

Using a micropipette to transfer exact liquid measurements in scientific experiments

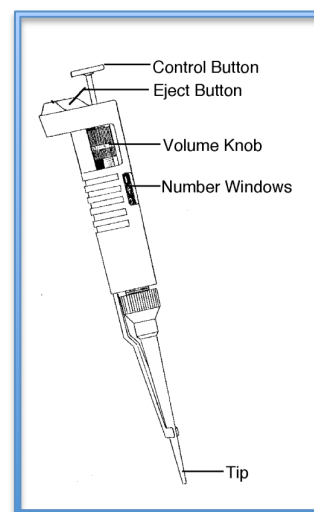
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Introduction

A micropipette is a scientific tool used to transfer small, exact volumes of liquid between 1-1000ul. Proper use of a micropipette is essential to successfully carry out a scientific experiment that requires exact volumes of a reagent during the sample preparation. Micropipettes are most often used in general or organic chemistry, biochemistry, and molecular biology experiments.

Each micropipette has a control button, eject button, volume knob, number windows, and a tip.

- ❖ The **control button** is used when drawing up and expelling liquid. Each control button has two stopping points.
 - The first stopping point is used to draw up the liquid.
 - The second stopping point is used when the liquid is expelled from the plastic tip attached to the tip of the micropipette.
- ❖ The **eject button** is used when discarding the plastic tip.
- ❖ The **volume knob** is used to adjust the volume for each micropipette.
- ❖ The **number windows** display the set volume based on the adjustments made on the volume knob
- ❖ The **tip** of the micropipette is the part of the micropipette that will attach to the plastic tips
- ❖ The **plastic tips** hold the volume of the reagent being used in the experiment



Anatomy of a micropipette

However, each micropipette can be used only in a specified range of liquids. Once the correct micropipette is chosen, the volume within the range of the micropipette must be specified. Next, the proper tip must be obtained and inserted onto the micropipette. The volume of liquid is drawn up and then expelled using the control button using the two stopping points on the button. Then, the tip is ejected. The whole process, when mastered, can be carried out in less than one minute.

CAUTION When using a micropipette, it is critical to follow these safety measures:

- ❖ Never attempt to pipet a volume outside of the specified volume range for each micropipette
- ❖ Always use gloves when handling biological fluids, strong acids, strong bases, or toxic materials
- ❖ Always dispose of plastic pipette tips in a biohazard bag when handling biological fluids
- ❖ Always work in a fume hood when using volatile (readily evaporated) liquids

Choosing the Correct Micropipette

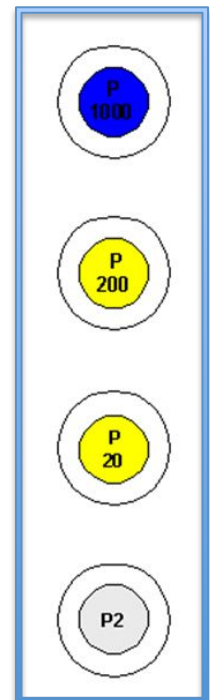
Choosing the correct micropipette is essential in preventing calibration errors and transferring an accurate volume of liquid.

Determine the volume of liquid you need to transfer. This will be stated in the steps to complete the experiment. The volume must be between .2-1000ul. For volumes greater than 1000ul, a serological pipette would be more useful.

Look at the top of the control button to see the pipette size

- ❖ If you need to pipet between 200-1000ul, you should use the blue P1000 pipette
- ❖ If you need to pipet between 20-200ul, you should use the yellow P200 pipette
- ❖ If you need to pipet between 2-20ul, you should use the yellow P20 pipette
- ❖ If you need to pipet between .2-2ul, you should use the gray P2 pipette

If the volume you wish to pipet falls within the range of more than one pipette (such as 2ul, 20ul, or 200ul), the pipettes manufactured for smaller volumes should be used. Accuracy is decreased when trying to pipet smaller volumes on larger volume pipettes.

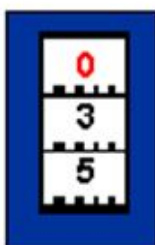


Micropipette control buttons

Adjusting to your Needed Volume

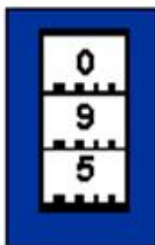
Adjusting the volume of the pipette is the trickiest part of the micropipetting process. A simple mistake could lead to a large error in the preparation of your experiment. You will need to refer to the **volume knob** and **number windows** to accurately input the volume you are going to pipet.

To adjust the volume, first refer to the number window. If the volume is lower than the volume you need to pipet, turn the volume knob clockwise to increase the volume until the desired volume is read in the number window. To decrease the volume, the volume knob should be turned counterclockwise. The following table describes how to read the number window for each pipette:



P1000 Pipettes

If you are using a P1000 pipette, the top, red number is the thousands digit. The middle number is the hundreds digit, and the lower number is the tens digit. In the example on the left, 350ul of liquid would be pipetted. The numbers should range from 020 and 100 for this pipette.



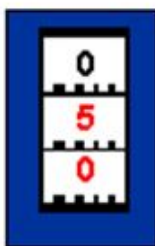
P200 Pipettes

If you are using the P200 pipette, the top number is the hundreds digit, the middle number is the tens digit, and the bottom number is the ones digit. In the example on the left, 95ul of liquid would be pipetted. The set numbers should range between 020 and 200 for this pipette.



P20 Pipettes

If you are using the P20 pipette, the top number represents the tens digit, the middle number represents the ones digit, and the bottom, red number represents the tenths digit. There is a decimal between the middle and bottom number. In the example on the left, 2.5ul of liquid would be pipetted. The numbers should range from 020 to 200 with this pipette.



P2 Pipettes

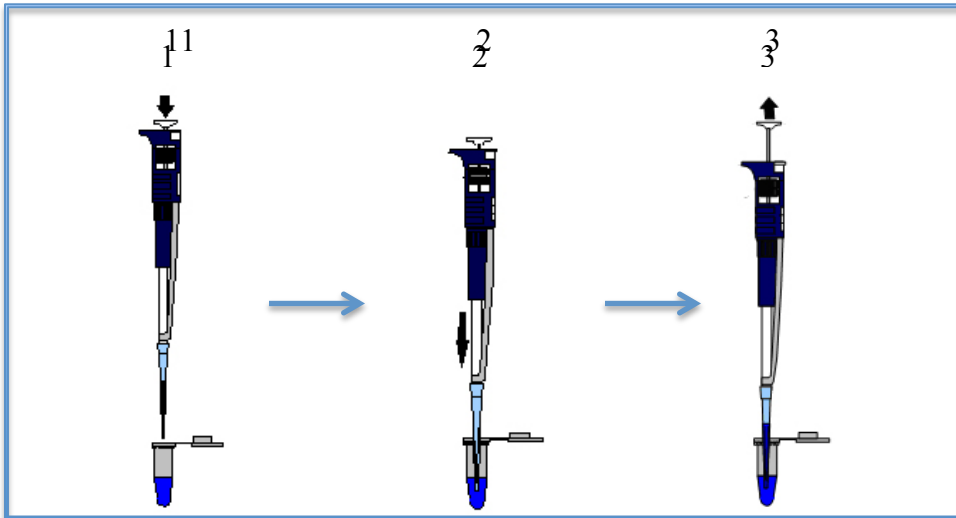
If you are using the P2 pipette, the top number represents the ones digit, the second, red number represents the tenths digit, and the bottom, red number represents the hundredths digit. In the example on the left, .5ul of liquid would be pipetted. The numbers should range from 020 to 200 with this pipette.

How to read the number window on a P1000, P200, P20, and P2 micropipette

Photos obtained from <http://www.di.uq.edu.au/sparqmicropipette>

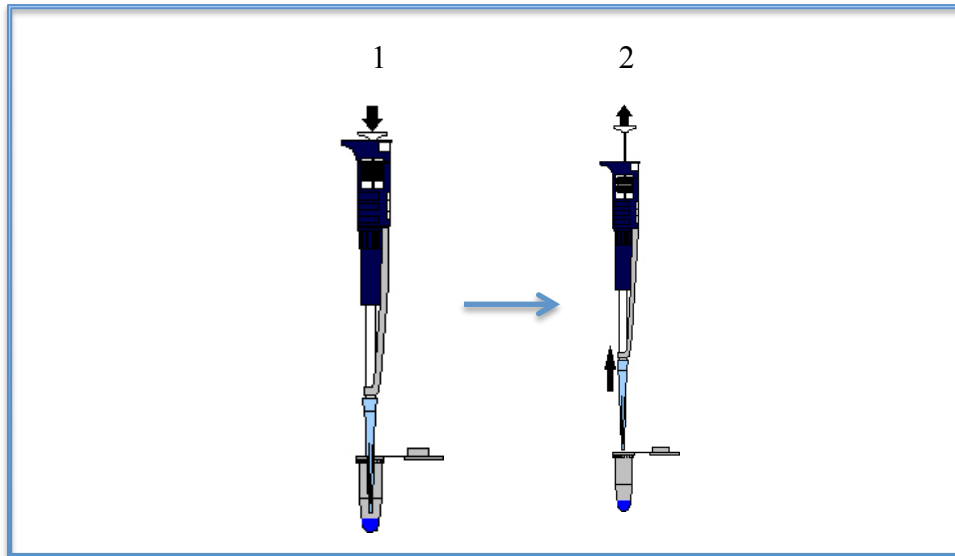
Pipetting the Liquid

1. Obtain the micropipette tips that match the micropipette you will need to use.
 - ❖ P1000 pipettes use the large, blue tips
 - ❖ P200 and P20 pipettes use the yellow tips
 - ❖ P2 pipettes use the clear tips
2. Insert the tip of the micropipette firmly into a plastic tip. The plastic tip should be attached securely to the pipette.
3. Press the control button down to the **first** stopping point. Do not push the control button all the way down.
4. Insert the plastic pipette tip into the liquid you wish to pipet. Once the tip is suspended in the liquid, slowly release the control button to its starting point. Then, remove the plastic tip from the liquid.



Visual depiction of steps 3-4 detailing how to draw up liquid before pipetting it into a new container. (1) The control button is pressed down to the first stopping point, (2) the tip is inserted into the liquid, and (3) the control button is released while the tip is still in the liquid.

5. Insert the plastic pipette tip into the container with the liquid you are transferring the pipetted liquid to. Push the control button down all the way. The button should pass the first stopping point and reach the second stopping point where you cannot push the control button down any further. The liquid should now be pipetted into the new liquid container. Do not release the control button.
6. Remove the plastic tip from the container. Once the tip is removed from the container, release the control button to its starting point. A visual depiction of this process can be seen on the following page.
7. Place the micropipette, which is still connected to the plastic pipette tip, over a biohazard bag. Press down on the eject button to release the plastic tip into the bag.



Visual depiction of steps 5-6 detailing how to transfer liquid to a new container. (1) The control button is pressed down to the second stopping point and the liquid is transferred to the new container. (2) The control button is then released to the starting point.

Tips

- ❖ Avoid touching plastic pipette tips to hands, counter, or other objects that could cause contamination
- ❖ Dispose of plastic pipette tips after each individual use to avoid cross-contamination
- ❖ Use smooth, controlled movements when using the control button
- ❖ Check the numbers on the number window periodically to confirm volume