



Parachute Science

Baking Soda and Vinegar Reaction

The Magic of Baking Soda and Vinegar

Overview:

This classic STEM experiment is a fantastic way to explore chemical reactions, gas expansion, and physics—all with simple household ingredients!

Supplies & Equipment Needed:

- Plastic Bottle (12-16 oz) – A water or soda bottle works best
- Baking Soda – About 2 tablespoons
- White Vinegar – About ½ cup
- Balloon – Standard latex balloon
- Plastic Funnel – Helps pour baking soda into the balloon
- Measuring Spoons & Cup – For accuracy
- Tray or Paper Towels – To catch spills

Step-by-Step Instructions:

Step 1: Set Up Your Experiment

1. Place your empty plastic bottle on a tray or a stable surface.
2. Stretch out the balloon a few times to loosen it up.
3. Use a funnel to pour 2 tablespoons of baking soda into the balloon.

Step 2: Create the Chemical Reaction

4. Pour ½ cup of vinegar into the plastic bottle.
5. Carefully stretch the balloon opening over the bottle's mouth, making sure the baking soda stays inside the balloon.
6. Once the balloon is secured, lift the balloon upright, allowing the baking soda to fall into the vinegar inside the bottle.

Step 3: Observe the Reaction!

7. Watch as the baking soda reacts with the vinegar, creating bubbles and gas!
8. The balloon begins to inflate as carbon dioxide (CO₂) is produced.



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Step 4: Take it to the Next Level – Add a Parachute!

Supplies:

- **String** – For attaching a parachute
- **Plastic Bag or Coffee Filter** – Used as a parachute
- **Rubber Bands** – For securing the parachute

Directions:

- If you want to test parachute science, attach string to the top of the balloon and secure a plastic bag or coffee filter as a parachute.
- Drop the inflated balloon from a safe height and observe how the parachute affects its descent.

Taking It to the Next Level – Experiment Variables

Want to explore further? Try these variations:

Change the Ratio of Baking Soda & Vinegar

- Does more baking soda or vinegar make the balloon inflate bigger or faster?

Use Different Bottle Sizes

- Does a bigger or smaller bottle affect the gas buildup and inflation speed?

Experiment with Different Parachute Materials

- Test parachutes made of plastic bags, coffee filters, or fabric—which slows the descent best?

Test Balloon Size & Shape

- Do larger balloons inflate more? Do longer balloons stretch differently than round ones?

Measure the Reaction Speed

- Use a stopwatch to time how quickly the balloon inflates when you change the amount of baking soda or vinegar.



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The Science Behind the Experiment

This experiment demonstrates two key scientific concepts:

1. Chemical Reactions & Gas Production

- Baking soda (sodium bicarbonate) + Vinegar (acetic acid) → Carbon dioxide gas (CO₂), water, and salt.
- The fizzing bubbles you see are CO₂ gas escaping. Since gases expand, they take up more space, inflating the balloon!

2. Parachute Science & Air Resistance

- If you attach a parachute to the balloon, it slows down as it falls due to air resistance (drag).
- The larger the parachute, the slower the descent, because more air pushes against the parachute's surface.

Additional Reading & Information

Want to learn more about the science behind this experiment? Check out these sources:

- **American Chemical Society (ACS):** www.acs.org – A deep dive into the chemistry behind acid-base reactions and why CO₂ is produced.
- **NASA STEM Activities:** <https://www.nasa.gov/stem-content/challenger-center-stem-at-home/> – Learn about air resistance and parachute dynamics through hands-on experiments and NASA-backed insights.
- **Science Buddies:** https://www.sciencebuddies.org/science-fair-projects/project-ideas/Chem_p086/chemistry/rocketology-baking-soda-vinegar-lift-off – A breakdown of the chemical reaction, with additional variations and experimental methods to try.

Ready to give it a try? Share your results and tag us with your experiments!  