

Redox Reactions Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet.

Table A: Reactions of Oxidizing Agents

	Cu^{2+}	Mg^{2+}	MnO_4^{1-}
H_2O_2			
KI			

Question 1: List the oxidizing agents in order, from weakest to strongest.

Question 2: Write half-reactions for the oxidizing agents in order, from weakest to strongest. (*Hint:* Remember that oxidizing agents get reduced.)

Table A2: Reactions of Reducing Agents

	Cu	Mg	Zn
H_2O_2			
KI			

Question 3: List the reducing agents in order, from strongest to weakest.

Question 4: Write the half-reactions for the reducing agents in order, from weakest to strongest. (*Hint:* Remember that reducing agents get oxidized.)

Question 5: The strongest oxidizing agent is said to have the most positive potential and the strongest reducing agent has the most negative potential. Based on your observations, list all the half-reactions (as reductions) in order from most negative to most positive.

Question 6: Consider the reaction involving magnesium metal.

- a. With what compound, element or ion did magnesium react?

- b. Write a half-reaction for what happened to this chemical. You may use a Table of standard Reduction Potentials¹ for help.

- c. Write the balanced equation for the reaction that occurred between magnesium metal and this chemical.

Question 7: You also observed a reaction with zinc metal.

- a. With what compound, element or ion did zinc react?

¹../tables/tables.pdf

b. Write a half-reaction for what happened to this chemical. You may use a Table of standard Reduction Potentials² for help.

c. Write the balanced equation for the reaction that occurred between zinc metal and this chemical.

Question 8: Based on your answers to Question 5, will either of these combinations produce a reaction?

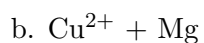
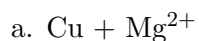


Table B1: Cell Potentials vs. a Cu^{2+}/Cu Couple

Electrochemical Cell	Half-Cell Being Studied	Measured Potential Difference vs. Cu^{2+}/Cu in mV	Measured Potential Difference vs. Cu^{2+}/Cu in V
Copper-Copper	Cu^{2+}/Cu		
Silver-Copper	Ag^{1+}/Ag		
Lead-Copper	Pb^{2+}/Pb		
Zinc-Copper	Zn^{2+}/Zn		

²./tables/tables.pdf

Table B2: Cell Potentials in Order, with Half-Reactions

Half-Cell	Measured Cell Potential (Most Negative to Most Positive)	Calculated Cell Potential vs. SHE (Add +0.34 V)	Standard Reduction Potential vs. SHE from Table
/	V	V	V
/	V	V	V
/	V	V	V
/	V	V	V

Question 9: Based on the order obtained by experiment,

- Which species has the highest energy filled or partially filled orbitals?
- Which species has the lowest energy unfilled or partially filled orbitals?
- Which species is the strongest reducing agent?
- Which species is the strongest oxidizing agent?

Question 10: Using the order you found in Data Table B2 for the cell potentials, write the half-reaction for each half-cell. Write the reactions as reductions.

Question 11: The Mg^{2+}/Mg couple was not tested when measuring half-cell potentials. Based on its behavior in Part A, where would you place it in Data Table B2? (If you are doing Part B first, return to this question after completing both parts of the lab.)