Rocket Science

Introduction

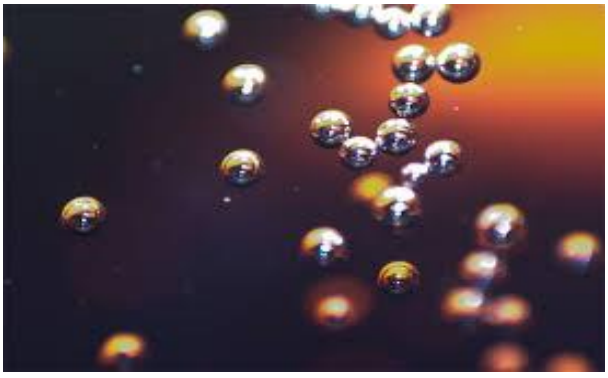
Have you ever seen the Diet Coke and Mentos experiment?

Have you ever wondered what makes the reaction work?

You might think that there is some magical ingredient in a Mentos sweet that causes a chemical reaction with the Diet Coke. The amazing eruption that takes place when Mentos are dropped into Diet Coke (or other brands of diet cola) is not a *chemical reaction* at all! Instead it is a *physical reaction*.

The Science behind it!

A carbonated beverage (e.g. Diet Coke) is packed full of *dissolved carbon dioxide gas*, which forms bonds with water.



While the Diet Coke is in the bottle, the gas is kept in solution by the bottle's *pressurised* conditions. When you pour some Diet Coke into a glass, some gas

escapes and forms a foam, but most stays trapped by the *surface tension* of the water. All of those gas bubbles want to escape, making it no wonder that carbonated beverages makes you burp!

After a while, the Diet Coke will go flat, but this process takes some time and will not be powerful enough to propel our rocket. By adding Mentos sweets to the Diet Coke, we can speed up the *nucleation process* to cause a *geyser* powerful enough to spray high into the air or, in this case, move a rocket.

Gum arabic on the surface of Mentos sweets breaks up the surface tension of the water in the Diet Coke. Did you know that if we looked under a microscope, we would see that the surface of Mentos is rough and filled with tiny dimples and holes that are great spots for *nucleation* because of how they increase the surface area available for reaction.

When Mentos and Diet Coke come into contact, lots of Carbon Dioxide (CO_2) bubbles form very quickly and cause a geyser-like eruption.

Use your dictionary to look up difficult words/terms or why not try www.dictionary.com

Watch this video to help you create your own 'Rocket Science' experiment: https://www.youtube.com/watch?v=3cY1MU0Gvjs

Watch this video to help you understand the Science behind the 'Geyser' experiment: https://www.youtube.com/watch?v=usDy8-xFYKk

Now, we are going to experiment! Consider the following key questions during the experiment:

- What is making the rocket move forward?
- How could we make the rocket move faster?

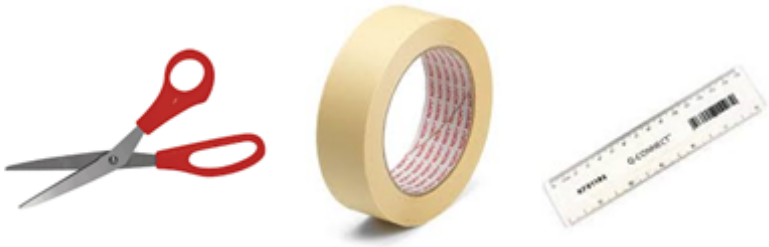
Experiment: Explore and demonstrate the effects of action and reaction forces.

Equipment:

Large open space, e.g. garden 	2 Litre Diet Coke 	1 pack of Mentos 
Masking Tape 	Scissors & Ruler  	Goggles (optional) 

Method

1. You may use goggles to protect your eyes if you wish. Why not try to get a family member to record your experiment! Try this experiment outside
2. Using your scissors, cut a 20cm strip of masking tape, use your ruler to help you measure



3. Stack 5 Mentos sweets on the sticky side of the masking tape and wrap the tape lengthwise around the sweets to create a package. The sides of the Mentos sweets should be exposed (not covered)

4. Remove the lid off the bottle of Diet Coke. Spill out three to four tablespoons of the Diet Coke so that it is not full to the top

5. Using a piece of masking tape, stick the wrapped Mentos to the lid of the bottle. Replace the cover of the bottle, make sure the Mentos do not touch the Diet Coke before securing the lid

6. Replace the lid tightly

7. Shake the bottle of Diet Coke to build up even more pressure inside the bottle. The ottle will feel very firm
8. Stand back and throw the bottle in the air with the lid faced downwards. The pressure inside the bottle should be enough to blow the cap off and propel the bottle in the air like a rocket!
9. Discuss the result of your experiment with family. What made the rocket move forward? How could we make the rocket move faster?
10. Optional: Next time, why not decorate your Diet Coke bottle like a rocket so it looks like the real deal!

ACTIVITY

Look up the meaning of the following terms.

Think about other subjects that these terms relate to (e.g. Science, Physics, Biology, Chemistry, Home Economics)

- Chemical reaction
- Physical reaction
- Carbon dioxide
- Pressurised
- Surface tension
- Nucleation process
- Gum Arabic