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CHAPTER 1

MATTER

IN

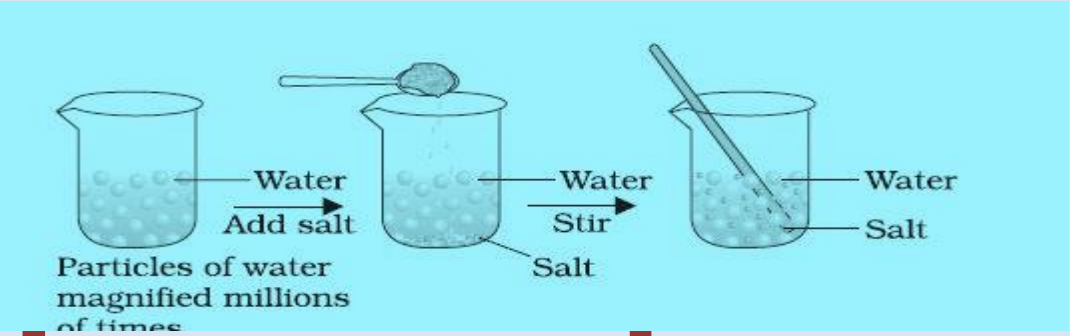
OUR SURROUNDING

MATTER

Those all objects have mass and occupy space called Matter. It is made up of very small tiny particles.

Characteristics of Particles of Matter

MATTER IS MADE UP OF TINY PARTICLES

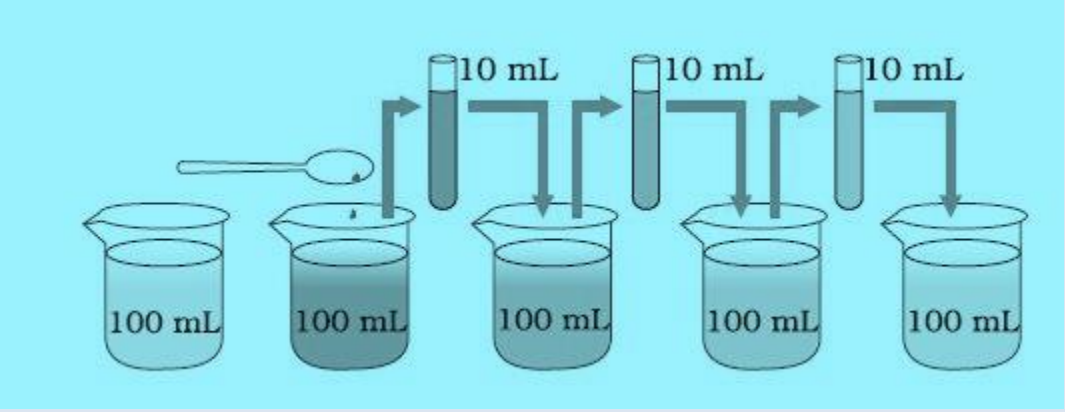


When we dissolve salt in water, the particles of salt get into the spaces between particles of water.

2. PARTICLES OF MATTER ARE CONTINUOUSLY MOVING

Take 2-3 crystals of potassium permanganate and dissolve them in 100 mL of water. Take out approximately 10 mL of this solution and put it into 90 mL of clear water.

- **Take out 10 mL of this solution and put it into another 90 mL of clear water.**
- **Keep diluting the solution like this 5 to8 times.**
- **Is the water still colored?**



This experiment shows that just a few crystals of potassium permanganate can colour a large volume of water (about 1000 L). So

we conclude that there must be millions of tiny particles in just one crystal of potassium permanganate, which keep on dividing themselves into smaller and smaller particles. Ultimately a stage is reached when the particles cannot divide further into smaller particles.

3. PARTICLES ARE HELD TOGETHER BY FORCES OF ATTRACTION

States of Matter

Matter around us exists in three different states– solid, liquid and gas. These states of matter arise due to the variation in the characteristics of the particles of matter

THE SOLID STATE

- Have definite shape and volume
- Less intermolecular space
- Strong intermolecular force
- High density , melting & boiling point
- Incompressible

THE LIQUID STATE

- No fixed shape but has volume
- Week intermolecular force
- Almost incompressible
- Large intermolecular space
- Low Density ,melting & boiling point

THE GASEOUS STATE

- Gases neither have definite shape no volume
- Very week intermolecular force
- Very large intermolecular space
- Highly compressible
- Density minimum

- Gases can flow

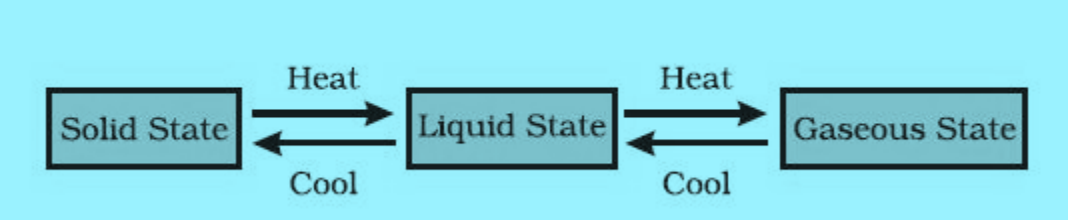
Changing state of Matter

Water can exist in three states of matter–
• solid, as ice,
• liquid, as the familiar water, and
• gas, as water vapour.

EFFECT OF CHANGE OF TEMPERATURE

On increasing the temperature of solids, the kinetic energy of the particles increases. Due to the increase in kinetic energy, the particles start vibrating with greater speed.
Stage is reached when the solid melts and is converted to a liquid. The temperature at which a solid melts to become a liquid at the atmospheric pressure is called its melting point.

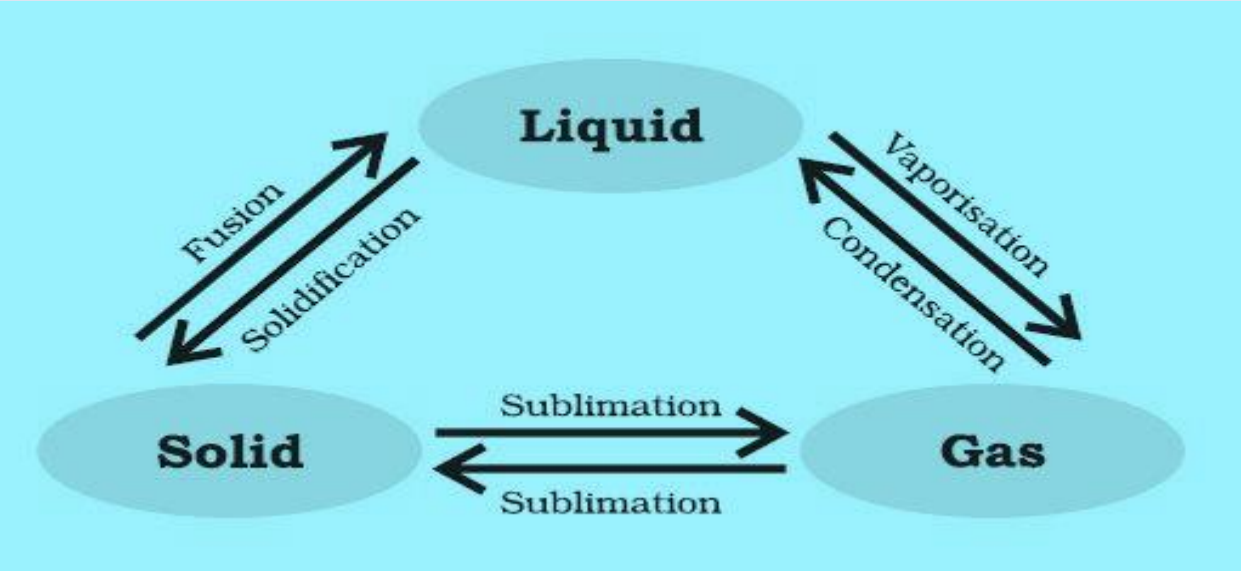
The process of melting, that is, change of solid state into liquid state is also known as fusion.



Substances around us change state from solid to liquid and from liquid to gas on application of heat. But there are some that change directly from solid state to gaseous state and vice versa without changing into the liquid state. A change of state directly from solid to gas without changing into liquid state (or vice versa) is called sublimation.

EFFECT OF CHANGE OF PRESSURE

Increasing or decreasing the pressure can change the state of matter.
By applying pressure, the inter particle spaces between particles of matter decreases. Thus, by applying pressure and reducing temperature we can convert a solid to liquid and a liquid to gas.



Evaporation
The phenomenon of change of a liquid into vapours at any temperature below its boiling point is called evaporation.

FACTORS AFFECTING EVAPORATION

An increase of surface area.

If the surface area is increased, the rate of evaporation increases.
For example
while putting Clothes for drying up we spread them out.

An increase of temperature:

With the increase of temperature, more number of particles get enough kinetic energy to go into the vapour state.

A decrease in humidity:

Humidity is the amount of water vapour present in air.
an increase in wind speed

EVAPORATION CAUSE COOLING

The particles of liquid absorb energy from the surrounding to regain the energy lost during evaporation,

LATENT HEAT

Latent heat of vaporization is the heat energy required to change 1 kg of a liquid to gas at atmospheric pressure at its boiling point.

Latent heat of fusion is the amount of heat energy required tochange 1 kg of solid into liquid at its melting point.

Some measurable quantities and their units to remember:

Quantity	Unit	Symbol
Temperature	kelvin	K
Length	metre	m
Mass	kilogram	kg
Weight	newton	N
Volume	cubic metre	m^3
Density	kilogram per cubic metre	$kg\ m^{-3}$
Pressure	pascal	Pa