Staffroom Experiments

Amazing Water and Oil - Part 1

Fill a plastic bottle with ⅓ water and ⅓ Oil
Allow the water and oil to settle
Add several drops of food colouring into the bottle (you can use several different colours)
Observe

Equipment

One plastic bottle with lid, a small but tall one is best (e.g. Roses cordial bottle)
Water
Oil - one of the cheaper cooking oils is fine
Food colouring in droppers (using food colouring straight from the bottle usually ends up with the colour all over your hands)
When you have finished this experiment place the lid an the bottle and store for use in the future

Explanation

Oil and water do not mix and as the oil is less dense than the water it rises and sits on the top.
Food colouring is mostly water so it does not like to mix with the oil.
The food colouring makes its way to the bottom and bursts out of the oil into the water below

Staffroom Experiments

Amazing Water and Oil - Part 2

Fill a plastic bottle with ⅓ water and ⅓ Oil
Allow the water and oil to settle
Add ¼ of a tablet of a Alka Seltzer tablet
Add more of the tablet when the reaction dies down
Observe

Equipment

One plastic bottle with lid, a small but tall one is best (e.g. Rose's cordial bottle) Water
Oil - one of the cheaper cooking oils is fine
You can use the same bottle from Amazing Oil and Water Part 1
Alka Seltzer tablets - these can be purchased from some chemists
If you put the lid on the bottle when you have finished you can reuse them at another time for this experiment.

Explanation

Oil and water do not mix and as the oil is less dense than the water it rises and sits on the top.
Alka Seltzer tablets contain baking soda and food acids. When the tablet is placed in water these two ingredients react to produce CO_2 gas.
When the tablet reaches the water it reacts and produces the gas which rises to the top of the bottle.
As it rises it takes some of the water with it. When the bubble reaches the top it releases the gas but the water makes its own way back down through the oil again.
This will keep happening until all the Alka Seltzer has reacted and is used up.

Staffroom Experiments

Floating an Egg in Water

¾ fill a large jar or beaker with water
Add a fresh egg to the water - it should sink
Add a quantity of salt to the water to make the egg rise to the top, keep adding the salt until it rises
Can you now make the egg float in the middle of the water?

Equipment
One large jar or beaker (big enough to hold an egg covered with water and leave room to add salt and more water.
Water in a jug
A Fresh Egg
Salt - you will need to add a good amount to the water
(It would be good to do this experiment first to find out how much of water and salt you will need)

Explanation
A fresh egg is denser than water, so it sinks to the bottom of the jar.
When you add salt to the water you increase its density and now the egg becomes less dense than the water so it floats.
You should be able to make the egg float in the middle of the beaker by add more water to decrease the density of the solution which will cause the egg to sink again.

Staffroom Experiments

How Many Drops of Water Can You Fit on a Coin?

Place a small coin on a plastic tray
Use a dropper fill of water to carefully add drops of water to the top of the coin
Count the number of drops you can add.
Who can get the most drops?

Equipment
A small coin - old 5 and 10 cent pieces are good
Droppers
Water
Plastic tray to catch all the water

Explanation
Water drops will join together and are held together by the bonds between the water particles. These bonds produce what we call surface tension.
The bonds can hold quite a lot of water in one large droplet on top of the coin.
When the force of gravity which is pulling the water droplet down becomes greater than the forces holding the water particles together the large droplet collapses.
The number of drops will of course depend on the size of the drop which is determined by the diameter of the dropper and how hard the person squeezes on it.
Note: if you add detergent to the water the large droplet will not form. The detergent makes the bonds between the water particles stretchy and they cannot hold the water together.

Staffroom Experiments

Squealing Balloons

Take a blown up and tied off balloon containing a hex nut
Hold the balloon at he tied off end and spin it in a circular motion
The nut inside should start to move around inside the balloon
Observe

Equipment
A good quality balloon
A hex nut

Explanation
The hex nut spins inside the balloon. As it does it vibrates the rubber of the balloon making a squealing noise.
Does it have to be a hex nut?- try some different shaped and sized objects and find out.

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Burning Balloons

Have two blown up balloons, one should contain a small amount of water
Hold the empty ballon over small candle
Observe
Hold the ballon with water in it over the candle
Observe

Equipment
Two good quality balloons
A small candle (tea light candles are good for this)
Water

Explanation
The empty ballon will pop over the flame as the fire burns the rubber
When the balloon with water in it is placed over the flame the heat from the fire goes into the water and heats this up so the rubber in the ballon does not get hot enough to burn.
This principle also allows you to heat water in a paper cup, using a flame.

Staffroom Experiments

The Great Milk Experiment

See www.nzase.org.nz/primaryscience/archive.php for full details

In a shallow dish place 0.5 cm of milk
Add two or three drops of food colouring to the milk
Add one drop of detergent
Observe

Equipment
Shallow dish: a petri dish makes it look scientific but a soup bowl will do
Milk- any type will do but a 'dark blue top' may work better. Meadow fresh are offering discount on a new type of milk to use in this experiment
Detergent in a dropper or a small bottle with nozzle end

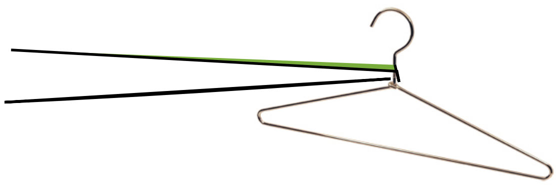
Explanation (simplified)
Milk contains water and milk fat. Detergent particles have two different 'ends'. One end likes water and hates fat (and dirt) while the other end likes water and hates fat. When the detergent is placed in the milk the water-loving end is attracted to the water and the fat-loving end to the milk fats. As the detergent particles are attracted, they move the milk around. The food colouring moves with the milk (it is used to show the milk moving).

Staffroom Experiments

Church Bell Coat Hangers

Use a metal coat hanger with a string tied in the centre around the hook and both ends free
Standing, hold the ends of the string in your ears
Lean forward and bang the coat hanger on a table, chair, window sill or any other object
Listen

Equipment
Metal coat hanger with centre of string tied around hook.



Explanation
Sound travels by vibrations.
Sound travels better when the particles in the substance it is traveling through are closer together, so sound travels really well through a solid.
The sound caused by the coat hanger hitting the table travels through the string to your ears and sounds very different to when it travels through the air.

Staffroom Experiments

The Burning Hanky

Soak a cloth hanky in a solution of 50% meths 50% water
Hold the hanky with tongs and set alight
(Hold this over a container full of water)
Observe

Equipment
Any cloth hanky will do but you may wish to use old ones. You could also use normal paper
This could be a demonstration only but if you trust the staff then give them a tray of water to do it over (Demo only for students)
Make sure you have fully immersed the hanky in the 50% water and 50% meths.
Tongs - must be long enough so the person holding the hanky won't get burned and can withstand fire (not plastic)
Matches - the longer ones are better
Tray (grey trays are good) half full of water

Explanation
The meths will burn (It burns with a fairly cool flame).
As it burns it causes the water to evaporate.
The meths will burn out before all the water goes so it will not burn the hanky.
The hanky will dry out a little.

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Egg into a Bottle

Place a piece of paper that is well alight into the glass bottle
Quickly place the hard boiled egg on top of the bottle
Observe

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Egg out of a Bottle

Hold the flask or bottle up so the egg fits loosely in the neck
Keeping the bottle held up, blow firmly into the bottle so air is forced in
Keep holding the flask up with the neck pointing down into a container
Observe

Equipment

A narrow necked glass bottle - a conical flask works well as do old milk bottles or look out for cranberry juice in bottles in the supermarket
A hard-boiled egg - you can also use water bomb balloons.
A slip of paper to burn
Matches
Container to hold and catch the egg (ice cream container is good)

Explanation

As the flame burns inside the bottle the air inside heats up, it moves faster (pressure increases) and takes up more space. Some of the air escapes from the bottle before the egg is placed on top. When the egg goes on, it starves the fire of oxygen and the flame will go out. When the flame goes out the air inside the bottle starts to cool down. The air particles move less (pressure reduced) and take up less space. The air pressure inside the bottle is now much less than the air pressure outside the bottle. The greater air pressure outside the bottle pushes the egg into the bottle where the air pressure is much less.

Staffroom Experiments

Raising Raisins

Fill a glass with a bubbly drink
Place two or three raisins into the drink
Observe

Equipment
Any glass will do - beakers make it look scientific, champagne bowls are a lot of fun
Any clear fizzy drink will do. Use a sugar free soft drink for a less sticky clean up or use bubbly wine at an appropriate time
Raisins - sultanas or currents will also work

Explanation
The fizzy drink has CO_2 forced into it to make it bubbly.
The raisins sink to the bottom of the glass because they are heavy.
At the bottom, the CO_2 bubbles attach themselves to the raisins (nucleation sites).
This makes the raisin less dense (lighter) and so it rises to the surface.
At the surface the bubbles pop, releasing the CO_2 making the raisin more dense (heavy) so it sinks to the bottom to start the process again.

Staffroom Experiments

Two Candles

Light the two candles
Predict what you think will happen when the candles are covered, which will go out first and why
Place the glass over the top of both candles
Observe

Equipment
Two candles of different heights - small birthday candles, with the pointy stand, are good. Stand them up in some blue tack or plasticene, close enough together so the both fit under the same glass
Glass or beaker to cover both candles
Fire-proof surface e.g. plate (just in case)

Explanation
Many people may think the bottom candle would go out first due to the heavy carbon dioxide gas being produced from the flames.
The taller candle will go out first.
The CO_2 produced is hot, this makes it less dense than cool CO_2 and air.
So the CO_2 rises to the top of the glass and puts the higher flame out first.

Staffroom Experiments

Flying Teabags

Make sure there are no major drafts where you are
Make a tube of the empty teabag and stand it up on its end
Light the top of the tube with a match
Carefully put out your match without blowing over the teabag
Observe

Equipment
Tube-type tea bag (Twinings Earl Grey Tea - Decaffeinated). Carefully remove staple and empty tea out
Matches
Fireproof surface - hard board, dinner plate etc

Explanation
The teabag will burn down to almost nothing.
As it burns it heats the air around it.
The air warms up, the air particles spread out and become less dense so they rise up into the air (Convection Current).
When the remains of the teabag are light enough they get caught in the air current therefore they fly upwards.

Staffroom Experiments

Magic Relighting Candle

Light the candle
Let it burn for a while until the wax at the top is well melted
Light a match, blow out the candle
Place the lit match above the wick and watch it light
Repeat and find out how high you can hold the match away from the wick and it still will light

Equipment
Candle - sitting safely on a dish. Tea lights (candles) are perfect
Matches

Explanation
When the candle burns it melts the wax and then turns it into vapour.
The vapour surrounds the wick and it is this that is burning.
When the candle is blown out, a wax vapour stream remains above the wick.
When a flame is introduced to the vapour stream, it relights the candle.

Staffroom Experiments

Drowning M&Ms

Half fill a small plastic container with water
Place an M&M at each end (try to get one with the M facing up)
Observe

Equipment
Small deep plastic container
Water
M&Ms - mixture of colours

Explanation
The candy coating around the M&M dissolves in the water.
The white layer under the M&M dissolves.
The chocolate does not dissolve.
The colours from the two different M&Ms do not mix quickly.

Staffroom Experiments

Damp Rid and Baking Soda

Place ½ tablespoon of 'Damp Rid' into a midsize sealable plastic bag
Add 50 mL of water
Seal carefully and mix the water with the 'Damp Rid'
Feel the mixture as it dissolves
Place ½ tablespoon of baking soda into a midsize sealable plastic bag
Add 50 mL of water
Seal carefully and mix the water with the baking soda
Feel the mixture as it dissolves
Place ½ tablespoon of both 'Damp Rid' and baking soda into the sealable plastic bag, add 50 - 100 ml water, seal quickly and carefully.
Observe
Open the bag if it gets too big

Equipment
Damp Rid - purchased in supermarkets in boxes as refills
Baking Soda
½ tablespoon measure
Sealable plastic bags - medium size
Jug with water - small container to measure out the water would be useful
Tray to hold all equipment in before and after the experiment

Explanation
The 'Damp Rid' [calcium chloride] dissolves in water. While this happens, it gives out energy and feels warm.
The baking soda dissolves in water. While this happens, it takes in energy and feels cold.
When the two are mixed together in the water they react and carbon dioxide is released.
The chemical reactions that occur are quite complex.