



Ready, set, pop!

Build a film canister rocket



Standards

NGSS 2-PS1-1

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

*NGSS 2-PS1-4

Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some can not.

*NGSS 5-PS1-2

Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

*Applies to optional lesson extension.

Materials list

- Nasco Film Canister Rocket Classroom Kit or Student Kit ([NE30334](#) or [NE30335](#))
- 1 clear drinking glass (or other transparent receptacle) for each group
- 1 balloon (10–12") for each group ([9742228](#))
- Student instruction worksheets
- Safety glasses ([SB39512](#))

Optional (for extension experiment)

- Scale

Objectives

Students will...

- Build a film canister rocket using water and Alka-Seltzer®
- Conduct an investigation to determine whether the mixing of two or more substances results in a new substance
- Explore chemical and physical changes and how heating or cooling can impact these changes

Introduction

Alka-Seltzer® contains citric acid and sodium bicarbonate (baking soda). When a tablet touches water it begins to dissolve and fizz/bubble. This is a chemical reaction that produces carbon dioxide (gas). When water and Alka-Seltzer® are added to a film canister and trapped, the gas expands and builds up pressure. The pressure builds up so much that it forces the lid to pop open and send the film canister flying into the air — like a little rocket!

Instructions

1. To begin the lesson, divide students into groups of 2–3 and give each group a film canister, 3 Alka-Seltzer® tablets, a clear drinking glass, a balloon, and a student instruction worksheet.
2. Fill a clear drinking glass about halfway with water and add an Alka-Seltzer® tablet. Have the students observe and discuss what they see.

- What is happening to the tablet?
- What is creating the fizz and bubbles?
- Do the tablet and water combine to create a new substance? If so, what is the substance?

Keep watching and discussing until the tablet dissolves completely. If you need to hold up the glass and walk around the room to show everyone, do so.

3. Do the same experiment again, except this time use a balloon to enclose the top of the glass. If the balloon does not fit the glass, use one of the film canisters instead. As the balloon begins to fill with carbon dioxide, have students try to explain what they think is happening.
4. Explain to the students that you are going to be doing the same experiment one last time, but this time you are going to be using a film canister and placing a cap onto it after you add the Alka-Seltzer® tablet (review safety precautions).

Ask students what they think will happen and explain why. After they have provided their reasoning, go ahead and fill the film canister halfway with water, add the tablet, and close the lid. You can keep the lid on the top or flip the canister over, either way will work. Observe the reaction together.

5. After discussing what happened and why, have students build their own rockets using the rocket template. Make enough copies so that each student receives a template to color and design. If limited on time, simply run the experiment.

Safety precautions

1. Make sure that you are using a space where a small mess can be easily cleaned up, like in a sink or outdoors.
2. After closing the cap of the film canister, make sure to back up and give the canister space. If you notice that the film canister is not launching, wait about 20–30 seconds before approaching. There might be a delay in the reaction or a leak of the gas.
3. Make sure that anything directly above the canister is not fragile (i.e., a light fixture).

Optional activity: Color change

The students will understand that water and Alka-Seltzer® create a chemical reaction, but you can also add food coloring to the water to show the physical change.

Extension experiment: Using variables

If you change the amount of water in the film canister, how does this affect the time it takes for the lid to pop off? In this experiment, the water is the independent variable, the time it takes for the lid to pop off is the dependent, and the Alka-Seltzer® tablet is the control.

Extension experiment: Hot vs. cold

If you use warm (or hot) versus cold water, how does this affect the time it takes to dissolve the tablet? Does this change the rate at which CO₂ is created? You can use a balloon over a film canister as a visual, or if you wish to collect data, you can use a timer to record how fast the tablet dissolves.

Extension experiment: Total weight of matter (need a scale)

Measure and add up the weight of the film canister (with the water inside), a tablet, and a balloon. Place the tablet inside the balloon and connect the balloon to the film canister (without dropping the tablet into the water). Once the balloon is secure onto the container (consider using tape for a tight seal), drop the tablet into the water. After the tablet dissolves, weigh everything together again on the scale. How does it compare to the original weight?

Ready, set, pop rocket worksheet

Name: _____ Group: _____

Introduction

Today we're going to experiment and build a small rocket using only a few common items. Before you begin, read the safety rules you need to follow during the activity:

Safety precautions

1. A teacher or parent should be available in case you need help.
2. Work in a space where a small mess is easy to clean up, like in a sink or outdoors.
3. During Experiment 3, after you close the cap of the film canister, make sure to back away from the canister and give it space. You should also make sure that there is nothing breakable above the canister, like a light.

Supplies

You will need the following items:

- 1 film canister
- 3 Alka-Seltzer® tablets
- 1 drinking glass
- 1 balloon
- Safety glasses

Experiment 1

Take an Alka-Seltzer® tablet and break it in half. Next, fill the glass halfway with water and add half of an Alka-Seltzer® tablet. Observe what happens and answer the questions below.

What is happening to the tablet?

What is creating the fizz and bubbles?

Do the tablet and water combine to create a new substance? If so, what is the substance?

Keep watching until the tablet dissolves completely. If you cannot see clearly, hold up the glass to get a closer look. You can also add the other half of the Alka-Seltzer® tablet if you need more time to watch the reaction.

Experiment 2

The next experiment is the same as the first one, except this time, after you drop the tablet into the glass, stretch the opening of a balloon over the top of the glass. If the balloon does not fit over your glass use one of the film canisters instead. After the balloon is placed over the glass or canister, observe what happens and write down what you see below.

Experiment 3

Review the safety rules before starting. Read the following instructions and answer the first question before you begin.

Fill your film canister halfway with water. Drop in a full Alka-Seltzer® tablet and quickly put the cap of the canister on top. Set the canister down with the cap on the bottom and back up to a safe distance.

Before you do this last experiment, what do you think will happen once you close the cap on the canister? Why?

Now, run the experiment to see if your predictions are correct.

Describe what you observed. Was your prediction correct?

Building a rocket

Now you have tested out the fuel you need to launch your rocket!

1. Prepare for your launch by coloring and cutting out the rocket ship template below. The triangular piece will be the nose cone and the rectangular piece wraps around the canister.
2. After cutting the pieces out, fold the triangular piece along the dotted lines to create a cone shape. The gray areas are tabs that you can use to tape or glue the cone together.
3. Wrap the rectangular piece around the side of the canister and secure with tape. Then, use tape to attach the cone to the bottom of your canister.
4. When you're ready, find a safe place to launch and follow the instructions for Experiment 3 again.

