



Louisiana State University Chemical Hygiene Plan

**Office of Environmental Health and Safety
June 2017**

- xi. Plan for accidents and ensure that appropriate supplies are in place and procedures are established for responding to an accident, including cleaning up chemical spills.
 - xii. Monitor the safety performance of the staff to ensure that the required safety equipment, practices and techniques are understood and are being employed and ensure that action is taken to correct work practices that may lead to chemical exposures or releases.
 - xiii. Report all accidents involving an employee's chemical exposure or involving a chemical spill that may constitute a danger of environmental contamination to the Supervisor and EHS. If the spill is significant, also notify LSU Police immediately.
 - xiv. Investigate all chemical accidents and near misses to determine the cause and take appropriate corrective action to prevent similar accidents. Contact the CHO or the EHS Office, when needed, for assistance with investigations, assessment, and recommendations for corrective action.
- E. Employees, staff, students, and visitors working with or around hazardous chemicals in a laboratory responsibilities include the following:
- i. Follow LSU's chemical hygiene procedures and all safety and health standards and rules.
 - ii. Understand and follow all standard operating procedures.
 - iii. Develop good personal hygiene habits.
 - iv. Report all hazardous conditions to the supervisor.

5. BASIC RULES AND PROCEDURES FOR WORKING WITH CHEMICALS

emergency procedures, and waste disposal. SDS should be reviewed before beginning work with a chemical to determine proper use and safety precautions.

OSHA has ruled that electronic access to SDSs is an acceptable alternative to maintaining paper files. Each lab, department, or work group has the option to maintain a hard copy SDS binder or file. As a minimum, each should maintain an inventory of hazardous materials names, suppliers, and methods to access the SDS. Please contact the EHS Office if

- ii. Chemical goggles and a full face shield (if necessary) shall be worn during chemical transfer and handling operations as procedures dictate.
- iii. Sandals, open toed shoes, and bare feet should be prohibited.
- iv. Lab coats provide adequate body protection for most operations in the laboratory. Laboratory coats will be laundered on a periodic basis (at least monthly). Laboratory coats shall be removed immediately upon discovery of significant contamination.
- v. Appropriate chemical-resistant gloves shall be worn at all times when there may be skin contact with chemicals. The degradation and permeation characteristics of the glove material selected must be appropriate for protection from the hazardous chemical being handled. EHS will provide glove selection information as required. Gloves are to be removed before leaving the work area. Care should be taken not to contaminate working area were gloves are not required by working in the area with gloves is available from the EHS web site.
- vi. Thermal-resistant gloves shall be worn for operations involving the handling of heated materials and cryogenic fluids. Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.
- vii. Respirator usage shall comply with LSU's Respiratory Protection Program. If the faculty or principle investigator feels that respirators are needed, the Chemical Hygiene Officer should be contacted for an exposure assessment. Voluntary use of respirators is encouraged where relief from nuisance odors or dust is desirable. A copy of OSHA's statement, "Information for

- v. Avoid working alone in the laboratory. When working alone in the laboratory arrange for periodic checks by personnel in adjacent laboratories.
- vi. Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.
- vii. Wash areas of exposed skin well before leaving the laboratory.
- viii. Keep work area clean and uncluttered, with chemicals and equipment being properly stored. Clean up the work area on completion of an operation or at the end of each day.
- ix. Plan your work. Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.
- x. Use engineering controls. U

- ii. Designated areas shall be posted and their boundaries clearly marked. Posting shall include the identification of the highly hazardous chemicals used in the area. Access to the laboratory should be restricted during high hazard chemical use by the laboratory supervisor.
- iii. Suitable gloves and long sleeves shall be worn during use of high hazardous chemicals.
- iv. Use the smallest amount of chemical that is consistent with the requirements of the work.
- v. Use high-efficiency particulate air (HEPA) filters or high-efficiency scrubber systems to protect vacuum lines and pumps.
- vi. Decontaminate a designated area when work is completed.

6. IDENTIFICATION AND CLASSIFICATION OF HAZARDOUS CHEMICALS

Chemicals have inherent physical, chemical and toxicological properties that require laboratory personnel to have a good understanding

B. Corrosive Substances

Corrosive substances cause destruction of, or alterations in, living tissue by chemical action at the site of contact. Major classes of corrosive substances include strong acids (e.g., sulfuric, nitric, hydrochloric, and hydrofluoric acids), strong bases (sodium hydroxide, potassium hydroxide, and ammonium hydroxide), dehydrating agents (sulfuric acid, sodium hydroxide, phosphorus pentoxide, and calcium oxide), and oxidizing agents (hydrogen peroxide, chlorine, and bromine). Symptoms of exposure for inhalation include a burning sensation, coughing, wheezing, laryngitis, shortness of breath, nausea, and vomiting. For eyes, symptoms include pain, blood shot eyes, tearing, and blurring of vision. For skin, symptoms may include reddening, pain, inflammation, bleeding, blistering and burns. As a physical hazard, corrosive substances may corrode materials they come in contact with and may be highly reactive with other substances. It is important to review information regarding materials they corrode, and their reactivity with other substances, as well as information on health effects.

Working with Corrosive Materials

Special attention should be given

materials. The extreme cold of cryogenic liquids requires special care in their use. The vapor that boils off from a liquid can cause the same problems as the liquid itself.

Working with Compressed Gas

E. Particularly Hazardous Substances

The OSHA Laboratory Standard defines a hazardous chemical as "a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed personnel. The term 'health hazard' includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes". Highly flammable and explosive substances comprise a category of hazardous chemicals.

i. Carcinogen

Carcinogens are chemical or physical agents that cause cancer. Carcinogens are defined as known or suspected carcinogens in the latest edition of the National Toxicology Program's "Carcinogens Summary". Generally they are chronically toxic substances which cause damage after repeated or long-duration exposure. Their effects may only become evident after a long latency period and are particularly insidious because they may have no immediate apparent harmful effects. For a large number of compounds there is limited evidence of carcinogenicity to animals from studies involving experimental animals. Certain select carcinogens are classified as "particularly hazardous substances" because there is evidence from human studies that exposure can cause cancer. These compounds should be handled using the general procedures for work with hazardous substances.

ii. Toxic and Highly Toxic Agents

Acute Toxicity Chemicals are any substance for which the LD50 data described in the applicable SDS (or other literature source) causes the substance to be classified as a level 3 or 4 health hazard according to the HMIS system. It is important to note that the above classification does not take into consideration chronic toxicity (carcinogenicity and reproductive toxicity). Also, note that LD50 values vary significantly between different species, and the human toxicity for a substance may be greater or less than that measured in test animals. OSHA considers substances that are either toxic or highly toxic, as defined above, to be particularly hazardous substances. In evaluating the hazards associated with work with toxic substances, it is important to note that a number of factors influence the response of individuals to exposure to toxic compounds. For example, people are rarely exposed to a single biologically active substance. With this point in mind, it is noteworthy that one toxin can influence the effect of a second. This underscores the importance of maintaining good laboratory practices at all times, and with all chemicals.

iii. Compounds with a High Degree of Acute Toxicity

Compounds that have a high degree of acute toxicity comprise a third category of particularly hazardous substances as defined by the OSHA Laboratory Standard. Acutely toxic agents include certain corrosive compounds, irritants, sensitizers (allergens), hepatotoxins, nephrotoxins, and neurotoxins, agents that act on the hematopoietic systems and agents which damage the lungs, skins, eyes, or mucous membranes. Substances that have a high degree of acute toxicity are interpreted by OSHA as being substances that "may be fatal or cause damage to target organs as the result of a single exposure or exposures of short duration".

- iv. **Reproductive and Developmental Toxins**
Reproductive toxins can affect the reproductive health of both male and female personnel and students if proper procedures and controls are not used. For women, exposure to reproductive toxins during pregnancy can cause adverse effects on the fetus; these effects include embryo lethality (death of the fertilized egg, embryo or fetus), malformations (teratogenic effects), and postnatal functional defects. Examples of embryotoxins include thalidomide and certain antibiotics such as tetracycline. Women of childbearing potential should note that embryotoxins have the greatest impact during the first trimester of pregnancy. Because a woman often does not know that she is pregnant during this period of high susceptibility, special caution is advised when working with all chemicals, especially those rapidly absorbed through the skin (e.g., formamide). Pregnant women and women intending to become pregnant should consult with their laboratory supervisor and EHS before working with substances that are suspected to be reproductive toxins.

- v. **Irritants**
Irritants are defined as non

engineering controls, work practices, and personal protective equipment to minimize potential exposures to themselves and other.

7. HOUSEKEEPING

Only trained and qualified personnel shall be allowed to work in a laboratory at LSU. Each

Chemical Hygiene Plan

8. ENVIRONMENTAL MONITORING.

In the event of concern about the performance of a hood, when a new hood is put into service, or there is reason to suspect exposure to laboratory personnel, contact EHS to arrange for monitoring and sampling. This may be desirable when highly toxic or very volatile toxic chemicals are used or stored regularly.

9. RECORDS

Accident reports for any safety related incident are to be submitted to Risk Management and Environmental Health and Safety.

10. SIGNS AND LABELS

A. Prominent signs and labels of the following types should be posted:

- i. Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory personnel.
- ii. Locations signs for safety showers, eyewash stations, other safety and first aid equipment, exits and areas where food and beverage consumption and storage are permitted.
- iii. Warning at areas or equipment where special or unusual hazards exist.

Door Posting for Emergency Purposes

B. All chemical containers (including waste receptacles) are to be labeled.

- i. Labeling is important for safe management of chemicals, preventing accidental misuse, inadvertent mixing of incompatible chemicals, and facilitating proper chemical storage. Proper labeling helps assure quick response in the event of an accident, such as a chemical spill or chemical exposure incident. Finally, proper labeling prevents the high costs associated with disposal of “unknown” chemicals.
- ii. All containers of chemicals being used or generated in LSU research and teaching laboratories must be labeled sufficiently to indicate contents of the container. On original containers, the label should not be removed or defaced in any way until the container is emptied of its original contents. Incoming containers should be inspected to make sure the label is in good condition. It is also advisable to put a date on new chemicals when they are received in the lab, and to put a date on containers of chemicals gener(r)6(.)-4()-4()-4(O)-4(n)9()-4(o)-4v-11

- f. Leave the hood operating when it is not in active use if hazardous chemicals are contained inside the hood or if it is uncertain whether adequate general laboratory ventilation will be maintained when the hood is non-operational.
 - g. The hood shall not be used as a means of disposal for volatile chemicals.
 - h. The ventilation system shall be inspected annually by EHS. The hood face velocity shall be at least 80-85 feet per minute. A record of each inspection shall be maintained by the Chemical Hygiene Officer.
- ii. Gloves Boxes and Isolation Rooms. The exhaust air from a glove box or isolation room will pass through scrubbers or other treatment before release into the regular exhaust system.
- iii. Flammable Storage Cabinets. Cabinets designed for the safe storage of flammable chemicals can only do so if used and maintained properly. Cabinets are generally made of double-walled construction and are made of 18 gage steel. The doors are two inches above the base of the cabinet is liquid proof to that point. Two vents are provided on opposite side of the cabinet and are equipped with flame-arrester screens. Always read the manufacturer's information and follow prudent safety practices such as:
- a. Store only compatible materials inside the cabinet.
 - b. Store chemicals of similar vapor density together when using mechanical ventilation (e.g., heavier than air vapors are vented through the bottom vent and lighter than air vapors through the top vent).
 - c. Do not store paper or cardboard inside cabinets with the chemicals.
 - d. Do not overload the cabinet.