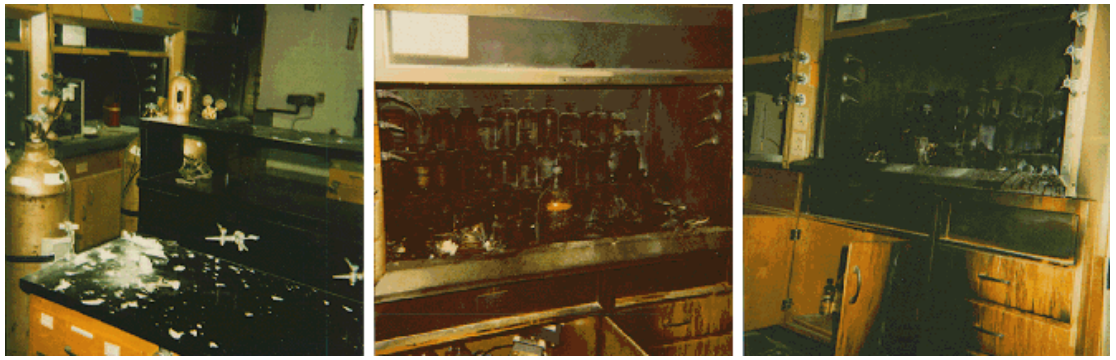
Chapter 2
General Work Practices

The cost of laboratory accidents can be enormous in terms of fatalities, serious injuries, property loss, and the costs of replacing equipment and repairing or rebuilding laboratories. For that reason, any one present within a laboratory, should know how to work safely with hazardous materials and how to create and design a hazardous-free and safe area and procedure for work inside the laboratory.



What makes some materials hazardous?

- Chemicals and chemical safety and awareness don't belong only in the laboratory anymore.
- Chemicals are everywhere and we use them in a variety of ways.
- Just look at the shelves in your home--the kitchen and bathroom shelves boast a variety of chemicals.

Classification of chemicals:

1- Toxic:

Most chemicals are toxic at some level of exposure. If allowed to enter the body through the nose, mouth, or skin they can make you sick. Fumes, dusts, and vapors from toxic materials can be especially harmful because they can be inhaled and pass quickly from the lungs into the blood, allowing the poisons to circulate throughout the body.

Classification of chemicals:

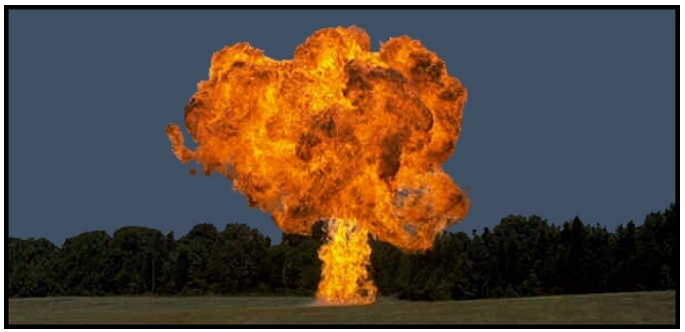
2- Corrosive:

Materials, such as strong acids and bases, can eat completely through other substances including your clothing. If splashed on the skin or eyes, they can cause serious burns. Some of these break down into poisonous gases making them doubly hazardous.

Classification of chemicals:

3- Explosive

Some materials can explode when they are exposed to heat or flame. Included in this category are materials such as flammable liquids and compressed gases, which can explode under certain conditions.



Classification of chemicals:

4- Flammable

This category includes all materials that catch fire easily, burn rapidly, spread quickly, and give off intense heat. Many materials used and stored in the workplace are flammable, including solvents and lubricants.

Classification of chemicals:

5- Reactive

These materials have to be isolated, stored in special containers, and used with extreme caution. Some can burn when exposed to air or water, some when mixed with other substances. It is important to note that reactive materials do not have to be near heat or flames to burn. They burn spontaneously. They can also give off vapors that can be harmful if inhaled.

USA Occupational Safety & Health Administration (OSHA) classification:

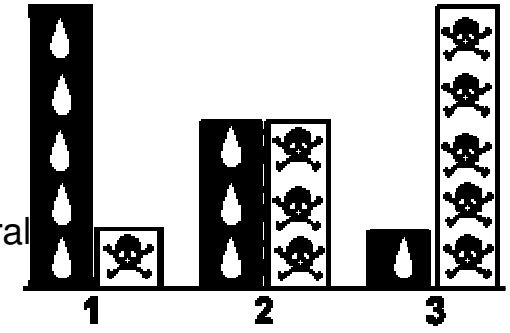
Carcinogens: capable of causing cancer such as asbestoses, benzene and cadmium.

Reproductive Toxins: have adverse effects on various aspects of reproduction, including fertility, gestation, lactation, and general reproductive performance such as Dimethyl formamide (DMF) and Hydrazine.

USA Occupational Safety & Health Administration (OSHA)

High Acute Toxicity Substance:

-A chemical with a median lethal dose (LD_{50}) of 50 mg or less per kg of body weight when administered orally to certain test populations.
-A chemical with an LD_{50} of 200 mg less per kg of body weight when administered by continuous contact for 24 hours to certain test populations.
- A chemical with a median lethal concentration (LC_{50}) in air of 200 parts per million (ppm) by volume or less of gas or vapor, or 2 mg per liter or less of mist, fume, or dust, when administered to certain test populations by continuous inhalation for one hour, provided such concentration and/or condition are likely to be encountered by humans when the chemical is used in any reasonably foreseeable manner.



Designated Areas

Any area where particularly hazardous substances, including carcinogens, acutely toxic chemicals and reproductive toxins, are stored or used must be posted as a **Designated Area.** These materials should be stored separately from other chemicals, as space permits.

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Chemical Safety Plan

The following represents very crucial points that should be considered when working with any hazardous chemicals inside the laboratory:

(1) Responsible behavior in the laboratory is essential.

(2) Perform no unauthorized experiments.

(3) Working alone in the laboratory is not permitted.

(4) Think about what you are doing in the laboratory.

Lab Apparel

- **Wear approved eye protection**
- **Footwear that completely covers the feet is required .**
- **A lab apron or coat must be worn**
- **Gloves should be worn when working with hazardous chemicals**

Chemistry Lab Policies

- **In case of fire or accident**, call the instructor at once. Be aware that wet towels can be used to smother small fires. Use any apparatus available to put out or contain a fire.

- **In case of the chemical spill on your body or clothing**, wash the affected area with large quantities of running water. Remove clothing that has been wet by chemicals to prevent further reaction with the skin.

- **In case of accidental ingestion of a chemical**, try to drink large volumes of water.

Chemistry Lab Policies

Glassware:

- Do not use broken, chipped, starred or cracked glassware.
- Clean all glassware after use.
- Do not pick up broken glassware with bare hands.
- Use gloves or sweep it up. Deposit broken glass in a "Broken Glass Safety Toss Box."
- Handle hot glassware with proper size and type of tongs or hot mitts.

Chemistry Lab Policies

Compressed gases:

- Store and transport compressed gas cylinders with the safety caps on.
- Transport large cylinders on a hand truck to which the cylinder is secured.
- Cylinders should be clamped securely to a wall or other firm support with an appropriate cylinder clamp or chains.
- Always use a reducing valve with gas cylinders.
- Do not lubricate, modify or tamper with a cylinder valve.
- Do not heat cylinders or store them near a heat source.

Standard Operation Procedures

- Standard Operation Procedures (SOPs) are common procedures in most laboratories which insure the proper and efficient work.
- SOPs relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals.

SOPs generally deals with the followings:
1. General Laboratory Safety Procedures
2. Procedures for Proper Labeling and Safe Storage of Chemicals

- 3. Chemical Fume Hood - Procedures for Proper and Safe Use
- 4. Corrosive Chemicals - Procedures for Safe Handling and Storage
- 5. Flammable and Combustible Liquids - Procedures for Safe Handling and Storage
- 6. Oxidizing Agents - Procedures for Safe Handling and Storage
- 7. Reactive Chemicals - Procedures for Safe Handling and Storage
- 8. Carcinogens, Reproductive Toxins, and Acutely Toxic Chemicals - Procedures for Safe Handling and Storage

9. Compressed Gases - Procedures for Safe Handling and Storage
10. Cryogenic Liquids - Procedures for Safe Handling and Storage
11. Electrical Safety Procedures
12. Glassware and Sharps - Procedures for Safe Handling and Disposal
13. Chemical Spill Response Procedures