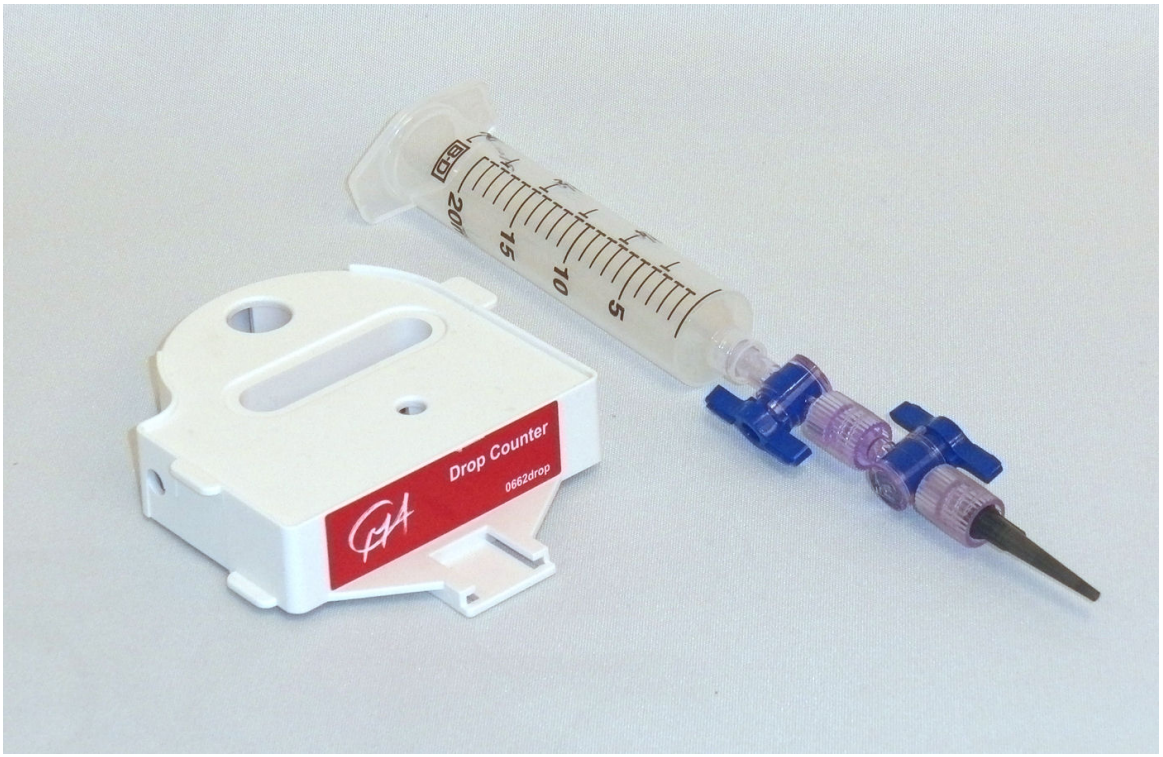
DROP COUNTER 0662DROP

USER'S GUIDE



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Short description

The CMA Drop Counter 0662drop is an accessory, which can be attached to CMA Photogate 0662i or CMA Photogate ML54f and used to record the volume of titrant added during titration experiments. During such experiments pH and temperature are easy to measure with respective sensors, but volume is not. A drop counter offers a simple way to measure volume. A drop-forming tip delivers drops of constant volume size, which are detected by the photogate. Counting added drops gives the total added volume.

The Drop Counter connects to the photogate via a slider. When properly positioned, a drop of titrant will block the infrared beam of the photogate each time a drop passes through. A LED indicator located on the photogate flashes each time such event happens. The Drop Counter has two round holes, larger hole for a pH electrode and smaller hole for a temperature sensor. It is delivered together with:

- a plastic 20-mL syringe with Luer-lock, by removing the piston the syringe becomes a titrant solution reservoir,
- two 2-way valves with Luer-lock connectors, and
- a plastic tip.

The drop dispenser is assembled by connecting two 2-way valves to the reservoir and attaching a tip to the second valve. One of the valves is used as an on-off valve (either completely open or completely shut) and one as an adjustment valve, to adjust to a slow, consistent rate.

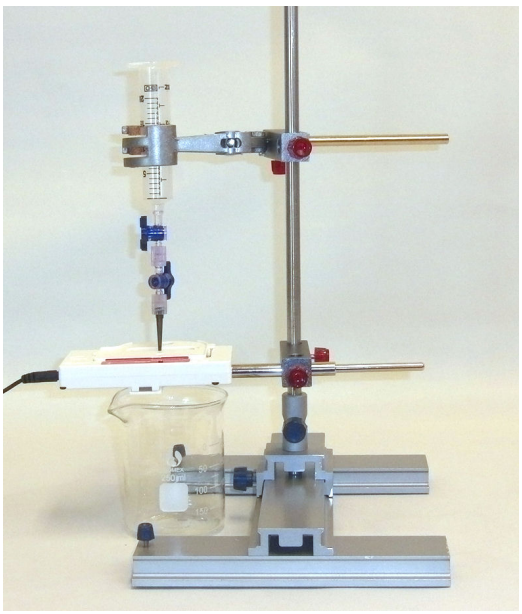
The drop counter attached to the photogate.

The assembled drop dispenser.

Calibration

The tip provided with the Drop counter produces drops of ≈ 0.04 mL volume. The Coach software offers a standard volume calibration, which makes use of this drop size volume.

For more accurate measurements one can calibrate the drop counter by counting the number of drops to fill a known volume. The volume of one drop can be calculated by dividing the total volume by the number of drops. To perform your own drops-per-mL calibration:



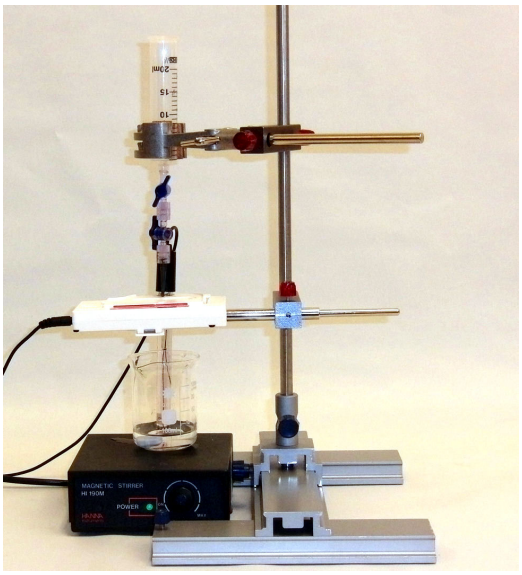
1. Mount the photogate together with a drop counter to a stand; use the provided steel support rod.
2. Mount the drop dispenser above the slot of the drop counter. Make sure that the drop dispenser is properly positioned; a falling drop of titrant has to block the infrared beam of the photogate. A LED indicator located on the photogate flashes when this happens.
3. Connect the photogate to your interface.
4. Before calibrating, adjust the flow rate of the two valves of the reagent reservoir. Temporarily, place another beaker below the tip of the reagent reservoir. First, completely open the on-off 2-way valve; then slowly open the top adjustment valve until a very slow drop rate is achieved - a rate of one drop 1.5 – 2 s. Close the bottom valve.
5. Fill the drop reservoir to 20.0 mL. Notice that because of using two extra valves the real liquid volume of the reservoir will be 22.0 mL. Open the bottom 2-way (on-off) valve to begin releasing drops.
6. Count released drops until the reservoir is empty. For this use the photogate in the counting mode.
7. Calculate the drop volume by dividing the total volume of 22 mL by the number of counted drops.

Collecting data

1. Slide the Drop Counter into CMA Photogate 0622i or Photogate ML54f.
2. Mount the photogate together with a drop counter to a stand; use the provided steel support rod.
3. Place a 100 mL beaker on a magnetic stirrer below the drop counter.
4. Insert the pH electrode through the larger round hole on the Drop Counter.
5. Slide the Drop Counter down the ring stand to a level such that the pH electrode is close to the bottom of the beaker.
6. Connect the photogate and pH sensor to inputs of your interface. In most cases the sensor will be automatically detected. Photogate will be automatically detected in the counting mode. Manually change this mode to drop counter mode to measure the volume or manually select the Drop Counter 0662drop from the Coach Sensor Library.
7. Mount the drop dispenser above the slot of the drop counter. Make sure that the drop dispenser is properly positioned; a falling drop of titrant has to block

the infrared beam of the photogate. A LED indicator located on the photogate flashes when this happens.

8. Before collecting data, adjust the flow rate of the two valves of the reagent reservoir (see point 4 of the calibration procedure).
9. Make sure that both on-off valve is in the closed position. Add about 20 mL of titrant to the reservoir.
10. Add the solution to be titrated to the 100 mL beaker. Notice that the solution level in a beaker should cover the bulb of the pH electrode. Turn on the magnetic stirrer.
11. Start your measurement.



Practical Information

- Important to achieve accurate results are stir rate and solution mixing, the response time of the pH electrode (close to one second), and the reaction rate of the compounds involved. Strong acids react more quickly than weak acids. The result is that, if the drops are closer together than about 1.5 seconds, the pH reading does not reflect the true chemistry going on in the solution.
- Minimize the volume of solution to be titrated. We recommend 5–10 mL of test solution. Larger volumes will take longer to mix and may require a very slow drop rate for best results.
- Add only as much distilled water to the solution being titrated as is necessary to cover the glass bulb of the pH Sensor (or other sensor).
- The CMA Drop Counter can be used with other CMA sensors such as Conductivity sensor or Ion-Selective Electrodes.

Warranty:

The Drop Counter 0662drop is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase provided that it has been used under normal laboratory conditions. This warranty does not apply if the sensor has been damaged by accident or misuse.

Note: *This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.*

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