CHEMISTRY

TEACHER RESOURCE · HANDS-ON CLASSROOM EXPERIMENTS

This single experiment lets students explore three chemistry concepts at once: gas pressure inflating a balloon, endothermic reactions, and CO2 density vs. air.

SUPPLIES

- Empty plastic bottle
- (water bottle or 2-liter)
- Baking soda
- White vinegar
- 2 funnels
- 2 balloons

THE EXPERIMENT

STEPS 1–6

1. Place the first funnel in the plastic bottle. Have one student hold the bottle while another pours about 1/2 cup of vinegar in. Remove the funnel.
2. Hold the first balloon upside down and place the second funnel in it. Slowly pour baking soda in until the balloon is about halfway full. Remove the funnel.
3. Have one student hold the bottle. The second student holds the balloon upside down and carefully stretches the opening over the bottle mouth — without dumping the baking soda yet.
4. Once the balloon is securely attached, turn the balloon right-side up and dump the baking soda into the vinegar.
5. Observe the balloon as CO2 from the chemical reaction fills it. (If the balloon doesn't fill, increase the amounts.)
6. Have students feel the plastic bottle. It should feel cold — this is an endothermic reaction.

TEACHER EXPLANATION — STEPS 1–6

When baking soda (a base) meets vinegar (an acid), a chemical reaction produces carbon dioxide gas. The increase in gas molecules raises pressure inside the bottle, forcing CO2 up into the balloon and inflating it. Concept 1: More gas = higher pressure = inflated balloon.

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THE EXPERIMENT

STEPS 7–10 (CONTINUED)

7. Carefully pinch the balloon to keep CO2 from escaping. Remove it from the bottle and tie off the end. (Teacher assistance recommended.)
8. Blow up the second balloon with air to about the same size. Tie it off.
9. Have a student hold both balloons as high as they can and release them at the same time.
10. Observe: which balloon falls faster?
11. Explain that CO2 is heavier than air — air is mostly nitrogen and oxygen, with very little CO2.

TEACHER EXPLANATION — STEPS 7–10

The reaction also absorbs energy from the surroundings — making the bottle feel cold. This is an endothermic reaction (takes in energy). Concept 2: Endothermic = cold. And since CO2 is denser than nitrogen and oxygen, the CO2 balloon falls noticeably faster. Concept 3: CO2 is heavier than air.

GAS PRESSURE

CO2 produced by the reaction raises pressure inside the bottle, forcing gas into the balloon.

ENDOTHERMIC

This reaction absorbs energy from surroundings — making the bottle feel cold to the touch.

CO2 VS. AIR

CO2 is denser than nitrogen and oxygen. The CO2 balloon falls noticeably faster when released.

IT LOOKS LIKE MAGIC. IT'S JUST SCIENCE.

Use these experiments to spark curiosity — then let the real explanation land.