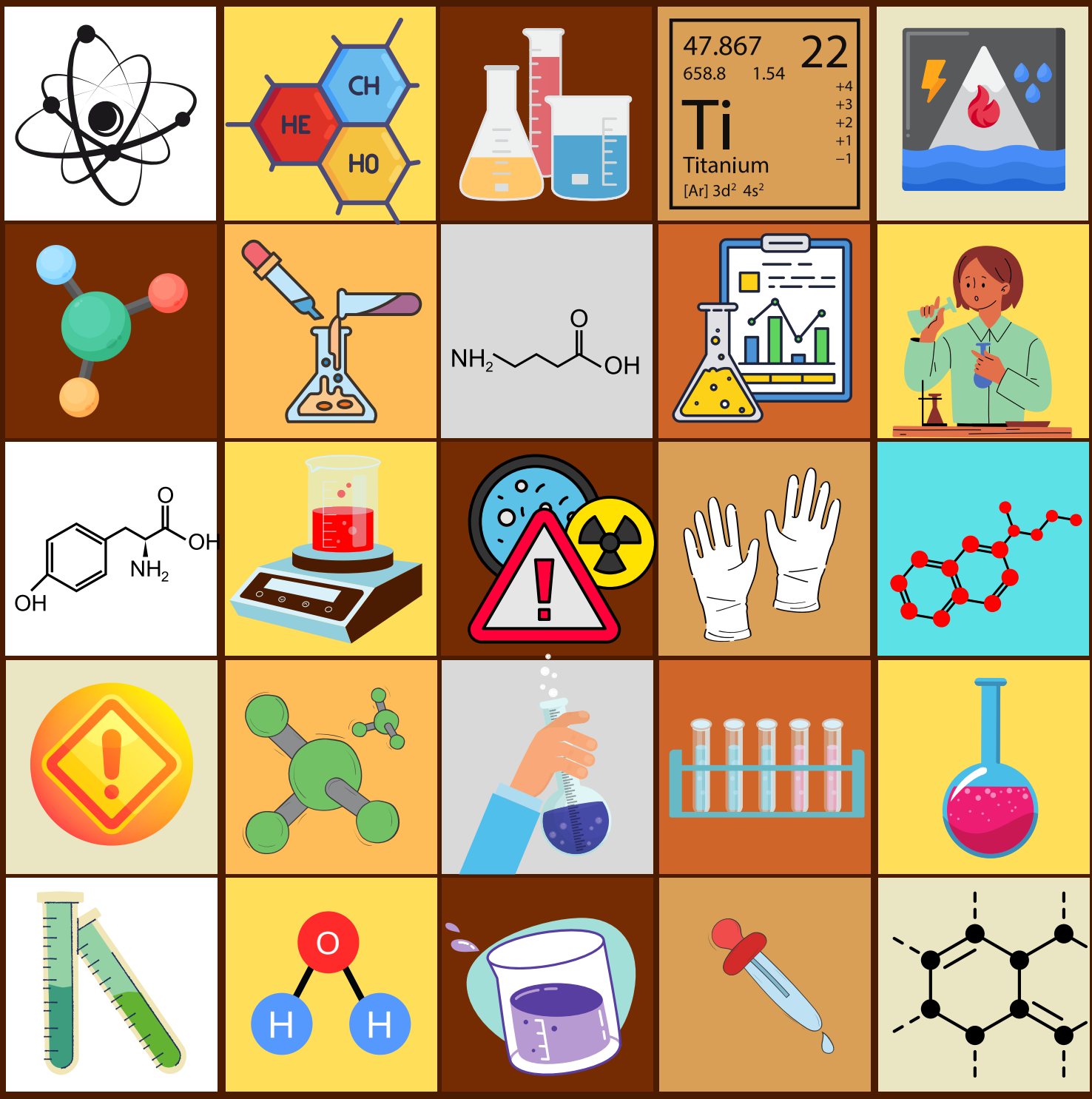


CLASS 9th NOTES

CHEMSITRY

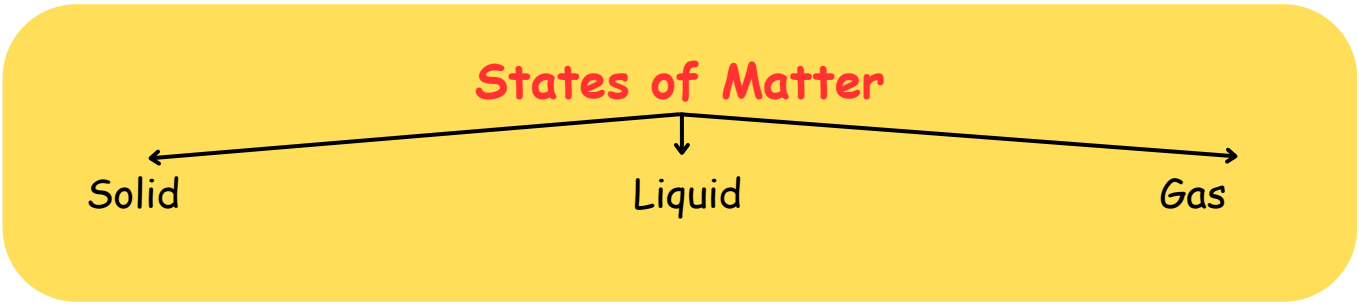
MATTER IN OUR SURROUNDINGS

PRASHANT KIRAD

MATTER IN OUR SURROUNDINGS

Matter:

- Matter is the material that makes up everything in the world, like the things around us. It's what takes up space, has weight, and pushes back when we touch it.
- Matter is made up of tiny particles which are very small.

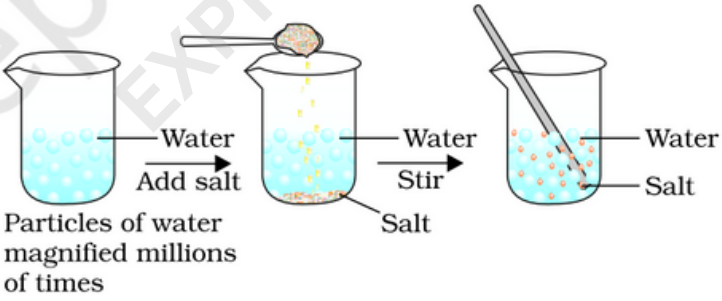


Characteristics of Particles:

1.Continuous Motion: Particles of matter are continuously moving i.e., they possess kinetic energy. As the temperature rises, particles moves faster because kinetic energy of the particles increases.

Gases> Liquids> Solids

2.Particles of matter exhibit spaces between them:



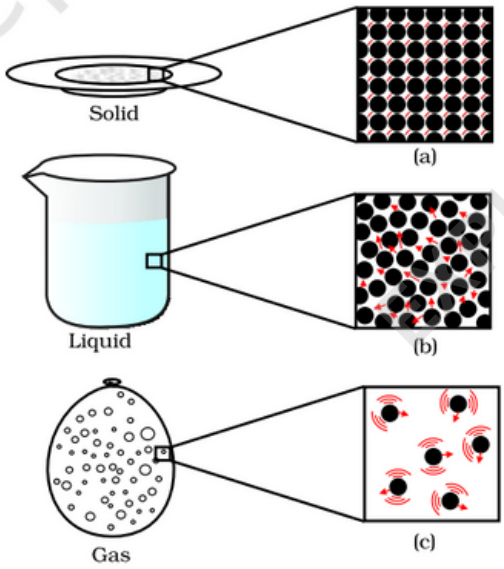
When we dissolve salt in water, the particles of salt get into the spaces between particles of water. Which depicts that there is enough space in between the particles.

Gases> Liquids> Solids

3.Attraction between particles: Particles of matter exert attractive forces on each other. For instance, this is why a stream of water stays together when we attempt to break it with our fingers.

Solids> Liquids> Gases

	SOLIDS	LIQUIDS	GASES
1	Particles are very closely packed	Particles are loosely packed	Particles are very loosely packed
2	Have definite shape and volume	Don't have definite shape but definite volume	Neither have definite shape nor volume
3	Inter particle forces are large.	Inter particle forces are intermediate.	Inter particle forces are negligible.
4	Particle motion is restricted to vibratory motion.	Particle motion is very slow.	Particle motion is very rapid and also random.
5	Have high density and can't be diffused	Density is lower then solids and can diffuse	Density is least and can easily diffused



a, b and c show the magnified schematic pictures of the three states of matter. The motion of the particles can be seen and compared in the three states of matter.

Change of State of Matter:

- Water can exist in three states of matter i.e., solid - ice, liquid - water, gas - water vapour.
- On heating ice melts into water and then converts into water vapours.

Change in the physical state of matter can be done in two ways :

(A) By Changing the Temperature:

(i) Melting Point: The temperature at which a solid melts to form liquid at atmospheric pressure is called its melting point. Melting point of ice is

273.16 K (0°C). During melting the temperature of ice does not rise even though heat is being supplied continuously because of latent heat of fusion. This latent heat of fusion is used up to overcome the forces of attraction between ice particles. At 0° C energy of water particles is much more than the energy of particles of ice at 0°C.

- ***Latent Heat of Fusion:*** *The amount of heat required to change 1kg solid to its liquid state (at its melting point) at atmospheric pressure.*

(ii) Boiling Point: The temperature at which a liquid boils to form vapours at atmospheric pressure is called its boiling point. Boiling point of water is 373 K (100°C +273 = 373 K).

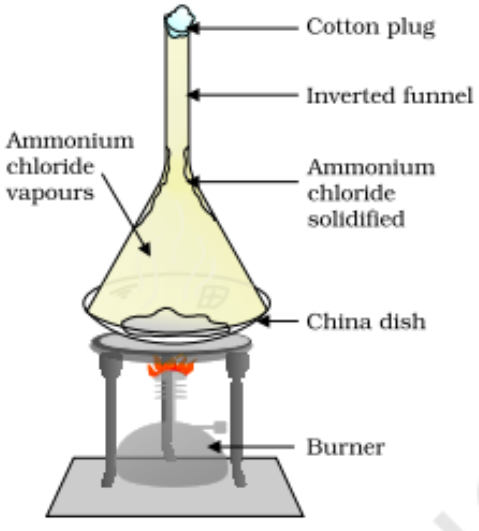
- ***Latent Heat of Vapourization:*** *The amount of heat required to change 1 kg liquid to its gaseous state (at its boiling point) at atmospheric pressure.*
- During boiling the temperature of water does not rise even though heat is being supplied continuously as this heat of vapourization is used up to overcome the forces of attraction between water particles.

At 100°C, energy of water vapours is much more than the energy of water at 100°C. So, we can change one state of matter to another state by changing temperature.

- At 25°C. Water is liquid.
- At 0°C, Water is solid (ice).
- At 100°C, water is gaseous state (steam).

(iii) Sublimation : The change of solid directly into vapours on heating and of vapours into solid on cooling without passing through the intervening liquid state is called sublimation.

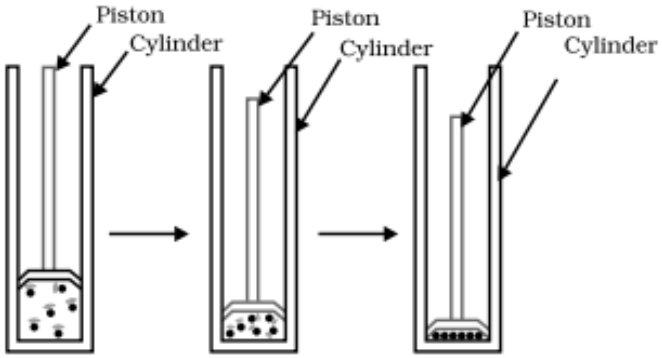
Example: When camphor or ammonium chloride is heated in a China dish covered by a inverted funnel (with cotton plug in its upper open end), the vapours of ammonium chloride are converted into solid ammonium chloride on coming in contact with the cold inner walls of the funnel.



Sublimation of Ammonium Chloride

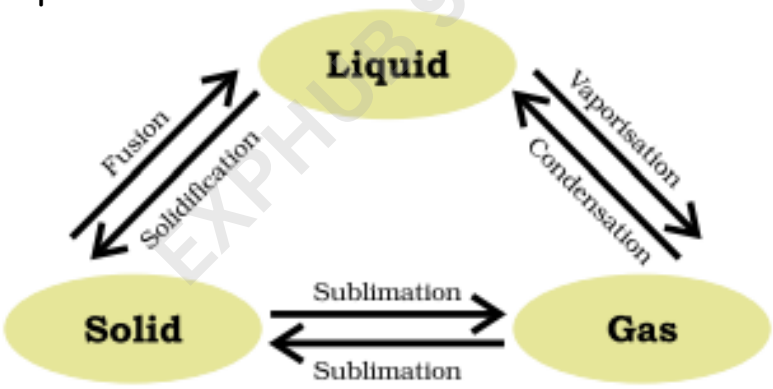
(B) Effect of Change of Pressure:

If we compress a gas in a cylinder, the distance between the particles of gas is reduced and finally gas is liquefied on lowering temperature.



By applying pressure, particles of matter can be brought close together.

- By applying high pressure, the particles of a gas can be brought close together:
- Solid carbon dioxide (dry ice) is changed into carbon dioxide gas directly without changing into liquid when pressure is reduced to one atmospheric pressure.
- Thus, states of matter i.e., solid, liquid and gas are determined by temperature & pressure.



Interconversion of Three States of Matter

Evaporation: A surface phenomenon in which liquid changes into vapours at any temperature below its boiling point is called evaporation. Particles on the surface of a liquid have higher kinetic energy than others, so they break the forces of attraction between the particles & escape from the surface of liquid in the form of vapours.

Factors affecting evaporation:

(a) Exposed surface area: On increasing surface area of liquid, rate of evaporation increase.

(b) Increase in temperature: Increases kinetic energy of particles hence rate of evaporation increases.

(c) Humidity: When the humidity of air (degree of dampness of air) is low, evaporation rate is increased. More humidity, less evaporation.
(d) Wind: When wind speed increases, rate of evaporation also increases.

Evaporation always causes cooling: The cooling caused by evaporation is based on the fact that when a liquid evaporates, it takes latent heat of vaporization from surroundings which on losing heat get cooled.
Example: When we put acetone on our hand, it gets vapourized by taking heat from our hand and our hand feels cool.