Single Replacement Lab Name: _____

*Purpose: To learn how to use the Activity Series to predict whether or not a single replacement reaction will occur

*Predictions: Copy this data table below. Then, in each box, write either "yes" or "no reaction".

Using the Activity Series, can… ↓	…replace Cu^{2+}?	…replace Mg^{2+}?	…replace Zn^{2+}	…replace Ag^{+}?
Cu				
Mg				
Zn				
Ag				

*Procedure:

1. Obtain three pieces each of copper, zinc, magnesium, and silver. Remember which is which.
2. Shine a small section of the zinc pieces with sandpaper. Also shine the copper if it appears dull.
3. Place each piece of metal in a separate well on your well plate according to the table below.
4. Add 10 drops of each nitrate solution according to the labels in the data table. If the box on the data table is shaded, do not combine that nitrate solution with your metal sample.
5. For three to five minutes, observe the surfaces of each of the metals, any colors of the solutions, as well as the vigorousness of each reaction. Record all observations in your data table.
6. Remove your three pieces of SILVER with tongs, rinse them well, and give them to your teacher.
7. Rinse all of the contents of your well plate into the waste beaker. Rinse and dry your well plate.

*Data Table: Observations of … *(← put a descriptive title here!)*

Metal	Reaction with aqueous $Cu(NO_3)_2$	Reaction with aqueous $Mg(NO_3)_2$	Reaction with aqueous $Zn(NO_3)_2$	Reaction with aqueous $AgNO_3$
Cu		d.	g.	j.
Mg	a.		h.	k.
Zn	b.	e.		l.
Ag	c.	f.	i.	

Questions following the lab:

1. ***Using the activity series***, predict the products and balance the following chemical reactions you observed in the lab. If no reaction is expected to occur, write "no reaction" or NR.
   a. $Cu(NO_3)_2$ + Mg →
   b. $Cu(NO_3)_2$ + Zn →
   c. $Cu(NO_3)_2$ + Ag →
   d. $Mg(NO_3)_2$ + Cu →
   e. $Mg(NO_3)_2$ + Zn →
   f. $Mg(NO_3)_2$ + Ag →
   g. $Zn(NO_3)_2$ + Cu →
   h. $Zn(NO_3)_2$ + Mg →
   i. $Zn(NO_3)_2$ + Ag →
   j. $AgNO_3$ + Cu →
   k. $AgNO_3$ + Mg →
   l. $AgNO_3$ + Zn →

2. Compare your equations in #1 above to your observations in the data table. Do the predictions from the Activity Series generally match your observations? Are there any trials which do not agree? Explain.

3. Is there a relationship between the vigorousness of the reaction and the separation between the two metals on the activity series? Provide two examples from your observations to support your claim.

4. What might prevent two different metals from reacting, even though they are predicted to react according to the activity series? Explain.

5. Both magnesium and potassium are above hydrogen on the activity series. You could rinse a piece of magnesium metal with water, but you cannot do the same thing for potassium. Explain why this is the case.

6. A student is trying to determine if AgCl will react with bromine gas. He is upset to find that bromine is not on the activity series of metals, even though silver is. Explain to him what he is doing wrong, and what he needs to do differently.