KINETIC THEORY OF GASES MINDMAP..

Behavior Of Ideal Gases and Basic Terms →

→ No interaction b/w molecules.

→ $\boxed{\text{Total internal energy of gas} = \text{Kinetic theory of molecules.}}$

→ $\boxed{\Sigma \vec{v_i} = 0}$

- **Pressure**: Force exerted by the gas per unit area.
- **No. of moles**: measure the amount of gas.
  1 mole = 6.023×10^{23} molecules.
- **Boyle's Law** = $\boxed{P \propto \frac{1}{V}}$ at T = Constant
- **Charle's Law** = $\boxed{V \propto T}$ at P = Constant.
- **Gay-Lussac's Law** = $\boxed{P \propto T}$ at V = Constant.
- **Avogadro's Law** = At same temp. and pressure, equal volume of all the gases contains equal no. of molecules.

Kinetic Energy Of Gas: →

- **Kinetic Energy**: $\boxed{K.E._T = \frac{1}{2} m N \langle v^2 \rangle}$.

$$\boxed{K.E._T = \frac{3}{2} PV = \frac{3}{2} nRT}$$

- **Law Of Equipartition Of Energy**:

$$\boxed{(K.E.)_x = (K.E.)_y = (K.E.)_z = \frac{nRT}{2}}$$

For Gases with fixed molecules, Total K.E. →

For mono-atomic gas: $\boxed{K.E. = \frac{3}{2} nRT}$

For di-atomic gas: $\boxed{K.E. = \frac{5}{2} nRT}$

- **Speed Of Molecules**: —

$$\boxed{V_{mp} = \sqrt{\frac{2RT}{M}}}, \quad \boxed{V_{avg} = \sqrt{\frac{8RT}{\pi M}}}, \quad \boxed{V_{rms} = \sqrt{\frac{3RT}{M}}}$$

Ideal Gas Equation: →

$\boxed{PV = nRT}$ R = Gas Constant = 8.31 J/mol-K

- **Pressure Of Gas**:

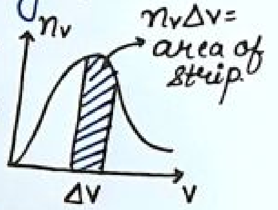
$$\boxed{P = \frac{mN\langle v^2 \rangle}{3V} = \frac{1}{3} \rho \langle v^2 \rangle}$$

m = mass of one molecule.
N = Total no. of molecules.
$\langle v^2 \rangle$ = mean square speed.
V = Total Volume
ρ = density of Gas.

Maxwell-Distribution Function: →

→ Total area under the curve = total no. of molecules.

→ Area of strip = no. of molecules with velocities lying b/w v and $v + \Delta v$.



- **Graham's Diffusion Law**: →

$$\boxed{\text{Rate of diffusion} \propto V_{rms}}$$

At same temp. →

$$\boxed{\frac{R_1}{R_2} = \sqrt{\frac{M_2}{M_1}}} \qquad \boxed{R \propto \frac{1}{\sqrt{M}}}$$

- **Mean Free Path**: →

$$\boxed{\lambda = \frac{1}{\sqrt{2}\pi d^2 n}}$$

d = diameter of molecules.
n = $\frac{\text{No. of molecules}}{\text{Volume}}$