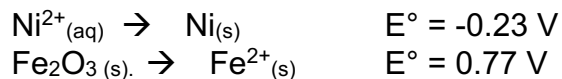


## ELECTROCHEMISTRY PRACTICE

This worksheet should help you identify how we use electrochemistry to understand chemical reactions. It is intended for you to work through it in order. (*Don't skip ahead.*)

Suppose you want to make a galvanic cell that you can use as a battery. In this battery, the two half reactions are:



In order for the reaction to be spontaneous, what is the cathode? What is the anode? Show the  $E^{\circ}_{\text{cell}}$  calculation for how you determined this.

What compound is being oxidized? What is being reduced?

What is the balanced redox reaction for the battery? (in basic conditions)

Draw a diagram of the cell and write the shorthand cell notation.

What is the value of  $\Delta G^\circ$  for the reaction?

What is the value of  $K$  for the reaction?

Considering Le Chatelier's principle, when you make the battery should you have high or low  $\text{Fe}^{2+}$  and  $\text{Ni}^{2+}$  concentrations? Why?

Now check your hypothesis. Solve for  $Q$ ,  $E_{\text{cell}}$ , and  $\Delta G$  for the following two scenarios:

Scenario A:  $[\text{Ni}^{2+}] = 0.250 \text{ M}$   $[\text{Fe}^{2+}] = 0.250 \text{ M}$

Scenario B:  $[\text{Ni}^{2+}] = 1.3 \text{ M}$   $[\text{Fe}^{2+}] = 1.3 \text{ M}$

Which scenario will yield a better, longer lasting battery?

As the reaction proceeds, what will happen to the mass of the Ni electrode? What will happen to the mass of the  $\text{Fe}_2\text{O}_3$  electrode?