Answers to Even # Homework Problems (8^{th} Edition)

Chapter 8

8.16 The rate of 'spoiling' is faster at higher temperatures

8.18 As reaction proceeds, concentrations of reactants decreases. Rate decreases as concentration decreases.

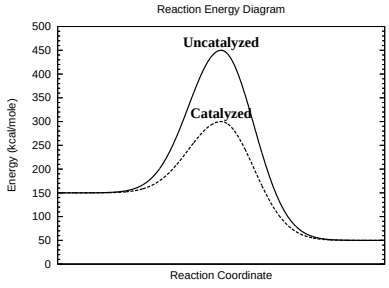
8.24 (a) At equilibrium, rates are equal, but concentrations are NOT.
(b) $[Cl_2] = [PCl_3]$ only if *all* of both PCl_3 and Cl_2 come from PCl_5

8.26 (a) $H_2O + CO_2 \longrightarrow H_2CO_3$

(b) $P_4O_{10} \longrightarrow P_4 + 5\ O_2$
(c) $3\ HF + PF_3 \longrightarrow 3\ F_2 + PH_3$

8.28 $K_{eq} = \frac{[N_2O_4]}{[NO_2]^2}$; $[N_2O_4] = K_{eq}\ [NO_2]^2 = (172)\ (0.0714)^2 = 0.877$ M

8.50



Chapter 9

9.14 (a) $LiOH \rightleftharpoons Li^+_{(aq)} + OH^-_{(aq)}$
(b) $(CH_3)_2NH + H_2O \rightleftharpoons (CH_3)_2NH^+_{2\ (aq)} + OH^-_{(aq)}$

9.20 (a) HSO_4^{-1} (b) $H_2BO_3^{-1}$ (c) I^{-1} (d) H_2O (e) NH_3 (f) PO_4^{-3}

9.22 (a) H_2O (b) H_2S (c) NH_4^+ (d) C_6H_5OH (e) HCO_3^{-1} (f) $H_2BO_3^{-1}$

9.24 (a) H_3PO_4 is the strongest acid, so equilibrium $\Longrightarrow$
(b) HCl is the strongest acid, so equilibrium $\Longleftarrow$
(c) HCO_3^{-1} is the strongest acid, so equilibrium $\Longrightarrow$

9.28 (a) Pyruvic acid (b) Phosphoric acid (c) Lactic acid (d) Carbonic acid

9.32 $NaOH + (NH_4)_2CO_3 \rightleftharpoons Na_2CO_3 + NH_4OH$
$NH_4OH \longrightarrow NH_3 + H_2O$

9.38 Wine

9.40 Titration is used to determine the acid or base concentration of a solution.

9.44 (0.72 M) (0.0197 L) = 0.0142 mole NaOH = 0.0142 moles H_2SO_4
M = $\frac{n}{V} = \frac{0.0142\ mol}{0.025\ L}$ = 0.568 M

9.52 (a) $H_3O^+ + HPO_4^{-2} \longrightarrow H_2O + H_2PO_4^{-1}$

(b) $OH^- + H_2PO_4^{-1} \longrightarrow H_2O + HPO_4^{-2}$

9.62 $HCl + CH_3COO^{-1} \longrightarrow CH_3COOH + Cl^{-1}$

CH_3COOH is a weak acid. Given that pK_a = 1.8 x 10^{-5} and $[CH_3COOH]$ = 0.100 M,
$K_a = \frac{[H^+][CH_3COO^-]}{[CH_3COOH]} \approx \frac{x^2}{0.1}$; x = $\sqrt{1.8x10^{-6}}$ = 1.34 x 10^{-3}; pH = -log(1.34x 10^{-3}) = 2.87

9.82

Acid	pK_a	K_a	Strength
lactic acid	3.85	1.41 x 10^{-4}	Strongest Acid
butanoic acid	4.82	1.51 x 10^{-5}	
barbituric acid	5.00	1.00 x 10^{-5}	Weakest Acid

(c) Since NaOH is a strong base, the only requirement is to known the concentration of each of the weak acid solutions.

9.84 The concentrations of ions is too low to conduct significant current.

9.102 $H_2CO_{3\,(aq)} \rightleftharpoons H_2O_{(liq)} + CO_{2\,(gas)}$