OXIDATION-REDUCTION: PROBLEMS

1. A battery is based on the following pairs: Sn^{2+}/Sn (E^0 = -0.15 V) and Fe^{3+}/Fe^{2+} (E^0 = +0.78 V).

Draw the battery and indicate with are both half-reactions (oxidation and reduction) and the place in which they take place.

Determine the electromotive force of the battery

2. The overall reaction of a Cu-Zn can be written as follows:

$$Zn + CuSO_4 \rightarrow Cu + ZnSO_4$$

The reduction potentials are Zn^{2+}/Zn (E^0 = -0.76 V) and Cu^{2+}/Cu (E^0 = 0.34 V). The current through this battery is 45 mA during 1 hr. Determine:

a) the half-reactions in the anode and cathode and the standard electromotive force of the battery
b) the amount of copper produced

Atomic wieght: Cu = 63.5

3. Consider the following chemical equation:

$$MnO_4^- + I^- \rightarrow Mn^{2+} + I_2$$

a) balance the equation, using the half-reaction's method
b) identify the oxidizing agent and the reductant
c) complete the equation, knowing that the ions come from:
    - reactants: potassium permanganate, potassium iodide, sulfuric acid
    - products: manganese sulfate, potassium sulfate, water, iodine
d) determine the volume of 0.1 M permanganate solution needed to titrate 5 g of potassium iodide

Atomic weights: K=39; I=127