

- Conducting inquiries safely
- Processing and synthesizing data

Identifying Gases

Changes to matter can result in the formation of gases. There are many different kinds of gas, and we can use their properties to help identify them. Three common gases are hydrogen, oxygen, and carbon dioxide.

- Oxygen gas will cause a glowing splint to reignite (catch fire).
- Carbon dioxide gas will put out a flame.
- Hydrogen gas will make a “pop” sound in the presence of a flaming splint.



Materials & Equipment

- 3 medicine droppers
- 3 medium test tubes
- test-tube rack
- 3% hydrogen peroxide solution 
- dish soap
- scoopula
- potassium iodide powder 
- matches
- wooden splints
- 0.1 M acetic acid solution
- sodium hydrogen carbonate powder
- 2 M hydrochloric acid solution 
- forceps
- mossy zinc chunks 
- 1 large test tube
- test-tube holder

CAUTION: Hydrogen peroxide may sting your skin. Potassium iodide will stain skin and clothing. Keep your hair tied back when working near open flames.

Purpose

To use gas tests to identify oxygen gas, carbon dioxide gas, and hydrogen gas

Procedure

Part 1 — Preparation of Oxygen

- Using a medicine dropper, add 1 mL (about 20 drops) of hydrogen peroxide solution to a clean test tube.
- Add two drops of dish soap.
- Using a scoopula, add a small amount (less than the size of a pea) of potassium iodide powder to the test tube.
- Use matches to light a wooden splint.
- Blow out the flame to make a glowing splint. Insert the glowing splint into the mouth of the test tube. Observe and record what happens to the splint.



Figure 4.13 A glowing splint will reignite in the presence of oxygen.

- Clean up as directed by your teacher.

Part 2 — Preparation of Carbon Dioxide

- Using a medicine dropper, add 1 mL (about 20 drops) of acetic acid to the second clean test tube.

- Using a clean scoopula, add a small amount (less than the size of a pea) of sodium hydrogen carbonate powder to the test tube.
- Use matches to light a wooden splint.
- Insert the flaming splint into the test tube. Observe and record what happens to the splint.
- Keep holding the large test tube upside down as you lift it off of the small test tube. Use matches to light a wooden splint.
- Insert the flaming splint into the large test tube. Observe and record what happens to the splint.
- Clean up your work area. Follow your teacher's instructions to safely dispose of all materials used. Wash your hands thoroughly.



Figure 4.14 A flaming splint will be extinguished in the presence of carbon dioxide.

- Clean up as directed by your teacher.

Part 3 — Preparation of Hydrogen

- Using a medicine dropper, add about 2 mL of hydrochloric acid to the third clean test tube.
- Use forceps to add a small piece of mossy zinc to the third test tube. Use a test tube holder to place a large test tube upside down and over the smaller test tube in order to trap any gas.



Figure 4.15 Trapping hydrogen gas

Analyzing and Interpreting

- Describe what happens in a positive test for oxygen gas.
- Describe what happens in a positive test for carbon dioxide gas.
- Describe what happens in a positive test for hydrogen gas.

Skill Practice

- Write a procedure for distinguishing between oxygen gas and carbon dioxide gas.

Forming Conclusions

- Explain why the three parts of this activity can be used to distinguish among oxygen, hydrogen, and carbon dioxide gas but not to determine whether an unknown gas is one of these three.