CHEM 125/6 Lab 5: Galvanic Cells

Section 600 Discussion Questions

Name:

You will have 1 hour to discuss and answer the questions below with your group based on the class data. Worksheets are due 1 week after completion of the experiment, and must be turned in as independent answers (do not plagiarize!). Keep your answers concise, yet still convey all needed information clearly. (35 points).

1. In the boxes below, write in the reactions occurring at the anode and cathode for the Cu | Cu2+, SO42- || Zn2+, NO3- | Zn cell? (2pts)



***Anode:***

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***Cathode:***

1. What is the standard electrochemical potential of the total cell (*Eº*cell) for Cu | Cu2+ (0.01M), SO42- (0.01M) || Zn2+ (0.1M), NO3- (0.2M) | Zn vs NHE? Give a 95% CI. (2 pts)
2. Given that the standard electrochemical potential of Zn2+/0 is *E*º = -0.76 V vs NHE, what is the measured standard electrochemical potential (*E*º(V)) of Cu2+/0 based on experimental data vs NHE? Give a 95% CI. (2 pts)
3. What is the concentration of CuSO4 in your unknown sample? (2 pts)
4. Draw the galvanic cell for the Cu | Cu2+, SO42- || Zn2+, NO3- | Zn cell, including the direction of electron flow and the flow of ions in solution. Label all relevant components of the cell (anode, cathode, salt bridge, voltmeter, etc.). (4 pts)
5. What are the standard electrochemical potentials, *E*º(V), for Mg2+/0 and Fe2+/0 vs NHE (12 pts)?
6. Draw the redox half reactions that occurred in each of your cells and where they are located w. r. t. each other in energy. Label the measured *E*º for each half reaction. (4 pts)
7. For the Cu | Cu2+ (1.0 M), SO42- (1.0 M) || Cu2+ (0.001 M), SO42- (0.001 M) | Cu cell, was there a current flow? How do you know? If so, explain why was there current flow between the two copper electrodes. If not, explain why there was no current flow. (4 pts)
8. In your own words and in terms of energy, *briefly* (1-2 sentences) define electrochemical potential. (3 pts)