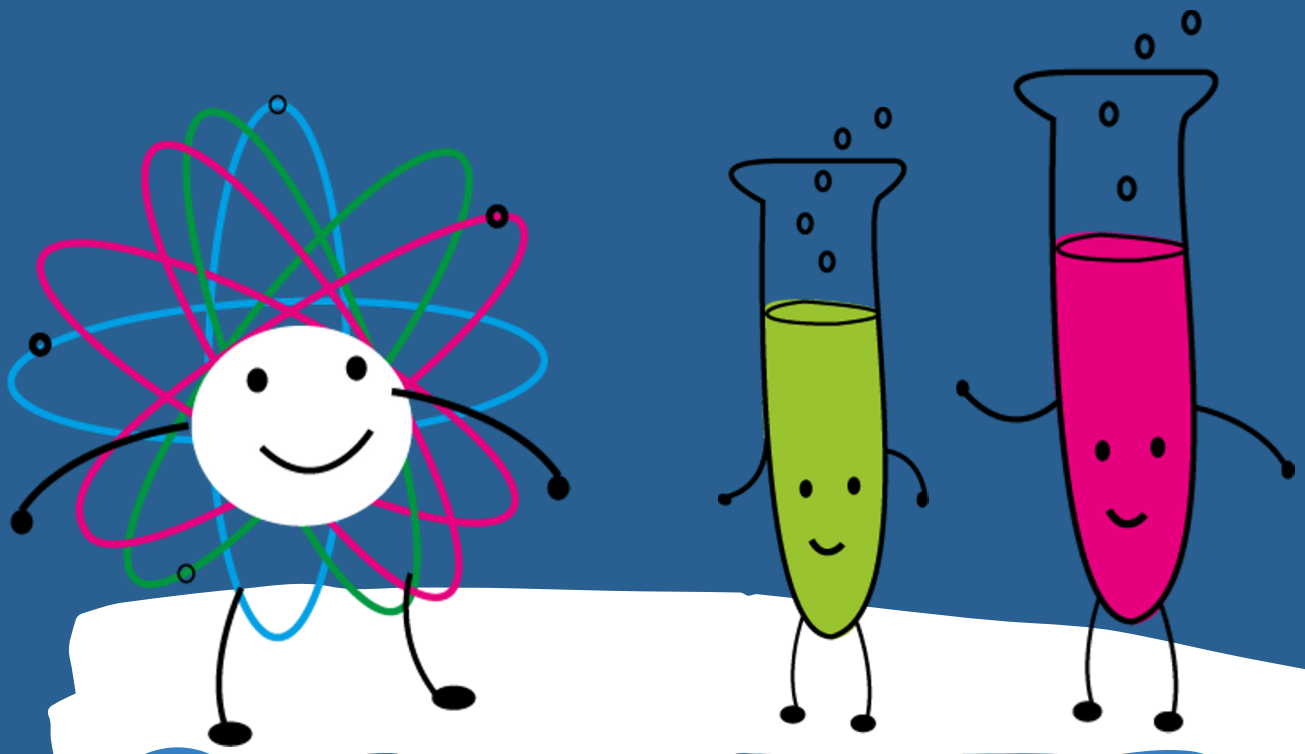


CHEMISTRY CATALYST

SCIENCE ACTIVITIES FOR ALL THE FAMILY

Chemistry Catalyst

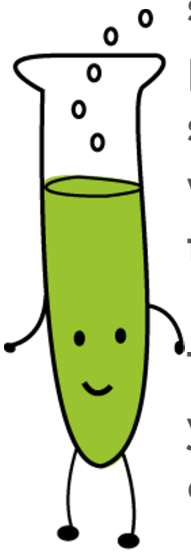
Science Activities for all the Family

This booklet is full of activities, websites and ideas that will spark your imagination and get your family fired up to enjoy the chemistry that is all around us.

Did you know?

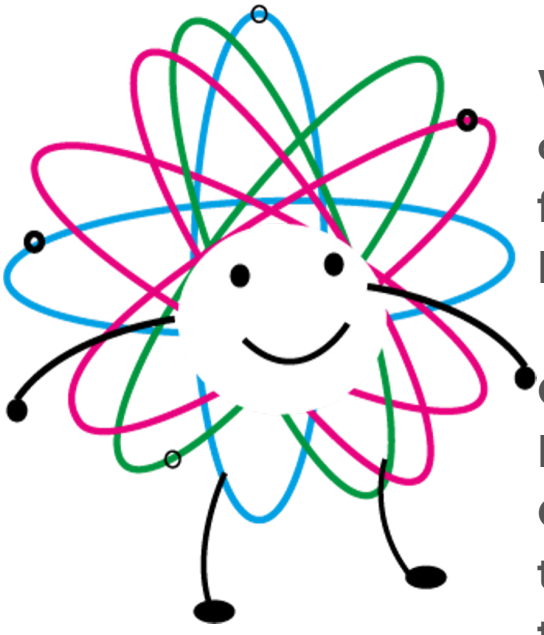
Learning as a family can help us to become confident, lifelong learners with all the benefits that brings - from better health to being happier.

Family learning supports children to achieve at school. It can help you find new interests and have fun together.



The activities in this guide are fun, practical and sometimes messy! They are aimed at parents of primary school children and those just starting secondary school. These experiments should be done with an adult and safety guidelines should be followed at all times.

There are lots of links to websites so that you can take your learning further. If you don't have access to a computer visit your local library or Online Centre.



We use chemicals and create chemical **reactions** every day - from baking bread to lighting a match!

Chemistry helps us understand how the world around us works. Chemists study the substances that make up **matter** and how they react.

Chemistry is a hands-on science and has many exciting experiments!

Studying chemistry can lead to jobs that enable you to:

- Solve important environmental issues
- Research new medicines
- Develop new products from perfume to paint
- Become a forensic scientist
- Teach others

Find out more about how chemistry is involved in our everyday life here:

www.rsc.org/learn-chemistry

www.science-sparks.com/brilliant-chemistry-experiments

www.acs.org/content/acs/en/education/whatischemistry

5 4 3 2 1 Blast off ...

Make rockets blast off using fizzy fuel!

What you need

- Empty plastic drinks bottle (500ml or smaller) with sports cap – eg a fruit shoot bottle
- Plastic container to place drinks bottle in
- Warm water from the tap
- Fizzy tablets - eg own brand effervescent vitamin C tablets
- Permanent marker pens

Safety guidelines

-Carry out this experiment outdoors and wear clothes that you don't mind getting splatters on!

-Wear safety glasses to protect your eyes from any fizzy splatters or flying bottles. These can be bought from DIY stores.

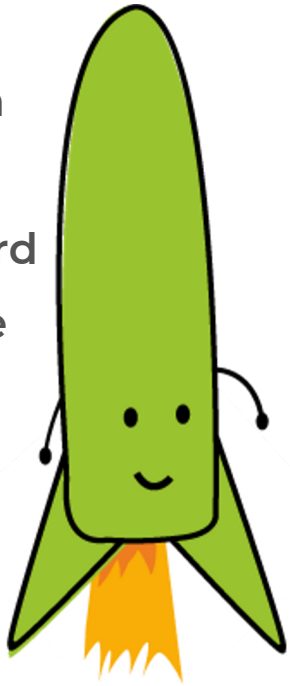
-Stand clear from the bottles once they've been placed upside down.

-Take care that the fizzy tablets are not consumed by children

INSTRUCTIONS

1. Decorate your bottle with your markers.
2. Take off the cap and make sure the pop-up lid is pushed down.
3. Fill the bottle halfway with warm water.

4. Break two tablets in half and drop them into the bottle.
5. Quickly screw the lid back on, shake hard and put the bottle upside down into the empty plastic jug.
6. Stand well back and wait.
7. If your rocket doesn't shoot off after 3 minutes. Try again using warmer water or half tablet more.



What's happening

When the fizzy tablet and water are mixed they create a chemical **reaction** and release bubbles of carbon dioxide (CO_2) gas.
As the bubbles of CO_2 increase, the pressure inside the bottle builds forcing the lid to pop open. Then the lid pops open, it pushes against the bottom of the jug thrusting the bottle upwards.

Exploring Further

- What happens if we use different brands of fizzy tablets?
- Will the temperature of the water affect the chemical reaction?
- Does the size of the bottle make any difference?

Fizzy Fun

Get the fizz factor with these simple bath bombs

What you need

- 250g baking soda or bicarbonate of soda
- 125g cream of tartar
- ½ tsp of olive oil
- Ice cube tray
- Water
- Glass bowl
- Spoon
- Food colouring (optional)
- Food flavouring such eg vanilla to help your bath bomb smell nice (optional)

Safety guidelines

-Be careful to check for any allergies before you use ingredients in the bath. If you aren't sure you are allergic to them, don't use them in the bath, watch them fizz in a bowl of water instead.
-Don't eat the bath bombs however nice they smell!
-Wear safety glasses as citric acid can irritate eyes
-These bath bombs are preservative free so use them within a few days.

INSTRUCTIONS

1. Mix the cream of tartar and bicarbonate of soda in the bowl with a spoon.
2. Add a few few drops (not too much) of the food colouring and a drop of the food flavouring to the bowl and mix well removing any lumps.

4. Add a few drops of water and mix. Keep adding water until the mixture forms large clumps.
5. Spoon the mixture into your ice cube tray and press it firmly with your fingers and then wash your hands.
6. Leave it to set in a dry place overnight and push the bath bombs out of the tray.
7. Store them in a dry container until you use them in your bath.

What's happening

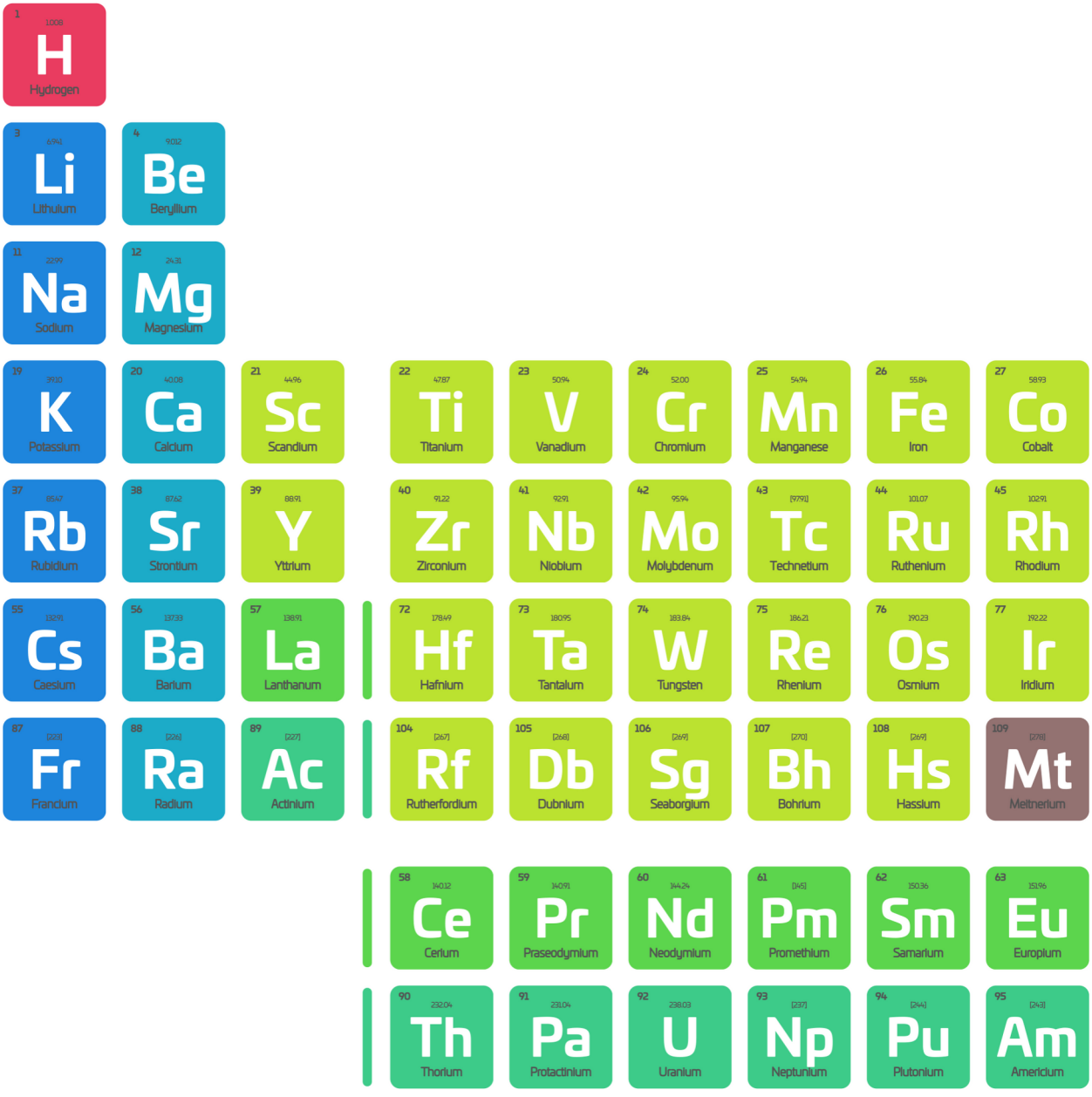
Dropping the bath bomb into water sets off a **reaction** between an acid (cream of tartar) and a base (bicarbonate of soda). As they react they form **molecules** of carbon dioxide which causes the bath bomb to fizz. The reaction helps to break up the bath bomb.

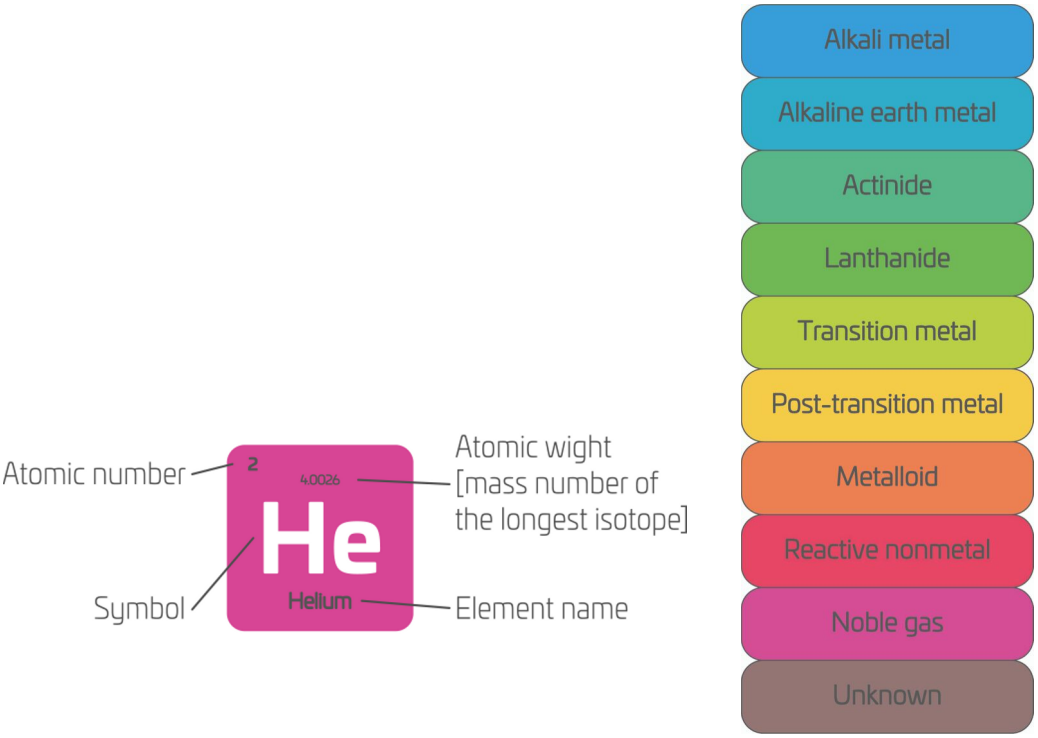
Exploring Further

- What happens if you leave different amounts of time for the bath bombs to dry?
- Does changing the ratio of baking soda and cream of tartar change the level of fizz? Don't use these ones in the bath!
- Do different flavourings and colourings change the fizz of the bath bomb?

Periodic Table

The periodic table is a big grid of all the **elements** that have been discovered so far. Each element is placed in a specific location because of its atomic weight and properties. Find out more about the periodic table here: **www.bbc.co.uk/newsround/46963919**




Alkali metal
Alkaline earth metal
Actinide
Lanthanide
Transition metal
Post-transition metal
Metalloid
Reactive nonmetal
Noble gas
Unknown
Atomic number
2
4.0026
He
Helium
Symbol
Atomic wight
[mass number of
the longest isotope]
Element name

Crazy Colours

Create a rainbow with candy

What you need

- Water
- Skittles or M&Ms or other coated sweets
- Plate

Safety guidelines

- Don't eat the sweets used in the experiment. Save some from the bag to munch on later!
- Be careful not to burn yourself when changing the temperature of water

INSTRUCTIONS

1. Place your skittles round the edge of the plate.
2. Carefully pour cool water into the centre of the plate until the water just covers the skittles.
3. The colour and sugar dissolve into the water and then diffuse through the water.
4. Take a picture to create your own art work.

What's happening

Skittles are coated in food colouring and sugar. When the sweets are covered in water the coating **dissolves** the colour then diffuses through the water. This is know as **diffusion.**

Exploring Further

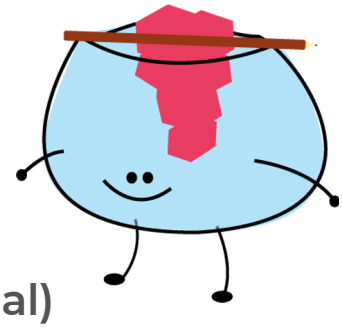
- What happens if you change the temperature of the water?
- What happens if you leave the dish overnight?
- What happens if you use milk instead of water?

Crystal icicles

Grow your own crystals

What you need

- A cup and a half of salt – ideally Epsom salts but you can use normal table salt
- Boiled water
- 2 Empty glass jars
- Cotton string
- Pencil
- Saucepan
- Food colouring (optional)



Safety guidelines

- An adult should boil the water and handle the salt solution whilst it is hot.
- Don't pour hot water into a glass jar, it could crack.
- Make sure you wash your hands thoroughly after the experiment.
- Don't leave the salt solution anywhere where it could be eaten by young children or pets

1. An adult should boil a cup of water in a saucepan, then add a cup of salt and take it off the heat source.
2. Stir until all salt is dissolved. Keep adding more salt and stir all the time until no more will dissolve.
   Let mixture cool down and pour into the glass jar.
   Add a couple of drops of food colouring to the glass jar if you want coloured crystals.

5. Wet the string by running it under a tap and wind one end round the middle of the pencil.
6. Place the pencil across the top of the jar so the string is in the solution but not touching the bottom or sides of the jar. If necessary, roll the string around the pencil to shorten the length of the string.
7. Leave your jar somewhere it will not be disturbed and wait for your crystal to grow!

What's happening

Heating the water allows the molecules in the solution to move faster and further apart, making more room for the extra **solute**, so that you create a **supersaturated solution**. However, as the salt water cools down the conditions become unstable. The dissolved salt will leave the water and stick to the string. As the water evaporates, the salt stays behind, making it even more unstable and encouraging the **crystals** to grow.

Exploring Further

- Try leaving jars in different places – the fridge, a cupboard on a windowsill – what happens?
- Do different types of string change the crystals that grow?

Carry on the learning

Here are some ideas to continue the learning after you've finished the activities in this booklet.

Why not find your own favourite chemistry experiments and tell your friends and family about it?

Find somebody that your family knows who uses chemistry as part of their job and ask them about it.

Why not visit one of the following places?
Explosion Museum of Naval Firepower Portsmouth
www.nmrn.org.uk/our-museums/explosion-museum-naval-firepower

Portsmouth Historic Dockyard
www.historicdockyard.co.uk

University of Portsmouth
www2.port.ac.uk/recruitment-and-outreach

The Family Learning Festival is held every October in different places across the country. Find out what is happening near you visit:
www.familylearningfestival.com

There are lots of sites on the internet with science activities for the family. Here are just a few of them:

www.rsc.org/Learn-Chemistry

www.rigb.org/families/experimental

www.bit.ly/bbcbanggoesthetheory

www.bbc.com/teach/terrific-scientific

Words to look out for

Atoms - The smallest particle of a chemical element that can exist.
Crystal - A solid whose molecules are arranged in a regular, repeating pattern. Crystals form when a liquid cools very slowly.
Elements - The building blocks for everything in the world. Depending on the temperature they can be a solid, liquid or gas.
Diffusion - Where molecules of a material move from an area of high concentration (where there are many molecules) to an area of low concentration (where there are fewer molecules).
Dissolve - Some substances dissolve when you mix them with another substance. A liquid that will dissolve something is called a solvent.
Matter - Everything that takes up space in the universe and is made up of the elements on the periodic table.
Molecule - A molecule is the smallest amount of a chemical substance that can exist. Molecules are made up of atoms that are stuck together in a particular shape or form.
Reaction - Reactions occur when two or more molecules interact and the molecules change.
Saturation - The point at which a solution of a substance can dissolve no more of that substance.
Solute - The solute is the substance that is being dissolved by another substance. In the crystal experiment the salt is the solute.
Solution - A mixture of one substance dissolved in another. A solution is composed of a solute and the solvent.
Supersaturated solution - A supersaturated solution is a solution that has more material dissolved in it then it would normally allow. Hot liquids can hold more solute than cold liquids.

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