

2. Producing and testing oxygen gas

Oxygen gas can be obtained by decomposing hydrogen peroxide. Fill a test tube about one-third full with 3% aqueous hydrogen peroxide. Add a small scoop of manganese (IV) dioxide (MnO_2) to the test tube. When a gas is being produced, light a wooden splint and blow out the flame. Quickly insert the glowing splint into the test tube.

a) Record what happens in your *Active Chemistry* log.

3. Producing and testing of carbon dioxide gas

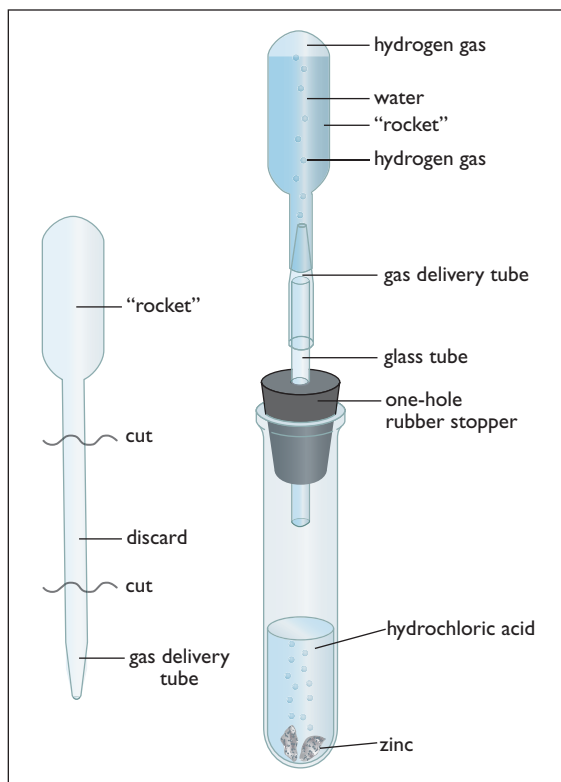
Carbon dioxide gas can be produced by the double-replacement reaction of an acid with baking soda (sodium hydrogen carbonate). Put two scoops of sodium hydrogen carbonate in a 250-mL beaker. Add 10 mL of hydrochloric acid (1M HCl) and cover the beaker with a watch glass. Test the gas by lighting a splint and then quickly inserting it into the mouth of the beaker (after removing the watch glass).

a) Record what happens in your *Active Chemistry* log.

4. Answer the following in your *Active Chemistry* log.

a) Describe how each gas behaved in the presence of a lit or glowing splint.

b) Summarize the positive test for determining if an unknown gas is H_2 , O_2 , or CO_2 .

**Part B: Gas-Powered Rockets**

In this part of the activity, you will use two of the gases that you produced to provide the propellant for a small rocket. You will use hydrogen and oxygen gases as the fuel for your rocket.

- For your rocket, you will use the bulb end of a Beral pipette. Fill the pipette (rocket) completely with water by immersing it in a beaker of water.
- To make hydrogen gas, fill one test tube one-third full with 3M HCl. Build the gas collection system shown in the diagram above. Add two pieces of zinc and place the stopper in the test tube. Fill a half of the rocket with hydrogen.
- To make oxygen gas, fill the other test tube one-third full with 3% aqueous hydrogen peroxide. Add a small scoop of MnO_2 and cover the tube with a stopper and nozzle. Fill a half of the rocket with oxygen gas.



Safety goggles and a lab apron must be worn at all times in a chemistry lab.