Chemistry CP II
Nernst Worksheet

Name: Key

Using the chart on page 796 in your text, find the standard cell potentials for the following equations. Then solve for the actual cell potential according to the modified conditions listed.

1. MnO_4^{1-} (aq) + Fe^{2+} (aq) → Mn^{2+} (aq) + Fe^{3+} (aq) **Modified Condition: $[Mn^{2+}] = 2.8$ M**

1.51 − .77

$$E^\circ_{cell} = 0.74 - \frac{0.0591}{5} \log \frac{2.8}{1^3}$$

0.734 volts

$$\log K = \frac{5(0.74)}{0.0591}$$

4.034×10^{62}

2. Pb^{2+} (aq) + Zn (s) → Pb (s) + Zn^{2+} (aq) **Modified Conditions: $[Zn^{2+}] = 0.0002$ M**

−.13 + 0.76

$$E_{cell} = .63 - \frac{0.0591}{2} \log 0.0002$$

.739 volts

$$\log K = \frac{2(.63)}{0.0591}$$

2.088×10^{21}

3. 5Al (s) + 3MnO_4^{1-} (aq) → 5Al^{3+} (aq) + 3Mn^{2+} (aq) **Modified Conditions: $[MnO_4^{1-}] = 1.5$ M and $[Al^{3+}] = 0.7$ M.**

1.51 +1.66

$$E_{cell} = 3.17 - \frac{0.0591}{15} \log \frac{(.7)^5}{(1.5)^3}$$

3.175 volts

$$\log K = \frac{15(3.17)}{0.0591}$$

$K = 10^{804.5}$

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Using the chart on page 796 in your text, find the standard cell potentials for the following equations. Then solve for the actual concentration of the indicated ion according to the modified conditions listed.

4. Cr^{3+} (aq) + Cl_2 (g) → $Cr_2O_7^{2-}$ (aq) + Cl^{1-} (aq) **Modified Condition: Actual voltage 0.08 volts and I want to know the concentration of Cr^{3+} ions in solution.**

$0.08 = 0.03 - \frac{0.0591}{6} \log \frac{1}{[Cr^{3+}]^2}$ -1.33 1.36

$.05 = -\frac{0.0591}{6} -\log [Cr^{3+}]^2$

$\frac{.05}{-.00985}$

$\log K = \frac{6(0.03)}{0.0591}$

$-5.076 = -\log [Cr^{3+}]^2$

1110.9

$345\ M = [Cr^{3+}]$

5. Zn (s) + $2Ag^{1+}$ (aq) → Zn^{2+} (aq) + 2Ag (s) **Modified Condition: Actual voltage 1.48 volts and I want to know the concentration of Zn^{2+} ions in solution.**

.80 -.76

$1.48 = 1.56 - \frac{0.0591}{2} \log \frac{[Zn]}{1}$

$\log K = \frac{2(1.56)}{0.0591}$

-0.08

6.19×10^{52}

$2.707 = \log [Zn]$

$509\ M = [Zn^{2+}]$

For Each of the above 5 problems, also solve for the equilibrium constant for the reaction.