### MCj00786230000[1]Lab : Activity Series

### Introduction

 In a single displacement reaction, an element replaces a similar element in a compound to create a new element and a new compound. In order for the reaction to take place, the element must be more active, or reactive, than the element in the compound. The activity series of metals lists the elements according to their reactivity, with more reactive elements at the top of the list and less reactive elements at the bottom. The activity series explains why some single displacement reactions work and others don’t.

In this lab, you will perform a series of micro-scale experiments to determine the reactivity of several common metals. Then you will create your own activity series of metals based on the results.

**Safety**

* Hydrochloric acid can cause burns to the skin and damage the eyes. Wear goggles at all times.
* Do not directly inhale any gases produced in this lab.

**Procedure**

1. Arrange the solid metals in the respective wells of the well plate as shown in the data table. Use a small piece or “1/4 of a pea” sized amount of the powdered metals.
2. Add about 6-10 drops of the solutions indicated in the data table to the appropriate wells. Record your observations of any color changes or gas production below.
3. NOTE: Reactions involving very active metals are fast while reactions involving less active elements tend to be very slow. BE PATIENT as you make observations in this lab. Note in each row which metal reacts first and the most readily. Include this information in the observations section below.
4. **CLEAN UP**: Soak up all remaining solutions and wrap left-over solids in a paper towel and place it in the trashcan. SOLIDS SHOULD NOT BE LEFT IN THE SINK. Rinse the well plate with water and dry it with a paper towel.

**Observations**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **zinc metal** | **aluminum foil** | **copper metal** |
| **Pb(NO3)2 solution** |  |  |  |
| **CuSO4 solution** |  |  |  |
| **AgNO3 solution** |  |  |  |
| **HCl solution** |  |  |  |

**Analysis**

Write a balanced equation for each single displacement reaction that took place. Include state symbols for all reactants and products.

**Conclusions**

1. Which metal element (Zn, Al or Cu) produced the most obvious reactions? \_\_\_\_\_\_\_\_

Which solution produced the most vigorous reactions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Which metal element was largely unreactive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which solution(s) produced the least/smallest reactions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Based on the **results of your experiment**, determine which metal is the more active metal in each pair: HINT: Remember the more active element will cause a reaction. If you saw a reaction with the metal and the solution, the metal element was more active. If you did not see a reaction between the metal and the solution, the element in the solution was more active. Circle the correct answer.

Zn vs. Pb Al vs. Pb Cu vs. Pb

Zn vs. Cu Al vs. Cu

Zn vs. Ag Al vs. Ag Cu vs. Ag

Zn vs. H Al vs. H Cu vs. H

1. Based on the results of your experiment, create an activity series of the following metals: Zn, Al, Cu, Pb, Ag, H. (List the most reactive elements first and the least reactive elements last).