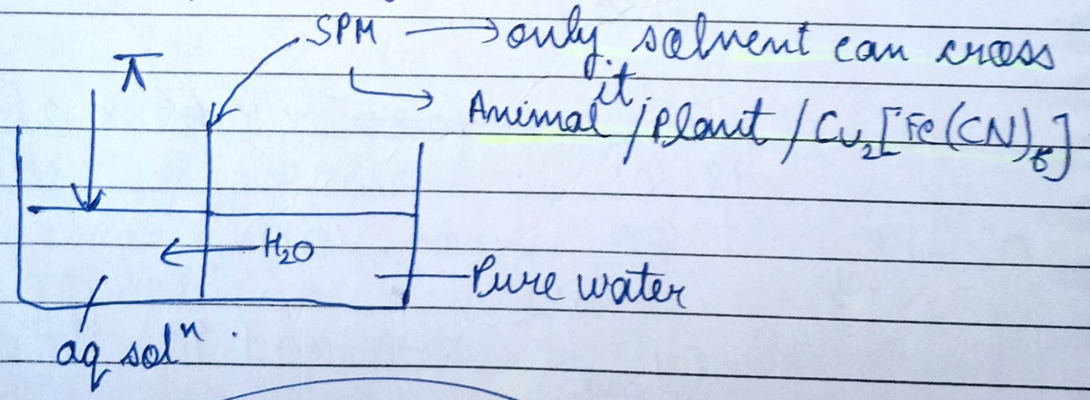
Osmotic Pressure (π):

↳ Spontaneous flow of solvent particles from less concentrated sol^n site to more concentrated sol^n site via SPM (Semi permeable membrane) is known as osmosis.

↳ Min^m applied pressure on more concentrated sol^n site in order to stop osmosis is known as osmotic pressure of that sol^n.

↳ If applied pressure on sol^n is more than its osmotic pressure then solvent will flow from high concentrated to less concentrated site, this is known as reverse osmosis (RO). Water is purified by this method.



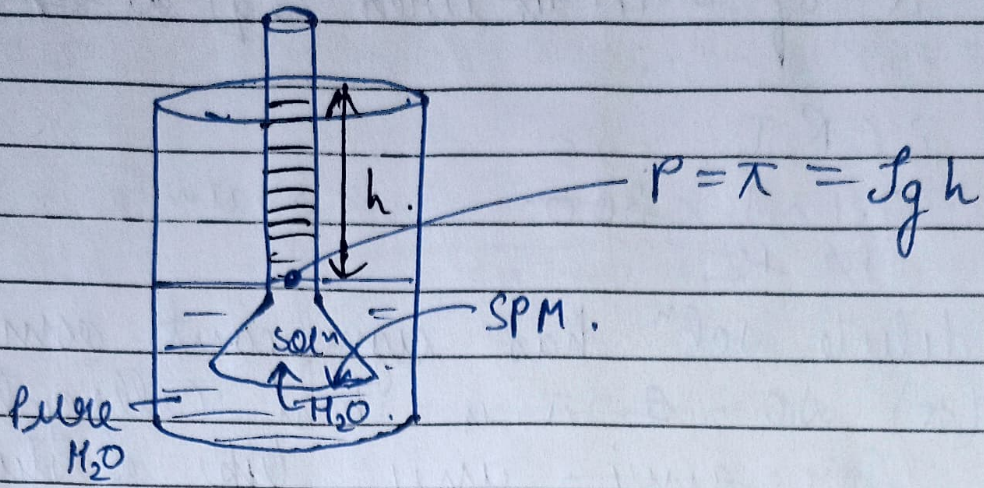
$\pi \propto$ conc^n of sol^n. → ~~Molarity (M)~~

$\pi \propto$ Temp.

$\pi \propto CT$

$$\boxed{\pi = CRT}$$

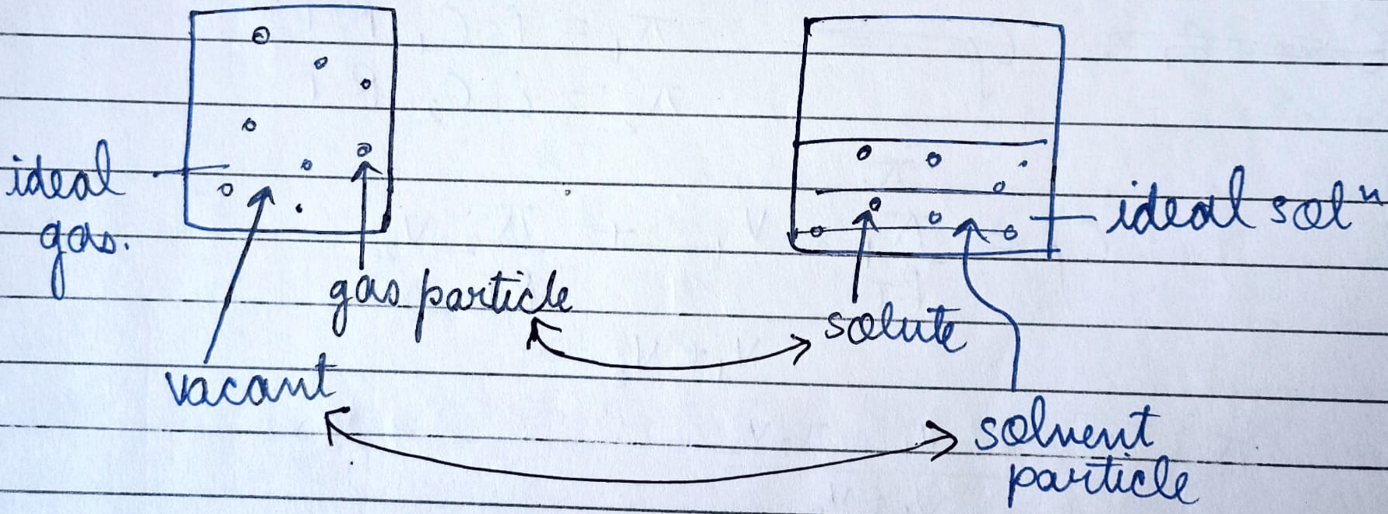
$R = \frac{1}{12}$ l atm mol^{-1} K^{-1}



Note :

$$P = \frac{n}{V} RT$$

$P = CRT$ · for ideal gases

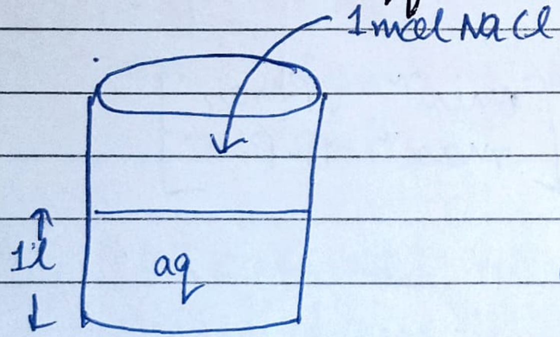


Isotonic → soln having same π.

Hypotonic → soln having less π

Hypertonic → soln having more π

Vant Hoff Factor (i) →



theoritical concⁿ = $\frac{1}{1}$ mol l⁻

actual concⁿ = $\frac{2}{1}$ mol l⁻

~~NaCl~~ ⇌ NaCl ⟶ $Na^+ + Cl^-$

58.5 ← ~~1 mol~~ 1 mol 1 mol

GMM_{th} = 58.5

$GMM_{obs} = \frac{23 \times 1 + 35.5 \times 1}{2}$

[observed = Actual = ~~the~~ experimental]

$$i = \frac{\text{actual conc}^n}{\text{th. conc}^n} = \frac{\text{actual C.P}}{\text{th. CP}}$$

$$= \frac{\text{GMM (th.)}}{\text{GMM (actual)}}$$

CP of soln $\propto$ concn

Case 1 If solute is non dissociative and non-associative ⇒

$i = 1$

Eg glucose, urea (Non-electrolytes)

Case 2 If solute is dissociative ⇒

$i > 1$

	$1 A_n$	$\longrightarrow$	nA
th.	a mol		0
actual	$a(1-\alpha)$		$na\alpha$

$$i = \frac{a(1-\alpha) + na\alpha}{a}$$

$$i = 1 - \alpha + n\alpha$$

→ α = degree of dissociation

n = no of particles produced by dissociation of one reactant particle

Case 3 i for associative solute :-

$$\boxed{i < 1}$$

	nA	$\longrightarrow$	A_n
the	a mol		0
actual	$a(1-\beta)$		$\frac{a\beta}{n}$

$$i = \frac{a(1-\beta) + \frac{a\beta}{n}}{a}$$

$$\boxed{i = 1 - \beta + \frac{\beta}{n}}$$

→ β = degree of association

$n = 2$ dimerisation

$n = 3$ trimerisation

| |
|

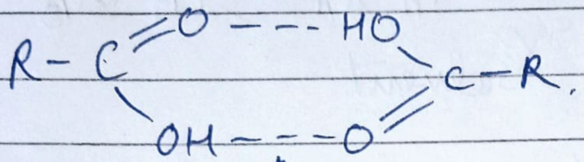
| |
|

★ $R-COOH \xrightarrow{aq} RCOO^- + H^+$

(CH_3COOH or C_6H_5COOH)

$\xrightarrow[\text{solvent}]{\text{non-polar}} (RCOOH)_2$

C_6H_6, CS_2



↑

Intermolecular H-bond