

Measuring Volume



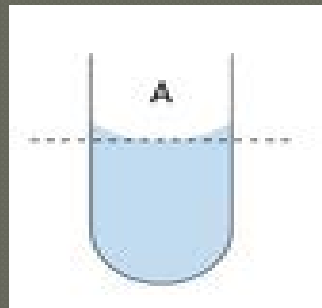
Measuring Volume

When a liquid is placed into a glass container it forms a **meniscus**. The meniscus is the curve seen at the top of a liquid in response to its container.

The meniscus can be either concave or convex:

Concave Meniscus

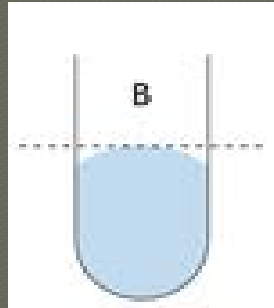
Occurs when the molecules of the liquid are more strongly attracted to the container than to each other. (ex. water in glass)



Measuring Volume

Convex Meniscus

Occurs when the molecules of the liquid are more strongly attracted to each other than to the container. (ex. mercury in glass)

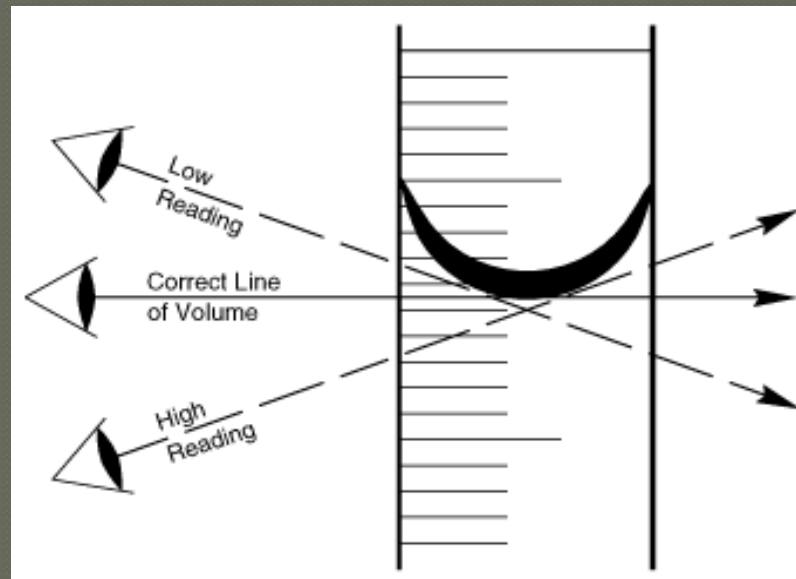


In some cases, the meniscus may appear flat (ex. water in some plastics).

Measuring Volume

In order to read the volume correctly:

- The vessel must be placed on a level and stable surface
- Never try to read volume while holding the vessel in your hand.
- Your eye must be level with the bottom of the meniscus.
(do not look down at or up at the bottom of the meniscus)

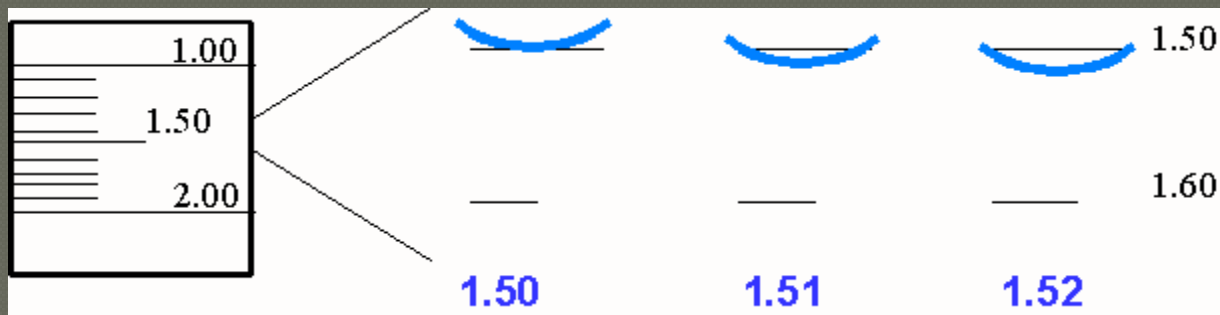


Measuring Volume

When measuring volume, ensure that you are recording your readings to the correct number of decimal places.

Ex) A buret will measure up to 50mL, and has graduations that measure 0.1mL.

→ Your eye can take the measurement to the next decimal place, so ALL measurements must be recorded to two decimal places



Using Medicine Droppers/Disposable Pipets

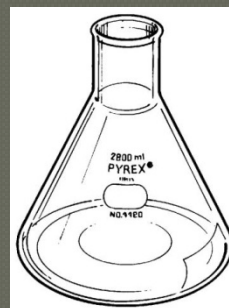
- Used when accurate volumes are not required.
- Can be calibrated by counting the number of drops it takes to make up one milliliter.
- Also can be used to add drops of solution to a graduated cylinder or flask to bring the meniscus to the proper level.



Beakers, Flasks, Graduated Cylinders

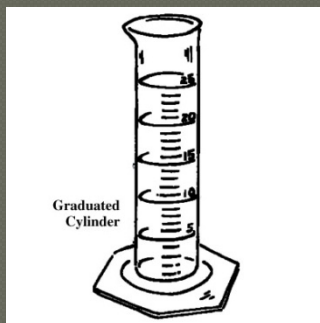
Using Beakers or Flasks

- Used when only approximate volumes are needed.



Using Graduated Cylinders

- Most common measuring device
- Skinnier cylinders are more accurate.

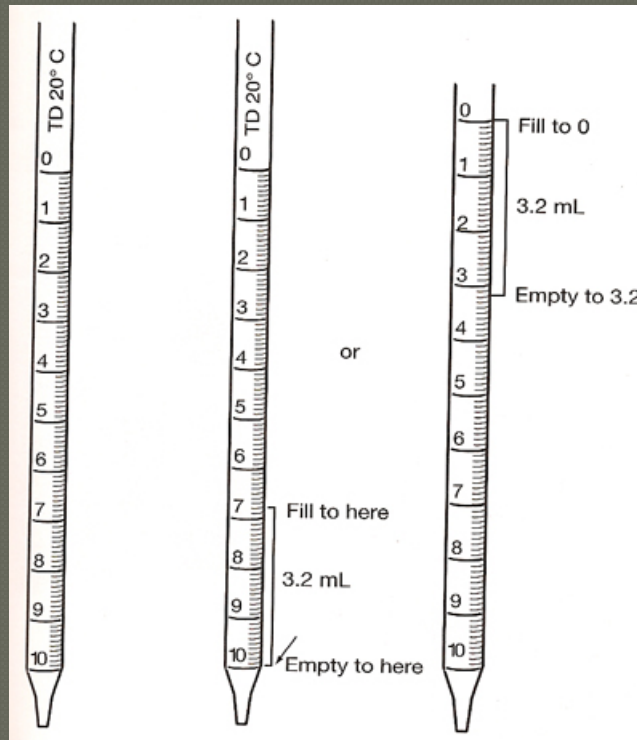


Using Pipets

Pipets are used to measure smaller volumes accurately.
There are 3 types:

Graduated (Mohr) Pipets:

- Are pipets where the tip is NOT part of the measurement (not a “blow-out” pipet)

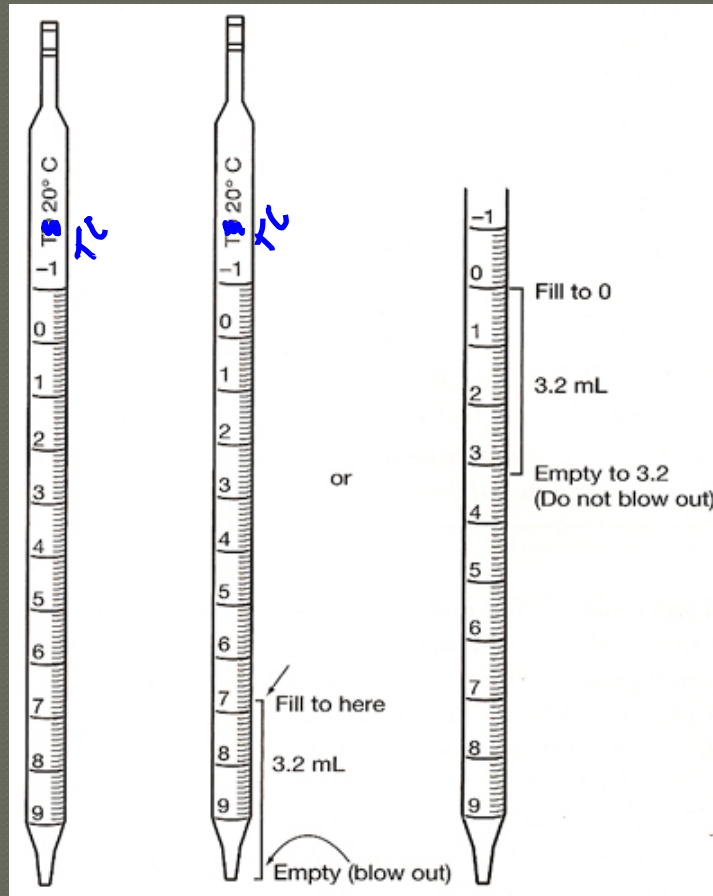


Using Pipets Con't.

Serological Pipets:

- Usually are disposable/sterile pipets
- The tip is included as part of the measurement (called a “blow-out” pipet)

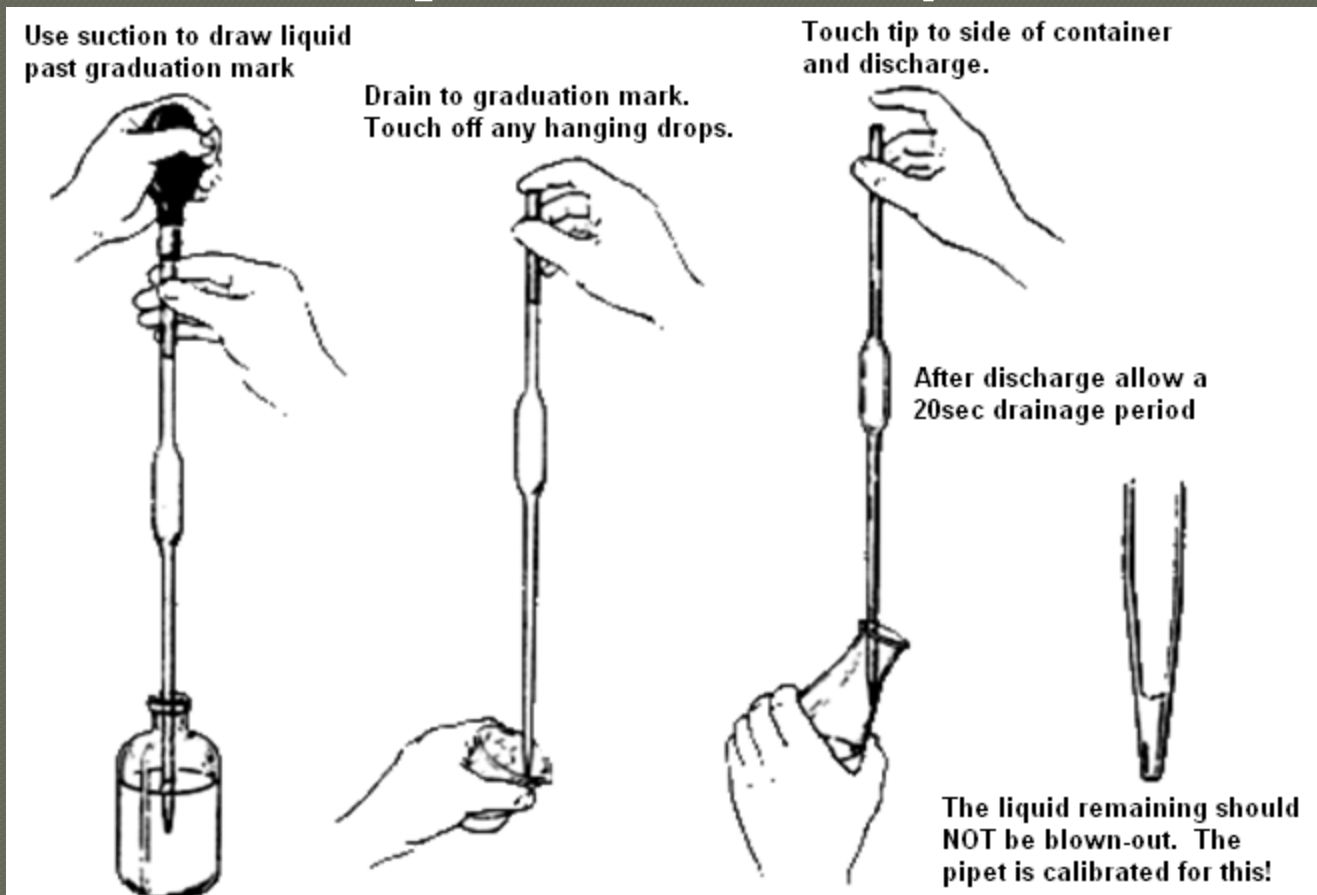
TD = Do NOT Blow out
TC = Blow out



Using Pipets Con't.

Volumetric Pipets:

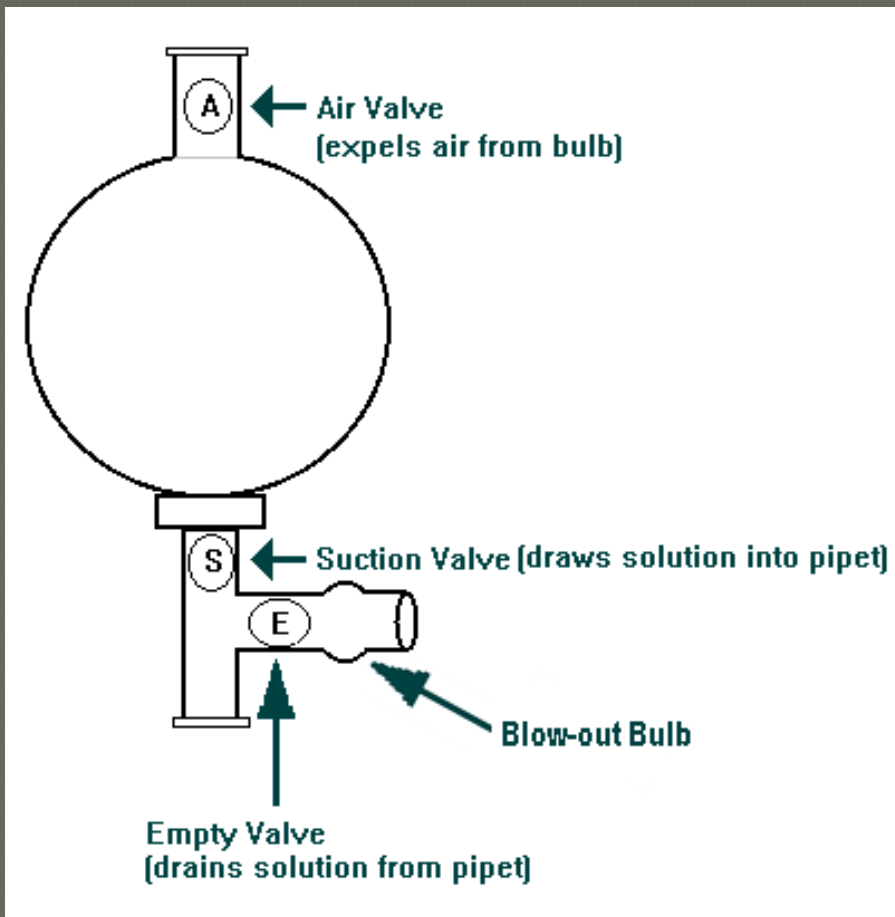
- Measure one volume very accurately.
- Are not meant to be “blown-out” – they are calibrated to account for liquid left behind by surface tension.



Using Pipets Con't.

There are a few different tools used to fill pipets.

Pipet Filler



Pipet Pump



*****You should never use your mouth to fill a pipet!**

Using Volumetric Flasks

Volumetric Flasks:

- Measure one volume very accurately.
- Are used mainly in preparation of solutions.
 - The solute is added to the empty flask
 - A small amount of solvent is added to dissolve the solute.
 - Solvent is added to dilute the solution “to the mark”.
 - The flask should be stoppered, and then inverted several times to ensure thorough mixing.



Using a Buret

Burets:

- Measure and deliver smaller amounts very accurately.
- Before using, the buret should be rinsed with the solution it will be measuring (the titrant):
 - Add a small portion of titrant (3-5mL)
 - Lay the buret to a nearly horizontal position and roll it so the liquid contacts the entire inside surface.
 - Drain the rinse into a waste beaker through the tip.

Using a Buret

Burets:

- To operate a buret:
 - Close the stopcock and use a funnel to fill the buret above the zero mark.
 - Ensure the buret is vertical and not on a slant.
 - Briefly open the stopcock wide open to remove any air bubbles.
 - Ensure the titrant is at some point below the zero mark
→ This will be your initial volume.

