

Sem-3/MJC-3/Phy/Unit-1/EC-2/04-07-25

Subject: Physics/By VKS

Topic: -

Mean Free Path (λ): The average distance travelled by a molecule betⁿ two consecutive collisions is called mean free path.

$$\therefore \text{Mean free Path } (\lambda) = \frac{S}{N}$$

where, S = total path.
 N = No. of collisions.

Calculation of mean free path (λ):
If volume of n cylinders is V , then

$$V = \pi d^2 c$$

where, c = velocity of the molecule
 d = radius of cylinders

No. of molecules per unit volume be n
then No. of molecules in the cylinder
 $= \pi d^2 c n$ — (1)

Average time betⁿ two successive collisions
 $= \frac{1}{\pi d^2 c n}$ Sec.

The average distance between two successive collisions

$$= \frac{1}{\pi d^2 c n} \times c$$

$\therefore \text{Mean free path, } \lambda = \frac{1}{\pi d^2 n}$

 — (2)

This is the required result.