

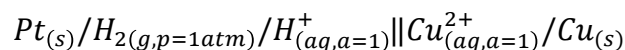
ELECTROCHEMISTRY – EN 314

Problem Set-2

Thermodynamics of Cells

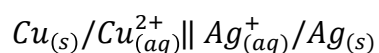
Date: 24th January 2019

Q.1. The measured electromotive force (EMF) for the cell



is +0.337 V. Write down the cell reaction and calculate the value of ΔG^θ for this reaction.

Q.2. For the following cell,



at 298K:

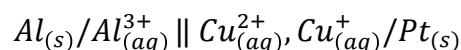
- I. State the cell reaction.
- II. Give the Nernst equation for the cell
- III. Calculate the cell EMF when the ions are present at activities of a) 1.0 and b) 0.1.

The standard electrode potentials are:

$$E_{Ag/Ag^+}^\theta = +0.80 \text{ V}$$

$$E_{Cu/Cu^+}^\theta = +0.34 \text{ V}$$

Q.3. For a hypothetical cell,



at 298 K:

- I. State the cell reaction.
- II. Give the Nernst equation for the cell

III. Calculate the cell EMF when

a) $a_{\text{Al}^{3+}} = a_{\text{Cu}^{2+}} = a_{\text{Cu}^{+}} = 1.0$

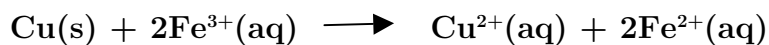
b) $a_{\text{Al}^{3+}} = a_{\text{Cu}^{2+}} = a_{\text{Cu}^{+}} = 0.1$

The standard electrode potentials are:

$$E_{\text{Cu}^{+}/\text{Cu}^{2+}}^{\theta} = +0.15 \text{ V}$$

$$E_{\text{Al}/\text{Al}^{3+}}^{\theta} = -1.61 \text{ V}$$

Q.4. Consider a galvanic cell that uses the reaction:

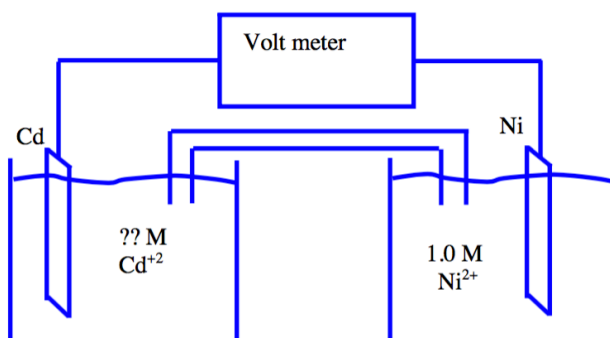


What is the potential of a cell at 25° C that has the following concentrations?

$$[\text{Fe}^{3+}] = 0.0001 \text{ M} \quad [\text{Cu}^{2+}] = 0.25 \text{ M} \quad [\text{Fe}^{2+}] = 0.2 \text{ M}.$$

What is the reaction quotient?

Q.5. The potential for a voltaic cell shown below is 0.240 V at 25° C standard potential is $E^{\circ} \text{ cell} = 0.170\text{V}$. What is the concentration of cadmium ion solution?



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