

**Non-Corroding  
Ring Stand Clamps**  
for  
**MicroLab's  
Model 154  
Constant Volume  
Drop Dispenser**  
and  
**Model 226  
IR Reflective Drop  
Counter**

- **Rugged**
- **Convenient**
- **Chemically Resistant**
- **Low Cost**

Made of rugged, chemically-resistant ultra-high-molecular-weight polyethylene, these lightweight clamps fit ring stands to 3/8" inch diameter (1/2" available). The Model 154 Drop Dispenser nests securely in the Model 156 clamp, and the Model 226 Drop Counter can be positioned both horizontally and vertically with the Model 158 clamp.

Model 156 Drop Dispenser Clamp: 2.3" x 5.0" x 1.0"      \$ 24.75

Model 158 Drop Counter Clamp: 1.5" x 1.5" x 1.0"      \$ 12.90

# Titrations

The most common titration is an acid-base equivalence-point experiment conducted with a burette and an indicator. However, there is a lot more useful information available if one is able to easily track and plot titrant volume with respect to pH, temperature, conductance, or other solution properties.

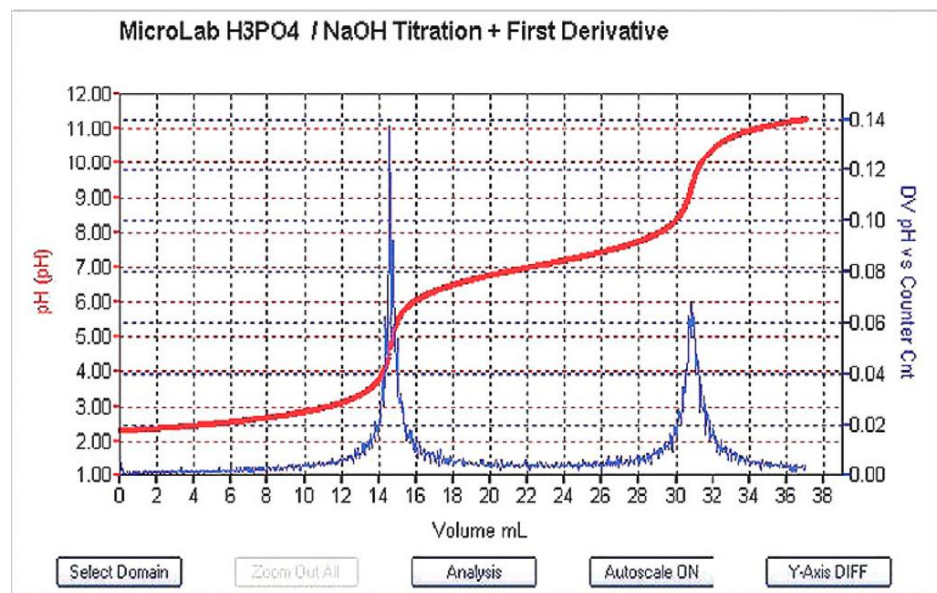
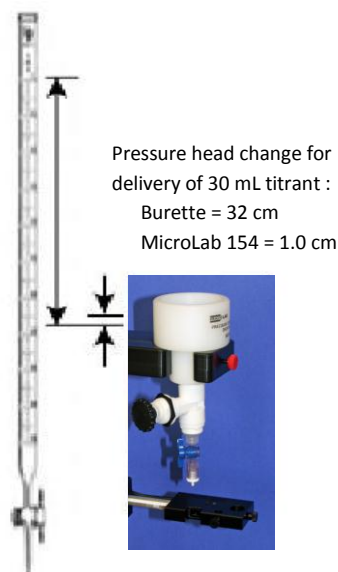
A drop counter and a precision drop dispenser provide a useful and cost-effective alternative to a burette. They will not break, their resolution is better, and their operator doesn't get tired or distracted. First and second derivative plots of drop counter data can be calculated and plotted in just a few seconds, and buffer regions are clearly visible. There is time to evaluate an experiment and run it again if necessary.

MicroLAB's patented Model 226 Drop Counter incorporates a reflective sensor that contains both an infra-red light emitting diode and a photo-transistor. A background correction circuit subtracts ambient light from the sensor's view when detecting a drop. Another circuit prevents multiple counts from fragmented drops.

Because the MicroLab drop counter counts individual drops, there is no need to read or interpolate a burette scale. MicroLAB's drop counter output is digital rather than analog. It may be calibrated by counting the number of drops to fill a 10 mL graduated cylinder. MicroLAB's "on-the-fly" formula tool is used to convert drops to volume in milliliters so that graphs read directly in volume

The MicroLab Model 154 Constant Volume Drop Dispenser is easy to use. Its multi-turn industrial needle valve gives smooth and precise control of drop rate in contrast to the small fractional rotation required to set drop rate with an often-sticky nylon or glass stopcock.

The MicroLab 154's change in pressure head during a titration is about 3% that of a burette for delivery of the same amount of titrant. This keeps drop volume and drop rate constant. Drop size is also smaller than a burette - about 0.034 mL/drop, compared to about 0.050 mL/drop. This gives the MicroLab 154 about 1.5 x better resolution in a titration, and better derivative plots and end point determinations.



This titration of phosphoric acid and sodium hydroxide was done with a MicroLab drop counter and constant volume drop dispenser.

Neutralization of the first and second hydrogen ions from the phosphoric acid is shown by the two inflections in the pH / titrant volume graph, and are marked by the peaks in the first derivative plot of this data.

The derivative can be used to determine the end point to one drop.

pKa1 and pKa2 can be determined by observing the solution pH at the midpoint of each neutralization curve, when the un-reacted acid and salt are of equal concentration. This titration took about 12 minutes and produced "text book" data.