

TOPIC : SOLUTIONS

1. The number of moles of sodium hydroxide present in 2.5 L of 0.5 M aqueous solution is
 (a) 2.16 (b) 0.5
 (c) 12.5 (d) 5
2. An azeotropic solution of two liquids has boiling point lower than either when it
 (a) shows a negative deviation from Raoult's law
 (b) shows a positive deviation from Raoult's law
 (c) show no deviation from Raoult's law
 (d) is saturation
3. The addition of a non-volatile solute to the solvent results in lowering of
 (a) vapour pressure as well as boiling point
 (b) vapour pressure as well as density
 (c) vapour pressure as well as freezing point
 (d) boiling point as well as freezing point
4. When a saturated solution of solution chloride is heated, it becomes
 (a) unsaturated
 (b) supersaturated
 (c) remains saturated
 (d) attains equilibrium conditions
5. Certain substance trimerises when dissolved in a solvent A. The van't Hoff's factor 'i' for the solution is
 (a) 1 (b) $\frac{1}{3}$
 (c) 3 (d) unpredictable
6. A non-volatile solute is found to dissociate in aqueous solution, the van't Hoff's factor i will be
 (a) > 1 (2) < 1
 (3) $= 1$ (d) $= 0$
7. 0.5 M aqueous solution of glucose is isotonic with
 (a) 0.5 M KCl solution
 (b) 0.5 M CaCl_2 solution
 (c) 0.5 M urea solution
 (d) 1 M solution of sucrose
8. Which of the following chemical entities can act as semipermeable membrane ?
 (a) $\text{Cu}_2 [\text{Fe}(\text{CN})_6]$ (b) $\text{Cu}(\text{SCN})_2$
 (c) BaC_2O_4 (d) BaSO_4
9. 1000 g of a sample of hard water was found to contain 0.01 g of MgSO_4 . The concentration of Mg^{2+} is
 (a) 100 ppm (b) 10 ppm
 (c) 1 ppm (d) 10^3 ppm
10. Which one of the following pairs of solution can we expect to be isotonic at the same temperature ?
 (a) 0.1 M urea and 0.1 M NaCl
 (b) 0.1 M urea and 0.2 M MgCl_2
 (c) 0.1 M NaCl and 0.1 M Na_2SO_4
 (d) 0.1 M $\text{Ca}(\text{NO}_3)_2$ and 0.1 M Na_2SO_4
11. Which of the following condition is not satisfied by an ideal solution ?
 (a) $\Delta H_{\text{mix}} = 0$ (b) $\Delta S_{\text{mix}} = 0$
 (c) $\Delta V_{\text{mix}} = 0$ (d) Raoult's law is obeyed
12. For a solution of a non-electrolyte in water, the Van't Hoff's factor is always
 (a) $= 0$ (b) ≤ 1
 (c) $= 2$ (d) > 1 but < 2
13. Which of the following is a colligative property?
 (a) Lowering of vapour pressure
 (b) Osmotic pressure
 (c) Boiling point
 (d) Change in entropy

14. For 0.7 M aqueous solution of certain electrolyte, the osmotic pressure
 (a) is independent of temperature
 (b) increases with increase in temperature
 (c) decreases with increase in temperature
 (d) first increases and then decreases with rise in temperature.
15. A substance shows the phenomenon of deliquescence if its vapour pressure is
 (a) equal to the atmospheric pressure
 (b) less than the atmospheric pressure
 (c) greater than that of water vapour in air
 (d) less than that of water vapour in air
16. Azeotropic mixture are
 (a) mixture of two solids with very small difference in melting points
 (b) mixture of two liquids having difference in melting points
 (c) constant boiling mixtures
 (d) ideal solutions in all respects
17. The two solutions having same molalities will also have same
 (a) mole fraction
 (b) molarities
 (c) normalities
 (d) lowering of vapour pressures
18. A solution of benzoic acid dissolved in benzene will show a molecular mass closer to
 (a) 122 (b) 244
 (c) 61 (d) 366
19. Which of the following conditions is not satisfied by ideal solutions ?
 (a) $\Delta H_{\text{mix}} = 0$
 (b) $\Delta V_{\text{mix}} = 0$
 (c) Obedience of Raoult's law
 (d) $\Delta G_{\text{mix}} = 0$
20. Which of the following solution has highest normality ?
 (a) 8 g L^{-1} (KOH)
 (b) normal phosphoric acid
 (c) 6 g per 100 (NaOH)
 (d) 0.5 M H_2SO_4
21. Arrange the following aqueous solutions in the order of their increasing boiling points
 (i) 0.001 M NaCl (ii) 0.001 M urea
 (iii) 0.001 M MgCl_2 (iv) 0.01 M NaCl
 (a) ii < i < iii < iv (b) i < ii < iv < iii
 (c) ii < i = iii < iv (d) iv < iii < i < ii
22. Two liquids A and B form an ideal solution. At 300 K the vapour pressure of a solution of 1 mole of A and x moles of B is 550 mm. If the vapour pressure of pure A and B are 400 mm and 600 mm respectively, then x is
 (a) 1 (b) 2
 (c) 3 (d) 4
23. The ratio of elevation in boiling point of aqueous solution of sodium chloride to that of an aqueous solution of glucose of same molalities is approximately
 (a) 1 (b) 2
 (c) 0.5 (d) 2.5
24. A sample of tooth past weighing 500 g, on analysis, was found to contains 0.2 g of fluorine. The concentration of fluorine in ppm is
 (a) 4×10^3 (b) 4×10^2
 (c) 4×10^0 (d) 2×10^2
25. The molality of a 15% (W/V) solution of H_2SO_4 of density 1.1 g/cm^3 is approximately
 (a) 1.2 (b) 1.4
 (c) 1.8 (d) 1.6

26. 10% aqueous solution of certain substance is isotonic with 5% aqueous solution of fructose ($C_6H_{12}O_6$). The molecular mass of the substance is
 (a) 90 u (b) 360 u
 (c) 180 u (d) 540 u
27. Which of the following solutions will have highest value of depression in freezing point
 (a) 6% aqueous solution of glucose
 (b) 6% aqueous solution of urea
 (c) 6% aqueous solution of sucrose
 (d) all the above will have same value
28. In order to prepare 0.1 m sodium chloride solution, the amount of NaCl required to be added to 100 g of water is
 (a) 5.85 g (b) 58.5 g
 (c) 0.585 g (d) 0.0585 g
29. How much water is needed to dilute 10 ml of decamolar hydrochloric acid to make it exactly decimolar solution ?
 (a) 990 ml (b) 1000 ml
 (c) 1010 ml (d) 100 ml
30. Benzoic acid undergoes dimerisation in benzene solution. The van't Hoff's factor 'i' is related to the degree of association ' α ' of the acid as
 (a) $i = i - \alpha$ (b) $i = 1 + \alpha$
 (c) $i = 1 - \frac{\alpha}{2}$ (d) $i = 1 + \frac{\alpha}{2}$
31. Which of the following statements are not true?
 I. Normality of a solution is always greater than molarity
 II. Normality of a solution increases with increase in temperature
 III. Normality of a solution may be equal to or greater than the molarity
 IV. Normality \times Eq. mass = Molarity \times Mol mass
32. Equal volumes of 0.1 M $AgNO_3$ and 0.2 M NaCl are mixed. The concentration of NO_3^- ions in the mixture will be
 (a) 0.1 M (b) 0.05 M
 (c) 0.2 M (d) 0.15 M
33. Which one of the following salts will have the 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
34. The volume of 0.1 M H_2SO_4 required to neutralize completely 40 ml of 0.2 M NaOH solution is
 (a) 10 ml (b) 40 ml
 (c) 20 ml (d) 80 ml
35. The relative lowering of vapour pressure of a solution containing 6 g of urea dissolved in 90 g of water is
 (a) 0.0196 (b) 0.05
 (c) 1.50 (d) 0.01
36. 50 ml of 0.2 M HCl is mixed with 50 ml of 0.1 M HCl and 100 ml of 0.05 M HCl. Assuming complete ionization. The pH of the resulting solution is
 (a) 4 (b) 3
 (c) 1 (d) 7
37. 0.6 g of a solute is dissolved in 0.1 L of a solvent which develops an osmotic pressure of 1.23 atm at $27^\circ C$. The molecular mass of the substance is
 (a) 149.5 (b) 120
 (c) 430 (d) none of these
38. Which of the following complex entity satisfy the following data. (i) Van't Hoff factor = 3 (ii) it contains Pt (IV), K(I) and chloride ions.
 (a) $K_2[PtCl_6]$ (b) $K_2[PtCl_4]$
 (c) $K_3[PtCl_5]$ (d) both 'a' and 'b'

39. In certain hill-station the boiling point of pure water was determined to be 97.4°C . What mass of NaCl must be dissolved in 1 kg of water so as to bring boiling point back to 100°C . k_b for water is 0.52 kg mol^{-1} and i for NaCl is 2.
- (a) 146.25 g (b) 292.5 g
(c) 73.125 g (d) 117 g
40. 25 ml of certain aqueous solution of KCl required 40 mL of 0.5 M AgNO_3 solution for complete precipitation of Cl^- ion. If KCl ionizes to a complete extent in solution, the freezing point of the solution in is (assume molality to the same as molarity) $k_f = 1.86 \text{ K kg mol}^{-1}$
- (a) -0.27°C (b) -5°C
(c) 2.97°C (d) -5.95°C
41. Which of the following aqueous solutions will have least vapour pressure?
- (a) 0.1m BaCl_2 (b) 0.1 m H_2NCONH_2
(c) 0.1 m Na_2SO_4 (d) 0.1 m Na_3PO_4
42. Two aqueous solutions S_1 and S_2 are separated by a semi-permeable membrane. S_1 has lower vapour pressure than S_2 . Then
- (a) More solvent will flow from S_1 to S_2
(b) More solvent will flow from S_2 to S_1
(c) Solvents from S_1 and S_2 will flow at equal rates
(d) No flow of solvents will take place
43. The vapour pressure of water at 50°C is 92.5 torr. What will be the vapour pressure of a solution which contains 1 mole of non-volatile solute in 1000 g of water at 50°C ?
- (a) 96.5 torr (b) 91.8 torr
(c) 94.2 torr (d) 90.8 torr
44. Which one of the following will have the highest freezing point at 1 atm.?
- (a) 0.1 m NaCl solution
(b) 0.1 m $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ solution
(c) 0.1 m BaCl_2 solution
(d) 0.1 m FeCl_3 solution
45. The value of observed and calculated molecular mass of $\text{Ca}(\text{NO}_3)_2$ are 65.4 and 194 g mol^{-1} respectively. The degree of dissociation of $\text{Ca}(\text{NO}_3)_2$ will be approximately
- (a) 25 % (b) 50 %
(c) 98 % (d) 80 %
46. Y g of a non-volatile organic substance of molecular mass M is dissolved in 250 g benzene. Molal elevation constant of the benzene is K_b . Elevation in its boiling point is given by
- (a) $\frac{4M}{K_b Y}$ (b) $\frac{4K_b Y}{M}$
(c) $\frac{K_b Y}{4M}$ (d) $\frac{K_b Y}{M}$
47. Mixture of volatile components A and B has total vapour pressure (in torr)
- $$p = 254 - 119\chi_A$$
- where χ_A is mol fraction of A in mixture. Hence p_A^0 and p_B^0 are (in torr).
- (a) 254, 119 (b) 119, 254
(c) 135, 254 (d) 154, 119
48. Consider 1 M solution of 2 solutes in same solvent. X is 80 % dimerses whereas Y is 90 % trimerises in solution. Which statement is correct
- (a) B.P of X < B.P of Y
(b) O.P of Y > O.P of X
(c) F.P. of X < F.P of Y
(d) Colligative properties of X = Y

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| <p>49. The V.P. of the solution of 2 liquids A($p^\circ = 80$ mm) and B ($p^\circ = 120$ mm) is found to be 100 mm when $\chi_A = 0.4$ the result shows that</p> <ul style="list-style-type: none">(a) Solution exhibits ideal behaviour(b) Solution exhibits positive deviations(c) Solution shows negative deviations(d) Solution will show positive deviations for lower concentration and negative deviations for higher concentration. | <p>50. The V.P. of a given temperature of an ideal solution containing 0.2 mol of a non-volatile solute and 0.8 mol of solvent is 60 mm of Hg. The V.P. of the pure solvent at the same temperature will be</p> <ul style="list-style-type: none">(a) 120 mm of Hg(b) 150 mm of Hg(c) 60 mm of Hg(d) 75 mm of Hg |
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ANSWER KEY

1	A	11	B	21	A	31	A	41	D
2	B	12	B	22	C	32	B	42	B
3	C	13	C	23	B	33	A	43	D
4	A	14	B	24	B	34	B	44	B
5	B	15	D	25	D	35	A	45	C
6	A	16	C	26	B	36	C	46	B
7	C	17	A	27	B	37	B	47	C
8	A	18	B	28	C	38	A	48	C
9	B	19	D	29	D	39	A	49	C
10	D	20	C	30	C	40	C	50	D