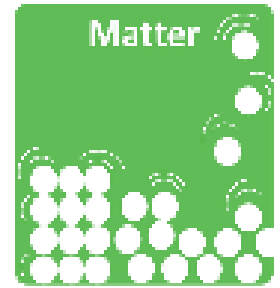


Knowledge organiser



Y7 topic: PARTICLE MODEL

I have already learned:

In KS2 (Year 4):

- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius ($^{\circ}\text{C}$)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

This topic links to:

Y7: Separating Mixtures

Y8: Elements

KS4: Atomic Structure, Bonding, Structure and the Properties of Matter

It is important to study the particle model because...

The particle model allows scientists to explain many of the observations that they make about the world around them. Everything in the world is made from particles- so it's pretty important for us to understand how they work! The particle model explains why ice floats in your drink and why oxygen diffuses into our cells and keeps us alive- it is essential knowledge for all areas of science.

Possible careers involving the particle model...

- Particle physicist- you could work at CERN!
- Cell Biologist- understanding diffusion would be essential
- Science Teacher- all students must understand how particles interact

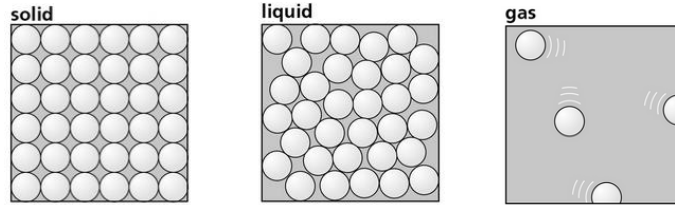
KNOWLEDGE ORGANISER

BIG IDEA: MATTER

TOPIC: PARTICLE MODEL

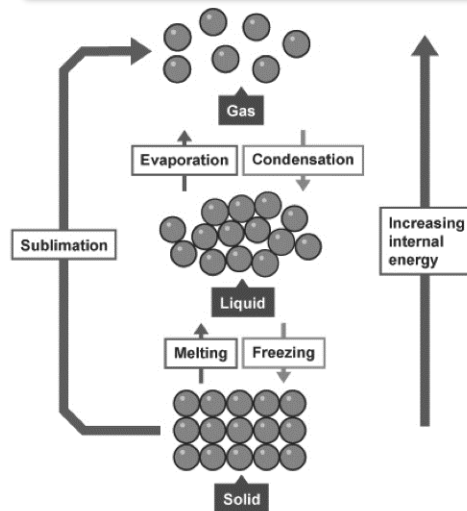
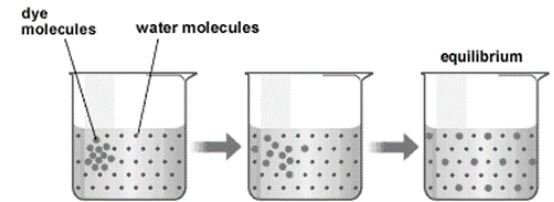
Key Word	Definition
particle	A very tiny object such as an atom or molecule, too small to be seen with a microscope
diffusion	The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer
density	How much matter there is in a particular volume, or how close the particles are
evaporate (evaporating) (evaporation)	Change from liquid to gas at the surface of a liquid, at any temperature
boil (boiling)	Change from liquid to a gas of all the liquid when the temperature reaches boiling point
condense (condensing) (condensation)	Change of state from gas to liquid when the temperature drops to the boiling point
melt (melting)	Change from solid to liquid when the temperature rises to the melting point
freeze (freezing)	Change from liquid to a solid when the temperature drops to the melting point
sublime (sublimation)	Change from a solid directly into a gas
gas pressure	The force exerted on the walls of a container when particles collide with them

There are three states of matter: solid, liquid and gas. Properties of solids, liquids and gases can be described in terms of **particles** in motion but with differences in the arrangement and movement of these same **particles**: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). This is known as the **particle model** and can be represented by these simple diagrams.

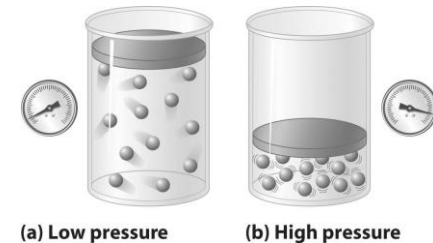


Solids usually have a higher **density** than liquids or gases because they contain more **particles** in a certain volume, the **particles** are therefore closer together. Gases can be compressed (squashed) because there is space between the **particles**. Water is an anomaly in this regard as ice (solid) floats on liquid water!

Diffusion is where gas or liquid **particles** spread out. They move from an area where there are many particles to an area where there are few particles. The rate (speed) of **diffusion** can be affected by: temperature, particles size and the states of the diffusing substance.



Gas particles move around randomly. When they collide with the walls of the container they exert a force on the container, this is known as **gas pressure**. The gas pressure will be higher when there are more particles, or they are moving faster.



When substances change state this is because they gain or lose energy.

Melting and **evaporation** are caused by the **particles** gaining energy from their surroundings. **Condensation** and **freezing** are caused by the **particles** losing energy to their surroundings.

A substance is a solid below its **melting point**, a liquid above it, and a gas above its **boiling point**.

