

Name \_\_\_\_\_

Date \_\_\_\_\_ period \_\_\_\_\_

**Metal Reactivity Lab**

Do all chemicals react with each other? Can chemical reactions be predictable? Are some metals more reactive than others? In this lab, you will make initial observations of 4 metals and solutions of these metals' ions. Then, the metals will be added to the solutions and you will observe whether or not a reaction occurs. Your observations will be used to compare metal reactivities and to form an "activity series" of metals.

**Procedure:**

1. Go to the following website:

<http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/animationsindex.htm>

2. Scroll down to the Electrochemistry heading and click on "click here to work the activity series".

3. Click **START** and then **OK** to the pop-up box.

4. Click on **Activity 1**.

a) Write down observations of the solutions

b) Choose one metal, write down initial observations and then immerse it into the solutions. Remove the metals from the solutions and record the results (both the changes in the metal and in the solutions). Write **NR** for no reaction.

c) Repeat the step above with the other 3 metals.

Record all observations on the data tables provided. After completing all reactions, begin to answer the post-lab analysis questions.

Observations of solutions					
metal observations		Mg(NO <sub>3</sub> ) <sub>2</sub>	Zn(NO <sub>3</sub> ) <sub>2</sub>	Cu(NO <sub>3</sub> ) <sub>2</sub>	AgNO <sub>3</sub>
	Cu				
	Mg				
	Zn				
	Ag				

5. Click on **Activity 2**. (follow the same procedures with the new metals and solutions)

a) Write down observations of the solutions

b) Choose one metal, write down initial observations and then immerse it into the solutions. Remove the metals from the solutions and record the results (both the changes in the metal and in the solutions). Write **NR** for no reaction.

c) Repeat the step above with the other 3 metals.

Observations of solutions					
metal observations		$\text{Fe}(\text{NO}_3)_2$	$\text{Zn}(\text{NO}_3)_2$	$\text{Cu}(\text{NO}_3)_2$	$\text{Pb}(\text{NO}_3)_2$
	Fe				
	Zn				
	Cu				
	Pb				

6. Click on **Activity 3**. (follow the same procedures with the new metals and solutions)

a) Write down observations of the solutions

b) Choose one metal, write down initial observations and then immerse it into the solutions. Remove the metals from the solutions and record the results (both the changes in the metal and in the solutions). Write **NR** for no reaction.

c) Repeat the step above with the other 3 metals.

Observations of solutions					
metal observations		$\text{Fe}(\text{NO}_3)_2$	$\text{Pb}(\text{NO}_3)_2$	$\text{Ni}(\text{NO}_3)_2$	$\text{Sn}(\text{NO}_3)_2$
	Fe				
	Pb				
	Ni				
	Sn				

6. Click on **Activity 4**.

a) Choose one metal and immerse it into the HCl. Write down any and all observations. Wait until the computer tells you it is okay to remove the metal. Remove the metals from the hydrochloric acid and record the results). Write **NR** for no reaction.

c) Repeat the step above with the other 7 metals.

metal observations		HCl
	Ag	
	Cu	
	Fe	
	Mg	
	Ni	
	Pb	
	Sn	
	Zn	

Analysis Questions:

1. Which metal(s) reacted with the most solutions? **(2 points)**
2. Which metal(s) reacted with the fewest solutions? **(2 points)**
3. List the four metal elements from each experiment in order of most to least reactive. You will make three lists—one from activity 1, one from activity 2 and one from activity 3. **(6 points)**

Activity 1

- 1.
- 2.
- 3.
- 4.

Activity 2

- 1.
- 2.
- 3.
- 4.

Activity

- 1.
- 2.
- 3.
- 4.

4. The above lists represent Activity Series' of metals. Combine the three lists above into one list. **(4 points)**
  - 1.
  - 2.
  - 3.
  - 4.
  - 5.
  - 6.
  - 7.
  - 8.
5. Using your data from Activity 4, where would hydrogen fit into your above Activity Series. **(2 points)**
6. The Statue of Liberty was constructed of copper metal. Based on your observations from this lab, explain why copper was chosen and suggest a better choice. Why do you think this “better choice” was not chosen? **(6 points)**
7. Which of the eight metals in this lab would most likely be found in a “free” or uncombined state in nature? **(3 points)**

8. Complete the following equations, writing products and balancing (*Remember to write the formulas correctly BEFORE balancing!*). If no reaction occurs, write NR. (1 point each)

