

2-1B Generating and Burning Hydrogen Gas

SkillCheck

- Observing
- Predicting
- Measuring
- Working co-operatively

Safety



- Wear safety goggles and protective clothing.
- Handle chemicals safely.
- Wash your hands thoroughly after doing this investigation.

Materials

- medium-diameter test tube
- large-diameter test tube (to fit over medium test tube)
- test tube rack
- candle
- matches
- wooden splints
- dilute hydrochloric acid solution (HCl)
- zinc metal (mossy)
- test tube holder
- chemical waste container

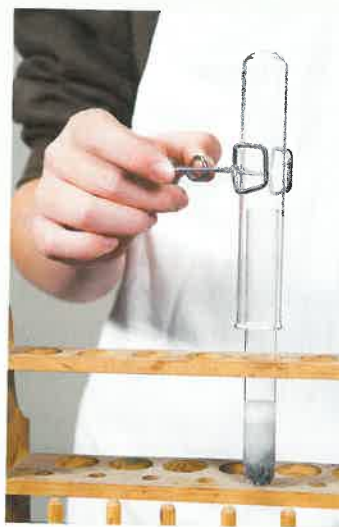
In this activity, you will generate hydrogen gas by combining a reactive metal with an acid. You will safely burn the hydrogen in a procedure called the “pop” test. Work with one or two partners.

Question

How can a burning wooden splint be used to test for the presence of hydrogen gas?

Procedure

1. Place the medium test tube in the test tube rack. Make sure the large test tube will fit over the medium test tube. Set the large test tube aside.
2. Set up a candle and light it. Have several wooden splints nearby.
3. Carefully pour hydrochloric acid (HCl) into the medium test tube until the test tube is no more than $\frac{1}{3}$ full. Be careful not to spill. If any acid does spill, ask your teacher for the best way to clean it up.
4. Place one or two pieces of zinc metal in the hydrochloric acid. The reaction will begin slowly. Look for bubbles forming on the surface of the zinc. These bubbles are hydrogen gas. Note any colour changes that occur on the surface of the zinc.
5. Using a test tube holder, hold the large test tube upside down over the mouth of the medium test tube to collect the hydrogen gas. The gas is invisible, but you will probably have collected enough in about 30 s.



6. Lift the large test tube away from the generating equipment. Keep it upside down so you do not lose any gas.

Conduct an INVESTIGATION

Inquiry Focus

7. Light a wooden splint and bring the flame near the base of the large test tube until the hydrogen gas ignites. Be prepared for a “pop” sound and do not drop the test tube! Observe.
8. Repeat the gas collection and ignition a few more times. Because oxygen is needed for burning to occur, blow into the large test tube a few times before refilling it with hydrogen. This will help produce a good “pop.”
9. When you are finished, pour the contents of the medium test tube into the chemical waste container provided by your teacher.
10. Clean up and put away the equipment you have used.

Analyze

1. How does the appearance of the zinc metal change as it reacts with the acid?
2. Predict what might happen to the zinc if it were left in the acid for a long time.

Conclude and Apply

1. Describe the appearance of zinc metal when it is reacting with hydrochloric acid.
2. Describe what happens during a positive test for hydrogen gas.

2-1C Essential Elements

Think About It

Each element has a history. Some elements have been known since ancient times, whereas others have only been discovered recently. In this activity, you will research an element and present your findings.

What to Do

1. Choose an element. Research some or all of the following information: when and where the element was discovered; its appearance; its physical and chemical properties; important compounds it is found in; its importance to life; whether it is rare or common; and its commercial value, if any. Be sure to cite your sources. You can begin your search at www.bcscience9.ca.
2. Demonstrate that you know your element. You could write an advertisement for it, create a commercial for it, make a poster describing it, lead a discussion on it, or use some other presentation, approved by your teacher.
3. Share your information with other students.