

Gross Science



STEAM Square Activity Sheet

Supplies Needed:

- Baking Soda
- Vinegar
- Zip Top Sandwich Bag
- Small Square of Paper Towel or toilet paper
- Optional: Food coloring, paint, glitter etcetera



Directions:

1. Make sure to do this experiment outside. Put a tablespoon of baking soda into the center of your paper towel or toilet paper and gather the corners in a pinch to make a sachet
2. Carefully pour 2/3 cup of vinegar into a zip top plastic bag. Add any additional items you chose (coloring, sprinkles, glitter, confetti, and so on)
3. Drop the paper towel containing the baking soda into the bag, seal tight, shake well, then set the bag in the grass or on pavement to watch. Keep faces away from the bag!

Questions:

- A. What happened to your bag? (talk about gasses and the chemical reaction, see page 2)
- B. Did your bag make noises? (our bodies do the same thing)
- C. What would happen if you modified the amount of vinegar or baking soda?

Extension Activity Ideas:

1

HOT OR COLD

Do the experiment in a glass and measure the temperature when the reaction occurs.

2

CLEANING CREW

Use a mixture of 1/2 baking soda and 1/2 vinegar to clean grout or other stains (test first)

3

VOLCANO

Do the experiment in side of a baggie and bury it in sand to make a volcano erupt

4

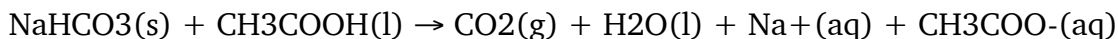
OTHER VINEGAR

Do you have other kinds of vinegar at home? See how they react and chart them

Why did this happen?

The reaction between baking soda and vinegar actually occurs in two steps, but the overall process can be summarized by the following word equation: baking soda (sodium bicarbonate) plus vinegar (acetic acid) yields carbon dioxide plus water plus sodium ion plus acetate ion

The chemical equation for the overall reaction is:



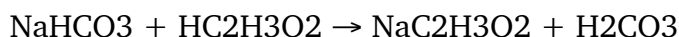
with s = solid, l = liquid, g = gas, aq = aqueous or in water solution

Another common way to write this reaction is:



The above reaction, while technically correct, does not account for the dissociation of the sodium acetate in water.

The chemical reaction actually occurs in two steps. First, there is a double displacement reaction in which acetic acid in the vinegar reacts with sodium bicarbonate to form sodium acetate and carbonic acid:



Carbonic acid is unstable and undergoes a decomposition reaction to produce the carbon dioxide gas:



The carbon dioxide escapes the solution as bubbles. The bubbles are heavier than air, so the carbon dioxide collects at the surface of the container or overflows it. In our experiment, we contain the gas in the plastic bag so they cannot escape until the bag pops or explodes in some cases.

Our Bodies:

A burp — sometimes called a belch — is nothing but gas. When you eat or drink, you don't just swallow food or liquid. You also swallow air at the same time. The air we breathe contains gases, like nitrogen.

Sometimes when you swallow these gases, they need to get out. That's where burping comes in! Extra gas is forced out of the stomach, up through the esophagus, and out of the mouth as a burp.

References:

Helmenstine, Anne Marie, Ph.D. "Equation for the Reaction Between Baking Soda and Vinegar." ThoughtCo, Feb. 11, 2020, [thoughtco.com/equation-for-the-reaction-of-baking-soda-and-vinegar-604043](https://www.thoughtco.com/equation-for-the-reaction-of-baking-soda-and-vinegar-604043).

"Why Do I Burp?." Edited by KidsHealth Medical Experts, KidsHealth, The Nemours Foundation, OAD, kidshealth.org/en/kids/burp.html.