

EDVOTEK® MyLab™ #1106

Micropipetting Basics

STORE AT ROOM TEMP.



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Designed for the Classroom
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OBJECTIVES

In this experiment, students learn and practice the critical micropipetting skills as they deliver their mixtures to a Pipet Card™.

COMPONENTS

This experiment contains reagents and disposables for 3 experiments.

- Fixed Volume (10 µL) Micropipette
- Disposable Micropipet tips
- Red dye
- Blue dye
- Yellow dye
- Pipet Cards™
- Microtiter plates

REQUIREMENTS

- Small container for discarding used tips
- Distilled or deionized water

GENERAL SAFETY PRECAUTIONS

Parental or adult supervision required.

1. Designate a clean and uncluttered area for performing experiments.
2. Read all instructions before you begin.
3. Do not eat or drink. Do not apply make-up or contact lenses. Adult(s) should not smoke while performing experiments.
4. Wash your hands before and after performing the experiment.
5. Gloves and goggles should be worn routinely as good laboratory practice.
6. Disinfect the counter top or bench with 70% isopropyl alcohol (rubbing alcohol, or place clean newspaper over the area to be used.

WARNING: Choking hazard. Products contain small parts. Not appropriate for children under 5 years old. No human or animal products are used in any experiments.

MEASURING SMALL VOLUMES WITH MICROPIPETS

Pipetting is a critically important technique in life science experiments to ensure accurate experimental results. In typical biotechnology experiments, biologicals and reagents such as DNA, enzymes and buffers are transferred (by pipetting) into small tubes which serve as reaction vessels. For these type of reactions, microliter volumes are typically used. There are 1,000 microliters in 1 milliliter of a solution. To put it in perspective, a 50 microliter sample is approximately equal in size to a single raindrop. A raindrop-sized sample is relatively large when compared to experimental samples which often are 5 - 20 microliters in volume.

Volumetric Applications of the Metric System

The metric system is used in micropipetting. The milliliter (mL) and microliter (μL) are two very useful units of measurement in molecular biology. "Milli" means one-thousandth and "Micro" means one-millionth.

The symbol " μ " means micro, the prefix for 1×10^{-6} (expressed in scientific notation) or 0.000001 (expressed in decimals). One microliter is abbreviated as " μL ". The two ways that this would be expressed is:

$$1 \mu\text{L} = 0.000001 \text{ mL} \text{ or } 1 \mu\text{L} = 1 \times 10^{-6}$$

There are 1,000 μL in 1 milliliter (mL), and 1,000 mL in one liter (L).
 $1,000 \mu\text{L} = 1 \text{ mL}$

$$1 \text{ mL} = 0.001 \text{ liter}$$

$$1 \mu\text{L} = 0.000001 \text{ liter}$$

$$1,000 \text{ mL} = 1 \text{ liter}$$

$$1,000,000 \mu\text{L} = 1 \text{ liter}$$

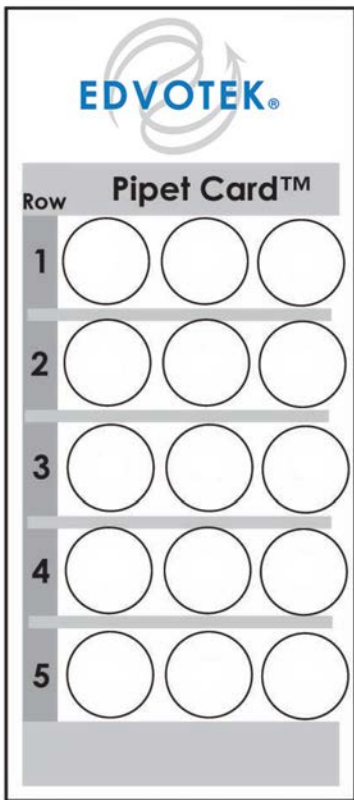
Fixed Volume Micropipet

Accurate pipetting can be achieved using fixed volume micropipets. These types of micropipets are preset to a specific volume. Although the volume of each individual micropipet cannot be changed, fixed volume micropipets operate similarly to the variable automatic micropipets. Most fixed volume pipets do not have ejector buttons, so the tips must be removed manually.

BRIEF DESCRIPTION OF THE EXPERIMENT

Various dye samples will be diluted from concentrated solutions in microtiter wells and spotted in triplicate on a Pipet Card™.

The concentrated dyes will be diluted in water. Students will learn how to pipet.



*Pipet Card figure not drawn to scale.
Actual card may appear slightly different.*

MICROPIPETTING USING A FIXED VOLUME MICROPIPET

In the activity which follows, you will use the fixed volume micropipet to prepare different dilute dye mixtures in the wells of a microtiter plate. You will then dispense 10 microliters (10 μL) of each diluted dye mixture on a Pipet card in triplicate.

1. Label five wells of a microtiter plate 1 to 5 and with your initials. Refer to the chart to prepare the 5 dye solutions.
2. After preparing the dye mixtures, perform the pipetting of each sample in triplicate.
3. Pipet 10 μL of each dye mixture in the corresponding numbered row of circles on the pipet card. Pipet the dye mixture into the center of each of the three circles.
4. Mix the remaining yellow and blue. What color do you get?

Dye Mixture Preparation Example:

- To the well labeled # 1, add 10 μL of Red dye and 40 μL of water for a total volume of 50 μL . Pipet 10 μL in triplicate onto pipet card.

Pipetting Chart

Using Fixed Volume (10 μL) Micropipettes

Well	A Red (μL)	B Blue (μL)	C Yellow (μL)	D Water (μL)	Total Volume (μL)
1	10	-	-	40	50
2	10	20	-	20	50
3	10	-	-	40	50
4	-	-	20	30	50
5	10	-	10	30	50

STUDY QUESTIONS

1. Why is it so important to pipette accurately in life science experiments?
2. How many microliters are in 1 milliliter?
3. List the following liquids in order of highest to lowest viscosity - buffer, alcohol, glycerol.

TERMS AND CONDITIONS

- FOB: Washington, DC
- Safety Data Sheets are available on our web site and by request.

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Answers to Study Questions:

1. The small volumes utilized in life science experiments require accuracy to ensure accurate experimental results.
2. What is the symbol for microliter? There are 1000 microliters (μL) in 1 milliliter (mL).
3. Glycerol (highest), buffer, alcohol (lowest)