

Year 5: what properties do materials have and how can they be changed or used?

Key Vocabulary:

constant	Parts of an investigation that are keep the same.
cooling	This is the process of reducing the temperature.
dissolve	The process where a substance is completely mixed with a liquid.
electrical conductor	A material that allows electrical current to pass through it easily.
electrical insulator	A material that has high resistance to electrical current passing through it.
evaporation	When a liquid gains energy and becomes a gas.
filtering	The process of separating solids from liquids.
flexible	A material that bends or changes shape easily.
heating	This is the process of increasing the temperature.
irreversible	A change that cannot be undone as some new has been made.
magnetism	The force that attracts a material to a magnet.
opaque	A material that blocks light (creating a shadow).
permeable	A material that allows water to pass easily through it.
reversible	When a material changes state but can return to its original state.
rigid	A material that it is very difficult to bend or change shape.
Solubility	How easily a solid (solute) can be dissolved in a liquid (solvent).
Solution	A liquid in which a solid has been dissolved.
Suspension	When a solid is mixed with a liquid and doesn't dissolve.
Thermal conductor	A material that allows heat to travel through it easily.
Thermal insulator	A material that does not allow heat to travel through it.
translucent	A material that will allow some light rays to pass through it but not all.
transparent	A material that allows all light rays to pass through it.
variables	Parts of an investigation that are changed and/ or measured.

Key Knowledge:

What I should already know:

All materials have a range of different properties that determine what they can be used for.

What I will be learning now:

Different materials are chosen for different purposes based on their specific properties of: flexibility, electrical and thermal conductivity, magnetism, solubility and transparency.

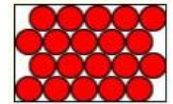
EXAMPLES: glass is both hard and transparent so ideal for a window. Stainless steel conducts heat really well so is ideal for a frying pan but not for the handle (wood or plastic are much better!).

States of Matter:

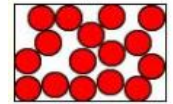
In a **solid**, the particles do not have enough energy to overcome the forces holding them in place.

In a **liquid**, the particles have enough energy to move over and around each other.

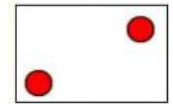
In a **gas**, the particles have enough energy to totally overcome the forces and to move freely.



Solid



Liquid



Gas



Changing state from solid to liquid to gas and back again is a **PHYSICAL** or **reversible change**.

When chocolate is melted, it can solidify so the change is **reversible**.

When sugar is dissolved in water, the change is reversible as, when the water is evaporated, the sugar is left behind.



Key Scientist:

Stephen Gray (1666 – 1736)
He discovered that electricity could be conducted through wires.



Any change such as burning that causes new substances to be made is called a **CHEMICAL** change. This cannot be reversed.



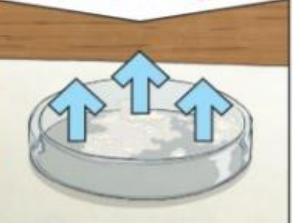


Cooking eggs by frying, boiling or scrambling is always an **irreversible change**.

When oil, vinegar and egg yolks are mixed, they make mayonnaise. It is not possible to separate this back into the oil, vinegar and egg so the change is **irreversible**.



Reversible changes, such as mixing and dissolving **solids** and **liquids** together, can be reversed by:

Sieving	Filtering	Evaporating
		
Smaller materials are able to fall through the holes in the sieve, separating them from larger particles.	The solid particles will get caught in the filter paper but the liquid will be able to get through.	The liquid changes into a gas , leaving the solid particles behind.

Solubility:

A solution is made when solid particles are mixed with liquid particles to the point that they are no longer visible to the naked eye.

Materials that will dissolve are called soluble.

Materials that won't dissolve are called insoluble.

When particles won't dissolve, a suspension is created.

Sugar and salt are soluble materials.



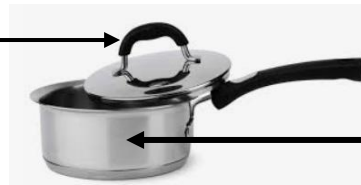
Sand is not a soluble material.



What are thermal insulators and conductors?

Materials that are good thermal conductors allow heat to move through them easily.

Materials that are thermal insulators do not let heat travel through them.



What are electrical insulators and conductors?

Electrical conductors allow electricity to pass through them easily while electrical insulators do not.

Electrical insulators have a high resistance which means that it is hard for electricity to pass through these objects.

5 Electrical Conductors



5 Electrical Insulators



Working Scientifically:



Which material is the best thermal insulator and hence the best material for a lunch box to be made from?

Do all metals conduct electricity equally as well?



How does the temperature of the solvent affect the rate at which a solute dissolves?

What other factors affect the rate at which a solute dissolves?

Working Scientifically:



Do all materials have the same properties?

Are all materials soluble?

Which changes are reversible and which are irreversible?