Almustaqbal University

College of Pharmacy

General chemistry Laboratory

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Safety in the Laboratory

A chemistry laboratory can be, and should be, a safe place to work. Accidents can be prevented if you think about what you are doing at all times, use good judgment, observe safety rules, and follow directions. In addition to the rules below, comments appear in each experiment to alert you to probable hazards, including specific instructions on how to protect yourself and others against injury. Be sure to read these and keep the warnings in mind as you perform each experiment. Do not deviate from the procedures given in this book unless you are instructed to do so.

THERE IS NO SUBSTITUTE FOR SAFETY IN THE LABORATORY.

Learn and observe these **safety rules** at all times:

1. Eye protection (OSHA approved goggles, safety glasses) must be worn by all students when working in the laboratory. This includes cleanup times and times when you yourself may not be working on an experiment, but someone near you is.
2. Do not eat or drink in the laboratory.
3. Do not taste any chemical.
4. Purses, sweaters, lunch bags, backpacks, and extra books should be stored in designated areas, but not in the laboratory working area.

Backpacks, in particular, should not be on the floor near your laboratory desk.

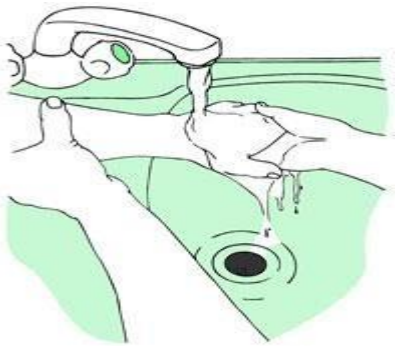
5. Shoes must be worn in the laboratory at all times. Bare feet are prohibited.
6. Long hair should be tied back or pinned up, so it will not fall into chemicals or flames.
7. Do not work in the laboratory alone. An instructor or teaching assistant must be present.
8. Never perform any unauthorized experiment.
9. If an accident occurs in the laboratory, no matter how minor, report it to the instructor immediately.
10. All experiments or operations producing or using chemicals that release poisonous, harmful, or objectionable fumes or vapors MUST be performed in the fume hood.
11. Never point the open end of a test tube at yourself or at another person.
12. If you want to smell a substance, do not hold it directly to your nose; instead, hold the container a few centimeters away and use your hand to fan the vapors toward you.
13. Hot glassware and cold glassware look alike. If you heat glass and put it down to cool, do not pick it up too soon. Do not put hot glassware where another person is apt to pick it up.
14. When inserting a glass tube, rod, or thermometer into a rubber tube or stopper, protect your hands by holding the material with gloves or layers of paper towel. Lubricating the glass with water or glycerine is helpful.

When diluting acids, always add the acid to water, never water to the acid.

15. Most organic solvents are flammable. Keep these liquids away from open flames.
16. Do not pour organic solvents down a sink in the open laboratory. Dispose of them as directed by your instructor, or down a drain in the fume hood. Flush with plenty of water.
17. When disposing of liquid chemicals or solutions in the sink, flush with large quantities of water.
18. Do not wind the electric cord around a hot plate if it is still warm. The hot plate might melt the rubber insulation.
19. Do not dispose of matches, paper, or solid chemicals in the sink. Matches, after you are sure they are extinguished, and paper should be discarded into a wastebasket. Solid chemicals should be disposed of in whatever facility is provided in your laboratory.
20. Do not put broken glassware into wastebaskets. Dispose of it in designated places.
21. If you should have skin contact with any harmful chemical, flush the contact area with large quantities of water. Have a nearby student call the instructor for aid.
22. If you spill any chemical, solid or liquid, be sure to clean it up so another student does not come into contact with it and perhaps be injured by it.
23. Chemical characteristics, hazard levels, and safety instructions for the chemicals you use in the laboratory are described in Material Safety Data Sheets (MSDS) that are generally available in the laboratory. Follow directions given by your instructor in regard to

these sheets. Pay close attention to particular safety precautions your instructor talks about before you begin each experiment.

24. Before leaving the laboratory, wipe the desk top and wash your hands with soap and water.



25. All laboratory workers should undergo simple first aid training For ALL chemical splashes, wash with plenty of water for 10 minutes .Control bleeding with direct pressure, avoiding any foreign bodies such as glass.

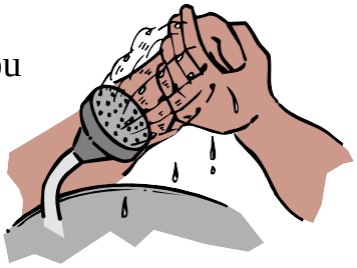
Preventing contamination of chemicals

To conduct experiments successfully, you must avoid contaminating the chemical reagents you use, or reagents that will be used by other students after you. The following procedures will help minimize the possibility of contamination:

1. After washing glassware, always use a final rinse of deionized or distilled water.
2. Avoid handling more than one reagent bottle at a time, so you do not interchange their stoppers by mistake.
3. When selecting a reagent bottle, read the label twice to be sure you have the chemical you want.
4. Do not lay tops of reagent bottles or stoppers on the laboratory bench.
5. Use separate spatulas to remove different solid chemicals from their bottles.

6. Never remove a liquid reagent from a stock bottle with an eye dropper. Pour a small portion into a clean, dry beaker, and use your eye dropper to remove the liquid from the beaker.
7. When a quantity of a chemical is removed from its original container, whether it is a solid or a liquid, do not return any excess to the stock bottle. Dispose of the unused portion as directed by your instructor.
8. Never weigh a chemical directly on a balance pan. Use a preweighed container. Weighing paper is acceptable for most solid chemicals.
9. Some chemicals react with some stoppers. If you are going to store a chemical or solution in a bottle other than its original container, be sure the stopper you select (glass, rubber, cork) is suitable for that substance.

10. Never pour water into a concentrated acid. Acid should be poured slowly into water.
11. Never leave a stock bottle uncovered. Be sure you cover the bottle with the proper cover.



Laboratory Wares

Commons Laboratory wares

Flasks

flasks are commonly used for simple measuring, storing and mixing of liquids. They are of similar to beakers but less than graduated cylinders, measuring pipets or burets.

Glass Beakers

The beakers are borosilicate glass (heat resistant) and graduated along the sides for measurement. These are perfect for heating liquids and storing solids in the laboratory.

Dropping Pipet

Used to transfer liquids in qualitative test. It does not allow a accurately measurement

Burets

Ground and finished stopcocks for leak-free operation. They feature durable, permanent markings; fine, sharp lines and large, easy-to-read numbers. Our Burets meet ASTM specifications.

Pipets

Pipets are used to measure and transfer small volumes (10 mL or less) of liquids. Pipets are long graduated tubes that allow one to accurately measure and transfer small volumes.

Pipet Bulbs

The orange pipette bulb can be used with the 10ml pipet. The thumbwheel pipetter is designed for use with the 2ml pipettes but will also work with small sizes. Neither work with corrosive liquids.

Test Tubes

A glass test tube is the most common of lab supplies. Made from borosilicate glass for strength & heat resistance. Optional marking spot allows for pencil notations.

Graduated Cylinders

Glass graduated cylinders are handy for accurate measurements of small volumes of liquid and will not cloud if exposed to materials such as concentrated NaOH, or any hydrocarbon

Volumetric flask

A **volumetric flask** is a type of laboratory flask (piece of laboratory glassware) used to contain or measure a very precise and accurate amount of a liquid.

Centrifuges

A **centrifuge** is a piece of equipment, generally driven by a motor, which puts an object in rotation around a fixed axis, applying force perpendicular to the axis. The centrifuge works using the sedimentation principle, where the centripetal acceleration is used to separate substances of greater and lesser density.

Spectrophotometer

A spectrophotometer is an instrument designed to detect the amount of radiant light energy absorbed by molecules.

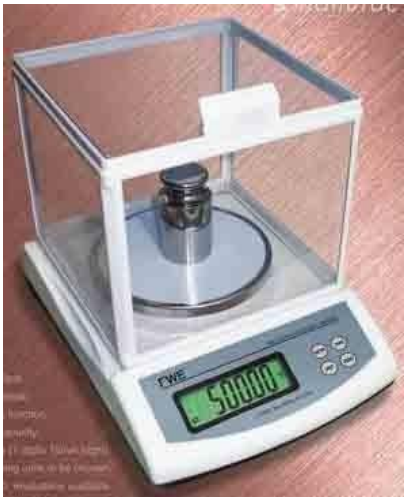
Hot Plates

hot plate provides an efficient source of infrared heat. Most have solid state push button auto ignition and heat output is fully adjustable.

pH Meter

A pH meter a device used for potentiometric pH measurements, which measures essentially the electro-chemical potential between a known liquid inside the glass electrode (membrane) and an unknown liquid outside.

Electric balance



an instrument or machine for weighing.

Microscope

A **microscope** is an instrument for viewing objects that are too small to be seen by the naked or unaided eye.

Vortex

vortex is an instrument for mixing substances or chemicals in a test tube.

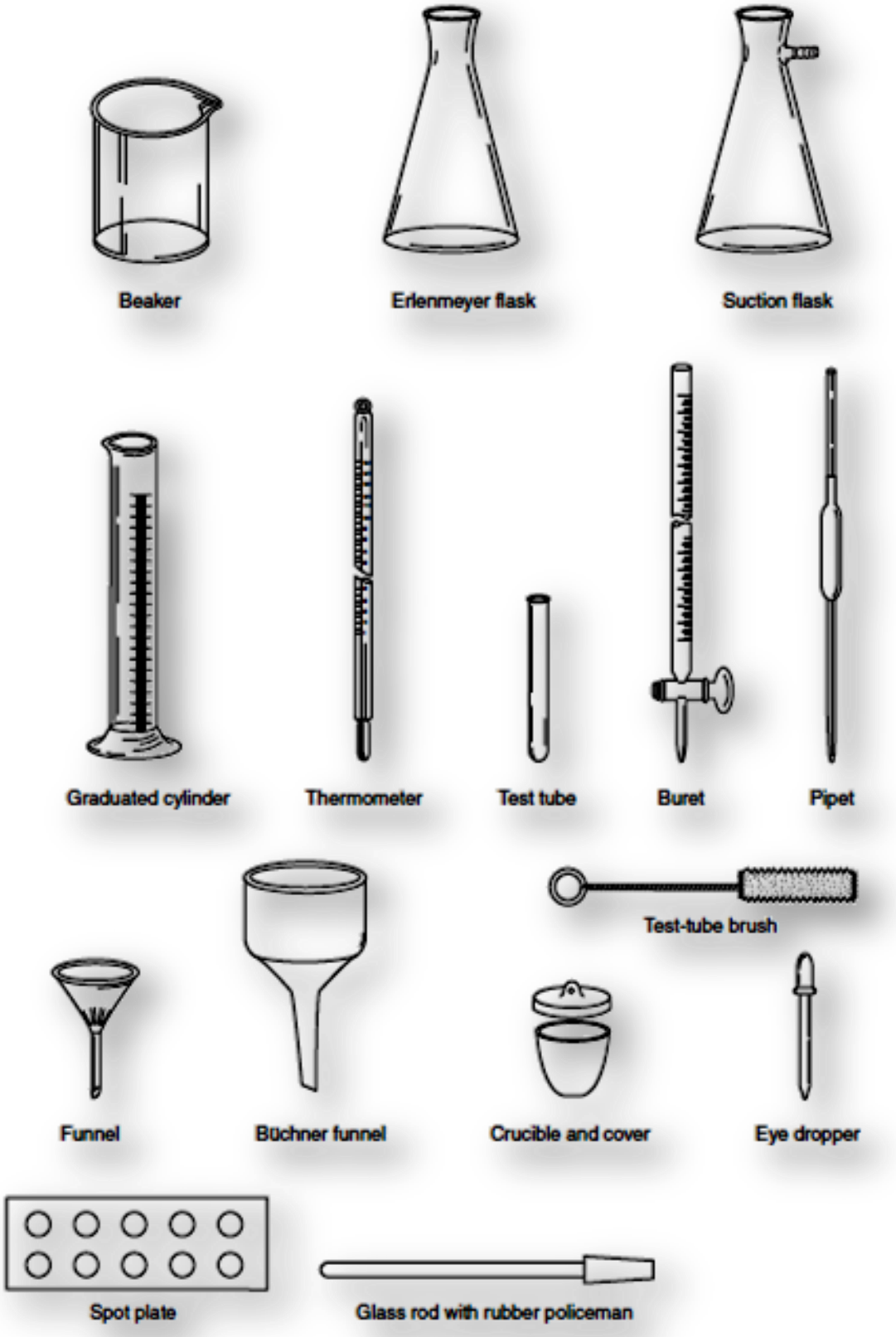


Figure 1 : some of the common laboratory wares

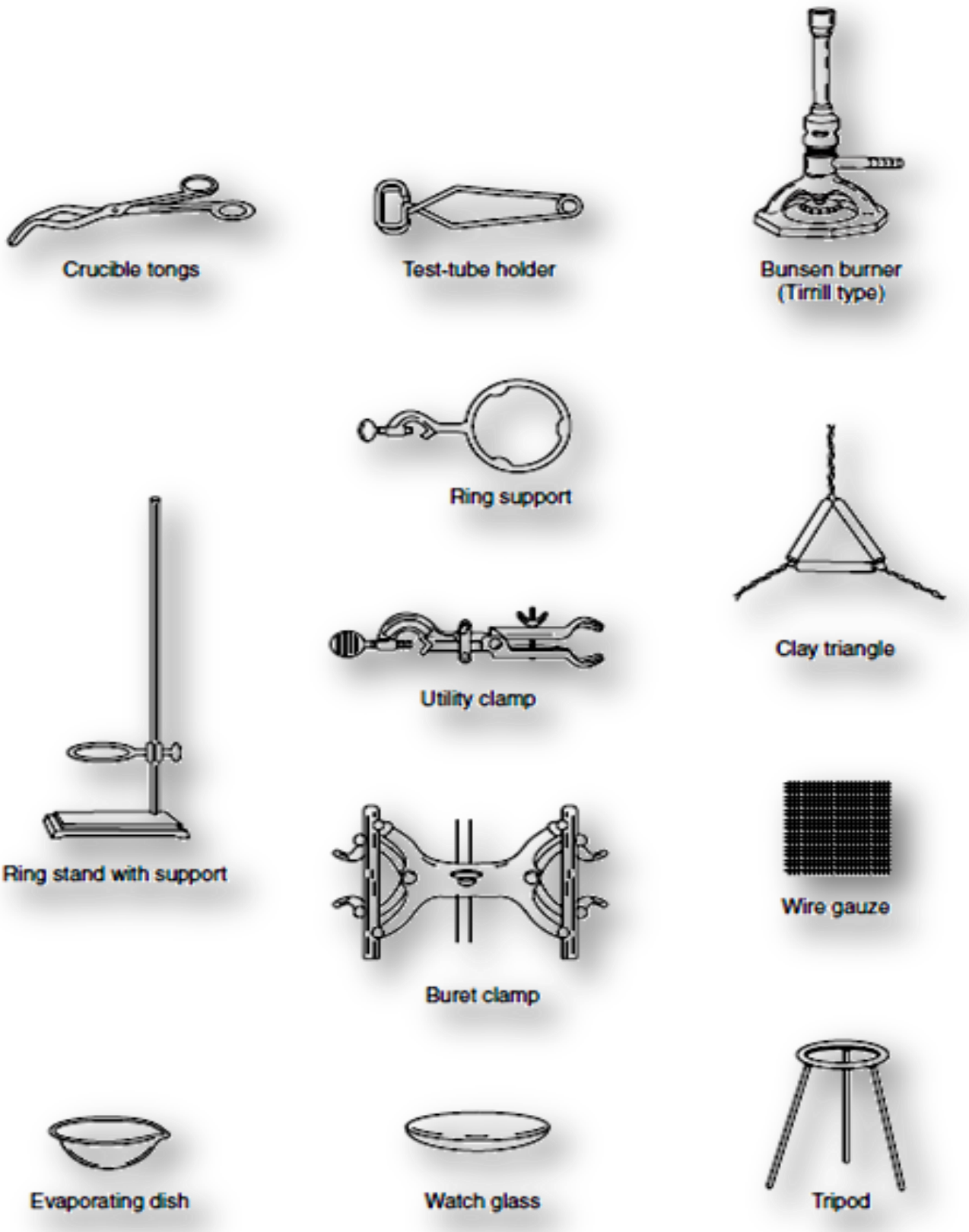
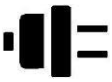


Figure 2 : some of the common laboratory wares

Laboratory Safety Symbols Found in your textbook

Toxic/Poison	Irritant	Environmental
 **Toxic/Poison** – A substance that can lead to death if inhaled, ingested, or absorbed by the skin	 **Irritant** - A substance that causes inflammation upon contact with skin or mucous membranes.	 **Environmental** - Substances that are harmful to the environment. They must be disposed of properly, not washed down the drain.
Flammable	**Corrosive**	**Explosive**
 **Flammable** – Any substance that will burn if exposed to an open flame.	 **Corrosive** – A substance that can destroy or burn living tissue and can eat away at other materials.	 **Explosive** – A substance that may explode if exposed to heat or flame.

Other Lab Safety Symbols Found in your textbook

- Glassware 
- Heat 
- Eye and Face 
- Sharps 
- Electrical 
- Animal 
- Chemical 
- Fire