Matter in our Surroundings

Anything that occupies space, has mass and offer resistance is called Matter.

Physical Nature of Matter.

- Matter is made up of particles. All matter constitute of very small particles. These small particles are called matter.
- These particles of matter are too small so they can not be seen by naked eyes or simple microscope.

Characteristics of Matter.

1. Particles of matter have spaces between them.
2. The particles are continously moving
3. Particles of matter attract each other.

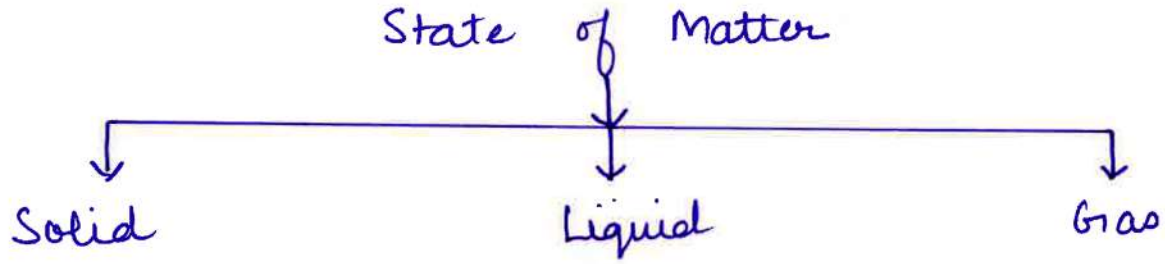
Diffusion

Diffusion is the movement of molecules from an area of high concentration to an area of a lower concentration. For example, spreading of ink in water.

- During diffusion, the particles occupy the interparticle space.
- The rate of diffusion increases with an increase in temperature due to the increase in the kinetic energy of particle.

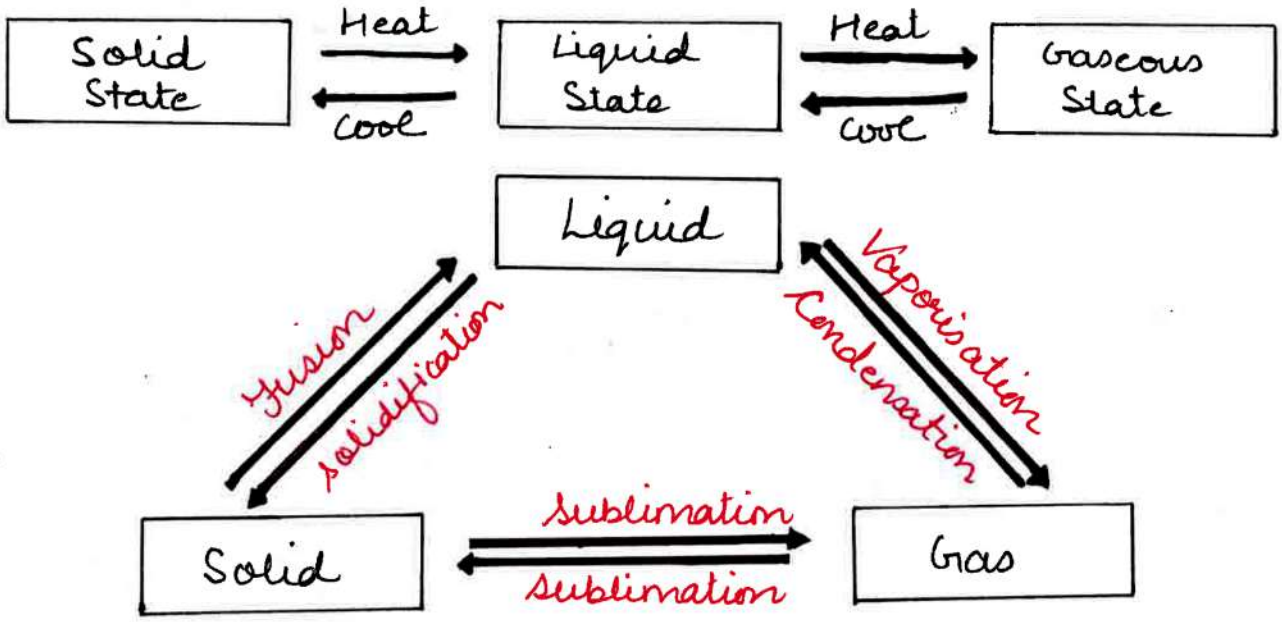
States of Matter

The matter is categorized in three categories.



Solids	Liquids	Grases.
Fixed shape	No fixed shape	No fixed shape
Fixed volume	Fixed volume	No fixed volume
High Density	Moderate Density	Low density
Not capable of filling their container	Capable of filling their container.	Capable of filling their containia
Can not be compressed	Can not be compressed	Can be compressed easily
Can not flow	Can flow	Can flow easily
Particles are closely packed	Particles are not as closely packed	Particles are loosely packed
The force of attraction between the particles is strong.	The force of attraction between the particles is not as strong as solids	They have a very weak force of attraction between particles
Kinetic energy is very low	Kinetic energy is more than solid	Maximum kinetic energy.

Interconversion of States of Matter.



Melting Point

The melting point of a solid is defined as the temperature at which solid melts to become liquid at the atmospheric pressure.

- At the melting point, these two phases, i.e. solid and liquid, are in equilibrium, i.e. at this point both solid state and liquid state exist simultaneously.

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.

Conversion of Temperature

- The temperature conversion formula from celsius to kelvin is:

$K = °C + 273.15$

- The temperature conversion formula from kelvin to celsius is:
  $°C = K - 273.15$
- The temperature conversion formula from Fahrenheit to celsius is:
  $°C = (F - 32) \times \frac{5}{9}$
- The temperature conversion formula from celsius to fahrenheit is:
  $F = °C \left(\frac{9}{5}\right) + 32$

Latent Heat of Fusion

Latent heat of fusion is the amount of heat energy that is required to change 1 kg of a solid into liquid at atmospheric pressure at its melting point.

Latent Heat of Vaporisation

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

Evaporation

The phenomenon by which molecules in liquid state undergo a spontaneous transition to the gaseous phase at any temperature below its boiling point is called evaporation.

- For example, the gradual drying of damp clothes is caused by the evaporation of water to water vapour.

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 increase in wind speed.

Cooling due to Evaporation

During evaporation, the particles of a liquid absorb energy from the surroundings to overcome the inter-particle force of attraction and undergo phase change. The absorption of heat from the surrounding makes the surroundings cool. Thus, producing cooling effect.
For example, sweating cools down our body.

Applications of cooling effect of Evaporation

1 We sweat in order to cool our bodies. Perspiration is essentially evaporation. Water from our body evaporates, taking energy from our body in the process and thus resulting in the lowering of our body temperature.

2. During the summer, we wear cotton clothes. Cotton, being a good absorber of water allows more sweat to be in contact with the atmosphere, consequently helping in more evaporation. It is for this reason that we feel cooler when we wear cotton clothes.

3. Water is stored in earthen pots to make it cool. The pores of the earthen pot, just like the pores of cotton cloth provide a larger surface area for more evaporation.

4. An air cooler is more effective on hot, dry days. The basic principle behind working of an air cooler is evaporative cooling. On a hot, dry day, the temperature is high and humidity is low, the evaporation rate is higher. The water takes energy from the air and gets converted to vapour. This makes the air cooler.