DEFINITION OF MATTER

Anything that exists is matter. Scientifically anything that has mass (weight) and occupies some space (volume) is called matter. e.g air, wood, water etc.

It is composed of very small particles called atoms or molecules.

There are three states of matter.

(i) Solid state (ii) Liquid state (iii) Gaseous State

KINETIC MOLECULAR THEORY OF MATTER

Important points of kinetic molecular theory of matter are given below.

(1) Matter is composed of very small particles which are called "Molecules".

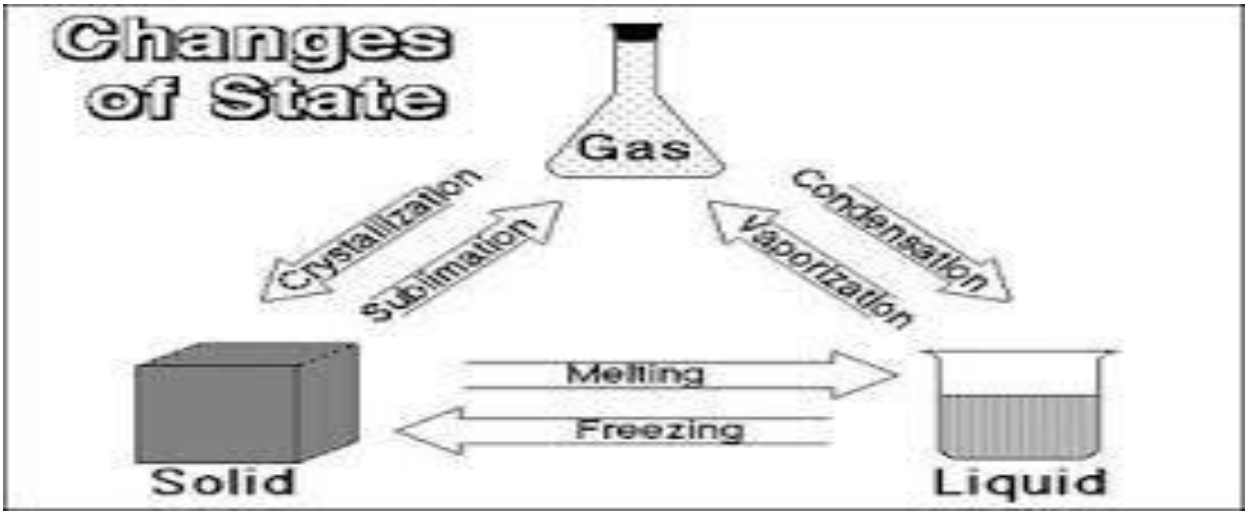
(2) Molecules of matters always remains in continuous motion, thus they possess kinetic energy.

(3) The three states of matter depend upon the arrangement motion and forces of attraction between these molecules.

PROPERTIES OF TYPES OF MATTER

S.No:	Solid State	Liquid State	Gaseous State
1	Solids have definite shape and definite volume.	Solids have definite volume but no definite shape.	Gases have neither definite shape nor definite volume.
2	Solids consist of atoms, molecules or ions.	Liquids consist of molecules.	Gases consist of molecules.
3	There are strong forces of attraction between the particles of solids (i.e, atoms, molecules or ions).	There are weak forces of attraction between the molecules of liquids.	There is no force of attraction between the molecules of gases.
4	Particles of solids are strongly bonded with one another at fixed positions. They show only vibration motion about their fixed position.	Molecules of liquids are not fixed at particular places; they can slide or roll over one another. Thus liquids flow and diffuse.	Molecules of gases are free to move everywhere. They are widely separated from one another. They show linear, circular and vibrational; motion.
5	Solids cannot be compressed by applying pressure.	Liquids cannot be compressed by applying pressure.	Gases can be compressed by applying pressure.
6	The diffusion in solids is negligible.	The diffusion in liquids is slow.	The diffusion in gases is fast and rapid.
7	Example: Pen, Chair, iron, Diamond are solids	Example: Water, Petrol, Oil, Honey are liquids.	Example: H_2, O_2, CO_2, CH_4 are gases.

INTER CONVERSION OF THREE STATES OF MATTER



MELTING POINT:

The temperature at which a solid becomes a liquid at a fixed pressure, usually standard pressure is called as melting point.

FREEZING POINT:

The temperature at which a liquid of specified composition solidifies under a fixed pressure, usually standard pressure is called as freezing point.

EVAPORATION:

Evaporation is the process of a substance in a liquid state changing to a gaseous state due to an increase in temperature and pressure.

CONDENSATION:

Condensation is the process of a substance in a gaseous state transforming into a liquid state. This change is caused by a change in pressure and temperature of the substance.

CRYSTALLIZATION:

The process in which dissolved solute comes out of solution and forms crystal is called crystallization.

SUBLIMATION:

The process of conversion of some solids into vapors (gaseous state) on heating without passing through liquid state is called sublimation.

DIFFUSION:

Inter mixing of two or more gases to form a homogeneous mixture without any chemical change is called "Diffusion Of Gases". Diffusion is purely a physical phenomenon. Gases diffuse very quickly due to large empty spaces among molecules. Different gases diffuse with different rates (velocities).

GRAHAM'S LAW OF DIFFUSION

Introduction:

The quantitative relationship between the rate of diffusion of different gases and their molar masses or densities is called Graham's Law of Diffusion established by a Scottish chemist, Thomas Graham in 1846.

Statement:

This law states that:

"Under the same conditions of temperature and pressure, the rate of diffusion of gas is inversely proportional to the square root of its density or molar mass."

Explanation:

According to Graham's law, lighter gases (with low density and also low molecular mass) diffuse faster than heavier gases (with high density and also high molecular mass). For Example, hydrogen gas diffuses four times faster than oxygen O_2 gas (with molar mass of 32 a.m.u.) at similar conditions because of less molar mass of H_2 (2 a.m.u.).

Mathematically, the comparative rates of diffusion of two gases can be formulated as:

Here,

r_1	=	rate of diffusion of gas 1
r_2	=	rate of diffusion of gas 2
d_1	=	density of gas 1
d_2	=	density of gas 2
M_1	=	Molar mass of gas 1
M_2	=	Molar mass of gas 2

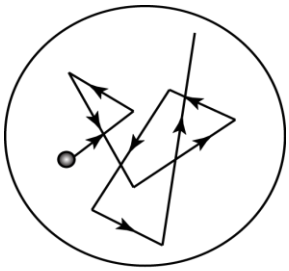
BROWNIAN MOVEMENT

Introduction:

In 1827, a British Botanist, Robert Brown observed the movement of pollen grains in water by microscope. This random motion of pollen grains is called Brownian movement.

Definition:

Brownian movement is a condition, rapid, zig-zag, free motion of suspended particles through the medium.



Brownian Movement

For Example:
To observe Brownian movement, some powdered sulphur is mixed in water with continuous stirring and then filtered this mixture. Some of the very tiny sulphur particles pass through the pores of filter paper into the filtrate. Now a drop of this filtrate is put on a slide and examined under a high power microscope. It is observed that sulphur particles performed rapid random zig-zag motion through the medium (water) and this motion is called Brownian movement.

FILL IN THE BLANKS.

i.	three	ii.	Volume	iii.	Motion
iv.	boiling	v.	liquid	vi.	Evaporation.

TICK THE CORRECT ANSWER

i. (c) 3

ii. (b) Gas

iii. (b) boiling point

iv. (b) Solid State

v. (b) Evaporation

vi (c) sublimation