LABORATORY SAFETY

- Safe lab environments are dependent upon both you and your colleagues. Everyone must work together to ensure the safety of the lab.

- You are responsible not only for your own safety, but also for the safety of others.

- Because laboratories involve numerous chemicals, procedures, and operations; they require extensive safety precautions.

- General Rules
- Personal Protective Equipment (PPE)
- Emergency Plan
- Glassware
- Fire Prevention
- Fume Hoods
- Electrical Hazards
- Chemical Safety

GENERAL LABORATORY RULES

- Laboratory hours : 1 PM – 5 PM
- Leave all coats and bags on the bench at the entrance of the lab. Only lab notebooks and essential items should be taken in.
- Do not start your experiment unless graduate assistant is present.
- Cuts on hands should be covered with sticking plasters to reduce the risk of infection.

GENERAL LABORATORY RULES (continued)

- Do not eat food, drink beverages, or smoke in the laboratory. Do not use laboratory glassware as containers for food or beverages.

GENERAL LABORATORY RULES (continued)

- No open toed shoes or high-heels.
- No shorts or loose fitting clothes.
- No loose long hair (must be pulled back into ponytail).
- No contact lenses.
- Know about the chemicals and hazards associated with your laboratory.
- Know what to do in emergency situations.
- Know how to read and interpret MSDSs.

GENERAL LABORATORY RULES (continued)

- Observe good housekeeping practices. Work areas should be kept clean and tidy at all times.

GENERAL LABORATORY RULES (continued)

- Wear personal protective equipment, as appropriate.
- Never work alone in the lab.
- Keep lab doors closed.
- Hallways, corridors, and exit ways must be kept clear. Do not locate (even temporarily) laboratory equipment or supplies in these areas.
- Wash your hands during and at the end of each lab session; use antibacterial soap. Dry your hands with disposable paper towel.

Personal Protective Equipment (PPE)

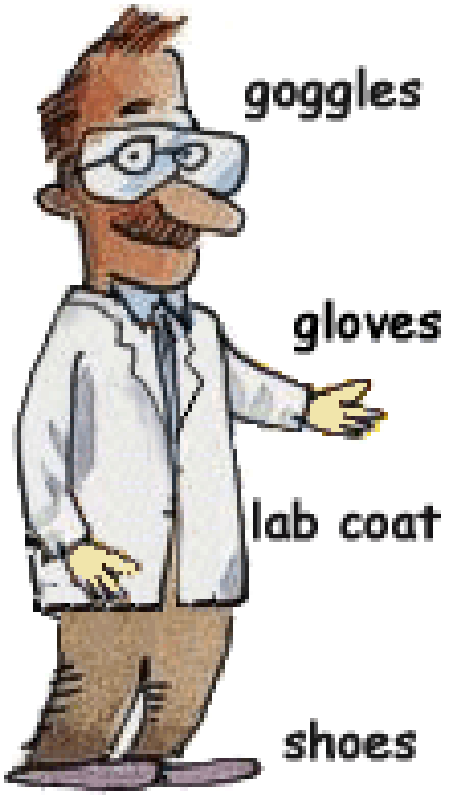
- Personal Protective Equipment (PPE) is not required just because it makes you look GOOFY.

  It is there to give you added protection against any accidents that may occur while working in the lab.

Personal Protective Equipment (PPE)

- There are several different types of PPE but you should always wear what is appropriate for your lab.

  - Safety Glasses or Chemical Goggles
  - Lab Coat or Apron
  - Gloves
  - Dust and Gas Masks



Emergency Plan

When you first walk into a lab you should always take note of the location of the:

- Safety Showers
- Safety Eye Washes
- Emergency Exits
- Fire Extinguishers
- Emergency Electrical Cut-off Switch

Laboratory Safety Equipment

Eye Wash

Hold eye lids open and flush eyes immediately with clean water for at least 15 min.

Drench Shower

Emergency Plan

- Knowing the emergency action plan and the location of safety equipment could prevent a minor emergency from turning into a major emergency.
- **Report all injuries** immediately to your supervisor or department safety coordinator.

Emergency Plan

Emergency Call List:

- Fire Department. 110
- Fire Safety Coordinator Ext.1100
- Building Supervisor Ext.7231
- Infirmary Ext.4440
- Dept. Safety Coordinator Ext.6893

Glassware

Rules to follow when handling glassware:

- Prevent damage to glassware during handling and storage.

- Inspect glassware before and after each use. Discard or repair any cracked, broken, or damaged glassware.

- Thoroughly clean and decontaminate glassware after each use.

Glassware

Rules to follow when handling glassware:

- When inserting glass tubing into rubber stoppers, corks, or tubing; follow these guidelines:
  - Use adequate hand protection.
  - Lubricate the tubing.
  - Hold hands close together to minimize movement if the glass breaks.
- Never use laboratory glassware to serve food or drinks.

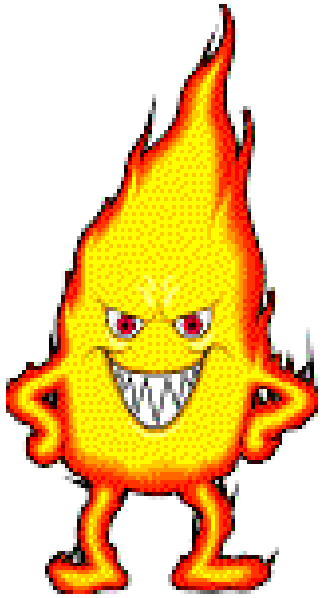
Glassware

Guidelines for disposing of broken glass:

- Do not pick up broken glass with bare or unprotected hands.
- Use a brush and dust pan to clean up broken glass.
- Remove broken glass in sinks by using tongs.
- Place all the recovered broken glass into the broken glass container.

Fire Prevention

- The best method of fire fighting is taking precautions to prevent one from occurring in the first place and being prepared if a fire in the lab should occur.



Fire Prevention

Ways to prevent fires are:

- Have good housekeeping practices.
- Use the smallest amount of flammable solvents as possible.
- Keep the flammable solvents away from ignition sources.
- Store flammables in a flammable storage cabinet.

Fire Prevention

- This is a photo of a lab fire that occurred due to improperly stored chemicals.

Fire Procedure

Students should simply do the following:

- Move away from danger and call for help.
- Sound the fire alarm and call the fire department.
- Know all the fire escape routes.
- Do not attempt to extinguish the fire unless there is no other choice.

Fire Procedure

Supervisors should do the following:

- Get all the people **OUT** first.
- Know all the fire escape routes.
- Close the door of the lab or room, but do not lock it.
- Call the fire department immediately.

Fire Procedure

If your clothing should catch on fire, follow the instructions:

- Use an emergency safety shower if it is nearby.
- Otherwise, use a fire blanket or the method of **"STOP, DROP and ROLL"**

  STOP moving around

  DROP to the ground and hold your hands across your chest

  ROLL on the ground in a coat or blanket to smother the flames.
- Cool burned areas with clean water.
- Promptly seek medical attention.

Laboratory Safety Equipment

Fire Blanket

Fire Extinguishers

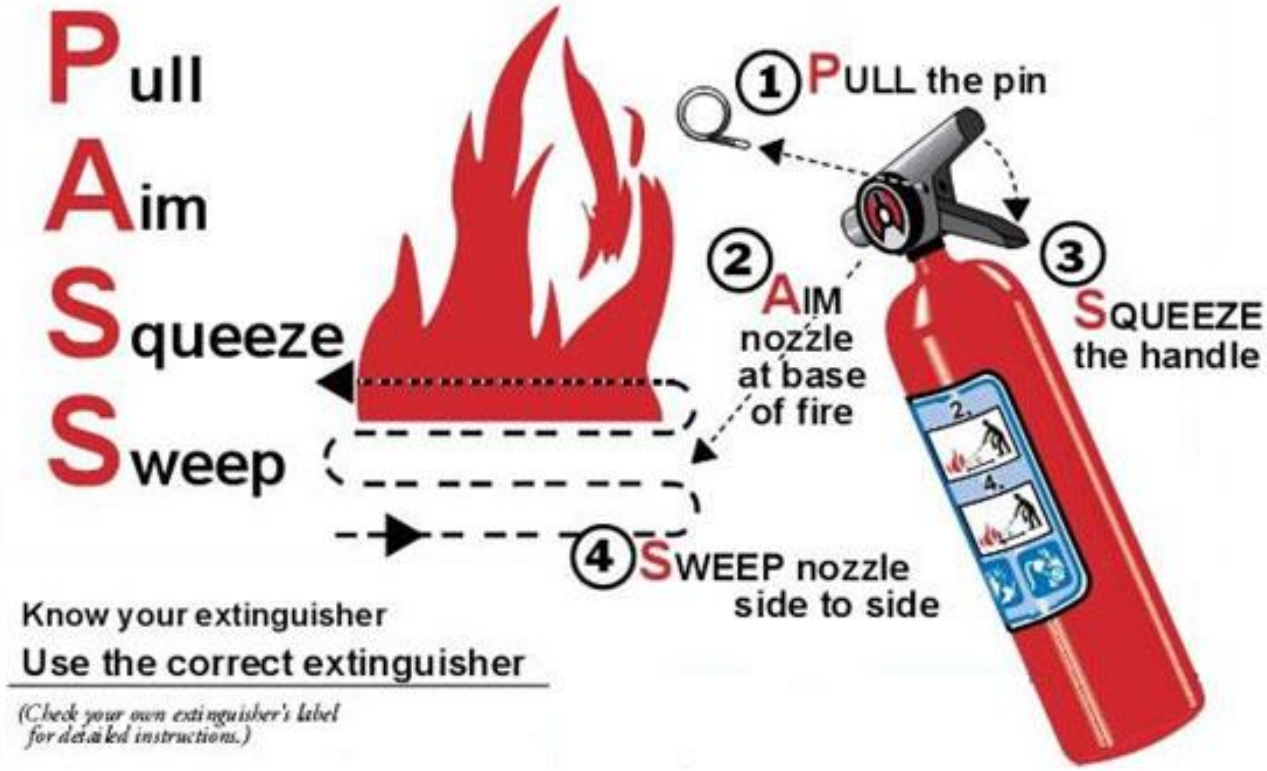
To operate an extinguisher:

Pull

Aim

Squeeze

Sweep



Know your extinguisher

Use the correct extinguisher

(Check your own extinguisher's label for detailed instructions.)

Fire Procedure

Types of Fires:

- CLASS A : Ordinary material like burning paper, cupboard, plastics, etc.
- CLASS B : Flamable or combustible liquids (gasoline, kerosene, organic solvents)
- CLASS C : Energized electrical equipment (appliances, switches, panel boxes, hot plates, stirrers, etc.) Water is a dangerous extinguisher due to the risk of electrical shock.
- CLASS D : Combustible metals (magnesium, titanium, potassium, sodium, etc.)

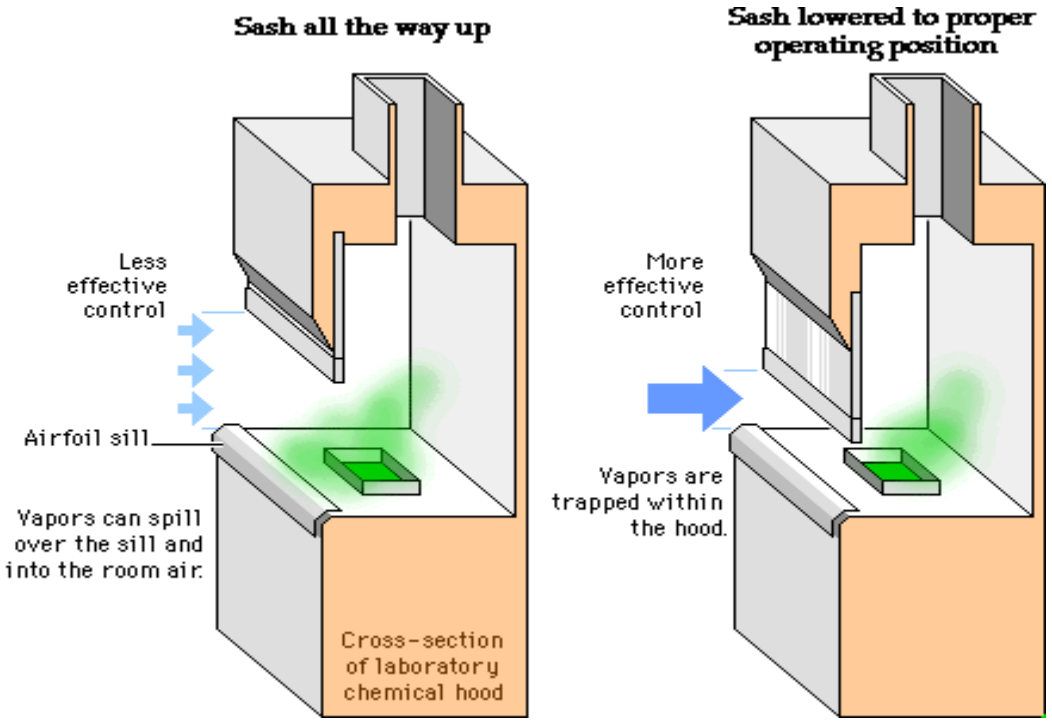
Fire Procedure

Common Extinguishers:

- Water Extinguishers : Suitable for Class A
- Dry Chemical Extinguishers : Suitable for Class A, B and C fires.
- CO_2 Extinguishers : Suitable for Class B and C fires.
- Metal / Sand Extinguishers : Suitable for Class D fires.

Fume Hoods

- Always use a fume hood when handling flamable solvents or corrosive substances.
- Fume Hoods are an essential component in the lab when it comes to protecting yourself from potentially harmful fumes.



Electrical & Physical Hazards

In case of Electrical Shock

- Turn off the current from the main power switch before attempting to rescue a person in contact with a live circuit.
- If this is not possible, use rubber glove to protect your hands; stand on a dry mat and rescue.

Chemical Safety

- Chemical safety procedures are set to protect the students, employees, and the environment from possible harm. Some of the procedures that help accomplish this are:
- Proper labeling
- Proper storage
- MSDS locations

Chemical Safety

Proper Labeling

- Proper labeling ensures that you receive the correct chemical and prevents you from getting harmed by one that is not labeled correctly.

Chemical Safety

Chemical Storage

- There are storage requirements for separating hazardous chemicals because an alphabetical storage system may place incompatible chemicals next to each other. Group chemicals according to their hazard category (i.e., acids, bases, flammables, etc.).

- Separate acids from bases. Store these chemicals near floor level.

Chemical Safety

Chemical Storage

- Isolate perchloric acid from organic materials. Do not store perchloric acid on a wooden shelf.
- Separate highly toxic chemicals and carcinogens from all other chemicals. This storage location should have a warning label and should be locked.
- Separate acids from flammables.

Chemical Safety

Chemical Storage (cont.)

- Do not keep peroxide-forming chemicals longer than twelve months.
- If flammables need to be chilled, store them in a laboratory-safe refrigerator, not in a standard refrigerator.
- Flammables should be stored in a flammable storage cabinet.

Chemical Safety

Material Safety Data Sheets (MSDS's)

- Know the location of the MSDSs.

- Before using any chemical, especially new chemicals, read the container label and the appropriate MSDSs. Container labels and MSDSs are good sources of information for chemical safety.

Chemical Safety

Material Safety Data Sheets (MSDS's)

An MSDS provides the following information:

- Identification
- Hazardous Ingredients
- Physical Data
- Fire and Explosion Hazard Data
- Health Hazard Data
- Reactivity Data
- Spill and Leak Procedures
- Special Protection Information
- Special Precautions

Chemical Safety

Mercury Spillage

- Report incident to Miss Balkan (KB 408)
- Collect with vacuum pump or capillary tubes.
- Treat the remainder with Zinc Dust (to form an amalgam).

Please note : Zinc Dust is flamable.

Chemical Safety

Gas Cylinders

- Always use cylinders in vertical position.
- Always use safety straps to hold the cylinders. Attach the straps to walls or benches.
- Do not knock or jar the pressure regulators.
- Regularly check all pipe-work for leaks with soap solution.
- Turn the cylinder neck valve off after you have finished your work.

Safety As You Leave

- Is your equipment safely turned down?
- Are all heaters, all switches and all water fluid flows to your unit turned off?
- Have you turned off the cooling water after the equipment was really cool?
- Have you safely closed all vessels containing volatile chemicals that may have dangerous or hazardous vapors?

Safety As You Leave

LAST GROUP LEAVING

Be sure
- The steam generator
- The air compressor
- All water and electricity
- Water flows
- Lights ARE TURNED **OFF**

- Call Technician to Lock the Lab Door.