Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences --particularly students of color and girls -- by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at www.projectexploration.org/stemathome.

## In this activity, you will:

build a bottle rocket utilizing materials in your home.


## Supplies Required:

- Empty plastic bottle
- Vinegar
- Baking soda
- A cork (or substitute)
- Wooden sticks or pencils (for launching pad)
- Scotch tape
- Scissors
- Optional: Funnel

## Video

How to make a rocket with baking soda and vinegar: https://tinyurl.com/y7q34uz5

Watch chemical reactions in action: https://tinyurl.com/ybudwjpp

## Overview

Bottle Rocket. Those two simple words can turn a boring day into one filled with, fun, excitement and learning. There is nothing more exciting than, rockets, chemistry and explosions! When we mix vinegar (HCH3COO) and baking soda (NaHCO3), we get the so-called acid-base reaction. Here vinegar is an acid and baking soda is a base. An acid is a chemical that wants to get rid of a positively charged hydrogen atom (proton) and a base wants that proton. In that reaction when the baking soda receives proton from the acid, it transforms into water and carbon dioxide. Carbon dioxide rapidly expands, and if the space is too small, it explodes. While building a rocket, our goal is to allow that pressure to release at the right time and on the right spot. That will make our rocket defy gravity and launch upwards!

## Instructions

1. Make a launching pad out of wooden sticks or pencils. Tape 3 sticks so the bottle can stand on them. Tape the sticks so they are going over the bottle cap. When we put a bottle on the sticks, the bottom of the bottle will look upwards, and the bottle cap will look down.
2. Check if your cork is a good fit for the bottle. If it's not, you can use duct tape to make it fit better.
3. Decorate your rocket (bottle) as you wish and you are ready to launch!
4. It is best to do this in an area where there is a lot of space and make sure you stand way back. You never know how far it might launch.
5. Pour vinegar (1 – 2 dL is enough)
6. Using a funnel, pour baking soda in the bottle (1 – 2 spoons). Close the bottle with the cork and turn it over so it stands on the launching pad.
7. If the pressure builds too fast, you can put baking soda in a piece of paper, put in the bottle, put the cork on and shake it so you start a reaction
8. 3, 2, 1, Blastoff!

## Additional Resources

**Think About It!** What do you think would happen if we used more baking soda or vinegar? Explain your thinking! What do you think would happen if we used warm water? Why? What things could we change to make the rocket go higher?

1. How to make plastic bottle rockets: https://tinyurl.com/y7e9elaz
2. Watch The Sci Guys: Science at Home - SE1 - EP18: Water Bottle Rockets: https://tinyurl.com/j4obonq
3. Read and learn more about chemical reactions with Ducksters: https://tinyurl.com/ybp9o3gj

## Share It Out

**Share on social media:** Record a video or take a picture of your rocket and post the results online using the hashtags:

#BottleRocketChallenge
#ProjectExploration
#StemAtHome

Tag a friend and challenge them to make their own rocket!

**Share via PE's website:** Students who complete STEM@home activities and share what they learned with the PE team via our website will earn points which can be traded in for cash prizes at the Explore Store. Your project number is 409. Learn more at www.projectexploration.org/explore-store

**Join PE's character contest!** Design a STEM character who will lead kids through activities and be featured on our website and in our STEMbooks. Cash prizes will be awarded to the top 3 finalists. Learn more at: www.projectexploration.org/character-contest.

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