

# Lab 1

## Laboratory instruction, safety rules, equipment

Depending upon the scientific research being conducted, a lab can be filled with dangerous chemicals, radioactive substances, biological specimens, sharp instruments, breakable glassware, and flammable objects. Thus, those working in labs need to be keenly aware of the many dangers associated with these items. To maintain a safe workplace and avoid accidents, lab safety symbols and signs need to be posted throughout the workplace.

The Laboratory Safety program provides guidance and support to researchers to identify and eliminate or reduce hazards, train personnel. There are many regulatory requirements that laboratories must comply with when working with biological, chemical, and radiological materials and it is our task to help identify the appropriate regulations and support the lab in maintaining compliance with them.

The Laboratory Safety program provides policies, procedures, training, guidance, and other information to assist research and teaching personnel to provide a safe and healthful environment in which to operate.

Before conducting any experiment, you should access the hazards related to the work, including; what are the worst possible things that could go wrong, how to deal with them, and what are the prudent practices, protective facilities, and equipment necessary to minimize the risk of exposure to the hazards.

Always know the hazards of the materials used (e.g., corrosivity, flammability, reactivity, and toxicity). Read the Material Safety Data Sheets (MSDS) for information on all chemicals you plan to use. Make sure all Personal Protective Equipment (PPE) is on hand. Use the MSDS or Personal Protective Equipment Selection Guide to select the needed equipment. Post a sign on the door to notify others of the lab hazards and list emergency contact numbers.



Always wear chemical splash goggles for eye protection when working with chemicals.

When pouring large quantities of hazardous chemicals, in addition to goggles, wear a face shield large enough to protect your ears and neck as well as your face.

Always wear gloves when handling chemicals. Select the glove material based on compatibility with the chemicals you may contact.

Always wear appropriate clothing: chemically resistant lab coats or aprons are recommended.



It is important to be properly dressed when working in a laboratory. Follow the guidelines below to ensure that your clothing covers your skin and protects you from spilled chemical, biological, or radioactive materials, falling objects, and other lab hazards.

DO:



Always wear a shoe that completely covers the foot and protects your feet.



Always wear clothes that cover and protect your legs down to your ankles.

DON'T:



Do not wear shorts or miniskirts (anything that would leave your legs bare and unprotected). Do not wear high-heeled shoes, open-toed/heeled shoes, sandals, or shoes made of woven materials.



Confine long hair and loose clothing.

## **Hazard symbols**

### **General warning**

The general warning lab safety symbol consists of a black exclamation point in a yellow triangle. As you'd expect, it is a general warning to laboratory staff that a hazard exists. This symbol can be found on equipment, doorways, cupboards, or other areas of the lab. It provides a good reminder to work safely and check if you are not sure of the safety procedures for certain equipment or areas in the lab.



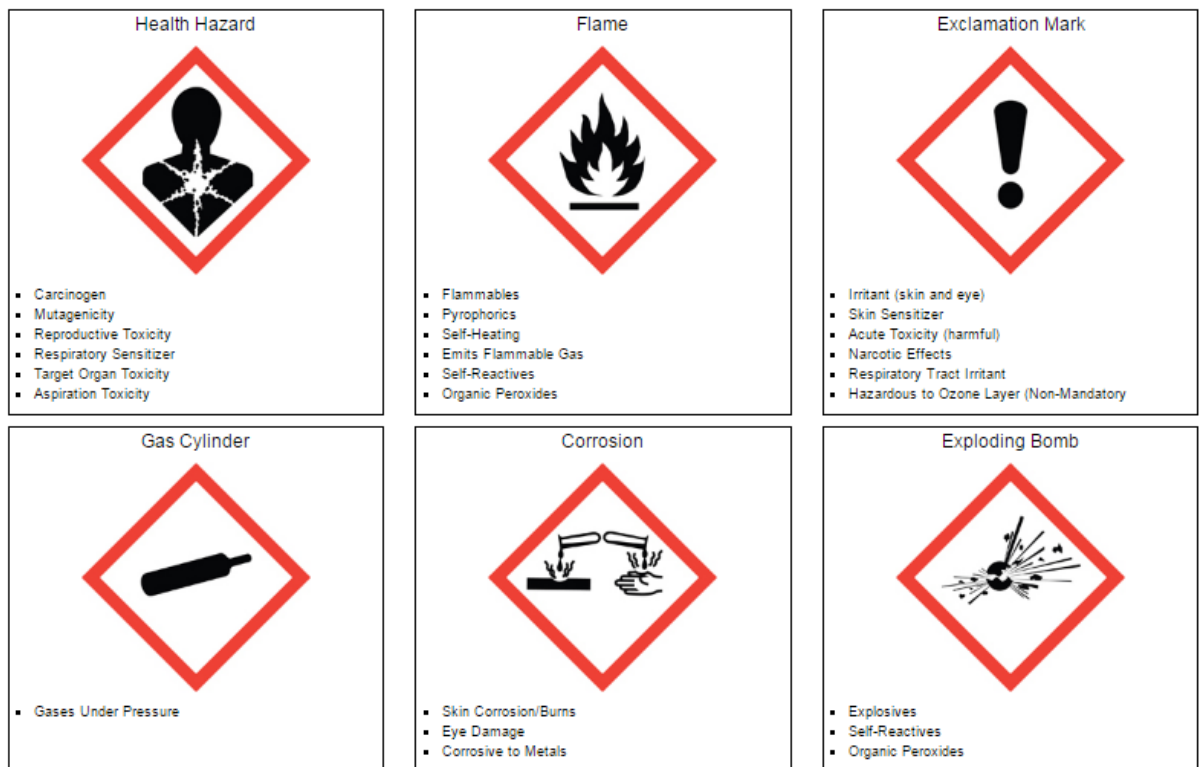
- Do not work with hazardous chemicals or processes when alone in the laboratory. An instructor must supervise undergraduate students at all times.
- Always use chemicals with adequate ventilation or in a chemical fume hood.
- Do not allow the release of toxic substances in cold rooms or warm rooms, since these areas have contained, re-circulated air.
- Use chemicals only as directed and for their intended purpose.
- Never use mouth suction to fill a pipette or siphon. Use a pipette bulb or other suitable device.
- Do not dispose of chemicals down the drain. Most chemicals must be disposed of as hazardous waste.



- Don't add water to acid because so much heat is released that the solution may boil very violently, splashing concentrated acid out of the container! If you add acid to water, the solution that forms is very dilute and the small amount of heat released is not enough to vaporize and spatter it. So Always Add Acid to water, and never the reverse.

## Health Hazard

The health hazard sign denotes chemicals in the lab that can cause serious, often long-term health problems. Hazards include carcinogens, respiratory sensitizers, target organ toxins, and mutagens. An important step in protecting worker health is recognizing the various health hazards in the lab, as ignorance of the harmful effects of laboratory materials can have serious and even fatal consequences.



## Emergency Procedures

Use secondary containers such as acid buckets or plastic totes.

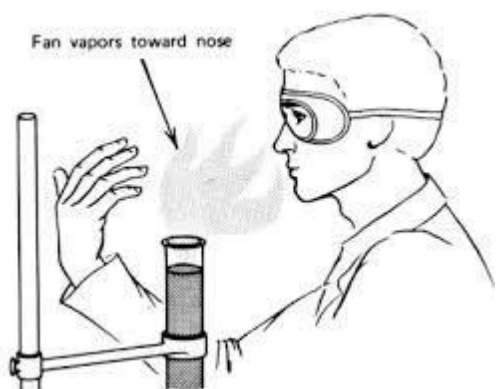
- Secure containers on carts.
- Wear appropriate PPE.
- Use freight elevators or limit access in passenger elevators.

- Use a hand truck with a safety chain when moving compressed gas cylinders.

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When it is necessary to smell chemicals in the lab, the proper technique is to cup your hand above the container and waft the air toward your face.

Try not to breathe in the air through your nose, but bring in just enough to make sense of the smell much like the approach you would take when someone asks you to do a breath check or when you're debating eating dairy beyond its expiry date.



Hold the test tube at an angle. Point the test tube away from yourself and all other people. Heat the test tube gently from the top of the substance being heated, and always wear safety goggles.



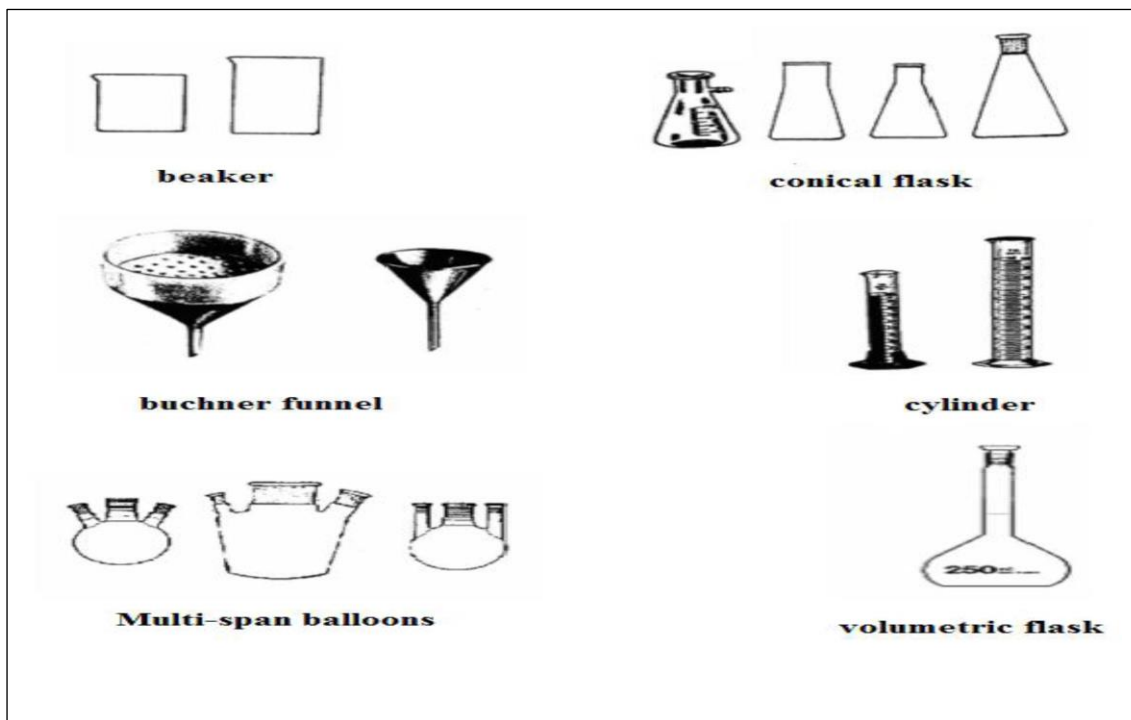
Wash with hot soapy water, rinse thoroughly with tap water, then rinse 3-4 times with deionized water. Be sure the final rinses sheet off of the glass.



## General Lab Equipment

Laboratories require a variety of equipment and instrumentation to run tests and research.

Among the many items that would be considered general lab equipment are pipettes, scales, centrifuges, Bunsen burners, freezers, hot plates, incubators, coolers, stirrers, water baths, and fumes hoods - to name a few.



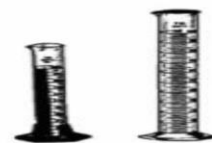
**beaker**



**conical flask**



**buchner funnel**



**cylinder**



**Multi-span balloons**



**volumetric flask**



**beaker**



**conical flask**



**buchner funnel**



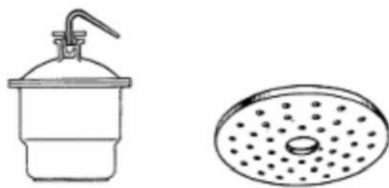
**cylinder**



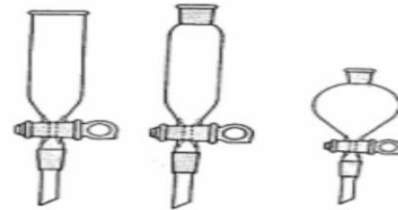
**Multi-span balloons**



**volumetric flask**



**Desiccator**



**Separatory funnel**



**Balloons with two openings**



**Four-way balloon with side pipe**





**test tube rack**



**watch glass**



**ring stand**



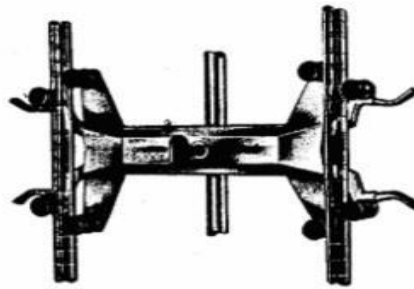
**Test tube brush**



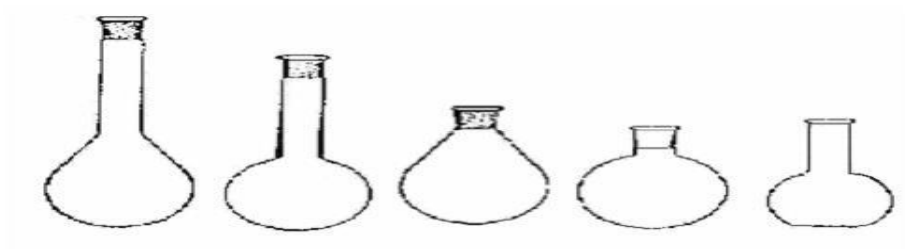
**bunsen burner**



**funnel holder**



**burette clamp**



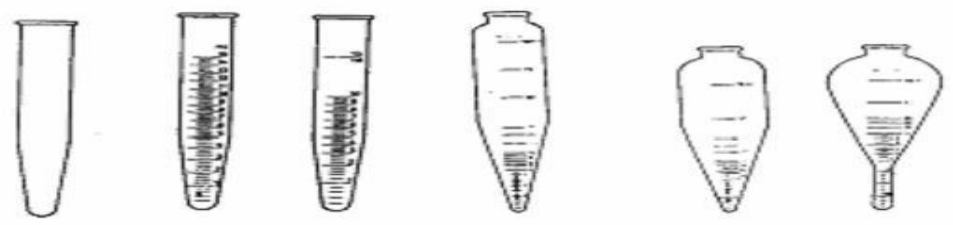
**Balloons with a span**



**test tube**



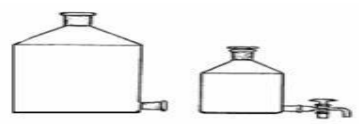
**Balloons with a span**



**Centrifuge test tube**



**Scaled test tube**



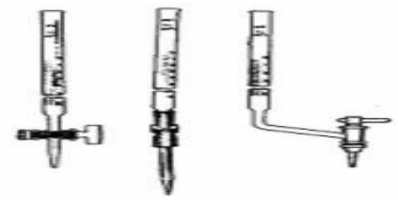
**Barrel**



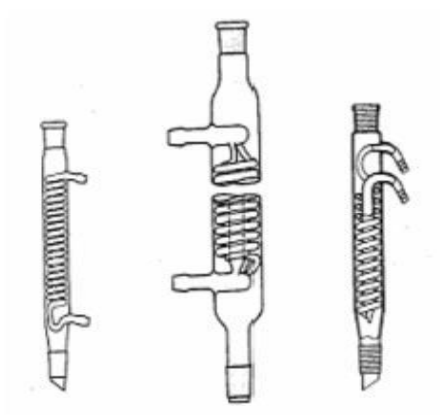
**Wash bottle**



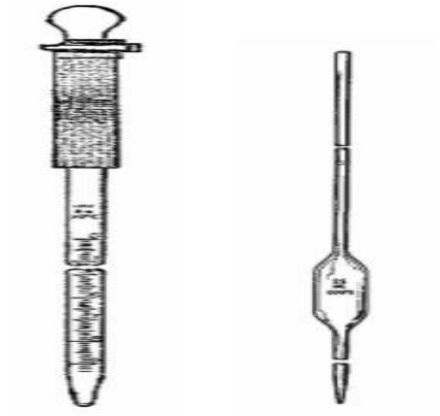
**Crucible**



**burette**



**Spiral condenser**



**volumetric pipette**



**utility clamp**



**mortar**



**tongs**



**holder Test tube**



**iron ring**



**utility clamp**



**pipestem triangle**



**spatula**



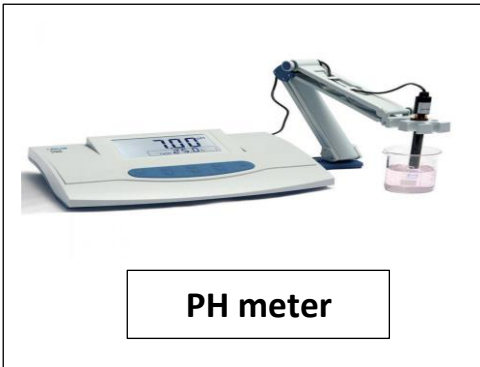
**Balance**



**Magnetic stirrer**



**Spectrophotometer**



**PH meter**



**Centrifuge**