

All children – regardless of gender, starting point or background – will have the opportunity to engage with a high-quality science education. They will be equipped with the knowledge, skills and vocabulary to understand how science can be used to explain what is occurring, predict how things will behave and analyse caused. We intend to inspire a sense of enjoyment and curiosity about science.

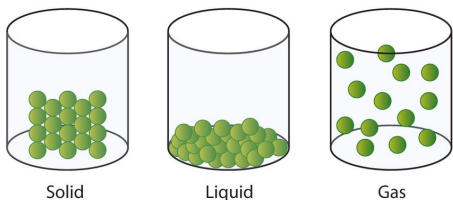
Properties and Changes of Materials

Spring 1

Igniting Prior Knowledge:

Year 4 (States of Matter)

- Matter usually exists in one of three states; solid, liquid or gas.
- Solids are made of molecules tightly packed in uniform rows; they retain their shape and have a fixed volume.
- Liquids are made of molecules that have more energy so move around more freely; they have a fixed volume but take the shape of the container holding them. A liquid can be poured and keeps a level, horizontal surface.
- Gases are made of molecules that have the most energy so move around freely and fill the space they occupy; it has no fixed shape or volume.
- Matter can change state when energy is added to it (heating, cooling or pressure). When matter changes state the molecules don't change, but the way they move does.
- Melting is a state change from solid to liquid.
- Freezing is a state change from liquid to solid. The freezing point of water is 0oC.
- Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100oC.
- Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid.
- Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy.
- Condensation is the change back from a gas to a liquid caused by cooling.



Solid

Liquid

Gas

Key Vocabulary:

- Thermal/electrical
- Insulator/conductor
- Change of state
- Mixture
- Dissolve
- Solution
- Soluble
- Insoluble
- Filter
- Sieve,
- Reversible/irreversible change
- Burning
- Rusting
- Evaporation
- Condensation

New Knowledge:

- Materials have different uses depending on their properties and state (liquid, solid, gas).
- Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.
- Materials are suitable for particular uses based on their properties, e.g. copper is a good electrical conductor so is used in electrical cables; bubble wrap/newspaper is a thermal insulator so is used to wrap ice cream to keep it cold.
- Technical innovations have enabled materials to be used in different products e.g. space craft.
- Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.
- Dissolving means the solid has broken into very tiny particles so that they appear to have disappeared to the eye to make a solution e.g. salt or sugar in water.
- Solids that do not dissolve make a mixture with the liquid.
- Mixtures can be separated by filtering, sieving and evaporation.
- You can get a dissolved solid back from a solution by evaporating the liquid off.
- Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.
- In a reversible reaction, you can get back the materials you started with.
- The result of an irreversible reaction might be a change of colour, the production of heat, light or a gas or chemical.

