Saitechinfo NEET JEE Academy

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SOLUTIONS AND COLLIGATIVE PROPERTIES

Class 12 - Chemistry

Time Allowed: 1 hour and 30 minutes   Maximum Marks: 45

1. An aqueous solution of methanol and water has vapour pressure **[1]**

    a) Equal to that of water   b) More than that of water

    c) Equal to that of methanol   d) Less than that of water

2. A compound undergoes complete tetramerization in a given organic solvent. The Van't Hoff factor **i** is: **[1]**

    a) 4   b) 2

    c) 0.25   d) 0.5

3. The plant cell will shrink when placed in: **[1]**

    a) water   b) hypotonic solution

    c) hypertonic solution   d) isotonic solution

4. Elevation of boiling point is inversely proportional to **[1]**

    a) molar mass of solute (M)   b) molality (m)

    c) weight of solute (W)   d) molal elevation constant (K_b)

5. Solubility of gas in liquid decreases with increase in **[1]**

    a) Pressure   b) Number of solute molecules

    c) Volume   d) Temperature

6. On mixing equal volumes of water and ethanol what types of deviation would you expect from Raoult's law? **[1]**

7. What is a semi-permeable membrane? **[1]**

8. Give reasons for the following: **[1]**

     a. Aquatic animals are more comfortable in cold water in comparison to warm water.

     b. Sprinkling of salt helps in clearing the snow-covered roads in hilly areas.

9. On mixing liquid X and liquid Y, volume of the resulting solution decreases. What type of deviation from **[1]**
    Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing
    liquids X and Y?

10. Define the term osmotic pressure. **[1]**

11. Define the term azeotrope? **[3]**

12. When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a **[3]**
    diagram. Give three applications of the phenomenon.

13. Calculate the depression in the freezing point of water when 10 g of $CH_3CH_2CHClCOOH$ is added to 250 g of **[3]**
    water. $K_a = 1.4 \times 10^{-3}$, $K_f = 1.86$ K Kg mol^{-1}.

14. Calculate the amount of benzoic acid (C_6H_5COOH) required for preparing 250 mL of 0.15 M solution in methanol. **[3]**

15. Calculate the mass percentage of benzene (C_6H_6) and carbon tetrachloride (CCl_4) if 22 g of benzene is dissolved in 122 g of carbon tetrachloride. **[3]**

16. a. Find the freezing point of a solution containing 0.520 g glucose ($C_6H_{12}O_6$) dissolved in 80.2 g of water [Given: K_f for water = 1.86 Km^{-1}] **[5]**

    b. A solution of glycerol ($C_3H_8O_3$) in water was prepared by dissolving some glycerol in 500 g of water. This solution has a boiling point of $100.420\,^0C$, what mass of glycerol was dissolved to make this solution? (K_b for water = 0.512 $K\ kg\ mol^{-1}$)

17. Calculate the molarity of given solutions: **[5]**

    30 g of $Co(NO_3)_2 \cdot 6H_2O$ in 4.3 L of solution

18. a. Draw the graph between vapour pressure and temperature and explain the elevation in boiling point of a solvent in solution. **[5]**

    b. Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 litres of water at 25^oC assuming it to be completely dissociated. (Atomic masses K = 39 u, S = 32 u, O = 16 u)

19. a. Which aqueous solution has higher concentration -1 molar or 1 molal solution of the same solute? Give reason. **[5]**

    b. 0.5 g KCl was dissolved in 100 g water and the solution originally at 20°C, froze at 0.24°C. Calculate the percentage ionization of salt. K_f per 1000 g of water = 1.86 K.