C1:Particles and their behaviour

Knowledge organiser

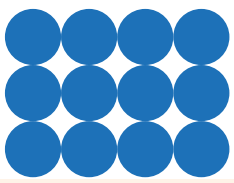
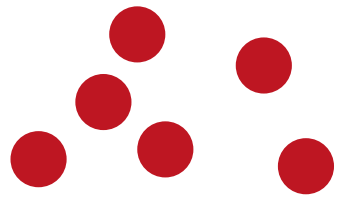
changes of state

particles gain energy from the surroundings → particles vibrate faster → particles lose their place in the pattern

melting

particles gain more energy from the surroundings → particles move faster → particles pull completely away from each other

boiling / evaporation

state of matter	solid	liquid	gas
How do the particles move?	particles do not move around, but vibrate on the spot	particles are touching but can slide over each other	particles are spread out far away from each other
arrangement of particles			
can it be compressed?	no, because there is no space between the particles	no, because the particles are touching their neighbours	yes, because there is space between the particles
can it flow?	no, because the particles can't move around	yes, because the particles can slide over each other and move around	yes, because the particles can move around

freezing

particles take a fixed place in a pattern ← particles move even slower ← particles lose more energy to the surroundings

condensation

particles come close together ← particles move slower ← particles lose energy to the surroundings

changes of state

Sublimation

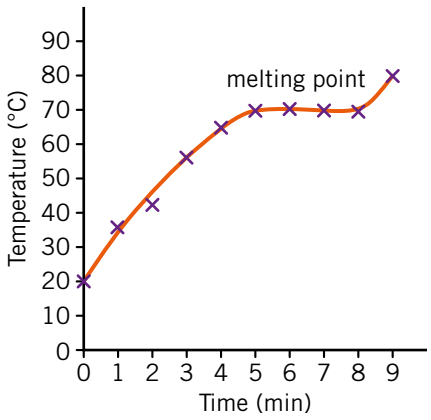
Some solids do not exist as liquids, but instead directly change state from solid to gas in a process called sublimation.

Melting and boiling points

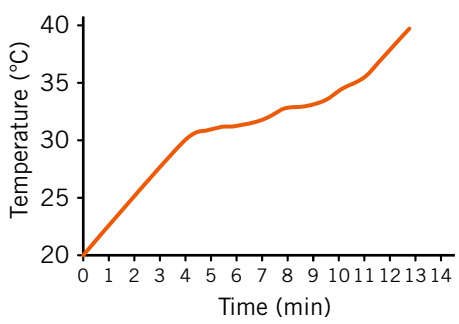
Melting point — the temperature at which a **substance** melts

Boiling point — the temperature at which a substance boils

If you heat a **solid** and plot a graph of temperature against time:



the melting point will appear as a flat line if the substance is **pure** (has only one type of particle).



If you don't see a flat line, the substance is a mixture (has different types of particle).

Diffusion

Particles move about randomly in liquids and gases and spread out through **mixtures**. This process is called diffusion. How quickly diffusion happens depends upon three variables:

Variable	Effect on diffusion
temperature	diffusion is faster at higher temperatures *because* particles move faster when hotter
particle size	diffusion is slower with larger, heavier particles
state of matter	diffusion is: • fast in gases • slow in liquids • doesn't happen in solids

Gas pressure

Gas particles move around, colliding with the walls of a container they are in. This causes a force called pressure. It depends on three variables:

Variable	Effect on gas pressure
temperature	Pressure increases at higher temperatures *because* particles move faster and therefore collide more frequently with the container.
particle size	Pressure increases with greater numbers of particles *because* there are more particles colliding with the walls of the container.
state of container	Pressure decreases as the size of container increases *because* particles have more space to move around, so they don't collide with the walls of the container as often.

Key terms

Make sure you can write a definitions for these key terms.

boiling boiling point change of state condensation diffusion evaporation freezing gas liquid melting mixture particle solid state of matter sublimation substance