SOLUTIONS

CHAPTER-2

TEST-A

SOLVED

Time: 1 hr. **Max. Marks: 30**

SECTION-A

Tick the correct option:

1. Which of the following thermodynamic function is less than zero for ideal solutions? **[1]**

   (i) ΔH_{mix} (ii) ΔU_{mix} (iii) ΔG_{mix} (iv) ΔS_{mix}

2. The average osmotic pressure of human blood is 7.8 bar at 37°C. What is the concentration of an aqueous NaCl solution that could be used in the blood stream? ($R = 0.083$ L bar mol^{-1} K^{-1}). **[1]**

   (i) 0.15 mol/L (ii) 0.32 mol/L (iii) 0.60 mol/L (iv) 0.45 mol/L

3. The depression in freezing point of 0.1 M aqueous solution of HCl, $CuSO_4$ and K_2SO_4 are in the ratio of **[1]**

   (a) 1 : 1 : 1.5 (ii) 1 : 2 : 3 (iii) 1 : 1 : 1 (iv) 2 : 4 : 3

Assertion-Reason type Questions:

(i) If assertion and reason both are correct and reason is the correct explanation of assertion.

(ii) If assertion and reason both are correct and reason is not the correct explanation of assertion.

(iii) If assertion is correct and reason is wrong.

(iv) If assertion is wrong and reason is correct.

4. Assertion: Isotonic solutions do not show the phenomenon of osmosis. **[1]**

   Reason: Isotonic solutions have equal osmotic pressure.

5. Assertion: A mixture of cyclohexane and ethanol shows negative deviation from Raoult's law. **[1]**

   Reason: Cyclohexane reduces the intermolecular attraction between ethanol molecules.

One word /One Sentence type Questions.

6. What is the limiting value of the van't Hoff factor for $Na_2SO_4.10H_2O$? **[1]**

7. What type of deviation is shown by ethanol-acetone mixture and why? **[1]**

SECTION-B

8. 100 g of liquid A (molar mass 140 g mol^{-1}) was dissolved in 1000 g of liquid B (molar mass 180 g mol^{-1}). The vapour pressure of pure liquid B was found to be 500 torr. Calculate the vapour pressure of pure liquid A and its vapour pressure in the solution if the total vapour pressure of the solution is 475 torr. **[2]**

9. Account for the following

   (i) 0.1 m NaCl solution has a higher boiling pint than 0.1 m glucose solution.

   (ii) Ethylene glycol is added to car radiator as an antifreeze. **[2]**

10. (i) Name one semipermeable membrane used in Osmosis.

    (ii) Arrange the following solution in order of increasing van't Hoff factor.

    0.1 m NaCl, 0.01 m NaCl, 0.01 m NaCl **[2]**

11. Calculate the molarity of 1L solution of H_2SO_4 (d = 1.20 g/ml) which is 23% w/v (mass by volume). **[3]**

12. 1.00 g of a non-electrolyte sulphur is dissolved in 50.0 g of benzene and lowers the freezing point of benzene by 0.40 K. The freezing point depression constant of benzene is 5.12 K kg mol^{-1}. Find the molecular mass and molecular formula of sulphur. **[3]**

13. (i) Define molal elevation constant.

    (ii) Show with well-labelled diagram, the variation between the vapour pressure and the freezing point for a pure solvent and the solution containing non-volatile solute. **[3]**

14. 2 g of benzoic acid (C_6H_5COOH) dissolved in 30 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant for benzene is 4.9 K kg mol^{-1}. What is the percentage association of acid if it forms a double molecule (called dimer) in solution? **[3]**

    (Atomic mass: H = 1, C = 12, O = 16)

15. (i) What are azeotropes?

    (ii) State Henry's law

    (c) Which of the following changes with change in temperature and why?

    Molarity or molality

    (iv) The partial pressure of ethane over a saturated solution containing 6.56×10^{-2} g of ethane is 1 bar. If the solution contains 5.00×10^{-2} g of ethane, then what shall be the partial pressure of the gas? **[1 + 1+ 1 + 2 = 5]**

