

# Bench Tips

Sponsored by: BrandTech

AS PREVIOUSLY PUBLISHED ON BIOCOMPARE.COM

By Emma Easthope

## How to Choose the Right Pipette for Your Application

Pipettes are among the most widely used lab tools, serving to aspirate, transport, and dispense a broad range of liquids. But with so many different models available, identifying the right pipette for your specific application can be challenging. Here, we explain the difference between air displacement and positive displacement functionality and suggest some key factors to consider for pipette selection.

### Air displacement versus positive displacement pipettes

Pipettes can broadly be categorized into two main groups based on how they work. Air displacement pipettes create a negative or positive pressure within the pipette shaft by moving a piston up or down, which causes the liquid to be aspirated into or expelled from a disposable tip. An advantage of these types of pipettes is that an air cushion between the liquid and the piston prevents the liquid from ever contacting the piston or pipette shaft, ensuring contamination-free handling. However, because certain liquids can influence the air cushion, air displacement pipettes may not be suitable for every liquid type or application. Problematic liquids include those with a high viscosity or high density, as well as highly volatile liquids and liquids with a propensity for foaming.

Positive displacement pipettes differ from air displacement pipettes in that the piston is in direct contact with the liquid. Specifically, the piston is located within a tip cylinder into which it aspirates the liquid through a vacuum before wiping the walls clean during dispensing. Positive displacement pipettes provide highly reproducible results regardless of the type of liquid being handled since they lack an air cushion. But because the piston/tip cylinder combination must be replaced to prevent contamination, positive displacement pipettes may require more time for tip changes and can incur higher consumable costs. In general, the positive displacement principle is used for repetitive pipettes or specialized positive displacement instruments.

### Factors to consider for pipette selection

When choosing a pipette, it is important to think carefully about the type of application you intend to perform. Taking the time to identify the right pipette for the job will ensure that your experiments are carried out successfully and reproducibly. The following selection criteria should help to guide your decision:

#### ***Type of liquid to be used***

The type of liquid to be used is a primary consideration, especially when it comes to deciding between an air

## Bench Tips

displacement pipette or a positive displacement model. High-viscosity liquids in particular can be difficult for air displacement pipettes, which are typically only able to handle viscosities of up to 260 millipascals per second (mPa/s) before the pipetting accuracy becomes compromised.

### ***Volume range required***

The volume range required is another significant factor. For reproducible results, it is essential that the desired volume can be dispensed in a single step, meaning that researchers should determine the volume range they need to cover in order to identify a device with the necessary requirements for achieving this.

### ***Number of deliveries***

In some experiments, such as molecular diagnostic tests or experiments involving valuable samples, each liquid must be dispensed individually. Single channel pipettes are best suited to these types of applications, for which product selection should be based on both the type of liquid to be handled and the volume range required.

In other experiments, such as immunocytochemical analyses or microplate-based ELISAs, it is often useful if a volume can be dispensed several times in succession, or in parallel. Options here include single channel pipettes that are capable of multi-dispensing, and multichannel pipettes that have been designed to correspond to a standard SLAS/ANSI format.

### ***Additional features***

Modern pipettes have various features and functionalities that are intended to make researchers' lives easier. These include ergonomic design elements for a more comfortable grip and reduced risk of repetitive strain injury, color-coding to ensure the correct pipette-tip combination is used, and volume-change protection to prevent the volume from being altered accidentally. In addition, electronic pipettes are now available with intuitive touchscreen operation inspired by smartphone technology, automatic tip ejection, and multiple pipetting modes, as well as the capacity to save complex processes and avoid repetitive programming. These are all worth considering when choosing a pipette that best meets the needs of your research.

BrandTech offers an extensive selection of pipettes, including both air displacement and positive displacement models. To learn more, visit [brandtech.com](http://brandtech.com)

## About the Author

### **Emma Easthope**

Emma Easthope is the founder and director of Cambridge Technical Content Ltd, based in the U.K. Since graduating with a bachelor's degree in biology from the University of Kent at Canterbury in 2000, she has gained extensive experience developing and running immunoassays within companies including Millennium Pharmaceuticals, AstraZeneca and Cellzome. She now produces a wide range of scientific content, including regular features for Biocompare.