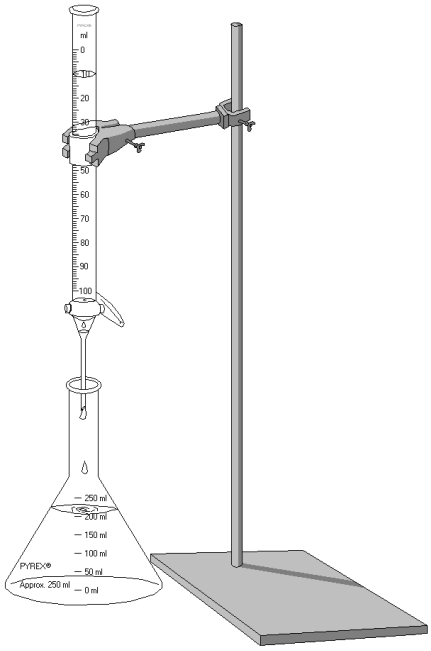
Titration Lab

In this activity, you will determine the concentration and pH of an unknown acid by titration with a known base.

Materials



safety goggles
latex gloves
sheet of blank white paper
distilled water
125 mL Erlenmeyer flask
sodium hydroxide solution (0.5 mol/L)
phenolphthalein
acetic acid solution (unknown concentration)
dropper
burette
burette stand
graduated cylinder (100 mL)

Procedure

1. Setup the burette, and burette stand as shown in the diagram.

2. Fill the burette with the 0.5 mol/L sodium hydroxide solution.

3. Place 10 mL of the acetic acid solution into the Erlenmeyer flask. Add 2 or 3 drops of phenolphthalein. Swirl to mix.

4. Place the Erlenmeyer flask over a sheet of white paper and under the burette, as shown in the diagram.

Trial 1

5. Slowly allow sodium hydroxide from the burette to pour into the Erlenmeyer flask until the solution changes color from clear to pink.

6. Make a note of the approximate volume of sodium hydroxide at the moment the solution changed color.

7. Dispose of the contents of your Erlenmeyer flask in the sink. Rinse out your Erlenmeyer flask with distilled water.

Trial 2

8. Refill your burette with sodium hydroxide.

9. Place 10 mL of the acetic acid solution into the Erlenmeyer flask. Add 2 or 3 drops of phenolphthalein. Swirl to mix.

10. Place the Erlenmeyer flask over a sheet of white paper and under the burette.

11. Slowly add a volume of sodium hydroxide to the Erlenmeyer flask that is 3 or 4 mL less than what you determined in Trial 1.

12. Allow sodium hydroxide to drip from the burette into the Erlenmeyer flask, **one drop at a time**. When the solution begins to change color from clear to pink, stop and swirl the flask briefly.

    a) If the color goes back to clear, keep adding sodium hydroxide, one drop at a time, stopping to swirl the flask each time the color changes.

    b) When the color stays pink, stop and record the volume of sodium hydroxide that you added.

13. Dispose of the contents of your Erlenmeyer flask in the sink. Rinse out your Erlenmeyer flask with distilled water.

Trial 3 and 4

14. Repeat the procedure from Trial 2 two more times and calculate the average volume of sodium hydroxide that you added to your solutions.

Analysis

1. Write the neutralization reaction between sodium hydroxide and acetic acid that is taking place in this lab.

2. Using the average volume you determined, the concentration of sodium hydroxide (0.5 mol/L), and the volume of acetic acid (10 mL), determine the initial concentration of the acetic acid solution.

3. Uisng the results of question 2, determine the pH of the acetic acid solution (before titration).