Fireworks in a Glass

You Will Need

- Warm Water
- Oil*
- A Tall Glass
- Food Colouring

* Please dispose of oil safely and responsibly.

This is a very cool, simple and fun experiment, and also completely safe, just don't drink the water!

Method

1. Fill the tall glass with warm water.
2. Pour a small amount of oil into another container and add a few drops of food colouring.
3. Give it a good stir, if it doesn't mix, add a bit of water.
4. Pour the food colouring and oil mixture into the warm water and watch the fireworks!

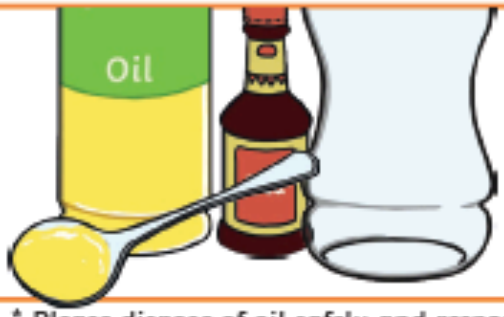
The Science Bit

Oil and water don't mix. Also oil is less dense than water (meaning there is less of it in the same volume) and therefore floats on top of water in a nice layer. The food colouring we used was water based and therefore does not mix with the oil, instead it sinks through the oil into the water below. Since the addition of the colouring makes the food colouring heavier than the water, it sinks to the bottom leaving trails (resembling fireworks) as some of the colour diffuses into the water.

Lava Lamp

You Will Need

- Water
- Vegetable Oil*
- A Clear Plastic Bottle or Jar
- Food Colouring
- Effervescent Tablets



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Method

1. Fill the bottle or jar a quarter full with water.
2. Top up, almost to the top with the vegetable oil
3. They should separate into two layers, water at the bottom and oil sitting on top.
4. Add about 6-8 drops of food colouring once the oil and water separate.
5. The colour will mix with the water at the bottom.
6. Pop in half an effervescent tablets and watch the bubbles form. Add more effervescent tablets bit by bit to keep the bubbles rising and falling.

The Science Bit

Firstly water and oil will not mix – this is because we say that water is a polar molecule – its structure means that is has a positive charge one end and a negative charge the other. Water molecules stick together because the positive end of one water molecule is attracted to the negative end of another. Oil molecule structure is different – it is non polar, meaning that its charge is more evenly spread out, so the oil is not attracted to water – in fact we call it hydrophobic (water fearing) so it tries to get as far away from water as possible and will not mix. The reason that oil rests on top of the water rather than underneath is because it has a different density to water.

As the effervescent tablets is added (this is made of citric acid and sodium bicarbonate) it reacts with the water and form carbon dioxide gas and sodium citrate. It is the carbon dioxide bubbles that carry the coloured water to the top.

How to Make an Egg Float

Materials

Water

Glass or Jug

Salt

Eggs

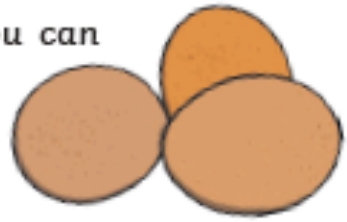
Instructions

1. Fill the bowl or glass about 2/3 full with tap water.
2. Drop the egg carefully into the bowl and observe it sinking to the bottom.
3. Remove the egg and add about 5 tablespoons of salt, test to see if your egg floats.
4. Add more salt if the egg still sinks.

The Science Bit

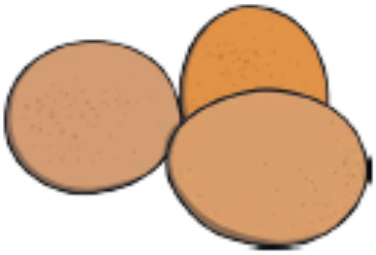
Objects sink in water when they are more dense than the water, by adding salt we make the water more dense, once the water is denser than the egg it floats.

You could also try other objects and see what else you can make float!

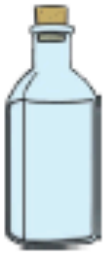


How to Make an Egg Bounce

Materials



Eggs



White Vinegar

Instructions

1. Fill a container with white vinegar, and carefully drop the egg inside. Make sure the egg is completely covered.
2. After a couple of days carefully rinse the egg, rubbing the shell gently.
3. Leave for another day in the vinegar if some shell remains and then rinse again.
4. Once the shell is removed carefully try to bounce the egg.
5. Drop carefully from quite a low height, the egg should bounce up from the surface.

The Science Bit

Investigation! Can you measure at what height it breaks? (maybe try this outside!) Or how high it can bounce on different surfaces?

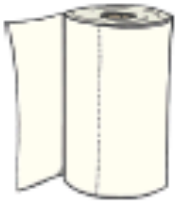
Think about how you can show your results! Think about using a table or a graph!

Fun with Rolling Eggs

Materials

Eggs
(Hard boiled might be safest)

Bubble wrap



Kitchen roll

Stop Watch/ Timer

Ramp or Slide

Instructions

1. Decide on two markers on your ramp which you will use to time the amount of time the egg takes to travel down the ramp.
2. Place the egg at the top marker and let the egg roll down the ramp to the second marker stop the timer when it gets to the second marker and record the result
3. Repeat 3 times, make sure you record your result each time.
4. Wrap bubble wrap around your egg then repeat steps2 and 3.
5. Wrap kitchen roll around your egg then repeat steps2 and 3.

The Science Bit

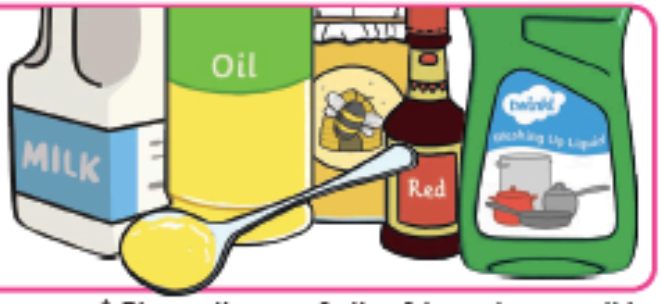
Investigation! Can you think of any more materials to try? What do you think slows down or speeds up the egg? Does friction play a part? Did any of the eggs break? Which material protected the egg the best?

Can you make an parachute for the egg to protect it from a fall?

Fun with Density

You Will Need

- Honey
- Milk
- Water
- A Glass
- Vegetable oil*
- Food colourings
- Golden syrup
- Washing up liquid



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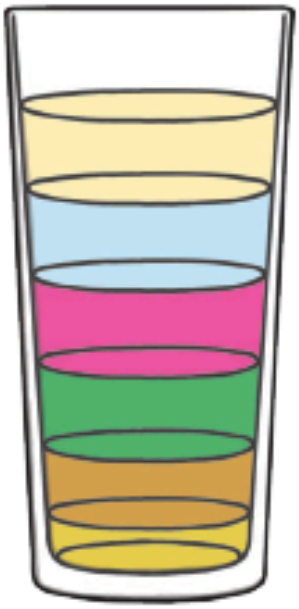
Density is a really tough concept to grasp. We confuse ourselves by referring to our weight all the time when we really mean our **mass**. **Mass** is effectively 'how much stuff' is there. **Density** is how much mass is in a volume (or space).

One way to illustrate density is to pour different liquids (which have different densities) on top of each other. The liquids with the greatest density sink to the bottom.



Method

1. Measure out the same volume of each of the liquids. Colour the water and the milk if you wish.
2. Starting from the bottom, pour in the honey. Make sure it goes into the middle of the glass and that you don't get any honey on the sides.
3. Slowly pour the golden syrup on top, followed by the washing up liquid.
4. Then add the milk, followed by the water.
5. Finally top with vegetable oil and admire your rainbow glass!

The Science Bit

Each of the liquids have a different mass of molecules or different numbers of parts squashed into the same volume of liquid, this makes them have different densities and therefore one can sit on top of the other – the more dense a liquid is the heavier it is.

Do you think you could float small objects on each of the different levels? We'd love to see a photo if you can.

Dissolving

Which solids dissolve in water?

You Will Need

- Water (hot and cold)
- Transparent Containers
- Substances to try and dissolve; sand, sugar, salt, coffee etc

Method

1. Add a teaspoon of whichever solid you are testing to a glass of cold water and a glass of hot water, stir and observe the difference.
2. Look to see if the solid dissolves in the hot water and cold water and if one is better than the other.
3. Can you design a chart to record your observation?

The Science Bit

Things like salt, sugar and coffee dissolve in water. They are soluble. They usually dissolve faster and better in hot water. Pepper and sand are insoluble, they will not dissolve even in hot water.

For Older Children

Everything is made of particles which are always moving. When a soluble solid (solute) is mixed with the right liquid (solvent), it forms a solution. This process is called dissolving.

Two things that affect the speed at which the solid dissolves are temperature and the size of the grains of the solid. Caster sugar which is made of fine particles will dissolve quickly, but bigger sugar particles will take longer.

Solids dissolve faster in hot water as in hot water the water molecules are moving faster, so bump into the solid more often which increases the rate of reaction.