

Identification Of The Common Laboratory Glassware, Pipettes And Equipment



(1) Identification of the common laboratory glassware :

Conical flasks and beakers:

They are used for mixing, transporting and reacting, but **not for accurate** volume measurements.



Conical flask



Beaker

Graduated cylinders

Used to measure the volume of a liquid. Graduated cylinders are generally more accurate and precise than laboratory flasks and beakers.



measuring cylinder

Volumetric flasks

It is used to make up a **solution** of fixed volume **very accurately**, (preparing standard solutions and reagents)



Volumetric flasks

Burettes

A burette delivers measured volumes of liquid. Burettes are used primarily for **Titration**.



Burettes

(2) Identification of laboratory 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.
- ❑ **There are three main type of pipettes are used in biochemical laboratory:**
 - (a) Volumetric or transfer pipettes.
 - (b) Graduated or measuring pipettes.
 - (c) Micropipettes



Types of pipettes

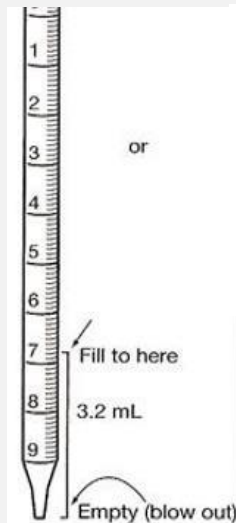
(a) Volumetric pipettes. [transfer]



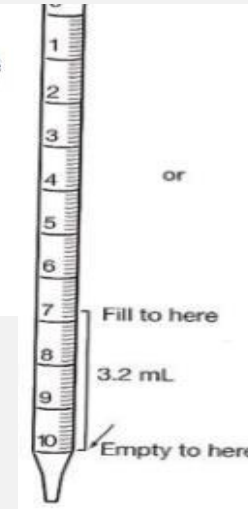
(b) Graduated pipettes. [measuring]

Serological pipette

Mohr pipette



- MOHR PIPETTES
– the graduations on these always end before the tip
- SEROLOGICAL PIPETTES
– the graduation marks continue to the tip



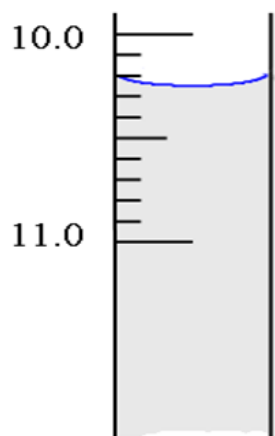
Micropipettes



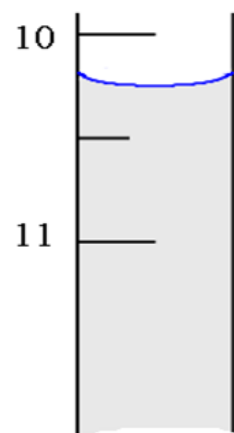
Comparison between type of pipettes

Volumetric pipettes	Graduated pipettes
Transfer (designed to deliver accurately fixed volume of liquid)	Measuring
Not graduated	Graduated
More accurate	Less accurate
Non-blown out	Some are blown out
Consists of a cylindrical bulb joined at both ends to narrowed glass tubing.	Don't contain a cylindrical bulb

Smallest Division Of Graduated Pipette:

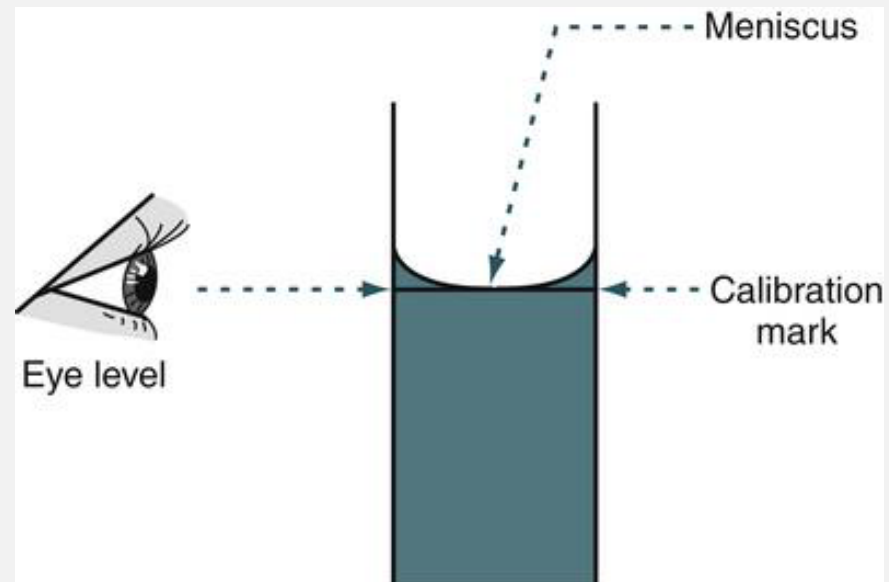
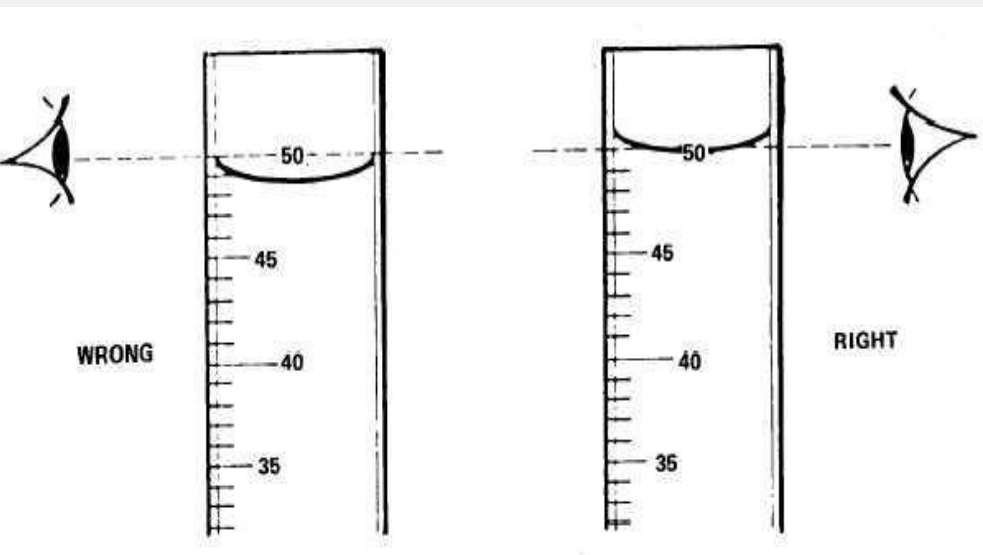


$$\frac{1\text{ml}}{10} = 0.1\text{ ml}$$



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

Reading the meniscus



Steps of the Use of pipettes:



- 1-Press the pipette into the **pump** with a slight twisting motion.
- 2-The pipette is first washed with water ,then rinsed several times with a little of the solution.
- 3-The pipette then filled to just above the mark , the liquid is allowed to fall to the mark .
- 4-The solution is allowed to drain into the appropriate vessel with the jet of the pipette touching the wall of the vessel .
- 5-After the flow of the liquid has stopped, the jet is held against the wall for some times and then removed.

Note:

- -For serological pipette, some are of the blown out type; the last drop being blown out against the vessel wall.
- -For volumetric pipette a certain amount of liquid will remain at the tip and this must not be "blown out".

Accuracy

- 1- Volumetric flasks and volumetric pipettes (**most accurate**).
- 2-Burets and graduated pipets.
- 3-Graduated cylinders.
- 4-Beakers and conical flasks. (least accuracy) -used only when a rough estimation of volume is required-

(2) Identification of the common laboratory Equipment:

(A) pH meter.



(B) Spectrophotometer.



(C) Balance.

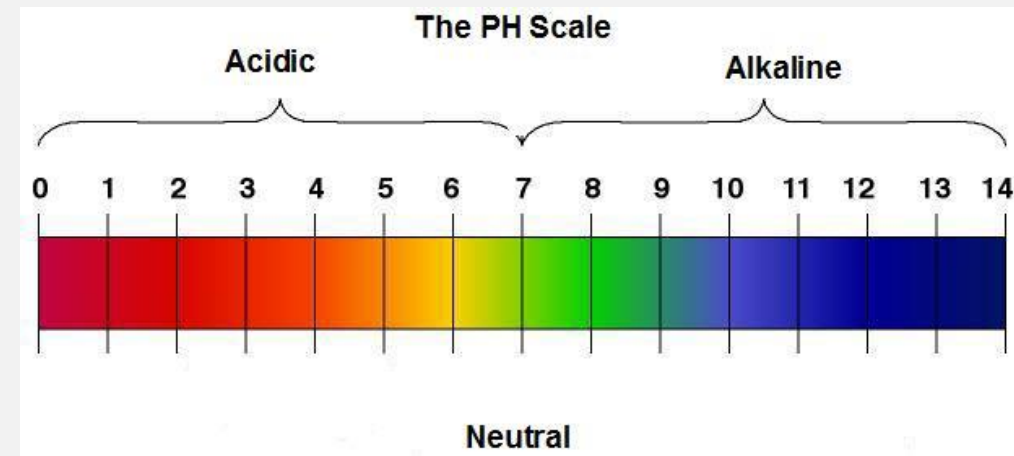


pH meter:

- The term pH introduced as a way of expressing **hydrogen ion concentration** .
- PH define as the negative logarithm of the hydrogen ion concentration .

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

- PH determines many important aspects of the structure and activity of biological macromolecules and thus of the behavior of the cell and organisms .
- PH range value (0 - 14) , the higher PH number, the lower the hydrogen ion concentration (**Alkaine**) and vice versa (**inverse relationship**).



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

• litmus s paper,



• a field kit



• PH meter. **The most accurate and reliable method**

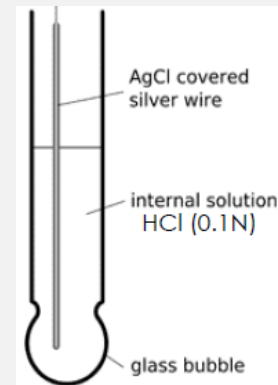


(A) pH meter

- ❑ A **pH meter** is an electronic device used for measuring the pH (acidity or alkalinity) of a liquid.
- ❑ **Note:** before use it needs to be **calibrated**
- ❑ **Calibration** : To ensure accurate measurements from your pH meter the meter will need to be calibrated before use. This is usually done by dipping the probe into a buffer solution of a known pH (pH 4, 7 and 10) and following the calibration steps based on our specific pH meter.
- ❑ pH meter contain glass electrode which is very sensitive and readily responds to changes in hydrogen ion concentration .

How to use the pH meter: <https://www.youtube.com/watch?v=vwY-xWMam7o>

Principle: <https://www.youtube.com/watch?v=P1wRXT12L3I>



Using a pH Meter:

- The meter must be calibrated by using standards of known pH before an unknown is measured., the pH 4.00 , pH 7.00 and pH10 standards should be used.
- To calibrate the pH meter, expose the hole in the electrode, rinse the electrode with deionized water, and place the electrode in the first standard solution then press “Cal” bottom.
- Don’t forget to rinse the electrode with water after reading pH of each standard solution.
- Place the electrode into the unknown solution and press “Read” bottom.
- Do not drop the electrode or bump it on the bottom of the beaker when immersing it in a solution.
- The glass membrane must be thoroughly hydrated to work properly. Do not allow the electrode to remain out of water any longer than necessary. When the electrode is not in use, keep it immersed in the buffer.

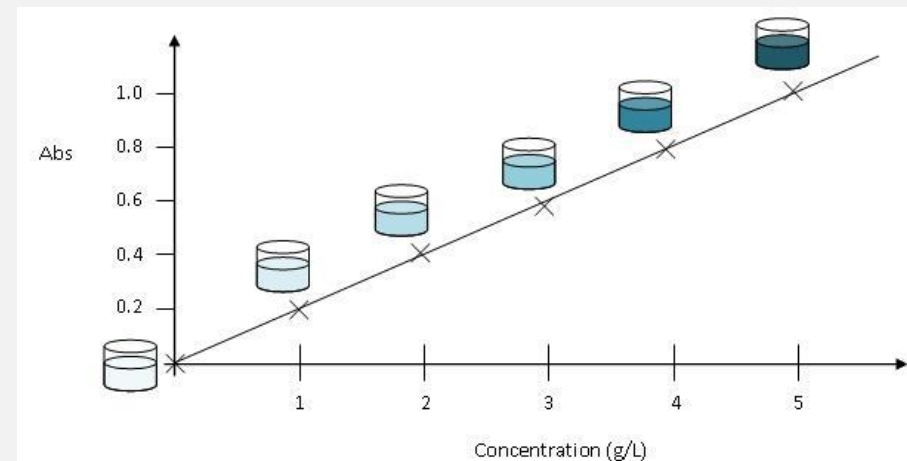
(B) Spectrophotometer

- **Spectrophotometer** is instrument used to measure the amount of light absorbed or transmitted by a sample at a given wavelength.
- **Wavelength** in this instrument divided into:
 - Invisible range (ultraviolet) from 100 to 360 nm [**Quartz cuvette** are used]
 - Visible range (above 360 nm -700 nm) [**Glass or plastic cuvette** are used]
- **Blank** : contain everything except the compound to be measure.

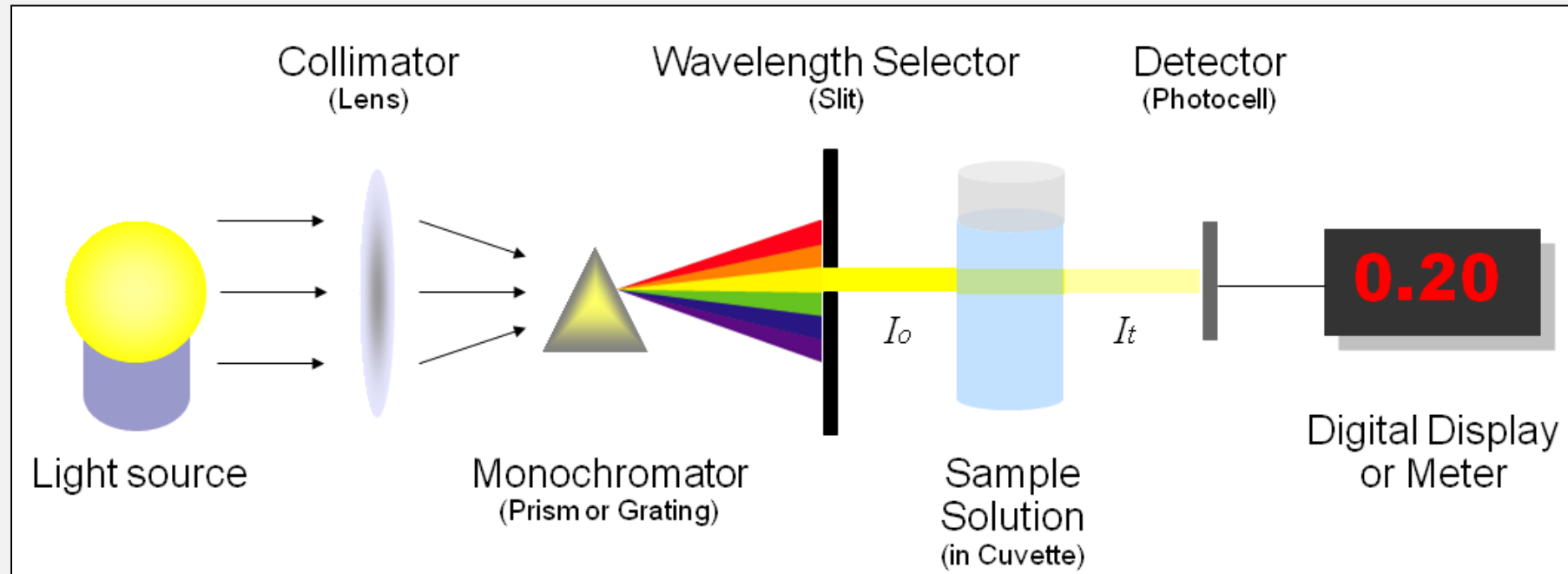


Con't

- By using the spectrophotometer, we can quantitatively measure **absorbance**, and this information can be used to determine the **concentration** of the absorbing molecule.
- **There is a direct relationship between concentration and absorbance.**
- **More** concentrated solution will absorb more light and transmits less. (vice versa)



How does a spectrophotometer work? (principle)



<http://www.youtube.com/watch?v=pxC6F7bK8CU>

(c) Electronic balance



- ❑ **Electronic Balance** is a device used to find accurate measurements of weight.
- ❑ It provide the results digitally, making them an easy tool for use.
- ❑ The weight can be displayed by different unites.
- ❑ Before waiting any substance, you should **(Zero)** the balance.
- ❑ **What does mean zeroing of the electronic balance?**

(mass of beaker + substance) -(mass of beaker) = (mass of substance)



How to use electronic balance <https://www.youtube.com/watch?v=0UymyTJATLc>



Practical Part

Objective

- To be familiar with the common laboratory tools and equipment.

Method and Results

(1) Identification of the common laboratory glassware

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

(2) Comparison between glassware accuracy

- 1-Place a beaker in the electronic balance, and read the weight.
- 2-Remove the beaker from the balance, and add 5ml of water using a graduated pipette (Mohr).
- 3-Record the weight.
- 4-Repeat the procedure again by using measuring cylinder this time.
- 5-Record the weight.

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

(3) Identification of laboratory pipettes:

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

	Type of pipette	Smallest division
A		
B		
C		

(4) Identification of the common laboratory equipment:

A. pH meter:

1-Standardize the PH meter by placing the electrode in a solution of known pH (PH 4 , 7, 9) “Calibration”.

2-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 pH4		
Standard pH7		
Standard pH9		
Sample A		
Sample B		

(4) Identification of the common laboratory equipment:

B. Spectrophotometer:

1-Adjust the spectrophotometer to zero using water as blank solution in the cuvette.

2-Read the absorbance of standard solution and the solution of unknown concentration at 280 nm.

3-Read your result.

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

Calculations:

$$\begin{array}{l} C_{\text{standard}} \rightarrow A_{\text{standard}} \\ C_{\text{unknown}} \rightarrow A_{\text{unknown}} \end{array} \longrightarrow C_{\text{unknown}} = \frac{C_{\text{standard}} \times A_{\text{unknown}}}{A_{\text{standard}}}$$

Where:

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

H.W

Why quartz cuvette used in the case of invisible wavelength?