

Laboratory Specific Safety Plan

Personal Protective Equipment

Eye and Face Protection

Eye protection should always be worn where there is potential for injury to the eyes or face from small particles, dust, toxic chemicals, biological substances, flying objects or particles, large objects, thermal or radiation hazards, and lasers. According to the types of and extent of hazards, different PPE should be worn. PPE for the face and eyes includes devices such as safety glasses, goggles, and face shields. These must always remain clean and free of contaminants. Safety glasses with side shields or goggles must always be worn in laboratory areas.

Body Protection

Protective clothing, such as lab coats or aprons with sleeves, should be worn when handling hazardous materials. This will prevent the contamination of skin and clothing. Body protections must always be worn in the laboratory areas.

Hand Protection

Selecting the proper gloves is very important since it is our hands that are often used to handle hazardous materials. These materials usually consist of caustic or toxic chemicals, biological substances, electrical sources, or extremely cold or hot objects that may irritate or burn your hands. In addition, traumatic injuries such as cuts, sprains and punctures may also occur. With the wide range of hazards, there also exists a wide range of gloves that may be used as PPE. It is important to know that not all gloves are protective against all chemicals. To choose the proper chemical resistance gloves for a specific chemical, available Internet sources includes Glove Chemical Resistance and Barrier Guide (Kleenguard), and Glove Chemical Resistance Guide (Best Manufacturing).

Foot Protection

Injuries that may occur when the proper footwear is not worn are chemical and heat burns from spills and splashes of acids and caustics, compression injuries, electrical shocks, and slipping. Wearing the proper footwear is therefore, very important when working in areas where physical and chemical hazards are present. Close-toed shoes must always be worn in laboratory areas where chemicals and biologicals are present.

Respiratory Protection

Respirators are used to prevent the exposure to air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. All respirator usage, which includes air purifying respirators and air supplied respirators, requires an annual physical, fit testing and training by TTU-EH&S prior to use. EH&S may be contacted at 742-3876 for more information on the use of a respirator (TTU OP 60.05). Disposable respirators are not allowed to be used in Texas Tech University laboratories for respiratory protection.

Eating and Drinking in the Lab

Eating, drinking, smoking, chewing tobacco, chewing gum, applying cosmetics, taking medications, or similar activities in laboratories may result in the accidental ingestion of hazardous materials (chemical, radiological, biological); therefore these activities and storing these items are strictly prohibited from all laboratory spaces. Such activities are permitted in an area (defined as a room with floor to ceiling walls and a closed door) separated from the laboratory space. If a separate area can only be accessed by going through the laboratory, then only covered food or beverage items may be carried through the laboratory. These requirements help to prevent the ingestion of hazardous materials, which can occur by touching one's mouth with contaminated hands, eating from a container that is contaminated, eating food that has come into contact with hazardous materials accidentally.

Proper Lab Clothing

Do not wear opened-toed shoes: Sandals, flip flops or other open toed shoes increase the risk of injury to your feet if chemicals or glassware are dropped or knocked off the lab bench. The safest shoes are closed-toed, flat soled leather shoes that are kept securely tied.

Avoid long hair or loose fitting clothing: Both can easily fall forward into your work area, posing a risk when working with an open flame or moving equipment such as a vacuum pump. Hair and clothing that falls into your work area can come in contact with hazardous biological samples or chemicals. Long hair should be tied back, and loose clothing should not be worn.

Spill Response and Clean-up Procedures

In the event of a chemical spill, the individual(s) who caused the spill is responsible for prompt and proper clean-up. It is also their responsibility to have spill control and personal protective equipment appropriate for the chemicals being handled readily available. See Developing a Spill Response Plan for more information.

The following are general guidelines to be followed for a chemical spill. More detailed procedures may be available in your Departmental Chemical Hygiene Plan or Spill Response Plan.

1. Immediately alert area occupants and supervisor, and evacuate the area, if necessary.
2. If there is a fire or medical attention is needed, contact UPD at 9-911.
3. Attend to any people who may be contaminated. Contaminated clothing must be removed immediately and the skin flushed with water for no less than fifteen minutes. Clothing must be placed in a waste bag for disposal if contacted by chemicals or placed in an autoclave bag for autoclaving if contacted by biological material.
4. If a volatile, flammable material is spilled, immediately warn everyone, control sources of ignition and ventilate the area.
5. Don personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information.
6. Consider the need for respiratory protection. The use of a respirator or self-contained breathing apparatus requires specialized training and medical surveillance. Never enter a contaminated atmosphere without protection or use a respirator without training. If respiratory protection is needed and no trained personnel are available, call EH&S at 742-3876. If respiratory protection is used, be sure there is another person outside the spill area in communication, in case of an emergency. If no one is available, contact EH&S at 742-3876.
7. Using the chart below, determine the extent and type of spill. If the spill is large, if there has been a release to the environment or if there is no one knowledgeable about spill clean-up available, contact EH&S at 742-3876.

Category	Size	Response	Treatment Materials
Nuisance Spill	up to 4 liters	chemical treatment or absorption	neutralization or <u>absorption spill kit</u>
Potentially Hazardous Spill	More than 4 liters	Call EH&S	outside help
Potentially Hazardous Spill	Small spill of low LD50 (<50mg/kg) or unknown toxicity	Call EH&S	outside help

8. Protect floor drains or other means for environmental release. Spill socks and absorbents may be placed around drains, as needed.
9. Contain and clean-up the spill according to the table above. Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical. Bulk absorbents and many spill pillows do not work with hydrofluoric acid. POWERSORB (by 3M) products and their equivalent will handle hydrofluoric acid. Specialized hydrofluoric acid kits also are available. Many neutralizers for acids or bases have a color change indicator to show when neutralization is complete.
10. When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container. Polyethylene bags may be used for small spills. Five gallon pails or 20 gallon drums with polyethylene liners may be appropriate for larger quantities. Supplied spill kits contain hazardous waste bags.

11. Complete a hazardous waste sticker, identifying the material as Spill Debris involving XYZ Chemical, and affix onto the container. Spill control materials will probably need to be disposed of as hazardous waste. Contact EHS at 742-3876 for advice on storage and packaging for disposal.
12. Decontaminate the surface where the spill occurred using a mild detergent and water, when appropriate.
13. Report all spills to your supervisor or the Principal Investigator and EH&S.
14. If at any point the person(s) does not feel adequately equipped or comfortable proceeding with the clean-up, or if the situation is likely to escalate, contact EH&S for further assistance.

Developing a Spill Response Plan

An effective spill response procedure should consider all of the items listed below. The complexity and detail of the plan will, of course depend upon the physical characteristics and volume of materials being handled, their potential toxicity, and the potential for releases to the environment.

1. Review Material Safety Data Sheets (MSDSs) or other references for recommended spill cleanup methods and materials, and the need for personal protective equipment (e.g., respirator, gloves, protective clothing, etc.)
2. Acquire sufficient quantities and types of appropriate spill control materials to contain any spills that can be reasonably anticipated. The need for equipment to disperse, collect and contain spill control materials (e.g., brushes, scoops, sealable containers, etc.) should also be reviewed. See Recommended Spill Control Materials Inventory for more details. EH&S can supply a spill kit that can be used if no other materials are available. After use, please call EH&S at 742-3876 to restock.
3. Acquire recommended personal protective equipment and training in its proper use. For example, if an air purifying respirator or self-contained breathing apparatus are needed, personnel must be enrolled in the Respiratory Protection Program and attend annual training and fit-testing.
4. Place spill control materials and protective equipment in a readily accessible location within or immediately adjacent to the laboratory.
5. Develop a spill response plan that includes:
 - Names and telephone numbers of individuals to be contacted in the event of a spill.
 - Evacuation plans for the room or building, as appropriate.
 - Instructions for containing the spilled material, including potential releases to the environment (e.g., protect floor drains).
 - Inventory of spill control materials and personal protective equipment.
 - Means for proper disposal of cleanup materials (in most cases, as hazardous waste) including contaminated tools and clothing.
 - Decontamination of the area following the cleanup.
6. Discuss the spill response plans with all employees in the area. EH&S offers training for employees who work directly with chemicals (see Chemical Spills and Waste Procedures) and who are expected to respond outside their work area to assist with spill cleanup (see Chemical Emergency Response (HAZWOPER) First Responder - Operations Level Training).

Recommended Spill Control Material Inventory

Your laboratory or work area should have access to sufficient quantity of absorbents or other types of materials to control any spill that can be reasonably anticipated. Additional materials may be found in certain laboratories and the chemical stockrooms.

Personal Protective Equipment

- chemical splash goggles
- gloves appropriate for the agent
- shoe covers
- lab coat and/or apron with sleeves

Absorption Materials

appropriate for agent

Neutralizing Materials

Acid Neutralizer

Caustic Neutralizer

- commercial neutralizers, such as Neutrasorb (for acids) and Neutrakit-2 (for bases) have built in color change to indicate complete neutralization

Solvent Neutralizer

- commercial solvent neutralizers, such as Solusorb, act to reduce vapors and raise the flashpoint of the mixture

Mercury Spills

Contact EH&S 742-3876

DETECTION AND INHIBITION OF PEROXIDES (Peroxide Formers Have to be Tested Every 6 Months)

Commercially Purchased Peroxide Test Strips

Test strips can be purchased commercially from vendors such as VWR and Fisher that are capable of detection of peroxide formation.

BASIC PROTOCOLS FOR SELF-TESTING

Ferrous Thiocyanate Detection Method

Ferrous thiocyanate will detect hydroperoxides with the following test:

1. Mix a solution of 5 ml of 1 % ferrous ammonium sulfate, 0.5 ml of 1 N sulfuric acid and 0.5 ml of 0.1 N ammonium thiocyanate (if necessary decolorize with a trace of zinc dust)
2. Shake with an equal quantity of the solvent to be tested.
3. If peroxides are present, a red color will develop.

Potassium Iodide Detection Method

1. Add 1 ml of a freshly prepared 10% solution of potassium iodide to 10 ml of ethyl ether in a 25 ml glass-stoppered cylinder of colorless glass protected from light (both components are clear).
2. A resulting yellow color indicates the presence of 0.005% peroxides.

Inhibition of Peroxides

1. Storage and handling under an inert atmosphere is a useful precaution.
2. Addition of 0.001 % hydroquinone, diphenylamine, polyhydroxyphenols, aminophenols or arylamines may stabilize ethers and inhibit formation of peroxides.
3. Dowex-1© has been reported effective for inhibiting peroxide formation in ethyl ether.
4. 100 ppm of 1-naphthol is effective for peroxide inhibition in isopropyl ether.
5. Hydroquinone is effective for peroxide inhibition in tetrahydrofuran.
6. Stannous chloride or ferrous sulfate are effective for peroxide inhibition in dioxane.

Please note that these methods are BASIC protocols. Should a researcher perform one of these methods, all safety precautions should be thoroughly researched and a detailed SOP should be generated.

Procedures for work with Carcinogens, Mutagens, Teratogens, and Reproductive Toxins

- It is the responsibility of the lab workers to be aware of hazards associated with any chemical they use. Information is available from Material Safety Data Sheets found in _____.
- All new workers in the laboratory who will work with carcinogens, mutagens, teratogens and reproductive toxins will be trained by one of the following people_____.
- For any chemical used in the laboratory, the lab worker is responsible for being aware of known or suspected hazards. For each known carcinogenic, mutagenic, or teratogenic chemical or reproductive toxin to be used the lab worker should identify these and other hazards (i.e. corrosive, reactive, flammable, toxic, irritant) based on available MSDS recommendations available in the laboratory.
- The lab worker should be aware of the physical form of the chemical and any potential phase changes during the experiment.
- The lab worker should be aware of the quantity on hand to be used.
- Opened containers of carcinogens, mutagens, teratogens and reproductive toxins should be stored in the labeled area under the hood and used in the hood as indicated in the laboratory.
- Sealed containers of carcinogens, mutagens, teratogens and reproductive toxins should be stored according to their hazards.
- Usage of these compounds should be limited to lab workers trained in their safe usage.
- All use of carcinogens, mutagens, teratogens and reproductive toxins should be carried out in the hood labeled for their use.
- Lab workers should wear Personal Protective Equipment (PPE) including, but not limited to gloves, lab coat, hair restraints, goggles and any other PPE recommended by the MSDS that is deemed appropriate.
- When working with hazardous chemicals, only group members should be in the lab. To prevent unauthorized usage of chemicals access is limited. Access to this lab can be acquired through _____.
- If OSHA monitoring is required, it should be performed by EH&S.
- Every lab worker is to receive training in the safe handling of hazardous chemicals and is to document this by signing an informed consent document.

If you have any questions, please ask _____.

Emergency Evacuation

Place emergency egress information here.

Emergency Action Plan (EAP)

In a global emergency, that requires entire building to be evacuated, leave the building and proceed to your designated assembly area at: _____

Place Emergency Shutdown Procedures for your area here. The procedures should be executed before evacuating the building **only if it is safe to do so**.

KNOW THE LOCATIONS OF:

Emergency Exit

Fire Extinguishers

Fire Alarms

Emergency Eye Washes

Emergency Showers

First Aid Kits

Fire blankets

Flashlights + batteries

Emergency kit

Chemical spill supplies

Material Safety Data Sheets

TRAINING REQUIREMENTS

Employee training shall include:

Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the department/EH&S, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

The physical and health hazards of chemicals in the work area; and

The measures employees can take to protect themselves from these hazards, including specific procedures the department has implemented to protect

employees from exposure to hazardous chemicals such as appropriate work practices, emergency procedures, and personal protective equipment.

The employee shall be trained on the applicable details of the Departmental Chemical Hygiene Plan and Standard Operating Procedures.

Classes of hazards such as flammables, corrosives, toxins, and reactives.

MSDS's for products which are representative of each hazard class will be discussed in detail.

Proper disposal of waste chemicals, to include the fact that no chemical may be disposed of in the sanitary sewer system.

HAZARD IDENTIFICATION

REQUIREMENTS

LABELING OF CONTAINERS: Departments shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced and that all chemicals are color coded according to the modified J. T. Baker color coding system.

CHEMICALS DEVELOPED IN THE LABORATORY: The following provisions shall apply to chemical substances developed in the laboratory.

If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the lab supervisor shall determine if it is a hazardous chemical as defined by the OSHA Hazard Communication Standard. If the chemical is determined to be hazardous, the lab supervisor shall provide appropriate training as required by this

If the chemical produced is a byproduct whose composition is not known, the lab supervisor shall assume that the substance is hazardous and shall provide appropriate training as required by this plan.

If the chemical substance is produced for another user outside of the laboratory, the lab supervisor shall comply with the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of Material Safety Data Sheets and labeling.

INCOMING CONTAINERS: It is University policy to require that suppliers of chemical products label their materials in accordance with the OSHA Hazard Communication Standard. As a minimum; identity, hazard warnings, and the name and address of the manufacturer or importer should be found on containers of hazardous substances shipped to TTU facilities. No container will be accepted unless it is properly labeled with the required information. The DCHC and lab supervisor are responsible for ensuring that incoming containers are labeled with required information. If a container is received without the required information, the manufacturer will be required to provide properly labeled containers.

MATERIAL SAFETY DATA SHEETS: Material Safety Data Sheets (MSDS's) shall be obtained from manufacturers and/or distributors for all chemicals purchased. The manufacturers and/or distributors shall be contacted a second time if the MSDS is not received or is found to be incomplete. Documentation of all MSDS requests and re-requests shall be kept on file in the laboratory.

The responsibility for obtaining, evaluating and maintaining MSDS's is assigned to each individual laboratory.

MSDS's for hazardous materials shall be readily accessible to employees during each work shift.

The location of these MSDS's, along with reference materials, shall be readily accessible to employees during each work shift.

RESPIRATOR USE

Where the use of respirators is necessary to prevent exposure above permissible exposure limits, the department shall provide, at no cost to the employee, the proper respiratory equipment as determined by the UCHO. Prior to use of any respiratory protective equipment, employees will:

be deemed physically capable of wearing a respirator by a licensed physician;

be trained in the proper use, care, cleaning and storage of respiratory protective equipment;

be initially fit tested by EH&S for a respirator appropriate to the hazard; and
be annually refitted to assure an adequate fit is maintained.

CONTACT INFORMATION

University Police Department: 742-3931

Fire Department: 9-911 (If you call from a cell phone dial 911 and let them know that you are located at Texas Tech University).

EH&S: Daytime (806) 742-3876

EH&S: After Work Hours, Weekends and Holidays (806) 543-3706 or (806) 742-3328

PI _____ After Hours _____

Emergency: 9-911 (If you call from a cell phone dial 911 and let them know that you are located at Texas Tech University).

Lab Notebooks

Lab notebooks will be checked and signed every week by the PI.

Your signature confirms that you have read and understand this policy and agree to comply with the special restrictions imposed on work in this area. All items noted above have been communicated during a training session administered by the Principal Investigator, Laboratory Trainer or Supervisor, and that you had the opportunity to ask questions.

Signature_____ Date_____

Signature_____ Date_____

Signature_____ Date_____

Signature_____ Date_____

Signature_____ Date_____

Signature_____ Date_____

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