CH 223 Worksheet 8

1. A voltaic cell is based on a Co^{2+} / Co half-cell and an AgCl / Ag half-cell. (a) What reaction occurs at the anode? (b) What is the standard cell potential?

2. Using the standard reduction potentials listed in Appendix E (see attached), determine if the following reaction is spontaneous under standard conditions:

\[
\text{Hg}^{2+} (aq) + 2 \text{I}^- (aq) \rightarrow \text{Hg} (l) + \text{I}_2 (s)
\]

3. For the reaction

\[
3 \text{Ni}^{2+} (aq) + 2 \text{Cr(OH)}_3 (s) + 10 \text{OH}^- (aq) \rightarrow 3 \text{Ni} (s) + 2 \text{CrO}_4^{2-} (aq) + 8 \text{H}_2\text{O} (l)
\]

(a) What is the value of \( n \)? (b) Use the data in Appendix E to calculate \( \Delta G^\circ \). (c) Calculate \( K \) at \( T = 426 \, \text{K} \).
4. A voltaic cell utilizes the following reaction and operates at 310 K.

\[ 3 \text{Ce}^{4+} (aq) + \text{Cr} (s) \rightarrow 3 \text{Ce}^{3+} (aq) + \text{Cr}^{3+} (aq) \]

(a) What is the emf of this cell under standard conditions?

(b) What is the emf of this cell when \([\text{Ce}^{4+}] = 3.0 \text{ M}, [\text{Ce}^{3+}] = 0.10 \text{ M and } [\text{Cr}^{3+}] 0.010 \text{ M}\)?

5. An aqueous cadmium (Cd) solution is electrolyzed using a current of 7.60 A. How many grams cadmium will be plated out after 2.00 days?