

Clean and wipe dry your 25-mL graduated cylinder and a 50-mL beaker (a rolled-up paper towel will enable you to dry the interior of the graduate). Weigh the graduated cylinder and beaker and record the mass of each to the nearest milligram (0.001 gram).

Obtain about 100 mL of distilled water in a clean Erlenmeyer flask. Determine and record the temperature of the distilled water.

Fill the graduated cylinder with distilled water so that the meniscus of the water level lines up with the 25-mL calibration mark of the cylinder. Place distilled water in the 50-mL beaker up to the 25-mL mark.

Weigh the graduated cylinder and the 50-mL beaker to the nearest milligram (0.001 gram) and calculate the mass of water each contains.

Using the Density of Water table from Appendix H in this manual, calculate the volume of water present in the graduated cylinder and beaker from the exact mass of water present in each.

Compare the *calculated* volume of water (based on the mass of water) to the observed volumes of water determined from the calibration marks on the cylinder and beaker. Calculate the percentage difference between the calculated volume and the observed volume from the calibration marks. Why are the calibration marks on laboratory beakers taken only to be an approximate guide to volume?

### B. The Pipet

Obtain a 25-mL pipet and rubber safety bulb. Clean the pipet with soap and water. Rinse the pipet with tap water and then with small portions of distilled water. Practice filling and dispensing distilled water from the pipet until you feel comfortable with the technique. Ask your instructor for assistance if you have any difficulties in the manipulation.

Clean and wipe dry a 150-mL beaker. Weigh the beaker to the nearest milligram (0.001 gram) and record.

Obtain about 100 mL of distilled water in a clean Erlenmeyer flask. Determine and record the temperature of the water.

Pipet 25 mL of the distilled water from the flask into the clean beaker you have weighed. Reweigh the beaker containing the 25 mL of water. Determine the weight of water transferred by the pipet.

Using the Density of Water table from Appendix H to this manual, calculate the *volume* of water transferred by the pipet from the *mass* of water transferred. Compare this calculated volume to the volume of the pipet as specified by the manufacturer. Any significant difference between these two volumes is an indication that you need additional practice in pipeting. Consult with your instructor for help.

How does the 25-mL volume dispensed by the pipet compare to the volumes as determined in Part A using a graduated cylinder or beaker? Is the pipet more or less precise?

### C. The Buret

Obtain a buret and set it up in a clamp on your lab bench.

Fill the buret with tap water, and check to make sure that there are no leaks from the stopcock before proceeding. If the stopcock leaks, have the instructor examine the stopcock to make sure that all the appropriate washers are present. If the stopcock cannot be made leakproof, replace the buret.

Clean the buret with soap and water, using a long-handled buret brush to scrub the inner surface of the buret. Rinse all soap from the buret with tap water, being sure to flush water through the stopcock also. Rinse the buret with several small portions of distilled water, then fill the buret to above the zero mark with distilled water.