case of skin contact
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Seek medical attention. Notify supervisor and EHS at x46200 immediately.

In case of eye contact
Immediately flush eyes with plenty of water from emergency eyewash station for at least 15 minutes by forcibly holding the eye open. Check for and remove any contact lenses. Seek medical attention. Notify supervisor and EHS at x46200 immediately.

If swallowed
Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt, or waistband. Seek medical attention. Notify supervisor and EHS at x46200 immediately. (The poison control center, (800) 222-1222, is available 24 hours every day).

Medical Emergency

Be familiar with the information in the UC Irvine Injuries & Medical Treatment poster (https://www.ehs.uci.edu/research-safety/occupational-health/_pdf/med-emergency-poster.pdf).

a. Life Threatening Emergency (all times: Business Hours, After Hours, Weekends and Holidays)--CALL 911 if the condition is LIFE THREATENING or REQUIRES IMMEDIATE MEDICAL ATTENTION. *Note: All serious injuries must be reported to EHS at **x46200** within 8 hours.* Complete online incident report at *https://www.ehs.uci.edu/forms/report-injury/index.php*.

b. Non-Life Threatening Emergency – Notify EHS (x46200) and your supervisor or faculty staff if the situation is not life threatening or does not require *immediate* medical attention. Go to Newport Urgent Care for medical attention.

ALL WORK RELATED INJURIES MUST BE REPORTED via the On-line Incident Form https://www.ehs.uci.edu/forms/report-injury/index.php, or call Human Resources, Workers Compensation (949) 824-9152.

Spill and Accident Procedures

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP.

Evacuate the spill area. Post someone or mark-off the hazardous area with tape and warning signs to keep other people from entering the area. Keep the appropriate fire extinguisher nearby. Avoid incompatible extinguishing agents. Use Class A-B-C or B-C for flammable liquids. **Fire extinguishers containing water are not suitable for flammable liquid fires.**

Spill – Assess the extent of danger. Help contaminated or injured persons if safe to do so. 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, <100 g) – 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 request a chemical waste pick-up.

Large (>1 L, >100 g) – Dial **911** and EHS at x46200 for assistance.

Chemical Spill on Body or Clothes – Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Seek medical attention. *Notify supervisor and EHS at x46200 immediately.*

Chemical Splash Into Eyes – Immediately flush eyes with plenty of water from emergency eyewash station for at least 15 minutes by forcibly holding the eye open. Check for and remove any contact lenses. Seek medical attention. *Notify supervisor and EHS at x46200 immediately.*

Decontamination/Waste Disposal Procedure

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP.

All of the subject chemicals must be disposed as a hazardous waste.

Hazardous chemical waste must be stored in a secondary container with the primary container lid closed, segregated to prevent incompatible mixtures, properly labeled with the accumulation start date, and disposed within six months. For information on hazardous waste management and obtain empty containers visit https://ehs.uci.edu/enviro/haz-waste/.

Do not dispose of hazardous waste using sinks, drains, intentional evaporation, or as regular trash.

Safety Data Sheet (SDS) Location

Online SDSs can be accessed at https://www.ehs.uci.edu/sds/index.php.

Required Training/Approvals

In addition to the general practices described below, follow the procedures specified in each banded or chemical specific SOP.

All work with hazardous materials requires the following prior to beginning work:

1. Employee or student must obtain approval from the Principal Investigator prior to beginning work with hazardous materials.
2. All training must be well documented.

3. Must be familiar with the UC Irvine Chemical Hygiene Plan. https://www.ehs.uci.edu/programs/_pdf/lab-res/chemical-hygiene-plan.pdf
4. Must have basic trainings including laboratory safety fundamentals, hazardous waste management, and hazardous materials incidents emergency procedures.
5. Must read the relevant Safety Data Sheet (formerly referenced as Material Safety Data Sheets).
6. Any additional laboratory specific training that is needed is referenced in the 'Laboratory Specific Use Procedures' section. Signed and dated training documents must be kept in each Lab's training records.

Additional Notes

Any deviation from this SOP requires approval from PI.

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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 use these instructions to write lab specific procedures for each banded SOP.

This section must describe lab-specific procedures to address the safe use of all highly hazardous chemicals from this band in use in the laboratory. These procedures may be organized around specific chemicals, specific tasks or the band as a whole. The following minimum requirements must be met:

- Identify designated use areas within the laboratory for highly hazardous chemicals in the following hazard bands:
  - Carcinogens
  - Reproductive Toxins
  - Toxic Chemicals
- Identify maximum use quantities for which the procedures in each band.
- If it is determined that this hazard band SOP is sufficient to address the safe use of all subject chemicals in this lab, then include the following statement in this section: ***"Procedures described in this hazard band SOP are sufficient for addressing the safe use of subject chemicals in this laboratory within the listed quantity limitations."***
- If it is determined that this hazard band SOP is not sufficient to address the safe use of all chemicals from that band in the lab, then write lab-specific procedures for to address these high hazard operations. Such operations are generally indicated by:
  - tasks requiring the use of specialized PPE,
  - tasks using highly hazardous chemicals outside of the fume hood,
  - tasks using larger quantities of hazardous chemicals,
  - tasks involving the use of particular chemicals considered by UCI EHS to be extremely hazardous, and
  - tasks considered to present high risk by lab personnel.

A few examples of what lab-specific tasks may look like are provided below:

Task #1: Title of the specific procedure being done.

1) Provide step-by-step instructions in a numbered/lettered format.
2) Include in the procedure any relevant:
   a) Locations of "designated areas" as called for in the special handling section of the SOP, or as otherwise required by regulations. *The entire laboratory, fume hood, or a portion of the laboratory may be considered as a designated area.*
   b) Use of specific administrative, engineering, and PPE controls.
   c) Specific quantity use limits/restrictions.
   d) Specific storage requirements.
   e) Specific first aid and spill procedures (including what should be handled by whom).
   f) Specific disposal procedures.
   g) Process-specific PI approvals required.

Task #2: Making dilutions of the acids and bases.

1) Consult with PI and obtain approval if quantities greater than 4 L are needed.
2) In a fume hood, slowly add the appropriate amount of concentrated acid or base to the calculated amount of water.
3) Return the concentrated acids/bases to the proper secondary containment or cabinet.

Task #3: Using the pH meter.

1) Calibrate on the day of pH testing using at least 2 standards.

2) Before use, rinse the electrode with deionized water and blot dry with a Kimwipe.
3) Transfer the electrode to the test solution.
4) If using a stir plate, make sure the electrode does not touch the stir bar.
5) Record the pH when the reading is stable (5–20 seconds after insertion of the electrode into the solution)
6) Add dilute acid or dilute base drop-wise until the correct pH is reached.
7) Rinse the electrode with deionized water and store according to the manufacturer's instructions.
8) Make sure the acid and base caps are on tightly.

Add as many tasks as necessary.

Documentation of Training

- Prior to conducting any work with hazardous chemicals, designated personnel must provide training to laboratory personnel specific to the hazards and procedures involved in working with hazardous substances.
- The Principal Investigator must provide their laboratory personnel with a copy of this SOP and access to the chemical hygiene plan, and the SDS provided by the manufacturer.
- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training.

I have read and understand the content of this SOP:

Name	Signature	Date