

UNIT 13

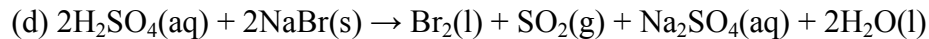
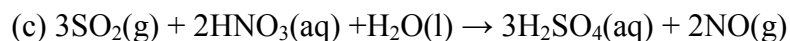
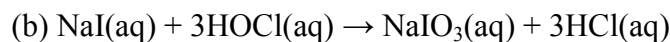
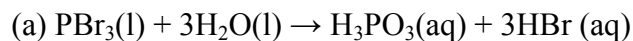
ASSIGNMENT

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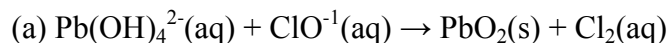
Name: _____

1. Indicate whether the following balanced equations involve oxidation-reduction processes and **if they do** show what is being oxidized and reduced. **Write oxidation numbers on all elements.** [8 pts]

Circle elements involved in reduction in RED & elements involved in oxidation in BLUE

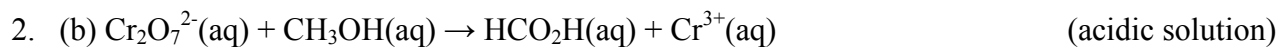


2. Balance the following redox equations: [2 x 3pt] = [6 pt]



[basic solution]

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3. A voltaic cell is created by placing a strip of copper metal into a solution of 1.0 M copper sulfate and a piece of Tin in a solution of Tin (II) chloride (1 mol/L).

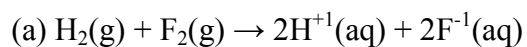
(a) Draw the above cell clearly identifying what is the **anode, cathode, direction of e^{-1} flow, salt bridge, ion movement, charge on electrons** [5 pts]

3. (b) Write the two half reactions of the chemical reaction **and** show the E°_{cell} for this process. [2 pts]

oxidation _____

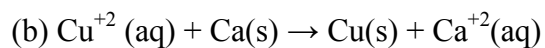
reduction _____

4. Calculate the standard EMF and ΔG° for each of the following reactions: **Write the half reactions.** [9 pts]



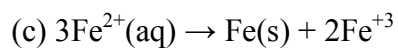
E°_{cell}

ΔG° (in kJ)



E°_{cell}

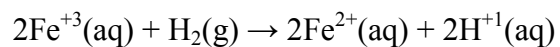
ΔG° (in kJ)



E°_{cell}

ΔG° (in kJ)

5. A voltaic cell utilizes the following reaction:



(a) Calculate E°_{cell} for this reaction [2 pts]

(b) What is the emf for this cell when $[\text{Fe}^{+3}]$ is 2.50M, $P_{\text{H}_2} = 0.85\text{atm}$, $[\text{Fe}^{2+}]$ 0.0010M and the pH in both compartments is 5.00? [4 pts]

6. A voltaic cell is constructed with two Zn^{2+} -Zn electrodes. The two cell compartments have $[\text{Zn}^{2+}] = 2.8\text{M}$ and $[\text{Zn}^{2+}] = 1.00 \times 10^{-2}\text{mol/L}$ respectively. [4 pts]

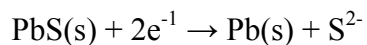
(a) Which electrode is the anode of the cell? _____

(b) What is the standard emf of this cell, E°_{cell} ? _____

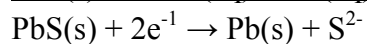
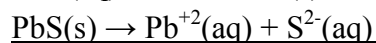
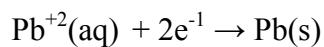
(c) What is the nonstandard emf for this cell?

7. Calculate the mass of Li formed by electrolysis of molten LiCl by a current of 7.5×10^4 A flowing for a period of 48.00 hrs. Assume that 85% of this current actually does chemical work (it is 85% efficient). [3 pts] **Answer in kg!**

8. The K_{sp} value for PbS(s) is 8.0×10^{-28} . By using this value together with an electrode potential from appendix E, determine the value of the standard reduction potential ($E^{\circ}_{red,overall}$) for the reaction: [4 pts]



This reaction can be written as sum of 2 steps:



$$E^{\circ}_{red1} = \underline{\hspace{4cm}}$$

$$E^{\circ}_{red2} = \underline{\hspace{4cm} ? \hspace{4cm}}$$

$$E^{\circ}_{red,overall} = E^{\circ}_{red1} + \underline{E^{\circ}_{red2}}$$