



PARISHRAM ACADEMY

NAME of Student : _____

Subject : Chemistry

Class : XII

State

Topic: 2 - Solutions

Total Marks :- 35

SECTION – A

Q. 1. Select the write the correct answer: (4 Marks)

- (i) The vapour pressure of a solution containing 2 moles of a solute in 2 moles of water (vapour pressure of pure water = 24 mm Hg) is
(a) 24 mm Hg (b) 32 mm Hg (c) 48 mm Hg (d) 12 mm Hg
- (ii) The colligative property of a solution is
(a) vapour pressure (b) boiling point (c) osmotic pressure (d) freezing point
- (iii) Henry's law constant for a gas CH_3Br is $0.159 \text{ mol dm}^{-3} \text{ atm}$ at 250°C . What is the solubility of CH_3Br in water at 25°C and a partial pressure of 0.164 atm ?
(a) $0.0159 \text{ mol L}^{-1}$ (b) 0.164 mol L^{-1} (c) 0.026 M (d) 0.042 M
- (iv) Which of the following statement is NOT correct for 0.1 M urea solution and 0.05 M sucrose solution?
(a) osmotic pressure exhibited by urea solution is higher than that exhibited by sucrose solution
(b) urea solution is hypertonic to sucrose solution
(c) they are isotonic solutions
(d) sucrose solution is hypotonic to urea solution

Q.2. Answer the following: (3 Marks)

- (i) A solution concentration is expressed in molarity and not in molality while considering osmotic pressure. Why?
- (ii) Write the equation relating boiling point elevation to the concentration of solution.
- (iii) What is van't Hoff factor?

SECTION – B

Attempt any Four

(8 Marks)

- Q. 3. How vapour pressure lowering is related to a rise in boiling point of solution?
- Q. 4. What are isotonic and hypertonic solutions?
- Q. 5. A solvent and its solution containing a nonvolatile solute are separated by a semipermeable membrane. Does the flow of solvent occur in both directions? Comment giving reason.
- Q. 6. The solubility of N_2 gas in water at 25°C and 1 bar is $6.85 \times 10^{-4} \text{ mol L}^{-1}$. Calculate (a) Henry's law constant (b) molarity of N_2 gas dissolved in water under atmospheric conditions when partial pressure of N_2 in atmosphere is 0.75 bar .
- Q. 7. A solution is prepared by dissolving 394 g of a nonvolatile solute in 622 g of water. The vapour pressure of solution is found to be 30.74 mm Hg at 30°C . If vapour pressure of water at 30°C is 31.8 mm Hg , what is the molar mass of solute?
- Q. 8. 1.02 g of urea when dissolved in 98.5 g of certain solvent decreases its freezing point by 0.211 K . 1.609 g of unknown compound when dissolved in 86 g of the same solvent depresses the freezing point by 0.34 K . Calculate the molar mass of the unknown compound. (Molar mass of urea = 60 g mol^{-1})

SECTION – C

Attempt any Four

(12 Marks)

- Q. 9. Obtain the relationship between freezing point depression of a solution containing nonvolatile nonelectrolyte and its molar mass. (Same will be asked for elevation in boiling point)
- Q. 10. The vapour pressure of water at 20°C is 17 mm Hg. What is the vapour pressure of solution containing 2.8 g urea in 50 g of water?
- Q. 11. A solution of citric acid $C_6H_8O_7$ in 50 g of acetic acid has a boiling point elevation of 1.76 K. If K_b for acetic acid is $3.07 \text{ K kg mol}^{-1}$, what is the molality of solution?
- Q. 12. A 0.15 m aqueous solution of KCl freezes at -0.510°C . Assume volume of solution equal to that of water.
- Q. 13. What is abnormal colligative property explain the reason.
- Q. 14. Define molal elevation constant (Ebullioscopic constant). Does it depend upon nature of solute? What are its units.

SECTION – D

Attempt Any Two

(8 Marks)

- Q. 15. (a) A solution is prepared by dissolving 394 g of a nonvolatile solute in 622 g of water. The vapour pressure of solution is found to be 30.74 mm Hg at 30°C. If vapour pressure of water at 30°C is 31.8 mm Hg, what is the molar mass of solute?
(b) What are the characteristics of nonideal solutions.
- Q. 16. (a) 1.02 g of urea when dissolved in 98.5 g of certain solvent decreases its freezing point by 0.211 K. 1.60 g of unknown compound when dissolved in 86.0 g of the same solvent depresses the freezing point by 0.34 K. Calculate the molar mass of the unknown compound. (Urea NH_2CONH_2 , N = 14, C = 12, O = 16, H = 1)
(b) Define mole fraction.
- Q. 17. (a) 3.975 g of sulphur is dissolved in 100 g of carbon disulfide. This solution boils at 319.81 K. What is the molecular formula of sulphur in solution? The boiling point of the solvent is 319.45 K. (Given that K_b for $\text{CS}_2 = 2.42 \text{ K kg mol}^{-1}$ and atomic mass of S = 32 u)
(b) Define molarity.