

## **SOP 2. Standard Operating Procedure for Corrosive Chemicals**

### **I. General Statement of Coverage**

Corrosive chemicals are substances that cause visible destruction or permanent changes in human skin tissue at the site of contact, or are highly corrosive to steel. The major classes of corrosives include strong acids, bases, and dehydrating agents.

### **II. Hazard Assessment**

A Job Hazard Assessment should be performed for work involving corrosive materials and should address the issues of proper use and handling, chemical toxicity, storage, disposal, spill response, and required PPE. See Section 21 and Form 4 of Section 25.0 of the Chemical Hygiene Plan.

### **III. Resources**

#### **A. Available Training**

Chemistry 685

EHS/Chemistry Lab Safety Course

#### **B. Text and Literature References**

Department of Chemistry Safety Handbook

#### **C. CHP Appendix III (Section 23.3) Chemical Information Tables**

Table 4. Corrosive Chemicals

### **IV. Chemical Storage**

#### **A. Special Storage**

Segregate the various types of corrosives. Separate acids and bases. Separate organic acids from mineral acids. Liquids and solids should also be separated. Specially designed corrosion resistant cabinets should be used for the storage of large quantities of corrosive materials. Store corrosives using secondary containment (such as on plastic trays). Do not store corrosive materials on high cabinets or shelves (above eye level).

#### **B. Gas Cylinders**

Gas cylinders must be secured while in use or in storage (empty or full). They should be stored with the valve cap secured. Refer to SOP #6-Compressed Gases. Regulators and manual control valves should be of a corrosion resistant variety such as monel. Regulators and manual control valves should be cleaned immediately after using corrosive gases.

### **V. Personal Protective and Emergency Equipment**

#### **A. Eye and Face Protection**

Refer to the Eye Protection Policy, Appendix IIB (Section 23.2). At a minimum, safety glasses with permanently attached top and side shields must be worn in the laboratory. These glasses, however, do NOT protect against splash hazards. When performing a hazardous activity, a face shield must be worn in addition to the safety glasses OR switch to chemical splash goggles (with shielded ventilation ports). Face shields are available from the Safety Office (free of charge).

#### **B. Gloves**

Appropriate gloves should be worn when handling hazardous materials. The selection of glove materials should be made from Appendix II, Part A (Section 23.2) of this document. If this chart is insufficient, please see the Safety Coordinator/CHO.

#### **C. Protective Clothing**

Lab coats, closed toed shoes and long sleeved clothing should be worn when handling hazardous materials. Additional protective clothing, such as aprons or full-length arm protection, should be worn if the possibility of skin contact is likely.

- D. **Hearing Protection**  
The use of hearing protection requires monitoring and training. See the Safety Coordinator/CHO for details.
- E. **Respirators**  
The use of respirators require medical certification, fit testing, and training. See the Safety Coordinator/CHO for details.
- F. **Eye Wash**  
Where the eyes or body of any person may be exposed to hazardous materials suitable facilities for quick drenching or flushing of the eyes and body shall be provided within, or near, the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.
- G. **Safety Showers**  
A safety shower should be available and functioning as specified by ANSI Z358.1.
- H. **Fire Extinguishers**  
All laboratories must contain at least one Carbon Dioxide (Type B-C) or Dry Chemical (Type A-B-C) fire extinguisher. Additional fire extinguishers are located near exits and/or stairwells in each building. Special Class D fire extinguishers (for certain metal fires) are available from the Safety Office.

## VI. Controls

- A. **Designated Areas**  
Some corrosive materials such as Iodoacetic Acid, Phenol, Bromine and Hydrogen Fluoride, require Designated Areas. See Section 18 of the CHP.
- B. **Chemical Fume Hoods**  
Use corrosive materials in a chemical fume hood or glove box. With a fume hood, work with the sash as far down as feasible (see below). Also, refer to the SOP on using glove boxes.
- C. **Glove Boxes**  
Refer to SOP 14 on the use of Dry Boxes.
- D. **Safety Shielding**  
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of corrosive chemicals which pose this risk should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.
- E. **Special Ventilation**  
Special ventilation is required if these materials are used outside of a fume hood. Fume hoods provide the best protection against exposure to corrosive materials in the laboratory and are the preferred ventilation control device. Always attempt to handle large quantities of corrosive materials in a fume hood. Perchloric acid digestions or handling large quantities of perchloric acid require the use of a specially designed hood. If your research does not permit the handling of large quantities of corrosive materials in your fume hood, contact the Chemical Hygiene Officer or the Division of Environmental Health and Safety to review the adequacy of all special ventilation.
- F. **Vacuum Protection**
  1. Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving oxidizing materials must be conducted in a fume hood, glove box or isolated in an acceptable manner.
  2. Mechanical vacuum pumps and the "House Vacuum System" must be protected using cold traps and, where appropriate, filtered to prevent particulate release. See the article on cold traps in the Department Safety Handbook under "Compressed Gases." The exhaust for the pumps should be vented into an exhaust hood.

**G. Signs and Labels**

1. Doorways: All OSHA Select Carcinogens, Reproductive Toxins, Highly Toxic materials, and NFPA Level 4 Flammable Liquids (Appendix IV, Tables 10-15) must be indicated on the acrylic door sign.
2. Containers: All hazardous materials must be clearly labeled with the correct chemical name.

**H. Utilities**

In Evans and Celeste Labs, utility shut-off valves are located in pipe chases just outside of the laboratories. In Newman/Wolfrom, the valves are located above the ceiling in the hallways. Look for the ceiling tiles with the green dots.

**I. Fire Protection**

Older buildings, such as Evans and Johnston Labs, do not have sprinkler suppression systems. This could be a consideration for storing or using large quantities of hazardous materials.

**VII. Specific Procedures**

Refer to the MSDS or other sources of information to become familiar with the properties of the particular substances including: chemical and physical properties, health hazard information, symptoms of over-exposure, etc.

**VIII. Emergency Procedures**

**A. Notification**

Refer to the “Emergency Response” section of the Department Safety Handbook for generic emergency response procedures. Specific emergency procedures should be developed for each group or laboratory. The procedures should address as a minimum the following:

1. Who to contact: (University police at 292-2121 or 292-2525, and Division of Environmental Health and Safety at 292-1284 during normal working hours, and the Principal Investigator of the laboratory including evening phone number).
2. The location of all safety equipment (showers, spill equipment, eye wash, fire extinguishers, etc.).
3. The location and quantity of all hazardous chemicals in the laboratory.
4. The method used to alert personnel in nearby areas of potential hazards.
5. Special first aid treatment required by the type of corrosive chemicals handled in the laboratory

**B. Spill Response**

1. Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any corrosive materials. Spill kits, located in each laboratory, for corrosive liquids are designed to control and neutralize the liquid portion of the spill. Never use paper towels on large spills of corrosive liquids. **THIS KIT SHOULD NOT BE USED FOR HYDROFLUORIC ACID.** Each spill kit comes with a sheet of instructions and information. This sheet is also available on the web page. Maintaining the spill kit is the responsibility of the Laboratory Supervisor. For spills that are too large or if you are unsure of the specific hazards, call the Safety Coordinator/CHO or 911 for assistance. Once cleaned up, refer to the “Waste Disposal” section of the Department Safety Handbook.
2. In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of sensitive chemicals.

3. Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

**IX. Decontamination and Waste Disposal**

**A. Decontamination Procedures**

1. Personnel:

- a. Immediately flush contaminated area with copious amounts of water after contact with corrosive materials. Remove any contaminated clothing to facilitate removal of chemicals. If a delayed response is noted report immediately for medical attention. Be prepared to detail what chemicals were involved.
- b. If the incident involves **Hydrofluoric acid (HF)**, seek immediate medical attention.
- c. If there is any doubt about the severity of the injury, seek immediate medical attention.

2. Area: Carefully clean work area after use.

3. Equipment:

**B. Waste Disposal**

Most corrosive materials must be disposed of as hazardous wastes. Questions regarding waste disposal should be directed to the Chemical Hygiene Officer, Hazardous Waste Specialist, or the Division of Environmental Health and Safety. Refer to the "Waste Disposal" section of the Department Safety Handbook.

**X. Approvals**

Some hazardous materials require special handling or prior approvals. See Section 18 and 20 of the CHP.

XI. SOP Prepared by \_\_\_\_\_ Date \_\_\_\_\_

Reviewed by \_\_\_\_\_ Date \_\_\_\_\_