

Willerby Carr Lane Primary School - Science

Topic: Properties and Changes of Materials

Year: 5

Strand: Chemistry

What should I already know?

- That matter is made of atoms and can exist in solid, liquid or gas state
- Changes to materials can be reversible or irreversible

What will I know by the end of the unit?

What properties can we use to compare and group materials?	Materials can be compared by properties such as their: <ul style="list-style-type: none"> • Hardness • Solubility • Transparency • Electrical conductivity • Thermal conductivity • Response to magnets
Why are certain materials chosen for particular uses?	<ul style="list-style-type: none"> • The properties of materials makes them suitable for different purposes • What materials would be good choices for making a frying pan, furniture, a model boat, a house roof, a car, a belt, a scarf, a hat, an electric cable, shoes?
What is the difference between a mixture and a solution?	<ul style="list-style-type: none"> • A mixture is created when two or more materials are combined and can be separated using methods such as sieving and filtration • Some materials will dissolve in liquids to form a solution • The solid seems to disappear in the solution. • A soluble material can dissolve however an insoluble material cannot dissolve.
How can materials be separated?	<ul style="list-style-type: none"> • Mixtures and solutions might be separated through filtering, sieving or evaporating. • A mixture of different solid particles can be separated using a sieve. • An insoluble solid can be separated from a liquid when passed through a filter. The liquid can pass through the filter whilst the solid particles are trapped in the filter. • When salt is mixed with water, it forms a solution. The salt seems to disappear in the water • The salt can be recovered – when the water evaporates into a gas, the solid salt will be left behind.


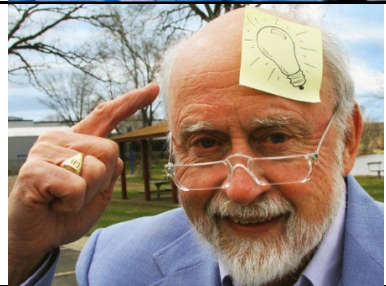

What are reversible changes?	<ul style="list-style-type: none"> • Some changes may be changed back • Dissolving, mixing and changes of state are reversible changes
What are irreversible changes?	<ul style="list-style-type: none"> • Some changes are permanent and cannot be changed back • changes that result in the formation of new materials are often irreversible • changes associated with burning and, for example, the action of acid on bicarbonate of soda, are irreversible

Vocabulary

absorbent	is able to soak up liquid easily
chemical	a substance that has been prepared especially artificially
conductor	will stop energy such as electricity or heat from transferring through
dissolve	to become incorporated into a liquid so as to form a solution.
evaporation	the process of turning from liquid into vapor.
filter	a porous device for removing solid particles from a liquid or gas passed through it.
flammable	will easily catch fire and burn quickly
flexible	easy to bend
gas	a substance or matter in a state in which it will expand freely to fill the whole of a container, having no fixed shape (unlike a solid) and no fixed volume (unlike a liquid).
hard	difficult to scratch
insoluble	a substance unable to be dissolved in water
insulator	a substance which does not readily allow the passage of heat or sound
irreversible	not able to be undone or altered
liquid	substance that flows freely but is of constant volume, having a consistency like that of water or oil.
made	materials which are made from natural materials but then altered using heat or chemicals
magnetic	objects are attracted to magnets
material	the matter from which a thing is or can be made.
mixture	a substance made by mixing other substances together
natural	a material that is used or worked with in a way it is found in nature
opaque	not able to be seen through
permeable	will allow liquids and gases to pass through it

plastic	a synthetic material that can be molded into shape while soft and then set into a rigid or slightly elastic form.
property	an attribute or characteristic of something.
reflective	will bounce off its surface
reversible	able to be turned the other way around
rigid	unable to bend or be forced out of shape; not flexible.
separate	divide into constituent or distinct elements.
sieve	a utensil consisting of a wire or plastic mesh held in a frame, used for straining solids from liquids, for separating coarser from finer particles,
solid	firm and stable in shape; not liquid or fluid.
soluble	a substance able to be dissolved, especially in water.

solution	a liquid mixture in which the minor component (the solute) is uniformly distributed within the major component (the solvent).
substance	a particular kind of matter with uniform properties
synthetic	materials which are made from natural materials but then altered using heat or chemicals
thermal	relating to heat
translucent	will let light, but not detailed shapes, pass through them
transparent	a material or article allowing light to pass through so that objects behind can be distinctly seen.
variable	able to be changed or adapted.
waterproof	does not let water pass through

Famous Chemists	
<p>Ruth Benerito</p> <p>Benerito is most famous for her work on making wrinkle-free cotton. She discovered a way to treat cotton fibers so that it makes cotton resistant to wrinkling. This is used in 'wash and wear' clothes.</p>	
<p>Spencer Silver</p> <p>In 1968, Silver developed a high-quality but "low-tack" adhesive. The adhesive's grip was strong enough to hold papers together, but weak enough to allow the papers to be pulled apart again without being torn. It could also be used again and again. In 1980, this was used to make the adhesive notes called Post-it Notes. The product became very popular and has been sold worldwide since.</p>	
<p>Adolf Spitteler and his Cat</p> <p>The story goes that the cat knocked over a bottle of formaldehyde in the lab one night, which dripped into the hapless animal's dish of milk. In the morning, Spitteler discovered that the formaldehyde had curdled the milk into a solid, horn-like material, which set him off on a train of research and development which led to the manufacture of the most beautiful of plastics: buttons, buckles, knitting needles, jewellery, pens, pots and much, much more</p> <p>See https://www.chemistryworld.com/podcasts/casein/3007625.article</p>	

Investigate!

- Which material makes the best 'mopper upper'? (absorbency)
- Which material keeps things cool the best? (thermal insulator)
- Which is the best type of paper for cleaning muddy water? (filtration)
- Which mixture creates a chemical reaction? (irreversible changes)

Common misconceptions

Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.

Some children may think:

- thermal insulators keep cold in or out
- thermal insulators warm things up
- solids dissolved in liquids have vanished and so you cannot get them back
- lit candles only melt, which is a reversible change.

