

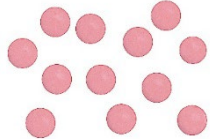


States of matter

Matter is anything that has **mass** and takes up space. Everything around us is made of **matter** and there are three **states** of matter – **solid**, **liquid** and **gas**. **Particle diagrams** explain the **properties** of solids, liquids and gases and they show how the **particles** are arranged.

Diagrams, definitions and properties

	Solid	Liquid	Gas
Diagram			
Definition	a state of matter with a defined shape and volume and where the particles are touching and vibrating	a state of matter with a defined volume but not a defined shape and where the particles are touching and moving randomly	a state of matter with no defined shape or volume and where the particles move randomly and have a large distance between them
Shape	fixed	takes shape of the bottom of the container	takes shape of container
Volume	fixed (cannot be compressed)	fixed (cannot be compressed)	can be compressed
Particle movement	can vibrate in place but cannot move out of position	constantly moving and can slide over each other	constantly moving
Kinetic energy	low	medium	high
Fluidity	cannot flow	can flow	can flow
Real-world example: making coffee	ground-up coffee beans	water in the coffee machine	when the water is heated in the coffee machine, some of the water becomes a gas as steam

Changes of state

During changes of state, the arrangement and energy of the **particles** must change.

When a **solid** reaches its **melting point**, it gains energy and turns into a liquid. The forces between particles are overcome and the **particles** can slide past each other.

When the temperature of a **liquid** increases, **particles** at the surface gain energy and overcome the forces of attraction. The **particles** turn into a **gas** (**evaporate**) and move randomly and freely. This can happen below the **boiling point**.

When the temperature of a **gas** decreases quickly, the **particles** lose energy and stop moving about. It turns into a **solid**, without first becoming a **liquid**.

Did you know ... ?

Water is an example of a **compound** which is found naturally in all three states of matter – ice as a **solid**, water as a **liquid** and water vapour as a **gas**.