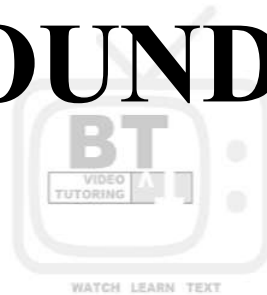




MATTER IN OUR SURROUNDINGS



Anything which occupies space and has mass is called matter.

Classification of matter

Physical classification

on the basis of appearance.

Chemical classification

on the basis of chemical composition.

Nature of matter

Matter is made up of particles.

The particles constituting matter are very small.

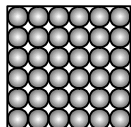
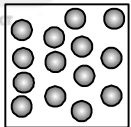
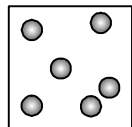
The particles have vacant space in them known as inter particle space.

Particles are not stationary and are in state of motion.

Attractive force are present in the particles of a substance. These are called interparticle force.

The particle motion increases with rise in temperature.

DIFFERENCE BETWEEN STATES OF MATTER

Property	Solid state	Liquid state	Gas state
Nature	Very hard	Fluid	Highly fluid
Compressibility	Negligible	Very small	Very high
Shape & volume	Definite	Only definite volume	Both indefinite
Inter particle space	Very small	Larger than solid	Very large
Inter particle force	Very strong	Weak	Very weak
Density	high	Less then solids	Very low
Kinetic energy	Low	Comparatively high	Highest
Diffusion	Negligible	Slow	Very fast
Eg.	Wood, Chalk, Sponge	Milk, water, benzene	O ₂ , N ₂ , CO ₂ , H ₂ .
			

Remember

Diffusion of solids in liquids increases with increase in temperature.

Diffusion of gases in liquids decreases with increase in temperature

Sponge is a solid but we can compress it easily because it has minute holes in which air is trapped.

When we press it the trapped air is expelled out that's why we can easily compress it.

Diffusion

Movement of the particle of a substance through the particle of other kind.

Eg - Ink diffuses in water, Sugar dissolves in water, Smell of perfume spreads

Rate of diffusion depends on

(a) Interparticular space in the medium of diffusion

Greater the inetrparticular space in the medium of diffusion, higher is the chance of diffusion of a substance through the medium.

Eg - Diffusion occurs least through solids, more in liquids and maximum in gases.

(b) Energy content of the diffused particles

Greater the energy content of the particles of a substance, faster it will diffuse.

Eg - Solids diffuse slowest and gases diffuse fastest in a given medium

(c) Temperature

At higher temperature the interparticular force of attraction weakens

The kinetic energy of the particles increases

Inter particular spaces increases

Temperature

The Physical quantity used to measure the degree of hotness and coldness (heat content) of a given solid, liquid or gaseous substance.

Scale of measuring the temperature

Celsius scale : from 0°C to 100°C

Fahrenheit scale : from 32°F to 212°F

Kelvin scale : (S.I.) scale.

Relation between different scale

$$F = 9/5(^{\circ}\text{C}) + 32^{\circ}$$

$$K = ^{\circ}\text{C} + 273.15$$

Note

Mercury is used in glass thermometers because it does not stick with glass.

Kelvin Scale is best scale measuring temperature as it has no negative sign

Pressure

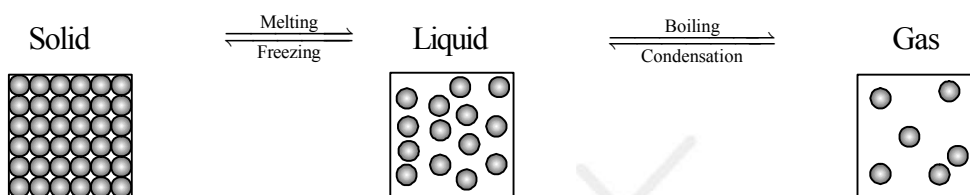
Scale of measuring the pressure

$$1 \text{ a.t.m.} = 760 \text{ mm} = 1.01 \times 10^5 \text{ pascal}$$

Interconversion of States of Matter

The phenomenon due to which the matter changes from one state to another state and back to the original state, on altering the conditions of

- (1) **Temperature**
- (2) **Pressure**



Effect of increasing temperature (heating)

Energy content of particles increases

Inter Particle Force of attraction decreases

Inter Particle space increases

Effect of decreasing temperature (Cooling)

Energy content of particles decreases

Inter Particle Force of attraction increases

Inter Particle Force of attraction decreases

Freezing

The process due to which a liquid changes into solid state at constant temperature, by giving out heat energy is known as freezing and this temperature is known as freezing point.

Note The freezing point of an impure liquid is always less than the pure liquid.

Melting

Process due to which solid changes into liquid state at constant temperature., by absorbing heat energy is known as melting and this temperature, is known as melting point.

Concept of Latent heat**Temperature remains constant when solid start melting...Why?**

This happens because all the heat energy supplied does not increase average kinetic energy.

It is used to weaken the intermolecular force of attraction and to increases inter molecular spaces.

Thus the supplied heat energy is used elsewhere.

This hidden heat is known as latent heat of fusion.

The amount of heat energy required to change 1 k.g.of a solid at its melting point at 1 a.t.m. and without any rise in temperature is known as specific latent heat of fusion.

Eg The latent heat of fusion of water (ice) = $3.34 \times 10^5 \text{ J kg}^{-1}$

Note The melting point of a substance is the measure of its inter molecular attractive forces

Eg	Diamond	4000°C	Iron	1535°C
	Rhombic Supher	95°C	Wax	63°C
	Ice	0°C		

Boiling

The process due to which a liquid changes into a gaseous state at constant temperature by absorbing heat energy is known as boiling and this temperature is known as boiling point.

Temperature remains constant when liquid starts boiling...Why?

This happens because all the heat energy supplied does not increase average kinetic energy.

It is used to weaken the intermolecular force of attraction and to increases inter molecular spaces.

Thus the supplied heat energy is used elsewhere.

This hidden heat is known as latent heat of vaporisation.

The amount of heat energy required to change 1 k.g. of a liquid at its boiling point into gaseous state at 1 a.t.m. and without any rise in temperature is known as specific latent heat of vaporization.

Eg The latent heat of vaporisation of water = 22500 KJ

Note The boiling point of an impure liquid is always higher than the pure liquid.

Condensation

The process due to which a gas changes into a liquid state at constant temperature by giving out heat energy is known as condensation and this temperature is known as liquifaction point.

Note Condensation is the phenomenon of spontaneous conversion of vapours to liquid.

It is not the process of conversion of a gas into liquid.

Pressure

Force applied per unit area is called pressure.

Why do gases exert pressure?

In a container filled with gas, the gas particles are never at rest.

They move randomly in all directions and collide with each other and with the walls of the container as well.

The force applied by these particles on the walls of the container is responsible for the pressure exerted by the gas.

Effect of pressure on the state of matter

The increase in pressure brings the particles of a substance closer, so the inter particle space decreases and the interparticle force increases.

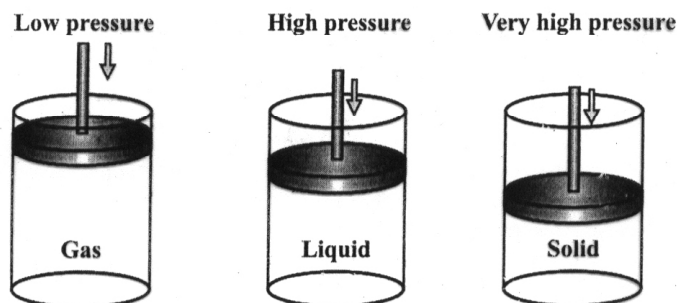
This leads to the change in state.

Eg - CO_2 gas can be liquified or even solidified at very low temperature and high P.

This solid CO_2 is dry ice.

For every gas there is a certain temperature above which gas can't be liquified however will be the pressure.

This temperature is known as critical temperature.



Sublimation

The process due to which a solid directly changes into gaseous state on heating, without changing first into liquid state and the gaseous state directly changes into solid state on cooling is known as sublimation.

Eg. : ammonium chloride, camphor, iodine etc.

Sublime

A gaseous form, directly formed from a solid on heating is known as sublime.

Sublimate

A solid state of matter formed directly from its gaseous state on cooling is called sublimate.

Application of sublimation

Sublimation can be used to purify the impure sample and nonvolatile impurities present in it.

Non volatile impurities will not change into vapours they will remain in dish.

Evaporation

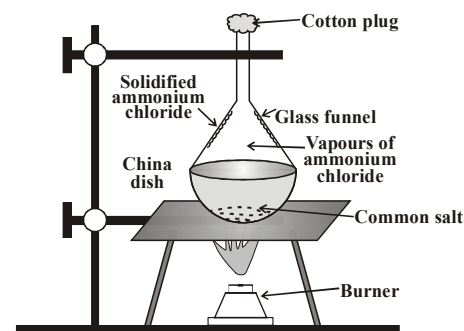
The phenomenon of changes of liquid to the vapour state at any temperature below the boiling point of the liquid.

Explanation of evaporation:

The particles of liquid collide with each other and transfer the kinetic energy from one particle to another, these collisions are called elastic collision.

Thus some molecules become more energetic and leave the liquid surface and escape into the air.

The molecules left behind are less energetic, so cooling is caused by evaporation.



Factors affecting evaporation

Surface area available for evaporation:

Greater the surface area of liquid more will be the rate of evaporation.

Increase in temperature:

Increase in temperature increases the kinetic energy of particles of the liquid. They acquire greater tendency to change to the vapour state as a result evaporation becomes fast.

Decrease in humidity:

Humidity represent the amount of water vapours present in air, higher the humidity level lower will be the evaporation.

Increase in wind speed:

With the increase in wind speed, the particles of water vapours present in air also move away and the air which replaces it, is comparatively dry. This will increase the rate of evaporation.

Do you know...???

Surgeons often perform minor surgeries on a portion of skin by spraying ether. It is low boiling liquid and evaporates at a very fast rate from the skin so the temperature of skin becomes so low that it gets almost numb.

That's why at the time of cut patient will not feel any pain due to numbness.

Application of evaporation :-

We wear cotton clothes in summer.

Water in earthen pitcher has become colder.

We see water droplets on the outer surface of a glass containing ice cold water.

Difference between gas and vapour

Vapour

The term vapour is used to describe those gases that usually exist as liquid at room temperature.

Eg : water, petrol etc.

Gas

The term gas is used to describe those gases that usually do not exist as liquids at room temperature.

Eg : O₂, N₂, CO₂ etc.

Boiling	Evaporation
Boiling occurs when liquid is heated.	Evaporation of a liquid takes place of its own
Boiling takes place at a specific temp i.e. (b.p.)	Evaporation takes place at all temperature
Boiling is bulk phenomena	Evaporation is surface phenomena.
No cooling is caused during boiling.	Cooling is always caused during evaporation