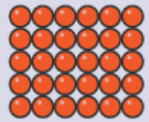
Chemistry: Types of matter (states and changing states

Key word	Definition
Particle	The smallest unit that makes up matter.
Physical properties	Physical properties are those that can be observed without changing the identity of the substance, e.g. colour, smell, melting point, etc.
Chemical properties	Properties that describe how a substance changes into a completely different substance, e.g. flammability, corrosion, etc.
State of matter	One of the distinct forms in which matter can exist, e.g. solid, liquid, gas
Change of state	A change from one state (solid or liquid or gas) to another without a change in chemical composition.
Freezing	(also known as solidification) A substance changes from a liquid to a solid.
Melting	A substance changes from a solid to a liquid.
Evaporation	(also known as vaporisation) A substance changes from a liquid to a gas.
Condensation	A substance changes from a gas to a liquid.
Sublimation	A substance changes directly from a solid to a gas without going through the liquid phase.
Melting point	The temperature at which a material changes from a solid to a liquid (melts). N.B. Melting point is the same as freezing point.
Boiling point	The temperature at which a substance changes from a liquid to a gas (boils). N.B. Boiling point is the same as condensation point.
Aqueous	When a substance is dissolved in water.

The Three states of matter

Materials come in three different forms – **solid**, **liquid** and **gas**.

- Which **state** a material is depends on how strong the forces of attraction are between the particles of the material.
- The **strength** of the **forces** depends on: they type of **material**, **temperature** and **pressure**.

State	Solid	Liquid	Gas
Closeness of particles	Very close	Close	Far apart
Arrangement of particles	Regular pattern	Randomly arranged	Randomly arranged
Movement of particles	Vibrate around a fixed position	Move around each other	Move quickly in all directions
Energy of particles	Low energy	Greater energy	Highest energy
2D diagram			

Strength of forces between particles

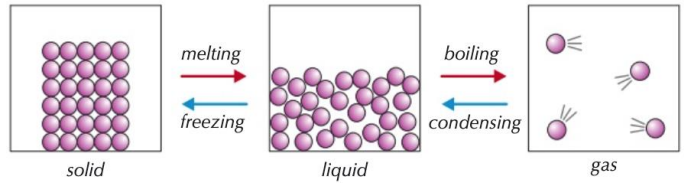
Strongest ← → Most movement

Movement of particles

Changes of state

Substances can **change** from one **state** to another. It is a **physical change** – only the **arrangement** or the **energy** of the **particles changes**, not the particles themselves.

The changes of state occur as **the bonds between particles form and break** as their gain and lose energy.



State symbols

$$2HCl_{(aq)} + CaCO_{3(s)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$$

Symbol equation can include **state symbols**: solid (s), liquid (l), gas (g), aqueous (aq)