Types of Equilibrium Constants in CH 223

K_a <u>Acid Dissociation Constant</u> (Chapter 14)
For the reaction: $HA + H_2O <=> H_3O^+ + A^-$,

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

K_b <u>Base Dissociation Constant</u> (Chapter 14)
For the reaction: $B^- + H_2O <=> OH^- + HB$,

$$K_b = \frac{[OH^-][HB]}{[B^-]}$$

K_c <u>Equilibrium Constant</u> using <u>Molarity</u> (Chapter 13)
For the reaction: a A + b B <=> c C + d D,

$$K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

K_f <u>Formation Constant</u> (Chapter 14 and 15)
For the reaction: $M^{2+} + 4\,L_{(aq)} <=> ML_4^{2+}$,

$$K_f = \frac{[ML_4^{2+}]}{[M^{2+}][L]^4}$$

K_p <u>Equilibrium Constant</u> using <u>Pressure</u> (atm) (Chapter 13)
For the reaction: $\frac{1}{2} N_{2(g)} + O_{2(g)} <=> NO_{2(g)}$,

$$K_p = \frac{P_{NO_2}}{P_{N_2}^{0.5} P_{O_2}}$$

Also: $K_p = K_c(RT)^{\Delta n}$

K_{sp} <u>Solubility Product Constant</u> (Chapter 15).
For the reaction: $ML_{2(S)}$ <=> M^{2+} + 2 L^-,

$$K_{sp} = \left[M^{2+}\right]\left[L^-\right]^2$$

K_{spa} <u>Solubility Product Constant</u> in <u>Acid</u> (Chapter 15)
For the reaction: $ZnS_{(s)}$ + 2 H_3O^+ <=> Zn^{2+} + H_2S + 2 $H_2O_{(l)}$,

$$K_{spa} = \frac{\left[Zn^{2+}\right]\left[H_2S\right]}{\left[H_3O^+\right]^2}$$

K_w <u>Autoionization of Water</u> Constant (Chapter 14)
For the reaction: 2 $H_2O_{(l)}$ <=> H_3O^+ + OH^-,

$$K_w = \left[H_3O^+\right]\left[OH^-\right] = 1.00 * 10^{-14} \text{ at } 25\ ^\circ C$$

k <u>Kinetics Rate Constant</u> (Chapter 12). The forward reaction (k_1) and the reverse reaction (k_{-1}) are related to the equilibrium constant, **K**, by

$$K = \frac{k_1}{k_{-1}}$$

Q <u>Reaction Quotient</u> (Chapter 13, 15, and 17), for non-equilibrium calculations.
Q is defined in a method similar to that of K.