# Titration and a Neutralization Reaction

**I. Purpose**: To determine the concentration of an acid of unknown concentration by titrating it with a known concentration base.

**II. Procedure**:

1. Obtain about 75 mL of standard sodium hydroxide solution and record the precise molarity of the solution.
2. Rinse a clean 50-mL buret with two 5 mL portions of sodium hydroxide solution.
3. Clamp the buret to a ring stand and place a waste beaker under the buret. Fill the buret to above the zero mark with sodium hydroxide solution. Open the stopcock to allow any air bubbles to escape from the tip. Close the stopcock when the liquid level in the buret is between the 0 and 10 mL mark.
4. Record the precise level (initial volume) of the solution in the buret. *Note*: Volumes are read from the top down in a buret. Always read from the bottom of the meniscus and remember to include the appropriate number of significant figures.
5. Measure close to 10 mL of the unknown hydrochloric acid solution using a 10-mL graduated cylinder. Record the volume precisely (sig figs). Pour all of the acid into a 125-mL Erlenmeyer flask.
6. Add about 20 mL of distilled water to the flask, followed by 2 drops of phenolphthalein indicator.
7. Position the flask under the buret so that the tip of the buret is inside the mouth of the flask. Place a piece of white paper under the flask to make it easier to detect the color change of the indicator at the end point.
8. Open the stopcock to allow approximately 5 - 8 mL of the sodium hydroxide solution to flow into the flask while continuously swirling the flask.
9. Add sodium hydroxide slowly, drop-by-drop, while swirling the flask. Use a wash bottle to rinse the sides of the flask with distilled water during the titration.
10. When a faint pink color appears and persists for about 10 seconds while swirling the flask, the endpoint has been reached. Close the stopcock and record the final buret reading.
11. Pour the solution into the sink and rinse the flask with distilled water.
12. Repeat for a 2nd trial.

**III. Data**

**IV. Conclusion**

The neutralization reaction of sodium hydroxide and hydrochloric acid is as follows:

$$HCl\ (aq) + NaOH\ (aq) \rightarrow NaCl\ (aq) + H_2O$$

Calculate the number of moles of NaOH dispensed from the buret. Use a mole ratio to determine the number of moles of HCl that reacted. Use the volume of unknown HCl to determine the molarity of the unknown HCl solution. Repeat for the 2nd trial.