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GROUP- A PHYSICAL CHEMISTRY Paper-III (Honours)

Q.1.(i) Explain the following terms—

(a) Mean free path (b) Collision frequency (c) Potentiometric titration.

(ii) What is Maxwell's distribution of molecular velocities ?
Write the effect of temperature on velocity distribution .

[Only For B.R.A. Bihar University]

Ans. (i) **(a) Mean free path :—**

—It is generally denoted by 'l'.

—It is the average distance covered by a molecule between the two successive collisions.

—It is directly proportional to the absolute temperature and thus by increasing the temperature, it also increases.

—It is inversely proportional to the pressure and this is the reason that when pressure increases then its value decreases.

—Mean free path, $l = \frac{V}{\sqrt{2}\pi\sigma^2 N}$

Where $\left\{ \begin{array}{l} V = \text{average velocity} \\ \sigma = \text{molecular diameter} \\ N = \text{number of molecules} \end{array} \right.$

(b) Collision frequency :—

—It is the number of collisions performed by the gaseous molecules per second, which can be expressed by the following equation—

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

Where $V =$ average molecular velocity

$\sigma =$ molecular diameter

(c) Potentiometric titration :—

—The principle of the potentiometric titration is based upon the emf measurement at its successive stages. Let us take an example of an acid-base titration then in this case, first of all we measure its emf at its