

# Little Book Of Experiments

Science investigations you can do at home!

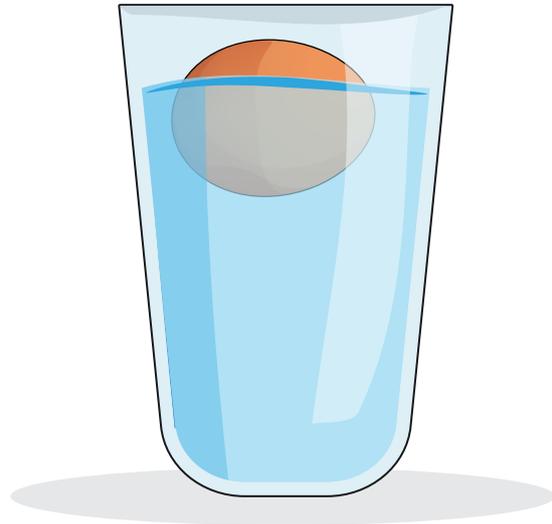


# Can eggs float in water?

*An egg sinks to the bottom if you drop it into a glass of ordinary drinking water but what happens if you add salt?*

## What you'll need:

- One egg
- Water
- Salt
- A tall drinking glass



## Instructions:

1. Pour water into the glass until it is about half full.
2. Stir in lots of salt (about 6 tablespoons).
3. Carefully pour in plain water until the glass is nearly full (be careful to not disturb or mix the salty water with the plain water).
4. Gently lower the egg into the water and watch what happens.

## What's happening?

Salt water is denser than tap water. Dense liquids allow objects to float. The denser the liquid the easier it is for an object to float in it. When you lower the egg into the liquid it drops through the normal tap water until it reaches the salty water, at this point the water is dense enough for the egg to float.

# Can chocolate be changed from a solid to a liquid?

*You will have seen chocolate melting on a hot day, so let's do some experiments to recreate these conditions. What temperature does chocolate go from a solid to a liquid? Is it different for white and dark chocolate? Give this fun science experiment a try and find out!*

## What you'll need:

- **Small chocolate pieces of the same size**
- **Plates (make sure you wash up afterwards!)**
- **Pen and paper to record your results**



## Instructions:

1. Put one piece of chocolate on a plate and put it outside.
2. Record how long it took for the chocolate to melt. It might not be hot enough to melt outside so check it after ten minutes to see if it has changed at all.
3. Repeat the process with a piece of chocolate on a plate that you put outside in the sun. Record your results in the same way.
4. Find more interesting locations to test how long it takes for the chocolate pieces to melt. You could try your school bag, hot water or even your own mouth.
5. Compare your results, what conditions were needed to make the chocolate melt? You might also like to record the temperatures of the locations you used using a thermometer (if you have one!) so you can think about what temperature chocolate melts at.

## What's happening?

Chocolate goes through a physical change at a certain temperature. It changes from a solid to a liquid. You can also reverse this change by putting the melted chocolate into a fridge or freezer where it will go from a liquid back to a solid.



# Can oil and water be mixed together?

*Some things just don't get along well with each other. Take oil and water as an example, you can mix them together and shake as hard as you like but they'll never become friends or mix together.....or will they?*

## What you'll need:

- **Small plastic bottle**
- **Water**
- **Food colouring**
- **2 tablespoons of cooking oil**
- **Washing up liquid**



## Instructions:

1. Add a few drops of food colouring to the water.
2. Pour about 2 tablespoons of the coloured water along with the 2 tablespoons of cooking oil into the small soft drink bottle.
3. Screw the lid on tight and shake the bottle as hard as you can.
4. Put the bottle back down and have a look, it may have seemed as though the liquids were mixing together but the oil will float back to the top.

## What's happening?

Usually, water mixes with other liquids to form solutions however oil and water do not mix. Water molecules are strongly attracted to each other, this is the same for oil, because they are more attracted to their own molecules they just don't mix together. They separate and the oil floats above the water because it has a lower density. To make this experiment more interesting try adding some washing up liquid to see what happens!

# Can you make a working parachute?

*Make an awesome parachute and learn about air resistance.*

*Can you design a parachute that can fall slowly to the ground?*

## What you'll need:

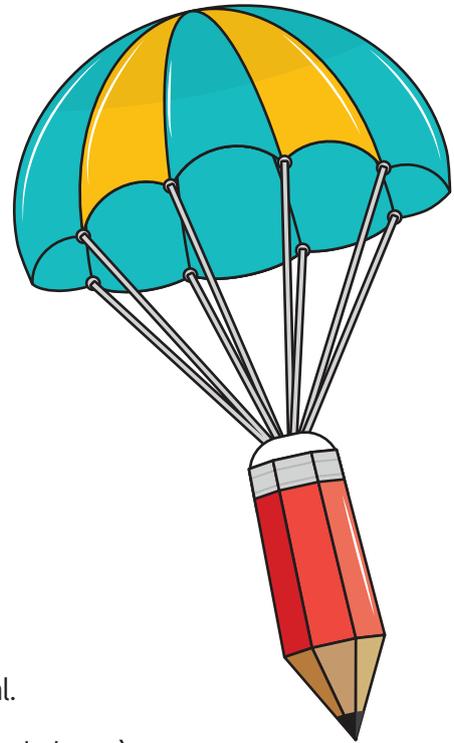
- **A plastic bag or light material**
- **Scissors**
- **String**
- **A small object to act as the weight, a little action figure would be perfect**

## Instructions:

1. Cut out a large square from your plastic bag or material.
2. Trim the edges so it looks like an octagon (an eight sided shape).
3. Cut a small hole near the edge of each side.
4. Attach 8 pieces of string of the same length to each of the holes.
5. Tie the pieces of string to the object you are using as a weight.
6. Use a chair or find a high spot to drop your parachute and test how well it works, remember that you want it to drop as slowly as possible.

## What's happening?

When you release the parachute the weight pulls down on the strings and opens up a large surface area of material that uses air resistance to slow it down. Air resistance is a force that slows down moving objects. The larger the surface area the more air resistance and the slower the parachute will drop.



## Can you make fizzy lemonade at home?

*Did you know you can make your own fizzy drink at home?*

*Have a go yourself by following the instructions below.*

### What you'll need:

- **Lemon**
- **Drinking glass**
- **Water**
- **1 teaspoon of baking soda**
- **Some sugar to make it sweet**



### Instructions:

1. Squeeze as much of the juice from the lemon as you can into the glass.
2. Pour in an equal amount of water as lemon juice.
3. Stir in the teaspoon of baking soda.
4. Give the mixture a taste and add in some sugar if you think it needs to be sweeter.

It might take a bit of adjusting on your first go!

### What's happening?

The mixture you made should go bubbly and taste like a lemonade soft drink. The bubbles that are created when you add the baking soda to the lemon mixture are carbon dioxide.

These are the same bubbles you'll find in real fizzy drinks. The carbon dioxide was produced when you mixed the lemon, which is an acid, to the baking soda.

## Can you make a volcano explode?

*Have you ever wanted to make a chemical reaction? Now you can! Follow the instructions below to make your own fizzy reaction. You could even make your own volcano out of craft materials first and then make it explode to look like a real volcano!*

### What you'll need:

- Baking Soda
- Washing up liquid
- Red food colouring
- Vinegar
- 2 cups
- A container to hold everything and avoid a big mess!
- Paper towels or a cloth (just in case)



### Instructions:

1. Place 2 teaspoons of baking soda into one of the cups. Place the cup into the container.
2. Add a few drops of red food colouring.
3. Add a squirt of washing up liquid.
4. Pour some vinegar (about 2 tablespoons) in another cup.
5. Pour the vinegar into the first cup.
6. Stand back and watch the reaction happen!

### What's happening?



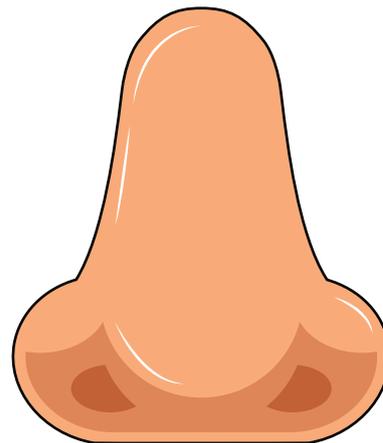
The baking soda reacts with the vinegar which is an acid. When they react together they break apart into water and carbon dioxide, which creates all the fizzing. The washing up liquid just adds more bubbles and the red food colouring makes it look more like lava!

## Can you taste without your nose?

*We all know that some foods taste better than others but what gives us the ability to experience all these unique flavours? This simple experiment shows that there's a lot more to taste than you might have first thought.*

### What you'll need:

- A small piece of peeled potato
- A small piece of peeled apple (same shape as the potato so you can't tell the difference)



### Instructions:

1. Close your eyes and mix up the piece of potato and the piece of apple so you don't know which is which.
2. Hold your nose and eat each piece, can you tell the difference?

### What's happening?

Holding your nose while tasting the potato and apple makes it hard to tell the difference between the two. Your nose and mouth are connected through the same airway which means that you taste and smell foods at the same time. Your sense of taste can recognize salty, sweet, bitter and sour but when you combine this with your sense of smell you can recognize many other individual 'tastes'. Take away your smell (and sight) and you limit your brains ability to tell the difference between certain foods.

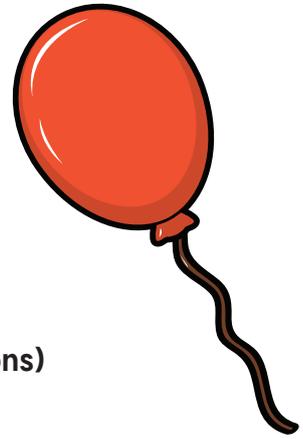


# Can you blow up a balloon without using your mouth?

*You can use this chemical reaction to blow up a balloon without having to huff and puff yourself!*

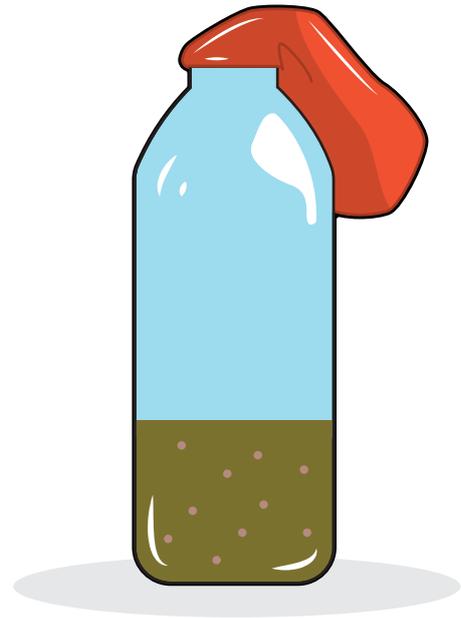
## What you'll need:

- **Balloon**
- **About 40 ml of water (about 3 tablespoons)**
- **Small plastic bottle**
- **Juice from a lemon (vinegar would also work if you have no lemons)**
- **1 teaspoon of baking soda**



## Instructions:

1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the 40 ml of water into the soft drink bottle.
3. Add the teaspoon of baking soda and stir it around until it has dissolved.
4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.



## What's happening?

Mixing the lemon and baking soda together causes a chemical reaction. When the two mix they create carbon dioxide which is a gas. The gas bubbles rise. Usually they would go into the air around it, but because we have trapped it in the bottle with a balloon on top, they have nowhere to go other than into the balloon!

# Can you make quicksand?

*Quicksand is a fascinating substance, make some of your own and play around with it.*

*Amaze your parents by demonstrating how it works.*

## What you'll need:

- 1 cup of cornflour
- Half a cup of water
- A large plastic container
- A spoon



## Instructions:

1. All you have to do for this one is mix the cornflour and water thoroughly in the container.
2. When you have made it, stir it slowly and it will appear to be liquid. But, stir it fast will make it hard like a solid! Try to hit or poke it fast to see what happens!
3. If you put your finger into it slowly, it easily slides in. But if you quickly try and pull your finger out, it will feel like it is stuck!

## What's happening?

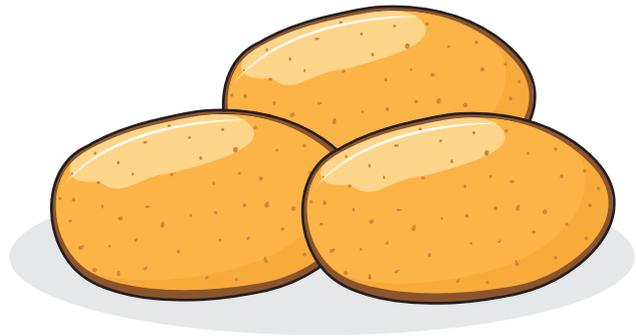
If you add just the right amount of water to cornflour it becomes very thick when you stir it quickly. This happens because the cornflour grains are mixed up and can't slide over each other due to the lack of water between them. Stirring slowly allows more water between the cornflour grains, letting them slide over each other much easier.

# Can you pierce a potato with a straw?

*Is it possible to stab a potato with a drinking straw? Find out with this fun science experiment for kids that shows how air pressure can be used in surprising ways.*

## What you'll need:

- Stiff plastic drinking straws
- A raw potato



## Instructions:

1. Hold a plastic drinking straw by its sides (without covering the hole at the top) and try quickly stabbing the potato, what happens?
2. Repeat the experiment with a new straw but this time place your thumb over the top, covering the hole.

## What's happening?

Placing your thumb over the hole at the top of the straw improves your ability to pierce the potato skin and push the straw deep into the potato. The first time you tried the experiment you may have only pierced the potato a small amount, so why are you more successful on the second attempt?

Covering the top of the straw with your thumb traps the air inside, forcing it to compress as you stab the straw through the potato skin. This makes the straw strong enough to pierce the potato, unlike the first attempt where the air is pushed out of the straw.

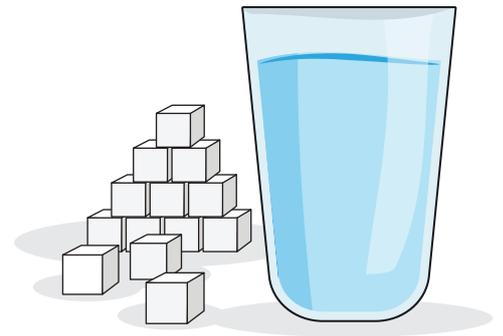


# Can you make sugar 'disappear'?

*What happens when your mum puts sugar in her tea? It dissolves into the water to make a solution! But does sugar only dissolve in hot water?*

## What you'll need:

- **Sugar cubes (or teaspoons of sugar if you have no sugar cubes)**
- **Cold water in a clear glass**
- **Hot water in a clear glass (adult supervision required!)**
- **Spoon for stirring**



## Instructions:

1. Make sure the glasses have an equal amount of water.
2. Put a sugar cube into the cold water and stir with the spoon until the sugar disappears. Repeat this process (remembering to count the amount of sugar cubes you put into the water) until the sugar stops dissolving, you are at this point when sugar starts to gather on the bottom of the glass rather than dissolving.
3. Write down how many sugar cubes you could dissolve in the cold water.
4. Repeat the same process for the hot water, compare the number of sugar cubes dissolved in each liquid, which dissolved more?

## What's happening?

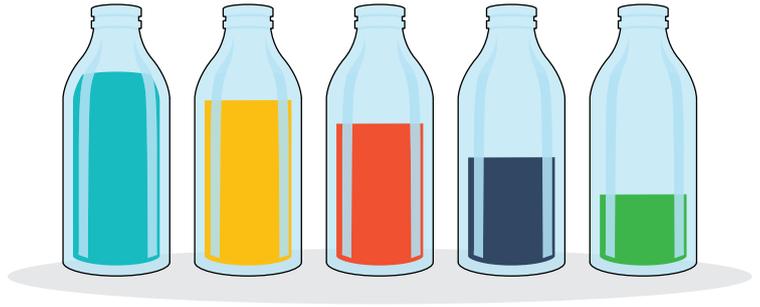
Hot water dissolves the sugar quicker than cold water because it has faster moving molecules which are spread further apart. With bigger spaces between the molecules, more sugar molecules can fit between. Every solution has a limit to how much they can dissolve. When sugar starts to collect at the bottom of the cup instead of dissolving, it means the solution is 'full' or it becomes a 'saturated solution.'

# Can you play a musical tune with water?

*Have you ever wanted to play a musical instrument? Well now you can! Experiment with your own special sounds by turning glasses of water into instruments!*

## What you'll need:

- 5 or more drinking glasses or glass bottles (be careful!)
- Water
- Wooden stick such as a pencil or wooden spoon



## Instructions:

1. Line the glasses up next to each other and fill them with different amounts of water. The first should have just a little water while the last should almost full, the ones in between should have slightly more than the last.
2. Hit the glass with the least amount of water and observe the sound, then hit the glass with the most water, which makes the higher sound?
3. Hit the other glasses and see what noise they make, see if you can get a tune going by hitting the glasses in a certain order.

## What's happening?

Each of the glasses will have make a different sound when you hit it. The glass with the most water will sound the lowest whilst the glass with the least water will sound the highest. When you hit the glass, small vibrations happen. This makes sound waves which travel through the water. If the glass has more water, that means the vibrations travel through it slower creating the deeper sound.



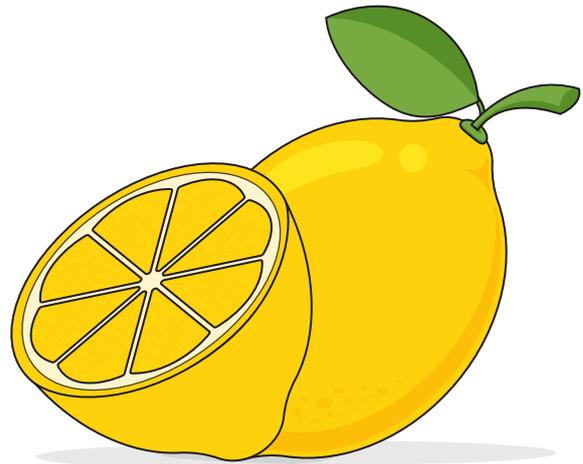
## Can you write an invisible letter?

*Now is your time to pretend to be a secret agent! We are going to make it so you can keep all your secret codes and messages hidden from others.*

*All you need is some basic household objects!*

### What you'll need:

- Half a lemon
- Water
- Spoon
- Bowl
- Cotton bud
- White paper
- Lamp or other light bulb



### Instructions:

1. Squeeze some lemon juice into the bowl and add a few drops of water.
2. Mix the water and lemon juice with the spoon.
3. Dip the cotton bud into the mixture and write a message onto the white paper.
4. Wait for the juice to dry so it becomes completely invisible.
5. When you are ready to read your secret message or show it to someone else, heat the paper by holding it close to a light bulb. Make sure you don't touch the light bulb!

### What's happening?

When you add water to the lemon juice, it dilutes it making it hard to see when you put it on paper. When you heat lemon juice, it oxidises which turns it brown. This means you can see it again! Some other liquids also work in a similar way such as orange juice, honey, milk, onion juice, vinegar and wine. Why don't you have a go with some other household items to see which ink is the best?