Pipetting a solution

Video: https://www.youtube.com/watch?v=Zq1kY0qLpMk&feature=youtu.be

Conditioning a pipet:

To use a pipet you must first clean and condition it. Assume it is dirty from the last lab.

1) Rinse with distilled water thoroughly.
2) Condition with the solution to be measured by drawing a small portion of that solution into the pipet. **Loosely** place with a pipet pump with a plastic wheel (or pipet bulb) on top of the pipet. Draw solution about halfway up the pipet by rolling the wheel with your thumb (or forefinger). Solution should fill the bulb – the wide part – about halfway. Quickly cap the top of the pipet with your thumb while simultaneously pushing the pump off with your thumb.
3) Roll the solution around inside the pipet and empty through **both ends** to ensure the inside of the pipet is coated with the solution.

Measuring volume with a pipet:

1) Loosely place the pump on top of the pipet again to draw solution well above the "mark" on the pipet. Take care NOT to suck the solution all the way up into the pump. Simultaneously push the pump off with your thumb while capping the top of the pipet.
2) Gently roll your thumb to lower the solution to the "mark" exactly. The bottom of the meniscus must be exactly at the "mark". Be sure that the tip of the pipet is not resting on the bottom of the beaker when you measure this. Otherwise, the level of the meniscus will change when you raise the pipet.
3) Dispense the solution into the flask by removing your thumb and letting it drain into the glassware (Erlenmeyer flask or beaker) to be used. Allow an extra 10-20 seconds for all solution to drain out. Touch the end of the pipet to the side of the glassware to remove the last drop.
4) Note: **DO NOT** force out the small amount of liquid remaining in the tip of the pipet. Pipets are calibrated to retain this amount.

Using a buret to deliver solution

Video: https://www.youtube.com/watch?v=7JLqO-uzH-Q&feature=youtu.be

Conditioning a buret:

To use your buret you must first clean and condition it. Assume it is dirty from the last lab.

1. Rinse with DI water thoroughly and let it drain through the tip.
2. Condition with the solution to be put in the buret by pouring a small portion of that solution into the buret with the stopcock closed. Roll the solution around inside the buret and empty through **both ends** to ensure the inside and the tip of the buret are coated with the solution.
    a. Note: If solution does not drain through the tip, it is because there is not enough air pressure within the buret to push it through. Simply add a few more milliliters of solution to drain through the tip.

Using a buret to deliver solution:

1) Secure the buret with a buret clamp on a ring stand. Ensure the buret is perpendicular to the bench and not angled.
2) Close the stopcock and fill the buret with the solution to just above the 0.00 mL mark. Open the stopcock to drain a small amount of solution into a waste beaker so it fills the tip with solution.
3) Be sure no air bubbles are present in the tip of the buret. If there is an air bubble in the tip of the buret, open the stopcock parallel to the buret to let solution flow through.
    a. If the air bubble does not come out after a few seconds, you will have to drain the entire solution through the tip (into your solution beaker/flask since your buret has been conditioned), close the stopcock, refill the buret with solution, and open the stopcock to drain solution through the tip again. The bubble should pop on the second drain.
4) Drain solution through the tip until the solution level is below the zero mark.
5) Read and record the initial volume as accurately as possible (2 decimal places).

Performing a titration

Video: https://www.youtube.com/watch?v=Hfhv7dx__1M&feature=youtu.be

A titration is a technique used to accurately and precisely standardize (calculate the concentration of) an unknown solution. A minimum of three good trials (volumes used are close to each other) is needed to ensure a good result.

Refer to the "Using a buret to deliver solution" technique to prepare a buret for titration. The solution in the buret is the titrant.

Prepare the solution in an Erlenmeyer flask or beaker. If using a solid reagent, refer to the "Preparing solutions" technique starting with solid reagent. If using an aqueous reagent, refer to the "Pipetting a solution" technique.

Because most solutions used in titrations are clear and colorless, an indicator is often used. Phenolphthalein is the most common one – it is colorless in acidic solutions and pink in basic solutions. Only 2-3 drops of indicator need to be used in titrations. The lightest color change is desired so the end point is as close to the equivalence point (determined by calculation) as possible. It is common practice to work on a white stir plate or on a white piece of paper. This makes the subtle color change more noticeable.

As you begin titrating, open the stopcock with one hand and swirl flask or beaker with the other. Alternatively, a stir plate and a magnetic stir bar can be used to constantly swirl the contents of the flask or beaker. In both cases, you should periodically wash the sides of the glassware with DI water to ensure that any titrant that may have splashed onto the sides of the glassware get washed into solution. If a stir bar is used, set up your apparatus so the titrant does not drop directly onto the stir bar. Also make sure the stir bar does not hit the sides of the glassware and splash solution.

As titrant is added (typically 1 mL at a time), you will see flashes of color. When the color flashes persist longer and longer, you should begin adding titrant in smaller increments. Eventually you should add titrant dropwise (or smaller) until the lightest color change persists for at least a minute. If you reach a very light color change, the color may fade after one minute.

The following steps should be followed in each trial of a titration:

1) swirl the receiving flask occasionally,
2) record the initial (starting volume) and final (permanent color change) volumes to 2 decimal places,
3) calculate the total volume of titrant used, and
4) ensure the volume of titrant is close for all three trials; perform another trial if one is far from the others.

Equivalence Point: stoichiometric point when moles acid = moles base (must be calculated)

End Point: visual point where the solution changes color slightly due to the presence of an indicator because of the presence of slight excess acid or base. The end point should be really close to the equivalence point in order to ensure accurate calculation.