CHAPTER 16: ACID-BASE EQUILIBRIA

LEARNING OBJECTIVES

You should know the meaning of the following terms:
Arrhenius acid, Arrhenius base, Brønsted-Lowry acid, Brønsted-Lowry base, Lewis acid, Lewis base, conjugate acid/base pair, amphoteric, strong and weak (as applied to acids, bases, and electrolytes), percent ionization, acid ionization constant (k_a), base ionization constant (k_b), hydrolysis, monoprotic acid, polyprotic acid

You should be able to give specific examples of Arrhenius acids and bases, Brønsted acids and bases, and Lewis acids and bases.

You should know the common strong and weak acids and bases.

You should by able to use equilibrium or percent ionization data (either qualitative or quantitative) to determine the relative strengths of Brønsted acids (or bases) and be familiar with the reciprocal relationship between the strengths of conjugate acid/base pairs.

You should be familiar with the general relations between molecular structure and the strength of both binary and oxyacids

You should be familiar with the general features of equilibria involving polyprotic acids and their ions.

You should be able to describe qualitatively how various salts affect the pH of aqueous solutions.

You should know the definitions of and understand the relationships among k_w, $[H^+]$, $[OH^-]$, pH, and pOH and be able to use these in calculations.

You should be able to work the following general classes of problems involving the ionization of weak acids and bases or their salts:

a. Ionization of a weak acid or base (e.g., determine k_a or k_b, given the initial concentration and $[H^+]$, pH, % ionization, etc.; determine $[H^+]$, pH, % ionization, etc., given k_a or k_b and the initial concentration; determine the initial concentration necessary to give a specified $[H^+]$, pH, % ionization, etc., if k_a or k_b is known).

b. Reaction of the salt of a weak acid or base with water (e.g., determine k_b or k_a for the ion of a salt derived from a weak acid or base, given k_a or k_b for the weak acid or base [i.e., you should understand the quantitative relation between k_a/k_b for conjugate acid/base pairs]; determine k_b or k_a for the ion of a salt derived from a weak acid or base (or k_a or k_b for the conjugate acid or base) given the concentration of the salt and the pH, $[H^+]$, etc., of the solution; determine the pH, $[H^+]$, etc. of a salt solution, given the initial concentration and k_a or k_b for the acid or base from which the salt is derived)

You should review the material on acids and bases in Chapter 4: Aqueous Reactions and Solution Stoichiometry