FLINN SCIENTIFIC

Name________________________________

Part 1. Data Tables

Voltage of each half-cell versus the zinc electrode

	Voltage	Anode	Cathode
Zn versus Ag			
Zn versus Cu			
Zn versus Fe			
Zn versus Mg			
Zn versus Pb			

Predicted and Measured Cell Potentials

Anode	Cathode	Equation for the Cell Reaction	Predicted Potential from Experimental Data	Measured Potential

Part 2. Data Table

	Voltage	Anode	Cathode
$Zn(s) \mid Zn^{2+}(1.0\ M) \mid\mid Cu^{2+}(0.0010\ M) \mid Cu(s)$			

Equation for Cell Reaction	Predicted Potential	Measured Potential

Part 3. Data Table

	Voltage	Anode	Cathode
$Zn(s) \mid Zn^{2+}(1.0\ M) \mid\mid Ag^{+}(\text{unknown } M) \mid Ag(s)$			

Equation for Cell Reaction	Calculated [Ag+]	Calculated Ksp AgCl	Reported Ksp AgCl

Calculations *(Show all work on a separate sheet of paper.)*

Part 1

1. Write reduction equations for each metal ion, arranging the equations in decreasing order of measured potential in the table below. Include zinc in the table, using 0.00 volts as the potential of the Zn | Zn^{2+} half-cell. Record the accepted standard potentials using the hydrogen electrode as standard, and calculate the difference between the two standard values.

Reduction Equations for Each Ion Arranged in Decreasing Order of Potential:

Reduction Equation	Electrode Potential using Zinc as the Standard, E°Zn	Accepted Electrode Potential using Hydrogen as Standard, E°	E°Zn – E°

2. Use the electrode potentials from the above table to predict the voltages of the six half-cell combinations selected in Part 1, step 10. Record this value and which metal is the cathode and which is the anode in the second Part 1 Data Table for each combination. Compare the predicted and measured potentials.

Part 2

Write a balanced net ionic equation for the reaction occurring in the cell in Part 2. Record this equation in the Part 2 Data Table. Use the Nernst equation to calculate what the expected voltage should be. Record this value in the Part 2 Data Table. Compare this value to the measured voltage.

Part 3

1. Write a balanced net ionic equation for the reaction occurring in the cell. Use the Nernst equation to calculate the concentration of the Ag^+ ion. Record this value in the Part 3 Data Table.
2. Calculate the value of the solubility product of AgCl. Compare the calculated value to a reported value. Record this value in the Part 3 Data Table.

Post-Lab Questions

1. What is an electrode potential?

2. Did the ranking of reduction equations agree with that in a published chart of $E°$ values?

3. How should the values found using the zinc electrode as a standard compare with those in the $E°$ table that are based on the standard hydrogen electrode? Did they?

4. What factors can cause a difference between experimental and reported values?

5. What does a negative value for a standard potential indicate?

6. How did the change in concentration of the copper ions in Part 2 affect the cell potential? Is this change in agreement (qualitatively) with that which would be predicted by LeChâtelier's Principle? Did the calculated and measured values agree?

7. Explain how the AgCl solubility product was determined.