

Chemistry 30
Introductory Redox Lab

Name _____ Date _____ Score _____

Purpose:

- To predict whether redox reactions are spontaneous or not
- To compare the relative tendency of metals and their metallic ions to react with each other.

Prelab:

- Choose 2 types of metal strips (you will be doing $\frac{1}{2}$ the reactions listed below!) Find another lab group who will do the other 8 reactions. You will be sharing results with them.
 - o List all the species for each reactions that you choose
 - o Write the best redox reactions.
 - o Show expected voltage.
 - o Indicate the expected colors for the reactants and products.

1. Copper strip in solution of iron (III) nitrate
2. Copper strip in solution of nickel (II) nitrate
3. Copper strip in solution of zinc sulfate
4. Copper strip in solution of copper (II) sulfate
5. Zinc strip in solution of copper (II) nitrate
6. Zinc strip in solution of nickel (II) nitrate
7. Zinc strip in solution of iron (III) nitrate
8. Zinc strip in solution of zinc sulfate
9. Nickel strip in solution of copper (II) nitrate
10. Nickel strip in solution of iron (III) nitrate
11. Nickel strip in solution of zinc sulfate
12. Nickel strip in solution of nickel (II) nitrate
13. Iron strip in solution of copper (II) nitrate
14. Iron strip in solution of zinc sulfate
15. Iron strip in solution of nickel (II) nitrate
16. Iron strip in solution of iron (III) nitrate

Prelab:

You have 8 reactions that you need to write out. Show voltage and colours as needed.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Apparatus:

- Spot plate
- Eye droppers
- Steel wool
- Metals strips (be sure they are clean – use steel wool)
- solutions

Procedure:

1. Place a small well polished piece of metal into the spot plate
2. Add a few drops of the appropriate solution to the strip. Be sure to use a CLEAN eyedropper!
3. Observe any changes that you see. Remember that redox reactions are slow – so you may have to wait at least 3 – 4 minutes before you write your observations. Note colour changes, new products, etc.

Observations:

Since you have only observed two metals, you will need to collaborate with another group to get results for the other two metals.

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Metal / solution	Cu^{2+}	Zn^{2+}	Ni^{2+}	Fe^{3+}
$\text{Cu}_{(s)}$				
$\text{Zn}_{(s)}$				
$\text{Ni}_{(s)}$				
$\text{Fe}_{(s)}$				

Questions:

1. Write a generalization about the likelihood of a reaction between a metal and its own aqueous ion?
2. Is the answer to question one dependent upon whether the metal has more than one ion charge? Why or why not? (Hint → you have three 'two charge' metals Ni, Fe, Cu. Explore your data booklet for some help!

3. When metallic ions want to form metals, they are undergoing _____. List the metallic ions in order of their tendency to form metals. Start with the most likely one!

4. When metals want to form their metallic ions, they are undergoing _____. List the metals in order of their tendency to form metallic ions. Start with the most likely one.

5. For the mixtures below, write the expected redox reaction. Be sure to give voltage and expected colours for reactants and products. Identify the oxidizing agent (OA) and the reducing agent (RA)

Hydrochloric acid, potassium bromide solution, manganese (IV) oxide crystals and copper strips
