Test

Solutions

Q1   On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid?
   a) Sugar crystals in cold water.
   b) Sugar crystals in hot water.
   c) Powdered sugar in cold water.
   d) Powdered sugar in hot water.

Q2   Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon _____.
   a) Temperature
   b) Nature of solute
   c) Pressure
   d) Nature of solvent

Q3   Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law?
   a) Methanol and acetone.
   b) Chloroform and acetone.
   c) Nitric acid and water.
   d) Phenol and aniline.

Q4   If two liquids A and B form minimum boiling azeotrope at some specific composition then _____.
   a) A–B interactions are stronger than those between A–A or B–B.
   b) Vapour pressure of solution increases because more number of molecules of liquids A and B can escape from the solution.
   c) Vapour pressure of solution decreases because less number of molecules of only one of the liquids escape from the solution.
   d) A–B interactions are weaker than those between A–A or B–B.

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
   a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
   b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
   c) Assertion is correct, but reason is wrong statement.
   d) Assertion is wrong but reason is correct statement.
   e) Both assertion and reason are wrong statements

Q5   Assertion:
      Molarity of a solution in liquid state changes with temperature.
      Reason:
      The volume of a solution changes with change in temperature.

Q6   Assertion:
When methyl alcohol is added to water, boiling point of water increases.
Reason:
When a volatile solute is added to a volatile solvent elevation in boiling point is observed.

Q7   Mention a large scale use of the phenomenon called 'reverse osmosis'?

Q8   What is the sum of the mole fractions of all the components in a three component system?

Q9   Calculate the volume of 80% (by mass) of H_2SO_4 (density = 1.80 g/ml) required to prepare 1 liter of 0.2 molar H_2SO_4?

Q10 1.0 g of a non-volatile solute was dissolved in 100 g of acetone at 298 K. The vapor pressure of solution was found to be 192.5 mm Hg. Calculate the molar mass of solute. [The vapor pressure of pure acetone at 298 K is 195 mm Hg]?

Q11 A deci-molar solution of $K_4[Fe(CN)_6]$ is 50% dissociated at 300 K. Calculate the osmotic pressure of the solution

Q12 An aqueous solution of sodium chloride freezes below 273 K. Explain the lowering in freezing point of water with the help of a suitable diagram?

Q13 For determining molar masses of macro-molecular substances in solution, the osmotic pressure measurement method is preferred over measurement method of any other colligative property of solution. Give two reasons for it?

Q14 Calculate the number of moles of methanol in 5 liters in its 2 m solution, if the density of the solution is 0.981 kg/ L (Molar mass of methanol = 32 g/mol)

Q15 The osmotic pressure of blood is 8.21 atm. at 37°C. How much glucose should be added per liter for an intravenous injection that is at same osmotic pressure as blood?

Q16 Two elements A and B form purely covalent compounds having molecular formulae AB_2 and AB_4. When dissolved in 20 g of benzene. 1 g of AB_2 lowers the freezing point by 2.3 K, whereas 1 g of AB_4 lowers it by 1.3 K. The molal depression constant for benzene is 5.1K kg mol^{-1} Calculate the atomic mass of A and atomic mass of B?

Q17 2 g of benzoic acid (C_6H_5COOH) dissolved in 25 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 dimer in solution?

Q18 45 g of ethylene glycol ($C_2H_6O_2$) is mixed with 600 g of water. Calculate:(a) freezing point depression, (b) freezing point of the solution (K_f for water = 1.86 K kg mol^{-1}

Q19 .

(a) Assuming complete ionization, calculate the expected freezing point of solution prepared by dissolving 6.00 g of Glauber's salt. $Na_2SO_4.10H_2O$ in 0.1 kg of water (K_f for H_2O = 1.86 K kg mol^{-1})

(b) Two liquids X and Y boil at 110 °C and 130 °C respectively. Which of them has higher vapor pressure at 50 °C?