CE213A

Problem Set II

1. Calculate the equilibrium constant of the reaction: $H_2O \rightleftarrows H^+ + OH^-$

Species	$(\Delta G_f^o)_i$ kcal/mole
H^+	-0.00
H_2O	-56.69
OH^-	-37.595

$R = Universal$ gas constant = 1.9872 x 10^{-3} Kcal/^{o}K/mole

T = 298$^o K$

2. Determine the solubility product for $CaCO_3$: $CaCO_3(s) \rightleftarrows Ca^{2+} + CO_3^{2-}$

Species	$(\Delta G_f^o)_i$ kcal/mole
CO_3^{2-}	-126.22
Ca^{2+}	-132.18
$CaCO_3(s)$	-269.78

$R = Universal$ gas constant = 1.9872 x 10^{-3} Kcal/^{o}K/mole

T = 298$^o K$

3. Calculate the equilibrium constant of the reaction: $NH_3(aq) + H_2O \rightleftarrows NH_4^+ + OH^-$

Species	$(\Delta G_f^o)_i$ kcal/mole
$NH_3(aq)$	-6.37
NH_4^+	-19.00
H_2O	-56.69
OH^-	-37.595

$R = Universal$ gas constant = 1.9872 x 10^{-3} Kcal/^{o}K/mole

T = 298$^o K$

4. Determine the Henry's Law constant for oxygen:

Species	$(\Delta G_f^o)_i$ kcal/mole
O_2(aq)	-3.93
O_2(g)	0.00

$R = Universal$ gas constant = 1.9872 x 10^{-3} Kcal/^{o}K/mole

T = 298$^o K$

5. Calculate the equilibrium constant of the reaction: $Fe^{3+}(aq) + 3H_2O \rightleftarrows Fe(OH)_3(s) + 3H^+$

Species	$(\Delta G_f^o)_i$ kcal/mole
Fe^{3+}	-2.52
$Fe(OH)_3(s)$	-166.00
H_2O	-56.69
H^+	0.00

$R = Universal$ gas constant = 1.9872 x 10^{-3} Kcal/$^\circ$K/mole

T = $298^\circ K$