

# Homemade Rockets Rock!

## Age group

3rd - 6th class



**Total time:** 1hr - 1.5hrs

**Outline:** To learn about forces, gas pressure, and chemical reactions

## Notes for parents/carers and teachers:

This activity can be carried out at home by an adult and child or with a small group of children, by varying the types of age-appropriate tasks. The materials are available at home or easily obtainable. The activity is written out with instructions directed to the child's parent/carer. Feel free to adapt as appropriate.

## Links to Primary Curriculum

The child should be enabled to

- identify and explore how objects and materials may be moved (Area: SESE, Science, Forces)
- explore and experiment with the properties and characteristics of materials in making structures (Area: Arts Education, Visual Arts)

## Key Learning points

- Chemical reactions and some factors that control them
- Gas pressure as a force
- Newton's Third Law – To every action there is an equal but opposite reaction

## What you need

1-2 chewing gum canisters  
1-2 Alka seltzer tablets  
Tap water  
Protective glasses/light toned sunglasses will do!  
Stopwatch/timer  
Coloured card  
Scissors,  
Sticky tape/glue,  
Optional -Home-made white lab coat, (a large old white shirt with adjusted sleeves)

## 1. Do you like rockets?

Open up their curiosity with the following questions:

Do you like rockets? Why? Have you ever seen one blasting off? Have you ever made a rocket at home? Would you like to?



## 2. What do you know about rockets and forces?

NOTE: For younger children, feel free to carry out the experiment first and then ask them some questions about what they think happened after.

### *Brainstorm on rockets and forces*

Start with saying something like “Space rockets need lots of science like physics and chemistry to make them work.

What do you think makes them blast off so fast? What helps them travel so high?

## Did you know?

- The Chinese invented rockets around 700 years ago while using gunpowder in their military and for fun, as fireworks.
- Space rockets can take people into space or can take objects like satellites into orbit.
- For a rocket to take off, the force of its engine must be greater than the weight of the rocket.

Brainstorm openly with them. Help them to think about the forces that a rocket engine needs to push itself off the ground. They may mention an explosion, fire or rocket fuel. This creates a force to push up the rocket, like in the experiment we will do today.

### 3. Making our mini-rockets

It's best to try this somewhere you don't mind getting things a little wet!

1. Fill the two canisters half-way with water and take two tablets out of a freshly opened packet of Alka Seltzers. Finely crush one of them.
2. Be ready with your timer/stopwatch. Place the whole tablet into one canister, and the crushed one into the other, without the lids on, and start your timer/stopwatch.
3. Time how long the fizzing goes on for in each canister. Write down how long this chemical reaction lasts. Why do you think the water stops bubbling? Which lasts longer? Why? Empty the contents into the sink.
4. Put on your protective glasses/sunglasses. Repeat the experiment with one canister, and this time put the lid on it immediately after you drop in a whole crushed tablet. Start timing the reaction as soon as you drop it in. Stand back, and hopefully the lid will pop off and fly high into the air.
5. Try changing the amount of the water in the canister but keeping the amount of tablet the same. You can also vary the temperature of the water (without burning yourself!) and record what happens. How does the temperature affect the speed of the reaction? Does warmer or colder water change the height the canister reaches?



6. Get creative and try to construct a simple paper or cardboard rocket around the body of the canister. You could make some fins and add a nose cone to top off your homemade rocket and watch it blast off. Remember this time, once the lid is on, you will place your canister upside down with the lid down on the surface. For extra pizzaz, you could add some food colouring (red, green, blue?) to the water if everyone's ok with the extra mess! Remember to have a few spare tablets and possibly canisters as this experiment is so much fun they'll want to repeat it a few times!

#### 4. How do these rockets work?

Prompt them with the following questions. You can then read the full explanation to them, or better still, put it into your own words.

##### *Key questions*

What do you think are the bubbles or fizzing that you saw? How did the water temperature affect your experiment? What do you think makes the canister shoot up?



##### *Explanation*

The secret is in the fizzing tablet! If you have ever mixed baking soda with vinegar, that's the same as this chemical reaction. Look at the ingredients of Alka Seltzer and you will see that it contains citric acid and bicarbonate of soda (baking soda). When you put the tablet in water, the acid and baking soda mix and react to produce bubbles of carbon dioxide gas. When the lid is on, this gas builds up so much pressure inside the canister that the gas pops the lid off. The gas creates a force on the lid. The lid is the path of least resistance for the gas pressure building up inside because the other sides of the canister are sealed and stronger.

If you tried varying the water temperature, you will have noticed that the temperature is important to the reaction. Warm water speeds up the reaction, and cooler water slows down the reaction, so it takes longer to build up enough pressure to pop off the lid.

Sir Isaac Newton was a physicist who loved to experiment, and one of his laws tells us what is happening here. Newton's Third Law says - for every action there is an equal and opposite reaction. So when the lid goes one way the gum canister shoots off in the opposite direction. Can you think of any other examples of Newton's Third Law in everyday life? (e.g. balls hitting off each other in a pool table)

## 5. Who gets to fly in real rockets?

We seem to always hear about all the men who fly around in space suits, and rockets, but what about women? We're here to tell you about those women, because girls can also do anything they set their minds to.

### Samantha Cristoforetti

Samantha Cristoforetti (born April 26, 1977) is an Italian European Space Agency astronaut, Italian Air Force pilot and engineer. She holds the record for the longest uninterrupted spaceflight by a European astronaut, and until June 2017 held the record for the longest single space flight by a woman until this was broken by Peggy Whitson and later by Christina Koch. She is also the first Italian woman in space.



## 6. What did you like? What did you learn?

Adults and children are both welcome to answer.

What did you like most/least about this experiment?

What did you learn about forces, pressure, and chemical reactions?

What else would you like to try in this experiment if you did it again?

## Some Resources

### *Alka Seltzer Rocket Eruptions:*

<https://littlebinsforlittlehands.com/alka-seltzer-rocket-activity-kids>

### *Rocket Facts for Kids:*

<https://kids.kiddle.co/rocket>

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