

1. The Henry's law constant (K_H) values of three gases (A, B, C) in water are 145, 2×10^{-5} and 35 kbar, respectively. The solubility of these gases in water follow the order: **(2024)**
 (a) $B > C > A$ (b) $A > C > B$
 (c) $A > B > C$ (d) $B > A > C$
2. The plot of osmotic pressure (π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope $25.73 \text{ L bar mol}^{-1}$. The temperature at which the osmotic pressure measurement is done is: **(2024)**
 (Use $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$)
 (a) 310°C (b) 25.73°C
 (c) 12.05°C (d) 37°C
3. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Helium is used to dilute oxygen in diving apparatus.
Reason (R): Helium has high solubility in O_2 .
 In the light of the above statements, choose the most appropriate answer from the options given below: **(2023)**
 (a) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
 (b) (A) is true but (R) is false.
 (c) (A) is false but (R) is true.
 (d) Both (A) and (R) are true and (R) is the correct explanation of (A).
4. Which amongst the following aqueous solution of electrolytes will have minimum elevation in boiling point? Choose the correct option: **(2023)**
 (a) 0.05 M NaCl (b) 0.1 M KCl
 (c) 0.1 M MgSO_4 (d) 1 M NaCl
5. The following solutions were prepared by dissolving 10 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) in 250 ml of water (P_1), 10 g of urea ($\text{CH}_4\text{N}_2\text{O}$) in 250 ml of water (P_2) and 10 g of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is: **(2021)**
 (a) $P_1 > P_2 > P_3$ (b) $P_2 > P_3 > P_1$
 (c) $P_3 > P_1 > P_2$ (d) $P_2 > P_1 > P_3$
6. 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: **(2021)**
 [At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]
 (a) 168 mm of Hg
 (b) 336 mm of Hg
 (c) 350 mm of Hg
 (d) 160 mm of Hg
7. The mixture which shows positive deviation from Raoult's law is: **(2020)**
 (a) Benzene + Toluene
 (b) Acetone + Chloroform
 (c) Chloroethane + Bromoethane
 (d) Ethanol + Acetone
8. The freezing point depression constant (K_f) of benzene is $5.12 \text{ K kg mol}^{-1}$. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places): **(2020)**
 (a) 0.80 K (b) 0.40 K
 (c) 0.60 K (d) 0.20 K
9. 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}] **(2020 Covid Re-NEET)**
 (a) 60
 (b) 80
 (c) 20
 (d) 40
10. Isotonic solutions have same **(2020 Covid Re-NEET)**
 (a) Freezing temperature
 (b) Osmotic pressure
 (c) Boiling temperature
 (d) Vapour pressure
11. For an ideal solution, the correct option is: **(2019)**
 (a) $\Delta_{mix} S = 0$ at constant T and P
 (b) $\Delta_{mix} V \neq 0$ at constant T and P
 (c) $\Delta_{mix} H = 0$ at constant T and P
 (d) $\Delta_{mix} G = 0$ at constant T and P

12. The mixture that forms maximum boiling azeotrope is: **(2019)**
 (a) Water + Nitric acid
 (b) Ethanol + Water
 (c) Acetone + Carbon disulphide
 (d) Heptane + Octane
13. If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be: **(2017-Delhi)**
 (a) Unchanged (b) Doubled
 (c) Halved (d) Tripled
14. Which of the following is dependent on temperature? **(2017-Delhi)**
 (a) Weight percentage
 (b) Molality
 (c) Molarity
 (d) Mole fraction
15. Toluene in the vapour phase is in equilibrium with a solution of benzene and toluene having mole fraction of toluene 0.50. If vapour pressure of pure benzene is 119 torr and that of toluene is 37.0 torr at the same temperature, mole fraction of toluene in vapour phase will be: **(2018-Gujarat)**
 (a) 0.325 (b) 0.462
 (c) 0.237 (d) 0.506
16. Which one of the following is incorrect for ideal solution? **(2016-II)**
 (a) $\Delta P = P_{obs} - P_{calculated \text{ by Raoult's law}} = 0$
 (b) $\Delta G_{mix} = 0$
 (c) $\Delta H_{mix} = 0$
 (d) $\Delta U_{mix} = 0$
17. The van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is: **(2016-II)**
 (a) 2 (b) 3
 (c) 0 (d) 1
18. At 100°C, the vapour pressure of a solution of 6.5 g of a solute in 100 g water is 732 mm. If $K_b = 0.52$, the boiling point of this solution will be: **(2016-I)**
 (a) 103°C (b) 101°C
 (c) 100°C (d) 102°C
19. Which of the following statements about the composition of the vapour over an ideal 1:1 molar mixture of benzene and toluene is correct? Assume that the temperature is at 25°C.
 (Given, vapour pressure data at 25°C, benzene = 12.8 kPa, toluene = 3.85 kPa) **(2016)**
 (a) The vapour will contain equal amounts of benzene and toluene
 (b) Not enough information is given to make a prediction
 (c) The vapour will contain a higher percentage of benzene
 (d) The vapour will contain a higher percentage of toluene
20. What is the mole fraction of the solute in a 1.00 m aqueous solution? **(2015 Re)**
 (a) 0.0177 (b) 0.177
 (c) 1.770 (d) 0.0354
21. Which one of the following electrolytes has the same value of van't Hoff's factor (i) as that of $Al_2(SO_4)_3$ (if all are 100% ionized)? **(2015)**
 (a) $K_3[Fe(CN)_6]$ (b) $Al(NO_3)_3$
 (c) $K_4[Fe(CN)_6]$ (d) K_2SO_4
22. Which one is not equal to zero for an ideal solution? **(2015)**
 (a) ΔS_{mix}
 (b) ΔV_{mix}
 (c) $\Delta P = P_{observed} - P_{Raoult}$
 (d) ΔH_{mix}
23. The boiling point of 0.2 mol kg^{-1} solution of X in water is greater than equimolar solution of Y in water. Which one of the following statements is true in this case? **(2015)**
 (a) Molecular mass of X is greater than the molecular mass of Y
 (b) Molecular mass of X is less than the molecular mass of Y
 (c) Y is undergoing dissociation in water while X undergoes no change
 (d) X is undergoing dissociation in water
24. Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression? **(2014)**
 (a) $C_6H_{12}O_6$ (b) $Al_2(SO_4)_3$
 (c) K_2SO_4 (d) KCl
25. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3 ? The concentrated acid is 70% HNO_3 . **(2013)**
 (a) 70.0 g of conc. HNO_3
 (b) 54.0 g conc. HNO_3
 (c) 45.0 g conc. HNO_3
 (d) 90.0 g conc. HNO_3