

**CHEMISTRY DEPARTMENT SAFETY AND ENVIRONMENTAL HEALTH
POLICIES AND PROCEDURES
May 7, 2010**

I. EMERGENCY PROCEDURES

Evacuation

1. Calmly and quietly walk to the nearest exit.
2. Look for EXIT signs to guide you if you are unsure of exit locations.
3. In case of fire, do not use elevators.
4. Report in at designated assembly area if applicable. Follow instructions of emergency personnel/PSU staff.
5. Follow emergency plans.

Fire

1. If it is safe to do so, activate the closest fire alarm.
2. Look for EXIT signs to guide you if you are unsure of exit locations.
3. Evacuate to a safe place outside and away from the building.
4. Stay close to floor level, below smoke and heat, if necessary.
5. Call 911 and report the location and nature of the fire.
6. Do not use elevators.
7. Small fires may be extinguished with an approved portable fire extinguisher by qualified personnel.
8. Follow emergency plans.

Flood

1. Do not enter any flooded area, i.e., basement, first floor, tunnel, etc.
2. Minor Flooding: call the Physical Plant (235-4779) and report the location and nature of the leak.

Medical

1. Dial 911 (from a university land line) and report the nature of the illness or injury and the location.

2. Stay with the victim until help arrives if there is no immediate danger to yourself.
3. Protect yourself from bodily fluids.

Tornado/Severe Weather

1. Take cover at the lowest level of the building. If an underground shelter is not available, move to an interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Avoid places with wide-span roofs such as auditoriums, gyms, cafeterias or large lobbies. The first floor bathrooms and a basement room in Heckert-Wells Hall have been designated as storm refuge areas.
2. Stay away from windows.
3. If outdoors take cover, if possible, inside a building. If shelter is not available or there is no time to get indoors, lie in a ditch or low-lying area or crouch near a strong building.
4. After tornado passes, remain alert for signs of additional tornadoes and/or flash flooding.
5. Follow Emergency plans.

II. SAFETY POLICIES

I. SAFETY PROCEDURES FOR THE ACADEMIC AND RESEARCH LABORATORY¹

A. Personal Protective Equipment (PPE) and Dress Requirements

- a. Safety splash goggles must be worn at all times in the academic laboratories by students, instructors, visitors, or any other individuals present during scheduled classes or when chemicals are in use. Students will be allowed to wear contact lenses underneath the safety splash goggles if they do not have eyeglasses but are strongly advised to obtain eyeglasses for use in the lab. Individuals using the computer room adjoining HW119 are not required to use protective eye wear.
- b. The department will provide instructors with safety goggles.
- c. In the research laboratory, laboratory supervisors may specify the type of eye PPE required for that laboratory and determine when additional eye PPE is required. In the absence of a determination by the laboratory supervisor, appropriate eye protection (usually safety splash goggles) must be worn in the laboratories by students, instructors, visitors, or any other individuals when chemicals are in use. Laboratory supervisors may specify areas of the lab in which eye protection is not required.

¹ All of the above regulations apply to both the academic and research laboratories unless otherwise stipulated.

- d. Short pants, miniskirts, high heel shoes, open-toed shoes, or sandals are not allowed in academic laboratories during scheduled lab classes. The wearing of laboratory aprons or laboratory coats is encouraged. The same standards for attire are strongly encouraged in research laboratories.
- e. The appropriate gloves should be worn when handling any hazardous substance.
- f. Long hair should be pinned or worn under a hat if possible in teaching or research laboratories.

B. Laboratory Behavior

- a. Instructors should inform students of behavior that is inappropriate in the laboratory and remain vigilant in insuring that students follow the behavioral guidelines.
- b. Pipetting solutions must always be carried out using a mechanical device.
- c. Students in the academic laboratories should never work alone.
- d. The preparation, storage, or consumption of any food or drink items in the laboratory is not allowed.
- e. Backpacks, briefcases, laptop computers, overcoats and other large items should not be stored in academic laboratories except in areas specifically designated for these items.

C. General Laboratory Regulations

- a. Nothing should be stored on the floor of the academic or research laboratory except garbage containers that enter the non-regulated waste stream and glass disposal containers.
- b. Safety showers, eyewashes, fire extinguishers and other emergency equipment should be clearly labeled and their position clearly defined to all personnel present in the laboratory. They should also be readily accessible. This equipment must be inspected monthly for proper operation.
- c. Undergraduate students working in research laboratories must be supervised at all times by a graduate student, a senior undergraduate research student, or the laboratory supervisor.

- d. Laboratory experiments should be optimized to use the smallest amount of material required to accomplish the goals of the experiment.
- e. Where ever possible a less hazardous chemical should be substituted for a more hazardous chemical in experiments
- f. For each experiment instructors or research supervisors should inform students of hazards associated with the use of a particular chemical or equipment and where possible provide demonstrations on the safe handling of these chemicals or equipment. MSDS sheets should be accessible either on a computer or by a hard copy to all individuals present in the laboratory.
- g. Prior to conducting any experiment in the academic laboratory, students will be provided with instructions on proper waste disposal associated the experiment. The site of waste disposal should be clearly marked and easily ascertained by both students and instructors.
- h. Broken glass should only be stored in containers designated for their disposal. This is also true of syringe needles which must be stored in containers specifically designed for their confinement and disposal.
- i. Experiments that could potentially produce explosion, or those that OSHA requires the use of face or body shields, cannot be conducted in the academic laboratories. In the research laboratory it is the responsibility of the laboratory director to provide the specific PPE needed for a "high risk" experiment.
- j. Fume hoods must be routinely checked for proper function in a quantitative fashion (i.e. qualitative analysis of paper strips in the hood is not sufficient). Their last inspection date along with the quantitative results of the inspection should be readily accessible to those working in the laboratory.
- k. Individuals supervising employees in a work environment must have written certification of completing safety training and that this information is archived at the specific institution. In the spirit of this legislation the institution should insure that all individuals supervising students in both the academic and research laboratory have written documentation supporting their competency in observing both state and federal regulation of safety in the laboratory. Each employee should then be certified that the appropriate training program has been completed.

III. CHEMICAL MANAGEMENT

Procedure for Waste Disposal

What is hazardous waste?

Any waste or combination of wastes of a solid, liquid, contained gaseous or semi-solid form, which because of quantity, concentration or physical or chemical characteristics may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or pose a substantial present or potential hazard to human health or the environment is classified as hazardous Waste.

Hazardous Waste Accumulation Area:

It should be located in the laboratory and under the control of the person generating the waste. In the case of teaching laboratory, it should be under the control of the chemical store in-charge and/or instructor/teaching assistant.

Hazardous Waste Accumulation Container:

1. All hazardous waste containers must be in good condition, with no excessive rust, structural defects of leaks, and of appropriate size. Containers must be compatible with the materials to be stored. For example, no acids should be stored in steel cans or drums and hydrofluoric acid and some acidic fluorides should not be stored in glass containers.
2. Each container must have a tight-fitting cap and be closed at all times except when adding waste.
3. Each container must be clearly identified with a hazardous waste label (see below).
4. Segregate incompatible substances; do not mix in the same container. For example, do not mix halogenated waste in non-chlorinated waste (see below for details). Follow MSDS for incompatibility information.
5. No more than one container of each type of waste generated can be stored at one time at the department's accumulation point. See <http://www.pittstate.edu/dotAsset/54446.pdf> for the university policy.

Container Labeling:

All waste containers must be clearly identified with the hazardous waste label. Old or extraneous labels should be removed or defaced. The label should be affixed to the container and will contain the words "Hazardous Waste". The label must be completely filled out to include the following information:

- (a) The contents of the container including the chemical name, written in English. Chemical formulae or trade names are not acceptable.
- (b) For mixtures of chemicals, all the constituents must be listed and the appropriate percentage of each. Relative quantities of all chemicals should sum to a total of 100%.
- (c) The person/s responsible for the waste and phone number.
- (d) If an unknown chemical is discovered, label it as "unknown" and attach a note detailing any information about what the chemical may be, in what experiment it may have been used, and where it was found.

Material Segregation:

Certain hazardous chemical wastes **cannot** be safely mixed or stored with other chemicals because a severe reaction or explosion can take place or an extremely toxic reaction product can result. In general, hazardous waste containers should be segregated by hazard class. The hazard class distinctions identified below should be used as a general guideline.

- Ignitable
- Pyrophorics
- Explosive
- Toxic
- Reactive with Water
- Reactive with Air
- Peroxide Formers
- Oxidizers
- Corrosive
- Concentrated Acids
- Concentrated Bases
- Reducers

More specific examples of wastes that should not be mixed or stored together are:

- (a) organic and inorganic wastes;
- (b) acids and cyanides and/or sulfides;
- (c) halogenated and non-halogenated organic solvents;
- (d) metals and organic solvents.
- (e) organic acid halides, organic acid anhydrides, inorganic acid anhydrides (e.g. phosphorus pentoxide) and anhydrous strongly acidic salts must all be treated as water-reactive and strong acids. As such, they must be kept apart from both alkalis and water.
- (g) Flammable waste must be stored in NFPA-rated containers and storage cabinets.

Flammable liquids are most hazardous at elevated temperatures due to rapid vaporization and, therefore, should not be stored near a heat source or a sparking source.

Mixed waste (i.e. mixtures of radioactive waste and hazardous waste) should be segregated from all other wastes.

Additional Procedure for Teaching Laboratories:

1. *In the case of teaching laboratories, where many different students will be working in the laboratory at different times, and on different experiments, additional waste collection procedures must be followed.*
2. *At the beginning of each laboratory class the Chemical Storage In-charge/Teaching Assistant will prepare waste collection containers. A number of appropriately labeled containers must be prepared if a number of incompatible waste streams are generated.*
3. *Upon completion of every experiment or class each student will empty his/her waste reagents into the designated waste container.*
4. *The names of chemicals must be written out completely and legibly, in English. Chemical symbols or abbreviations are not sufficient.*

Waste Pick up and Disposal:

There is no storage time limit for laboratory hazardous waste accumulation areas while a container is being filled. However, once a hazardous waste container located in a laboratory hazardous waste accumulation area is filled to at least 95% capacity, it must be picked-up and transferred to the main (< 90-day) hazardous waste storage area within 3 days.

The chemical store serves the main hazardous storage area from where the waste should be picked up within 90 days by the concerning authority for its disposal.

Other Potentially Hazardous Wastes:

Gas cylinders should be returned to the manufacturer or distributor whenever possible. In the case the gas cylinder needs to be replaced, the office secretary should be notified.

Sharp Materials (Sharps):

1. Sharp materials include needles, syringes (with or without needles attached), scalpels, broken glass such as test tubes, vials and pipettes, petri dishes, laboratory slides, and anything that can potentially pierce a plastic bag. Sharps have the added hazard of potentially cutting or puncturing the skin and transmitting disease.
2. Sharps should be segregated by contamination type (i.e. biological, hazardous). Unused sharps, specifically needles and syringes, should always be considered biological.
3. Place the sharps in a red OSHA-approved sharps containers. The sharps containers are provided by the department.
4. Place a biohazard label and the College's ID label on the sharps container.
5. Place a "Hazardous Waste" label on the sharps container next to the biohazard.
6. Consult with the chemical store room in-charge for disposal procedures.

Non-biological, non-hazardous broken laboratory glassware

Non-hazardous broken laboratory glassware is any broken glassware such as bottles, flasks, pipettes or vials that does not meet the criteria of hazardous, biological, or radioactive waste. Such glassware must be placed in a box labeled "broken glassware" and placed in the regular trash.

Spill Procedures:

In the event of a spill, the following steps should be taken.

1. Assess the hazards. If uncertain of the hazards, assume the worst.
2. Evacuate the area and all others in the area. If anyone has been injured or exposed to toxic chemicals or vapors, they should be removed to fresh air, contaminated clothing removed and skin and eyes flushed with water for 15 minutes. Campus police (at 620-235-4625 or at 911 from a campus land line) should be notified immediately and medical attention sought, if necessary. Emergency phone numbers should be posted both on the laboratory door and in the laboratory hazardous waste accumulation area.
3. Confine the spill area and restrict access to the area.
4. Report the spill. From a safe place, call Campus police at 620-235-4625 or at 911 from a campus land line and provide them with information on the location, extent and nature of the spill and injuries.
5. Secure the area until emergency response personnel arrive. Post personnel near commonly-used entrances to the area to alert others to the danger, and to redirect them to alternative routes.
6. Notify Supervisor.

Saturated Paper Waste:

If you use paper towels to clean a chemical spill, put them in an appropriate container or bag and dispose of them with your regular chemical waste. Do not put paper towels used for chemical cleanups in your trash can.

What is Biological Waste?

Biological waste is any waste that is potentially biohazardous, infectious, or pathological. The categories of regulated biological waste are defined as follows:

1. **Cultures and Stocks of Infectious Agents and Associated Biologicals.** All cultures and stocks of infectious agents are designated as infectious wastes because of the high concentration of disease causing organisms typically present in these materials. Included in this category are specimen cultures and stocks from medical and pathological laboratories, cultures and stocks of infectious agents from research and industrial laboratories, wastes from the production of biologicals, and discarded live and attenuated vaccines. Also culture dishes and devices used to transfer, inoculate, and mix cultures are designated as infectious wastes.
2. **Pathological Waste.** Human or animal pathological wastes including bodies/carcasses, tissues, organs, body parts, body fluids and their containers, that were involved in any medical or research procedure.
3. **Human Blood and Blood Products.** All waste, human blood, serum, plasma, and other blood products or components are considered infectious wastes. Items that are saturated and/or dripping, and/or caked with human blood, including but not limited to: serum, plasma, other blood components and their containers.
4. **Contaminated Sharps.** All discarded sharp materials (sharps) which have been used in animal or human patient care, treatment or research, present the double hazard of inflicting injury and inducing disease. All needles, syringes (with or without the attached needle), blades, scalpels, vials, culture dishes (regardless of the presence of infectious agents), slides and cover slips, and broken glass are considered sharps. All sharps used in patient care are considered infectious wastes because of the possibility of undiagnosed bloodborne diseases (i.e., Hepatitis or AIDS).

Biological Waste Accumulation and Disposal:

1. Where possible, biological waste should be decontaminated prior to disposal. Methods of decontamination include autoclaving and bleaching.
2. All biological waste collected for disposal should be placed in a rigid container (e.g. a box, pail, or stand) that is double-lined with two regulation biohazard plastic bags. The plastic bags must be of sufficient strength to prevent ripping or tearing (3-millimeter equivalent) and must be marked according to federal, state and local regulations (i.e., red in color and/or with biohazard symbol on the outside).
3. The biological waste container must have a proper label identifying the nature of the waste.
4. When the biological waste container is full, or the maximum weight limit of the container is reached, the following procedures must be followed:
 - (a) Ensure that the packaged waste is within the required weight limits as indicated on the container provided;
 - (b) Seal or tie each bag;
 - (c) Label the outer bag with the identification labels;
 - (d) Securely close each container with 3 strips of tape on top, bottom and side seams; and
 - (e) Notify the Campus Environmental Office at extension 4774.

Chemical Inventory

A central inventory shall be maintained for the chemicals and materials. The staffing required to create and update the inventory will be provided by the department. The inventory shall be managed separately for the chemical store and for the individual research laboratories.

Any chemical entering the department should be delivered to the chemical store, where it is registered into the central system, before being distributed to the concerned laboratory or person.

The inventory should be available to the faculty and research students of the department.

Approved by the Department of Chemistry:

James McAfee _____

Kris Mijares _____

Dilip Paul _____

Bipin Shah _____

William Shirley _____

Khamis Siam _____

Irene Zegar _____

_____ Bobby Winters, Acting Chair