Chapter 01
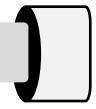
Solution

NEET–FLASHBACK

Q.1 200 mL of an aqueous solution of a protein contain its 1.26 g. The Osmotic pressure of this solution at 300 K is found to be 2.57×10^{-3} bar. The molar mass of protein will be: ($R = 0.083$ L bar mol^{-1} K^{-1})
[AIPMT Mains 2011]
(1) 61038 g mol^{-1} (2) 51022 g mol^{-1}
(3) 122044 g mol^{-1} (4) 31011 g mol^{-1}

Q.2 p_A and p_B are the vapour pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be: **[AIPMT Mains 2012]**
(1) $p_B + x_A (p_B - p_A)$ (2) $p_B + x_A (p_A - p_B)$
(3) $p_A + x_A (p_B - p_A)$ (4) $p_A + x_A (p_A - p_B)$

Q.3 Which of the following compounds can be used as antifreeze in automobile radiators?
[AIPMT Mains 2012]
(1) Nitrophenol   (2) Ethyl alcohol
(3) Methyl alcohol   (4) Glycol

Q.4 Vapour pressure of chloroform ($CHCl_3$) and dichloromethane (CH_2Cl_2) at 25°C are 200 mmHg and 41.5 mmHg respectively. Vapour pressure of the solution obtained by mixing 25.5 g of $CHCl_3$ and 40g of CH_2Cl_2 at the same temperature will be: (Molecular mass of $CHCl_3$ = 119.5 u and molecular mass of CH_2Cl_2 = 85 u)
[AIPMT Mains 2012]
(1) 90.93 mmHg   (2) 285.5 mmHg
(3) 173.9 mmHg   (4) 615 mmHg

Q.5 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is: **[NEET (UG) 2013]**
(1) 0.1 M   (2) 0.02 M
(3) 0.01 M   (4) 0.001 M

Q.6 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 K kg mol^{-1}. Then molecular mass of non-volatile substance is:
[AIIMS 2013]
(1) 58 g mol^{-1} (2) 120 g mol^{-1}
(3) 116 g mol^{-1} (4) 60 g mole^{-1}

Q.7 Strength of H_2O_2 is 15.18 gL^{-1}, then it is equal to:
[AIIMS 2013]
(1) 1 volume   (2) 10 volume
(3) 5 volume   (4) 7 volume

Q.8 Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression? **[AIPMT 2014]**
(1) KCl   (2) $C_6H_{12}O_6$
(3) $Al_2(SO_4)_3$ (4) K_2SO_4

Q.9 Addition of 1 kg of non-volatile solute in volatile solvent increases the boiling point from 350 K to 355 K and decreases the freezing point form 250 K to 220 K. If K_b is 15.5 K Kg/mol, then K_f will be: **[AIIMS 2014]**
(1) 2.1 K kg mol^{-1} (2) 93.01 K kg mol^{-1}
(3) 76 K kg mol^{-1} (4) 10 K kg mol^{-1}

Q.10 The boiling point of 0.2 mol kg^{-1} solution of X in water is greater than equimolal solution of Y in water. Which one of the following statements is true in this case? **[AIPMT 2015]**
(1) Molecular mass of X is greater than the molecular mass of Y.
(2) Molecular mass of X is less than the molecular mass of Y.
(3) Y is undergoing dissociation in water while X undergoes no change.
(4) X is undergoing dissociation in water while Y undergoes no change.

Q.11 Which one is notequal to zero for an ideal solution? **[AIPMT 2015]**
(1) ΔS_{mix}
(2) ΔV_{mix}
(3) $\Delta P = P_{observed} - P_{Raoult}$
(4) ΔH_{mix}

Q.12 Which one of the following electrolytes has the same value of van't Hoff's factor (i) as that of the $Al_2(SO_4)_3$ (if all are 100% ionised **[AIPMT 2015]**
(1) $K_3[Fe(CN)_6]$ (2) $Al(NO_3)_3$
(3) $K_4[Fe(CN)_6]$ (4) K_2SO_4

Q.13 Osmotic pressure of a solution containing 1 g protein in 100 mL solution at 300 K is 1.66 bar. What is the molecular weight of protein:
($R = 0.083$ L bar mol^{-1} K^{-1}) **[AIIMS 2015]**
(1) 150 (2) 120 (3) 130 (4) 300

Q.14 On adding a non-volatile solute to a solvent, the vapour pressure of solvent decreases and becomes z × vapour pressure of solvent where z is: **[AIIMS 2015]**
(1) mole fraction of solvent
(2) mole fraction of solute
(3) molality
(4) molarity

Q.15 The van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is **[NEET (II) 2016]**
(1) 2 (2) 3 (3) 0 (4) 1

Q.16 Which one of the following is incorrect for ideal solution? **[NEET (II) 2016]**
(1) $\Delta P = P_{obs} - P_{calculated\ by\ Roult's\ law} = 0$
(2) $\Delta G_{mix} = 0$
(3) $\Delta H_{mix} = 0$
(4) $\Delta U_{mix} = 0$

Q.17 Which of the following statement about the composition of the vapour over an ideal 1: 1 molar mixture of benzene and toluene is correct? Assume that the temperature is constant at 25°C. (Given: Vapour Pressure Data at 25°C, benzene = 12.8 kPa, Toluene = 3.85 kPa)
[NEET (I) 2016]
(1) The vapour will contain a higher percentage of benzene
(2) The vapour will contain a higher percentage of toluene
(3) The vapour will contain equal amounts of benzene and toluene

(4) Not enough information is given to make a predication.

Q.18 At 100°C the vapour pressure of a solution of 6.5g of a solute in 100g water is 732 mm Hg. If $K_b = 0.52$, the boiling point of this solution will be:
[NEET (I) 2016]
(1) 101°C (2) 100°C
(3) 102°C (4) 103°C

Q.19 On dissolve 1gm solute in 50gm benzene, then depression in freezing point is 0.4K. Find out molecular weight of solute?
(K_f=5.12 K kg/mol) **[AIIMS 2016]**
(1) 512 (2) 256
(3) 728 (4) 528

Q.20 If density of methanol is 0.8 kg L^{-1}. Find out its required volume to prepare 0.4M, 2.5 L solution:
[AIIMS 2016]
(1) 0.4 L (2) 4.0 L (3) 0.04 L (4) 40 L

Q.21 If we dissolve non-volatile solute in solvent then lowering in vapour pressure depends on?
[AIIMS 2016]
(1) $\dfrac{\text{number of mole of solute}}{\text{number of mole of solvent}}$
(2) $\dfrac{\text{number of mole of solvent}}{\text{number of mole of solute}}$
(3) $\dfrac{\text{number of mole of solvent}}{\text{number of mole of solution}}$
(4) $\dfrac{\text{number of mole of solution}}{\text{number of mole of solute}}$

Q.22 0.5 mole NaCl has dissolved in 500 gm H_2O then find out its freezing point and boiling point.
Given- $(K_f)_{H_2O}$ = 1.8 K kg/mol
$(K_b)_{H_2O}$ = 0.5K kg/mol **[AIIMS 2016]**
(1) −1.8°C, 100.5°C (2) −3.6°C, 101°C
(3) −3.6°C, 99°C (4) 0°C, 100°C

Q.23 Density of a pure liquid is 1.25gm/ml, if molecular weight is 62.5gm/mol, then find out its molarity: **[AIIMS 2016]**
(1) 2M (2) 5 M (3) 50 M (4) 20 M

Q.24 If molality of the dilute is doubled, the value of molal depression constant (K_f) will be:
[NEET 2017]
(1) doubled (2) halved
(3) tripled (4) unchanged

Q.25 Which of the following is dependent on temperature? **[NEET 2017]**
(1) Molality   (2) Molarity
(3) Mole fraction   (4) Weight percentage

Q.26 When 45 gm solute is dissolved in 600 gm water freezing point lower by 2.2 K, calculate molar mass of solute ($K_f = 1.86$ K kg mol^{-1}).

[AIIMS 2018]

(1) 63.4   (2) 80 gm   (3) 90 gm   (4) 21 gm

Q.27 The mixture that forms maximum boiling azeotrope is: **[NEET 2019]**
(1) Acetone + Carbon disulphide
(2) Heptane + Octane
(3) Water + Nitric Acid
(4) Ethanol + Water

Q.28 For an ideal solution, the correct option is:

[NEET 2019]

(1) $\Delta V_{mix} = 0$ at constant T and P
(2) $\Delta G_{mix} = 0$ at constant T and P
(3) $\Delta S_{mix} = 0$ at constant T and P
(4) $\Delta H_{mix} = 0$ at constant T and P

Q.29 The mixture which shows positive deviation from Raoult's law is: **[NEET 2020]**
(1) Benzene + Toluene
(2) Acetone + Chloroform
(3) Chloroethane + Bromoethane
(4) Ethanol + Acetone

Q.30 If 8 g of a non-electrolyte solute is dissolved in 114 g of n-octane to reduce its vapour pressure to 80%, the molar mass (in g mol^{-1}) of the solute is [Given that molar mass of n-octane is 114 g mol^{-1}]
[Covid NEET 2020]

(1) 60   (2) 80   (3) 20   (4) 40

Q.31 Isotonic solutions have same

[Covid Re-NEET 2020]

(1) Freezing temperature
(2) Osmotic pressure
(3) Boiling temperature
(4) Vapour pressure

Q.32 The following solutions were prepared by dissolving 10 g of glucose ($C_6H_{12}O_6$) in 250 ml of in water (P_1) 10 g of urea (CH_4N_2O) in 250 ml water (P_2) and 10 g of sucrose ($C_{12}H_{22}O_{11}$) in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is: **[NEET 2021]**
(1) $P_2 > P_1 > P_3$ (2) $P_1 > P_2 > P_3$
(3) $P_2 > P_3 > P_1$ (4) $P_3 > P_1 > P_2$

Q.33 The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in molar ratio 3 : 2 is:
[At 45°C vapour pressure of benzene is 280mmHg and that of octane is 420 mm Hg.]
[NEET 2021]

(1) 160 mm of Hg   (2) 168mm of Hg
(3) 336 mm of Hg   (4) 350mm of Hg

Q.34 In one molal solution that contains 0.5 mole of a solute there is **[NEET 2022]**
(1) 50 mL of solvent   (2) 500 g of solvent
(3) 100 mL of solvent (4) 1000 g of solvent.

Q.35 Given below are two statements one is labelled as Assertion and the other is labelled as Reason.

[NEET 2023]

Assertion: Helium is used to dilute oxygen in diving apparatus.
Reason: Helium has high solubility in O2. In the light of the above statements, choose the correct answer from the options given below
(1) Both A and R are true and R is NOT the correct explanation of A
(2) A is true but R is false
(3) A is false but R is true
(4) Both A and R are true and R correct explanation of A

ANSWER KEY

NEET-FLASHBACK

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	2	4	1	3	1	3	3	2	4	1	3	1	1	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	1	1	2	3	1	2	4	4	2	1	3	4	4	4
Que.	31	32	33	34	35										
Ans.	2	1	3	2	1										