Sem. 2

Paper 2

Viscosity of gas

Co-efficient of viscosity :-

Since $f = \eta A \frac{dv}{dx}$ ...(1)

if $A = 1\,cm^2$, $dv = 1\,cm/sec$, $dx = 1\,cm$

then $[f = \eta]$

So, Co-efficient of viscosity may be defined as it is equal to resistance offerse between layers or friction produced when one cm/sec change in velocity of layer moves in unit cross section area in 1cm small change in seperation between layers

or if $\frac{dv}{dx}$ = ~~1 dyne~~ $\cdot sec^{-1}$ = velocity gradiant

and $A = 1\,cm^2$, then $[f = \eta]$

So, Co-efficient of viscosity may also be defined as it is equal to frictional force produced if unit velocity gradiant occurs in unit area of cross section

Unit of η (Co-efficient of viscosity) :- in CGS

$$\therefore \eta = \frac{f}{A}\frac{dx}{dv} = \frac{dyne}{cm^2}\frac{cm}{cm/sec} = \frac{dyne\ sec}{cm^2} = dyne\ sec\ cm^{-2}$$

(in CGS)

in SI unit

$$\eta = \frac{Newton}{m^2} \times \frac{m}{m/sec} = \frac{N}{m^2} sec = N \cdot m^{-2} sec$$

or $\left[\eta = kg\frac{m}{sec^2} \times m^{-2} \cdot sec = kg\, m^{-1} sec^{-1}\right]$