

Department of Chemistry and Biochemistry

**SAFETY AND CHEMICAL HYGIENE PLAN**

A. EMERGENCIES

IMPORTANT NUMBERS:

SECURITY	<b>953-5611</b>
POISON CONTROL CENTER	<b>1-800-922-1117</b>
HEALTH SERVICES	<b>953-5520</b>

1. INJURIES

- a. If anyone is injured, call Security immediately and perform first aid (if you are knowledgeable in it).
- b. In life threatening situations, first call Security, then Health Services during the day and Security only after 5:00 p.m. in the evening.
- c. Call the Poison Control Center for first aid for exposure to hazardous chemicals.
- d. A first aid kit is located in the stockroom, SCIC 317, and in each lab.
- e. The Health Center (953-5520) is open Monday - Friday, 8:30 - 5:00. The Health Center is at 181 Calhoun Street.
- f. Include the MSDS sheet of the exposure chemical with any student being transported by EMS injured in a laboratory environment where chemicals are involved.

2. FIRES

- a. In the event of a small fire, use a fire extinguisher to put it out. For a larger fire, pull the fire alarm located near each exit or stairwell. Call Public Safety (**3-5611**) and evacuate all persons from the building.
- b. There are fire extinguishers in all labs and in the halls and fire blankets in the lab areas. Never wrap a fire blanket around someone. Always use it to smother a fire in the stop, drop, and roll procedure. If you do not know how to use this equipment, see the lab manager.

3. MAJOR CHEMICAL SPILLS

- a. In the event of a large spill of any hazardous chemical, evacuate the room, close the door if possible, pull the fire alarm to evacuate the building, then call Public Safety (3-5611).

4. EVACUATION PROCEDURES

Leave the area in an orderly manner; walk, don't run; follow designated evacuation routes to assembly areas away from building. Do not use elevators! Make a count of your group in the assembly area. The command post for the Director of Fire and Life Safety and the Fire Department is the corner of George and Coming Street.

B. STANDARD OPERATING PROCEDURES FOR CHEMICAL USE

In order to reduce employee exposure to hazardous chemicals and to assure that any exposure does not exceed the Permissible Exposure Limit (PEL) for that chemical, the following must be observed:

1. Prior to the use of any chemical in the laboratory, first determine the PEL for that chemical

as well as the specific hazards and precautions for that chemical. This information can be found in the MSDS files. Discuss with the lab manager how this chemical should be handled, what protective equipment to use, and how to dispose of any chemical waste. If this chemical is a carcinogen, reproductive toxin, or is known to be extremely hazardous, then follow the special guidelines described in a later section. The use of radioactive substances is described in a separate protocol.

2. Hazardous chemicals with PEL's of 50 ppm or lower must be used in an operating fume hood; examples are concentrated hydrochloric acid, chloroform, benzene, and naphthalene. Hazardous chemicals with PEL's higher than 50 ppm should be poured from their stock containers in the fume hood and then the smallest possible amount is taken outside the hood. These amounts should be used in a covered container whenever possible. Use a container with a narrow opening, such as an Erlenmeyer flask covered with parafilm or a stoppered reagent bottle. Keep your face away from the container opening and always ensure that there is adequate ventilation in the laboratory. If the ventilation system is not working, then volatile chemicals cannot be used in the laboratory.
3. If there is a reason to believe that exposure to a specific chemical routinely exceeds the PEL for that chemical, then the College is required to monitor that exposure to that chemical according to OSHA guidelines and inform the employee of monitoring results within 15 days.
4. Safety goggles must be worn at all times in the laboratory. In addition, gloves and a lab coat must be worn when working with any potentially hazardous chemical.
5. Do not eat, drink, or smoke in any laboratory; also, wash your hands after working with chemicals.
6. Do not smell, taste, or touch any chemical.
7. Do not pipet at anytime by mouth.
8. All labs are equipped with eyewash stations marked by a warning sign. If any chemical gets into your eyes, flush both eyes with a gentle stream of water for at least 15 minutes. Use thumb and index finger to hold each eye open. Wash hands thoroughly before placing them near eyes. Emergency aid must be summoned during the flushing process. Eyewashes should be examined monthly for proper operation.
9. If any chemical gets on your skin or clothing, wash it off with lots of water.
10. When working with flammable chemicals, be certain there are no flames or sparks nearby. Remember, some flammable vapors are heavier than air and can travel along a countertop to a Bunsen burner 20 feet away. A standard hotplate must not be used to heat a flammable liquid at any time.
11. Do not work alone in a laboratory or chemical storage area.
12. Unauthorized entry into the flammable storage building is prohibited. Entry by a single individual is prohibited. A minimum of two people is required to enter the flammable storage building. Personal protective equipment must be worn in this facility.

#### C. LABELING AND STORAGE OF CHEMICALS

1. Labels on incoming containers of chemicals must not be removed or defaced. Any MSDS sheets that arrive with chemicals should be filed in the lab manager's office.
2. All chemical containers, including temporary ones, should have an accurate label of contents; this includes flasks and beakers. Use labeling tape; include all precautions and warnings from the original container. Containers containing more than one type of chemical shall be labeled with all the chemicals that are in that container. The chemical makeup and other proper name of the chemical(s) shall be written in permanent ink on the label on the container.
3. All flammable chemicals should be stored in approved flammable storage cabinets.
4. Acids should be stored in the acid cabinet.
5. Return all chemicals to the chemical storeroom or their proper storage location after use.
6. Unlabeled chemical containers should be reported to the lab manager as soon as possible.

D. FUME HOODS

1. Set fume hood sashes at 100 linear feet per minute (LFM) for normal chemical use. Hood frames are marked accordingly.
2. Always determine that a fume hood is working properly before using. Hang a tissue in front to observe the flow of air.
3. If the flow of a fume hood does not seem adequate, notify the lab manager who will check the flow rate.
4. Hoods not in use shall be closed in accordance with NFPA to one inch opening.

E. USE OF COMPRESSED GASES

1. Before moving a tank of compressed gas, install the safety cap on the tank. Transport compressed gas tanks using only carts designated for that purpose.
2. "Full", "In Use", or "Empty" labels or tags must be placed on all cylinders- stored or used.
3. Before using a tank of compressed gas, securely chain the tank to a lab bench.
4. When installing a regulator on a tank, remember, flammable gases have left-handed threads.
5. When opening the valve on a tank, remember, only open the valve about one-quarter turn; this is usually enough to achieve full pressure and allows for immediate shut-off in case of emergency.

6. When you are finished using a compressed gas for the day, always turn off the main valve. Before you remove a regulator, first bleed off the gas. If the gas is flammable, check that there are no ignition sources nearby.
7. Do not store an oxygen cylinder near a flammable gas cylinder. NOTE: The valve and the regulator on an oxygen tank MUST be free from oil or grease. Oil on contact with oxygen or other oxidizers can be explosive.

F. CARCINOGENS, REPRODUCTIVE TOXINS AND EXTREMELY HAZARDOUS CHEMICALS

\*OSHA has strict guidelines for using carcinogens. These guidelines are referenced in the Guide for Laboratory Use of Chemical Carcinogens. This is located in the College of Charleston OSHA Manual.

Use of any chemical that is defined as a carcinogen or reproductive toxin is suspected to be extremely hazardous must adhere to the following guidelines:

1. Containers of these chemicals should be stored within a secondary container to trap any escaping powder or vapor.
2. All work with these chemicals must be done in a "designated area." A designated area can be a fume hood or a portion of a hood or part of a lab counter. The designated area must be marked off and labeled with warning signs. It should be covered with absorbent paper. In addition, if the chemical is a liquid, the absorbent paper should be placed on a nonporous tray which is capable of containing any possible spill. When work is completed in that area, the area must be cleaned and decontaminated; see below.
3. If the chemical being used is volatile, then the work must be done in an operating fume hood.
4. All work with these chemicals requires a lab coat, gloves and goggles.
5. Any spill of these chemicals will hopefully be contained by the absorbent paper and tray. Put contaminated paper in a properly labeled container with a tight seal. Decontaminate any area of the spill with paper towels and a detergent solution. Put all contaminated materials in a properly labeled sealed container. For a large spill, follow the guidelines below. See the lab manager for disposal of contaminated materials.
6. If an employee must use one of these chemicals outside of a fume hood and if that chemical is volatile or if there is any possibility that the PEL for that chemical will be exceeded, then the employee must use an approved respirator. Any employee required to use an approved respirator must FIRST go through the College's program on respirator use for proper training and fitting.
7. Regulated radioactive materials should only be handled by properly licensed personnel.

## G. CHEMICAL SPILLS

1. For cleanup of small spills, use paper towels or vermiculite absorbent. For large spills, use spill pillows as diking. If the chemical spilled is very hazardous and volatile, e.g., a gallon of hydrochloric acid or chloroform, then evacuate everyone from the room, seal it off and call Security (3-5611). If the spill is severe enough, evacuate the building by pulling the fire alarm. In any case where the PEL for a chemical might be exceeded by cleaning it up, then the cleanup must be done by the Fire Department's Hazardous Response Team. It must be remembered that it is potentially fatal to clean up a spill of a hazardous chemical.
2. Use protective clothing and goggles when cleaning up a spill. Respirators can only be used by employees trained in their use. Leave the cleanup of hazardous materials to trained professionals.
3. Any contaminated materials resulting from a spill should be sealed in a appropriately labeled container and disposed of in accordance with Federal, State, and Local laws. See the lab manager.
4. Clean up spilled water or broken glass immediately. There is a container for broken glass in each Lab.
5. For cleaning up mercury (i.e., from broken thermometers), collect the mercury in a container if possible. If not, sprinkle sublimed sulfur over the mercury. In 24 hours, the mixture can be swept up and disposed of as a hazardous chemical.

## H. WASTE DISPOSAL

1. Do not put any toxic, corrosive or flammable substance down the drain or in the trash; check the MSDS files and the lab manager for proper disposal. LIST EXACT CONTENTS AND QUANTITIES of all waste.
2. Disposable petri dishes and other plastic items that are contaminated with cultures or blood should be autoclaved. Be sure to use indicating tape and label the autoclave bag with College of Charleston's address before discarding. When loading the autoclave bag in the sterilizer, put the bag in a metal container to catch any spills.
3. All hazardous waste to be disposed of through the College of Charleston Hazardous Waste Contract shall be labeled and dated for the date it is declared a waste. Under no circumstances will be unlabeled hazardous waste be accepted for disposal.

## I. INFORMATION AND TRAINING

1. All laboratory employees will be trained in contents of the OSHA Laboratory Standard. Training will be given before the employee begins work in the

laboratories and will include reading and discussing the Chemical Hygiene Plan. The employee will be given a copy of the plan and will sign a form stating that he or she has read and understood it.

2. All students must have the lab safety regulations explained to them and as evidence that this procedure has been performed, sign a copy which will be kept on file by the department.
3. Persons operating machinery must do so only after sufficient instruction.

#### J. MEDICAL CONSULTATIONS

1. Whenever there is a significant chemical spill or release or exposure to a hazardous chemical, or whenever an employee develops signs or symptoms associated with exposure to hazardous chemicals, then, that employee has the right to and the opportunity for a medical examination and evaluation. This will be provided by the College at no charge. Call Security.

#### K. FIELD TRIPS

1. Drivers must be 21 years of age or older with valid driver's license (preferable a South Carolina license).
2. A waiver of liability and hold harmless agreement must be signed by the student if over 18 years of age or parental consent must be obtained. Also a medical consent form to authorize the faculty member to seek medical care for the student must be signed. A copy will be filed by the department.
3. It is the responsibility of the instructor to obtain telephone numbers pertinent to the area prior to the field trip.
4. In case of an accident, the instructor will notify the parents, the office of the Dean of Undergraduate Studies, the Chairman of the Department, and the Dean of Sciences and Mathematics.
5. A list of pertinent telephone numbers, a first aid kit, and a cellular phone will accompany each field trip.

#### L. EYE PROTECTION

The only acceptable eye protection when working with chemicals in any laboratory is splash-resistant, impact-resistant ANZI Z-87 approved goggles.

Face shield must be worn in addition to goggles when handling concentrated acids or bases or potentially explosive or highly reactive chemicals.

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