SOLUTION

Q.1. Mole fraction of the solute in a 1.00 molal aqueous solution is
   a) 0.1770
   b) 0.0177
   c) 0.0344
   d) 1.7700

Q.2. P_1^0 and P_2^0 are the vapour pressure of pure liquid components, A and B, respectively of an ideal binary solution. If X_1 represents the mole fraction of component A, the total pressure of the solution will be.
   a) $P_1^0 + X_1 (P_2^0 - P_1^0)$
   b) $P_1^0 + X_1(P_1^0 - P_2^0)$
   c) $P_2^0 + X_1 (P_2^0 - P_1^0)$
   d) $P_2^0 + X_1 (P_1^0 - P_2^0)$

Q.3. The vapour pressure of water at 20°C is 17.5 mm Hg. If 18 g of glucose $(C_6H_{12}O_6)$ is added to 178.2 g of water at 20°C, the vapour pressure of the resulting solution will be
   a) 17.325 mm Hg
   b) 15.750 mm Hg
   c) 16.500 mm Hg
   d) 17.500 mm Hg

Q.4 Benzene and toluene form nearly ideal solution. At 20°C, the vapour pressure of benzene is 75 torr and that of toluene is 22 torr. The partial vapour pressure of benzene at 20°C for a solution containing 78 g of benzene and 46 g of toluene in torr is
   a) 53.5
   b) 37.5
   c) 25
   d) 50

Q.5. At certain hill station pure water boils at 99.725 °C. If Kb for water is 0.513 °Ckg mol^{-1} then boiling point of 0.69 m solution of urea will be
   a) 103 °C
   b) 100.079 °C
   c) 100.359 °C
   d) unpredictable

Q.6. Coolent used in car radiator is aqueous solution of ethylene glycol. In order to prevent the solution from freezing at $-0.3°C$. How much ethylene glycol must be added to 5 kg of water ? ($Kf = 1.86$ K kg mol^{-1})
a) 50 kg
b) 55 g
c) 45 g
d) 40 g

Q.7. A current of dry air is passed through a solution of 2.64 g of a non volatile solute in 30.0 g of ether and then through pure ether. The loss in weight of solution was 0.645 g and of the ether 0.0345 g. The molecular weight of the solid is
a) 122
b) 12.2
c) 244
d) 135

Q.8. If liquids A and B form an ideal solution
a) the enthalpy of mixing is zero
b) the entropy of mixing is zero
c) the free energy of mixing is zero
d) the free energy as well as the entropy of mixing are each zero

Q.9. Which of the following modes of expressing concentration is independent of temperature?
a) Molarity
b) Formality
c) Normality
d) Molality

Q.10. During depression of freezing point in a solution the following are in equilibrium
a) liquid solvent, solid solvent
b) liquid solvent, solid solute
c) liquid solute, solid solute
d) liquid solute, solid solvent

Q.11. Which of the following is not a colligative property?
a) Depression in freezing point
b) Elevation of boiling point
c) Osmotic pressure
d) Modification of refractive index

Q.12. Which of the following colligative properties can provide molar mass of proteins (or polymers or colloids) with greatest precision?
   a) Depression in freezing point
   b) Osmotic pressure
   c) Relative lowering of vapour pressure
   d) Elevation of boiling point

Q.13. The relationship between osmotic pressure at 273 K when 10g glucose (P1), 10 g urea (P2), and 10g sucrose (P3) are dissolved in 250 ml of water is
   a) P1 > P2 > P3
   b) P3 > P1 > P2
   c) P2 > P1 > P3
   d) P2 > P3 > P1

Q.14. Which of the following 0.10 m aqueous solution will have the lowest freezing point?
   a) $Al_2(SO_4)_3$
   b) $C_6H_{10}O_5$
   c) KI
   d) $C_{12}H_{22}O_{11}$

Q.15. If a is the degree of dissociation of Na_2SO_4 , the Vant Hoff's factor (i) used for calculating the molecular mass is
   a) $1 - 2\alpha$
   b) $1 + 2\alpha$
   c) $1 - \alpha$
   d) $1 + \alpha$

Q.16. Which of the following liquid pairs shows a positive deviation from Raoult's law ?
   a) Water - nitric acid
   b) Benzene - methanol
   c) Water - hydrochloric acid
   d) Acetone - chloroform

Q.17. Equimolar solutions in the same solvent have
   a) different boiling and different freezing points
   b) same boiling and same freezing point
   c) same freezing point but different boiling point
   d) same boiling point but different freezing point

Q.18. Which of the following statement is correct if the intermolecular forces in liquids A, B and C are in the order A < B < C?
   a) B evaporates more readily than A
   b) B evaporates less readily than C
   c) A and B evaporates at the same rate
   d) A evaporates more readily than C

Q.19. A solution made up of numerous components in which each component's property is the weighted sum of its separate properties. The solution is
   a) Ideal Solution
   b) Non-Ideal solution
   c) Real Solution
   d) None of the mentioned

Q.20. The osmotic pressure of a solution is directly proportional to
   a) the molecular concentration of the solute
   b) the absolute temperature at a given concentration
   c) the lowering of vapour pressure
   d) all the above.

Q.21. Which of the following salt will have same value of Vant Hoff's factor(i) as that of $K_4[Fe(CN)_6]$
   a) $Al_2(SO_4)_3$
   b) NaCl
   c) $Al(NO_3)_3$
   d) Na_2SO_4

Q.22. Azeotropic mixture of HCl and H_2O has
   a) 48% HCl
   b) 22.2% HCl
   c) 36% HCl
   d) 20.2% HCl

Q.23. An aqueous solution freezes out -0.186°C (Kf = 1.86°, kb = 0.512). What is the elevation in boiling point?
   a) 0.186
   b) 0 .512
   c) 0.86
   d) 0.0512

Q.24. The average osmotic pressure of human bipod is 7.8 bar at 37°C. What is the concentration of an aqueous solution of NaCl that could be used in blood stream?
   a) 0.15 mol L-1
   b) 0.30 mol L-1
   c) 0.60 mol L-1
   d) 0.45 mol L-1

Q.25. Which has the minimum osmotic pressure?
   a) 200 ml of 2 M NaCl
   b) 200 ml of 1 M glucose
   c) 200 ml of 2 M urea
   d) all have same.