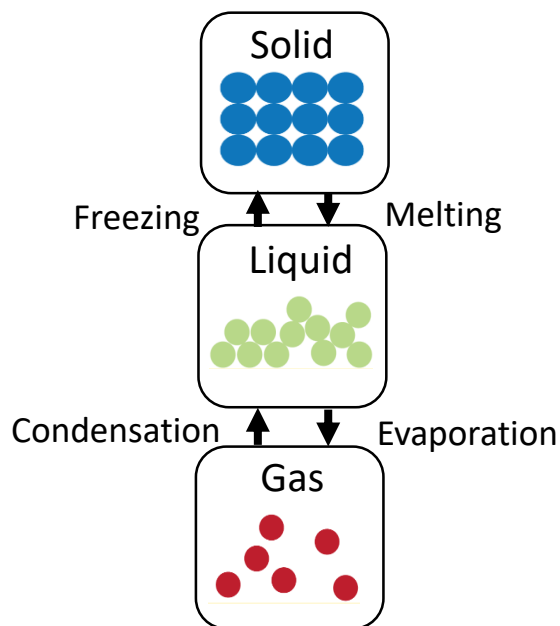




Box 1: Keywords

Boiling	The change of state from liquid to gas that occurs when bubbles of the substance in its gas state form throughout the liquid. It happens at the boiling point.
Condensing	The change of state from gas to liquid
Density	The mass per unit volume – how heavy something is for its size
Diffusion	The movement of liquid or gas particles from a place of high concentration to a place of low concentration
Evaporation	The change of state from liquid to gas that occurs when particles leave the surface of the liquid only. It can happen at any temperature
Freezing	The change of state from liquid to solid
Melting	The change of state from solid to liquid
Particle	The tiny things that substances are made from
Sublimation	The change of state from solid to gas

Box 2: Particle model and particle behaviour



State of matter			
How do the particles move?	Particles do not move about, but vibrate on the spot	Particles are touching but can slide over each other	Particles are spread out far away from each other
Can it be compressed?	No, because there is no space between the particles	No, because the particles are touching	Yes, because the particles are not touching and there is space between them
Can it flow?	No, because the particles can't move around	Yes, because the particles can slide over each other and move around	Yes, because the particles can move around

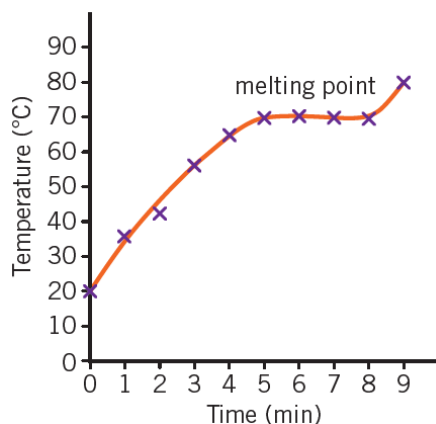


Box 3: Melting and boiling points

Melting point — the temperature at which a substance melts

Boiling point — the temperature at which a substance boils

If you heat a solid and plot a graph of temperature against time the melting point will appear as a flat line if the substance is **pure**.



Box 4: Diffusion

Particles move about randomly in liquids and gases and spread out through mixtures. This process is called **diffusion**. How quickly diffusion happens depends upon three variables:

Variable	Effect on diffusion
Temperature	Diffusion is faster at higher temperatures because particles move faster when hotter
Particle size	Diffusion is slower with larger, heavier particles
State of matter	Diffusion is: fast in gases, slow in liquids, doesn't happen in solids

Box 5: Density

Density tells us how heavy something is for its size.

You can calculate density using the formula:

$$\text{density} = \text{mass} \div \text{volume}$$

Mass is the amount of 'stuff' an object is made of, measured in grams or kilograms.

Volume is the amount of space an object takes up, measured in cm^3 .

Density of a substance depends on:

- the mass of the particles
- how closely together the particles are arranged

A substance is most dense as a solid, as the particles are closely packed together, and least dense as a gas, as the particles are spread far apart.

Box 6: Key skills

Using models to compare properties of materials

Use number lines to determine state of matter of substances

Measure temperature using a thermometer

Plot a line graph

Box 7: Pathway

Previous knowledge: Matter exists in three states; changes of state are reversible

Future links: Atomic structure, bonding, structure and properties

Careers: polymer chemists, ceramic producers, perfume designers, chefs, water company, food production workers, caterers

Box 8: Cross curricular links

Physics – particle model

Maths – graphing, number lines