Names Period:

HANDS-ON LAB

Exploring Reactivity

Reactivity is a measure of how readily an element transfers electrons to another element during a chemical reaction. The reaction between sodium and hydrogen is quite rapid and is marked by a vigorous bubbling of the solution. Other elements also react with hydrogen but more vigorously than sodium. Still others react less vigorously than sodium. In fact, you can rank these elements in a series according to their relative reactivities with hydrogen.

By observing the behavior of elements when they react with other substances, chemists can learn about the properties of the elements and the atoms that make them up. In this lab, you will carry out an investigation to compare the relative reactivities of three elements. From the results, you will be able to draw conclusions about the properties of these elements and how their atomic structures compare to one another.

RESEARCH QUESTION What other types of tests do chemists use to learn about the properties of atoms?

MAKE A CLAIM

Which metal do you think will react most vigorously when placed in hydrochloric acid? What information could you gather to help you make your prediction?

SAFETY INFORMATION

- Wear indirectly vented chemical splash goggles, a nonlatex apron, and nitrile gloves during the setup, hands-on, and takedown segments of the activity.
- Secure loose clothing, wear closed-toe shoes, and tie back long hair.
- The reaction between a metal and hydrochloric acid gives off hydrogen gas. Hydrogen gas and fumes from hydrochloric acid should not be inhaled, so these reactions should be completed inside a fume hood or in a well-ventilated room.
- Hydrochloric acid (HCl) is a strong acid that is highly corrosive to skin and other tissues. During a reaction with metals, inhalation of the fumes can cause irritation of the respiratory tract and shortness of breath, and the hydrogen released should be kept away from open flames.
- Point the test tube away from people whenever it contains reactants.
- Use caution when working with glassware, which can shatter if dropped and cut skin.
- Immediately clean up any liquid spilled on the floor so it does not become a slip/fall hazard.
- Tell your teacher immediately if you spill chemicals on yourself, the table, or floor.
- Follow your teacher's instructions for disposing of all waste materials.
- Wash your hands with soap and water immediately after completing this activity.

MATERIALS

- indirectly vented chemical
- splash goggles, nonlatex apron,
- nitrile gloves
- aluminum, small sample
- hydrochloric acid, 1 M
- magnesium, small sample
- test tubes (3)
- test tube rack
- zinc, small sample

CARRY OUT THE INVESTIGATION

1. Place a piece of aluminum in one test tube, zinc in a second test tube, and magnesium in a third test tube.
2. Place about 5–10 drops of 1 M hydrochloric acid in each test tube.
3. Record the relative reactivity (high, medium, low) of each element in the data table.
4. Pour the hydrochloric acid into a designated waste container, and rinse the test tubes.

COLLECT DATA

Record the reactivity of each element based on your observations. Element Magnesium Aluminum Zinc Relative reactivity

ANALYZE

1. How did you determine whether a reaction was vigorous or not?

2. Which metal reacted most vigorously when placed in the acid? Give evidence to support your answer.