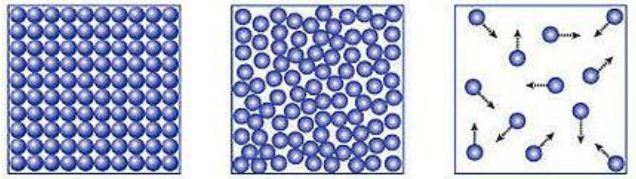
Year 7 Chemistry Knowledge Organiser
Topic 1: Particles

KPI 1: Describe the arrangement of particles in a solid, liquid and gas, and link this to their properties.

Particle Theory

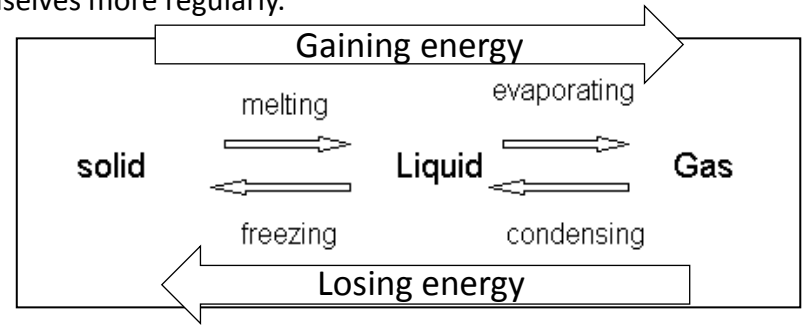
All matter is made up of particles. Particles are found in all 3 states of matter. Particles in the 3 states behave differently.



In **solids**, particles are arranged in a **regular pattern** and they can only **vibrate** in a fixed position. Particles in solids are not free to move.
In **liquids**, particles can **slide pass** each other. They are **arranged randomly**.
In **gases**, particles carry a lot of energy and they **move in all directions** in a high speed. Particles are **far apart** and are **arranged randomly**.

Change of State

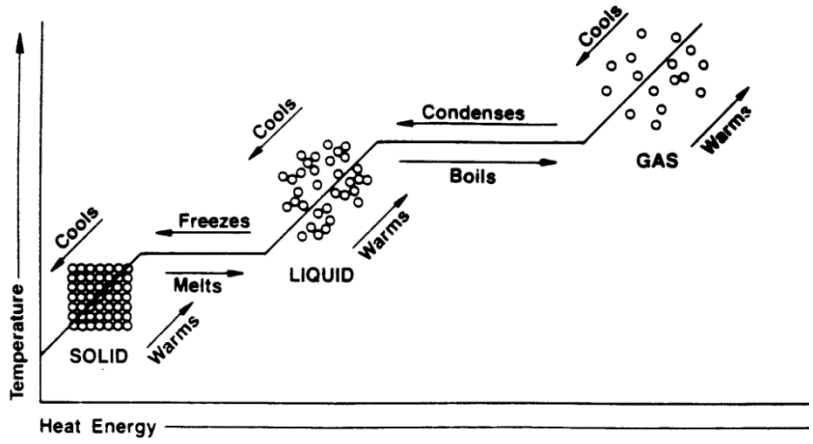
Changes of state take place when the particles gain or lose energy. When energy is applied, particles gain energy and move further apart. When energy is lost, particles become closer to each other and arrange themselves more regularly.



Key Terms	Definitions
State of matter	Matter is divided into three states: solid, liquid, and gas.
Melting	Change of state from solid to liquid.
Freezing	Change of state from liquid to solid
Evaporation	Change of state from liquid to gas.
Condensation	Change of state from gas to liquid.
Diffusion	Particles spread from a region of higher concentration to a region of lower concentration.
Rate	How fast an event, e.g. diffusion, is happening.
Concentration	The number of particles in a known volume.
Particles	All matter is made up of tiny particles.
Pressure	Pressure is formed when particles collide with the walls of containers.

Interpreting the Energy-Temperature Graph

During the change of state, **the temperature will stay the same until the change of state has been completed**, i.e. all liquid has turned into gas, all liquid has frozen into solid, etc.



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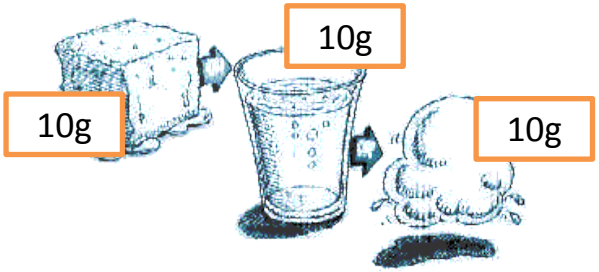
KPI 2: Explain changes of state in terms of the particle model.

Conservation of Mass

Mass stays the same before and after a change of state. For example, 10g of ice melts into 10g of water, and 10g of water evaporates into 10g of water vapour. The same applies to other substances.



Diffusion and Factors Affecting Diffusion

Diffusion is the **movement of particles from a higher concentration to a lower concentration. Diffusion will stop when particles spread themselves evenly.** Diffusion occurs in liquids and gases but not in solids, because particles in a solid are not free to move.

Examples of diffusion include:

1. Oxygen diffusing into cells.
2. Carbon dioxide diffusing out of cells.

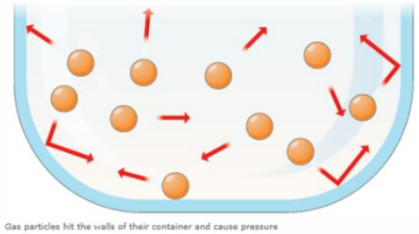
Diffusion

There are **2 factors** affecting the rate of diffusion:

1. **Temperature**: When temperature increases, particles gain more energy. They can then move and spread out at a higher rate.
2. **Concentration**: When concentration increases, the rate of diffusion increases.

Gas Pressure

Gas pressure is **caused by gas particles colliding with the walls of the container.** A container also experiences pressure on the outside. Air particles on the outside collide with the outside wall. **An imbalance between the pressure on the inside and outside can cause the container to change its shape.**



Gas particles hit the walls of their container and cause pressure

There are **3 factors** affecting gas pressure:

1. Number of particles:

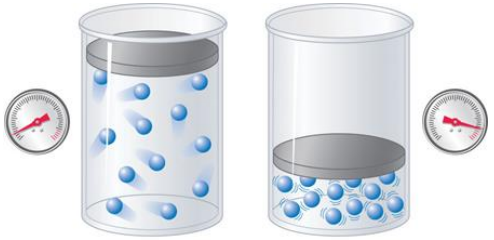
The more gas particles inside the container, the more often collisions will occur, creating a higher pressure.

2. Temperature:

If gas particles are heated up, they move with a higher speed and collide more often with the walls of the container, causing a higher pressure.

3. Volume:

If the same amount of gas particles are put into a container of a smaller volume, pressure will increase because particles will collide more frequently with the walls when they have less space.



(a) Low pressure (b) High pressure