Awe and Wonder

Cornflour Slime

You will need:

A large bowl

Food colouring

Large covered table or area where mess is not a problem

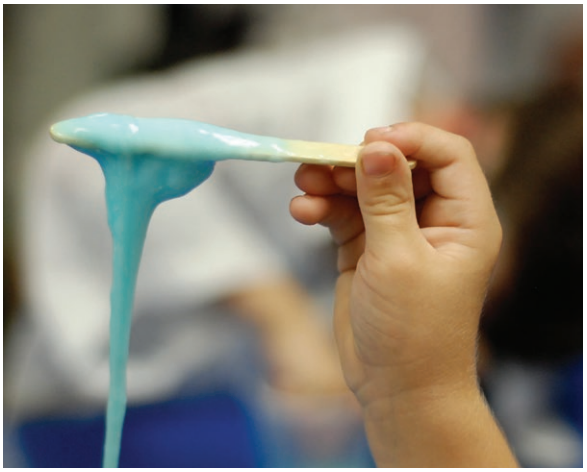
200ml water

200-300g cornflour

Aprons

Method:

1. Pour the cornflour into the bowl.
2. Pour the water in, mixing slowly as you go. Keep adding more water until the mixture becomes thick (and hardens when you tap on it).
3. Add a few drops of food colouring to make your slime the colour you want it.
4. Put your hands in the slime and experiment with handling it.
5. What happens when you pick the slime up, squeeze it or even punch or slap it?
6. Do you think it is a solid or a liquid?
7. How is it different to water?



The Science

The slime is a non-Newtonian liquid which means it is different to 'normal' liquids. It gets thicker when it is pushed or pressed down. The cornflour is not actually dissolved in the water so when pressure is put on the mixture, the water molecules are pushed away. Other non-Newtonian liquids react in different ways to pressure. Tomato ketchup gets runnier if you shake it. If you whip cream for a long time, it gets thicker and thicker.

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.

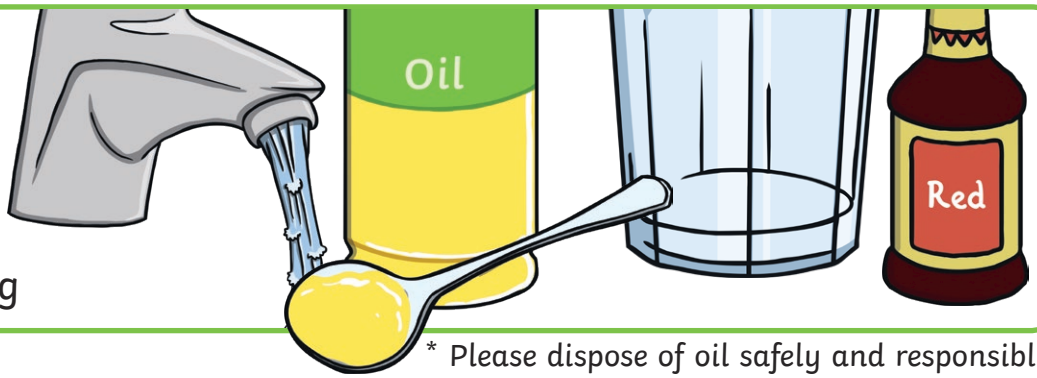
Two things that affect the speed at which the solid dissolves are temperature and the size of the grains of the solid. Caster sugar which is made of fine particles will dissolve quickly, but bigger sugar particles will take longer.

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.

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!

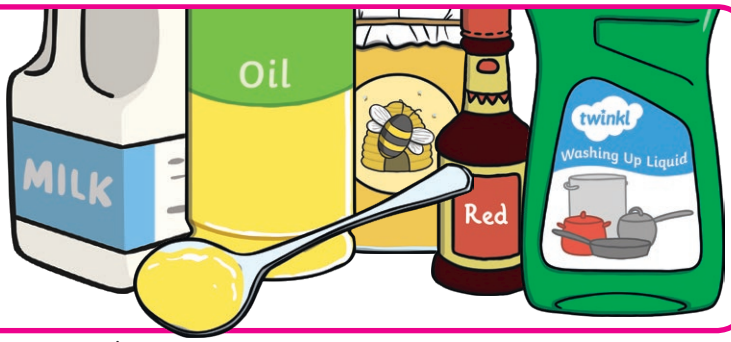
The Science Bit

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.

Fun with Density

You Will Need

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



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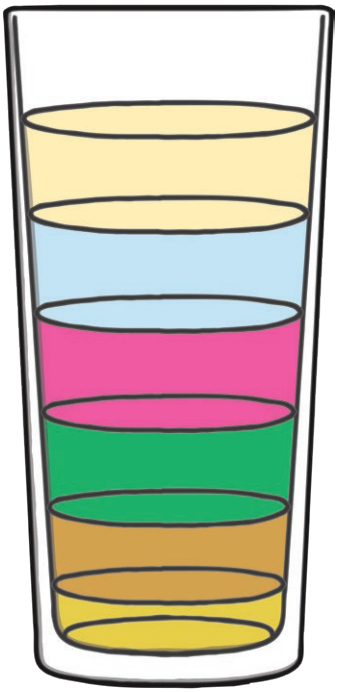
Density is a really tough concept to grasp. We confuse ourselves by referring to our weight all the time when we really mean our **mass**. **Mass** is effectively 'how much stuff' is there. **Density** is how much mass is in a volume (or space).

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

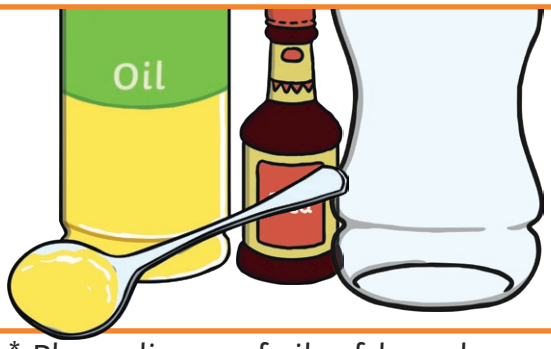
Each of the liquids have a different mass of molecules or different numbers of parts squashed into the same volume of liquid, this makes them have different densities and therefore one can sit on top of the other – the more dense a liquid is the heavier it is.

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

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.

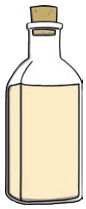
As the effervescent tablets is added (this is made of citric acid and sodium bicarbonate) it reacts with the water and form carbon dioxide gas and sodium citrate. It is the carbon dioxide bubbles that carry the coloured water to the top.

Awe and Wonder

Fizzy Colours

You will need:

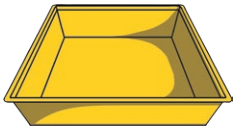
Paint pots or plastic cups



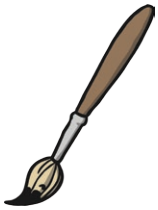
White vinegar

A few tubs of bicarbonate of soda

Shallow tray



Paintbrushes or medicine syringes



Food colouring in several colours

Method:

1. Pour out the bicarbonate of soda into the tray and spread it out.
2. Drop a few blobs of different coloured food colouring into each paint pot.
3. Top up to half full with white vinegar.
4. Put a paintbrush or medicine syringe into each paint pot.
5. Suck the coloured vinegar into the syringe or soak the paintbrush.
6. Drip the colour into the tray. What happens to the powder? What happens to the liquid?
7. Once you have dripped 2 or more colours use the brush to mix the 2 colours together. What happens?
8. What can you see in the mixture?

The Science

You just made a chemical reaction! You mixed the acid (vinegar) and the alkali (bicarbonate of soda).
Did you see the bubbles of carbon dioxide (CO^2)? That is a gas. The bicarbonate of soda is an alkali, it reacts or changes when it mixes with an acid like vinegar because they are very different. If you mix either one with water (which is neutral, not an acid or an alkali) nothing happens because they are not as different.

Awe and Wonder

Rainbow Colour Mixing

You will need:

A bowl

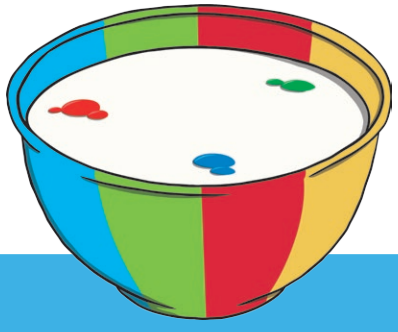
A cup of milk (whole or 2%)

Different colours of food colouring

Washing-up liquid

Method:

1. Carefully pour a cup of milk into a bowl.
2. Taking care not to mix the colours, drop three drops of one food colouring at one side. About a third of the way around, add three drops of another colour and another third of the way around, add three drops of another colour.
3. Next, squeeze a drop of washing-up liquid into the centre of the bowl.
4. What happens to the colours?



The Science

Milk is mainly water with another big ingredient: fat. The washing-up liquid bonds with the fat in the milk. The food colouring is pushed out because the bond is so strong.