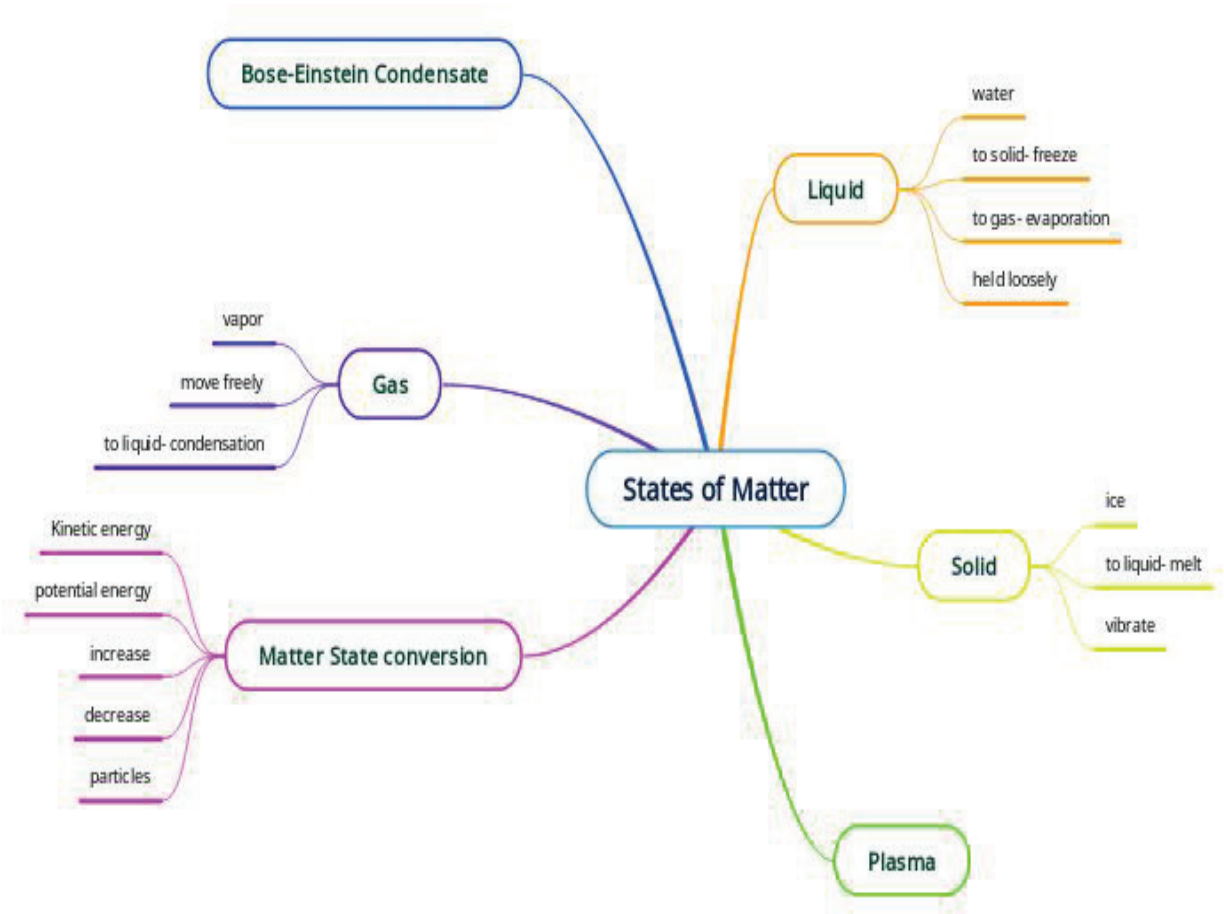
MATTER IN OUR SURROUNDINGS

MIND MAP



SUMMARY

Matter

Anything that occupies space and has mass and is felt by senses is called matter.
Matter is the form of five basic elements the Panch tatva – air , earth ,fire , sky and water.

Characteristics of particles of matter/ Particle Nature of Matter

Made of tiny particles. Vacant spaces exist in particles. Particles are in continuous motion. Particles are held together by forces of attraction.

States of Matter

Basis of Classification of Types

Based upon particle arrangement
Based upon energy of particles
Based upon distance between particles

We can classify our body into three states of matter i.e.,
Bones and teeth are solids.
Blood and water present in our body are liquids.
Air in our lungs is gaseous and also there is 70% of water is in our body.

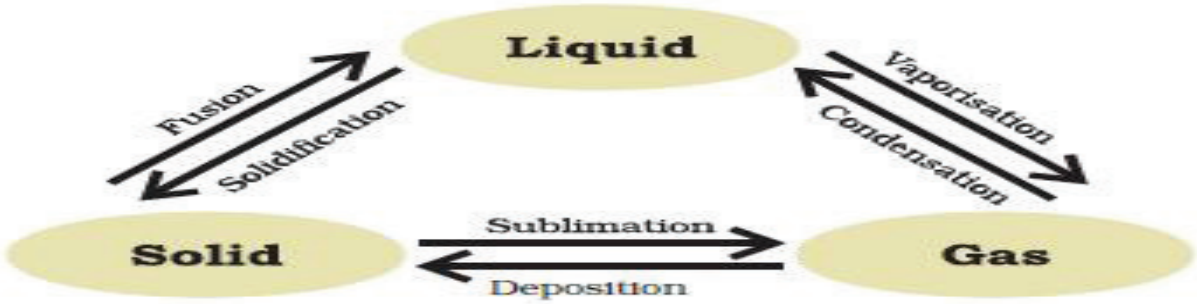
Property	(i) SOLID	(ii) LIQUID	(iii) GAS
Shape and volume	Fixed shape and definite volume.	Not fixed shape but fixed volume.	Neither fixed shape nor fixed volume.
Interparticle space	Inter particle distances are smallest.	Inter particle distances are larger.	Inter particle distances are largest.
Compressibility	Incompressible.	Almost incompressible.	Highly compressible.
Movement	High density and do not diffuse.	Density is lower than solids and diffuse.	Density is least and diffuse.
Forces of attraction	Inter particle forces of attraction are strongest.	Inter particle forces of attraction are weaker than solids .	Inter particle forces of attraction are weakest.
Arrangement of molecules	Constituent particles are very closely packed.	Constituent particles are less closely packed.	Constituent particles are free to move about.
Fluidity	Cannot flow	Flows from higher to lower level	Flows in all directions

(iv) Plasma (non –evaluative)
A plasma is an ionized gas.
A plasma is a very good conductor of electricity and is affected by magnetic fields.
Plasma, like gases have an indefinite shape and an indefinite volume. Ex. Ionized gas
(v) Bose-Einstein condensate (non –evaluative)
A BEC is a state of matter that can arise at very low temperatures.
The scientists who worked with the Bose-Einstein condensate received a Nobel Prize for their work in 1995.
The BEC is all about molecules that are really close to each other (even closer than atoms in a solid).

Interchange in states of matter -Matter Can Change its State

Water can exist in three states of matter –

- Solid, as ice ,
- Liquid, as the familiar water, and
- Gas, as water vapour.



Sublimation : The changing of solid directly into vapours on heating & vapours into solid on cooling. Ex. Ammonium chloride , camphor & iodine.

a) Effect of change in temperature

The temperature effect on heating a solid varies depending on the nature of the solid & the conditions required in bringing the change .

On increasing the temperature of solids, the kinetic energy of the particles increases which overcomes the forces of attraction between the particles thereby 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 melting point of ice is 273.16 K.

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

Boiling point: The boiling point of a liquid is defined as the temperature at which the vapour pressure of the liquid is equal to the atmospheric pressure. For water this temperature is 373 K (100°C = 273 + 100 = 373 K).

b) Effect of Change of Pressure

Increasing or decreasing the pressure can change the state of matter. Applying pressure and reducing temperature can liquefy gases.

Solid carbon dioxide (CO_2) is stored under high pressure. Solid CO_2 gets converted directly to gaseous state on decrease of pressure to 1 atmosphere without coming into liquid state. This is the reason that solid carbon dioxide is also known

as dry ice.

Latent Heat :

The hidden heat which breaks the force of attraction between the molecules during change of state.

Latent Heat of Fusion	Latent Heat of Vaporisation
Heat energy required to change 1kg of solid into liquid.	Heat energy required to change 1kg of liquid to gas at atmospheric pressure at its boiling point.

Thus, we can say that pressure and temperature determine the state of a substance , whether it will be solid, liquid or gas.

Evaporation & Boiling

Particles of matter are always moving and are never at rest.

At a given temperature in any gas, liquid or solid, there are particles with different amounts of kinetic energy.

In the case of liquids, a small fraction of particles at the surface, having higher kinetic energy, is able to break away from the forces of attraction of other particles and gets converted into vapour .

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

Factors Affecting Evaporation

Temperature: The rate of evaporation increases with an increase in temperature.
Surface area: The rate of evaporation increases with an increase in surface area.
Humidity: The rate of evaporation decreases with an increase in humidity.

Wind speed: The rate of evaporation increases with an increase in wind speed.

Evaporation cause cooling.

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

For example, sweating cools down our body.

Applications of Evaporative Cooling

• To keep water cool, it is kept in earthenware containers. Similar to the pores in cotton fabric, the pores in the earthen pot's surface area allow for more evaporation.

• To keep our body cool, we sweat a lot. Evaporation is what transpiration ultimately is. Our body's water evaporates, using energy in the process and lowering our body temperature as a result.

• We dress in cotton during the summer. Since cotton is a powerful water absorbent, it

allows more perspiration to come into touch with the air, promoting more evaporation. We have a cooling effect when wearing cotton clothing because of this.

Evaporation Vs Boiling

S.No.	Evaporation	Boiling
1	It takes place at any place.	It takes place at definite temperature called boiling point ofliquid.
2.	Temperature of liquid decreases during evaporation.	Temperature of liquid does not change during boiling.
3.	Evaporation is a surface phenomenon; it takes place only at the surface of the liquid.	Boiling is the bulk phenomenon; it takesplace in the whole mass of the liquid.
4.	Evaporation is a slowand silent process.	Boiling is a rapid andviolent process.

Kelvin & Celsius Scale

Kelvin is the SI unit of temperature, 0 ℃ =273.16 K. we take 0 ℃ = 273 K.

SI unit of temperature is Kelvin. T (K)= T (0 ℃) +273

Kelvin scale of temperature has always positive sign , hence regarded as better scale than Celsius.

Atmosphere (atm) is a unit of measuring pressure exerted by a gas. The SI unit of pressure is Pascal (Pa):

1 atmosphere = 1.01×10^5 Pa. The pressure of air in atmosphere is called atmospheric pressure. The atmospheric pressure at sea level is 1 atmosphere, and is taken as the normal atmospheric pressure.