



Keyword	Definition
Change of state	The change of a substance from one physical form to another
Condensing	The change of state when a gas changes to a liquid
Diffusion	The passive movement of particles from a high concentration to a low concentration (down concentration gradient)
Evaporation	The change of state when a liquid changes to a gas.
Freezing	The change of state when a liquid changes to a solid.
Gas	A substance that does not have a fixed shape or volume.
Gas Pressure	The force of gas particles hitting the walls of a container
Liquid	A substance with a fixed volume but not a fixed shape.
Melting	The change of state when a solid changes to a liquid.
Particle	The general term for a small piece of matter.
Solid	A substance with a fixed shape and volume.

All substances will exist as a SOLIDS, LIQUID or a GAS. It just depends on the temperature that they are at.

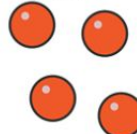
Solid



Liquid



Gas



We use circles to represent the particles in a substance. This gives us a model to use to understand how the particles are arranged and how they interact with each other.

Forces between particles:

Solid: There are strong forces of attraction between the particles in a solid. Therefore, particles can only vibrate in a fixed position.

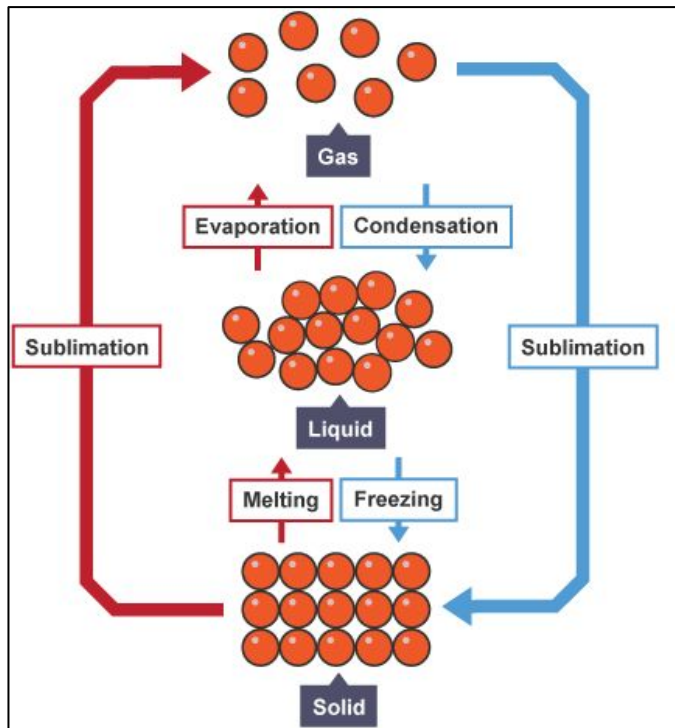
Liquid: There are weaker forces of attraction between the particles in a liquid. Therefore, the particles are close together, and are able to move around each other.

Gas: The forces of attraction between the particles are overcome. Therefore, the particles are far apart and move quickly in all directions.

We call this attraction between neighbouring particles: **intermolecular forces of attraction**

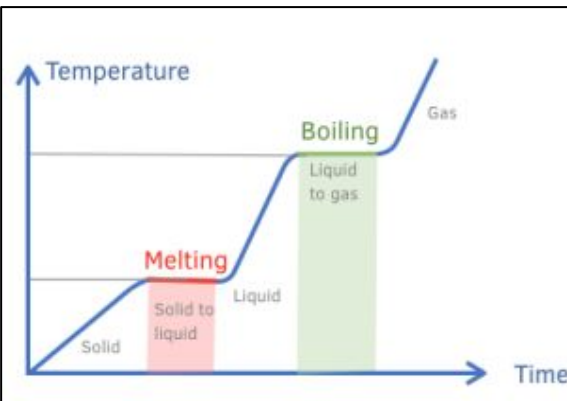
Further Reading:
<https://www.bbc.co.uk/bitesize/topics/z9r4jxs>

The particles vibrate in a fixed position.	The particles are close together and move around each other.	The particles are far apart and move quickly in all directions.
The particles cannot move from place to place.	The particles are arranged in a random position.	The particles are arranged in a random way.
Particles have a fixed shape and cannot flow.	The particles flow and take the shape of the bottom of their container.	The particles flow and completely fill their container.
The particles cannot be compressed (squashed)	The particles cannot be compressed.	The particles can easily be compressed.



When we add thermal energy (heat) the particles gain energy and they move more. When they move more they are able to overcome the **intermolecular forces** that keep them attracted to their neighbouring particles. This is how a substance changes state. The opposite occurs when the substance cools (removes thermal energy)

In this diagram the red arrows show heating and the blue cooling.



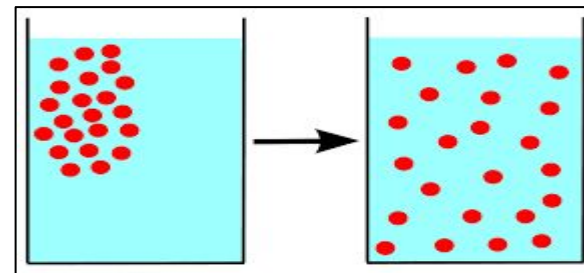
Temperature ($^{\circ}\text{C}$) is a measure of the movement of the particles in a substance. When a substance changes state the temperature does not change as the (thermal) energy goes to overcoming the **intermolecular forces of attraction**.

The temperature at which a substance melts is called its **melting point** and the temperature at which a substance boils is called its **boiling point**.

Room temperature is around 20°C . If the melting point of a substance is greater than room temperature, the substance will be a solid.

The melting point of water is 0°C and its boiling point is 100°C . Hence water is a liquid at room temperature.

As the particles of a gas collide with the walls of their container they exert a force. **Gas pressure** is the force exerted by a gas on a specific area.



We call liquids and gases fluids as the particles are free to move around.

Diffusion is the movement of fluid particles from a high concentration (where there are lots) to a low concentration (where there are less). We call this a concentration gradient.

Diffusion is a passive process, which means that it does not require any energy. It will just happen.

This is how smells, like perfume spread around a room.

