Name: _____

Chemistry 30

Unit 6: Redox Reactions and Electrochemistry

Assignment 3 Electrochemistry

1. Use half-reaction potentials to predict whether the following reactions are spontaneous or nonspontaneous in aqueous solutions. If the reaction is spontaneous, write a balanced equation and calculate the total voltage.

   a. $I_2 + Cl^- \rightarrow I^- + Cl_2$

   b. $MnO_4^- + Br^- + H^+ \rightarrow Mn^{2+} + Br_2 + H_2O$

2. Compare an electrochemical cell with an electrolytic cell by completing the following table:

	Electrochemical Cell	Electrolytic Cell
Energy Conversion		
Spontaneous Chemical Reaction?		
Value of E° (positive or negative)		

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3. Potassium reacts with chlorine to produce the ionic compound potassium chloride:

   $2\ K\ (s) + Cl_2\ (g) \rightarrow 2\ KCl\ (s)$

   a. Write a balanced half-reaction for the oxidation reaction.

   b. Write a balanced half-reaction for the reduction reaction.

4. What reaction (oxidation or reduction) occurs at an anode of . . .

   a. an electrochemical cell

   b. an electrolytic cell

5. An iron bar is to be electroplated with zinc.

   - Identify what will act as the two electrodes for the cell
   - Identify each electrode as either the anode or cathode
   - Write the half-reactions occurring at each electrode
   - Identify a solution that would make a suitable electrolyte for this cell
   - Identify which electrode will be attached to the negative post of the battery and which will be attached to the positive post, and explain.

   A fully labeled diagram may be a useful way to answer these questions.

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6. The net equation for a given galvanic cell is:

$$Sn\ (s) + 2\ Ag^{+} \rightarrow Sn^{2+} + 2\ Ag\ (s)$$

   a. Write the two half-reactions involved, and identify each in terms of (1) site of oxidation or reduction and (2) anode or cathode.

   b. Calculate the net potential of the cell (the voltage), assuming standard conditions.

   c. Draw a fully labeled diagram of the electrochemical cell. Be sure to indicate the flow of electrons in the external circuit (through the wire and light bulb) and the flow of ions in the solution.