NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY, HEALTH, AND QUALITY DIVISION

Chapter 53: Chemical Safety

Laboratory Standard Operating Procedure Template

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URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/chemsafetyTemplateSOP.pdf | .doc

All experiments that will be performed in a *chemical laboratory* must be discussed with the ESH coordinator and chemical laboratory supervisor before starting work. In certain cases, written approval is required. The ESH coordinator makes the decision for situations where formal approval is needed. This will take the form of a written standard operating procedure (SOP) outlining steps and mitigations of the experimental process. This template is recommended for SOPs. (See Chemical Safety: Chemical Hygiene Plan Requirements [SLAC-I-730-0A09S-040].)

Procedure title	
Procedure author	
Date of creation / revision	
Name of responsible person	Principal investigator, laboratory supervisor, or autonomous researcher
Location to be performed	Building or lab number, beam line
Proposal number(s):	

1.	**This standard operating procedure (SOP) is for a**

☐ Specific laboratory procedure or experiment
Examples: synthesis of chemiluminescent esters, folate functionalization of polymeric micelles

☐ Generic laboratory procedure that covers several chemicals
Examples: distillation, chromatography

☐ Generic use of specific chemical or class of chemicals with similar hazards
Examples: organic azides, mineral acids

2.	**Process or experiment description** *Briefly summarize the process or experiment, including an estimate of how long the process takes and how frequently it will be conducted. Include total quantities (volume, mass) of the materials you to expect to use.*

3.	**Risk assessment** *Identify potential safety hazards. For chemical hazards, be specific (for example, flammability, corrosivity, reactivity/explosion, acute toxicity, or carcinogenicity). List OSHA hazards, NPFA ratings, and occupational exposure limits.*

References:

SLAC Safety Data Sheets (http://www-group.slac.stanford.edu/esh/groups/fsd/hmaq/hazmat/hazcom.htm)

SLAC National Accelerator Laboratory. Nanomaterial Safety Plan (SLAC-I-730-0A09M-008, http://www-group.slac.stanford.edu/esh/eshmanual/references/hazmatPlanNano.pdf)

Stanford University, Department of Environmental Health and Safety. General Use Standard Operating Procedures. Available from Laboratory Chemical Safety Toolkit (http://chemtoolkit.stanford.edu/, under "Safe Lab Practices")

Stanford University, Department of Environmental Health and Safety. Stanford Lab Safety Sheets (http://www.stanford.edu/dept/EHS/prod/researchlab/lab/lab_safety_sheets.html)

Stanford University, Department of Environmental Health and Safety. General Principles and Practices for Working Safely with Engineered Nanomaterials (http://www.stanford.edu/dept/EHS/prod/researchlab/IH/nano/)

American Chemical Society. *Journal of Chemical Health and Safety* (http://www.sciencedirect.com/science/journal/18715532)

Canadian Centre for Occupational Health and Safety. Web Information Service (http://ccinfoweb.ccohs.ca)

Furr, A. Keith. *CRC Handbook of Laboratory Safety.* Available from CRCnetBASE (http://crcnetbase.com)

Hall, Stephen K. *Chemical Safety in the Laboratory*. Available from Stanford University, Swain Chemistry and Chemical Engineering Library (https://lib.stanford.edu/swain)

Lewis, Richard J. *Sax's Dangerous Properties of Industrial Materials*. Available from Knovel (http://www.knovel.com)

National Oceanic and Atmospheric Association. CAMEO Chemicals, Database of Hazardous Materials (http://cameochemicals.noaa.gov)

National Research Council. *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards* (http://www.nap.edu/catalog.php?record_id=12654)

Pohanish, Richard P. *Sittig's Handbook of Toxic and Hazardous Chemicals and Carcinogens*. Available from Knovel (http://www.knovel.com)

United States National Library of Medicine. TOXNET: Toxicology Data Network (http://toxnet.nlm.nih.gov)

4.	**Safety equipment** *Specify all equipment needed to perform research or experiment safely.*
4.a.	Engineering / ventilation controls Examples: fume hood use, explosion shielding, equipment interlocks
4.b.	Personal protective equipment and other safety equipment Examples: safety glasses, nitrile gloves, cryo gloves, absorbent bench paper

4.c.	Location of nearest emergency safety equipment Examples: organic azides, mineral acids

Item	Location
Eyewash / safety shower	
First aid kit	
Chemical spill kit	
Fire extinguisher	
Telephone	*Telephones are located near the entrance to laboratories.*
Fire alarm manual pull station	
Safety stations	

5.	**Shipping and receiving requirements** *Describe shipping or receiving requirements, especially for highly toxic, highly reactive/unstable, highly flammable, and corrosive materials.*

References:
ESH Manual Chapter 52, "Hazardous Materials and Waste Transportation" (http://www-group.slac.stanford.edu/esh/eshmanual/)

6.	**Designated area** *Where highly toxic, highly reactive/unstable, highly flammable, and corrosive or nanomaterials are used, identify the designated work area(s) and the necessary personnel decontamination after completion of work.*

7.	**Step-by-step operating procedure** *Provide a sequential description of work, including details such as chemical concentrations and when special safety equipment is to be utilized. Include temperature, pressure, and other experimental conditions. Schematics or pictures are suggested for complex setups.*

1. Step
2. Step

8.	**Special handling procedures, transport, and storage requirements** *Describe special handling and storage requirements for hazardous chemicals in your laboratory, especially for highly reactive/ unstable and highly flammable materials and corrosives. Describe transport and secondary containment requirements, between the laboratory and beam lines or between facilities.*

9.	**Beam line handling and storage requirements** *Describe sample handling procedures and sampling set up at the beam lines. Are samples sealed or open? Is ventilation required? Are heating, cooling, or gas distribution systems present?*

10.	**Emergency procedures** *Indicate how spills, personnel exposure/injury, and other accidents should be handled and by whom. List emergency contact numbers.*

Life-threatening emergencies (for example, fire, explosion, large-scale spill or release, compressed gas leak, valve failure)

1. **Call 911.**
2. Alert people in the vicinity and activate the local alarm systems.
3. Evacuate the area and go to emergency assembly point (EAP). *Indicate EAP here.*
4. Remain nearby to advise emergency responders.
5. Once personal safety is established, call ext. 5555 to activate internal response.
6. Provide local notifications.

Identify the area management staff that must be contacted and include their work and home numbers. This must include the PI and may include the safety coordinator and facilities manager.

If personnel exposed or injured

1. Remove the injured/exposed individual from the area, unless it is unsafe to do so because of the medical condition of the victim or the potential hazard to rescuers.
2. Administer first aid as appropriate.
3. Flush contamination from eyes/skin using the nearest emergency eyewash/shower for a minimum of 15 minutes. Remove any contaminated clothing.
4. Bring to the hospital copies of safety data sheets (SDSs) for all chemicals to which the victim was exposed.

Non-life-threatening emergencies

1. Call ext. 5555 to activate internal response.
2. Provide local notifications.

Identify the area management staff that must be contacted and include their work and home numbers. This must include the PI and may include the safety coordinator and facilities manager.

If personnel exposed or injured

1. Call the SLAC Occupational Health Center at ext. 2281 for more information and to schedule an appointment.

For small spills / local cleanup

In the event of a minor spill or release that can be cleaned up by local personnel (personnel are authorized via work planning and control to handle spilled material, appropriate PPE is available, compatible spill response material is readily available in sufficient quantity, and cleanup is safe):

1. Notify personnel in the area and restrict access. Eliminate all sources of ignition.
2. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection.
3. Wearing appropriate personal protective equipment, clean up spill. Collect spill cleanup materials in a tightly closed container. Manage spill cleanup debris as hazardous waste.
4. Submit online waste pickup request (http://www-group.slac.stanford.edu/esh/forms/hazpickup.pdf) to Waste Management.

Building maintenance emergencies (for example, power outages, plumbing leaks)

Submit a Facilities service request (https://famis.slac.stanford.edu/famis_fss/fweb.home) or call appropriate building manager.

Identify the building manager using the SLAC Building Information database (https://oraweb2.slac.stanford.edu/apex/epnprod/f?p=111:1).

Additional emergency procedures

Describe additional, local emergency procedures.

11.	**Waste disposal** *Identify amounts of waste anticipated and appropriate disposal procedures. Segregate waste by hazard class (for example, flammable, corrosive) and state (solid, liquid), label appropriately, and place in the laboratory's hazardous waste cabinet.*

Additional waste guidelines

Describe additional, local waste guidelines.

12.	**Training requirements** *List the general and laboratory-specific training required*

☐ User laboratory training
☐ Laboratory User CHP Training (ESH Course 199)
☐ Hazard Communication (ESH Course 103)
☐ Hazardous Waste Management (ESH Course 105)
☐ Cryogenic and Oxygen Deficiency Safety Training (ESH Course 170)
☐ Hazardous Materials Transportation General Awareness and Safety Training (ESH Course 123)
☐ Nanomaterials Laboratory Safety Training (ESH Course 161)

☐ Other: _____

Additional training requirements

List additional, local training requirements.

1. Additional training requirement
2. Additional training requirement

13.	**Approval** *Standard operating procedures must be approved by the laboratory manager and directorate safety coordinator.*

Laboratory manager *(name, signature, date)*: _____
Directorate safety coordinator *(name, signature, date)*: _____

Additional approvals

List subject matter experts consulted for approval:

1. Person consulted
2. Person consulted

Additional prior approvals required

List any tasks that require prior approval by the principal investigator or laboratory manager (for example, use of restricted chemicals and other higher hazard chemicals and running of higher hazard operations):

1. Task requiring prior approval
2. Task requiring prior approval