Identification of the common laboratory glassware, pipettes and Equipment .

1) Identification of the common laboratory glassware:

a. Conical flasks and beakers.

b. Graduated cylinders (measuring cylinder).

c. Volumetric flasks.

d. Burettes.

e. Pipettes.

(1) Identification of the common laboratory glassware:

A- Conical flasks and beakers:

- They are used for mixing, transporting and reacting.
- But not for accurate volume measurements.

Conical flasks

Beaker

B- Graduated cylinders (measuring cylinder)

- It is used to measure the volume of a liquid.

Graduated cylinders

C- Volumetric flasks:

- It is used to make up a solution of fixed volume very accurately.

Volumetric flasks

D- Burettes:

- It delivers measured volumes of liquid. They are used primarily for titration.

Burette

2)- Pipettes:

- Are Tools commonly used to transport a measured volume of liquid.
- Pipettes come in several designs for various purposes with differing levels of accuracy and precision.

- *There are three types of pipettes are used in biochemical laboratory:*

(a) Volumetric or transfer pipettes.

(b) Graduated or measuring pipettes.

(c) Micropipette.

- Types of pipettes:

(a) Volumetric pipettes.

(b) Graduated pipettes.

Serological pipette

Graduated between two marks

Mohr pipette

Graduation mark down to the tip

(c) Micropipettes.

- Comparing between two main types of pipettes:

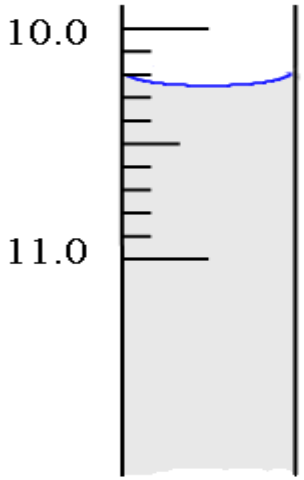
a) Volumetric pipettes

1. Transferring (designed to deliver accurately fixed volume of liquid)
2. Non-blown out.
3. Not graduated.
4. More accurate.
5. Consists of a cylindrical bulb joined at both ends to narrowed glass tubing.

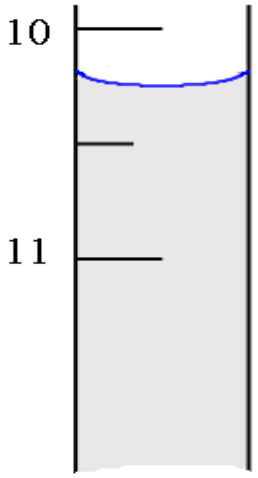
b) Graduated pipettes

1. Measuring.
2. Some are blown out.
3. Graduated
4. Less accurate
5. Don’t contain a cylindrical bulb.

SMALLEST DIVISION OF GRADUATED PIPETTE



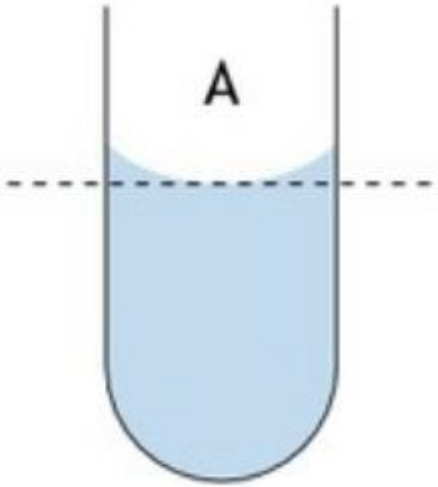
$$\frac{1\text{ml}}{10} = 0.1\text{ ml}$$

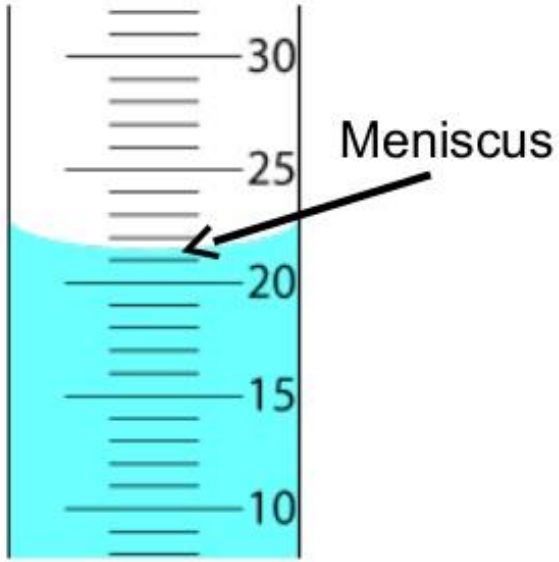


$$\frac{1\text{ ml}}{2} = 0.5\text{ ml}$$

Meniscus

- Curve at the top of a liquid in any container
- **ALWAYS** read from the BOTTOM of the meniscus





- Steps of using pipettes:

- The pipette is first washed with water, then rinsed several times with a little of the solution to be used and finally filled to just above the mark , the liquid is allowed to fall to the mark .
- The solution is allowed to drain into the appropriate vessel with the jet of the pipette touching the wall of the vessel .
- After the flow of the liquid has stopped, the jet is held against the wall for some times and then removed .
- A certain amount of liquid will remain at the tip and this must not be "blown out".

(3) Identification of the common laboratory Equipment:

(A)Balance.
(B) pH meter.
(C) Spectrophotometer.

Balance

pH meter

Spectrophotometer

a)- pH meter:

- A **pH meter** is an electronic device used for measuring the pH (acidity or alkalinity) of a liquid.

- PH define as the negative logarithm of the hydrogen ion concentration .

$$\mathbf{PH=} - \log_{10} [H+]$$

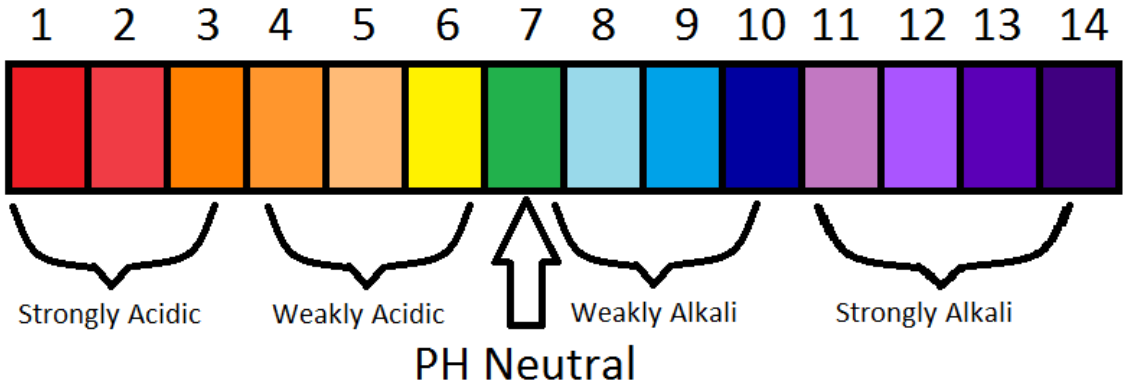
- So, the term pH introduced as a way of expressing hydrogen ion concentration.

- Hydrogen ion concentration of many solution is low and difficult to measure accurately.

- Since the PH determines many important aspects of the structure and activity of biological macromolecules and thus of the behavior of the cell and organisms .

- **Note:** PH range value (0 - 14).

The higher PH number , the lower the hydrogen ion concentration, and the lower PH meter, the higher hydrogen ion concentration.



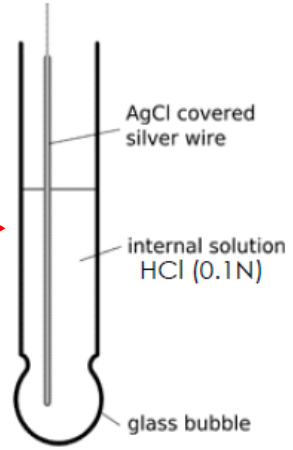
- There are many ways in biochemical laboratory to measure PH value such as:

1. litmus paper.

2. a field kit.

3. PH meter the most accurate and reliable method.

*** Note: before use it needs to be calibrated.**



Glass electrode

This video shows the using of a pH Meter https://www.youtube.com/watch?v=vwY-xWMam7o

b)- Spectrophotometer:

• Spectrophotometer is an instrument used to measure the intensity of light at a given wavelength that is transmitted or absorbed by a sample.

• **Wavelength** in this instrument divided into:

1. Invisible range(ultraviolet) from 100 to 360 nm **(Quartz cuvette are used).**

2. Visible range (above 360 nm -700 nm) **(Glass or plastic cuvette are used).**

• **Blank**: contain everything except the compound to be measure.

- **Spectrophotometer** can be used to measure the amount of light absorbed by a solution.

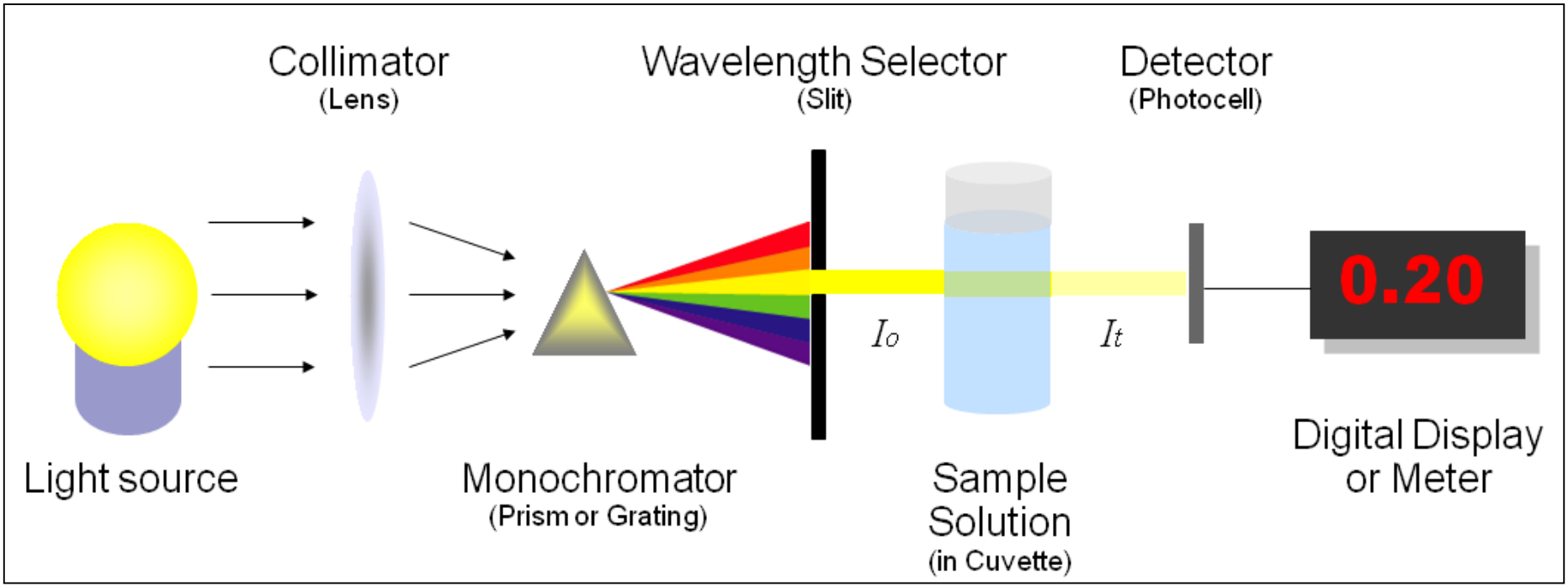
- By using the spectrophotometer, *we can quantitatively measure absorbance*, and this information can be used to determine the concentration of the absorbing molecule.

- More concentrated solution will absorb more light and transmits less.

More concentrated solution → high absorbance value.

Less concentrated solution → less absorbance value.

How a spectrophotometer works



- Objective:

- To be familiar with the most common **glassware** and **equipment** in biochemistry labs.

- Method and Results:

1. Identification of the common laboratory glassware:

Glassware number	Type of glassware	Final volume
1		
2		
3		
4		
5		

2. Comparing between glassware accuracy:

- Place a beaker in the electronic balance.
- To the beaker, add 5ml of water using a graduated pipette (Mohr).
- Record water weight.
- Repeat the procedure again by using measuring cylinder this time.
- Record water weight.

Type of glassware	Weight of beaker	Weight of beaker + water	Weight of water
Graduated pipette (Mohr)			
Measuring cylinder			
Which one is more accurate? ……			

3. Identification of the common laboratory pipettes:

- Examine the three pipettes placed on your laboratory bench.
- Record their types and the volume of their smallest division.

Type of pipette	Smallest division

4- Identification of the common laboratory equipment:

a) PH meter:

• Standardize the PH meter by placing the electrode in a solution of known pH (PH 4 , 7, 10) ➔ **Calibration.**

• Wash the electrode with distilled water and dry by tissue then put it into sample solution (A) then wash it again and place it in solution (B) ➔ **Read PH.**

Note: After use the electrode, you should storage it in distilled water and never be allowed to dry out. IF the electrode get dry it will required reactivation.

Solution	pH value	Neutral, acidic or basic
Standard 4		
Standard 7		
Standard 10		
Sample A		
Sample B		

b) Spectrophotometer:

• Adjust the spectrophotometer to zero using **water** as blank solution in the cuvette.

• Read the absorbance of standard solution and the solution of unknown concentration at **280 nm.**

• Read your result.

Solution	Absorbance at 280nm
BSA standard solution (0.5 g/100 ml)	
Solution of Unknown concentration	

- Calculation:

$C_{standard} \rightarrow A_{standard}$

$C_{unknown} \rightarrow A_{unknown}$

$$C_{unknown} = \frac{C_{standard} \times A_{unknown}}{A_{standard}}$$

- **C standard =** concentration of standard solution, **C unknown =** concentration of unknown solution.
- **A standard =** Absorbance of standard solution, **A unknown =** Absorbance of unknown solution.

- Example

Solution	Absorbance at 280nm
BSA standard solution (0.5 g/100 ml)	1.803
Solution of Unknown concentration	0.636

$C_{standard} \rightarrow A_{standard}$

$C_{unknown} \rightarrow A_{unknown}$

$$C_{unknown} = \frac{C_{standard} \times A_{unknown}}{A_{standard}}$$

$C_{unknown}$ = (0.5 x 1.803) / 0.636 = **0.318 g/100ml**

Thank you