MEDIUM | 7 – 12 | 1 – 2 HRS

1. Learn about the life and work of Gloria Long Anderson
2. Find out how fuel can be used to power rockets
3. Make a rocket powered by an effervescent vitamin C tablet

STORIES IN CHEMISTRY

FIZZY FUEL ROCKETS

Illustration: Gloria Long Anderson

INTRODUCTION

Gloria Long Anderson is a talented American chemist, who worked as a researcher in the U.S Air Force Rocket Propulsion Laboratory developing new solid rocket fuels.

Anderson was brought up in a poor farming community in Arkansas in the 1930s. Her parents encouraged their children to get a good education. Gloria was bright and attended a segregated school. Since very few jobs were available to African American women, Gloria decided to go to university in the hope she could have a professional career.

During her university studies, she worked in a sweet factory in the summer holidays to make ends meet. After Gloria finished her degree, she was turned down for a professional chemist job because she was African American, so instead studied for a PhD in chemistry. Due to financial challenges she almost dropped out several times. Gloria, however, was determined to work as a chemist. Her hard work and commitment led her to win many academic awards.

DID YOU KNOW?

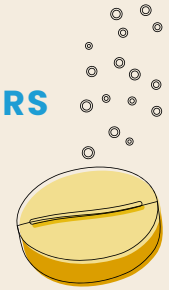
A fuel is a substance which burns using oxygen from the air, releasing energy and waste gasses such as carbon dioxide. Rocket engines can be powered by solid or liquid rocket fuels which burn with oxygen gas to make an explosive reaction that releases lots of gas very quickly. Rockets work by firing large volumes of hot gas downward out of the engine exhaust. This causes a force called 'thrust', which propels the rocket upwards.

SAFETY

- **Take care with rockets, and do this activity outside.**
- **Always point the rocket straight upwards and do not lean over them.**
- **Keep people and pets a safe distance away.**
- **Vitamin C tablets should be handled and stored by an adult.**
- **This activity should be supervised by adults at all times.**

ACTIVITY

USING EFFERVESCENT VITAMIN C TABLET CONTAINERS TO MAKE POP ROCKETS

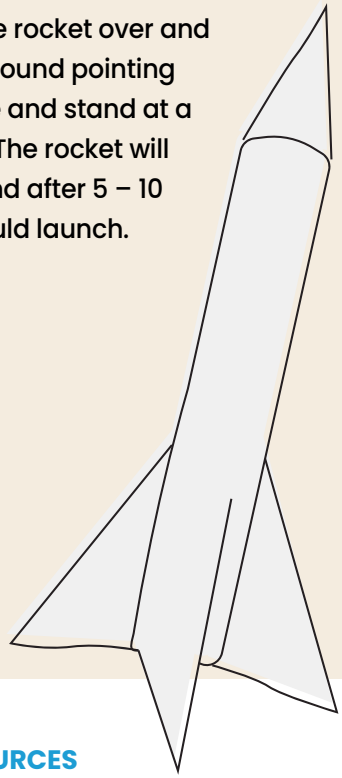


To commemorate the work of Gloria Long Anderson, the experiment below will demonstrate how to make a chemically-powered rocket.

INSTRUCTIONS

1. Remove the vitamin C tablets from the tube and place in a dry container.
2. Using a pen, mark the length of the vitamin C tube on a piece of A4 paper. Cut the paper to the length of the tube. Wrap tightly around the tube and tape securely.
3. Make 4 triangular shaped fins out of paper. Space them equally and tape onto the open end of the tube.
4. Cut out a large circle of paper and then cut this into quarters. Then fold one quarter into a tight cone shape so it will fit over the closed end of the tube. Tape securely.
5. Place the small ball of blue-tack inside the lid of the tube.
6. Break an effervescent vitamin C tablet in half. Push the two halves of the tablet into the blue-tack so they are sticking out, but secured in place if the lid is held upside down.
7. Using a small jug of warm tap water, fill the vitamin C tube until it is about a third full.
8. Ask an adult to help you choose a safe place to launch your rocket.
9. Holding your rocket with the nose cone pointing downwards, carefully ease the lid firmly on.
10. Quickly turn the rocket over and place on the ground pointing upwards. Move and stand at a safe distance. The rocket will begin to fizz, and after 5 – 10 seconds it should launch.

Step 6



YOU WILL NEED

- A tube of effervescent vitamin C tablets
- A medium sized airtight food container
- A small jug
- Access to warm and cold water
- 1cm Diameter ball of blue-tack (or modelling clay)
- 3 Pieces of A4 paper
- Scissors
- Sellotape
- Marker pen

WHAT'S HAPPENING?

Effervescent vitamin C tablets mainly are a mixture of three dry powders — an acid (citric acid), an alkali (bicarbonate of soda), and the vitamin C.

When they get wet, the chemical powders react together. The chemical reaction between an acid and a chemical with 'carbonate' in the name produces carbon dioxide gas. This results in the fizzing when the vitamin C tablet is dropped into water.

The carbon dioxide gas quickly fills up the space above the liquid in the tube. When the pressure of gas in the airspace is high enough, the lid is pushed off violently and the pressurised gas and water escape downwards towards the ground. The force of the escaping gas and water downwards produces thrust (an upwards force) and propels the rocket upwards off the ground.

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