Dr. Casagrande's Chemistry 1 Final Exam Review Sheet 3

Chapter 18 Problem

1. For the reaction, $2\ H_2S\ (g) \rightleftharpoons 2\ H_2\ (g) + S_2\ (g)$,
   a. Determine the equilibrium constant expression, K_{eq}, for this reaction.

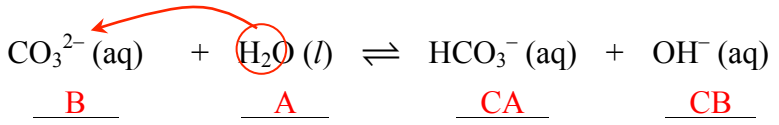
$$K_{eq} = \frac{[H_2]^2[S_2]}{[H_2S]^2}$$

   b. Given $[H_2S] = 0.193$ M, $[H_2] = 0.0035$ M, and $[S_2] = 0.0035$ M at equilibrium, calculate the value for K_{eq}.

$$K_{eq} = \frac{[0.0035]^2[0.0035]}{[0.193]^2} = 1.15\times10^{-6}$$

Chapter 19 Problems

2. For following reaction, **circle the H^+ being transferred and draw an arrow** from the acid to the base *in the reactants* and **label** the acid (**A**), the base (**B**), the conj. acid (**CA**), and the conj. base (**CB**).



3. A solution has $[H^+] = 1.0\times10^{-8}$ M. Determine the pH, $[OH^-]$, and pOH of this solution. Is this solution acidic, basic, or neutral?

$$pH = -\log[1.0\times10^{-8}] = 8 \quad (\text{or pH} = -\text{exponent} = 8)$$

$$pOH = 14 - 8 = 6$$
$$[OH^-] = 10^{-6} = 1.0\times10^{-6}\ \text{M}$$

or

$$[OH^-] = 1.0\times10^{-14} / 1.0\times10^{-8} = 1.0\times10^{-6}\ \text{M}$$
$$pOH = -\log[1.0\times10^{-6}] = 6$$

Solution is BASIC because $[OH^-] > [H^+]$ or because pH > 7

4. What is the pOH of a solution with $[OH^-] = 3.8\times10^{-10}$ M? What are the $[H^+]$ and pH of this solution? Is it acidic, basic, or neutral?

$$pOH = -\log[3.8\times10^{-10}] = 9.42$$

$$pH = 14 - 9.42 = 4.58$$
$$[H^+] = 10^{-4.58} = 2.6\times10^{-5}\ \text{M}$$

or

$$[H^+] = 1.0\times10^{-14} / 3.8\times10^{-10} = 2.6\times10^{-5}\ \text{M}$$
$$pH = -\log[2.6\times10^{-5}] = 4.58$$

Solution is ACIDIC because $[H^+] > [OH^-]$ or because pH < 7

5. a. Write the *balanced* neutralization equation for RbOH and malic acid, $H_2C_4H_4O_5$.

$$2\ RbOH\ (aq) + H_2C_4H_4O_5\ (aq) \rightarrow Rb_2C_4H_4O_5\ (aq) + 2\ H_2O\ (l)$$

6. In a titration, 30.0 mL of KOH solution is neutralized by 13.85 mL of 0.600 M HI solution.
   a. Determine the number of moles of KOH neutralized in the reaction

$$?\ \text{mol KOH} = 0.01385\ \cancel{\text{L HI}} \times \frac{0.600\ \text{mol HI}}{1\ \cancel{\text{L HI}}} \times \frac{1\ \text{mol KOH}}{1\ \cancel{\text{mol HI}}} = \boxed{0.00831\ \text{mol KOH}}$$

   b. Determine the concentration of the KOH solution

$$[\text{KOH}] = \frac{0.00831\ \text{mol KOH}}{0.0300\ \text{L}} = \boxed{0.277\ \text{M}}$$