



Chemistry Rocket

TAILS AND TALES™

15-minute STEAM
2021 Summer Reading

The Science

The baking soda and vinegar that we used in this bottle rocket create an acid/base reaction. Baking soda is sodium bicarbonate, and the chemical formula is NaHCO_3 . Vinegar, or acetic acid, is HCH_3COO . A baking soda and vinegar reaction is actually two parts. It happens so fast that we don't realize that it's actually two reactions. First, carbonic acid is formed. This quickly breaks down into water and carbon dioxide gas. The other product of the reaction is sodium acetate, which you can use to make Hot Ice. All the CO_2 gas that is formed by the reaction creates pressure inside the bottle. The pressure builds up until it pushes the cork out of the opening of the bottle. Then WHOOOOSH! We have liftoff!

The rocket flies high because of Newton's 3rd Law of Motion, which states that for every action, there is an equal and opposite reaction. The CO_2 gas and liquid push out of the bottom of the rocket, which pushes the rocket upwards with great force!



Take It Further

Test different quantities of baking soda and vinegar to lengthen the flight time and distance. Work with different sized plastic bottles, too. You're looking for the perfect combination of bottle size and fuel to achieve the best launch at the highest speed (distance divided by time). A higher flight, means figuring out the best combination of vinegar to baking soda to produce the most explosive reaction. There may be modifications you can make to the bottle so it travels farther as well. Do some research on the Venturi Effect and see how that might improve things. Maybe the temperature of the vinegar you use will make a difference

Taken in part from frugalfun4boys.com & stevespanglerscience.com/lab/experiments/acid-base-rocket



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