Experiment 1
Basic Laboratory Operations

I. Safety Rules: (page 33)

1. Safety glasses (goggles) or face shield must be worn in the laboratory all the time. Contact lenses are not allowed, they must be replaced with eyeglasses together with safety glasses.

2. Liquid-proof shoes must be worn in the lab., Sandals, canvas or high-heel shoes are strictly prohibited.

3. The clothing must be long-sleeve, cotton-made, and covers skin from the neck to below the knee. Synthetic clothing (like nylon) is sticky to the skin and not safe in the lab. especially in the case of fire.

4. Laboratory coat or apron must be worn to protect the outer clothing.

5. Never taste, smell or touch a liquid unless you are specifically allowed to do this. (chemicals may be poisonous or may cause sensitivity.

6. Gloves must be worn specially when transferring corrosive chemicals.

7. Smoking, drinking, eating, and chewing are not permitted at any time in the laboratory.

8. In the case of accident (like chemical spill, breaking of glass, injury, fire, …), never panic, and immediately report it to your instructor even with small accidents.

9. In the case of chemical spill on hands, wash them immediately with plenty of water.

10. In case of fire, do not discharge fire extinguisher when a person's clothes are on fire. Use SAFETY SHOWER.

11. Never heat flammable liquids on a direct flame. Ask your instructor how to do this.

12. Do not work alone in the lab. For any reason. Always you should work with, at least, one person near to you.

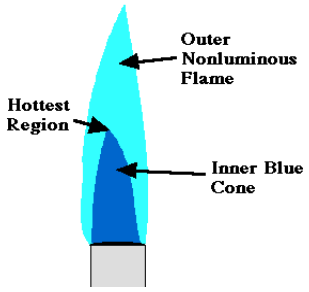
13. Be aware of the mistakes of your neighbor in the laboratory, you may be a victim of his (her) mistakes.

II. *Bunsen Burner*:

- How to lit and adjust the Bunsen burner.
- Gas mixture of hydrocarbons, mainly methane CH_4 gas.
- Insufficient oxygen results in yellow luminous flame, carbon particles (smoke), water, and poisonous carbon monoxide gas (CO) are produced.

$$6CH_4\,(g) + 9O_2\,(g) \longrightarrow 2CO_2\,(g) + 12H_2O(g) + 2C(s) + 2CO(g)$$

- With sufficient amount of oxygen, gaseous CO_2 and water are produced according to the following reaction:



- Three regions
- Outer nonluminus flame
- Hottest region, bright blue, top of the inner cone, 1500 C_o
- Do the temperature test with a wire gauze

$$CH_4\,(g) + 2O_2\,(g) \longrightarrow CO_2\,(g) + H_2O(g)$$

Bunsen burner in the Lab:

III. Laboratory Balance:

Choice of balance depends on the accuracy and precision required.

Top loading Balance:

Triple beam Balance:

IV. Laboratory equipment and glassware (use the internet)

Introduction to Glassware and Apparatus

List of Some Laboratory glassware and equipment:

1. Funnel
2. Erlenmeyer Flask
3. Beaker
4. Graduated Cylinder
5. Pipette
6. Test Tube
7. Burette
8. Test Tube Rack
9. Wire Gauze
10. Medicine Dropper
11. Wash Bottle
12. Bunsen Burner
13. Iron Ring
14. Stand
15. Clamp
16. Pipette Filler or rubber Bulb
17. Tongs/Crucible Tongs
18. Clay Triangle
19. Crucible and Lid
20. Glass Rod
21. Test Tube Brush
22. Goggles
23. Spatula

V. Use of Pipette (safety bulb) *(Technique 16b)*

Use of Pipette filler

VI. Determination of Density of a Solid:

- Intensive property and extensive property.
- At a given temperature.
- SI units: g/cm^3 for solids; g/mL for liquids and g/L for gases.

The Experiment: finding the density of an irregular object.

VII. The Report:

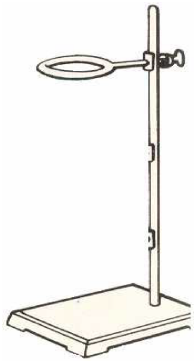
- Prelab. Report *(before the lab.)*
- The report sheet *(during the lab period)*
- Post-lab report *(after the lab period)*

Lab Quiz *(Look at this link)*

Funnel	Erlenmeyer Flask	Beaker

Graduated Cylinder	Burette 	Pipette

Test Tube	Test Tube Rack	Bunsen Burner
Wire Gauze	Medicine Dropper	Wash Bottle

Utility Clamp	Iron Ring	Stand (*with ring*) 

Pipette Filler or rubber Bulb	Goggles	Tongs/Crucible Tongs
Clay Triangle	Crucible and Lid	Crucible in Triangle

Spatula	Glass Rod 	Test Tube Brush

VIII. Techniques: *(Summarized on pages 7 & 8 in your lab. manual.)*

Some of these techniques are listed below:

Technique #	***Name***	***Technique #***	***Name***
1.	-----	10.	Transferring Liquids & Solutions
2.	Cleaning Glassware	11.	Decantation, G. Filtration
3.	Handling Chemicals	12.	-----
4.	Disposing of Chemicals	13.	Heating Liquids & Solutions ***(Over Hot Plate or Water Bath)***
5.	Preparing Solutions	14.	Evaporating Liquids ***(Flammable & None-Flammable)***
6.	Measuring Mass	15.	Using a Crucible ***(Drying, firing, ignition, …)***
7.	-------	16.	Measuring Volume ***(Reading a meniscus, Using and preparing Pipet & Buret, Pipet Filler)***
8.	--------	17.	▪ **Testing for Odor** ▪ **Testing for Acidity & Basicity**
9.	Transferring Solids		

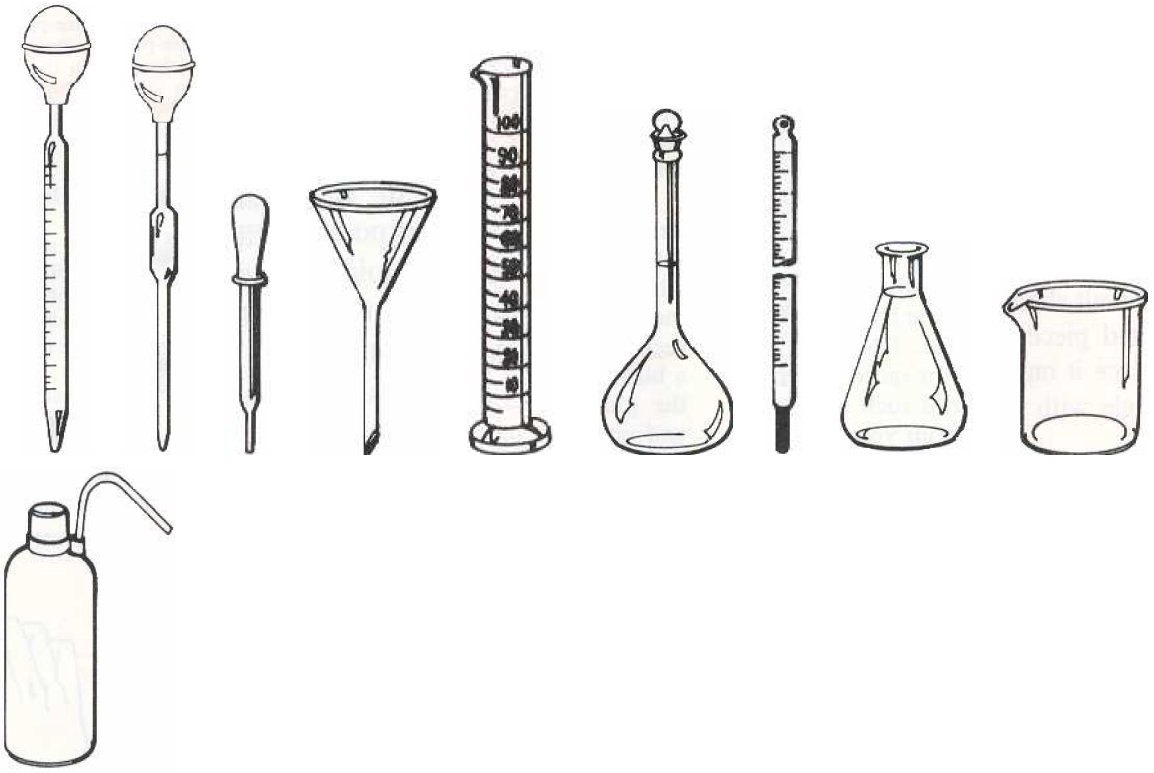
Important:

See the laboratory assignment on the laboratory techniques, page 31-32.

Technique 14:
Heating volatile or flammable liquids in the laboratory in a water bath

The End

2014
Modified: 2019, 2020, 2021



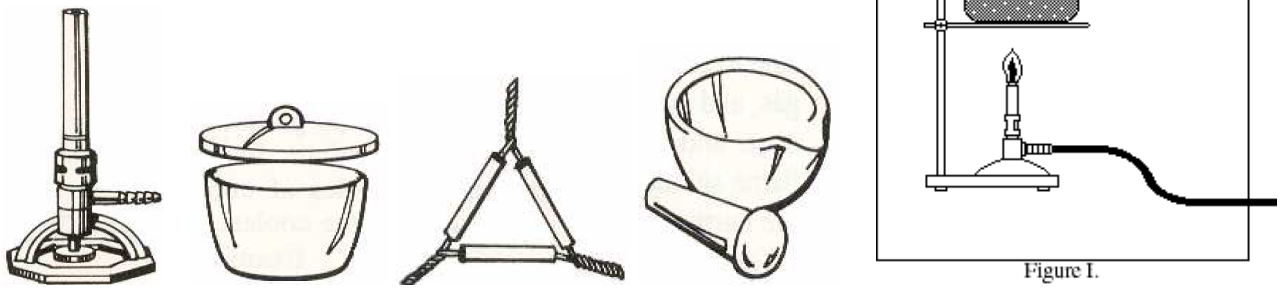


Figure I.