DPP No: 22

Maximum Time
50 Min

Chemistry

TARGET

JEE-MAINS

SYLLABUS : Solution

1. If P_0 and P are the vapour pressures of a solvent and its solution respectively and N_1 and N_2 are the mole fractions of the solvent and non-volatile solute respectively, then correct relation is :

   (A) $P = P_0 N_2$ (B) $P = P_0 N_1$ (C) $P_0 = P N_1$ (D) $P = P_0 (N_1/N_2)$

2. The vapour pressure lowering caused by the addition of 100 g of sucrose (molecular mass = 342) to 1000 g of water if the vapour pressure of pure water at 25°C is 23.8 mm Hg

   (A) 1.25 mm Hg   (B) 0.125 mm Hg   (C) 1.15 mm Hg   (D) 00.12 mm Hg

3. Relative decrease in vapour pressure of an aqueous NaCl is 0.167. Number of moles of NaCl present in 180g of H_2O is :

   (A) 2 mol   (B) 1 mol   (C) 3 mol   (D) 4 mol

4. In an experiment, 1g of a non-volatile solute was dissolved in 100g of acetone (mol. mass = 58) at 298K. The vapour pressure of the solution was found to be 192.5 mm Hg. The molecular weight of the solute is (vapour pressure of acetone = 195 mm Hg)

   (A) 25.24   (B) 35.24   (C) 44.66   (D) 55.24

5. The vapour pressure of pure benzene, C_6H_6 at 50°C is 268 Torr. How many moles of non-volatile solute per mol of benzene is required to prepare a solution of benzene having a vapour pressure of 167 Torr at 50°C?

   (A) 0.377   (B) 0.605   (C) 0.623   (D) 0.395

6. The relative lowering in vapour pressure is

   (A) $\propto X_{solute}$ (B) $\propto \dfrac{1}{X_{solute}}$ (C) $= X_{solute}$ (D) $\propto m$

7. At a constant temperature, ΔS will be maximum for which of the following processes :

   (A) Vaporisation of a pure solvent

   (B) Vaporisation of solvent from a solution containing nonvolatile and nonelectrolytic solute in it

   (C) Vaporisation of solvent from a solution containing nonvolatile but electrolytic solute in it

   (D) Entropy change will be same in all the above cases

8. The elevation of boiling point method is used for the determination of molecular weight of

   (A) Non-volatile and soluble solute   (B) Non-volatile and insoluble solute

   (C) Volatile and soluble solute   (D) Volatile and insoluble solute

9. Which statement is correct for the boiling point of solvent containing a dissolved solid substance

   (A) Boiling point of the liquid is depressed

   (B) Boiling point of the liquid is elevated

   (C) There is no effect on the boiling point

   (D) The change depends upon the polarity of the liquid

10. A complex of iron and cyanide ions is 100% ionised at 1m (molal). If its elevation in b.p. is 2.08. Then the complex is (K_b = 0.52° mol^{-1} kg) :

(A) $K_3[Fe(CN)_6]$ (B) $Fe(CN)_2$ (C) $K_4[Fe(CN)_6]$ (D) $Fe(CN)_4$

11. Which of the following 0.1 M aqueous solutions will have the lowest freezing point

(A) Potassium sulphate   (B) Sodium chloride

(C) Urea   (D) Glucose

12. In cold countries, ethylene glycol is added to water in the radiators of cars during winters. It results in

(A) Lowering in boiling point   (B) Reducing viscosity

(C) Reducing specific heat   (D) Lowering in freezing point

13. Which of the following has been arranged in order of decreasing freezing point?

(A) 0.05 M KNO_3 > 0.04 M $CaCl_2$ > 0.140 M sugar > 0.075 M $CuSO_4$

(B) 0.04 M $BaCl_2$ > 0.140 M sucrose > 0.075 M $CuSO_4$ > 0.05 M KNO_3

(C) 0.075 M $CuSO_4$ > 0.140 M sucrose > 0.04 M $BaCl_2$ > 0.05 M KNO_3

(D) 0.075 M $CuSO_4$ > 0.05 M $NaNO_3$ > 0.140 M sucrose > 0.04 M $BaCl_2$

14. Molal depression constant for water is 1.86°C. The freezing point of a 0.05 molal solution of a non-electrolyte in water is :

(A) −1.86°C   (B) −0.93°C   (C) −0.093°C   (D) 0.93°C

15. An aqueous solution freezes at - 0.186°C (k_f= 1.86°; k_b = 0.512). What is the elevation in boiling point

(A) 0.186   (B) 0.512   (C) $\dfrac{0.512}{1.86}$ (D) 0.0512

16. Select correct statement :

(A) Osmosis produced by semipermeable membrane.

(B) Desalination of sea-water is done by reverse osmosis

(C) Both are correct statements

(D) None is correct statement

17. 0.5 M solution of urea is isotonic with

(A) 0.5 M NaCl solution   (B) 0.5 M sugar solution

(C) 0.5 M $BaCl_2$ solution   (D) 0.5 M solution benzoic acid in benzene

18. The relationship between osmotic pressure at 273 K when 10 g glucose (P_1) ,10 g urea (P_2) and 10 g sucrose (P_3) are dissolved in 250 mL of water is :

(A) $P_1 > P_2 > P_3$ (B) $P_3 > P_1 > P_2$ (C) $P_2 > P_1 > P_3$ (D) $P_2 > P_3 > P_1$

19. Osmotic pressure of blood is 7.40 atm at 27°C. Number of moles of glucose to be used per litre for an intravenous injection that is to have the same osmotic pressure as blood is :

(A) 0.3   (B) 0.2   (C) 0.1   (D) 0.4

20. The osmotic pressure of 1 m solution at 27°C is

(A) 2.46 atm   (B) 24.6 atm   (C) 1.21 atm   (D) 12.1 atm]

21. Assuming each salt to be 90% dissociated which of the following will have highest osmotic pressure-

(A) Decinormal $Al_2(SO_4)_3$

(B) Decinormal $BaCl_2$

(C) Decinormal Na_2SO_4

(D) A solution obtained by mixing equal volumes of (2) and (3) and filtering

22. The amount of benzene that will separate out (in grams) if a solution containing 7.32 g of triphenylmethane in 1000 g of benzene is cooled to a temperature which is 0.2°C below the freezing point of benzene?

(K_f = 5.12 K-Kg/mol)

23. If relative decrease in vapour pressure is 0.4 for a solution containing 1 mol NaCl in 3 mol H_2O, NaCl is .... % ionised.

(A) 60%   (B) 50%   (C) 100%   (D) 40%

24. A solute 'S' undergoes a reversible trimerization when dissolved in a certain solvent. The boiling point elevation of its 0.1 molal solution was found to be identical to the boiling point elevation in case of a 0.08 molal solution of a solute which neither undergoes association nor dissociation. To what percent had the solute 'S' undergone trimerization?

(A) 30%   (B) 40%   (C) 50%   (D) 60%

25. A solution of x moles of sucrose in 100 grams of water freezes at −0.2ºC. As ice separates the freezing point goes down to −0.25ºC. How many grams of ice would have separated?

(A) 18 grams   (B) 20 grams   (C) 25 grams   (D) 23 grams

ANSWER KEY

1.	(B)	2.	(B)	3.	(B)	4.	(C)	5.	(B)	6.	(C)	7.	(A)
8.	(A)	9.	(B)	10.	(A)	11.	(A)	12.	(D)	13.	(A)	14.	(C)
15.	(D)	16.	(C)	17.	(B)	18.	(C)	19.	(A)	20.	(B)	21.	(A)
22.	232	23.	(C)	24.	(A)	25.	(B)						