

## Science Experiments

### 1. Fingerprint Collection

What you need

- 1 artist's paintbrush
- 1 piece of charcoal
- packing tape
- white paper

What to do

1. Using the paintbrush, apply a light coating of dust from the charcoal briquette to a surface in your home (the surface could be a glass, a remote control or an MP3 player).
2. Apply a piece of the clear packing tape to the surface and "lift" any prints you see.
3. Stick the tape onto white paper. You may have captured a fingerprint or two. If you didn't, go ahead and put a few fingerprints of your own on the item, and repeat the procedure.

## 2. Make Your Own Quick Sand

Quick sand is a fascinating substance, make some of your own and experiment on a safe scale. Amaze your friends 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. This one is simple, just mix the cornflour and water thoroughly in the container to make your own instant quick sand.
2. When showing other people how it works, stir slowly and drip the quick sand to show it is a liquid.
3. Stirring it quickly will make it hard and allow you to punch or poke it quickly (this works better if you do it fast rather than hard).
4. Remember that quick sand is messy, try to play with it outside and don't forget to stir just before you use it.
5. Always stir instant quicksand just before you use it!

### 3. Invisible Ink with Lemon Juice

#### **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.

#### **What's happening?**

Lemon juice is an organic substance that oxidizes and turns brown when heated. Diluting the lemon juice in water makes it very hard to notice when you apply it the paper, no one will be aware of its presence until it is heated and the secret message is revealed. Other substances which work in the same way include orange juice, honey, milk, onion juice, vinegar and wine. Invisible ink can also be made using chemical reactions or by viewing certain liquids under ultraviolet (UV) light.

#### 4. Cut Ice Cubes in Half Like Magic

Speed up the melting process of ice with the help of a little pressure. Cut a piece of ice in half like magic and learn how this process relates to ice skating.

##### **What you'll need:**

- One ice cube
- A piece of fishing line (or something similar) with a weight tied to each end
- A container
- Some kind of tray to keep things from getting wet

##### **Instructions:**

1. Turn the container upside down and put it on the tray.
2. Place the ice cube on top of the upside down container.
3. Rest the fishing line over the ice cube so that the weights are left dangling over the side of the container.
4. Watch it for around 5 minutes.

##### **What's happening?**

The pressure from the two weights pulls the string through the ice cube by melting the ice directly under the fishing line. This is similar to ice skating where the blades of a skater melt the ice directly underneath, allowing the skater to move smoothly on a thin layer of water.

## 5, Magic Coin

### Materials you will need:

- Bowl of cold water
- Coin (bigger than the bottle opening)
- Glass Coke Bottle (with a small opening/mouth)

### Steps:

1. Fill a bowl with some cold water.
2. Place the bottle neck and coin in the bowl of water to chill them. This helps to make an airtight seal when you place the coin on the top of the bottle.
3. Place the coin on the top of the bottle.
4. Wrap your hands around the bottle and wait for several seconds.

What happens to the coin?

5. Remove your hands from the bottle and wait.

What happens to the coin now?

Why does the coin jump? When you hold the bottle with your hands, the air inside the bottle heats up. The warm air pushes harder than the cool air that is outside the bottle so it forces the coin up. When the air inside the bottle cools down the coin will stop jumping.

## 6. Chemical Reaction Experiment

### **Materials you will need:**

- Vinegar
- A Bowl
- Washing Powder

### Steps:

1. Take a spoonful of soap powder and place it in the bowl.
2. Add several drops of the vinegar onto the soap powder in the bowl.

Watch to see what happens.

This reaction becomes a bubbling froth that gives off carbon dioxide gas. Once it finishes frothing, it leaves behind a salt substance that is not edible (DO NOT eat this salt). This chemical reaction is caused by the vinegar acting as the acid and the soda is the base.

You may want to do this experiment outside so you can hose away the mess.

## 7. Grow Mould On Purpose

### Materials Needed:

Materials

Bread

An Eye Dropper

Sandwich Bags

1. To begin conducting this experiment you will need to place several bread slices on a clean surface.
2. Fill a small glass with water.
3. Take the eye dropper and fill it with water.
4. Place drops of water on each bread slice.
5. Decide on three different moisture levels for the bread slices and make two of each moisture level.
6. Once you have each slice of bread moistened, place each piece of bread in a sandwich bag and seal it.
7. Label each bag with a description of which sample it is.
8. Place one of each of the samples in the light and one of each of the samples in the dark.

*(As the mould grows over time, track the mould growth. At the end of the project, note the differences of growth in the mould on the bread in the light and the dark. )*

## 8. Rusting Cents For Science

Experiment: What will make a cent rust faster, orange juice or Cola?

### Materials

- Two new cents
- Two glasses or bowls
- Orange juice
- Cola (or 7 Up, lemonade etc...)

*Don't forget to predict your result before you start!*

1. You need to find two new, clean cents, some orange juice and soda, and get two bowls or glasses to put the liquid and cents in.
2. Place a cent in each bowl or glass and fill one part way with orange juice and the other part way with cola.
3. Wait about one week and then check the cents. Do either one of them have any rust on them? They may not yet, and if they do not you will have to leave them for another week and check them again. Be sure to record your results!



## 9. Experiment:

How to make a packet of ketchup float or sink on my command!

### Materials

- \* A 1 litre plastic bottle
- \* Ketchup pack from a fast food restaurant
- \* Salt

### Method:

1. Remove any labels from the bottle and fill it all the way to the top with water.
2. Add a ketchup pack to the bottle.
3. If the ketchup **floats**, you're all set - go to step 4. If the ketchup **sinks** in the bottle, go to step 5.
4. For the floating ketchup pack simply screw the cap on the bottle and squeeze the sides of the bottle hard. If the ketchup sinks when you squeeze it, and floats when you release it, congratulations, you're ready to show it off. If it does not sink when you squeeze it, try a different kind of ketchup pack.
5. If the ketchup pack **sinks**, add about 3 tablespoons (45 ml) of salt to the bottle. Cap it and shake it up until the salt dissolves.
6. Continue adding salt, a few tablespoons at a time until the ketchup is just barely floating to the top of the bottle.
7. Once it is consistently floating, make sure the bottle is filled to the top with water, and then cap it tightly.
8. Now squeeze the bottle. The magic ketchup should sink when you squeeze the bottle and float up when you release it. With some practice you can get it to stop in the middle of the bottle.

## 10. Experiment: How to make Chicken sounds from a cup.

### Materials

cotton string (nylon string will not work well)

1 paper clip

Paper towel

A nail

Scissors

plastic drinking cup

water

### To Do

1. Cut a piece of thread about 40 cm long.
2. Ask an adult to use the nail to carefully punch a hole in the centre of the bottom of the cup.
3. Tie one end of the thread to the middle of the paper clip.
4. Push the other end of the yarn through the hole in the cup and pull it through as shown in the picture.
5. Get a piece of paper towel about the size of €5, then fold it once and get it damp in the water.
6. Now it's time to make some noise! Hold the cup firmly in one hand, and wrap the damp paper towel around the string near the cup. While you squeeze the string, pull down in short jerks so that the paper towel tightly slides along the string. If all goes well - you hear a chicken!

## 10. Mixing Oil and Water

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 will they? Take this fun experiment a step further and find out how bringing oil and water together can help you do your dishes

### What you'll need:

Small soft drink bottle

Water

Food colouring

2 tablespoons of cooking oil

Dish washing liquid or detergent

### 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?

While water often mixes with other liquids to form solutions, oil and water does not. 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.

If you really think oil and water belong together then try adding some dish washing liquid or detergent. Detergent is attracted to both water and oil helping them all join together and form something called an emulsion. This is extra handy when washing those greasy dishes, the detergent takes the oil and grime off the plates and into the water.

## **11. Potato shoot experiment**

### **What you need:**

- a shooting potato (one that has little white shoots growing out of it)
- a shoe box
- scissors
- rocks

### **Activity:**

1. Cut a small coin-size hole in the short end of the shoe box. Put a handful of potting mix in the corner of the box opposite the hole you have made.
2. Lay the potato in the soil.
3. Put the rocks in the box with the potato to create 'obstacles'.
4. Put the lid on the box and put it somewhere where there is plenty of light.
5. After 4 weeks, open the box and you'll see that the potato shoot has made it's way around and over the rocks to reach the hole where the sunlight is coming in.

### **Explanation**

Plants have cells that are sensitive to light and tell the plant which way to grow. Plants will always grow toward the light. The shoe box had a tiny hole of light and the potato shoot twisted until it reached the light.

## 12. How to Create a Tornado in a Bottle:

### **What you'll need:**

- Water
- A clear plastic bottle with a cap (that won't leak)
- Glitter
- Dish washing liquid

### **Instructions:**

1. Fill the plastic bottle with water until it reaches around three quarters full.
2. Add a few drops of dish washing liquid.
3. Sprinkle in a few pinches of glitter (this will make your tornado easier to see).
4. Put the cap on tightly.
5. Turn the bottle upside down and hold it by the neck. Quickly spin the bottle in a circular motion for a few seconds, stop and look inside to see if you can see a mini tornado forming in the water. You might need to try it a few times before you get it working properly.

### **What's happening?**

Spinning the bottle in a circular motion creates a water vortex that looks like a mini tornado. The water is rapidly spinning around the centre of the vortex due to centripetal force (an inward force directing an object or fluid such as water towards the centre of its circular path). Vortexes found in nature include tornadoes, hurricanes and waterspouts (a tornado that forms over water).

### 13. Design and Test a Parachute

Learn about air resistance while making an awesome parachute! Design one that can fall slowly to the ground before putting it to the test, making modifications as you go.

#### 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 whole 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 worked, remember that you want it to drop as slow as possible.

#### What's happening?

Hopefully your parachute will descend slowly to the ground, giving your weight a comfortable landing. 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. The larger the surface area the more air resistance and the slower the parachute will drop.

Cutting a small hole in the middle of the parachute will allow air to slowly pass through it rather than spilling out over one side, this should help the parachute fall straighter.



#### 14. Escaping Water

Water can certainly move in mysterious ways, get the water from one cup to make its way up hill and back down into a second empty cup with the help of paper towels and an interesting scientific process.

##### What you'll need:

A glass of water

An empty glass

Some paper towels

##### Instructions:

Twist a couple of pieces of paper towel together until it forms something that looks a little like a piece of rope, this will be the 'wick' that will absorb and transfer the water (a bit like the wick on a candle transferring the wax to the flame).

Place one end of the paper towels into the glass filled with water and the other into the empty glass.

Watch what happens (this experiment takes a little bit of patience).

##### What's happening?

Your paper towel rope (or wick) starts getting wet, after a few minutes you will notice that the empty glass is starting to fill with water, it keeps filling until there is an even amount of water in each glass, how does this happen?

This process is called 'capillary action', the water uses this process to move along the tiny gaps in the fibre of the paper towels. It occurs due to the adhesive force between the water and the paper towel being stronger than the cohesive forces inside the water itself. This process can also be seen in plants where moisture travels from the roots to the rest of the plant.

### 15. Egg Bubbles

This fun science experiment for kids focuses on some of the interesting characteristics of eggs. Prove the existence of a small air pocket inside an egg as well as thousands of small holes in the shell called pores, while learning what air does as it is heated.

#### What you'll need:

A clear glass or jar

Hot water (adult supervision is a good idea when using hot water)

An egg

A magnifying glass

#### Instructions:

1. Place the egg carefully into the glass or jar.
2. Carefully pour hot water into the glass or jar until it is nearly full.
3. Leave the glass or jar on a table or flat surface and watch the egg closely for a few minutes (the glass may become hot so be careful).
4. Use your magnifying glass to closely examine what is happening.

### What's happening?

After surrounding the egg with hot water you will notice tiny bubbles forming on the egg shell which eventually bubble their way to the surface.

An egg contains a small air pocket at its larger end between the shell and egg white. When the air trapped inside this small pocket begins to heat up it expands and tries to find a way out of the shell, but how does it escape?

They're too small to see under normal conditions but with the help of a magnifying glass you can see that egg shells contain thousands of small holes called pores (human skin has pores too).

The pores allow air to pass through the shell, making it look like the egg is breathing as the air expands and is forced through the shell.

### **Diet Coke & Mentos Eruption**

One of the most popular experiments of modern times is the Diet Coke and Mentos Geyser. Made popular by Steve Spangler, this experiment is a lot of fun and sure to amaze your friends and family assuming you do it outside rather than in the living room).

#### **What you'll need:**

- Large bottle of Diet Coke
- About half a pack of Mentos
- Large Empty bottle

#### **Instructions:**

1. Make sure you are doing this experiment in a place where you won't get in trouble for getting Diet Coke everywhere. Outside on some grass is perfect, please don't try this one in your family lounge!!
2. Stand the Diet Coke upright and unscrew the lid. Put some sort of funnel or tube on top of it so you can drop the Mentos in at the same time (about half the pack is a good amount).
3. Time for the fun part, drop the Mentos into the Diet Coke and run like mad! If you've done it properly a huge geyser of Diet Coke should come flying out of the bottle, it's a very impressive sight. The record is about 9 metres (29 feet) high!

### **What's happening?**

Although there are a few different theories around about how this experiment works, the most favoured reason is because of the combination of carbon dioxide in the Diet Coke and the little dimples found on Mentos pieces.

The thing that makes soft drinks bubbly is the carbon dioxide that is pumped in when they bottle the drink at the factory. It doesn't get released from the liquid until you pour it into a glass and drink it, some also gets released when you open the lid (more if you shake it up beforehand). This means that there is a whole lot of carbon dioxide gas just waiting to escape the liquid in the form of bubbles.

Dropping something into the Diet Coke speeds up this process by both breaking the surface tension of the liquid and also allowing bubbles to form on the surface area of the Mentos. Mentos candy pieces are covered in tiny dimples (a bit like a golf ball), which dramatically increases the surface area and allows a huge amount of bubbles to form.

The experiment works better with Diet Coke than other soft drinks due to its slightly different ingredients and the fact that it isn't so sticky. Diet Coke that has been bottled more recently worked better than older bottles that might have lost some of their fizz sitting on shop shelves for too long, just check the bottle for the date.