



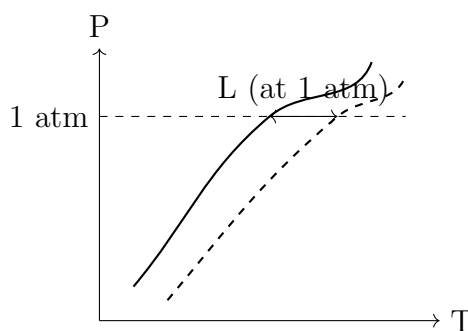
DPP -7 [Elevation in Boiling Point]

Chapter: Solution

"I accept Class 12 fully. No excuses. No delay. I will complete every assignment honestly I will work without waiting for motivation. This is my year. I will not waste it.."

TYPE-1 : Conceptual & Definition Based

- The molal elevation constant is the ratio of the elevation in B.P. to :**
 - Molarity
 - Molality
 - Mole fraction of solute
 - Mole fraction of solvent
- The phase diagrams for the pure solvent (solid lines) and the solution (non-volatile solute, dashed line) are recorded below : The quantity indicated by L in the figure is :**



- Δp
- ΔT_f
- $K_b m$
- $K_f m$

TYPE-2 : Calculate Molecular Weight of Solute

- Elevation in boiling point was 0.52°C when 6 g of a compound x was dissolved in 100 g of water. Molecular weight of x is : ($K = 5.2 \text{ K mol}^{-1} 100 \text{ g H}_2\text{O}$)**
 - 120
 - 60
 - 100
 - 342
- Boiling point of benzene is 353.23 K. When 1.8 g of non-volatile solute is dissolved in 90 g of benzene. Then boiling point raised to 354.11 K. Given K_b (benzene) = $2.53 \text{ K kg mol}^{-1}$. Then molecular mass of non volatile substance is :-**

- (1) 58 g mol^{-1}
 (2) 120 g mol^{-1}
 (3) 116 g mol^{-1}
 (4) 60 g mol^{-1}
3. **If 0.15 g of a solute, dissolved in 15 g of solvent, is boiled at a temperature higher by 0.216°C , than that of the pure solvent. The molecular weight of the substance, (Molal elevation constant for the solvent is 2.16°C) is**
- (1) 10.1
 (2) 100
 (3) 1.01
 (4) 1000
4. **Elevation in boiling point was 0.52°C when 6 g of a compound x was dissolved in 100 g of water. Molecular weight of x is : ($K = 0.52 \text{ kg mol}^{-1}$)**
- (A) 120
 (B) 60
 (C) 100
 (D) 342
5. **A 2% solution of glucose has the same elevation in the boiling point as that of a 5% solution of a non-volatile solute. The molar mass of the solute is :** [NSEC-2003]
- (A) 180
 (B) 450
 (C) 72
 (D) 18

TYPE-3 : Calculate Boiling Point of Solution

1. **At 100°C the vapour pressure of a solution of 6.5g of a solute in 100 g water is 732 mm. If $K_b = 0.52^\circ\text{C m}^{-1}$, the boiling point of this solution will be :-**
- (1) 101°C
 (2) 100°C
 (3) 102°C
 (4) 103°C
2. **The molal elevation constant for water is $0.56^\circ\text{K kg mol}^{-1}$. Calculate the boiling of the solution made by dissolving 6.0 gm of urea in 200 gm of water**
- (1) 100.28°C
 (2) 100°C
 (3) 0.28°C
 (4) 200.28°C
3. **When 0.6 g of urea dissolved in 100 g of water, the water will boil at (K_b for water = $0.52 \text{ kJ. mol}^{-1}$ and normal boiling point of water = 100°C) :** [NSEC-2001]
- (A) 373.052 K
 (B) 273.52 K
 (C) 372.48 K
 (D) 273.052 K

4. Water is added to the solution such that the mole fraction of water in the solution becomes 0.9. The boiling point of the solution is
- (1) 354.7 K
 - (2) 375.5 K
 - (3) 376.2 K
 - (4) 380.4 K
5. An aqueous solution containing 1g of urea boils at 100.25°C. The aqueous solution containing 3 g of glucose in the same volume will boil at -
- (A) 100.75 °C
 - (B) 100.5 °C
 - (C) 100°C
 - (D) 100.25°C

TYPE-4 : Calculate K_b (Ebullioscopic Constant)

1. If the elevation in boiling point of a solution of 10 g of solute (mol wt. = 100) in 100 g of water is ΔT_b , then the ebullioscopic constant of water is [NCERT Pg. 50]
- (1) $100\Delta T_b$
 - (2) ΔT_b
 - (3) $\frac{\Delta T_b}{10}$
 - (4) $10\Delta T_b$
2. The rise in the boiling point of a solution containing 1.8g of glucose in 100 g of a solvent is 0.1°C. The molal elevation constant of the liquid is
- (1) 0.01 K/m
 - (2) 0.1 K/m
 - (3) 1 K/m
 - (4) 10 K/m

TYPE-5 : Formula Derivation & Relation Based

1. W gm of non-volatile organic substance of molecular mass M is dissolved in 250 gm benzene. Molal elevation constant of benzene is K_b . Elevation in its boiling point is given by
- (1) $\frac{M}{K_b W}$
 - (2) $\frac{4K_b W}{M}$
 - (3) $\frac{M}{K_b W}$
 - (4) $\frac{4M}{K_b W}$
2. 1 g of a non volatile non electrolyte solute is dissolved in 100 g of two different solvents A and B whose ebullioscopic constants are in the ratio of 1 : 5. The ratio of the elevation in their boiling points $\frac{\Delta T_b(A)}{\Delta T_b(B)}$ is : [JEE(Main) 2019 Online (10-04-19)S2, 4/120]
- (1) 1 : 5

- (2) 10 : 1
 (3) 1 : 0.2
 (4) 5 : 1
3. If the elevation in boiling point of a solution of non-volatile, non-electrolytic and non-associating solute in solvent ($K_b = x \text{ K. kg.mol}^{-1}$) is $y\text{K}$, then the depression in freezing point of solution of same concentration would be (K_f of the solvent = $z \text{ K. kg. mol}^{-1}$)
- (1) $\frac{2xy}{yz}$
 (2) $\frac{y}{xz}$
 (3) $\frac{x}{yz}$
 (4) $\frac{y}{2x}$

TYPE-6 : Mole Fraction & VP Based Numericals

1. Elevation in b.p. of an aqueous urea solution is 0.52° . ($K_b = 0.52^\circ \text{ mol}^{-1} \text{ kg}$) Hence, mole-fraction of urea in this solution is :
- (1) 0.982
 (2) 0.567
 (3) 0.943
 (4) 0.018
2. For a dilute solution containing 2.5 g of a non-volatile non-electrolyte solute in 100 g of water, the elevation in boiling point at 1 atm pressure is 2°C . Assuming concentration of solute is much lower than the concentration of solvent, the vapour pressure (mm of Hg) of the solution is (take $K_b = 0.76 \text{ K kg mol}^{-1}$) [IIT 2012, 3/136]
- (A) 724
 (B) 740
 (C) 736
 (D) 718