Exercise 9.4
Standard Potential for Electrochemical Cells

1. What can the standard potential tell you about when a reaction is (or is not) thermodynamically allowed?

2. Use electrochemical data to calculate a standard free energy of formation.

(a) Write a balanced chemical equation for the reaction in which chlorine is reduced to chloride while iodide is oxidized to iodine. Both ions are in the aqueous phase, chlorine is a gas, and iodine is a solid. *You will need the half reactions later, so you might as well write them out now…*

(b) Calculate the standard potential for this reaction.

(c) Calculate the standard free energy change for this reaction from the standard potential.

(d) Calculate the standard free energy of formation of the chloride ion. *Compare your answer to the one in the data table.*

3. Ozone can be produced electrochemically from oxygen.

(a) If this reaction is performed in acidic aqueous solution, water is oxidized to ozone and oxygen is reduced to water. Write balanced half reactions for this process.

(b) Use standard free energies of formation to predict the standard cell potential for this reaction.