Worksheet 13: Titrations

Objectives

1. Understand why titration curves have a particular shape and recognize the difference in the titration curves of acid/base titrations
2. Describe how molar concentrations of a weak acid and its conjugate base vary with pH
3. Identify the major species in solution and calculate the pH at various points during a titration

Key Questions

1. The following questions concern the titration of 25 mL of 0.1 M NH_3 with 0.05 M HCl. The K_b of ammonium is 1.8×10^{-5}.

   (a) Calculate the pH of the solution before the addition of any HCl.

   (b) Calculate the pH after the addition of 1 mL of HCl.

   (c) Calculate the pH after the addition of 10 mL of HCl.

   (d) Calculate the pH after the addition of 25 mL of HCl.

   (e) Calculate the pH after the addition of 50 mL of HCl.

   (f) Calculate the pH after the addition of 100 mL of HCl.

   (g) Use your results from the previous problems to draw a graph of pH vs volume of HCl. Indicate the equivalence point, the half equivalence point, and the buffer region.