Science in your Kitchen

20 experiments for you to try at home

Brought to you by the Leith Academy Science Department

Welcome

Lots of people think that science only happens in a laboratory. Not true. Science is all around you and, whether you realise it or not, you're doing science every day. When you wonder why your shadow changes shape during the day or you find out who can kick a football the furthest, you're doing science.

This file contains details of 20 simple experiments you can do at home. None of them need special equipment and with any luck you'll have most of the things already at home. Of course, you can't just pop out to get stuff from the shops at the moment – so just try the experiments you have the equipment for.

Most of the experiments are easy to set up, though for one or two you'll find a second pair of hands useful. For some experiments, an adult must be present.

Being a good scientist

1. Be prepared - make sure you've got everything you need before you start an experiment.
2. Watch carefully. Doing an experiment may seem the fun bit, but a good scientist will take the time to really look at what is happening. Each experiment has a space for you to write down or draw what you see. Give as much detail as you can.
3. Think. You may not know why something you see has happened, but you might be able to come up with some ideas. The world's most famous scientists - like Isaac Newton and Albert Einstein - weren't the ones who did the experiments. They were the ones who were able to explain what happened.

Enjoy your experiments.

Note for parents

The experiments in this book can all be done safely by children, but it would be useful for an adult to be present. For one or two of the experiments this is essential - these are marked in the book.

The equipment needed should all be readily available. There's a list at the back of any slightly more unusual things, and where you can get them.

There is a temptation simply to do the experiments and not think too much about

what's happening. This can be fun, but it's not true science. Please encourage your child to observe carefully and to write notes about what they see. Discuss what happens in the experiments and ask them if they can suggest reasons for what has happened. At the back of the book you'll find a short explanation of each experiment.

Many of the experiments suggest new ideas. "What if I try this instead?" "What if we change the amount of this?" This is good science and you should encourage it. However, please be sure any further experiments you child does are sensible and safe.

We would very much welcome your comments on this book. At the back you'll find a form you can complete once your child has done most or all of the experiments. Please ask your child to hand it in to any member of the science department.

IMPORTANT NOTE

The experiments in this book use standard household equipment and chemicals. If the experiments are carried out properly, they are safe to do. We have indicated where we believe adult assistance is appropriate.

As a result, we cannot accept any liability for damage or injury caused when carrying out the experiments in this book.

1 Fizz it up

What you need
Some vinegar, some bicarbonate of soda and a small dish.

What to do
Put about a teaspoon of bicarbonate of soda on to a dry dish.

Carefully dribble on a little vinegar.

What did you see?

Can you explain it?

Other ideas
Make a mini-volcano with plasticene. Put some bicarbonate of soda into the ‘crater’. Add a few drops of red food colouring, then add the vinegar. Watch the lava flow.

2 Yo-yo raisins

What you need
A can or fresh bottle of fizzy lemonade or fizzy water, a few raisins and a tall glass.

What to do
Pour the lemonade into the glass.

Drop in a few raisins and watch for minute or two.

What did you see?

Can you explain it?

Other ideas
Try other things instead of raisins - peanuts or small pieces of chocolate.

If you can get jumbo-size raisins, try comparing them with normal-size raisins.

3 The balancing egg

What you need
An egg and some salt

What to do
Pour a small pile of salt onto a dry table.

Balance an egg - pointy end down - on the pile of salt.

Gently blow away the salt from the bottom of the egg.

What did you see?

Can you explain it?

Other ideas
Does it make any difference if you use a hard-boiled egg?

4 Bottle breaker **Adult needed**

What you need
A small glass bottle with a strong screw lid and three plastic bags.

What to do
Fill the bottle right to the top with water. Screw the lid on tightly. Put the bottle inside a plastic bag. Then put the bottle and bag inside another plastic bag. Then put it all in a third plastic bag.

Put the whole thing into the freezer or the ice compartment of the fridge and leave it overnight.

With an adult present, look inside the bag the next morning.

What did you see?

Can you explain it?

Other ideas

Try a plastic bottle - do you think you'll get the same result?

5 Lifting ice

What you need
An ice cube, a piece of wet string and some salt.

What to do
Put the ice cube on a plate.

Lay the end of the wet string on top of the ice cube.

Sprinkle some salt on to the top of the ice cube.

Wait a minute, then try to lift up the ice cube.

What did you see?

Can you explain it?

6 Indoor fireworks **Adult needed**

What you need
An iron nail, a file and a candle.

What to do
Ask an adult to file down a nail into iron powder. This will take a while, but you don’t need much.

Light the candle, then gently sprinkle the iron powder into the flame.

What did you see?

Can you explain it?

7 Red flowers from white

What you need
A white carnation flower and some dark red food colouring.

What to do
Half-fill an old cup or glass with water. Add some food colouring to the water to get a fairly dark red.

Use scissors to cut 1 cm from the end of the stem of the carnation.

Put the carnation into the coloured water and leave for a few days.

What did you see?

Can you explain it?

Other ideas **Adult needed**

Use a sharp knife to cut the stem of another white carnation lengthways. Put each half of the stem in different coloured water - try red and blue.

8 Chromatography

What you need
Some felt pens - dark colours usually work best.

Some strips of paper cut from coffee filter papers - about 1 cm wide and 10 cm long. You could also try using strips cut from newspaper, but make sure they're cut from the edge so there is no print on them.

What to do
Put a 1 cm depth of water in a small glass. Mark a dot with a felt pen 2 cm from the bottom of the strip of paper. Put the paper into the glass so the end of the paper is in the water but the ink dot is above the water.

Fold the other end of the paper around a pencil so you can leave it hanging in the water. You must make sure the ink dot doesn't go in the water. Now wait for a few minutes, then look at the strip of paper.

What did you see?

Can you explain it?

9 Scrambled eggs **Adult needed**

What you need
A hard-boiled egg and a raw egg, both in their shells. (If you boil an egg for this experiment, make sure it boils for ten minutes and let it cool.)

What to do
Stand the raw egg on end in the middle of a large table, and then spin it.

Do the same with the hard-boiled egg.

What did you see?

Can you explain it?

Other ideas
Lie a Smartie on the table, then try spinning it in the same way.

10 Liquid layers

What you need
Golden syrup, cooking oil, water and a plastic bottle with the top cut off. (You could use an old glass instead.)

What to do
Slowly pour in some syrup so there is a 2 - 3 cm layer in the bottom of the bottle. Let the syrup settle.

Now slowly pour in a 2 - 3 cm layer of cooking oil.

Lastly, pour in a 2 - 3 cm layer of water. Let everything settle.

What did you see?

Can you explain it?

Other ideas
Stir up the contents of the bottle with a spoon, then wait a few minutes.

11 Living yeast

What you need
Dried yeast (not the ‘easy-blend’ sort), some sugar, a glass bottle, a bowl and a balloon.

What to do
Add about a teaspoon of yeast and a teaspoon of sugar to the bottle. Pour in some warm (not boiling) water and swirl the bottle around.

Fit a balloon over the neck of the bottle. Put the bottle into a bowl of hot water to keep it warm, and wait. (It may take several hours.)

What did you see?

Can you explain it?

Other ideas
When the experiment has finished, try to tie the balloon. How does it float compared to a normal balloon?

12 Cabbages, acids and alkalis **Adult needed**

What you need
A small red cabbage (not pickled cabbage), strips of blotting paper or filter paper, bicarbonate of soda, vinegar.

What to do
Tear the red cabbage into small shreds. Boil the shreds in a small pan of water for five minutes. Remove the cabbage, making sure you keep the liquid.

Let the liquid cool, then soak the strips of paper in it. Let the strips dry.

Add drops of different liquids to the strips of paper - you can try vinegar, lemon juice or soapy water. Stir a little bicarbonate of soda into water, and try that as well.

What did you see?

Can you explain it?

13 Home-made plastic **Adult needed**

What you need
Full-fat milk (don’t use skimmed or semi-skimmed) and some vinegar.

What to do
Warm about 250 ml of milk in a pan. When it is just starting to bubble, stir in a little vinegar.

Keep stirring. The mixture should start to change within a few seconds.

Let the mixture cool, then rinse the contents of the pan under the cold tap.

What did you see?

Can you explain it?

14 Telephone for two **Adult needed**

What you need
Two plastic cups - the type you get from drinks machines are OK but stronger plastic will help. Best of all would be two empty golden syrup tins.

About ten metres of string or cotton.

What to do
Ask an adult to make a small hole in the bottom of each cup or tin.

Thread the end of a piece of string through the hole in one of the cups. Tie a knot so the string doesn't pull back. The knot should be on the inside of the cup. Attach the other end of the string to the other cup in the same way.

Get a friend to hold one of the cups to his or her mouth. Walk away until the string is tight and put the other cup to your ear. Ask your friend to speak quietly into their cup.

What did you hear?

Can you explain it?

15 D-I-Y stalactites

What you need
Salt, two small bottles, large paper-clips, wool or string, and a small saucer.

What to do
Stir plenty of salt into a large glass of very hot water. Keep stirring. If all the salt dissolves, add more. Allow to cool, then pour half into each glass bottle.

Attach a paper-clip to each end of a piece of wool - about 40 cm long.

Put one end of the wool in one of the bottles, and the other end of the wool in the other bottle. Make sure the ends of the wool are in the solution.

Now make sure that the bottom of the loop of wool between the bottles is hanging below the level of the salt solution in the bottles.

Place a saucer under the bottom of the loop of wool. Leave for a week.

What did you see?

Can you explain it?

16 Blow-up bottle

What you need
A fairly fresh plastic bottle of fizzy drink. (A 2 litre size works best.)

What to do
The bottle needs to be about half to three-quarters full. If necessary, drink some.

Put the top back on tightly.

Try squashing in the sides of the bottle.

Now give the bottle a good shake.

Try squashing in the sides of the bottle again.

What did you see?

Can you explain it?

17 Floating eggs

What you need
Two large glasses, two fresh eggs and some salt.

What to do
Fill both glasses with hot water.

Into one of the glasses, stir a large spoonful of salt until it dissolves.

Carefully put an egg in each glass.

(If you don’t see anything unusual happen, add extra salt to the salty water and stir again.)

What did you see?

Can you explain it?

18 How plants drink **Adult needed**

What you need
A stick of celery, a sharp knife, some food colouring, an old mug or glass.

What to do
Cut a piece of celery about 8 cm long. Make sure it has a clean cut at each end.

Put a 2 cm depth of water in an old mug or glass, and add some drops of food colouring until the mixture is fairly dark.

Place the celery into the coloured water so that one end of the celery in under the surface. Now leave it for two or three hours.

Look at the end of the celery that was dipped in the water. Use a sharp knife to cut up the celery lengthways. See if you can pull out some of the ‘tubes’.

What did you see?

Can you explain it?

19 Invisible ink **Adult needed**

What you need
Fresh lemon juice, white paper, a small paintbrush and a warm oven.

What to do
Use the paintbrush to draw a picture or write a message on the paper using the lemon juice.

Let the piece of paper dry completely.

Put the piece of paper in a warm oven for a few minutes.

What did you see?

Can you explain it?

Other ideas
Try using milk instead of lemon juice.

20 Growing crystals **Adult needed**

What you need
Salt (sea salt is best because it comes in larger crystals), cotton, super glue, an empty jam jar and a lollipop stick.

What to do
Fill the jar with hot water. Add plenty of salt and stir it to help it dissolve quickly. If all the salt completely dissolves and there are no salt crystals at the bottom of the jar, add some more and stir again. Then put the jar of salt solution on one side to cool.

Ask an adult to super-glue the largest salt crystal you can find onto one end of a length of cotton. (This is called the seed crystal.)

Wind the other end of the cotton around the lollipop stick. Put the stick over the top of the jar so that the seed crystal is about halfway in to the solution.

Leave the jar in a cool place for a few days. Then lift out the seed crystal to see how it's getting on. You can then put it back in the solution and leave it for a few more days. Check again.

What did you see?

Can you explain it?

So why does it work?

This section gives a short explanation for each of the experiments. Don't read them until you've done the experiment and tried to come up with your own explanation.

1 Fizz it up
Vinegar is an acid. It reacts with the bicarbonate of soda to produce bubbles of carbon dioxide gas. This is the fizz that you see.

2 Yo-yo raisins
Raisins are slightly denser than the lemonade, so they sink. But when they are at the bottom of the glass, bubbles of gas stick to them. This makes the (raisin + bubbles) less dense that the lemonade, so the raisin rises to the top. The bubbles then burst, so the raisin sinks again.

3 The balancing egg
When you blow away the salt, a few grains remain right under the point of the egg. These are enough to keep the egg balanced.

4 Bottle breaker
When water freezes, it expands (gets bigger). If the bottle is absolutely full and the top is tight, the water can only get bigger by breaking the bottle.

5 Lifting ice
Adding salt to the ice lowers its melting point. This means that the ice at the top of the ice cube melts, and the string sinks slightly into the ice. The water then freezes again, trapping the string in the ice.

6 Indoor fireworks
Because the iron is now in a fine powder, it can burn easily in the candle flame. As there are thousands of tiny iron grains, you get a fireworks display.

7 Red flowers from white
Flowers drink by drawing liquid up tubes to all parts of the plant, including the petals. If the liquid is coloured, the petals pick up that colour.

8 Chromatography
As the water rises up the strips of paper, it carries the ink with it. Different colours of ink move at different speeds, so if the ink is made of a mixture of colours, they will be separated.

9 Scrambled eggs
When you try to spin the unboiled egg, the liquid contents slop around inside the egg and stop it from spinning. With a hardboiled egg, there's nothing to slop around and so the egg will spin.

10 Liquid layers
Some liquids are denser than others. (A litre of water has a greater mass than a litre of oil, so we say the water is denser). Less dense liquids will float on top of denser liquids.

11 Living yeast
Yeast, even when dried, is a living fungus. When it's 'woken up' by being mixed with warm water, it will feed on any sugar that it finds. The yeast produces carbon dioxide gas as a waste product - this is what blows up the balloon.

Carbon dioxide is denser than air. A balloon filled with carbon dioxide will sink to the ground quickly.

12 Cabbages, acids and alkalis
Red cabbage contains a chemical called an indicator. Indicators change colour if they are added to acids or alkalis. Red cabbage juice should turn red in acids and green in alkalis.

13 Home-made plastic
When vinegar, which is an acid, is added to warm milk, it sets up a chemical reaction. This re-arranges the particles in the milk. Instead of being free to move and runny, they start to stick together and become lumpy. These lumps become your plastic.

14 Telephone for two
When you speak into one of the cups, your voice makes the air in the cup vibrate. This makes the bottom of the cup vibrate. This vibration is passed down the string and makes the bottom of the other cup vibrate. This in turn makes the air in the cup vibrate - this is what your partner's ear detects.

15 D-I-Y stalactites
The water, which is full of dissolved salt, soaks into the wool and starts to drip into the saucer. As it drips, the water evaporates, leaving behind the salt in a small stalactite.

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16 Blow-up bottle
Fizzy drinks contain a lot of gas dissolved in them. When you shake the bottle, some of this gas is released. This 'blows up' the bottle and makes it

hard to squeeze in the sides.

17 Floating eggs
A fresh egg is slightly denser than water, so it sinks. But adding salt to water makes the water denser than the egg. This makes the egg float.

18 How plants drink
Plants have narrow tubes called xylem. Water passes up these tubes to all parts of the plant. Xylem tubes in celery are quite big, so you should be able to see them. The tubes show up as coloured dots on the end of the celery.

19 Invisible ink
When you put the paper in the oven to dry, all the water (which makes up most of the lemon juice) evaporates. The chemicals that remain combine with oxygen in the air, and turn brown.

20 Growing crystals
The salt solution you make is called ‘saturated’ - it is holding as much salt as it possibly can. As some of the water slowly evaporates, the water that’s left can’t hold all the dissolved salt. This means some of the salt forms around the seed crystal, making it grow larger. With time, patience and lots of salt, it’s possible to grow really huge crystals.