Use of a Burette in a Standardization Titration

A burette is used for accurately measuring volumes of a solution. The key operations in using a burette are: a) reading the meniscus level,
b) proper rinsing,
c) proper filling without spillage,
d) removing air from the tip, and
e) touching off droplets from the tip.
All of these procedures need to be done correctly in order to measure the delivered volume precisely.

1. Rinsing the Burette.

Check that the burette is not obviously dirty and that the stopcock works freely. Use a small plastic funnel to add solution to the burette. Rinse the funnel first with some of the solution you want to add to the burette. Also rinse the outside of the funnel stem, and wipe the funnel dry on the outside where the flared part meets the top of the stem with a quarter section of paper towel. Insert the funnel and add 5 to 10 mL of the solution to the burette with the stopcock closed. Holding the burette in a nearly horizontal position, rotate it so that the solution contacts the entire inner surface. Drain the rinsings out by opening the stopcock. Repeat this rinsing two more times. If droplets or rivulets of liquid appear on the inner surface of the calibrated part of the burette, clean it in accordance with instructions from your demonstrator.

2. Filling the Burette.

Using a small burette funnel, fill the burette to near the zero mark with the desired solution. Open the stopcock briefly, to displace all the air from the tip. Wipe the outer stem of the funnel dry, and invert it on a clean piece of paper towel for later use.

3. Initial Reading of the Burette.

Open the stopcock until the liquid level is slightly below zero. Read this level to the nearest 0.01 mL, as follows. Hold a backing card or a piece of paper with a thick black line on it behind the burette so that the top of the black line is 3 divisions below the bottom of the meniscus. (This card gives a constant background for readings, regardless of the level, and the black region provides a sharp outline of the meniscus. The apparent level of the meniscus changes if the card is raised or lowered. Always use 3 divisions for the sake of uniformity). With your eye at the same level as the bottom of the meniscus, read the level of the meniscus, estimating to the nearest tenth of a division, i.e., to the nearest 0.01 mL. Record this reading as "Initial volume reading". If you are too short to get on a level with the meniscus, kneel on your stool and/or lower the burette in its clamp until the tip nearly touches the table-top. Do not stand on a rung of the stool. Touch off the tip of the burette on the clean inner surface of a waste beaker, just as you do with a pipette, so as to remove the partial droplet. Wait for a minute and then read the meniscus level again. If it has decreased, your burette stopcock is leaking, and you should check with your demonstrator. It may be possible to solve the problem by tightening the stopcock.

4. Titration

The burette tip should extend 2 to 3 cm into the titration flask. The flask should sit on a white background so color changes are most easily seen. As you add solution from the burette to the flask, manipulate the stopcock with your left hand and swirl the flask with your right. When you are within 1 or 2 mL of the end point, stop adding titrant and rinse down the inner walls of the flask with a minimum amount of deionized water to wash spattered droplets down into the flask. Now add titrant at a slow, drop-wise speed. When you think you are within a couple of drops of the end point, touch off the droplet on the tip and wash down the flask again. Add one more drop, touch off the top and rinse down the wall of the flask at the touching-off point. Repeat this procedure until the end point color change occurs. Careful workers add half-drops instead of full drops at this stage.

5. Final Reading

Make this reading in the same way as the initial reading. Again, be sure your eye is at the same level as the meniscus, to avoid parallax error. Record this reading as "Final volume reading".

6. Replicate Titrations

You can use your result from the previous titration to calculate approximately how much titrant is required for the present sample. It is best to calculate this amount only approximately so that you remain objective in judging the end point in each titration.

7. Clean-up

Rinse out the burette well with deionized water, including the stopcock and tip, and let it drain before returning it to the storeroom.