RAFFLES INSTITUTION RAFFLES PROGRAMME - YEAR THREE CHEMISTRY

NATURE AND CLASSIFICATION OF MATTER

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Elements, Compounds and Mixtures

Element: A substance that is made up of only one type of atom. It cannot be chemically split into simpler substances.

- Pure substance (only one type of atom)
- Cannot be chemically split into simpler substances
- Fixed m.p. and b.p.

Compound: A substance that contains two or more elements chemically joined together.

- Pure substance (but more than one type of atom)
- Can be decomposed into elements or into simpler compounds
- Can only be formed from elements through chemical processes/chemical change
- Can only be separated into elements with chemical methods
- Fixed m.p. and b.p.
- Elements are in fixed proportion by mass
- Physical properties differ from those of constituent elements

Mixture: A substance that contains two or more elements physically together but not reacted with one another chemically.

- Impure substance (with more than one type of atom)
- Can be formed from elements through physical processes (no chemical change occurs)
- Can only be separated into elements with physical methods
- No fixed m.p. and b.p.
- Proportion of the constituents in a mixture can vary
- Physical properties are the same as those of constituents

Particulate Nature of Matter

1. Matter is made of atoms
2. Atoms/molecules' energy of motion is felt as temperature (temp → KE)
    a. vibration/translation
3. Pressure of gas is due to motion of molecules striking object bearing pressure
4. Large distance between molecules of gas compared to size of molecules

When explaining states / change in states, 3 steps:

1. Arrangement of particles

(Packed closely in orderly arrangement, Packed closely in disorderly arrangement, Far apart in disorderly arrangement)

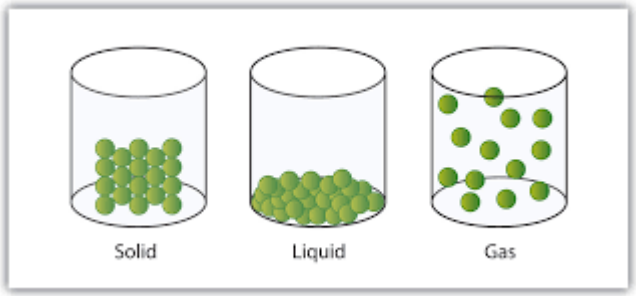
2. Forces of attraction between particles

(Very strong, Strong, Weak)

3. Movement of particles

(Vibrate and Rotate around fixed positions, Slip and slide over each other, Constant random motion)

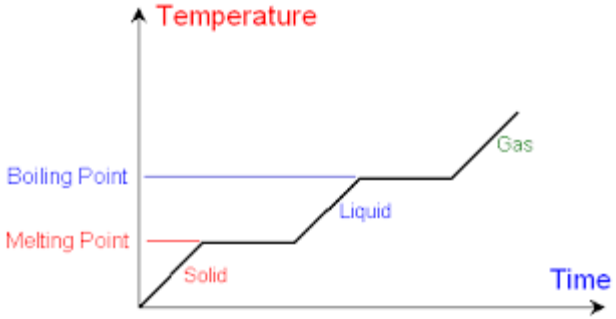
	Solid	Liquid	Gas
Energy Content	Lower than in liquid or gas	Lower than in gas	High (High Kinetic Energy)
Arrangement of Particles	Close together in an orderly arrangement	Close together but in no orderly arrangement (disorderly arrangement)	Far apart and no orderly arrangement (disorderly arrangement)
Motion	Vibration (about its fixed positions)	Vibration and Translation (Slip and Slide over each other)	Vibration and Translation(Constant random motion)
Forces of attraction between particles	Stronger than in gas or liquid (Very strong)	Stronger than in gas (strong)	Weak or none
Compressible	No	No	Yes



States of Matter: Solid - Liquid - Gas

Phase Transition:

- Shown with heat curve
- Energy used to send molecules into different states
- Temperature will remain same until all of solid/liquid has undergone transition to liquid/gas



Evidence

- Diffusion (matter is particulate)
- Movement from area of high concentration to an area of low concentration
- Rate of diffusion affected by temperature and mass of particles