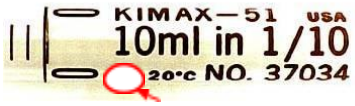
# Pipettes and Pipette Instructions

## Volumetric pipettes

- Volumetric pipettes are NOT graduated.
- They are calibrated to a specific volume.
- Volumetric pipettes are most frequently to deliver (TD) but NOT blown out. They may have a colored or etched ring at the top of the pipette. A color block at the top of the pipette is for manufacturer identification and is NOT a ring. These pipettes are held vertically and drained by gravity with the tip of the pipette placed against the side of the container above the liquid.
- Volumetric pipettes are designed to deliver a single volume precisely. They have a bulb-like enlargement which contains the majority of the liquid. The liquid must be drawn up to the fill line for accurate measurement.

## Graduated pipettes

1. Serological pipettes 

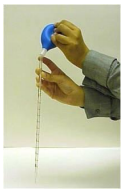

   - Measure various volumes with a single pipette.
   - Graduated to the tip. (Accurate measurement includes **all** fluid from the graduated fill line to the tip)
   - *To deliver/**blow-out.*** The vast majority of serological pipettes is TD/blow out and will have the letters TD and/or **two** etched (indicating blow out) or colored lines near the top of the pipette. After the pipette has drained by gravity, the last drop must be blown out with a bulb or dial device. ***Note:* volumetric pipettes are TD/drain and serological pipettes are TD/blow out.
   - Graduated pipettes are not as accurate as volumetric pipettes, due to the fact that each graduation line is not individually calibrated and any imperfection in the internal diameter will have a greater effect on the volume delivered.

2. Transfer pipettes (frequently encountered in the clinical lab)

   - One-piece design with built-in bulb for controlled drawing and dispensing of liquids in drop form.
   - Disposable to prevent cross-contamination.
   - Drawing volume up to graduation mark will deliver approximate volume indicated. Transfer pipettes are NOT the pipette of choice to deliver precise volumes. Also available without graduation markings.
   - Available in sterile and non-sterile versions.

3. Mechanical/automated pipettes
   - Typically used to deliver volumes less than 1000µL
   - MUST use a disposable tip
   - Can be fixed- volume or adjustable for a range of volumes
   - Can be single or multiple channel

## Manual Pipetting Procedure



1. Hold the pipette several centimeters below the opening of the bulb with one hand.

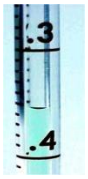
2. With your other hand squeeze the bulb and touch the bulb opening to the top of the pipette. Do not insert more than 1/2 cm of the pipette into the bulb.

3. Holding the pipette **vertically**, place the tip into the liquid sample 2-5 mm beneath the meniscus away from the sides or bottom of the tube (container). ***Note: it is **critical** to hold the pipette straight up and down. Insertion of the pipette tip that is too shallow, leads to sample vortexing and bubbles. Insertion too deep leads to droplets on the outside of the tip.*

4. **Slowly** release the pressure on the bulb. By steadily releasing pressure on the bulb, liquid will to be drawn into the tube, slowly. ***Note: Do NOT release your hand quickly or the liquid could flow into the bulb and be contaminated.*

5. Pull the **bottom** of the curved liquid surface, the meniscus, a centimeter or two **above** the desired volume graduation mark.

6. Quickly, but carefully, remove the bulb and **immediately** slip your free index finger over the top of the pipette. ***Note: Do NOT use your thumb. The index finger offers more control.*




7. With your finger firmly on the top of the pipette, lift the pipette out of the sample.

8. Position yourself so that you are at **eye-level** with the liquid in the tube. ***Note: Best practice is NOT to raise the pipette to eye-level, but rather to move your body to reach eye-level.*

9. **Slowly** raise your finger to allow the liquid to drop in the tube until the **bottom** of the **meniscus** lines up with desired graduation mark. ***Note: This MUST be performed with a vertical pipette at eye-level for accurate measurement.*

10. Touch the **tip** of the pipette to the inside of the container to remove a hanging drop.

11. Touch the **tip** of the pipette to the second container and release your finger.

12. If the pipette is a **serological** pipette, verify that it is a TD pipette and gently place the bulb on the end of the pipette and squeeze slightly to "blow out" the remaining liquid. Then remove the pipette from the second container. **Note: If the pipette is volumetric TD, then DO NOT BLOW OUT or shake the pipette, allow to drain, withdraw.