Laboratory Investigation Name _____

Chemistry: Form L10.1A Date _____ Period _____

Exploring the Activity Series

PROBLEM

Which metals can replace hydrogen?

INTRODUCTION

Acids, such as hydrochloric acid, release hydrogen when they react with active metals. Metals can only replace other metals if they are more active. By reacting metals with acids, their activity is compared to hydrogen. In this laboratory exercise, you will compare the activity of several metals to hydrogen by reacting them with hydrochloric acid.

MATERIALS (*per group*)

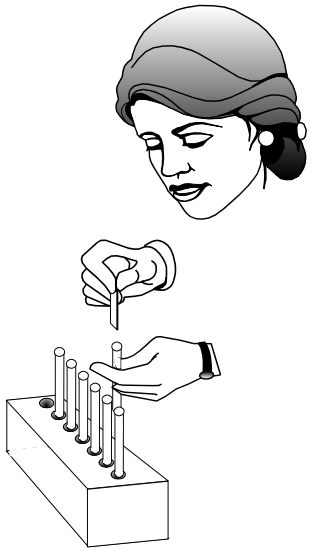
Aluminum; copper II sulfate solution; copper; hydrochloric acid; lead; magnesium; silver nitrate solution; silver; steel wool; test tube rack; test tubes (8); tin; zinc

PROCEDURE

1. Using steel wool, polish the surfaces of strips of aluminum, copper, lead, magnesium, silver, tin, and zinc.

2. Place seven test tubes in a test tube rack. With a graduated cylinder, transfer 5 mL of hydrochloric acid to each of the seven test tubes.

3. Place each of the metal strips into a separate test tube containing hydrochloric acid. Note the reactivity of the metals by observing how quickly hydrogen gas is released. Record your observations in the data table, ***Reaction of Metals with Hydrochloric Acid***, on the next page.



4. Based on their reactions with hydrochloric acid, rank the metals 1 to 6, with 1 meaning most active and 6 meaning least active.

5. Using a clean graduated cylinder, transfer about 5 mL of copper II sulfate solution and 5 mL of silver nitrate solution into separate test tubes. Set the test tubes aside in a test tube rack.

6. Place a strip of silver into the test tube containing copper II sulfate solution. Place a strip of copper into the test tube containing silver nitrate solution. Let stand. Note whether any crystals begin to form on the surfaces of the metal strips. Note what happens to the color of the solutions. Record your observations below in the table ***Reaction of Metals with Salt Solutions***.

7. Based on their reactions with the salt solutions, rank the metals 1-2, with 1 meaning most active and 2 meaning least active.

OBSERVATIONS

Reaction of Metals with Hydrochloric Acid

Metal	Reaction Description	Rank
Aluminum		
Copper		
Lead		
Magnesium		
Silver		
Tin		
Zinc		

Reaction of Metals with Salt Solutions

Metal	Reaction Description	Rank

CONCLUSIONS

1. Which metals did not react with hydrochloric acid to release hydrogen? What does this tell you about their activity? _____

2. Why was it necessary to react silver and copper with salt solutions in order to rank their activity? _____

3. Based on all your observations, rank the metals you examined, including hydrogen, from 1-7, with 1 meaning most active. How do your results compare to the activity series? _