

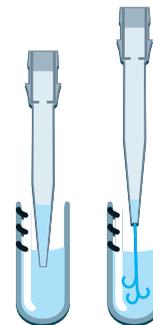
# 10 TIPS

## To Improve Your Pipetting Technique

Of all the factors contributing to the performance of a pipette, the most critical are the skill and expertise of the operator.

### 1 Prewet the pipette tip

Aspirate and fully expel an amount of the liquid at least 3 times before aspirating for delivery. Failure to prewet increases evaporation within the tip air space, which can cause significantly lower delivery volumes. Prewetting reduces evaporation.



### 2 Work at ambient temperature

Allow liquids and equipment to equilibrate to ambient temperature prior to pipetting. The volume of liquid delivered by air displacement pipettes varies with relative humidity and vapor pressure of the liquid - both of which are temperature-dependent. Constant temperature minimizes variation of pipetted volume.



### 3 Examine the tip before and after dispensing sample

Before dispensing, carefully remove droplets on the outside of the tip, being sure to stay clear of the tip opening to avoid wicking liquid out of the tip. After dispensing, and before releasing the plunger, deliver any residual liquid remaining in the tip by touching the tip to the side of the container. Surface tension will help draw the remaining liquid out of the tip.



### 4 Use standard mode pipetting

Depress the plunger to the first stop, immerse the tip into the liquid and aspirate by releasing the plunger. Remove the pipette from the liquid and depress the plunger to the second stop to dispense the entire contents.

Standard (or forward) mode pipetting yields better accuracy and precision than reverse mode for all but viscous or volatile liquids. Reverse mode often results in over-delivery.



### 5 Pause consistently after aspiration

After aspirating, and before removing the tip from the liquid, pause for one second. Make this pause as consistent as possible.

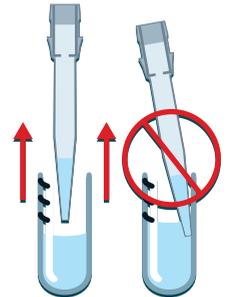
Liquid continues to flow into the tip for a short time after the plunger stops. At the same time, evaporation within the tip is occurring. Pausing consistently balances these two effects and ensures correct aspiration.



## 6 Pull the pipette straight out

When aspirating, hold the pipette vertically and pull the pipette straight out from the center of the container.

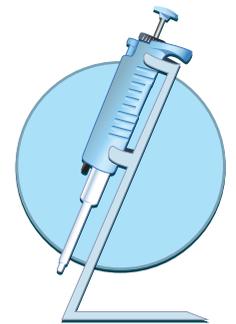
This technique is especially important when pipetting small volumes (less than 50  $\mu\text{L}$ ). Holding the pipette at an angle as it is removed from the liquid alters the volume aspirated. Touching the sides of the container causes wicking and loss of volume.



## 7 Minimize handling of the pipette and tip

Hold the pipette loosely, return it to the pipette stand or set it down between deliveries. Avoid handling pipette tips, or containers of liquid to be pipetted.

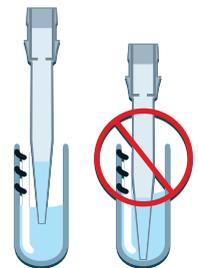
Body heat transferred during handling disturbs temperature equilibrium, which leads to variations in delivered volume.



## 8 Immerse the tip to the proper depth

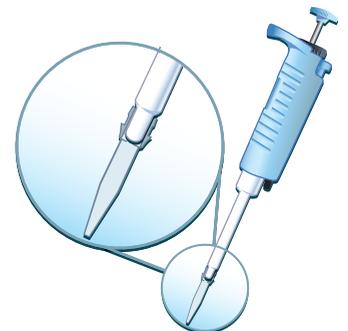
Before aspirating, immerse the tip adequately below the meniscus. Large volume pipettes (1-5 ml) should be immersed 5-6 mm, while smaller volume pipettes should be immersed 2-3mm.

Too little immersion, particularly with large volume pipettes, can lead to aspiration of air. Too much immersion can cause liquid to cling to the outside of the tip. Contacting the container bottom with the tip may restrict aspiration.



## 9 Use the correct pipette & pipette tip

Use high quality tips intended for use with the pipette of your choice. Inferior tips and pipettes can result in inaccuracy, imprecision, or both. Quality tips provide an airtight seal, are made of superior materials, and are free of molding defects - thereby ensuring dependable liquid delivery.



## 10 Use consistent plunger pressure and speed

Depress the plunger smoothly until coming to rest with a light and consistent force at the first stop. Immerse the tip, then release the plunger at a constant rate.

It's all about rhythm - repeatable actions produce repeatable results.

