

# Syracuse University

## Laboratory Guidance Document

# Corrosives

This Laboratory Guidance Document was created by Syracuse University Environmental Health & Safety Services (EHSS) to assist researchers in developing laboratory specific standard operating procedures (SOPs) for the storage, handling, and disposal of corrosive materials.

### Potential Hazards:

A 'corrosive' is a material that causes irreversible destruction of living tissue via chemical action at the point of contact. These types of chemicals are most commonly used in laboratory procedures, so caution must be used during handling, storage, and disposal. Exposure to a corrosive material most commonly affects the skin, eyes, and respiratory tract.

Exposure may be caused by:

- Splashes when pouring
- Spills while carrying containers
- Skin contact with contaminated containers or surfaces
- Splatters or mists from reactions
- Vapors from open or leaking containers
- Inhaling corrosive dusts

The severity of exposure depends on the concentration of the corrosive material and the duration of contact. Most acids tend to produce immediate pain at the site of contact and begin to harden the skin, whereas most bases do not produce an immediate warning. Base burns can be very severe due to this delay in pain which allows the base to remain in contact with the tissue longer.

### Properties:

Corrosive chemicals can be solids, liquids, or gases. Generally speaking, these materials have a very low pH (acids) or a very high pH (bases). Strong bases are usually more corrosive than acids. When bases make contact with the skin, they feel slippery (much like soap on the hands) and are often harder to remove from the skin (or other surfaces) than acids.

*Examples of corrosive materials:*

Organic Acids	Inorganic Oxidizing Acids	Inorganic Non-oxidizing Acids	Bases
Acetic acid	Chromic acid	Hydrochloric acid	Ammonium hydroxide
Citric acid	Nitric acid	Phosphoric acid	Calcium hydroxide
Formic acid	Perchloric acid		Sodium hydroxide
Oxalic acid	Sulfuric acid		Tri-sodium phosphate

### General Precautions:

#### 1. Training

The Principal Investigator is responsible for ensuring all personnel under their supervision are aware of the hazards of corrosive materials, have received appropriate hands-on training, adhere to the laboratory SOPs, and are provided with the appropriate personal protective equipment.

#### 2. Awareness

Corrosives often present other associated hazards. Be aware of all hazards present and adjust SOPs accordingly.

### Personal Protective Equipment (PPE):

- In addition to the standard laboratory attire (i.e., long pants and closed toe shoes), the following PPE is recommended:
  - ANSI certified (Z87) chemical splash goggles
  - Knee-length lab coat
  - Chemically compatible gloves
- When handling extremely corrosive chemicals (e.g., hydrofluoric acid) donning a full-face shield and a chemical resistant apron is advised.
- Additional PPE may be necessary based on other hazards present.

### Best Practices for the Safe Handling of Corrosive Materials:

Although SOPs will vary according to the material used, the following practices are generally applicable for projects involving corrosive materials:

1. When mixing a corrosive liquid or solid with water, always add the corrosive material to the water (not in reverse). This will minimize the effects of any resulting exothermic reaction.
2. When mixing a corrosive solid with water, add the material slowly to the water, stirring continuously, and cool the mixture as needed.
3. Ensure spill clean-up kits are readily available and compatible with the material in use.
4. Perform work involving corrosive materials inside a fume hood.
5. When corrosive gases are to be discharged into a liquid, a trap, check valve, or vacuum break device should be employed to prevent dangerous reverse flow.
6. Corrosive gas cylinder regulators should be removed when the cylinders are not in use and flushed with dry air or nitrogen after use.

### Storage:

1. Ensure proper segregation of incompatible chemicals/materials.

As a rule of thumb:

1. Acids and bases must be segregated for storage and away from heat/flare.
  2. Segregate inorganic oxidizing acids (e.g., nitric acid) from organic acids (e.g., acetic acid), flammables, and combustibles.
  3. Segregate acids from chemicals that could generate toxic gases upon contact (e.g., sodium cyanide and iron sulfide).
  4. Segregate acids from water reactive metals such as sodium, potassium, and magnesium.
2. Demarcate corrosive storage areas by posting [in-lab primary hazard postings](#).

3. Liquid corrosives should be stored below eye level.
4. Corrosive gas cylinders should be stored in accordance with the Compressed Gases Guidance Document Review.
5. Ensure that storage containers are in good condition and compatible with the chemical.
6. If you notice powder deposits, discoloration, and crystallization around the cap of a container, particularly an oxidizing acid, contact EHSS immediately.

#### **Disposal & Waste Management:**

Corrosive chemical waste must be stored in a compatible container and labeled with a hazardous waste tag provided by EHSS.

- Ensure the waste container is fitted with a proper screw cap.
- Place the waste container in the satellite accumulation area in secondary containment and notify the EHSS Hazardous Waste Group at 315.443.9132 for disposal.

#### **Spill Response:**

Only personnel who understand the hazards of the corrosive material and are confident in their ability to safely and properly clean the spill should perform the cleanup.

1. EHSS and/or the lab personnel may clean small spills by absorbing the spill with paper towels then decontaminating the spill area with compatible cleanup materials.
  - a. Be especially careful to wipe up visible residues from all surfaces. Skin contact with dry residue of some corrosive materials (e.g., sodium hydroxide and potassium hydroxide) can result in burns.
2. EHSS will oversee and direct the cleanup of large spills. Depending on the location and/or severity of the spill, EHSS may seek assistance from an outside emergency response services provider.
3. All cleanup materials contaminated with carcinogenic materials should be disposed of as hazardous waste.

#### **First Aid:**

The manufacturer's SDS should be used as a reference for determining appropriate first aid measures. First Aid measures can be found in Section 4 of the Safety Data Sheet.

1. **Skin Contact:**
  - Quickly remove all PPE and clothing that may contain the corrosive material.
  - Rinse the affected area with water for at least 15 minutes.
  - Seek medical attention.
2. **Eye Contact:** Flush eyes with lukewarm water for at least 15 minutes and seek medical attention immediately.
3. **Ingestion:** Seek medical attention immediately.
4. **Inhalation:** Move to fresh air and seek medical attention immediately.

#### **Incident Response:**

All laboratory emergencies must be reported to DPS at 315-443-2224.