Matter in Our Surroundings

- **Characteristics of matter particles**
  - Atoms are the smallest possible units of the matter which combine to form molecule.
  - There are spaces between matter particles.
  - Matter particles move continuously – movement increases with rising temperature.
  - Matter particles attract each other – attraction force is highest in solids > liquids > gases.
- Everything around us is composed of matter.
- There are five states of matter- solid, liquid, gaseous, plasma and Bose-Einstein condesate
- **Solid phase**
  - Permanent change in shape is difficult
  - Negligible compressibility
  - Definite shape, size, and boundary
  - No particle motion
- **Liquid phase**
  - No fixed shape and boundary
  - Have a fixed volume
  - Low compressibility
  - Lesser particle motion
- **Gaseous state**
  - No fixed shape, volume, and boundary
  - Highly compressible
  - Gases exert pressure
  - High particle motion

Solid	Liquid	Gas

Definite shape	No definite shape	No definite shape
Occupies space	Occupies space	Occupies space
Definite volume	Definite volume	No definite volume
Cannot be compressed	Slightly compressible	Highly compressible
Rigid	Not rigid	Not rigid
Does not diffuse in other solids	Can diffuse in other liquids	Can diffuse in other gases

- **Plasma State**

  - Super-energetic and super-excited particles
  - No definite shape and volume
  - Most common state of matter in universe
  - Influenced by electric and magnetic field

- **Bose-Einstein Condensate**

  - Super-unenergetic and super-cooled particles
  - Formed on cooling an extremely low density gas to an extremely low pressure
  - Super-fluid and super-conductive

- **Change of state**

  - A change of state occurs because heat energy breaks the force of attraction between particles. Kinetic energy of the particle increases.

- **Melting point**

  - The temperature at which a solid melts into a liquid at normal atmospheric pressure.
  - At melting point, the temperature does not change until all solid converts into liquid.

- **Latent heat**

  - The heat required to break the force of attraction between the particles at transition temperature. This heat becomes confined within the material and is called the latent heat.
  - Amount of heat required to change 1 kg of material to change its state at normal atmospheric pressure at transition temperature is called the latent heat for that transition.

- **Sublimation**

  - Solid $\rightleftharpoons$ gas [directly]
  - Example: Ammonium chloride

- **Effect of change of pressure**

  - If pressure is applied,

- Melting point → decreases
- Boiling point → increases

- **Dry Ice –** Solid CO_2 [directly converts to gas]

- **Evaporation –** Change of liquid into vapours at any temperature below the boiling point

- **Factors affecting evaporation**

- Surface area → If increases, evaporation rate increases
- Temperature → If increases, evaporation rate increases
- Humidity → If increases, evaporation rate decreases
- Wind speed → If increases, evaporation rate increases

- **Evaporation cause cooling –** The particles take the latent heat from body and evaporate causing the body to feel cool.