CHEMISTRY

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CLASS - XII

MODULE – 01

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EXERCISE-II

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Q.59 For 0.1 *M* solution, the colligative property will follow the order

(1) $NaCl > Na_2SO_4 > Na_3PO_4$

(2) $NaCl < Na_2SO_4 < Na_3PO_4$

(3) $NaCl > Na_2SO_4 \approx Na_3PO_4$

(4) $NaCl < Na_2SO_4 = Na_3PO_4$

Q. 1 Mole fraction of $C_3H_5(OH)_3$ in a solution of 36 g of water and 46 g of glycerine is :

(1) 0.46 (2) 0.36
(3) 0.20 (4) 0.40

Q.2 An aqueous solution of urea containing 18 g urea in 1500 cm^3 of solution has a density of 1.052 g/cm^3. If the molecular weight of urea is 60, then the molality of solution is-

(1) 0.2 (2) 0.192
(3) 0.064 (4) 1.2

Q.3 What is the molarity of H_2SO_4 solution that has a density of 1.84 gm/cc at 35^0C and contains 98% by weight-

(1) 4.18 M (2) 8.14 M
(3) 18.4 M (4) 18 M

Q.4 25 mL of 3 M HCl were added to 75 mL of 0.05 M HCl. The molarity of HCl in the resulting solution is approximately-

(1) 0.055 M (2) 0.35 M
(3) 0.787 M (4) 3.05 M

Q.5 0.2 mole of HCl and 0.1 mole of $CaCl_2$ were dissolved in water to have 500 ml of solution, the molarity of Cl^- ions is-

(1) 0.04 M (2) 0.8 M
(3) 0.4 M (4) 0.08 M

Q.6 When 5.0 gram of $BaCl_2$ is dissolved in water to have 10^6 gram of solution. The concentration of solution is-

(1) 2.5 ppm (2) 5 ppm
(3) 5M (4) 5 gm L^{-1}

Q.7 The vapour pressure of water depends upon :

(1) Surface area of container
(2) Volume of container
(3) Temperature
(4) All

Q.8 A vessel has nitrogen gas and water vapours in equilibrium with liquid water at a total pressure of 1 atm. The partial pressure of water vapours is 0.3 atm. The volume of this vessel is reduced to one third of the original volume, at the same temperature, then total pressure of the system is :(Neglect volume occupied by liquid water)

(1) 3.0 atm (2) 1 atm
(3) 3.33 atm (4) 2.4 atm

Q.9 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 :

(1) $P = P_0N_2$ (2) $P = P_0N_1$
(3) $P_0 = PN_1$ (4) $P = P_0(N_1/N_2)$

Q.10 A mixture contains 1 mole of volatile liquid A ($P_A^0 = 100$ mm Hg) and 3 moles of volatile liquid B($P_B^0 = 80$ mmHg). If solution behaves ideally, the total vapour pressure of the distillate is

(1) 85 mm Hg (2) 85.88 mmHg
(3) 90 mm Hg (4) 92 mm Hg

Q.11 Mixture of volatile components A and B has total vapour pressure (in Torr) p = 254 – 119 x_A where x_A is mole fraction of A in mixture. Hence p_A^0 and p_B^0 are (in Torr)

(1) 254, 119 (2) 119, 254
(3) 135, 254 (4) 119, 373

Q.12 Ratio of Mole fraction of benzene (P_B^0= 150 torr) and toluene (P_T^0 = 50 torr) in vapour phase if the given solution has a vapour pressure of 120 torr?

(1) 7 : 1 (2) 7 : 3
(3) 8 : 1 (4) 7 : 8

Q.13 Two liquids A & B form an ideal solution. What is the vapour pressure of solution containing 2 moles of A and 3 moles of B at 300 K? [Given : At 300 K, Vapour pr. of pure liquid A(P_A^0) = 100 torr, Vapour pr. of pure liquid B(P_B^0) = 300 torr]

(1) 200 torr (2) 140 torr
(3) 180 torr (4) None of these

Q.14 At 300 K, the vapour pressure of an ideal solution containing 3 mole of A and 2 mole of B is 600 torr. At the same temperature, if 1.5 mole of A & 0.5 mole of C(non-volatile) are added to this solution the vapour pressure of solution increases by 30 torr. What is the value of P_B^0 ?

(1) 940 (2) 405
(3) 90 (4) None of these

Q.15 At a constant temperature, ΔS will be maximum for which of the following processes :

(1) Vaporisation of a pure solvent
(2) Vaporisation of solvent from a solution containing nonvolatile and nonelectrolytic solute in it
(3) Vaporisation of solvent from a solution containing nonvolatile but electrolytic solute in it
(4) Entropy change will be same in all the above cases

Q.16 Which of the following is less than zero for ideal solutions ?

(1) ΔH_{mix} (2) ΔV_{mix}
(3) ΔG_{mix} (4) ΔS_{mix}

Q.17 If vapour pressures of pure liquids 'A' & 'B' are 300 and 800 torr respectively at 25°C. When these two liquids are mixed at this temperature to form a solution in which mole percentage of 'B' is 92, then the total vapour pressure is observed to be 0.95 atm. Which of the following is true for this solution.

(1) $\Delta V_{mix} > 0$ (2) $\Delta H_{mix} < 0$
(3) $\Delta V_{mix} = 0$ (4) $\Delta H_{mix} = 0$

Q.18 Consider a binary mixture of volatile liquids. If at X_A = 0.4 the vapour pressure of solution is 580 torr then the mixture could be (p_A° = 300 torr, p_B° = 800 torr) :

(1) $CHCl_3 - CH_3COCH_3$ (2) $C_6H_5Cl - C_6H_5Br$
(3) $C_6H_6 - C_6H_5CH_3$ (4) $nC_6H_{14} - nC_7H_{16}$

Q.19 Which of the following will form ideal solution ?

(1) C_2H_5OH and water
(2) HNO_3 and water
(3) $CHCl_3$ and CH_3COCH_3
(4) C_6H_6 and $C_6H_5CH_3$

Q.20 Which of the following shows negative deviation from Raoult's law ?

(1) $CHCl_3$ and acetone (2) $CHCl_3$ and C_2H_5OH
(3) $C_6H_5CH_3$ and C_6H_6 (4) C_6H_6 and CCl_4

Q.21 The osmotic pressure of equimolar solutions of $BaCl_2$, NaCl and glucose will be in the order

(1) glucose > NaCl > $BaCl_2$
(2) $BaCl_2$ > NaCl > glucose
(3) NaCl > $BaCl_2$ > glucose
(4) NaCl > glucose > $BaCl_2$

Q.22 The osmotic pressure of a solution of benzoic acid dissolved in benzene is less than expected because-

(1) Benzoic acid is an organic solute
(2) Benzene is a non-polar solvent
(3) Benzoic acid dissociates in benzene
(4) Benzoic acid gets associated in benzene

Q.23 Assuming each salt to be completely dissociated which of the following will have highest osmotic pressure -

(1) Decimolar $Al_2(SO_4)_3$
(2) Decimolar $BaCl_2$
(3) Decimolar Na_2SO_4
(4) A solution obtained by mixing equal volumes of (2) and (3) and filtering

Q.24 A complex containing K^+, Pt (IV) and Cl^- is 100% ionised giving i = 3. Thus, complex is

(1) $K_2[PtCl_4]$ (2) $K_2[PtCl_6]$
(3) $K_3[PtCl_5]$ (4) $K[PtCl_3]$

Q.25 pH of 1M HA (weak acid) is 2. Hence van't Hoff factor is -

(1) 1.2 (2) 1.02
(3) 1.1 (4) 1.01

Q.26 In which case van't Hoff factor is maximum

(1) KCl, 50% ionised
(2) K_2SO_4 40% ionised
(3) $FeCl_3$, 30% ionised
(4) $SnCl_4$, 20% ionised

Q.27 The vapour pressure of water at room temperature is lowered by 5% by dissolving a solute in it, then the approximate molality of solution is :

(1) 2 (2) 1
(3) 4 (4) 3

Q.28 The Van't Hoff factor for a dilute aqueous solution of glucose is

(1) zero (2) 1.0
(3) 1.5 (4) 2.0

Q.29 The van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is

(1) 91.3% (2) 87%
(3) 100% (4) 74%

Q.30 The vapour pressure of pure liquid A is 10 torr and at the same temperature when 1 g of B solid is dissolved in 20 g of A, its vapour pressure is reduced to 9.0 torr. If the molecular mass of A is 200 amu, then the molecular mass of B is :

(1) 100 amu (2) 90 amu
(3) 75 amu (4) 120 amu

Q.31 The vapour pressure of a solution of a non-volatile solute B in a solvent A is 95% of the vapour pressure of the solvent at the same temperature. If the molecular weight of the solvent is 0.3 times the molecular weight of the solute, what is the ratio of weight of solvent to solute.
(1) 0.15 (2) 5.7
(3) 0.2 (4) none of these

Q.32 The vapour pressure of a dilute aqueous solution of glucose is 750 mm of mercury at 373 K. The mole fraction of solute is-
(1) $\frac{1}{10}$ (2) $\frac{1}{7.6}$
(3) $\frac{1}{35}$ (4) $\frac{1}{76}$

Q.33 1 mol each of following solutes are taken in 5 mol water,
A. NaCl B. K_2SO_4
C. Na_3PO_4 D. glucose
Assuming 100% ionisation of the electrolyte, relative decrease in vapour pressure will be in order :
(1) A < B < C < D (2) D < C < B < A
(3) D < A < B < C (4) equal

Q.34 The vapour pressure of a solvent decreased by 10 mm of Hg when a non-volatile solute was added to the solvent. The mole fraction of solute in solution is 0.2, what would be mole fraction of the solvent if decrease in vapour pressure is 20 mm of Hg.
(1) 0.2 (2) 0.4
(3) 0.6 (4) 0.8

Q.35 The vapour pressure of a saturated solution of sparingly soluble salt(XCl_3) was 17.20 mm Hg at 27ºC. If the vapour pressure of pure H_2O is 17.25 mm Hg at 300 K, what is the solubility of sparingly soluble salt XCl_3 in mole/Litre.
(1) 4.04×10^{-2} (2) 8.08×10^{-2}
(3) 2.02×10^{-2} (4) 4.04×10^{-3}

Q.36 Select correct statement -
(1) b.p. of 1 molal NaCl solution is twice that of 1 molal sucrose solution
(2) b.p. elevation of 1 molal glucose solution is half of the 1 molal KCl solution
(3) b.p. is a colligative property
(4) All of the above

Q.37 Which has the equal boiling point ?
(A) 0.1 M Na_2SO_4
(C) 0.1 M $C_6H_{12}O_6$ (glucose)
(B) 0.1 M $MgCl_2$
(D) 0.1 M $Al(NO_3)_3$
(1) (A) and (B) (2) (B) and (C)
(3) (C) and (D) (4) None of these

Q.38 Aluminium phosphate is 100% ionised in 0.01 molal aqueous solution. Hence, $\Delta T_b / K_b$ is :
(1) 0.01 (2) 0.015
(3) 0.0175 (4) 0.02

Q.39 A 0.001 molal solution of a complex $[MA_8]$ in water has the freezing point of –0.0054ºC. Assuming 100% ionization of the complex salt and K_f for H_2O = 1.86 Km^{-1}, write the correct representation for the complex
(1) $[MA_8]$ (2) $[MA_7]A$
(3) $[MA_6]A_2$ (4) $[MA_5]A_3$

Q.40 Which of the following has been arranged in order of decreasing freezing point?
(1) 0.05 M KNO_3 > 0.04 M $BaCl_2$ > 0.140 M sucrose > 0.075 M $CuSO_4$
(2) 0.04 M $BaCl_2$ > 0.140 M sucrose > 0.075 M $CuSO_4$ > 0.05 M KNO_3
(3) 0.075 M $CuSO_4$ > 0.140 M sucrose > 0.04 M $BaCl_2$ > 0.05 M KNO_3
(4) 0.075 M $CuSO_4$ > 0.05 M KNO_3 > 0.140 M sucrose > 0.04 M $BaCl_2$

Q.41 Aqueous solution of barium phosphate which is 100% ionised has $\Delta T_f / K_f$ as 0.05. Hence, given solution is
(1) 0.01 molal (2) 0.02 molal
(3) 0.04 molal (4) 0.05 molal

Q.42 A 0.2 molal aqueous solution of a weak acid (HX) is 20 per cent ionised. The freezing point of this solution is (Given k_f = 1.86º C kg mol^{-1} for water) :
(1) –0.45ºC (2) – 0.90ºC
(3) –0.31 ºC (4) – 0.53ºC.

Q.43 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) :
(1) $K_3[Fe(CN)_6]$ (2) $Fe(CN)_2$
(3) $K_4[Fe(CN)_6]$ (4) $Fe(CN)_4$

Q.44 A solution of x moles of sucrose in 100 grams of water freezes at -0.2^0C. As ice separates the freezing point goes down to 0.25^0C. How many grams of ice would have separated?
(1) 18 grams (2) 20 grams
(3) 25 grams (4) 23 grams

Q.45 Elevation of boiling point of 1 molar aqueous glucose solution (density = 1.2 g/ml) is
(1) K_b (2) 1.20 K_b
(3) 1.02 K_b (4) 0.98 K_b

Q.46 Osmotic pressure of blood is 7.40 atm at 27°C. Number of mol of glucose to be used per L for an intravenous injection that is to have the same osmotic pressure as blood is :
(1) 0.3 (2) 0.2
(3) 0.1 (4) 0.4

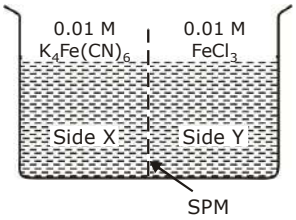
Q.47 A solution of glucose ($C_6H_{12}O_6$) is isotonic with 4 g of urea (NH_2–CO–NH_2) per liter of solution. The concentration of glucose is :
(1) 4 g/ ℓ (2) 8 g/ ℓ
(3) 12 g/ ℓ (4) 14 g/ ℓ

Q.48 A solution of a substance containing 1.05 g per 100 mL. was found to be isotonic with 3% glucose solution. The molecular mass of the substance is :
(1) 31.5 (2) 6.3
(3) 630 (4) 63

Q.49 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 -
(1) $P_1 > P_2 > P_3$ (2) $P_3 > P_1 > P_2$
(3) $P_2 > P_1 > P_3$ (4) $P_2 > P_3 > P_1$

Q.50 Which one of the following pairs of solution can we expect to be isotonic at the same temperature -
(1) 0.1 M urea and 0.1 M NaCl
(2) 0.1 M urea and 0.2 M $MgCl_2$
(3) 0.1 M NaCl and 0.1M Na_2SO_4
(4) 0.1 M $Ca(NO_3)_2$ and 0.1 M Na_2SO_4

Q.51 $FeCl_3$ on reaction with $K_4[Fe(CN)_6]$ in aqueous solution gives blue colour. These are separated by a semipermeable membrane AB as shown. Due to osmosis there is



(1) Blue colour formation in side X.
(2) Blue colour formation in side Y.
(3) Blue colour formation in both of the sides X and Y.
(4) No blue colour formation.

EXERCISE-III

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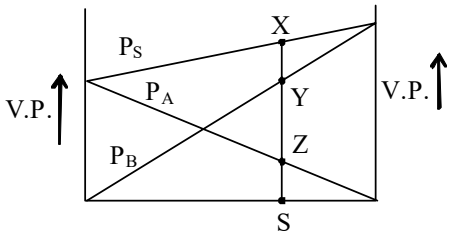
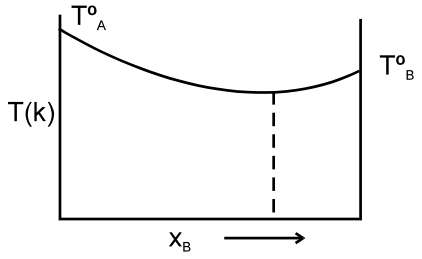
MCQ/COMPREHENSION/STATEMENT/MATCHING

Q.1 Consider following vapour pressure composition graph. Hence-



(A) V.P. of A = SZ
(B) V.P. of B = ZY
(C) V.P. of B = SY
(D) V.P. of solution at X = SZ + SY

Q.2 The diagram given below represents boiling point composition diagram of solution of component A and B, which is/are incorrect among the following?



(A) The solution shows negative deviation
(B) A-B-interactions are stronger than A-A and B-B
(C) The solution is ideal solution
(D) The solution shows positive deviation.

Q.3 The example of negative deviationis
(A) HCl & H_2O
(B) C_2H_5OH & H_2O
(C) $CHCl_3$ & CH_3COCH_3
(D) C_6H_6 & $C_6H_5CH_3$

Q.4 acetone and carbon disulphide form binary liquid solution showing positive deviation from Raolut law. The normal polling point (T_b) of pure acetone is less than that of pure CS_2. Pick out the **incorrect** statements among the following.
(A) Boiling temperature of mixture is always less than boiling temperature of acetone.
(B) Boiling temperature Azeotropic mixture is always less than boiling temperature of pure CS_2
(C) When a small amount CS_2(less volatile component) is added to excess of acetone boiling point of resulting mixture increases.
(D) A mixture of CS_2 and CH_3COCH_3 can be completely separated by simple fractional distillation.

Q.5 Which of the following is correct for an ideal solution ?
(A) Raoult's law is obeyed for entire concentration range and temperatures
(B) $\Delta H_{mix} = 0$
(C) $\Delta V_{mix} = 0$
(D) $\Delta S_{mix} = 0$

Q.6 Which of the following will form non-ideal solution ?
(A) C_2H_5OH and water
(B) HNO_3 and water
(C) $CHCl_3$ and CH_3COCH_3
(D) C_6H_6 and $C_6H_5CH_3$

ABOUT PHYSICS WALLAH

Alakh Pandey is one of the most renowned faculty in NEET & JEE domain's Physics. On his YouTube channel, Physics Wallah, he teaches the Science courses of 11th and 12th standard to the students aiming to appear for the engineering and medical entrance exams.

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