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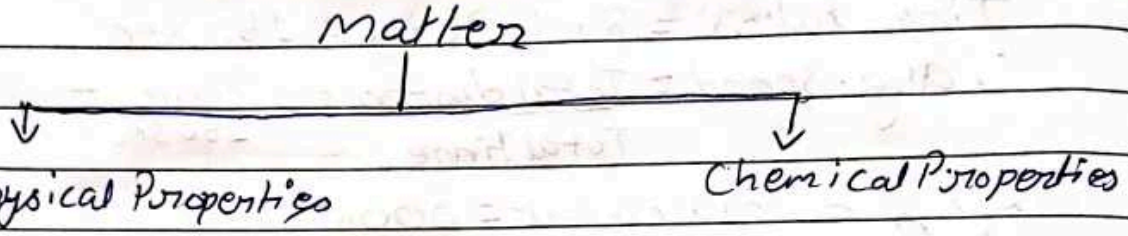
Matter in our surroundings [Class 9]

⇒ Anything that has mass and occupies space is called matter.

Eg:- Table, Chair, air, honey, etc.

Classification of Matter:-



Physical Nature of Matter

⇒ Matter is made up of small particles:-

- Matter is made up of tiny particles, the tiny particles are called atom. We cannot see atoms even with a microscope.

⇒ Particles of matter have space between them:-

- The atoms of an object have certain space between them. This varies as solids have least space; liquids have lesser space and gases have most

Example:- When sugar is dissolved in water, we will get a clear solution, because sugar takes up the interspaces in between the water.

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⇒ Particles of matter are in constant motion:-

- Particles of matter are always moving.
- The movement is least in solids (vibrating in place), more in liquids (sliding past each other), and most in gases (moving freely at high speeds).

Example:- The smell of perfume spreads in a room because the perfume particles are moving and gets diffused through air particles.

Diffusion:-

- The mixing of a substance with another substance due to the motion or movement of its particles is called diffusion.
- It is fastest in gases and slowest in solids.
- Energy possessed due to motion of partice is kinetic energy.
- Higher temperature = higher kinetic energy of particles, causing them to move faster, thus increasing the rate of diffusion.

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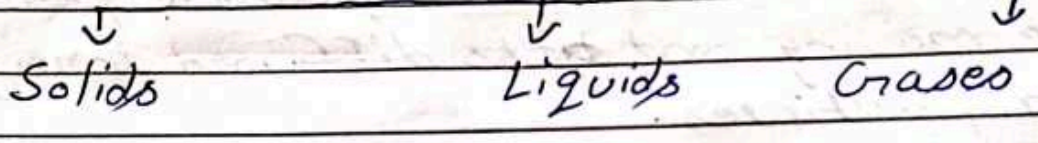
⇒ Particles of Matter Attract each other :-

- In every substance, there is an inter-particle force of attraction acting between its particles. To break something we need to overcome this force.
- Force of attraction :- Solids > liquids > gases

States of Matter



⇒ Solids

- They have definite shape, distinct boundaries and fixed volumes.
- They have negligible compressibility.
- It is difficult to change their state.

⇒ Liquids

- They have no fixed shape. but have fixed volume.
- Liquids flow and change shape, hence they are called fluids.
- They donot have distinct boundaries. It takes the shape of containers.

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⇒ Gases

. They donot have fixed volumes nor shape.

. The force of attraction between its particles is very low.

. The particles of gas have the highest kinetic Energy

. They are highly compressible.

. They can exert pressure on the walls of its container

Conversion of Temperature:-

. SI unit of Temperature = K

⇒ To convert Celsius to kelvin and vise-versa.

. Celsius to kelvin :- $\boxed{K = C + 273}$

. Kelvin to Celsius:- $\boxed{C = K - 273}$

Can matter change its State?

. Yes, matter can change its state under different conditions of temperature and pressure.

Ex- Ice.

Effects of Temperature:-

- Increases the kinetic energy, hence particles start vibrating faster.
- Heat overcomes attraction forces, making particles move freely. This leads to melting when a solid converts to a liquid and then a gas.

⇒ Melting point:- The minimum temperature at which a ~~substance~~ solid becomes liquid at room temperature.

E.g:- **Melting point of ice = 0°C**

Latent Heat:-

⇒ Fusion:-

- Converting of solids in liquids
- During melting, the temperature remains constant until all solid melts.
- Heat energy used to overcome attraction forces is called latent heat.

⇒ Latent Heat of Fusion:- Heat needed to convert 1kg of solid to liquid.

⇒ Boiling Point:- The temperature at which a liquid changes to gas at atmospheric temperature. [373K for water

- Boiling is a bulk phenomenon.

Latent Heat of Vapourization:- Heat needed to convert 1 kg of gas at boiling point.

Sublimation:-

- When solid changes directly to gas without becoming liquid.

E.g:- Ammonium chloride, camphor, iodine etc.

Deposition:-

- Gas changes directly to solid without becoming liquid.

Effects of Pressure

- Gases ~~that~~ can be changed into liquids by increasing the pressure.
- Solids can be changed into gases by decreasing the pressure.

Evaporation:- [Surface Phenomenon]

- The phenomenon of change of liquid into vapours at any temperature below its boiling point.

Factors affecting evaporation

- Temperature :- $T\uparrow = K.E\uparrow = Evaporation\uparrow$
- Surface Area :- Surface Area $\uparrow$ = Evaporation $\uparrow$
- Humidity :- Humidity $\uparrow$ = Evaporation $\downarrow$
- Wind speed :- Wind speed $\uparrow$ = Evaporation $\uparrow$

Cooling ~~due to~~ Evaporation

- During evaporation, the particles of liquid absorb energy from the surroundings to overcome the inter-particle forces of attraction and undergo phase change. The ~~absorbtion~~ absorption of heat from the surrounding makes the surroundings cool.

Example - 1. Cooling of water in clay pot / earthenware
2. Cooling sensation on palm after spraying perfume or nail polish remover.