(A) Mean Free Path: —

Gas molecules are always in state of rapid motion colliding with each other. The distance travelled by a gas molecule before colliding with another molecule is called Free Path. and the average length of a large number of such Path is called Mean free Path and it is denoted by symbol 'l'.

The expression of Mean free Path is given as follows

$$l = \frac{1}{\sqrt{2\pi\sigma^2 N}}$$

where N = Number of Molecules per Cubic Metre of the gas

σ = Molecular Drameter in Metres

(B) Collision Diameter: —

When two gaseous molecules approach each other by continue moving till a point at which the mutual repulsion is so great that they have to retrace their paths.

The distance between centres of two such molecules at the point of the closest approach is called Collision diameter. The Collision diameter is denoted by Sigma 'σ'.

(C) Collision Frequency: - It is denoted by Nc. The number of Collisions suffered by gas molecules per sec. per Cubic metre of a gas is called Collision frequency of the gas. It is given by following expression: —

$$Nc = \frac{1}{\sqrt{2}} \pi v \sigma^2 N^2 = 2\sigma^2 N^2 \sqrt{\frac{\pi RT}{M}}$$

where v is the average molecular velocity in metre sec^{-1}. N is the number of molecules per Cubic metre of the gas.
σ is the molecular diameter in Metres.

At a particular temperature, distance travelled by a molecule between two successive collision depends upon the pressure of the gas.

When the temperature is very high, the molecules are comparatively near to each other and mutual Collisions are larger as compared to those at low pressure, then the mean free path l is expressed as

$$l = \frac{c}{Nc}$$ where C = Velocity of molecule.