ELECTROCHEMISTRY REVIEW

anode cathode

$Mg_{(s)} | Mg^{2+}_{(aq)} || Al^{3+}_{(aq)} | Al_{(s)}$

-2.37 -1.66

a.) Give the balanced equation for the spontaneous cell reaction that occurs. $2Al^{3+}_{(aq)} + 3Mg_{(s)} \rightarrow 2Al_{(s)} + 3Mg^{2+}_{(aq)}$

b.) ~~Indicate the oxidizing agent and the reducing agent in this reaction.~~

c.) Label the anode and the cathode.

d.) Calculate $E°_{cell}$. $-1.66 + 2.37 = 0.71V$

e.) How would increasing the size of the anode affect the voltage? Explain.

No effect

Example: 0.34 0.80

Consider the reaction $Cu_{(s)} + 2Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$.

a.) Write the line notation for this reaction. $Cu_{(s)} | Cu^{2+}_{(aq)} || Ag^{+}_{(aq)} | Ag_{(s)}$

b.) Calculate $E°_{cell}$. $0.80 - 0.34 = \boxed{0.46V}$

c.) Is this reaction spontaneous or nonspontaneous? yes

d.) Calculate ΔG. $\Delta G = -nFE = -2(96485)(0.46) = -88766.2J = \boxed{-88.8kJ}$

e.) Calculate K. $\Delta G = -RT\ln K = -8.314(273)\ln x = \nearrow$ $x = \boxed{9.66 \times 10^{16}}$

f.) How would the cell potential be affected by the addition of $NaCl_{(aq)}$? Explain.

Adding NaCl will cause a decrease in the concentration of Ag^{+} ions since $Ag^{+}_{(aq)} + Cl^{-}_{(aq)} \rightarrow AgCl_{(s)}$. The reaction will shift to the left to produce more Ag^{+} ions.

Example:

A current of 5.7A is passed through a solution of Zn^{2+}, producing 3.2g of zinc metal. How long is the current applied?

$$\frac{3.2g\ Zn}{65.39g} \times \frac{1mol}{} = 0.049mol \times \frac{96485C}{mole} \times 5.7A$$

26948.3 seconds

7.5 hours