

# Developing an Activity Series of Metals Lab

## Single Replacement Reactions

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Develop a basic activity series through an exploration of single replacement reactions.

### **MATERIALS:**

#### *Metals:*

- Zinc (granular)
- Iron (filings)
- Copper (small pieces)
- Magnesium (tape, cut in small pieces)

#### *Aqueous Solutions (in dropper bottles):*

- 0.1 M CuSO<sub>4</sub>
- 0.1 M AgNO<sub>3</sub>
- 0.1 M Zn SO<sub>4</sub>
- 1.0 M HCl

4 small test tubes

test tube rack

### **PROCEDURE: READ ALL INSTRUCTIONS FIRST**

1. Using the four test tubes, place a small amount of one of the provided metals (one small piece or the amount that would fit on the tip of a spatula) in each of the four tubes. Add approximately 10 drops of each required solution into each tube.
2. Record your observations. Comment on any reactions, including color changes, gas production, or formation of precipitates that you observe.
3. Clean all test tubes and repeat Steps #1 and #2 for each of the other three metals. When finished, you will have attempted 16 different reactions (16 trials).
4. Write a balanced equation for all reactions that occur. Include physical state symbols for the reactants and products (i.e. *s*, *aq*, *l*, *g*). In some cases, there may be no reaction. In this event, go ahead and write the single replacement reaction as you normally would write it, but then write "no reaction" on the product side of the equation.
5. Construct an activity series by listing the metals in decreasing order of activity. For example, a reaction such as  $\text{Zn (s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu (s)} + \text{Zn}^{2+}(\text{aq})$  implies that zinc is above copper in the activity series. In other words, zinc has a higher "activity" than copper since it replaces the copper that is originally in solution. **INCLUDE A DISCUSSION THAT DESCRIBES HOW YOUR OBSERVATIONS FROM THE LAB SUPPORT YOUR PROPOSED ACTIVITY SERIES.**

**PRESENT ALL OF YOUR OBSERVATIONS, EQUATIONS, AND YOUR RESPONSE TO #5 IN A NEAT, ORGANIZED FASHION.**