Chemistry
Notes: Matter

Kinetic Theory:

1. A gas is composed of particles, usually molecules or atoms These particles are small and relatively far apart from one another. There is no attractive or repulsive forces between the particles, all that is there is empty

2. Particles of a gas are always moving in a constant, but random motion. This is an independent motion and they move in straight paths.

3. Collisions of particles in a gas are elastic. They make it possible for kinetic energy to be transferred between particles without loss. Therefore, the total kinetic energy remains constant.

Gas Pressure**:** Is the force exerted by a gas per unit surface area of an object. When there are no gas particles present, then collisions between particles aren't present therefore a vacuum is produced. This is empty space with no particles and no pressure.

Atmospheric pressure: Pressure exerted when air molecules collide with objects. Atmosphere pressure decreases as elevation increases

Barometers Devices that are used to measure atmospheric pressure. Pressure is measured in *pascals (Pa).* Atmospheric pressure is 101.3 kilopascals (kPa) at sea level. One standard atmosphere is the pressure required to support 760 mm of mercury in a mercury barometers at 25 degrees Celsius.

1atm = 760 mm Hg = 101.3 kPa

Kinetic Energy and Kelvin Temperature:

- When a substance is heated, it begins to absorb energy, some of which is stored within particles. Absorbed energy speeds up particles; this causes the average kinetic energy to increase. This also results in an increase in temperature.

- Particles have no kinetic energy at very low temperatures; absolute zero (0K or -273 degrees C) is the temperature that the motion of particles ceases.

Liquids:

- Particles of liquids are free to slide past on another
- Particles of a liquid are attracted to one another.
- Liquids have two properties: vapor pressure and boiling point

<u>*Vaporization:*</u> When a liquid becomes a gas. *Evaporation* occurs when a liquid becomes a gas at the surface of that liquid and it is not boiling. Liquids evaporate faster when heated. Heat increases the average kinetic energy. This enables more particles to overcome the attractive forces, which keep them in the liquid state.

<u>*Boiling Point:*</u> is the temperature at which vapor pressure of a liquid is equal to external pressure. *Normal boiling point* is the boiling point of a liquid at a pressure of 101.3 kPa. As lower pressures the boiling point of liquids decrease, because particles need less kinetic energy.

Solids:

- Particles of solids are packed against one another in an organized pattern. They do not slide past one another.

Melting Point: The temperature at which a solid turns into a liquid. The melting and freezing points are the same temperature. At that temperature the liquid and solid are in equilibrium with each other.

Crystals Made up off atoms, ions, or molecules that are arranged in an orderly, repeating, three-dimensional pattern the melting point of crystals varies because of the types of bonds between atoms. Shapes of crystals depend on the arrangement of particles within it.

- Unit Cells: The smallest groups of particles within a crystal.
- Allotropes: Crystals with two or more different molecular forms of the same element in the same physical state are known as.
- Amorphous: Solids that lack an ordered internal structure are known as.

Changes of State:

Phase Diagrams: give the conditions of temperature and pressure that a substance exists as a solid, liquid and gas.

- Triple point: is the point that describes the set of conditions that all three phases exist in equilibrium with each other.
- Sublimation is when a substance passes directly from a solid to a vapor