# Year 5
# Unit: Properties of materials

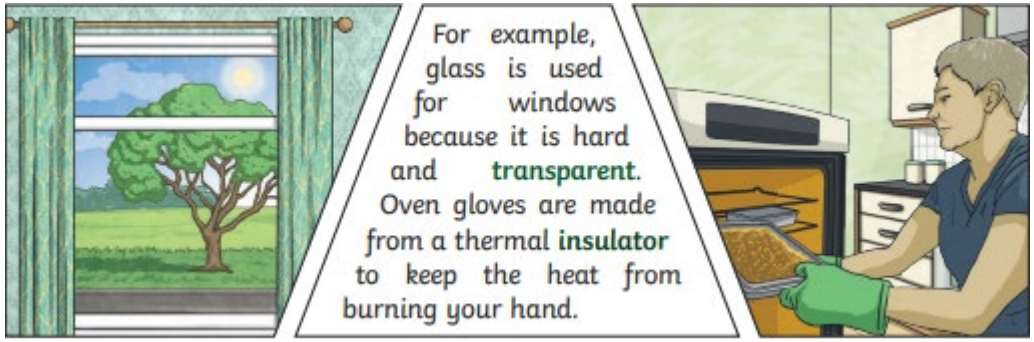
**Intent:**
To compare and group together everyday materials on the basis of their properties (including hardness, solubility, transparency, conductivity).
To know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.
To demonstrate that dissolving, mixing, and changes of state are reversible changes.

**Prior learning**
Year 2 – Identify and compare the suitability of a variety of everyday materials.
Year 3 – Compare and group materials based on whether they are attracted to a magnet.
Year 4 – Compare and group materials according to whether they are solids, liquids, or gases.
Year 4 – Observe that some materials change state when they have been heated or cooled.

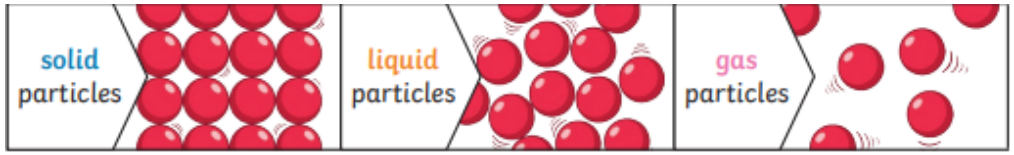
**Later learning (not in Year 5)**
KS3 – Chemical reactions as the rearrangement of atoms.
KS3 – the pH scale for measuring acidity/alkalinity; and indicators.

**Key Questions:**
Oxygen and helium are examples of a what?
Name one property of wood.
Why can't you see sugar that has been mixed in a cup of hot water?
What is the process called when a gas is cooled?
Mixing and dissolving are examples of what?
Why is it important for the sole of a shoe to be flexible?
What is an example of an irreversible change?
What does soluble mean?
Name a material which is insoluable.

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.




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.

## Changes of State


The solid melts.
The liquid freezes.



The gas condenses.
The liquid evaporates.

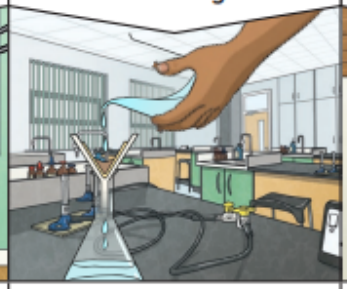
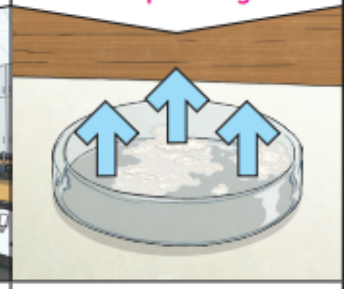

## Dissolving

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.

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. |

| Vocabulary | |
|---|---|
| **Condensing** | When a gas, such as water vapour, cools and turns into a liquid. |
| **Conductor** | A conductor is a material that heat, or electricity can easily travel through. Most metals are both thermal conductors (they conduct heat) and electrical conductors (they conduct electricity). |
| **Evaporating** | When a liquid turns into a gas or vapour. |
| **Freezing** | When a liquid cools and turns into a solid. |
| **Gases** | One of the three states of matter. Gas particles are further apart that solid or liquid 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 gases are oxygen and helium. |
| **Insulator** | An insulator is a material that does not let heat or electricity travel through them. Wood and plastic are both thermal and electrical insulators. |
| **Liquids** | 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 liquids include water and milk. |
| **Materials** | The substance that something is made out of, e.g., wood, plastic, metal. |
| **Melting** | The process of heating a solid until it changes into a liquid. |
| **Solids** | One of the three states of matter. Solid particles are very close together, meaning solids, such as wood and glass, hold their shape. |
| **Transparency** | A transparent object lets light through so the object can be looked through, for example glass or some plastics. |