

 <b>Indiana State University</b>	<b>ISU Laboratory Safety Guideline</b>
	<b>Working with Corrosive Chemicals and Storage Guidelines</b>
	<b>Date: December 2012</b>

**Corrosive Chemicals** are substances that cause the visible destruction or permanent changes of skin tissue at the site of contact and are highly corrosive to steel. A corrosive chemical can be a liquid, solid or gas and can affect the eyes, skin, gastrointestinal tract and respiratory tract.

Liquid corrosive chemicals are those with a pH of 4.0 or lower or a pH of 9.0 or higher. A highly corrosive chemical has a pH of 2.0 or lower or a pH of 12.5 or higher. Solutions of all strong acids and bases at concentrations greater than 1 molar (1M) are corrosive.



#### Examples of Corrosive Chemicals

- ❖ **Strong Acids:** hydrochloric, sulfuric, phosphoric, nitric
- ❖ **Strong Bases:** metal hydroxides, potassium, ammonia
- ❖ **Strong Dehydrating Corrosives:** phosphorus pentoxide, calcium oxide
- ❖ **Strong Oxidizing Corrosives:** concentrated hydrogen peroxide, sodium hypochlorite
- ❖ **Corrosive Gases:** chlorine, ammonia, nitrogen dioxide
- ❖ **Corrosive Solids:** phosphorus, phenol, sodium hydroxide

#### Handling Procedures for Corrosive Materials

1. Safety goggles, appropriate protective gloves and a laboratory coat should always be worn when working with corrosive chemicals. A face shield, rubber apron, and rubber booties may also be appropriate depending on the work performed.
2. Appropriate protective gloves which are resistant to permeation or penetration from corrosive chemicals should be selected and tested for the absence of pin holes prior to use.
3. Eyewashes and safety showers should be readily available in areas where corrosive chemicals are used and stored. In the event of skin and eye contact with a corrosive

chemical, the affected area should be immediately flushed with water for 15 minutes. Contaminated clothing should be removed and medical attention sought.

4. Corrosive chemicals should be handled in a fume hood to ensure that any possible hazardous or noxious fumes generated are adequately vented.
5. Safety shielding: Shielding is required any time there is risk of explosion, splash or a highly exothermic reaction. Procedures which pose these risks should be done in a fume hood with the sash in the lowest feasible position. Portable shields can also be used if necessary.
6. Vacuum Protection: Evacuated glassware can implode and eject flying glass, and chemicals. Vacuum work involving corrosives must be conducted in a fume hood, glove box or isolated in an appropriate manner. Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. The vacuum pump must be rated for work with corrosives.
7. When mixing concentrated acids with water, add the acid slowly to the water. Allow the acid to run down the side of a container and mix slowly to avoid violent reactions and splattering. NEVER ADD WATER TO ACID.
8. Reactions involving acids and bases are often very exothermic.
  - Use only heat resistant labware.
  - Allow for extra volume in mixing and or reaction vessel to allow for expansion.
  - Pre-cooling solutions and cooling while mixing or cooling during the reaction may be required.
9. Appropriate spill material should be readily available in areas where corrosive chemicals are used and stored.
10. Protective carriers made of polyethylene or other non-reactive material should be used when transporting corrosive chemicals.

### **Storage Procedures for Corrosive Materials**

1. Specially designed corrosion resistant cabinets should be used for the storage of corrosive materials. Plastic trays should also be used.



2. Do not store corrosive liquids above eye level.

3. Do not store corrosives in chemical fume hoods or allow containers of corrosives in proximity to hot plates or heating mantles or open flame.
4. Follow chemical segregation guidelines.
  - Acids and caustics (bases) should be stored separately from each other. Secondary containers and plastic trays can be used to separate items within a corrosive cabinet.
  - Inorganic acids should be separated from organic acids and flammable/combustible materials. (Inorganic acids are particularly reactive with flammable/combustible materials.)
  - Acids should be segregated from active metals such as sodium, potassium and magnesium and from chemicals which can generate toxic gases such as sodium cyanide and iron sulfide.