Cell Potentials and Free Energy – Reading Guide

*section 17.4 in OpenStax*

**Cell Potential and ∆G**

We can relate ∆Go to $E\_{cell}^{°}$ by the following equation:

∆Go =

Consider the following reaction: 3 Pb2+ + 2 Cr(s) → 3 Pb(s) + 2 Cr3+

 Using the values in Table 17.2, calculate $E\_{cell}^{°}$ for this reaction.

 How many electrons are transferred in this reaction? n = \_\_\_\_\_\_\_\_

 Calculate ∆Go for this reaction.

 Is the reaction spontaneous under standard conditions? Justify your answer.

**Cell Potential and Keq**

We can also relate $E\_{cell}^{°} $to *K*eq by the following equation:

$E\_{cell}^{°}$ =

Consider the oxidation of zinc metal by acid (H+) under standard conditions (25°C).

Write a *balanced* equation for this reaction.

Using the values in Table 17.2, calculate $E\_{cell}^{°} $for this reaction.

 How many electrons are transferred in this reaction? n = \_\_\_\_\_\_\_\_\_

 Calculate *K*eq for this reaction.

We are able to determine the spontaneity of a reaction based on the numerical values of the following:

 ∆Go = *(positive or negative)*

 $E\_{cell}^{°} $= *(positive or negative)*

 Keq = \_\_\_\_\_\_ *(> 1 or < 1)*

**Cell Potential and Concentration**

When an electrochemical cell operates under **non-standard** conditions, we must calculate Ecell (as opposed to $E\_{cell}^{°} $for standard conditions) using the Nernst Equation.

Nernst Equation: Ecell =

Work through Example 17.6 before attempting the following practice problem.

Write a *balanced* equation for this cell: Zn(s) | Ag+(aq) (0.500*M*) ‖ Zn2+ (0.0255*M*) | Ag(s)

Calculate $E\_{cell}^{°}$ for this reaction.

 How many electrons are transferred in this reaction? n = \_\_\_\_\_\_\_

 Calculate the value of Q for this reaction.

 Using the Nernst Equation, calculate the cell potential (Ecell) for this reaction.

**End of Chapter 17 Practice Problems**

#29, 31a, 33a–b

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”