



Building a Simple Electrolysis Apparatus to Split Water into Hydrogen and Oxygen

★ OBJECTIVE

To build a simple electrolysis apparatus and use electricity to split water (H_2O) into hydrogen (H_2) and oxygen (O_2) gases.

? BACKGROUND

Water is made of hydrogen and oxygen atoms chemically combined in a 2:1 ratio. During electrolysis, an electric current passes through water and separates it into its elemental gases: hydrogen collects at the negative electrode (cathode) and oxygen collects at the positive electrode (anode).

🧪 MATERIALS

- 2 clear test tubes
- Rubber stoppers with holes (to fit test tubes and electrodes)
- 2 graphite pencils or graphite rods (electrodes)
- 9V battery (or 6V–12V DC power supply)
- Alligator clip leads
- Plastic cup or small beaker
- Water
- Baking soda (sodium bicarbonate)
- Measuring spoon
- Tape or clay to seal
- Ruler or measuring tape (optional)
- Safety goggles (recommended)

🛡️ SAFETY

- Never look directly into the test tubes while the experiment is running.
- Do not mix up the electrodes while connected to power.
- Keep the setup away from flammable materials.
- Handle glass test tubes carefully.
- This experiment uses low voltage. Do not use wall outlets.



TIP

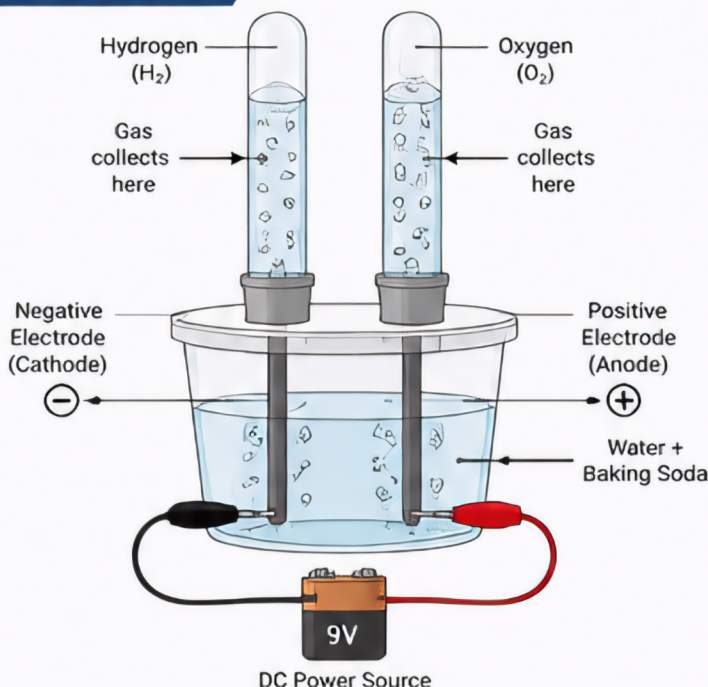
Adding a small amount of baking soda increases the conductivity of water, making the reaction work better.

📊 OBSERVATIONS

Record your measurements and observations.

Time (min)	Volume of Gas Collected at Cathode (H_2) (mL)	Volume of Gas Collected at Anode (O_2) (mL)	Notes / Observations

APPARATUS DIAGRAM



📋 PROCEDURE

1. Add 1 level teaspoon of baking soda to 1 cup of water. Stir until dissolved.
 2. Fill the plastic cup with the solution.
 3. Insert a graphite electrode through each rubber stopper.
 4. Fill each test tube with water, then invert over the electrodes so no air bubbles are trapped.
 5. Seal around the stoppers with tape or clay to help prevent leaks.
 6. Connect the negative (–) lead from the battery to the electrode under the test tube on the left.
 7. Connect the positive (+) lead to the electrode under the test tube on the right.
 8. Make sure all connections are secure.
 9. Turn on the power (connect the battery).
 10. Observe bubbles collecting in both test tubes.
- Record your observations below.

🔍 ANALYSIS & QUESTIONS

1. Which gas (hydrogen or oxygen) collected in greater volume? _____
2. What is the approximate ratio of hydrogen volume to oxygen volume? _____
3. Write the word equation for the reaction.

4. Write the balanced chemical equation for the reaction.

5. How could you test to confirm that the gas collected at the cathode is hydrogen? _____
6. How could you test to confirm that the gas collected at the anode is oxygen? _____
7. What did you learn from this experiment? _____