



1. Purpose

The purpose of this procedure is to provide employees with basic safety information regarding working with acids and bases in laboratories and other process areas in the facility. The standard is written to comply with the Occupational Safety and Health Administration's (OSHA) regulations on the *Occupational Exposure to Hazardous Chemicals in Laboratories*, 29 CFR 1910.1450 and the *Hazard Communication*, 29 CFR 1910.1200.

2. Scope

The Program applies to all laboratories owned, leased or operated by KSU where acids and bases are handled, or likely to be handled. These areas include, but are not limited to, laboratories, art studios, engineering fabrication shops, maintenance shops, and chemical and hazardous wastes storage areas. The program covers all faculty, staff, students, contractors and other personnel at KSU or under the management or control of KSU.

3. Responsibilities

Managers/Laboratory Supervisors/PIs and supervisors have the primary responsibility for safety in labs and process areas under their jurisdiction. This responsibility includes conducting Job Hazard Assessments (JHA) for tasks involving working with acids and bases to identify the hazard, determining the appropriate controls, and ensuring the necessary personal protective equipment (PPE) is available and utilized.

Employees, students, and staff are also jointly responsible for their own safety regarding the use of acids and bases in the laboratory. This responsibility includes reading Safety Data Sheets (SDSs) prior to working with the materials, following standard operating procedures (SOPs), and wearing the appropriate PPE while conducting experiments using the materials.

4. Procedure

A. Hazard Information

Acids and bases are corrosive and will destroy body tissue. The extent of injury depends on factors such as the type and concentration of the chemical, the route of exposure, the type of tissue contacted, and the speed used in applying emergency measures. Acids, especially in concentrated form, are most likely to cause immediate pain upon contact with tissues.



The eyes are especially susceptible to acids and bases and must be immediately flushed with water for at least 15 minutes if exposure occurs. Inhalation of vapors, dust, and mists of acids and bases irritate the nose, throat, and lungs. Secondary toxic effects may occur if the material is absorbed from the lungs into the blood stream. The extent of these effects depends on the concentration in air and the duration of exposure. Ingestion causes severe burns of the mucous membranes of the mouth, throat, esophagus, and stomach.

Concentrated solutions of inorganic acids are not flammable. However, combustion can occur when an oxidizing acid is mixed with other chemicals or with combustible materials. Acids also react with many metals, resulting in the liberation of hydrogen, a highly flammable gas. Some acids are strong oxidizing agents and can react destructively and violently when in contact with organic or other oxidizable materials. Perchloric acid may form explosive perchlorate crystals which are shock sensitive and can detonate.

B. Control Measures

Managers/Laboratory Supervisors/Principal Investigators (PIs) must evaluate the use of acids and bases in their work area to determine the extent of the hazard and evaluate the necessary controls to safeguard employees' health. SDSs and other sources of information should be reviewed before working with acids or bases. EHS may be contacted to provide technical assistance. This is especially important when dealing with such hazardous substances as hydrofluoric acid and perchloric acids. When evaluating hazards and control measures for acids and bases, consider the following:

1) Substitution and Chemical Management

- The end-user should determine if a safer chemical alternative is available.
- Working quantities of acids and bases should be kept to a minimum.
- Only the minimum amount of material required should be procured and used.

2) Personal Protective Equipment (PPE)

General PPE guidelines when working with acids and bases are presented below. Specific PPE requirement should be determined following hazard assessment.

- At a minimum, safety glasses with side shields, laboratory coats (or appropriate coveralls in other process areas), chemically resistant gloves, and closed-toed shoes should be worn when handling small quantities of weak or diluted acids and bases. This is to be considered as minimum protection and must be upgraded if necessary.
- Additional PPE such as chemical splash goggles, face-shield, chemical apron, disposable coveralls, and respiratory protection should be worn if there is a greater chance of chemical exposure or when handling strong or concentrated acids or bases. Where potential for splashing chemicals exists, and when handling



any amount of strong or concentrated acids or bases, chemical goggles with face-shield and protective chemical apron MUST be used.

3) Ventilation

- Local exhaust ventilation such as a chemical fume hood or other appropriate exhaust ventilation must be used when handling acids and bases in a manner that may produce an airborne hazard. This includes procedures such as transfer operations, preparation of mixtures, blending, sonification, spraying, and heating.
- Use of perchloric acid requires a specialized fume hood equipped with a water-wash system. Please contact EHS for further guidance if you intend to use perchloric acid.

4) Work Practices

- Do not add water into acid. Slowly add the acid to the water and stir.
- Use a mechanical aid or a pipette bulb for pipetting.
- Open bottles or other acid/bases containers slowly and carefully, and wear protective equipment to protect hands, face, and body from splashes, vapors, gases and fumes.
- Wipe drips from containers and bench tops. Clean up visible residues, as skin contact with dry residue can result in burns.
- Do not eat, drink, smoke, chew gum, apply cosmetics, or store food, beverages and tobacco products in work areas where acids and bases are being used.

5) Storage

Before storing corrosives, inspect all incoming containers to ensure that they are undamaged and properly labeled. Do not accept delivery of defective containers.

- Store acids and bases in a cool, dry environment, free from extreme temperatures and humidity.
- Store acids and bases separately from each other, and away from other incompatible chemicals/materials.
- Check the SDS of the chemical to make sure you are not storing incompatible chemicals together.
- All acids and bases must be stored in sealed, compatible containers with tight-fitting caps.
- Store all corrosive liquids in secondary containment.
- Store containers at a convenient height for handling, below eye level if possible. High shelving increases the risk of dropping containers and the severity of damage if a fall occurs.
- Use storage cabinets specifically designed for acids and bases.
- All containers must be properly labeled.



C. Emergency Procedures

1) Spills

Laboratory/shop personnel may clean-up small spills of acids or bases provided that all of the following conditions are met:

- The hazards of the material(s) are known, and appropriate precautions can be taken to prevent personal exposure.
- There is no potential for a release to the environment.
- There are no personal injuries as a result of the spill.
- The clean-up procedures are known, and the proper equipment (e.g., PPE and spill clean-up materials) is available.
- The spill can be cleaned up safely.

If all the above conditions are not met and for incidents involving large spills, **call the KSU emergency number 470-578-6666 (6666)** for emergency spill response. Evacuate the area and restrict personnel from the area until clean-up is complete.

Spill clean-up materials should not be incompatible with the spilled chemicals. Laboratories and shop areas where acids and bases are handled should have an adequate number of appropriate spill kits to meet anticipated needs.

2) Emergency Eyewash and Emergency Shower

An emergency eyewash and emergency shower must be located in all areas where acids and/or bases are used. In the event of skin or eye contact, flush the affected area for at least 15 minutes and call 470-578-6666 (6666) for emergency response.