Saitech Informatics

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SOLUTIONS

Class 12 - Chemistry

Time Allowed: 1 hour and 28 minutes **Maximum Marks: 45**

1. Calculate the osmotic pressure of $0.25\,M$ solution of urea at 37^0C. $R = 0.083\,L\,bar/mol/k$. **[1]**
2. What are constant boiling mixtures called? **[1]**
3. Why the solution of sugar in water does not conduct electricity whereas that of common salt in water does? **[1]**
4. Some liquids on mixing form "Azeotropes". What are azeotropes? **[1]**
5. How much urea (molar mass 60 g/mol) should be dissolved in 50 g of water so that its vapour pressure at room temperature is reduced by 25%? **[1]**
6. What do you mean by 10% aqueous solution of sodium carbonate. **[1]**
7. How does change in temperature changes the molarity and molality values? **[1]**
8. State Henry's law. **[1]**
9. State the main advantage of molality over molarity as the unit of concentration. **[1]**
10. State the condition resulting in reverse osmosis. **[1]**
11. When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a diagram. Give three applications of the phenomenon. **[3]**
12. A solution containing 8 g of a substance in 100 g of diethyl ether boils at $36.86^0\ C$, whereas pure ether boils at $35.60^0\ C$. Determine the molecular mass of the solute. [For ether, K_b = $2.02 K kg mol^{-1}$] **[3]**
13. A weak electrolyte AB in 5% dissociated in aqueous solution? What is the freezing point of a 0.10 molar aqueous solution of AB? Kf = 1.86 deg/molal? **[3]**
14. What is meant by: **[3]**
    i. Colligative properties?
    ii. Molality of a solution?
15. If the solubility product of CuS is 6×10^{-16}, calculate the maximum molarity of CuS in aqueous solution. **[3]**
16. State Raoult's law for a solution containing volatile components. What is the similarity between Raoult's law and Henry's law? **[5]**
17. 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 =$0.512\ K\ kg\ mol^{-1}$)
18. 0.6 mL of acetic acid (CH_3COOH), having density 1.06 g mL^{-1}, is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.0205°C. Calculate the van't Hoff factor and the dissociation constant of acid. **[5]**
19. a. Explain giving examples the term colligative molality. Why do we sometimes get abnormal molecular **[5]**

masses of the substances using colligative properties of the solutions?

b. The freezing point depression of 0.1 molal solution of benzoic acid in benzene is 0.256 K. For benzene k_f is 5.12 K kg mol^{-1}. Calculate the value of Van't Hoff factor for benzoic acid in benzene. What conclusion can you draw about the molecular state of benzoic acid in benzene.