AP Unit 3 Day 4 Practice

#1.) $2\,Ag(s) + Ni^{2+}(aq) \rightarrow 2\,Ag^{+}(aq) + Ni(s)$

$\downarrow [AgNO_3] = \downarrow [Ag^+] = \downarrow [\text{products}] \Rightarrow Q < 1$ (further from equil.)

$\Rightarrow \uparrow$ voltage

#2.) $(Cu^{2+} + 2e^- \rightarrow Cu(s) \quad E^\circ = +0.34\,V)$ flip! $E^\circ_{ox} = -0.34\,V$

$Ag^+ + e^- \rightarrow Ag(s) \quad E^\circ = +0.80\,V = E^\circ_{red}$

$E^\circ_{cell} = E^\circ_{ox} + E^\circ_{red} = -0.34 + 0.80 = \boxed{0.46\,V}$

#3.) $\Delta G = -nFE_{cell} = -\left(\frac{6\,mol\,e^-}{mol_{rxn}}\right)\left(96{,}485\,\frac{C}{mol\,e^-}\right)\left(1.08\,V\right)$ (J/C)

$= -625{,}000\,\frac{J}{mol_{rxn}} \times \frac{1\,kJ}{1{,}000\,J} = \boxed{-625\,\frac{kJ}{mol_{rxn}}}$

#6.) $\frac{1}{}I_2 + \frac{2}{}Cu^+ \rightarrow \frac{2}{}I^- + \frac{2}{}Cu^{2+}$

$2e^- + I_2 \rightarrow 2I^-$

$(Cu^+ \rightarrow Cu^{2+} + e^-) \times 2$

#7.) $E^\circ_{cell} = -2.54\,V \Rightarrow$ NOT therm. favorable

$\Rightarrow +\Delta G,\ K < 1$

#9.) $2\,Ag(s) + Ni^{2+}(aq) \rightarrow 2\,Ag^{+}(aq) + Ni(s)$

$\downarrow [Ni(ClO_3)_2] = \downarrow [Ni^{2+}] = \downarrow [\text{reactants}] \Rightarrow Q > 1$ (closer to equilibrium)

$\Rightarrow \downarrow$ voltage

#10.) $Co^{2+} + Fe \rightarrow Fe^{3+} + Co$

Fe is oxidized!

$(Fe^{3+} + 3e^- \rightarrow Fe(s) \quad E° = -0.04\ V)$ flip! $\Rightarrow E°_{ox} = +0.04\ V$

$Co^{2+} + 2e^- \rightarrow Co(s) \quad E° = -0.28\ V$

$E°_{cell} = 0.04 - 0.28 = -0.24\ V \Rightarrow$ NOT Spontaneous!

$\Rightarrow$ $+\Delta G°, K < 1$

#11.) $\underline{3}\ Sn^{4+} + \underline{2}\ Cr \rightarrow \underline{2}\ Cr^{3+} + \underline{3}\ Sn^{2+}$

$3 \times (2e^- + Sn^{4+} \rightarrow Sn^{2+})$

$2 \times (Cr \rightarrow Cr^{3+} + 3e^-)$