STEM in a Bag

SPACE EDITION

ALKA-SELTZER ROCKET

Chemical reactions have the ability to change the structure of matter, which can help us do some extraordinary things. For example, scientists have found a way to use chemical reactions to shoot rockets up into space. You can create your own version of this using a simple Alka-Seltzer tablet as fuel.

WHAT YOU NEED:

- Index cards
- Tape
- Film canister
- Scissors
- water
- paper towels
- Alka-Seltzer tablet

THE GOAL:

Create a rocket that can shoot into the air using a film canister and an Alka-Seltzer tablet

TRY THIS:

1. Flip the film canister upside down so that the lid is on the bottom. Wrap a piece of the index card around the canister and tape it so the canister is covered.
2. Cut three triangle-shaped fins out of an index card and tape them to the bottom of your rocket (the side with the lid).
3. Create a nose for the rocket. Cut a circle out of one of the index cards. Cut a triangle piece out of the circle (it should look like a pie slice). Now that a piece is cut out, you can twist the circle into a cone shape. Tape the cone in place and then tape it to the top of the rocket.
4. Fill the canister with water about ½ full. Take it to an open space outdoors.
5. When you are ready to shoot your rocket, place the antacid tablet into the canister and snap the lid on tight. Stand it upright on the ground on a flat surface with the lid on the bottom. Stand back and watch!

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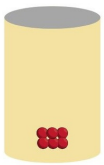
ALKA-SELTZER ROCKET CONT.

WHAT MAKES THE ROCKET GO UP?

As the Alka-Seltzer tablet reacts with the water, it creates bubbles of Carbon Dioxide gas. When this gas builds up in the container, it creates pressure inside the container that causes the lid to pop off.

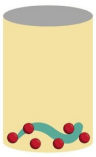
Newton's Third Law of Motion says that every action has an equal and opposite reaction. So when the air rushes downwards out of the container, the container will shoot up in the opposite direction.

WHY DOES THE GAS EXERT SO MUCH PRESSURE?



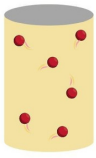
SOLID

The tablet starts out as a solid--its molecules are packed tightly together in a compact form and they can't move around very much.



LIQUID

When the tablet dissolves in the water, part of it becomes liquid. The liquid molecules loosen up and flow more freely.



GAS

As the ingredients in the tablet dissolve and react, gas molecules are also created.
These molecules spread out and bounce around very quickly. As the amount of gas in the container increases, more molecules start to bounce off the walls of the container, until the lid eventually pops off.

READ ALL ABOUT IT!

- **Rocket Boys** by Homer Hickam, Jr.
- **Rocketry (Build It Yourself)** by Carla Mooney

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REAL ROCKETS WORK THE SAME WAY

Big rockets also go up by releasing gas. Rockets carry tanks of fuel that are kept in liquid form at very low temperatures. Because there's no air in space, they also carry tanks of oxidizer, which provide the oxygen needed to burn the fuel. When the rocket fuel and oxidizer are mixed and burned, they turn into gas. As the gas is released from the bottom of the rocket, the rocket goes up!

MORE TO EXPLORE

See what happens when you make changes to your rocket. Try using a different water temperature or more or Alka-Seltzer. Does it take more or less time to go up? Does it stay in the air longer? Why do you think this happens?

DID YOU KNOW?

The Alka Seltzer tablet fizzes because it contains an **acid** (citric acid) and a **base** (sodium carbonate). When the tablet dissolves in water, the acid and base combine and react with one another. This is the same type of reaction that occurs when you mix vinegar and baking soda.

STANDARDS

This activity aligns with the following Oklahoma Academic Standards for Science:

- 5-PS1-1 Matter & Its Interactions
- 5-PS1-4: Matter & Its Interactions
- MS-PS1-2 Matter & Its Interactions
- MS-PS1-3 Matter & Its Interactions
- MS-PS2-1 Motion & Stability: Forces & Interactions
- HS-PS1-5 Matter & Its Interactions
- HS-PS2-6 Motion & Stability: Forces & Interactions

Note: The instructions for this activity were adapted from a lesson plan from Imagination Station. It can be found at the following link: **https://www.imaginationstationtoledo.org/educator/activities/rockets**

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