Popping good chemistry

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We will be: investigating what happens when carbon dioxide gas is produced from an irreversible change inside a container.

Learning objectives

Understanding

- I understand that some solids dissolve.
- I can describe an irreversible change.
- I know that an irreversible change produces new materials.

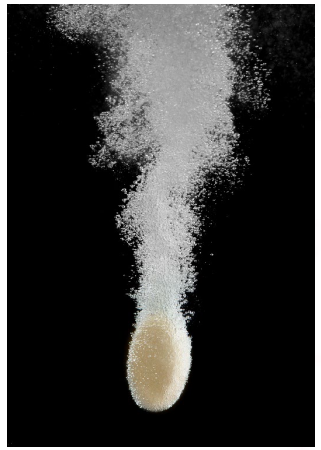
Enquiry skills

- I can make and test predictions.
- I can make observations, take measurements and record my results.
- I understand what ‘variables’ are.
- I can suggest how to improve my investigation.

Useful vocabulary 1

- **Dissolve:** some substances dissolve when mixed with water or other liquids. The substance doesn't disappear but breaks down into tiny particles and spreads out.
  Can you think of some substances that dissolve?
  Salt, sugar, coffee, vinegar

- **Effervescent:** a reaction that produces bubbles of gas.



- **Gas:** a state of matter where particles have high energy and can move around freely in all directions. Gases can change their shape and spread out.

Useful vocabulary 2

- **Reversible change:** a change where no new materials are created and the original material can be recovered. For example: melting, evaporating, freezing, dissolving and mixing.

- **Irreversible change:** a chemical change or reaction where new materials are formed.
  Can you think of any examples?
  Baking a cake, burning coal, a bike rusting

- **Variable:** something that is observed or measured in a science experiment.
  Can you think of some examples?
  Size, mass, temperature, time

- **Vitamin:** found in foods in very small amounts as part of a healthy diet.
  Have you heard of any vitamins? Vitamin C, Vitamin D, Vitamin E

Discussion

Watch while your teacher puts a vitamin tablet in a glass of water.

What do you think will happen when you put a tablet inside the tube with some water and put the lid on?

The tube will explode!

I don't think the tablet will fizz because it needs air to make it fizz.

You won't see anything happen - the tablet and water will just react in the tube.

The bubbles will push against the cap until it pops off!

What are your ideas?

Safety

We need to be careful when doing science experiments to make sure everyone is safe.

Never put anything in your mouth during a science experiment and always follow instructions from your teacher.

Safety rules

1. Protect your eyes by wearing safety glasses.
2. Make sure the tube is standing upright when you add your tablet. Never point it towards anyone.
3. Do not look directly down at the tube as the lid might pop off suddenly.
4. If the lid has not popped off after a few minutes, ask your teacher for help.
5. Wash your hands after you have finished the experiment.

Instructions

Remember to follow the safety rules.

Before you start: fill the empty tube with water, then pour it into a measuring cylinder or jug. Write down the volume and calculate half. This is the volume of water you will use each time.

1. Measure out the water and carefully pour into the tube.
2. Break one of the tablets in half.
3. Put **half of one** tablet in the tube and put the lid on firmly. Work with a partner to make sure you start the timer as soon as the lid is on.
4. Stop the timer when the lid pops off.
5. Record the result.
6. Repeat with one tablet.

Your results will be more reliable if you do more repeats.

Results

Make a table to record your results.

	Time (seconds)			
Amount of tablet	1st test	2nd test	3rd test	Mean
0.5				
1.0				

What did you find out (understanding)?

- How do you know a gas was produced?

- How do you know this is an irreversible reaction?

What did you find out (enquiry skills)?

- If you repeated the experiment, what variables could you change and investigate? For example, could the amount of water affect the time taken for the lid to pop off?

- What would happen if you repeated the experiment using one whole tablet that was crushed up?

- Could you design an experiment to collect the gas in a balloon and measure it?

What did you find out (everyday life)?

- Can you think of any other chemical reactions that produce carbon dioxide?
  - Bicarbonate of soda and vinegar in a model volcano.
  - Bicarbonate of soda and citric acid in sherbet sweets.
  - Burning of fossil fuels.
  - Respiration (breathing) in animals.

Evaluation

How do you feel about our learning objectives today?

Understanding

I understand that some solids dissolve.

I can describe an irreversible change.

I know that an irreversible change produces new materials.

Enquiry skills

I can make and test predictions.

I can make observations, take measurements and record my results.

I understand what ‘variables’ are.

I can suggest how to improve my investigation.

Acknowledgements

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Additional information

This resource was originally developed by Declan McGeown, who worked at Royal Society of Chemistry from 2015 to 2022. It encapsulates his passion for getting learners excited about a subject he loved and is published in his memory. Beth Anderson, Alex Farrer and Helen Scally adapted, tested and reviewed the materials.