

14/2021

Matter

- 1) matter is anything that occupies space, has mass and can be perceived by our senses.
- 2) can be classified into 3 categories:
 - a) Solids
 - b) liquids
 - c) gases

CHARACTERISTICS	SOLID	LIQUID	GASES
a) shaped and volume	fixed	volume fixed	not fixed
b) Arrangement of particles	close together	further than solids	very far apart
c) Inter-molecular space	very less	more than solids	lot of space
d) Inter-molecular force	very strong	less than solids	very weak
e) compressibility	can't be compressed	Negligible	can be compressed
f) Diffusion	none	none	present
g) Density	maximum	less than solids	least
h) Rigidity / fluidity	Rigid	fluid	fluid

- 4) All metals and noble gases are mono-atomic.
- 5) most ~~dia~~ non-metal are diatomic.
- 6) A molecule, composed of atoms can exist freely.

MONOATOMIC: Molecule composed of 1 atom

DIATOMIC: Molecule composed of 2 atoms

POLYATOMIC: Molecule composed of more than 2 atoms

Matter

CHARACTERISTICS OF MOLECULES:-

- > they are very small in size.
- > they have spaces between them
- > they are in constant motion as they possess kinetic energy
- > they attract each other.

CHANGE OF STATE:-

- a) the process of change of state from 1 state to another either by absorption or rejection of heat at a constant temperature

MOLECULAR MODEL:-

- Arrangement of particles
- Intermolecular force
- Intermolecular space
- Kinetic energy

MELTING MOLECULAR MODEL:-

In a solid, the molecules are tightly packed. They have less intermolecular space but a strong intermolecular force between them. The molecules vibrate about their mean position thus they contain less kinetic energy. On heating a solid, the kinetic energy increases due to which they move more violently. At their melting point the molecules require sufficient kinetic energy to become further separated from each other by overcoming the forces of attraction between them. They become free to move in between the substance, they have lesser intermolecular force, i.e. the state of the substance becomes liquid. Molecules in a liquid are loosely packed.

MELTING/ FUSION AND FREEZING :-

When a solid is heated at a fixed temperature it changes into liquid. This process is called melting or fusion. The reverse happens when this liquid is cooled. The liquid freezes into solid at the same fixed temperature. This is called freezing.

eg: Ice to water, water to ice.

VAPORIZATION BY MOLECULAR MODEL:-

In a liquid, the molecules move in all direction but within the boundary of the container. They exert small forces of attraction on each other. They have low kinetic energy. On heating the average kinetic energy of molecules of liquids increases. At a particular temperature the molecules acquire sufficient kinetic energy to overcome the forces of attraction between themselves and they become free to leave the liquid surface. This is called Vaporization.

VAPORIZATION OR BOILING:-

The change from liquid state to gaseous state on heating at a constant temperature by absorption of heat is called vaporization or boiling. Boiling is at a fixed temperature while evaporation can occur at any time.

eg: water to vapours

EVAPORATION:-

Evaporation is another process by which a liquid changes into vapour. The change of state from liquid to vapour at all temperature from the surface of a liquid.

RATE OF EVAPORATION:-

- 1) The evaporation temperature of the liquid:- the rate of evaporation is higher if the temp. of the liquid is higher.
- 2) The area of the exposed surface:- the rate of evaporation increases if the area of the exposed area increases
- 3) The nature of liquid:- Volatile liquids evaporate much faster as the force of attraction between their molecules is negligible.
- 4) The flow of air above the liquid:- If air is blown above a liquid it evaporates much faster.
- 5) The presence of moisture or humidity:- In dry air evaporation is faster than on humid days.

Molecular model of Evaporation:-

In liquids molecules move within their boundary as they collide with each other. During this collision, some of molecules below the surface of the liquid gain enough energy to overcome their forces of attraction and their intermolecular spaces which is originally more in solids but lesser than gases. As these molecules move to the surface of the liquid they absorb heat from their surrounding areas which allows them to escape into the atmosphere with the air molecules. This is the molecular model of evaporation.

SUBLIMATION AND DEPOSITION:-

- Sublimation is the process by which a solid directly changes into its vapour if heat is supplied to it.

eg: Naphthalene balls, dry ice to CO_2

- Deposition is the process where vapour on cooling turns directly into a solid form without first changing first into a liquid.

eg: Formation of frost, sand dunes (formation)

Explanation of Sublimation by the Molecular Model:-

In some solids the intermolecular force of attraction and intermolecular space is higher. In such solids on heating they acquire sufficient kinetic energy to overcome their forces of attraction entirely and become free to move anywhere, thus their intermolecular spaces increase more and they turn into vapour. This is the molecular model of sublimation.