

Pressure of a fixed volume of gas increases as temperature increases (temperature increases, speed increases, collisions occur more frequently and with more force so pressure increases).

Temperature of gas is linked to the average kinetic energy of the particles.

If kinetic energy increases so does the temperature of gas.

No kinetic energy is lost when gas particles collide with each other or the container.

Gas particles are in a constant state of random motion.

$$P = m \div V$$

$$\text{Density} = \text{mass} \div \text{volume.}$$



Density Mass of a substance in a given volume

Freezing	Liquid turns to a solid. Internal energy decreases.
Melting	Solid turns to a liquid. Internal energy increases.
Boiling / Evaporating	Liquid turns to a gas. Internal energy increases.
Condensation	Gas turns to a liquid. Internal energy decreases.
Sublimation	Solid turns directly into a gas. Internal energy increases.
Conservation of mass	When substances change state, mass is conserved.
Physical change	No new substance is made, process can be reversed.

Kinetic theory of gases

Particle model

AQA PARTICLE MODEL OF MATTER

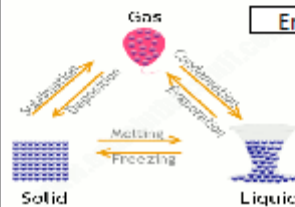
Internal energy and energy transfers

Change of state

Specific Latent Heat	Energy needed to change 1kg of a substance's state
Specific Latent Heat of Fusion	Energy needed to change 1kg of solid into 1 kg of liquid at the same temperature
Specific Latent Heat of Vaporisation	Energy needed to change 1kg of liquid into 1 kg of gas at the same temperature

$$\text{Energy needed} = \text{mass} \times \text{specific latent heat.}$$

$$\Delta E = m \times L$$



Specific Heat Capacity

Energy needed to raise 1kg of substance by 1°C

Depends on:

- Mass of substance
- What the substance is
- Energy put into the system.

Change in thermal energy = mass X specific heat capacity X temperature change.

$$\Delta E = m \times c \times \Delta \theta$$

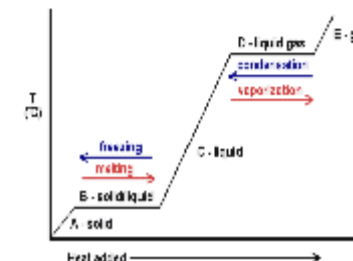
Internal energy

Energy stored inside a system by particles

Internal energy is the total kinetic and potential energy of all the particles (atoms and molecules) in a system.

Heating changes the energy stored within a system

Heating causes a change in state. As particles separate, potential energy stored increases. Heating increases the temperature of a system. Particles move faster so kinetic energy of particles increases.



State	Particle arrangement	Properties
Solid	Packed in a regular structure. Strong forces hold in place so cannot move.	Difficult to change shape.
Liquid	Close together, forces keep contact but can move about.	Can change shape but difficult to compress.
Gas	Separated by large distances. Weak forces so constantly randomly moving.	Can expand to fill a space, easy to compress.

	Units
Density	Kilograms per metre cubed (kg/m³)
Mass	Kilograms (kg)
Volume	Metres cubed (m³)
Energy needed	Joules (J)
Specific latent heat	Joule per kilogram (J/kg)
Change in thermal energy	Joules (J)
Specific heat capacity	Joule per kilogram degrees Celsius (J/kg°C)
Temperature change	Degrees Celsius (°C)
Pressure	Pascals (Pa)