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Kinetic Theory of Gases [KTG]

Hand Notes For JEE Mains, Advance, NEET UG, Class 11 & 12 etc…

Hand Notes

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KINETIC THEORY OF GASES (K·T·Gn)

Assumption about K·T·Gn

|i|→ Gasses consist of large no. of small particle which is called molecules, each molecules of gas is identical & behave as a solid, Rigid, elastic sphere.

*|ii|→ collision b/w Gas molecule & container wall is perfectly elastic (Momentum & Energy both are conserved) (Energy loss = 0)

*|iii|→ Size of Gas molecule is negligible (10^{-24} kg) that's why effect of Gravity is not consider. It means density of gas Molecule is same energy.

Exemplar

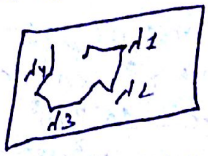
AIR AIIMS |iv|→ Size of Gas molecule is negligible that's why it occupied complete volume of container (vol of gas = vol. of container)

|v|→ There is no attractive or, Repulsive between gas molecules.

*|vi|→ Time b/w two successive collision & contact time during collision ($1 : 10^{-8}$).

|vii|→ Average distance b/w two successive collision is called mean free path.

$$\langle \lambda \rangle = \frac{\lambda_1 + \lambda_2 + \cdots \lambda_N}{N}$$



$$= \frac{\text{total distance in 'N' collision}}{\text{No. of collision.}}$$

Gas equation → AIIMS 2016

$$PV = \mu RT$$

P → Press. of gas; V → Val. of gas / vol. of container; T → Temp. of Gas.; μ → No. of Moles $\frac{M}{mw}, \frac{N}{N_A}$; R → universal gas const. $R = 8.31 \frac{J}{mole}, \frac{2\,cal}{mol}$

P (unit) :→ $\frac{N}{m^2}, \frac{D}{cm^2}$, Pa, bar, atm pr, mm of Hg column, Torr.

$1 \frac{D}{cm^2} = 10^{-2} \frac{N}{m^2}$ | 1 pascal (Pa) = 1 N/m^2

1 bar = 10^5 N/m^2 | 1 atm pr. = $10^5 N/m^2$

760 mm of Hg column
or,
76 cm of Hg column
or,
0.76 m " "
= 1 atm pr. = $10^5 N/m^2$

m = mass of one Molecule
M = Mass of gas = m·N
mw = Molecular wt = m N_A
N = total no. of Molecule
K = Boltzman const = R/N_A
= 1.38×10^{-23} J/K

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