

0-I	23 - 29
S-I	14 - 20

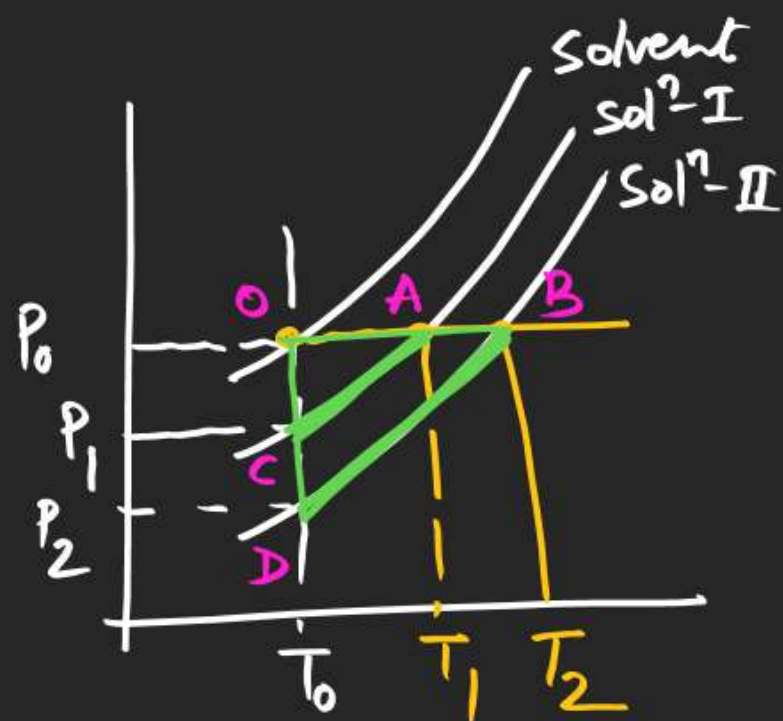
$$\frac{P_s}{P_0}$$

$$P_s = P_T = X_{\text{solvent}} P_0$$

$$\frac{P_s}{P_0} = X_{\text{solvent}} = \frac{2}{3}$$

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

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

Elevation in b.p.tfor dilute solⁿfor dilute dilⁿ $\triangle OBD \sim \triangle OAC$

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

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

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

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

for dilute solⁿ

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

$$\Delta P = m \times \left(\frac{M_{solvent}}{1000} \times P_0 \right)$$

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

molar elevation constant
(Ebullioscopic const)

$$K_b = \frac{R T_0^2}{1000 L_v}$$

→ B. pt of pure solvent

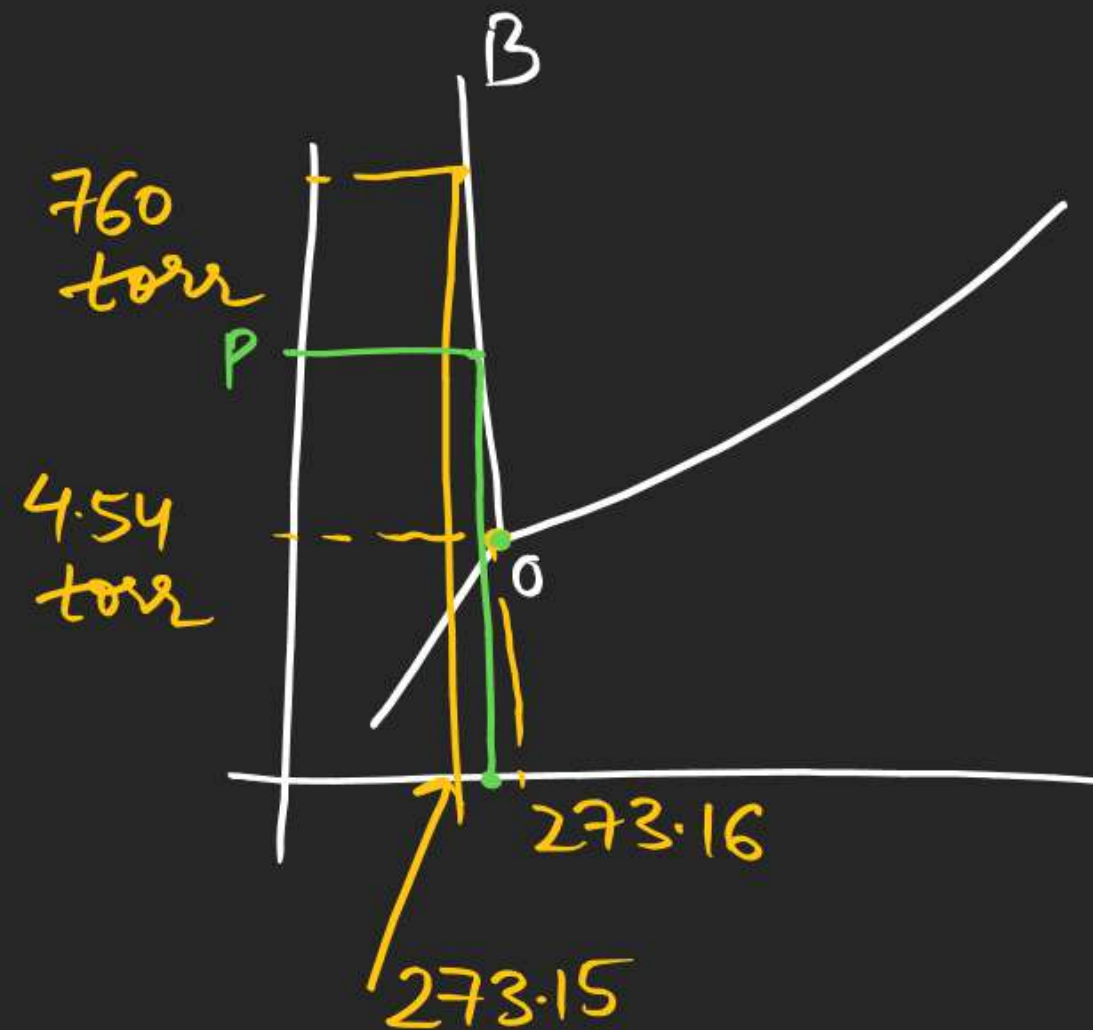
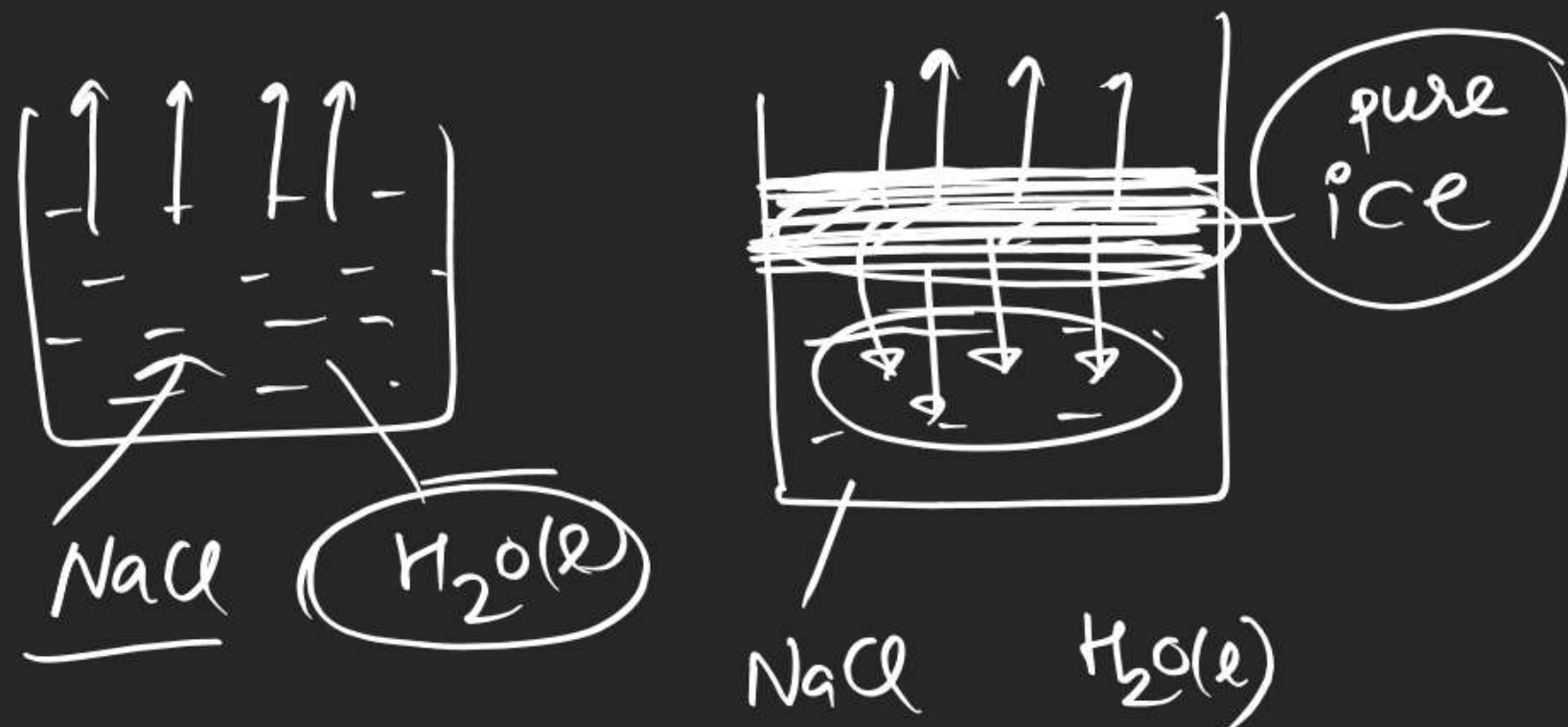
← Latent heat of vapourisation (J/gm or cal/gm)

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

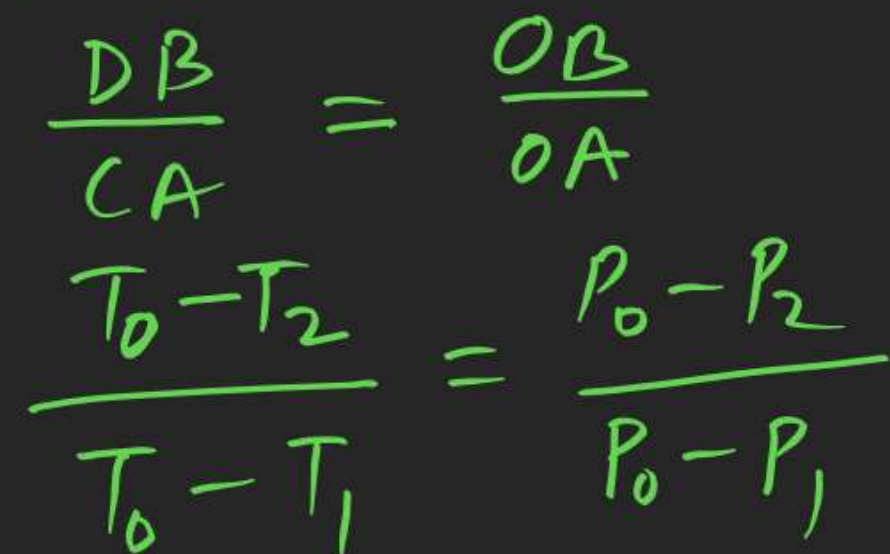
$$R \approx 2 \text{ cal/K/mol}$$

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

③ Depression in freezing point \rightarrow



Triple point = freezing point



$$\frac{\Delta T_{f2}}{\Delta T_{f1}} = \frac{\Delta R_2}{\Delta P_1}$$

$$\Delta T_f \propto \Delta P$$

$$\Delta T_r \propto m$$

$$\Delta T_f = K_f m$$

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

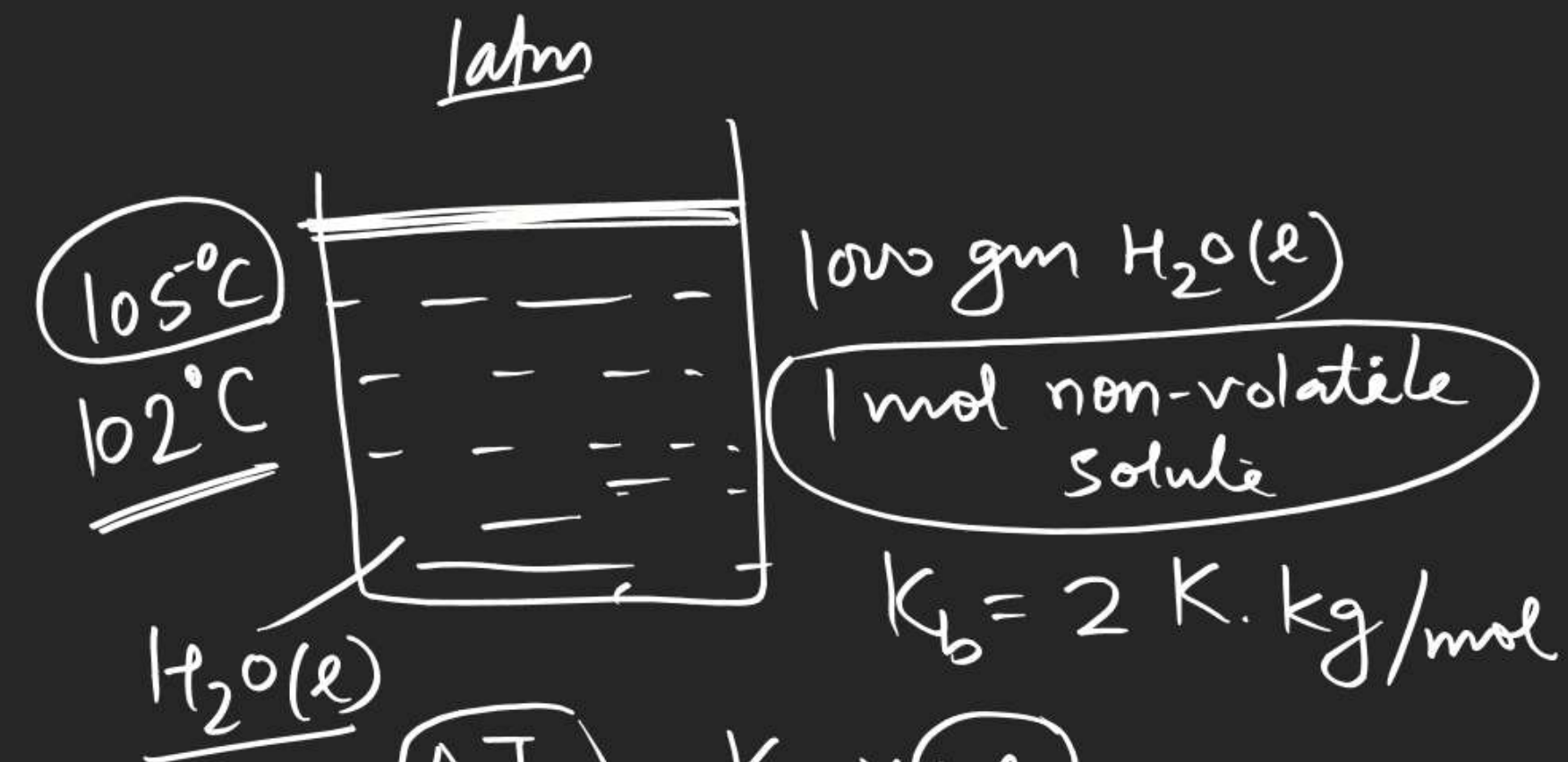
T_0 = freezing point of pure solvent

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

$$\Delta p \propto m$$

molar depression
constant
or

Cryoscopic const



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

$$\Delta T_b = 2 \times \left(\frac{n}{W} \times 1000 \right) \uparrow$$

$$10 = 2 \times \left(\frac{1}{W} \times 1000 \right)$$

$$W = 200$$

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

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

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

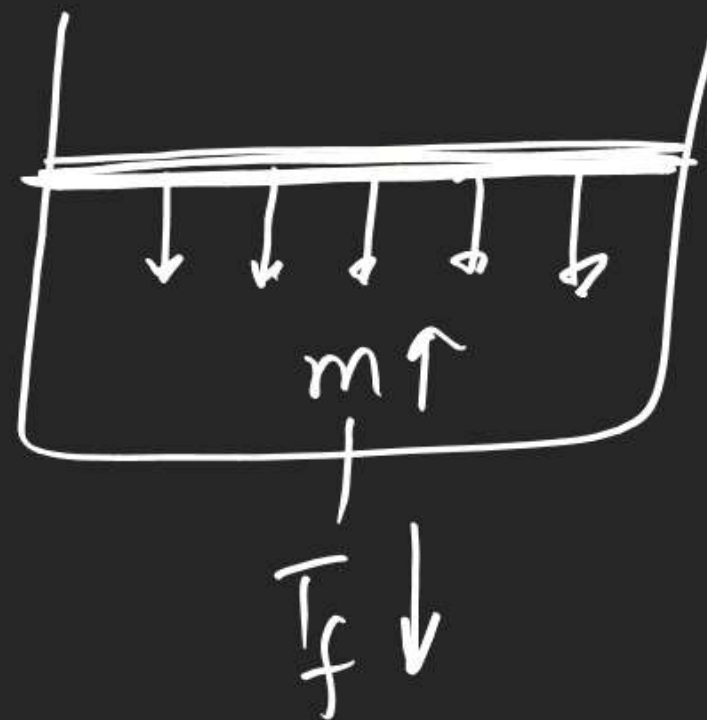
Q. If a solⁿ prepared by mixing 1 mol non-volatile solute in 1000 gm $H_2O(l)$ is heated upto 110°C at 1 atm. find the amount of water vapourised.



1000 gm H_2O

1 mol non-volatile
Solute

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



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

$$= 2 \times 1$$

$$271 \text{ K}$$

$$270 \text{ K}$$

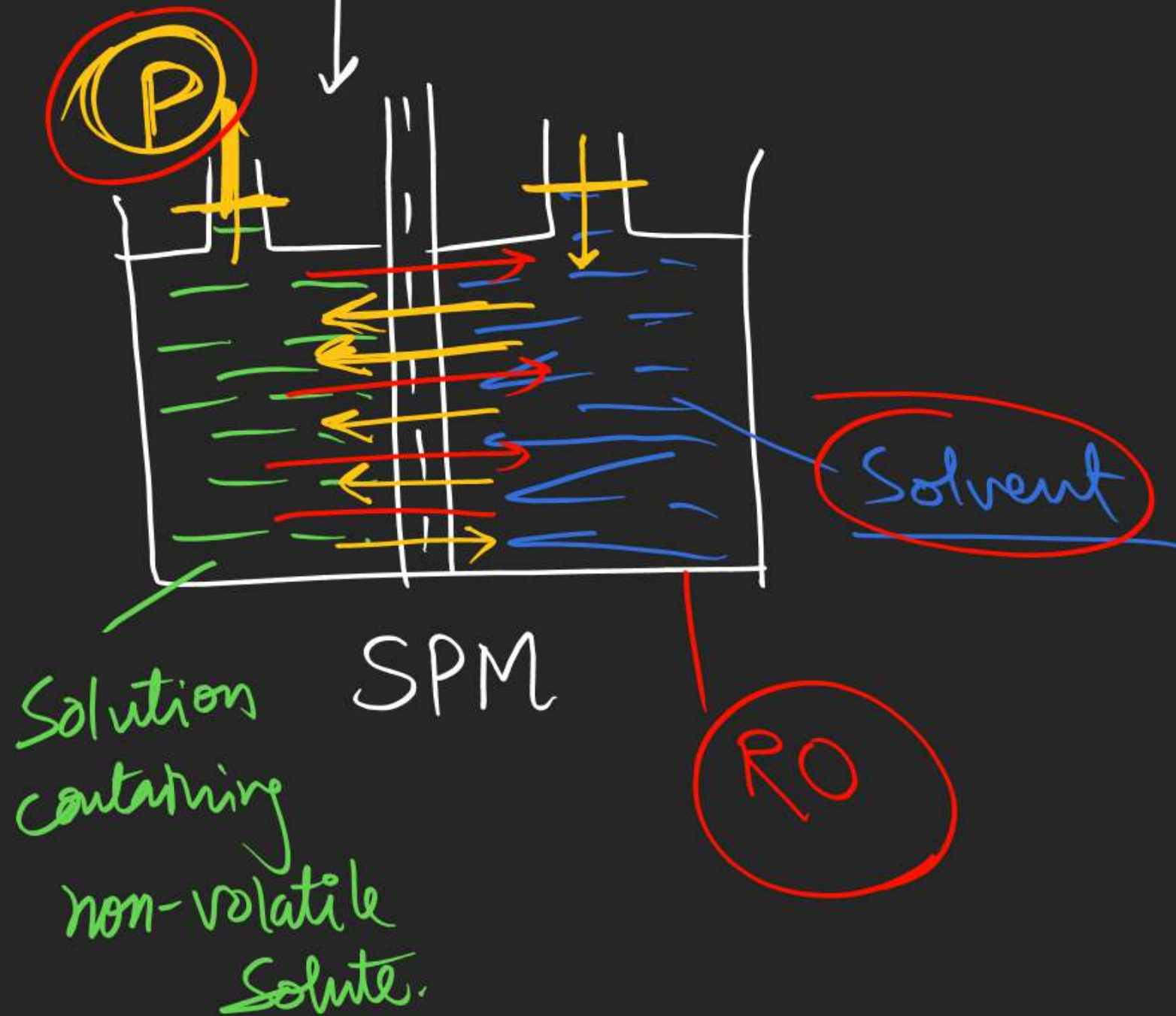
$$10 = 2 \times \frac{1}{W} \times 1000$$

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

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

$$263 \text{ K}$$

IV Osmosis & osmotic pressure



Osmosis : \rightarrow 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.

~~I-~~
J-Adv

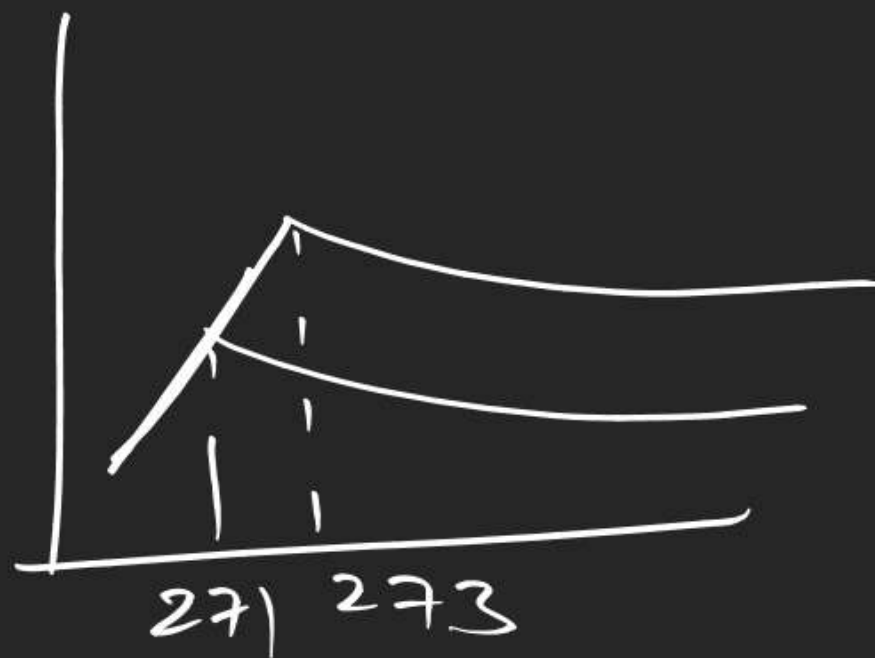
21, 20, 18, 17, 11, 6-8

O-I 30-34

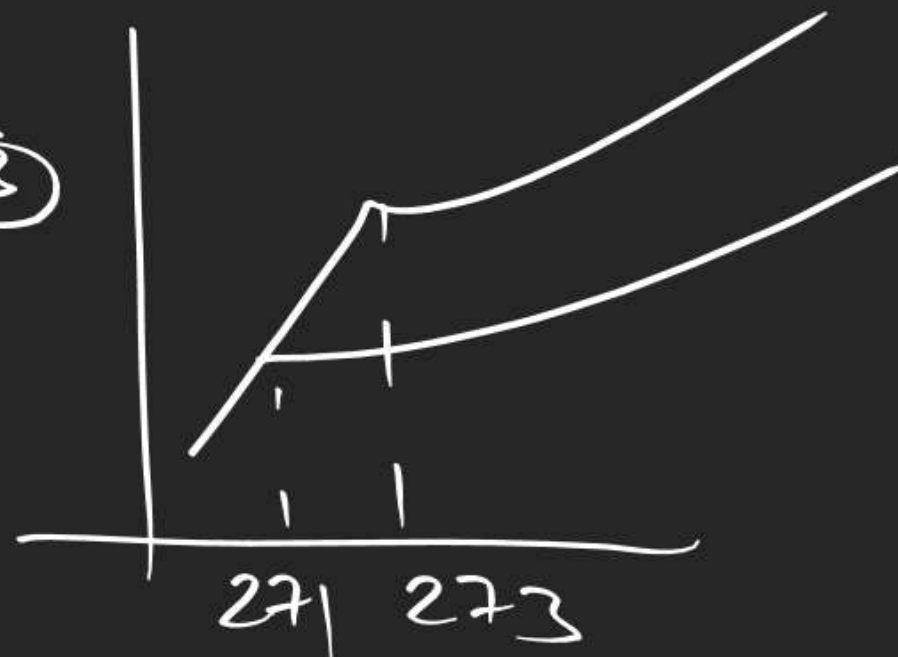
S-I 21-28

$$\Delta T_f = 2$$

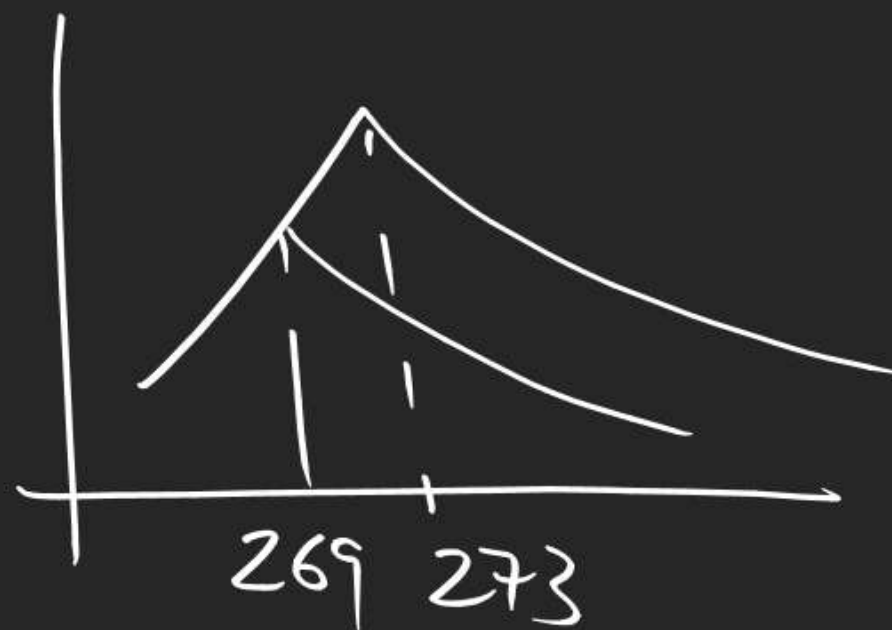
(A)



(B)



(C)



$$P_s = 750$$

$$\underline{P_o = 760}$$

$$\frac{P_o - P_s}{P_s} = m \times \frac{18}{1000}$$

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