

# Properties and Changes of Materials

## Knowledge

### Properties and Changes of Materials

- I can compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- I can know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- I can demonstrate that dissolving, mixing and changes of state are reversible changes
- I can explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

## Working Scientifically

- Carry out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'
- Compare materials in order to make a switch in a circuit.
- Observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes.
- Research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

## Hook into a Book



## Activate Prior Knowledge

### EY

- Waterproof materials (making a scarecrow)
- Choosing materials for a super hero cape
- Using their senses to explore natural materials
- Compare similar and different properties of materials

### KS1

- I can distinguish between an object and the material from which it is made
- I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- I can describe the simple physical properties of a variety of everyday materials
- I can compare and group together a variety of everyday materials on the basis of their simple physical properties.
- I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

### KS2

- I can compare and group materials together, according to whether they are solids, liquids or gases
- I can observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- I can observe how magnets attract or repel each other and attract some materials and not others
- I can compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials



Investing in

the UNIQUENESS

of each individual

"I Am Fearfully And Wonderfully Made"  
– Psalms 139 v14

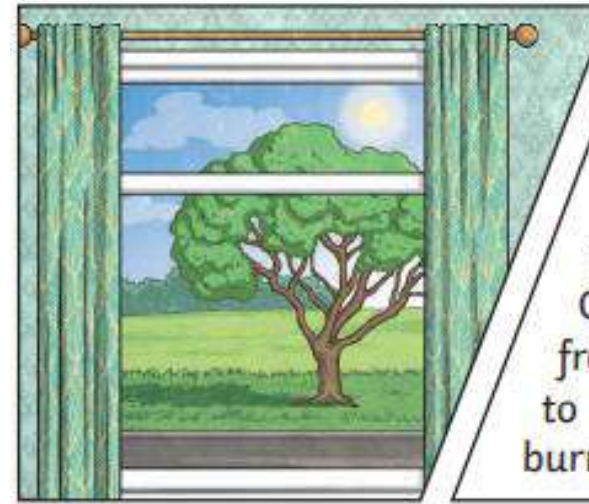


## Key Vocabulary

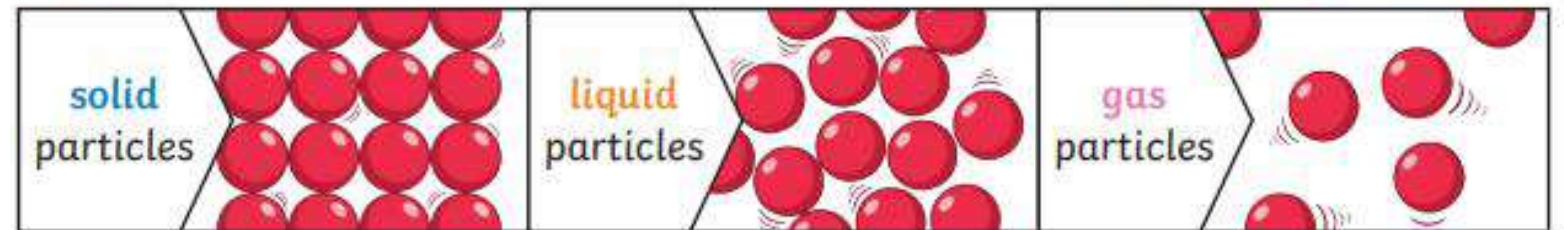
<b>materials</b>	The substance that something is made out of, e.g. wood, plastic, metal.
<b>solids</b>	One of the three states of matter. <b>Solid</b> particles are very close together, meaning <b>solids</b> , such as wood and glass, hold their shape.
<b>liquids</b>	This state of matter can flow and take the shape of the container because the particles are more loosely packed than solids and can move around each other. Examples of <b>liquids</b> include water and milk.
<b>gases</b>	One of the three states of matter. <b>Gas</b> particles are further apart than <b>solid</b> or <b>liquid</b> particles and they are free to move around. A gas fills its container, taking both the shape and the volume of the container. Examples of <b>gases</b> are oxygen and helium.
<b>melting</b>	The process of heating a <b>solid</b> until it changes into a <b>liquid</b> .
<b>freezing</b>	When a <b>liquid</b> cools and turns into a <b>solid</b> .
<b>evaporating</b>	When a <b>liquid</b> turns into a <b>gas</b> or vapour.
<b>condensing</b>	When a <b>gas</b> , such as water vapour, cools and turns into a <b>liquid</b> .

## Key Knowledge

Different **materials** are used for particular jobs based on their properties: electrical **conductivity**, flexibility, hardness, **insulators**, magnetism, solubility, thermal **conductivity**, **transparency**.



For example, glass is used for windows because it is hard and **transparent**. Oven gloves are made from a thermal **insulator** to keep the heat from burning your hand.



## Changes of State



**solid**

The **solid** melts.

The **liquid** freezes.



**liquid**



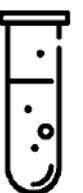
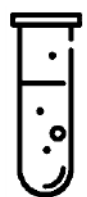
**liquid**

The **gas** condenses.

The **liquid** evaporates.

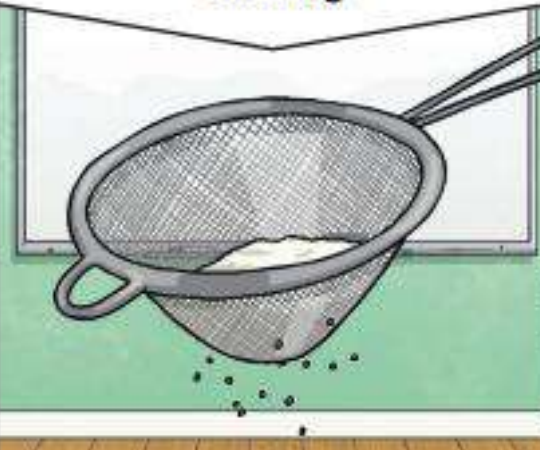

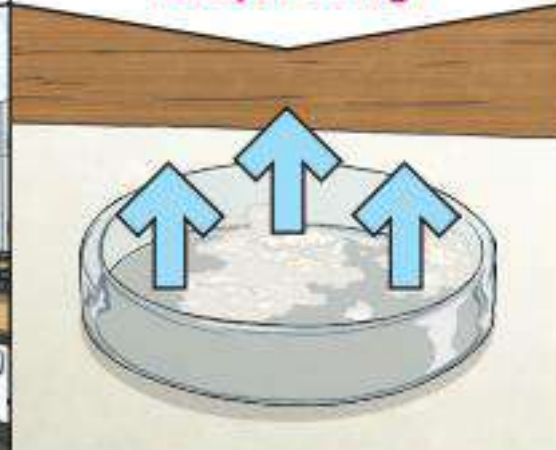


**gas**






Key Vocabulary	
<b>conductor</b>	A <b>conductor</b> is a material that heat or electricity can easily travel through. Most metals are both thermal <b>conductors</b> (they <b>conduct</b> heat) and electrical <b>conductors</b> (they <b>conduct</b> electricity).
<b>insulator</b>	An <b>insulator</b> is a material that does not let heat or electricity travel through them. Wood and plastic are both thermal and electrical <b>insulators</b> .
<b>transparency</b>	A <b>transparent</b> object lets light through so the object can be looked through, for example glass or some plastics.


Key Knowledge		
Reversible changes, such as mixing and dissolving <b>solids</b> and <b>liquids</b> together, can be reversed by:		
<p><b>Sieving</b></p> 	<p><b>Filtering</b></p> 	<p><b>Evaporating</b></p> 
Smaller <b>materials</b> are able to fall through the holes in the sieve, separating them from larger particles.	The <b>solid</b> particles will get caught in the filter paper but the <b>liquid</b> will be able to get through.	The <b>liquid</b> changes into a <b>gas</b> , leaving the <b>solid</b> particles behind.

**Dissolving**  
A solution is made when **solid** particles are mixed with **liquid** particles. **Materials** that will dissolve are known as soluble. **Materials** that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.

Sugar is a soluble **material**.



Sand is an insoluble **material**.





Irreversible changes often result in a new product being made from the old **materials** (reactants). For example, burning wood produces ash. Mixing vinegar and milk produces casein plastic.

