Activity 1: Accuracy in volume measurements

Requirements

- 50 mL burette
- Burette clamp and stand
- Funnel
- Water
- 100 mL graduated cylinder
- 100 mL beaker

Health and safety, and *outline* instructions

1. Set up a burette on a stand assembly (see Figure 1).

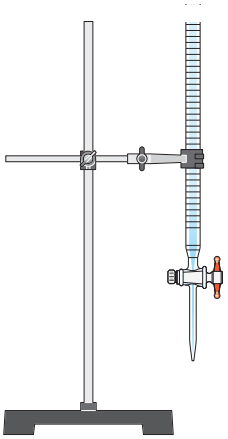

Figure 1

2. Fill the empty burette with water. Make sure the meniscus of the water in the burette rests on the 0.00 mL line at the top of the burette (see Figure 2).

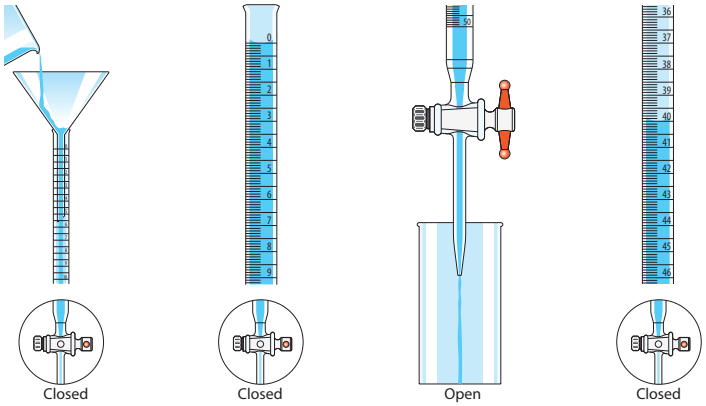

Figure 2

3. Place a 100 mL graduated cylinder beneath the tip of the burette. Open the stopcock and slowly release about 40 mL of water from the burette into the graduated cylinder. Record the **exact** volume of water dispensed from the burette in the appropriate column of the results table. In this experiment the volume released from the burette will represent the accepted value.

4. Read the volume of water in the graduated cylinder by observing the markings on the side of the cylinder. Be sure to read the volume at the bottom of the meniscus. Record the volume of water in the graduated cylinder in the correct column of the results table.

5. Pour the water in the measuring cylinder into the beaker. Read the volume of water in the beaker by observing the markings on the side of the beaker. Record this volume in the correct column of the results table.

6. Calculate the difference in the volume read from the graduated cylinder and the volume read from the burette. Enter the difference in the “Difference” column of the results table.

7. Calculate the difference in the volume read from the beaker and the volume read from the burette. Enter the difference in the “Difference” column of the results table

Results		
	Volume (mL) of water	**Difference**
Volume dispensed from burette	Accepted value =	0.0 mL
Volume in graduated cylinder		
Volume in beaker		

The accuracy of a piece of laboratory glassware is often expressed in terms of its percentage error. The lower the percentage error, the more accurate the piece of glassware. Percentage error can be calculated using the expression:

% error = [(difference between measured value and accepted value)/accepted value] × 100

Use your experimental results to calculate the percentage error of:

(i) the 100 mL measuring cylinder

(ii) the 100 mL beaker

Notes/observations/questions

1. Based on your calculations, which of the two (the beaker or the measuring cylinder) is the more accurate piece of apparatus when measuring volume?

2. Look closely at the calibration markings on each of the three pieces of equipment. Why do you think the burette reading was chosen as the accepted value?

3. Which piece of glassware should not be used in a quantitative experiment?

Give reasons for your choice.