**Directions: For each question, provide your work and final answer below the question. Without work, no credit will be given. Check significant figures and units.**

1. Sn + 2 Ag+ → Sn2+ + 2 Ag
2. Calculate the standard voltage of a cell involving the system above.
3. What is the equilibrium constant for the system above?
4. Calculate the voltage at 25C of a cell involving the system above when the concentration of Ag+ is 0.0010 molar and that of Sn2+ is 0.20 molar.
5. A steady current of 1.00 ampere is passed through an electrolytic cell containing a 1 molar solution of AgNO3 and having a silver anode and a platinum cathode until 1.54 grams of silver is deposited.
6. How long does the current flow to obtain this deposit?
7. What weight of chromium would be deposited in a second cell containing 1–molar chromium(III) nitrate and having a chromium anode and a platinum cathode by the same current in the same time as was used in the silver cell?
8. If both electrodes were platinum in this second cell, what volume of O2 gas measured at standard temperature and pressure would be released at the anode while the chromium is being deposited at the cathode? The current and the time are the same as in (b)
9. A solution of CuSO4 was electrolyzed using platinum electrodes by passing a current through the solution. As a result, there was a decrease in both [Cu2+] and the solution pH; one electrode gained in weight a gas was evolved at the other electrode.
10. Write the cathode half reaction that is consistent with the observations above.

(b) Write the anode half reaction that is consistent with the observations above.

1. Sketch an apparatus that can be used for such an experiment and label its necessary components.
2. List the experimental measurements that would be needed in order to determine from such an experiment the value of the faraday.
3. A galvanic cell is constructed using a chromium electrode in a 1.00-molar solution of Cr(NO3)3 and a copper electrode in a 1.00-molar solution of Cu(NO3)2. Both solutions are at 25C.
4. Write a balanced net ionic equation for the spontaneous reaction that occurs as the cell operates. Identify the oxidizing agent and the reducing agent.

(b) A partial diagram of the cell is shown below.



1. Which metal is the cathode?
2. What additional component is necessary to make the cell operate?
3. What function does the component in (ii) serve?

(c) How does the potential of this cell change if the concentration of Cr(NO3)3 is changed to 3.00-molar at 25C? Explain.