



The rocket fueled by kitchen supplies

Experiment Guide

7 - 12

Physics, Chemistry

Duration: 1 hour

There are many different ways to make things fly. For example, you can throw a ball. Birds fly by flapping their wings. Airplanes have turbines for this purpose. All these methods have one thing in common: a driving force. As you can see, this force can be generated in many different ways. But how can you make your own rocket fly without touching it?

How does it work?

rdinary foods can produce spectacular effects when mixed together. Have you ever seen what happens when you drop Mentos into cola? We now want to use a similar phenomenon—a chemical reaction—to make a rocket fly. When chemicals are combined, reactions can take place. This transforms the original ingredients into completely new substances.

In our experiment, the original substances are baking soda, citric acid, and water. When they come together, they create a gas called carbon dioxide (CO₂). Because the gas needs space, high pressure builds up in the bottle. When the pressure gets too high, the CO₂ pushes the bottle cap away and the gas flows out. The rocket is pushed upward into the air with the same force. This is called recoil.

Let your rocket fly!

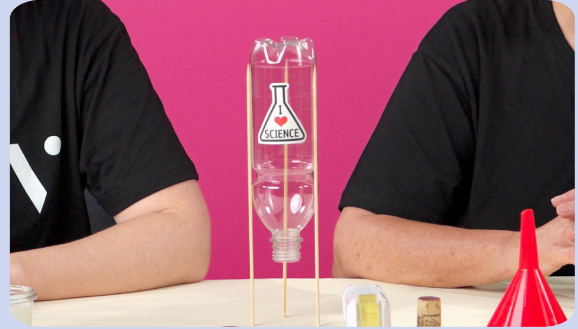
You will need:

- 1 empty 0.5 l plastic bottle
- 1 cork (it should fit on the neck of the bottle)
- Scissors
- 1 tablespoon baking soda
- 1 tablespoon citric acid
- 100 ml water
- Funnel
- Safety goggles
- Barbecue skewers (3 or 4)
- Adhesive tape
- Decorative materials



Step 1

Attach the skewers to the bottle using tape. It should be able to stand upright securely.



Step 2

If you want, you can now decorate the rocket. Tip: Leave the bottom part of the bottle free so you can see how much fuel you put in later.



Step 3

Now your rocket is ready. Find a place outdoors to launch it. (Caution: Choose a place that can get dirty and is away from other people or fragile objects. Wear goggles to protect your eyes.)



Step 4

Now add the baking soda and citric acid to your bottle (use the funnel to do this).



Step 5

Next, pour the water into the bottle. Now put the cork firmly on the bottle, shake it briefly if necessary, and place it with the holder facing downwards. (Caution: Take a few steps back and stand some distance away from the rocket.)



Step 6

Watch your rocket take off!

Want to do more experiments?

- Try to find the perfect mixture of baking soda, citric acid, and water so that your rocket flies the highest.
- Do you know of any other reactions or processes that generate pressure? How could they be used as rocket fuel?

Background knowledge

Real rockets don't fly into space using baking soda and citric acid, of course. A commonly used fuel is hydrazine, which can shoot objects into space thanks to its violent chemical reactions—including telescopes, for example! These provide data and images from distant regions of our universe. Researchers, such as the Matthee group at ISTA, use this information to study how stars, galaxies, and black holes evolve.



You can also find the entire experiment on YouTube!