

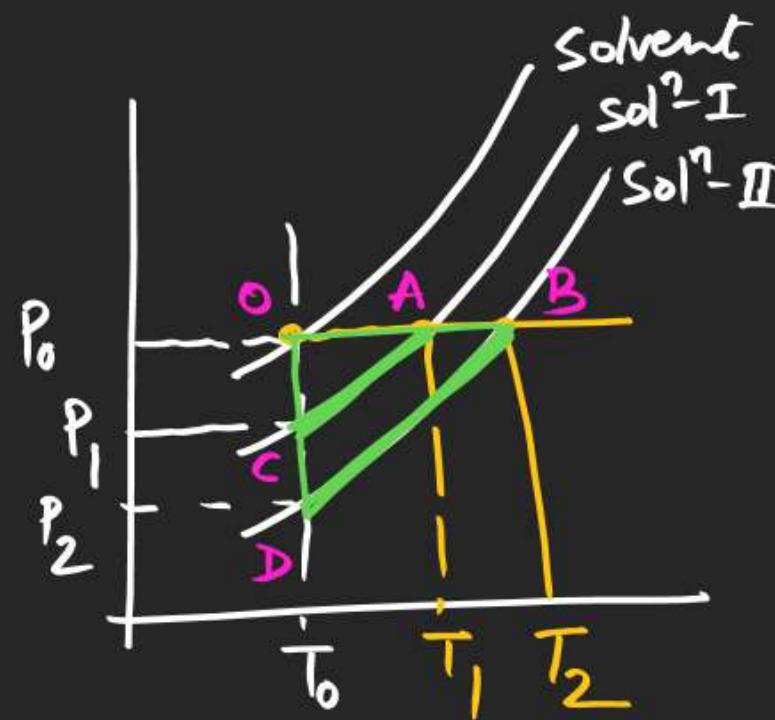
$$P_S = P_T = X_{\text{Solvent}} P_0$$

$$\frac{P_S}{P_0}$$

$$\frac{P_S}{P_0} = \chi_{\text{solvent}} = \frac{2}{3}$$

$$\frac{P_0 - P_S}{P_0} = \frac{1}{3}$$

$$\frac{10 - 9}{10} = \frac{n}{n + N} = \frac{1/m_B}{1/m_B + 1/m_A}$$

Elevation in b.ptfor dilute solnfor dilute diln

$$\Delta OBD \sim \Delta OAC$$

$$\frac{OB}{OA} = \frac{OD}{OC}$$

$$\frac{T_2 - T_0}{T_1 - T_0} = \frac{P_0 - P_2}{P_0 - P_1}$$

$$\frac{\Delta T_{b2}}{\Delta T_{b1}} = \frac{\Delta P_2}{\Delta P_1}$$

$$\boxed{\Delta T_b \propto \Delta P}$$

for dilute soln

$$\frac{P_0 - P_s}{P_0} = m \times \frac{M_{sol}}{1000}$$

$$\Delta P = m \times \frac{M_{solvent}}{1000} \times P_0$$

for a given solvent

$$\boxed{\Delta P \propto m}$$

$$\Delta T_b \propto m$$

$$\boxed{\Delta T_b = K_b \times m}$$

depends
on
solvent

molal elevation
constant
(Ebullioscopic const)

$$K_b = \frac{RT_0^2}{1000 L_v} \rightarrow \text{B.p.t of pure solvent}$$

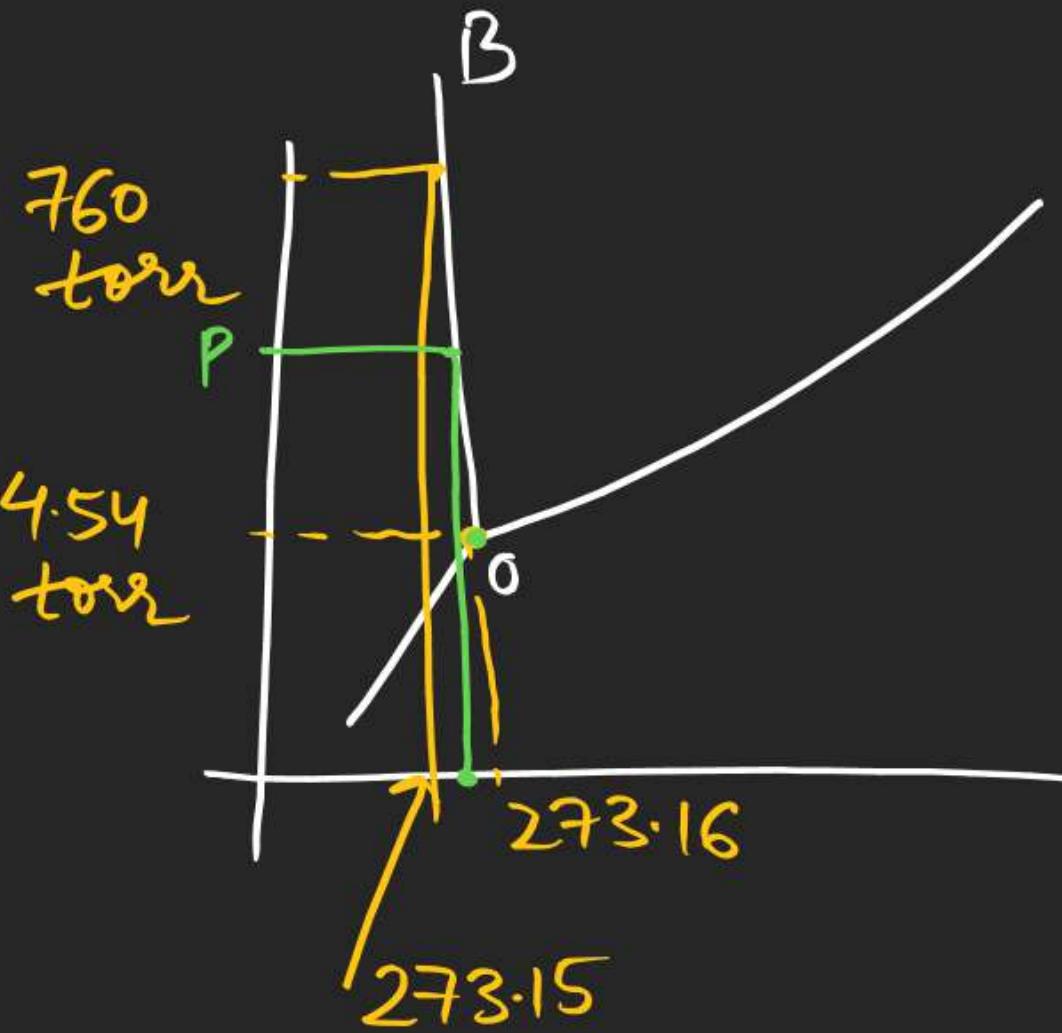
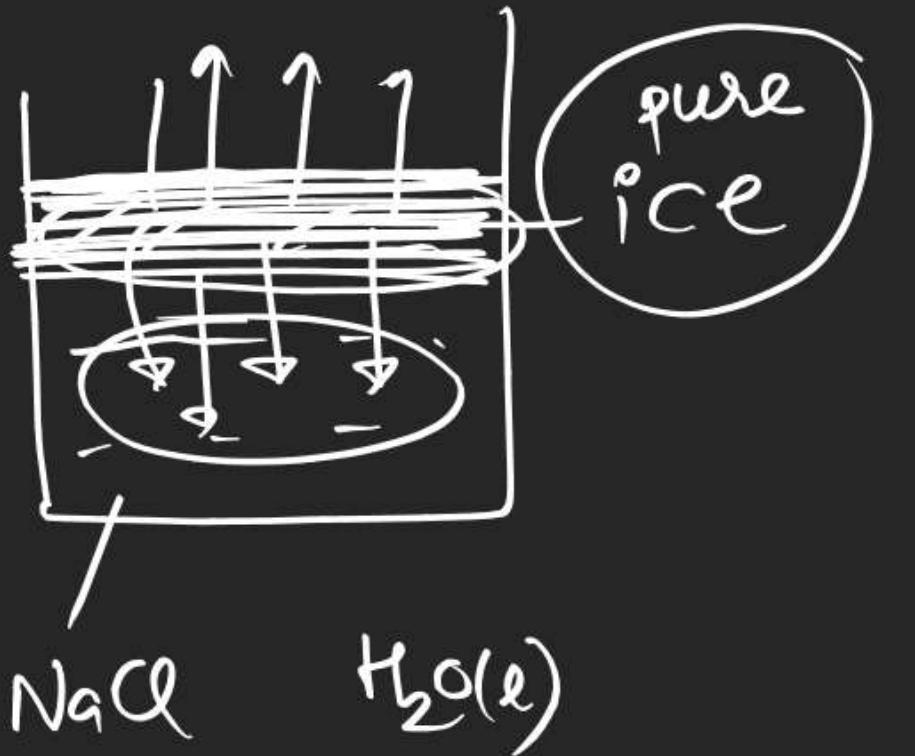
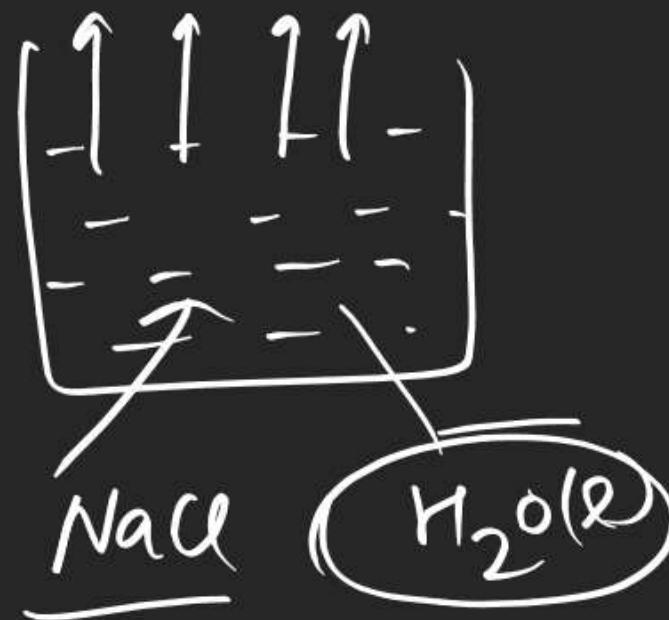
Latent heat of vapourisation (J/gm or cal/gm)

$$R = 8.314 \text{ J/K/mol}$$

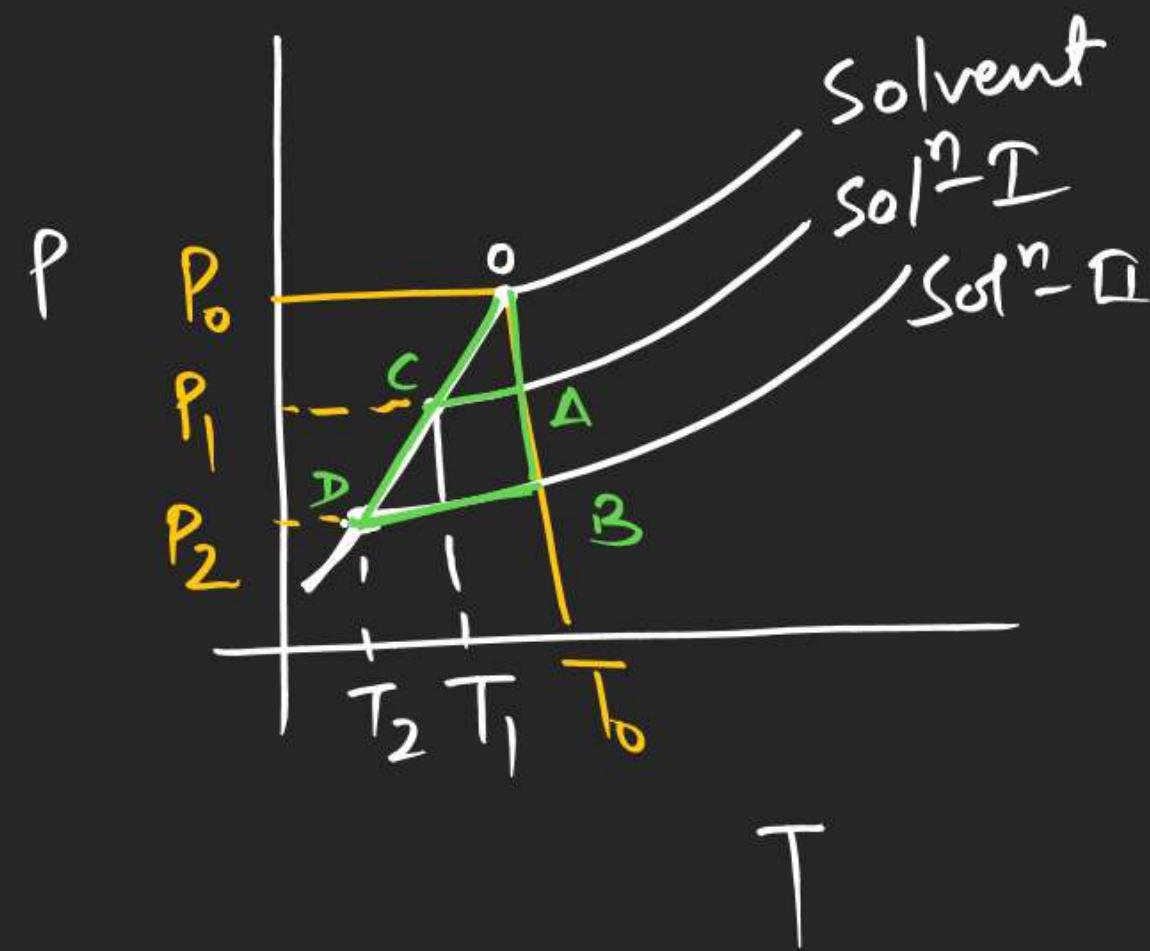
$$R \approx 2 \text{ cal/K/mol}$$

$$L_v = \frac{\Delta H_{\text{vap}}}{M} \text{ (J/mol or cal/mol)}$$

③ Depression in freezing point : \rightarrow



Triple point = freezing point



$$\Delta OAC \sim \Delta OBD$$

$$\frac{\Delta B}{CA} = \frac{OB}{OA}$$

$$\frac{T_0 - T_2}{T_0 - T_1} = \frac{P_0 - P_2}{P_0 - P_1}$$

$$\frac{\Delta T_{f_2}}{\Delta T_{f_1}} = \frac{\Delta P_2}{\Delta P_1}$$

$$\Delta T_f \propto \Delta P \quad \Delta P \propto m$$

$$\Delta T_f \propto m$$

$$\boxed{\Delta T_f = K_f m}$$

$$K_f = \frac{RT_0^2}{1000D L_f}$$

T_0 = freezing point of pure solvent

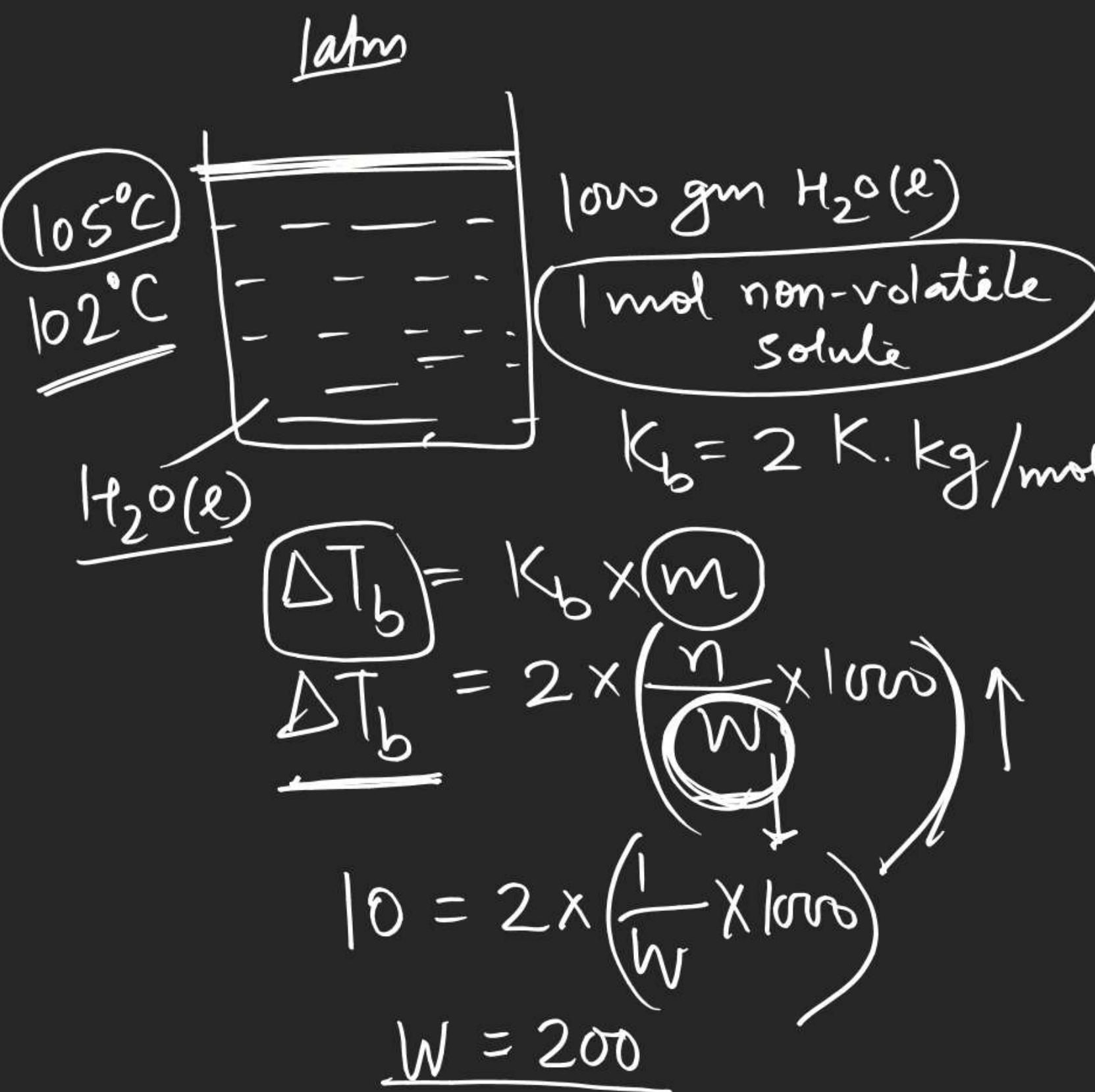
L_f = latent heat of fusion (J/gm or cal/gm)

molal depression

constant

or

osmotic const

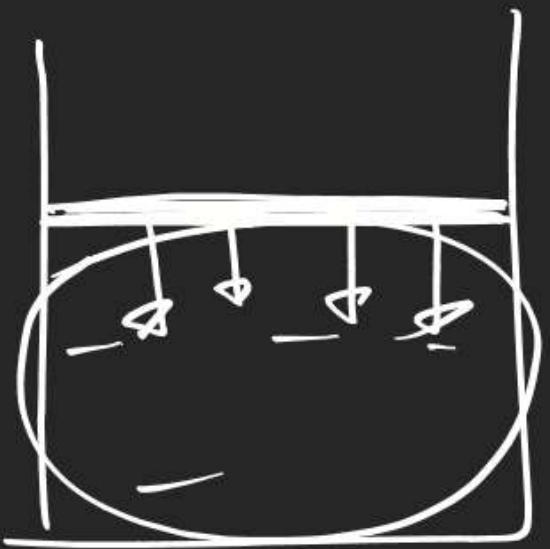


$$\Delta T_b = K_b \times m$$

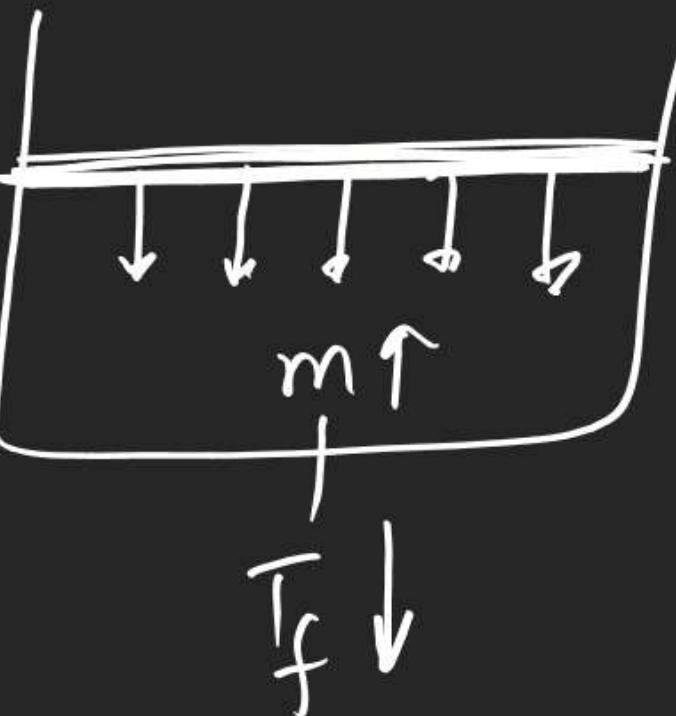
$$K = \frac{\text{Unit of } K_b}{\text{kg}} \times \left(\frac{\text{mol}}{\text{kg}} \right)$$

$K \cdot \frac{\text{kg}}{\text{mol}} = \text{Unit of } K_b$

Q: If a soln prepared by mixing 1 mol non-volatile solute in 1000 gm $H_2O(l)$ is heated upto 110°C at 1 atm. find the amount of water vapourised.

1000 gm H_2O 1 mol non-volatile
Solute

$$K_f = 2 \text{ K.Kg/mol}$$



271 K

$$\Delta T_f = K_f \times m$$

$$= 2 \times 1$$

270 K

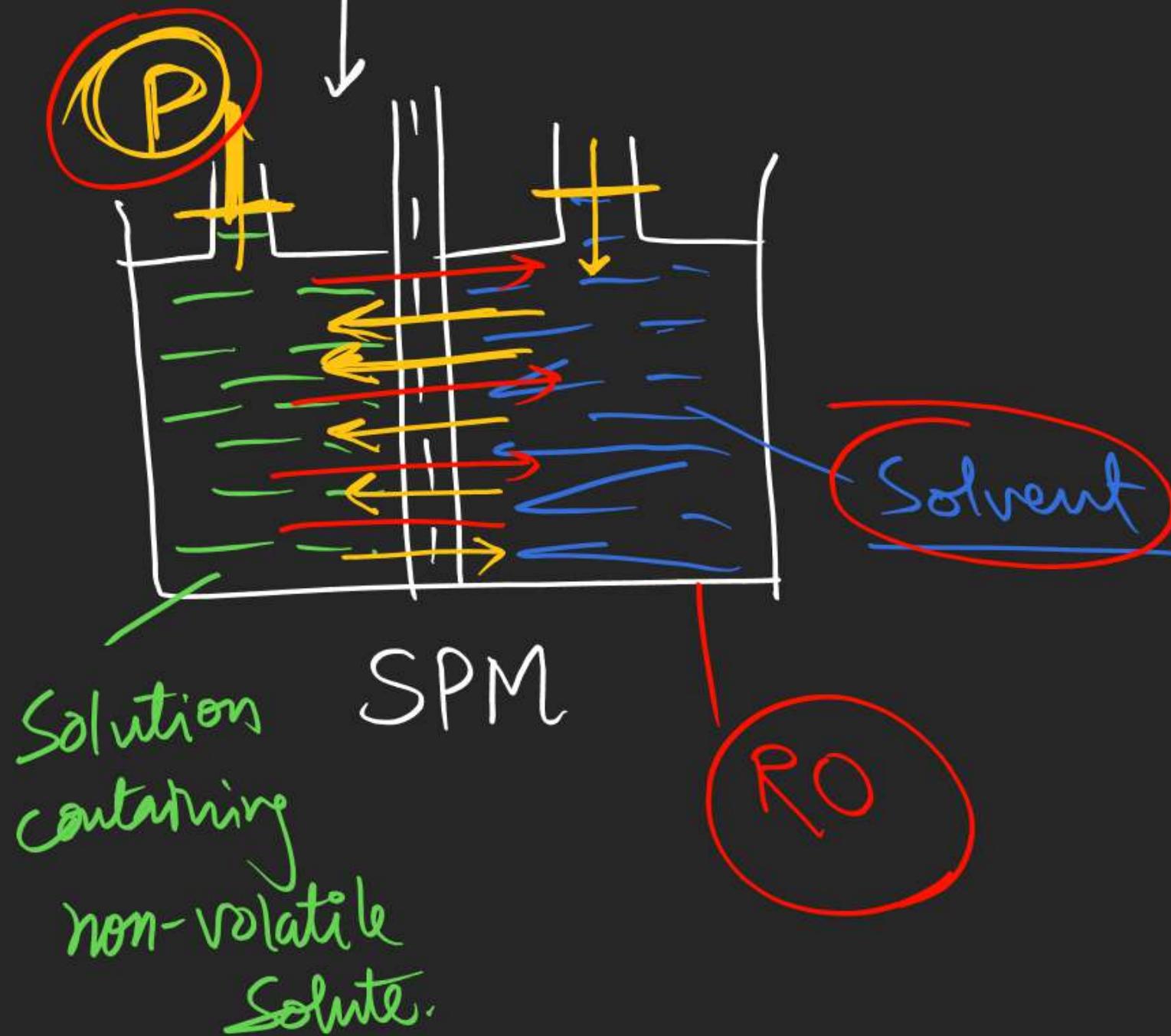
$$10 = 2 \times \frac{1}{W} \times 1000$$

263 K

$$W = 200 \text{ gm}$$

$$\underline{\underline{W_{ice} = 800 \text{ gm}}}$$

IV Osmosis & osmotic pressure



Osmosis: → Spontaneous flow of solvent molecules from solvent side to solution side or from a solution at lower conc. to a solution at higher conc. is called osmosis.

J-
I-

J-Adv

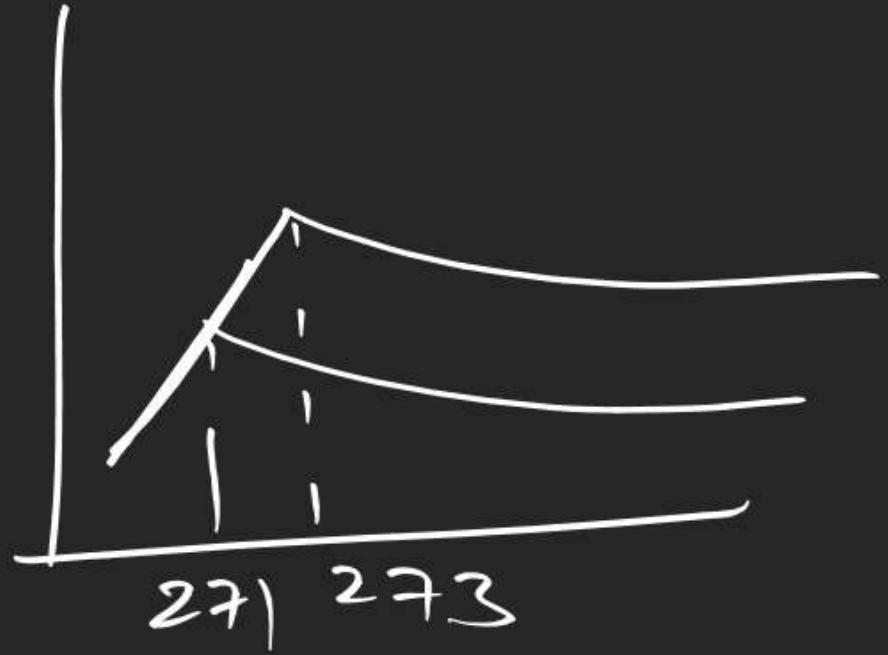
21, 20, 18, 17, 11, 6-8

O-I 30 - 34

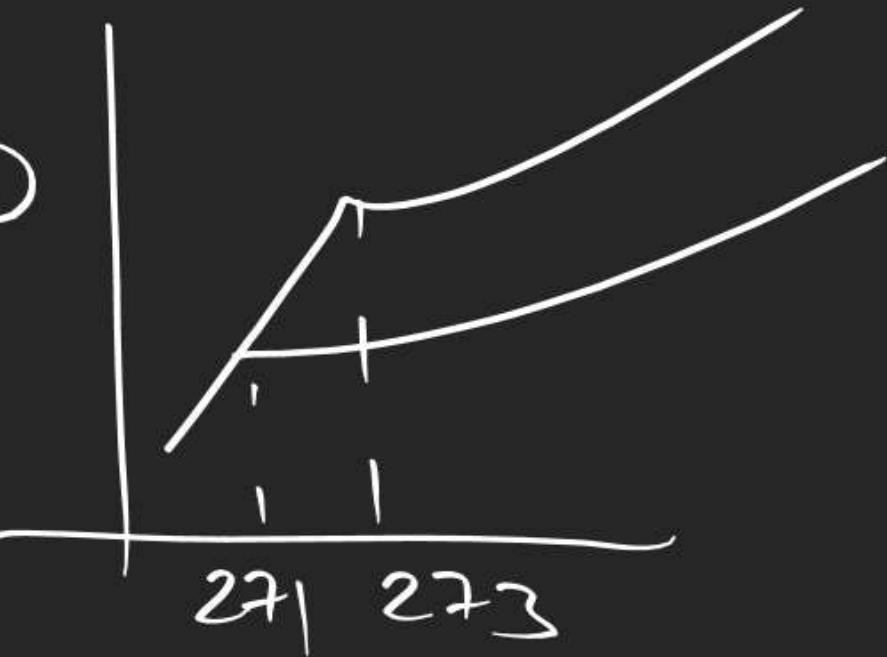
S-I 21 - 28

$$\Delta T_f = 2$$

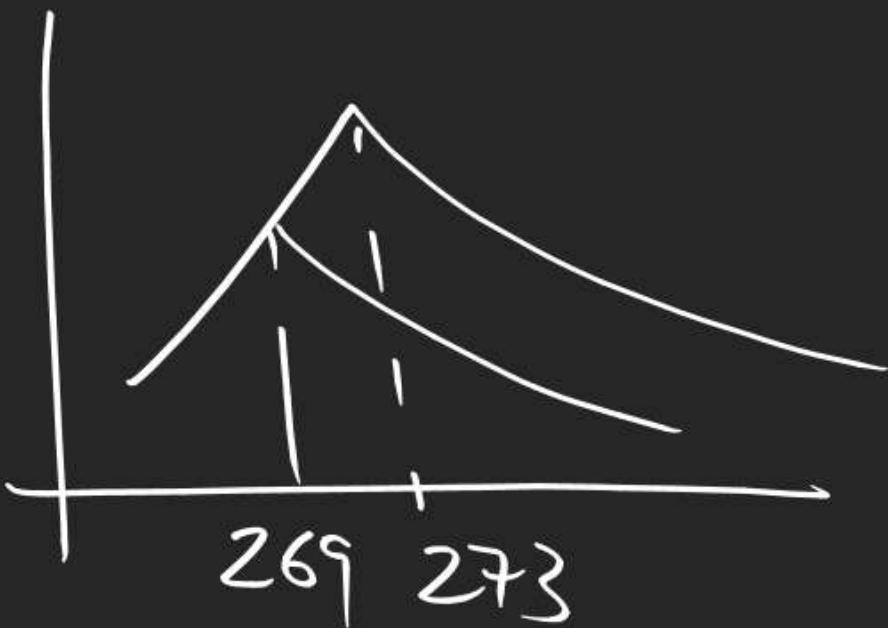
(A)



(B)



(C)



$$P_s = 750$$

$$\overline{P_0 = 760}$$

$$\frac{P_0 - P_s}{P_s} = m \times \frac{18}{100}$$

$$\frac{P_0 - P_s}{P_0} = \chi_{\text{solute}}$$