

## ROCKETS

### Alka-Seltzer Rockets

What do you know about gas and pressure?

What do you want to know about gas and pressure?

### Gas and Pressure

Gas is composed of particles (molecules or atoms) that are randomly moving in all directions. These particles travel in a straight line until they hit another particle or the surface of the container they are in. When they hit the side of the container, they exert a force on that surface, this is what scientists call **pressure**. Formally, **pressure** is defined as a *force per unit area*.

Anything that increases either the number of collisions on the surface of a container or the force of the collisions will increase the pressure. The velocity of the particles increases with temperature, and when the particles are moving faster they exert more force when they collide with the surface, which increases the pressure. Decreasing the size of the container means the same number of particles have a smaller area to move in and are more likely to collide. In this way, changing the volume of the container can increase or decrease the pressure.

Can you think of examples of things that have high pressure?



## Materials

- An open outdoor area
- A film canister
- An Alka-Seltzer tablet
- Water

## Instructions

1. Break an Alka-Seltzer tablet in half.
2. Get a glass bowl or cup and fill it up with water.
3. Drop the Alka-Seltzer tablet in the cup or bowl of water. Note: A clear cup/bowl will work best.
4. Observe: what happened when you added the tablet? Either describe it in words or draw a picture below.

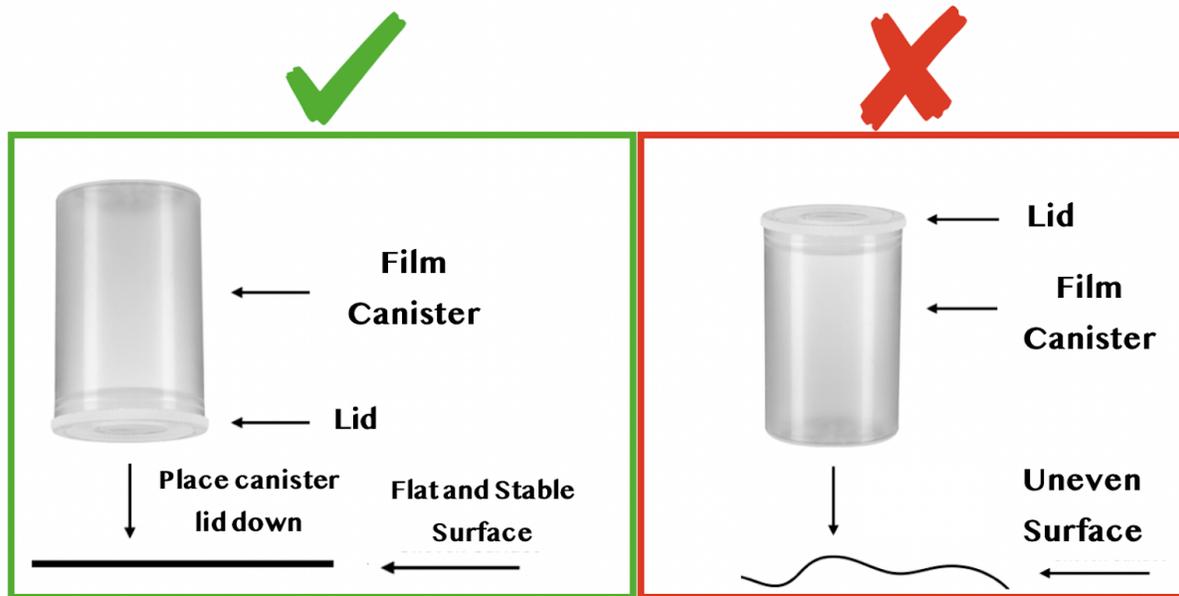
What's happening?

A **chemical reaction** happens when Alka-Seltzer is put into water. The tablet contains sodium bicarbonate (baking soda) and citric acid. In the presence of water, the sodium bicarbonate and citric acid react to form **carbon dioxide gas** (along with a molecule called trisodium citrate and water molecules). That is why bubbles form when you put an Alka-Seltzer tablet in water!



## Experiment

1. Take the other half of the tablet from earlier and place it in the film canister.
2. Add a small amount of water (about 2 tablespoons) into the canister and **very quickly** secure the canister lid. Quickly shake the canister and place it **lid down** on the launch pad. Step back at least 5 feet.



## Analysis

1. Describe or draw a picture of what you observed.



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2. How long did it take the canister to launch?
  3. How high did the canister go into the air?
  4. Was anything left behind on the launch pad?
  5. What makes this film canister a rocket?

Now that you've made a rocket, what do you think we can do to make the rocket launch higher in the air? Our film canister rocket launches because of pressure build up from the carbon dioxide produced from the chemical reaction. Are there ways we can change the experiment that would build up more pressure?

Scientists think about each step of an experiment, and change one part of a step first to see how it changes the final outcome. If you change too many things at the same time, it will be hard to know which change you made was more impactful than the other changes.

6. What steps would you change to make the rocket launch higher in the air? (*Could you use more of the Alka-Seltzer tablet? Could you shake it more or less? What temperature of water works best?*)

Can you think of anything else that builds up gas or pressure? For example, have you ever mixed baking soda and vinegar? Could you use baking soda and vinegar to make a rocket? Experiment and find out!





Use the table on the next page to design your own rocket experiment. We've included a few ideas to get you started, but consider what else you can change to make the best rocket possible.



	Prediction	How long did it take the rocket to launch?	How high did the rocket launch?	Anything left on the launch pad?	Any other notes?
Half tablet, not crushed with water					
Half tablet, crushed with water					
Whole tablet, not crushed with water					
Whole tablet, crushed with water					
Baking soda and vinegar					

