17 • Aqueous Equilibria

17.3 Acid-Base Titration

Acid-base titration is the careful, quantitative combination of acid and base to achieve neutralization. Typically, a known concentration of base, called the *titrant*, is added from a buret to an acid solution of unknown concentration. The **equivalence point** of a titration is the point at which stoichiometric amounts of base and acid have been combined. An **indicator** is generally used to estimate the equivalence point. An indicator is a compound that exhibits a pH-dependent color change. The point at which the indicator changes color is called the *end point*. Indicators are chosen such that the color change occurs in the pH range of the equivalence point.

Strong Acid/Base Titration Example

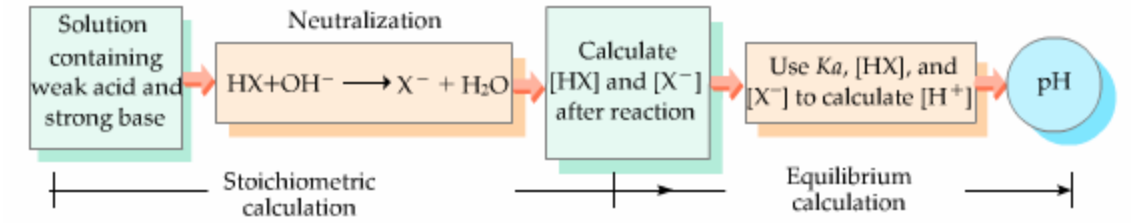
Calculate the pH when the following quantities of NaOH solution have been added to 50.00 ml of 0.100 M HCl solution.

a) 49.00 ml of 0.100 M NaOH

Before rxn			
Change			
After rxn			

b) 51.00 ml of 0.100 M NaOH

Before rxn			
Change			
After rxn			



Weak Acid/Base Titration Example

Calculate the pH of the solution formed when 45.0 ml of 0.100 M NaOH is added to 50.0 ml of 0.100 M $HC_2H_3O_2$ ($Ka = 1.8 \times 10^{-5}$)

Step 1: Calculate how acid and bases reacts and determine starting conditions for dissociation of weak acid

Before rxn			
Change			
After rxn			

Step 2: Convert to Molarity using total volume

Step 3: Use Weak acid to calculate pH

Start			
Change			
Equilibrium			

pH at Equilvalance Point Titration Example

Calculate the pH at the equivalence point in the titration in 50.0 ml of 0.100 M $HC_2H_3O_2$ (Ka = 1.8×10^{-5}) with 50.0 ml of 0.100 M NaOH.

Here's How:

1) Find the # moles of C.Base available from acid
2) Find molarity of C. Base
3) Use Kb expression of C.Base to show how much [OH-] is needed to neutralize acid
4) Find pOH and then pH of resulting solution after equilvalence