

FIREWORKS IN A GLASS

You will need:

- Warm water
- A tall glass
- Oil
- Food colouring

Instructions:

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!

Why does this happen?

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

Instructions:

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 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!

Why does this happen?

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.

Why not try this...

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

Instructions:

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 at the 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 tablet and watch the bubbles form. Add more effervescent tablets bit by bit to keep the bubbles rising and falling.

Why does this happen?

Firstly water and oil will not mix – this is because we say that water is a polar molecule – its structure means that it has a positive charge on one end and a negative charge on 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 are added (this is made of citric acid and sodium bicarbonate) it reacts with the water and forms carbon dioxide gas and sodium citrate. It is the carbon dioxide bubbles that carry the coloured water to the top.

DISSOLVING

You will need:

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

Instructions:

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?

Why does this happen?

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.

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.