

Games, Nature, & Experiments

Inflating Balloon

Estimated Time: 30 minutes

Age range: 6th – 8th grade

What you need: baking soda, vinegar, empty water bottle, rubber balloon, funnel (you can also use a piece of paper to make your own), writing utensil, paper (or printer)



Background Information:

When baking soda and vinegar are mixed together they create a new substance called **carbonic acid**. The **carbonic acid** is very unstable and quickly breaks down into **carbon dioxide gas** (CO₂) and liquid water (H₂O). The bubbles that form after mixing baking soda and vinegar together is the **carbon dioxide gas** (CO₂) being released.

Additionally, during this **experiment**, you will look for evidence of **physical changes** and **chemical changes**. When a **physical change** occurs, the composition of a substance does not change. In **chemical changes**, the composition is changed. An example of a physical change is freezing water into ice cubes. The ice is still composed of H₂O, just like the water, but it is a solid instead of a liquid. If the ice were melted, there would be the same amount of water that you had started with. An example of a chemical change is burning wood. The change creates heat and light, and the action cannot be easily undone. Wood can't be un-burnt.

Today you will be using the **scientific method** to conduct an experiment. Follow the instructions on the next page to get started.

New Words or Adult Tips

Have students fill out appropriate parts of the scientific method before, during, and after the experiment.

Carbonic acid is a weak acid that is made when water is mixed with carbon dioxide gas.

Carbon dioxide gas is a colorless gas made up of carbon and oxygen.

An **experiment** is a scientific process done to test a hypothesis and learn something new.

A **hypothesis** is a statement predicting the outcome of an experiment.

A **chemical change** occurs when a new substance is created.

A **physical change** occurs when molecules of a substance are rearranged, but their composition is not changed.

The **scientific method** is the process that scientists use to test hypotheses and conduct experiments.

Observations are things that you notice happening during an experiment.

Instructions/Steps:

1. Pour vinegar into the empty water bottle until the water bottle is filled to about 1 inch from the bottom.



2. Use the funnel to pour 2 tablespoons of baking soda into the rubber balloon.



3. Stretch the opening on the balloon around the mouth of the water bottle without pouring the baking soda into the water bottle to create an airtight seal.



4. Lift up the balloon to pour the baking soda into the water bottle but do not remove the balloon from the water bottle.



5. Watch the baking soda react with the vinegar and write down your **observations**.



Scientific Method

Question:

What will happen if baking soda and vinegar is mixed in an empty water bottle with a balloon attached to the top of the water bottle?

Hypothesis:

If _____, then _____

because _____.

Data Collection/Observations:

Use the space provided to record your observations. You may also draw pictures, if helpful.

Analysis:

What chemical changes did you notice? Explain what makes these chemical changes.

What physical changes did you notice? Explain what makes these physical changes.

Are there any other conclusions you can make based on your observations?

Answers to the first two questions can be found at the end of this document.



Name: _____ #: _____

Conclusion:

What was the result of the experiment? Was your hypothesis correct? Why or why not?

Think of some ways you could do this experiment differently to inflate the balloon even more. Describe the changes you would make.

How could you do this experiment so that the balloon would inflate less? Describe the changes you would make.

Are there any other experiments you could try that involve baking soda and vinegar?

Answers to the second and third questions can be found at the end of this document.

Inflating Balloon Answer Key

What chemical changes did you notice? Explain what makes these chemical changes.
There was a chemical change. We know this because carbon dioxide gas was produced.

What physical changes did you notice? Explain what makes these physical changes.
There were no physical changes.

Think of some ways you could do this experiment differently to inflate the balloon even more. Describe the changes you would make.

Generally, using *more* baking soda will result in *greater* inflation.

How could you do this experiment so that the balloon would inflate less? Describe the changes you would make.

Generally, using *less* baking soda will result in *less* inflation.

Sources:

Balloon Image: <https://www.flickr.com/photos/crystalflickr/190713106>