

States of matter

Matter can generally take 3 different forms:

- Δ Solids, liquids or gases

Properties

A property of a substance is a characteristic that we can use to describe it.

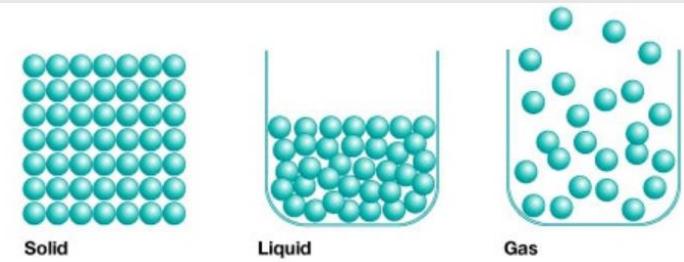
- Δ Solids can not flow and have fixed shapes. They can not be compressed (squashed).
- Δ Liquids flow and take the shape of their container. They can not be compressed (squashed).
- Δ Gases flow and fill their container. They can be compressed (squashed).

Density This is a measure of how tightly packed the particles are in a given volume.

- Density = $\frac{\text{Mass}}{\text{Volume}}$
- Units are kg/m³ or g/cm³
- We use a digital balance to measure the mass of an object
- We use a ruler to measure the length, width and height of a regular shaped solid
- Volume = length x width x height
- We can use displacement of water to measure the volume of irregular solids

Particle Theory

- ✓ The particles that make up all objects are arranged differently for solids, liquids and gases. Their arrangement affects their properties.
- ✓ Solids – particles all touching, not free to move



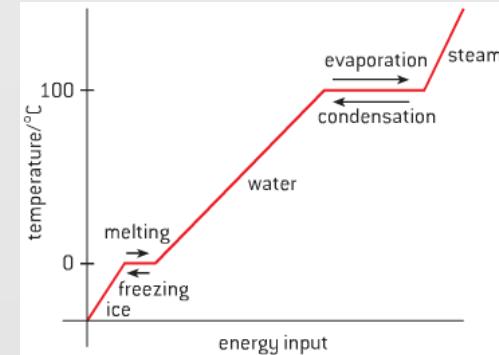
- ✓ Liquids – particles touching but not in a regular arrangement and can move freely
- ✓ Gases – Particles are far apart and can move freely

Expansion & Contraction

- Δ When solids, liquids and gases are heated they expand (get bigger)
- Δ This is because the particles gain more energy from the heat so move more quickly
- Δ As they move more quickly the particles spread out more so the object expands
- Δ Likewise when objects cool down the particles have less energy and so move more slowly so spaces between the particles get smaller

Changes of State

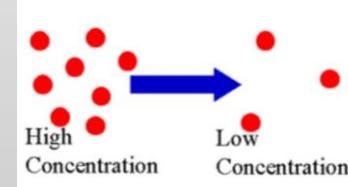
- ✓ When we increase the energy of a substance and measure its temperature the graph looks like this



- ✓ The horizontal parts are caused by energy being needed to break bonds and change state i.e. move from solid to liquid to gas

Diffusion

- Diffusion is the movement of a fluid (liquid or gas) from an area of high concentration to an area of lower concentration.



- Think of concentration a bit like density (the number of particles in a given volume)
- It is caused by the energy of the particles moving and is faster in gases than it is in liquids

Key Words

Particles, Density, Diffusion, Concentration, Melting, Freezing, Condensing, Evaporating