**ACTIVE SITE TUTORIALS**

**Date :** 20-08-2019 **TEST ID: 493**

**Time :** 15:39:00 **CHEMISTRY**

**Marks :** 928

2.SOLUTIONS

**Single Correct Answer Type**

| 1. | The ratio of the value of any colligative property for solution to that of sugar solution is | | | | | | | |
|  | a) | 1 | b) | 0.5 | c) | 2 | d) | 4 |
| 2. | What would be the freezing point of aqueous solution containing 17 g of in 1000 g of water. | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 3. | The osmotic pressure of a solution (density is 1 g ) containing 3 g of glucose (molecular weight = 180) in 60 g of water at is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 4. | The molal freezing point constant of water is 1.86 K , If 342 g of cane sugar ( is dissolved in 1000 g of water, the solution will freeze at | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 5. | On mixing 10 mL of acetone with 40 mL of chloroform, the total volume of the solution is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | Cannot be predicted |
| 6. | The most likely of the following mixtures to be an ideal solution is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 7. | on reaction with in aqueous solution gives blue colour. These are separated by a semi-permeable membrane AB as shown. Due to osmosis, there is | | | | | | | |
|  | a) | Blue colour formation in side X | | | | | | | |
|  | b) | Blue colour formation in side Y | | | | | | | |
|  | c) | Blue colour formation in both of sides X and Y | | | | | | | |
|  | d) | No blue colour formation | | | | | | | |
| 8. | A mixture of volatile components A and B has total vapour pressure (in torr)  Where is the mole fraction of A in mixture. Hence, and are (in torr) | | | | | | | |
|  | a) | 254, 119 | b) | 119, 254 | c) | 135, 254 | d) | 154, 119 |
| 9. | An azeotropic solution of two liquids has boiling point lower than either of them when it | | | | | | | |
|  | a) | Shows negative deviation from Raoult’s law | | | | | | | |
|  | b) | Shows no deviation from Raoult’s law | | | | | | | |
|  | c) | Shows positive deviation from Raoult’s law | | | | | | | |
|  | d) | Is saturated | | | | | | | |
| 10. | Which has the maximum osmotic pressure at temperature ? | | | | | | | |
|  | a) | 100 mL of 1 m urea solution | | | | | | | |
|  | b) | 300 mL of 1 M glucose solution | | | | | | | |
|  | c) | Mixture of 100 mL of 1 M urea solution and 300 mL of 1 M glucose solution | | | | | | | |
|  | d) | All are isotonic | | | | | | | |
| 11. | A 5% solution of cane sugar (molecular weight = 342) is isotonic with 1% solution of substance X. The molecular weight of X is | | | | | | | |
|  | a) | 171.2 | b) | 68.4 | c) | 34.2 | d) | 136.2 |
| 12. | A teacher one day pointed out to his students the peculiar fact that water is a unique liquid which freezes exactly at and boils exactly at . He asked the students to find the correct statement based on this fact | | | | | | | |
|  | a) | Water dissolves anything, however sparingly the dissolution may be | | | | | | | |
|  | b) | Water is a polar molecule | | | | | | | |
|  | c) | Boiling and freezing temperatures of water were used to define a temperature scale | | | | | | | |
|  | d) | Liquid water is denser than ice | | | | | | | |
| 13. | The vapour pressure (VP) of a dilute solution of non-­volatile solute is and the VP of a pure solvent is . The lowering of the VP is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 14. | The osmotic pressure of a solution increases if | | | | | | | |
|  | a) | Temperature is lowered | | | | | | | |
|  | b) | Volume is increased | | | | | | | |
|  | c) | Number of solute molecules is increased | | | | | | | |
|  | d) | None of the above | | | | | | | |
| 15. | On mixing 10 mL of carbon tetrachloride with 10 mL of benzene, the total volume of the solution is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | Cannot be predicted |
| 16. | Azeotropic mixtures are | | | | | | | |
|  | a) | Constant boiling point mixture without changing the composition | | | | | | | |
|  | b) | Those which boil at different temperatures | | | | | | | |
|  | c) | Mixtures of two solids | | | | | | | |
|  | d) | None of the above | | | | | | | |
| 17. | A solution containing 4 g of a non-volatile organic solute, per 100 mL was found to have an osmotic pressure equal to 500 cm of mercury at . The molecular weight of solute is | | | | | | | |
|  | a) | 14.97 | b) | 149.7 | c) | 1697 | d) | 1.497 |
| 18. | When 20 g of naphthoic acid () is dissolved in 50 g of benzene (), a freezing point depression of 2 K is observed. The van’t Hoff factor (*i*) is | | | | | | | |
|  | a) | 0.5 | b) | 1 | c) | 2 | d) | 3 |
| 19. | When a solution is separated from a solvent by a semi-permeable membrane, then the phenomenon taking place is called as | | | | | | | |
|  | a) | Osmosis | b) | Diffusion | c) | Solubility | d) | None |
| 20. | A mixture of benzene and toluene forms | | | | | | | |
|  | a) | An ideal solution | b) | Non-ideal solution | c) | Suspension | d) | Emulsion |
| 21. | Boiling point elevation is | | | | | | | |
|  | a) | Additive property | | | b) | Constitutive property | | |
|  | c) | Colligative property | | | d) | Partly additive and partly constitutive | | |
| 22. | The Van' t Hoff factor of assuming 100% dissociation | | | | | | | |
|  | a) | 1/2 | b) | 2 | c) | 1 | d) | 3 |
| 23. | Which solution will have the highest boiling point? | | | | | | | |
|  | a) | 1% glucose in water | b) | 1% sucrose in water | c) | 1% in water | d) | 1 % in water |
| 24. | The osmotic pressure of equimolar solutions of and glucose follow the order | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 25. | The depression in freezing point is maximum if the solvent used is | | | | | | | |
|  | a) | Camphor | b) | Naphthalene | c) | Benzene | d) | Water |
| 26. | If a 6.84% (weight/volume ) solution of cane sugar (molecular weight = 342) is isotonic with 1.52% (weight/volume) solution of thiocarbamide, then the molecular weight of thiocarbamide is | | | | | | | |
|  | a) | 152 | b) | 760 | c) | 60 | d) | 180 |
| 27. | 12.2 g of benzoic acid in 100 g benzene has depression in freezing point . If there is 100% polymerzation, the number of molecules of benzoic acid in associated state is | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 3 | d) | 4 |
| 28. | Assuming each salt to be 90 % dissociated which of the following will have the highest osmotic pressure? | | | | | | | |
|  | a) | Decinormal | | | | | | | |
|  | b) | Decinormal | | | | | | | |
|  | c) | Decinormal | | | | | | | |
|  | d) | A solution obtained by mixing equal volumes of (b) and (c) and filtering | | | | | | | |
| 29. | Which statement is incorrect about osmotic pressure (, volume () and temperature ()? | | | | | | | |
|  | a) | , if is constant | | | b) | , if is constant | | |
|  | c) | , if is constant | | | d) | is constant, ifis constant | | |
| 30. | The freezing point of 1% aqueous solution of calcium nitrate will be | | | | | | | |
|  | a) |  | b) | Above | c) |  | d) | Below |
| 31. | The molal elevation constant of water . The boiling point of 1.0 molal aqueous solution (assuming complete dissociation of ) should be | | | | | | | |
|  | a) | 100.52 | b) | 101.04 | c) | 99.48 | d) | 98.96 |
| 32. | The freezing point of 1 m solution assuming to be 100% dissociated in water is (K ) | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 33. | The freezing point of a 0.05 molal solution of non-electrolyte in water is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 34. | An aqueous solution freezes at . What is the elevation in boiling point? | | | | | | | |
|  | a) | 0.186 | b) | 0.512 | c) |  | d) | 0.0512 |
| 35. | For a dilute solution, Raoult’s law states that | | | | | | | |
|  | a) | The lowering of vapour pressure is equal to the mole fraction of the solute | | | | | | | |
|  | b) | The relative lowering of vapour pressure is equal to the mole fraction of the solute | | | | | | | |
|  | c) | The relative lowering of vapour pressure is proportional to the amount of solute in the solution | | | | | | | |
|  | d) | The vapour pressure of the solution is equal to the mole fraction of the solvent | | | | | | | |
| 36. | Based on the given diagram, which of the following statements regarding the solutions of two miscible volatile liquids are correct?  Plots AD and BC show that Raoult''s law is obeyed for the solution in which B is a solvent and A is the solute and as well as for that in which. A is solvent and B is solute  Plot CD shows that Dalton''s law of partial pressures is observed by the binary solutions of components A and B  ; and AC and BD corresponds to the vapour pressures of the pure solvents A and B, respectively    Select the correct answer using the codes given below: Codes: | | | | | | | |
|  | a) | 1 and 2 | b) | 2 and 3 | c) | 1 and 3 | d) | 1, 2, and 3 |
| 37. | An aqueous solution of methanol in water has vapour pressure | | | | | | | |
|  | a) | Equal to that of water | | | b) | Equal to that of methanol | | |
|  | c) | More than that of water | | | d) | Less than that of water | | |
| 38. | Solution distilled without change in composition at a temperature is called | | | | | | | |
|  | a) | Amorphous | | | b) | Azeotropic mixture | | |
|  | c) | Ideal solution | | | d) | Super saturated solution | | |
| 39. | The osmotic pressure of a 5% (weight/volume) solution of cane sugar at is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 40. | The lowering of vapour pressure due to a solute in a 1 m aqueous solution at is | | | | | | | |
|  | a) | 13.44 torr | b) | 14.12 torr | c) | 312 torr | d) | 352 torr |
| 41. | If a thin slice of sugar beet is placed in concentrated solution of , then | | | | | | | |
|  | a) | Sugar beet will lose water from its cells | | | | | | | |
|  | b) | Sugar beet will absorb water from solution | | | | | | | |
|  | c) | Sugar beet will neither absorb nor lose water | | | | | | | |
|  | d) | Sugar beet will dissolve in solution | | | | | | | |
| 42. | Two solutions of and COOH are prepared separately. The molarity of both is 0.1Mand osmotic pressure and respectively  The correct relationship between the osmotic pressures is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 43. | The osmotic pressure of a dilute solution is directly proportional to the | | | | | | | |
|  | a) | Diffusion rate of the solute | | | | | | | |
|  | b) | Ionic concentration | | | | | | | |
|  | c) | Boiling point | | | | | | | |
|  | d) | Flow of solvent from a concentrated solution | | | | | | | |
| 44. | Each pair forms ideal solution except | | | | | | | |
|  | a) | and | b) | and | c) | and | d) | and |
| 45. | The Henry’s law constant for the solubility of gas in water at 298 K is . The mole fraction of In air is 0.8 The number of moles of from air dissolved in 10 moles of water of 298 K and 5 atm pressure is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 46. | The use of common salts, e.g or anhydrous is made to clear snow on the rods. This causes: | | | | | | | |
|  | a) | A lowering in the freezing point of water | | | | | | | |
|  | b) | A lowering in the melting point of ice | | | | | | | |
|  | c) | Ice melts at the temperature of atmosphere present at that time | | | | | | | |
|  | d) | All of the above | | | | | | | |
| 47. | The relative decrease in the vapour pressure of an aqueous solution containing 2 mol in 3 mol is 0.50. On reaction with , this solution will form | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 48. | Which of the following 0.1 M aqueous solutions will have the lowest freezing point? | | | | | | | |
|  | a) | Potassium sulphate | b) | Sodium chloride | c) | Urea | d) | Glucose |
| 49. | An azeotropic mixture of and water has | | | | | | | |
|  | a) | 84% of | b) | 22.2% | c) | 63% of | d) | 20.2% |
| 50. | 25 mL of an aqueous solution of was found to require 20 mL of 1 M solution when titrated using a as indicator. The depression in freezing point of solution with 100% ionization will be:  and molarity = molality) | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 51. | Which condition is not satisfied by an ideal solution? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | Obeyance of Raoult’s law | | |
| 52. | When 0.004 M is an isotonic acid with 0.01 M glucose, the degree of dissociation of is | | | | | | | |
|  | a) | 75% | b) | 50% | c) | 25% | d) | 85% |
| 53. | The correct relationship between the boiling points of very dilute solutions of () and (, having the same molar concentration, is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 54. | The osmotic pressure of a sugar solution at is 2.5 atm. The concentration of the solution in mole per liter is | | | | | | | |
|  | a) | 10.25 | b) | 1.025 | c) | 1025 | d) | 0.1025 |
| 55. | The boiling point of an azeotropic mixture of water and ethyl alcohol is less than that of the theoretical value of water and alcohol mixture. Hence the mixture shows | | | | | | | |
|  | a) | The solution is highly saturated | | | b) | Positive deviation from Raoult's law | | |
|  | c) | Negative deviation from Raoult's law | | | d) | Nothing can be said | | |
| 56. | The freezing point among the following equimolal aqueous solutions will be highest for | | | | | | | |
|  | a) | (aniline hydrochloride) | | | b) |  | | |
|  | c) |  | | | d) | (glucose) | | |
| 57. | Which aqueous solution has minimum freezing point? | | | | | | | |
|  | a) | 0.0 1M | b) | 0.005 M | c) | 0.005 M Mg | d) |  |
| 58. | The osmotic pressure of blood is 7.40 atm at . The number of mol of glucose to be used per liter for an intravenous injection that is to have the same osmotic pressure as blood is | | | | | | | |
|  | a) | 0.3 | b) | 0.2 | c) | 0.1 | d) | 0.4 |
| 59. | Which is not a colligative property? | | | | | | | |
|  | a) | Lowering of vapour pressure | | | b) | Freezing point | | |
|  | c) | Osmotic pressure | | | d) | Elevation in boiling point | | |
| 60. | Semi-permeable membrane is chemically | | | | | | | |
|  | a) | Copper ferrocyanide | | | b) | Copper ferricyanide | | |
|  | c) | Copper sulphate | | | d) | Potassium ferrocyanide | | |
| 61. | A pressure cooker reduces cooking time because | | | | | | | |
|  | a) | Heat is more evenly distributed | | | | | | | |
|  | b) | Boiling point of water inside the cooker is increased | | | | | | | |
|  | c) | The high pressure tenderizes the food | | | | | | | |
|  | d) | All of the above | | | | | | | |
| 62. | Isotonic solutions are those which have | | | | | | | |
|  | a) | Same osmotic pressure | | | b) | Same molarity | | |
|  | c) | Same density | | | d) | Same normality | | |
| 63. | The depression in freezing point of 0.01 m aqueous solution is . 1 m urea solution freezes at . Assuming molality equal to molarity. pH of solution is | | | | | | | |
|  | a) | 2 | | | | | | | |
|  | b) | 3 | | | | | | | |
|  | c) | 3.2 | | | | | | | |
|  | d) | 4.2 | | | | | | | |
| 64. | Osmosis is the spontaneous flow through a semi-permeable membrane of | | | | | | | |
|  | a) | A less concentrated solution into more concentrated solution | | | | | | | |
|  | b) | The solvent from a solution of lower concentration to one of higher concentration | | | | | | | |
|  | c) | Solute particles from a solution of higher concentration to one of lower concentration | | | | | | | |
|  | d) | None | | | | | | | |
| 65. | A molal solution is one that contains 1 mol of a solute in | | | | | | | |
|  | a) | 1000 g of solvent | b) | 1 L of solvent | c) | 1 L of solution | d) | 22.4 L of solution |
| 66. | The osmotic pressure of a non-aqueous solution is measured by | | | | | | | |
|  | a) | Berkeley and Hartley method | | | b) | Pfeffer's method | | |
|  | c) | Morse and Frazer method | | | d) | Townend's method | | |
| 67. | The solutions in which the blood cells retain their normal shape, with regard to the blood, are | | | | | | | |
|  | a) | Isotonic | b) | Hypertonic | c) | Hypotonic | d) | None |
| 68. | An example of colligative property is | | | | | | | |
|  | a) | Freezing point | b) | Boiling point | c) | Vapour pressure | d) | Osmotic pressure |
| 69. | The osmotic pressure of a dilute solution is given by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 70. | The osmotic pressure of a solution containing 0.1 mol of solute per liter at 273 K is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 71. | The freezing point of a solution prepared from 1.25 g of non-electrolyte and 20 g of water is 271.9K. If the molar depression constant is 1.86 K then molar mass of the solute will be | | | | | | | |
|  | a) | 105.7 | b) | 106.7 | c) | 115.3 | d) | 93.9 |
| 72. | The mole fraction of component A in vapour phase is and mole fraction of component A in liquid mixture is ( = vapour pressure of pure A; = vapour pressure of pure B). Then total vapour pressure of the liquid mixture is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 73. | Dissolving 120 g of urea (mol. Wt. 60) in1000 g of water gave a solution of density 1.15 g/mL. The molarity of the solution is | | | | | | | |
|  | a) | 1.78M | b) | 2.00M | c) | 2.05M | d) | 2.22M |
| 74. | Which of the following solutions has the minimum freezing point | | | | | | | |
|  | a) | 1 molal solution | | | b) | 1 molal solution | | |
|  | c) | 1 molal solution | | | d) | 1 molal urea solution | | |
| 75. | If and are vapour pressures of solvent and its solution, respectively, and are mole fractions of solvent and solute, respectively, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 76. | When mercuric iodide is added to the aqueous solution of potassium iodide, | | | | | | | |
|  | a) | Freezing point is raised | | | b) | Freezing point is lowered | | |
|  | c) | Freezing point does not change | | | d) | Boiling point does not change | | |
| 77. | The vapour pressure of a solvent decreased by 10 mm of Hg when a non-volatile solute was added to the solvent. The mole fraction of solute in solution is 0.2, what would be the mole fraction of solvent if the decrease in vapour pressure is 20 mm of Hg | | | | | | | |
|  | a) | 0.8 | b) | 0.6 | c) | 0.4 | d) | 0.2 |
| 78. | Which of the following solutions has the maximum freezing point? | | | | | | | |
|  | a) | 1 molar of solution | | | b) | 1 molar of solution | | |
|  | c) | 1 molar of solution | | | d) | 1 molar of urea solution | | |
| 79. | If Raoult's law is obeyed, the vapour pressure of the solvent in a solution is directly proportional to | | | | | | | |
|  | a) | The mole fraction of the solvent | | | b) | The mole fraction of the solute | | |
|  | c) | The mole fraction of the solvent and solute | | | d) | The volume of the solution | | |
| 80. | The vapour pressure of pure benzene at is 268 torr. How many moles of non-volatile solute per mole of benzene is required to prepare a solution of benzene having a vapour pressure of 167 torr at ? | | | | | | | |
|  | a) | 0.377 | b) | 0.605 | c) | 0.623 | d) | 0.395 |
| 81. | The value of for water is calculated from glucose solution. The value of for water calculated for solution will be | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | Zero |
| 82. | Which of the following solutions (1 molal) will have the maximum freezing point, assuming equal ionization in each case? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 83. | The mole fraction of toluene in the vapour phase which is in equilibrium with a solution of benzene and toluene ( having 2.0 mol of each is | | | | | | | |
|  | a) | 0.50 | b) | 0.25 | c) | 0.60 | d) | 0.40 |
| 84. | When common salt is dissolved in water | | | | | | | |
|  | a) | The melting point of the solution increases | | | | | | | |
|  | b) | The boiling point of solution decreases | | | | | | | |
|  | c) | Both melting point and boiling point decrease | | | | | | | |
|  | d) | The boiling point of the solution increases | | | | | | | |
| 85. | What will be the molecular weight of determined experimentally following elevation in the boiling point or depression in freezing point method? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None |
| 86. | 0.004 M is isotonic with 0.01 M glucose.Degree of dissociation of is | | | | | | | |
|  | a) | 75% | b) | 50% | c) | 25% | d) | 85% |
| 87. | The molecular weight of benzoic acid in benzene as determined by depression in the freezing point method corresponds to | | | | | | | |
|  | a) | Ionization of benzoic acid | | | b) | Dimerization of benzoic acid | | |
|  | c) | Trimerization of benzoic acid | | | d) | Solvation of benzoic acid | | |
| 88. | can exist as a hydrated complex; 1 m aqueous solution has the depression in freezing point of . Assume 100% ionization and kg, then the complex is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 89. | The molal depression constant for water in . The freezing point of a 0.05-molal solution of a non electrolyte in water is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 90. | Which of the following will have the highest boiling point at 1 atm pressure? | | | | | | | |
|  | a) | 0.1 M | b) | 0.1 M sucrose | c) | 0.1 M | d) | 0.1 M glucose |
| 91. | Blood has been found to be isotonic with | | | | | | | |
|  | a) | Normal saline solution | | | | | | | |
|  | b) | Saturated solution | | | | | | | |
|  | c) | Saturated solution | | | | | | | |
|  | d) | Saturated solution of a 1 : 1 mixture of and | | | | | | | |
| 92. | Dry air was passed successively through a solution of 5 g of a solute in 180 g of water and then through pure water. The loss in the weight of solution was 2.50 g and that of pure solvent 0.04 g. The molecular weight of the solute is | | | | | | | |
|  | a) | 31.25 | b) | 3.125 | c) | 312.5 | d) | None |
| 93. | The factor / represents | | | | | | | |
|  | a) | Molarity | b) | Formality | c) | Normality | d) | Molality |
| 94. | The elevation in boiling point of a solution of13.44 g of in 1 kg of water using the following information will be (molecular weight of and | | | | | | | |
|  | a) | 0.16 | b) | 0.05 | c) | 0.1 | d) | 0.2 |
| 95. | A perfectly semi-permeable membrane when use to separate a solution from its solvent permits through it the passage of | | | | | | | |
|  | a) | Solute only | b) | Solvent only | c) | Both (a) and (b) | d) | None |
| 96. | Which of the following substances will lose its whose solubility with increase in temperature? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | All |
| 97. | The relative lowering of vapour pressure is equal to the mole fraction of the non- volatile solute. This statement was given by | | | | | | | |
|  | a) | Raoult | b) | Henry | c) | Joule | d) | Dalton |
| 98. | The total vapour pressure of a mixture of 1 mol A ( =150 torr) and 2 mol B is 200 mm. In this case | | | | | | | |
|  | a) | There is positive deviation from Raoult’s law | | | | | | | |
|  | b) | There is negative deviation from Raoult’s law | | | | | | | |
|  | c) | There is no deviation from Raoult’s law | | | | | | | |
|  | d) | Molecular masses of A and B are also required | | | | | | | |
| 99. | The Van’t Hoff factor of very dilute solution of is | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 3 | d) | 4 |
| 100. | Lowering in vapour pressure is highest for | | | | | | | |
|  | a) | 0.2 m urea | b) | 0.1 m glucose | c) | 0.1 m Mg | d) | 0.1 m |
| 101. | Which salt shows maximum osmotic pressure in its 1 m solution | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 102. | The osmotic pressure of 40% (weight/volume) urea solution is 1.64 atm and that of 3.42% (weight/volume) cane sugar is 2.46 atm. When equal volumes of the above two solutions are mixed, the osmotic pressure of the resulting solution is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 103. | Which solution will show maximum elevation in boiling point? | | | | | | | |
|  | a) | 0.1 M | b) | 0.1 M | c) |  | d) |  |
| 104. | An ideal solution was obtained by mixing methanol and ethanol. If the partial vapour pressure of methanol and ethanol are 2.619 kPa and 4.556 kPa, respectively, the composition of vapour (in terms of mole fraction) will be | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 105. | The colligative properties of a solution depend on | | | | | | | |
|  | a) | The number of solute particles present in it | | | | | | | |
|  | b) | The chemical nature of the solute particles present in it | | | | | | | |
|  | c) | The nature of the solvent used | | | | | | | |
|  | d) | None | | | | | | | |
| 106. | At , the vapour pressures of pure liquids, benzene and toluene are 160 mm Hg and 60 mm Hg, respectively. At the same temperature, the vapour pressure of an equimolar solution of the two liquids, assuming the ideal solution, should be | | | | | | | |
|  | a) | 140 mm Hg | b) | 110 mm Hg | c) | 220 mm Hg | d) | 100 mm Hg |
| 107. | pH of a 0.1 M monobasic acid is found to be 2. Hence, its osmotic pressure at a given temperature K is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 108. | Equimolal solutions A and B show depression in freezing point in the ratio 2:1. A remains in the normal state in solution. B will be | | | | | | | |
|  | a) | Normal in solution | | | b) | Dissociated in solution | | |
|  | c) | Associated in solution | | | d) | Hydrolysed in solution | | |
| 109. | A solution containing 8.6 g urea in 1 L was found to be isotonic with a 5% (weight/volume) solution of organic non-volatile solute. The molecular weight of latter is | | | | | | | |
|  | a) | 348.9 | b) | 34.89 | c) | 3489 | d) | 861.2 |

**Multiple Correct Answers Type**

| 110. | If and are the V.P. of solvent and solution respectively and and are the mole of solute and solvent then : | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | None of these | | | | | | | |
| 111. | Which of the following is/are not affected by temperature? | | | | | | | |
|  | a) | Molarity | b) | Molality | c) | Normality | d) | Mole fraction |
| 112. | A difference between diffusion and osmosis is | | | | | | | |
|  | a) | A semi-permeable membrane is required for osmosis while diffusion requires no semi-permeable membrane | | | | | | | |
|  | b) | In osmosis movement of molecules is only in one direction whereas in diffusion movement is on both sides | | | | | | | |
|  | c) | In osmosis only the solvent moves while in diffusion both solute and solvent move | | | | | | | |
|  | d) | None of the above | | | | | | | |
| 113. | Consider the two solutions:  **I**: 0.5 M aqueous solution at is complete ionized  **II**: 2.0 M in benzene at , dimerizes to the full extent  Which of the following statement(s) is (are) correct? | | | | | | | |
|  | a) | Both the solutions display equal osmotic pressure | | | | | | | |
|  | b) | Both have equal vapour pressure | | | | | | | |
|  | c) | Solution II is hypertonic | | | | | | | |
|  | d) | Solution II has greater depression in freezing point than solution I | | | | | | | |
| 114. | The dissolution of which of the following compounds is exothermic | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 115. | 2 L of 1 molar solution of a complex salt shows an osmotic pressure of 98.52 atm. The solution is now treated with 1 L of , which of the following are correct? | | | | | | | |
|  | a) | Weight of precipitated is 861 g | | | | | | | |
|  | b) | The clear solution will show an osmotic pressure of 98.52 atm | | | | | | | |
|  | c) | The clear solution will shown an osmotic pressure of 65.68 atm | | | | | | | |
|  | d) | 2 mol of will be present in solution | | | | | | | |
| 116. | For a non-volatile solute | | | | | | | |
|  | a) | The vapour pressure of a solute is zero | | | | | | | |
|  | b) | Vapour pressure of solution = Vapour pressure of pure solvent | | | | | | | |
|  | c) | Vapour pressure of solution = Vapour pressure of solvent in solution | | | | | | | |
|  | d) | All of the above | | | | | | | |
| 117. | Two miscible liquids A and B having vapour pressure in pure state and are mixed in mole fraction and to get a mixture having total vapour pressure of mixture . Which of the following relations are correct? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | All of these |
| 118. | Which of the following form is an ideal solution? | | | | | | | |
|  | a) | Ethyl bromide + Ethyl iodide | | | b) | Ethyl alcohol + Water | | |
|  | c) | Chloroform + Benzene | | | d) | Benzene + Toluene | | |
| 119. | The vapour pressure of a dilute solution of a solute is influenced by : | | | | | | | |
|  | a) | Temperature of solution | | | | | | | |
|  | b) | Mole fraction of solute | | | | | | | |
|  | c) | Melting point of solute | | | | | | | |
|  | d) | Degree of dissociation of solute | | | | | | | |
| 120. | The following is a graph plotted between the vapour pressure of two volatile liquids against their respective mole fractions    Which of the following statement is/are correct? | | | | | | | |
|  | a) | When and , then | | | b) | When and , then | | |
|  | c) | When and , then | | | d) | When and , then | | |
| 121. | A maxima or minima is obtained in the temperature. The composition curve of a mixture of two liquids does not indicate | | | | | | | |
|  | a) | That the liquids are immiscible with one another | | | | | | | |
|  | b) | That the liquids are partially miscible at the maximum or minimum | | | | | | | |
|  | c) | An azeotropic mixture | | | | | | | |
|  | d) | A eutectic formation | | | | | | | |
| 122. | Effect of adding a non-volatile solute to a solvent is: | | | | | | | |
|  | a) | To lower the vapour pressure | | | b) | To increase its freezing point | | |
|  | c) | To increase its boiling point | | | d) | To decrease its osmotic pressure | | |
| 123. | Which pair(s) of liquids on mixing is/are expected to show no net volume change and no heat effect? | | | | | | | |
|  | a) | Acetone and ethanol | | | b) | Chlorobenzene and bromobenzene | | |
|  | c) | Chloroform and benzene | | | d) | -Butyl chloride and -butyl bromide | | |
| 124. | Choose the correct option: | | | | | | | |
|  | a) | A represents vapour composition and B liquid composition | | | | | | | |
|  | b) | A as well as B represent liquid composition | | | | | | | |
|  | c) | Both A and B represent vapour composition | | | | | | | |
|  | d) | A represents liquid composition and B vapour composition | | | | | | | |
| 125. | The processes of getting fresh water from sea water is/are known as : | | | | | | | |
|  | a) | Osmosis | b) | Filtration | c) | Desaltation | d) | Reverse osmosis |
| 126. | Which statement is/are correct about osmotic pressure , volume and temperature ? | | | | | | | |
|  | a) | if is constant | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) | if is constant | | | | | | | |
|  | d) | is constant if is constant | | | | | | | |
| 127. | The solution (s) which will boil at the highest temperature is/are | | | | | | | |
|  | a) | 0.1 M urea | b) |  | c) |  | d) |  |
| 128. | Which of the following statements is/are false for a solution of chloroform and acetone? | | | | | | | |
|  | a) | The solution formed is an ideal solution | | | | | | | |
|  | b) | The solution formed is a non-ideal solution with positive deviation from Raoult’s law | | | | | | | |
|  | c) | The solution formed is a non-ideal solution with negative deviation from Raoult’s law | | | | | | | |
|  | d) | The solution behaves ideally or non-ideally depending upon its composition | | | | | | | |
| 129. | Which of the following statements is/are true about an azeotropic mixture? | | | | | | | |
|  | a) | An azeotropic mixture boils at constant temperature | | | | | | | |
|  | b) | The composition of an azetropic mixture changes on distillation | | | | | | | |
|  | c) | An azeotropic solution of two liquids has a boiling point lower than that of either of them when it shows positive deviation from the Raoult’s law | | | | | | | |
|  | d) | An azetropic solution of two liquids has a boiling point higher than that of either of them if it shows positive deviation from Raoult’s law | | | | | | | |
| 130. | A mixture of two immiscible liquids A and B, having vapour pressure in pure state obeys the following relationship if and are mole fractions of A and B in vapour phase over the solution | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) | If then | | | d) | If then | | |
| 131. | For a given value of degree of dissociation, which of the following have correct Van’t Hoff factor? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 132. | Osmotic pressure of a solution is | | | | | | | |
|  | a) | Directly proportional to the molar concentration of the solution | | | | | | | |
|  | b) | Inversely proportional to the molecular weight of the solute | | | | | | | |
|  | c) | Inversely proportional to the temperature | | | | | | | |
|  | d) | Directly proportional to the volume of the solution | | | | | | | |
| 133. | Osmotic pressure in dilute solution is | | | | | | | |
|  | a) | Inversely proportional to the moles of non-volatile solution | | | | | | | |
|  | b) | Directly proportional to temperature | | | | | | | |
|  | c) | Directly proportional to the molarity of solution | | | | | | | |
|  | d) | Independent of temperature and moles of solute dissolved | | | | | | | |
| 134. | Which of the following statements is/are correct? | | | | | | | |
|  | a) | The freezing point of water is depressed by the addition of glucose | | | | | | | |
|  | b) | The degree of dissociation of a weak electrolyte decrease as its concentration decreases | | | | | | | |
|  | c) | Energy is released when a substance dissolves in water provided that the hydration energy of the substance is more than its lattice energy | | | | | | | |
|  | d) | If two liquids that form an ideal solution are mixed, the change in entropy is positive | | | | | | | |
| 135. | Among 1% solution of urea, glucose and sucrose : | | | | | | | |
|  | a) | The vapour pressure and freezing point are the lowest for urea | | | | | | | |
|  | b) | The vapour pressure and boiling point are the lowest for urea | | | | | | | |
|  | c) | The depression in freezing point is the highest for urea | | | | | | | |
|  | d) | The elevation in boiling point is the highest for urea | | | | | | | |
| 136. | Which of the following represent(s) correctly the changes in thermodynamic properties during the formation of 1 mole of an ideal binary solution? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 137. | Which the following statements is/are correct? | | | | | | | |
|  | a) | Minimum boiling azeotropic mixture boils at temperature lower than either of the two pure components | | | | | | | |
|  | b) | Maximum boiling azeotropic mixture boils at temperature higher than either of the two pure components | | | | | | | |
|  | c) | Minimum boiling azeotropic mixture shows positive deviation | | | | | | | |
|  | d) | Maximum boiling azeotropic mixture shows negative deviation | | | | | | | |
| 138. | The colligative properties of a solution is/are : | | | | | | | |
|  | a) | molality | | | | | | | |
|  | b) | 1/molecular weight | | | | | | | |
|  | c) | Proportional to each other | | | | | | | |
|  | d) | None of the above | | | | | | | |
| 139. | Molecular weight of urea is 60. A solution of urea containing 6 g of urea in one litre is a | | | | | | | |
|  | a) | 1 N | b) | 0.1 M | c) | 0.1 N | d) | 1 M |
| 140. | If and are the V.P. of solvent and its solution respectively and and are the mole fraction of solvent and solute respectively then : | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 141. | Ideal solution is formed when its components : | | | | | | | |
|  | a) | Have zero heat of mixing | | | | | | | |
|  | b) | Have zero volume change | | | | | | | |
|  | c) | Obey Raoult’s law | | | | | | | |
|  | d) | Can be converted into gases | | | | | | | |
| 142. | In the depression in freezing point experiment, it is found that | | | | | | | |
|  | a) | The vapour pressure of the solution is less than that of pure solvent | | | | | | | |
|  | b) | The vapour pressure of the solution is more than that of pure solvent | | | | | | | |
|  | c) | Only solute molecules solidify at freezing point | | | | | | | |
|  | d) | Only solvent molecules solidify at freezing point | | | | | | | |
| 143. | The osmotic pressure of a decimolar solution of glucose at 30 is/are : | | | | | | | |
|  | a) | 24.88 atm | b) | 2.488 atm | c) | 0.248 atm | d) | 189.09 cm |
| 144. | By adding water to the solution of ionic compound its : | | | | | | | |
|  | a) | Concentration remains same | | | | | | | |
|  | b) | Concentration increases | | | | | | | |
|  | c) | Ionization may increase | | | | | | | |
|  | d) | Concentration decreases | | | | | | | |
| 145. | On mixing 1 mole of ( = 42 mm) and 2 mole of ( = 36 mm), one can conclude : | | | | | | | |
|  | a) | Total vapour pressure of mixture = 38 mm | | | | | | | |
|  | b) | Mole fraction of vapours of above liquid mixture . | | | | | | | |
|  | c) | Positive deviation from Raoult’s law | | | | | | | |
|  | d) | Ideal solution of two | | | | | | | |
| 146. | Consider the following solutions  I. 1 M sucrose  II. 1 M  III. 1 M benzoic acid in benzene  IV. 1 M  Which of the following is/are true? | | | | | | | |
|  | a) | All solutions are isotonic | | | b) | III is hypotonic of I, II, and IV | | |
|  | c) | I, II, and III are hypertonic of IV | | | d) | IV is hypertonic of I, II, and III | | |
| 147. | What happens when glycerine is added to a litre of water? | | | | | | | |
|  | a) | The freezing point of the water is lowered | | | | | | | |
|  | b) | The boiling point of the water in increased | | | | | | | |
|  | c) | The viscosity of the water is increased | | | | | | | |
|  | d) | The temperature of the water is increased | | | | | | | |
| 148. | 1 mol benzene and 2 mol toluene will have | | | | | | | |
|  | a) | Total vapour pressure of 38 mm | | | | | | | |
|  | b) | Mole fraction of vapour of benzene above liquid mixture is 7/19 | | | | | | | |
|  | c) | Positive deviation from Raoult’s law | | | | | | | |
|  | d) | Negative deviation from Raoult’s law | | | | | | | |
| 149. | Consider the following graph pertaining to distillation. The distillate to residue ratio is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 150. | Which are colligative properties? | | | | | | | |
|  | a) | Boiling point | | | | | | | |
|  | b) | Osmotic pressure | | | | | | | |
|  | c) | Elevation in freezing point | | | | | | | |
|  | d) | Depression in freezing point | | | | | | | |
| 151. | Which relations are not correct for an aqueous dilute solution of if its degree of dissociation is ? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | of | | |
| 152. | Among 0.1 solutions of and : | | | | | | | |
|  | a) | The vapour pressure and freezing point are the lowest for urea | | | | | | | |
|  | b) | The vapour pressure and freezing point are the highest for urea | | | | | | | |
|  | c) | The elevation in boiling point is the highest for | | | | | | | |
|  | d) | The depression in freezing point is the highest for | | | | | | | |
| 153. | Which of the following statements is/are correct? | | | | | | | |
|  | a) | Patrol is a homogeneous mixture of alkanes | | | | | | | |
|  | b) | Heterogeneous mixtures have variable compositions in different parts of the sample | | | | | | | |
|  | c) | Homogeneous mixtures are uniform throughout the sample | | | | | | | |
|  | d) | Alloys are heterogeneous mixtures of metals | | | | | | | |
| 154. | Which of the following combinations are correct for a binary solution, in which the solute as well as solvent are liquid? | | | | | | | |
|  | a) | and | | | | | | | |
|  | b) | ||  and | | | | | | | |
|  | c) | and | | | | | | | |
|  | d) | and | | | | | | | |
| 155. | When acetone and chloroform are mixed, hydrogen bonding takes place between them. Such a liquid pair will cause | | | | | | | |
|  | a) | Positive deviation from Raoult’s law | | | b) | Negative deviation form Raoult’s law | | |
|  | c) | No deviation form Raoult’s law | | | d) | Cannot be predicted | | |
| 156. | At constant temperature, the osmotic pressure(s) of solution (s) is/are : | | | | | | | |
|  | a) | Directly proportional to the concentration | | | | | | | |
|  | b) | Inversely proportional to the molecular weight of solute | | | | | | | |
|  | c) | Directly proportional to the square of the concentration | | | | | | | |
|  | d) | Directly proportional to the square root of the concentration | | | | | | | |
| 157. | To 10 mL of 1 M solution of 5 mL of 0.5 M is added. is precipitated out. What will happen? | | | | | | | |
|  | a) | Freezing point will increase | | | b) | Boiling point will increase | | |
|  | c) | Freezing point will lower down | | | d) | Boiling point will lower down | | |
| 158. | Which inorganic precipitate(s) act(s) as semipermeable membrane? | | | | | | | |
|  | a) | Calcium phosphate | | | | | | | |
|  | b) | Barium oxalate | | | | | | | |
|  | c) | Nickel phosphate | | | | | | | |
|  | d) | Copper ferrocyanide | | | | | | | |
| 159. | Which of the following is/are true? | | | | | | | |
|  | a) | For the same solution, elevation in boiling point = depression in freezing point | | | | | | | |
|  | b) | The Van’t Hoff factor for a dilute solution of is 3 | | | | | | | |
|  | c) | The elevation in boiling point is due to increase in vapour pressure | | | | | | | |
|  | d) | The depression in freezing point is due to decrease in vapour pressure | | | | | | | |
| 160. | Which of the following forms ideal solution? | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) | Hexane-heptane | | | | | | | |
|  | d) | None of these | | | | | | | |
| 161. | At what temperature a 5% solution (wt./vol.) of glucose will develop an osmotic pressure of 7 atm? | | | | | | | |
|  | a) | 33.94 K | b) | 306.94 K | c) | 273 K | d) | 33.94 |
| 162. | Which of the following solutions will boil at the highest temperature? | | | | | | | |
|  | a) | urea | | | | | | | |
|  | b) | sodium nitrate | | | | | | | |
|  | c) | calcium nitrate | | | | | | | |
|  | d) | barium chloride | | | | | | | |
| 163. | The osmotic pressure of a solution depends on | | | | | | | |
|  | a) | Nature of solute | | | b) | Nature of solvent | | |
|  | c) | Temperature | | | d) | Molar concentration of solute | | |
| 164. | For an ideal binary liquid system : | | | | | | | |
|  | a) | The change in enthalpy () is zero | | | | | | | |
|  | b) | Raoult’s law is obeyed | | | | | | | |
|  | c) | Change in volume ( is zero | | | | | | | |
|  | d) | None of the above | | | | | | | |
| 165. | The ideal solutions are formed when on mixing : | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 166. | 1.2575 g sample of is dissolved to prepare 250 mL solution showing an osmotic pressure of 1.478 atm of at. Which of the following statements is/are correct about this solution? | | | | | | | |
|  | a) | Each molecule furnishes three ions in solution | | | | | | | |
|  | b) | The Van’t Hoff factor is = 3 | | | | | | | |
|  | c) | The equilibrium molarity of | | | | | | | |
|  | d) | The equilibrium molarity of | | | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Assertion - Reasoning Type** | | | |
| This section contain(s) 0 questions numbered 167 to 166. Each question containsstatement 1(Assertion) and statement 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **only one** is correct. | | | |
|  | a) | Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1 | |
|  | b) | Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1 | |
|  | c) | Statement 1 is True, Statement 2 is False | |
|  | d) | Statement 1 is False, Statement 2 is True | |

|  |  |  |  |
| --- | --- | --- | --- |
| 167 |  | | |
|  | **Statement 1:** | | The mass of acetic acid molecule in benzene is more than the actual value of the solute. |
|  | **Statement 2:** | | Molecules of acetic acid dimerise in benzene due to hydrogen bonding. |

|  |  |  |  |
| --- | --- | --- | --- |
| 168 |  | | |
|  | **Statement 1:** | | Henry’s law and Raoult’s law are not independent, i.e., one can be derived from the other |
|  | **Statement 2:** | | The partial pressure is directly proportional to the mole fraction of the concerned species for ideal solutions |

|  |  |  |  |
| --- | --- | --- | --- |
| 169 |  | | |
|  | **Statement 1:** | | The osmotic pressure of 0.1 M urea solution is less than 0.1 M solution |
|  | **Statement 2:** | | Osmotic pressure is not a colligative property |

|  |  |  |  |
| --- | --- | --- | --- |
| 170 |  | | |
|  | **Statement 1:** | | van’t Hoff factor for electrolytes is always more than unity. |
|  | **Statement 2:** | | The number of particles increases in solution due to electrolytic dissociation. |

|  |  |  |  |
| --- | --- | --- | --- |
| 171 |  | | |
|  | **Statement 1:** | | Non-ideal solutions form a azeotropic mixture |
|  | **Statement 2:** | | The boiling point of an azeotropic mixture is only higher than boiling points of both components |

|  |  |  |  |
| --- | --- | --- | --- |
| 172 |  | | |
|  | **Statement 1:** | | Ebulliscopy or cryoscopy cannot be used for the determination of mol. wt. of polymers. |
|  | **Statement 2:** | | High molecular weight solute leads to very low value of . |

|  |  |  |  |
| --- | --- | --- | --- |
| 173 |  | | |
|  | **Statement 1:** | | Near the freezing point of an aqueous solution of a non-volatile solute only ice separates out. |
|  | **Statement 2:** | | The remaining solution shows equilibrium between solid solvent-liquid solvent. |

|  |  |  |  |
| --- | --- | --- | --- |
| 174 |  | | |
|  | **Statement 1:** | | Vapour pressure of 0.5 M sugar solution is more than 0.5 M solution |
|  | **Statement 2:** | | The lowering of vapour pressure is directly proportional to the number of species present in the solution |

|  |  |  |  |
| --- | --- | --- | --- |
| 175 |  | | |
|  | **Statement 1:** | | On adding l to water its vapour pressure increase |
|  | **Statement 2:** | | Addition of non-volatile solute decreases the vapour pressure |

|  |  |  |  |
| --- | --- | --- | --- |
| 176 |  | | |
|  | **Statement 1:** | | Osmotic pressure of non-aqueous solutions can be determined by Berkeley-Hartley method. |
|  | **Statement 2:** | | The semipermeable membrane used in Berkeley-Harley method is |

|  |  |  |  |
| --- | --- | --- | --- |
| 177 |  | | |
|  | **Statement 1:** | | Camphor is used as a solvent in the determination of the molecular mass of naphthalene and anthracene |
|  | **Statement 2:** | | Camphor has high molal elevation constant |

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| 178 |  | | |
|  | **Statement 1:** | | Addition of to aqueous solution of KI shows an increase in vapour pressure. |
|  | **Statement 2:** | | The number of particles present in solution decreases due to formation of complex |

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| 179 |  | | |
|  | **Statement 1:** | | The boiling point of 0.1 M urea solution is less than that of 0.1 M KCl solution. |
|  | **Statement 2:** | | Elevation of boiling point is directly proportional to the number of species present in the solution. |

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| 180 |  | | |
|  | **Statement 1:** | | and are zero for an ideal solution |
|  | **Statement 2:** | | The interactions between the particles of the components of a solution are almost identical as between the particles in liquids |

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| 181 |  | | |
|  | **Statement 1:** | | The dissolution of gases in water is always an endothermic process |
|  | **Statement 2:** | | The dissolution of gases in water proceed with a negative value of |

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| 182 |  | | |
|  | **Statement 1:** | | Osmosis is a bilateral process. |
|  | **Statement 2:** | | In osmosis net flow from dilute to concentrated solution is noticed. |

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| 183 |  | | |
|  | **Statement 1:** | | For isotonic solutions |
|  | **Statement 2:** | | For isotonic solutions |

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| 184 |  | | |
|  | **Statement 1:** | | Boiling point of water is 100 although water boils below 100 on mountains. |
|  | **Statement 2:** | | Boiling point of a liquid is the temperature at which V.P. of liquid becomes equal to 1 atm. |

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| 185 |  | | |
|  | **Statement 1:** | | Addition of a non-volatile causes a depression in vapour pressure. |
|  | **Statement 2:** | | Vapour pressure of a solution directly proportional to mole fraction of solvent. |

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| 186 |  | | |
|  | **Statement 1:** | | 0.1 M solution of glucose has same increment in freezing point than has 0.1 M solution of urea |
|  | **Statement 2:** | | for both has different value |

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| 187 |  | | |
|  | **Statement 1:** | | Sodium chloride used to clear snow on the roads |
|  | **Statement 2:** | | Sodium chloride depresses the freezing point of water |

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| 188 |  | | |
|  | **Statement 1:** | | The difference in the boiling points of equimolar solution of and HF decreases as their molarity is decreased |
|  | **Statement 2:** | | The extent of dissociation decreases steadily with increasing dilution |

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| 189 |  | | |
|  | **Statement 1:** | | The elevation in boiling point for two isotonic solutions may not be same |
|  | **Statement 2:** | | The boiling point depends upon the concentration of the solute |

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| 190 |  | | |
|  | **Statement 1:** | | If red blood cells were removed from the body and placed in pure water pressure inside the cells increase. |
|  | **Statement 2:** | | The concentration of salt content in the cells increase. |

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| 191 |  | | |
|  | **Statement 1:** | | The increasing pressure on water decreases its freezing point |
|  | **Statement 2:** | | The density of water is maximum at 273 K |

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| 192 |  | | |
|  | **Statement 1:** | | Raoult’s law for solute-solvent systems can be written as |
|  | **Statement 2:** | | For dilute solutions Raoult’s law many be written as |

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| 193 |  | | |
|  | **Statement 1:** | | Azeotropic mixture are formed only by nonideal solution and they may have boiling points either greater than both the components or less than both the components. |
|  | **Statement 2:** | | The composition of the vapour phase is same as that of the liquid phase of an azeotropic mixture. |

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| 194 |  | | |
|  | **Statement 1:** | | 0.1 M solution of has greater osmotic pressure than 0.1 M solution of glucose at same temperature |
|  | **Statement 2:** | | In solution, dissociates to produce more number of particles |

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| 195 |  | | |
|  | **Statement 1:** | | Cooking time in pressure cooker is reduced |
|  | **Statement 2:** | | The boiling point inside the pressure cooker is raised |

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| 196 |  | | |
|  | **Statement 1:** | | The elevation in boiling point of a solution of non-electrolyte is proportional to its molality |
|  | **Statement 2:** | | The molal elevation constant is the ratio of the elevation in boiling point to its molality |

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| 197 |  | | |
|  | **Statement 1:** | | The sum of mole fractions of all the component of a solution is unity |
|  | **Statement 2:** | | The mole fraction is a temperature-dependent quantity |

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| 198 |  | | |
|  | **Statement 1:** | | A mixture of cyclohexane and ethanol deviation from Raoult’s law. |
|  | **Statement 2:** | | Cyclohexane reduces the intermolecular attraction between ethanol molecules. |

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| 199 |  | | |
|  | **Statement 1:** | | If a liquid solute more volatile than the solvent is added to the solvent the vapour pressure of the solution may increase ie Ps>P0. |
|  | **Statement 2:** | | In presence of a more volatile liquid solute only the solute will form the vapour and solvent will not. |

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| 200 |  | | |
|  | **Statement 1:** | | Larger the value of cryoscopic constant of the solvent, lesser will be the freezing point of the solution |
|  | **Statement 2:** | | Depression in the freezing point depends on the nature of the solvent |

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| 201 |  | | |
|  | **Statement 1:** | | Great care is taken in intra-venous injections to have comparable concentration of solutions to be injected to patient. |
|  | **Statement 2:** | | By not controlling the concentration the red blood cells may shrink or swell. |

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| 202 |  | | |
|  | **Statement 1:** | | The water pouch of instant cold pack for treating athletic injuries breaks when squeezed and NH4NO3 dissolves lowering point of temperature. |
|  | **Statement 2:** | | Addition of non volatile solute into solvent result in depression of freezing point solvent. |

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| 203 |  | | |
|  | **Statement 1:** | | A cook cries more in cutting onion rather than cutting an onion taken out from refrigerator. |
|  | **Statement 2:** | | The cold onion has lower vapour pressure of its volatile content. |

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| 204 |  | | |
|  | **Statement 1:** | | Water boiling at at 1 atmospheric pressure in a beaker is not at equilibrium |
|  | **Statement 2:** | | If refers to an open system |

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| 205 |  | | |
|  | **Statement 1:** | | Addition of solvent to a solute always lowers the V.P. |
|  | **Statement 2:** | | The increase in relative surface area give rise to an increase in V.P. |

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| 206 |  | | |
|  | **Statement 1:** | | Iodine is more soluble in than in water |
|  | **Statement 2:** | | Non-polar solutes are more soluble in non-polar solvents |

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| 207 |  | | |
|  | **Statement 1:** | | One molar aqueous solution has always higher concentration than one molal |
|  | **Statement 2:** | | The molality of a solution depends upon the density of the solution whereas molarity does not |

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| 208 |  | | |
|  | **Statement 1:** | | An ideal solution is one which obey Raoult’s law. |
|  | **Statement 2:** | | is an ideal solution. |

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| 209 |  | | |
|  | **Statement 1:** | | The molecular weight of acetic acid determined by depression in freezing point method in benzene and water was found to be different. |
|  | **Statement 2:** | | Water is polar and benzene is non polar. |

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| 210 |  | | |
|  | **Statement 1:** | | At low concentration, benzene and toluene forms ideal solution. |
|  | **Statement 2:** | | Components with structural similarity forms ideal solution. |

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| 211 |  | | |
|  | **Statement 1:** | | Osmosis is one sided movement of solvent particles. |
|  | **Statement 2:** | | In osmosis, the net movement of solvent particles from dil. to conc. solution and from conc.to dil. solution takes place through semipermeable membrane, showing finally the direction of dil. to conc. |

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| 212 |  | | |
|  | **Statement 1:** | | and in an ideal solution are zero |
|  | **Statement 2:** | | interactions in ideal solutions are same as between and |

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| 213 |  | | |
|  | **Statement 1:** | | The molecular mass of polymers cannot be calculated using the boiling point or freezing point method |
|  | **Statement 2:** | | The boiling point method for determining the molecular masses is used for compounds stable at high temperature |

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| 214 |  | | |
|  | **Statement 1:** | | Ice melts earlier if NaCl is poured on it. |
|  | **Statement 2:** | | The freezing point of water is lowered on addition of NaCl. |

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| **Matrix-Match Type** | | | | | | | | | |
| This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**. | | | | | | | | | |

| 215. | partial pressure of component A in liquid mixture, vapour pressure of A, mole fraction of A in liquid mixture | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (p) | | Azeotropic mixture | |
|  | **(B)** |  | | (q) | | Obeys Raoult’s law | |
|  | **(C)** |  | | (r) | | Non-ideal solution with positive deviation | |
|  | **(D)** |  | | (s) | | Non-ideal solution with negative deviation | |
|  |  |  | | (t) | | Ideal solution | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | Q,t | p,r | p,s | p,q |  |  |
|  | **b)** | p,r | q,t | q,t | p,s |  |  |
|  | **c)** | p,q | p,s | p,r | q,t |  |  |
|  | **d)** | p, | p,r | q,s | p,r |  |  |

| 216. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (p) | |  | |
|  | **(B)** |  | | (q) | | Lowering in vapour pressure | |
|  | **(C)** | Mixture that boils like pure solvent | | (r) | | Azeotropic mixture | |
|  | **(D)** | Van’t Hoff factor | | (s) | | Raoult’s law | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | q | s | r | p |  |  |
|  | **b)** | s | r | p | q |  |  |
|  | **c)** | p | q | s | r |  |  |
|  | **d)** | r | p | q | s |  |  |

| 217. | Norma molecular mass of solute  Observed molecular of solute from colligative property measurement | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (p) | | 0.1 M in benzene | |
|  | **(B)** |  | | (q) | | 0.1 M urea in water | |
|  | **(C)** |  | | (r) | | 0.05 M barium chloride in water | |
|  | **(D)** |  | | (s) | | 0.1 in water | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | R,s | r | p | q |  |  |
|  | **b)** | r | p | q | s |  |  |
|  | **c)** | p | r,s | r | p |  |  |
|  | **d)** | q | p | s | r |  |  |

| 218. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Additive property | | (1) | | Molarity | |
|  | **(B)** | Constitutive property | | (2) | | Dipole moment | |
|  | **(C)** | Additive and constitutive property | | (3) | | Optical activity | |
|  | **(D)** | Colligative property | | (4) | | Molecular weight | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | 2 | 3 | 1 | 4 |  |  |
|  | **b)** | 4 | 3 | 2 | 1 |  |  |
|  | **c)** | 1 | 4 | 2 | 3 |  |  |
|  | **d)** | 4 | 3 | 1 | 2 |  |  |

| 219. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Raoult’s law | | (p) | | Effect of pressure on the solubility of gas in liquid | |
|  | **(B)** | Henry’s law | | (q) | |  | |
|  | **(C)** | Ethyl alcohol + Water | | (r) | | Ideal solution | |
|  | **(D)** | Benzene + Toluene | | (s) | | Azeotropic mixture | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | q | r | s |  |  |
|  | **b)** | r | s | p | q |  |  |
|  | **c)** | q | p | s | r |  |  |
|  | **d)** | s | r | q | p |  |  |

| 220. | Match the following: | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Urea, glucose, fructose | | (p) | | 1:0. 8:1 | |
|  | **(B)** |  | | (q) | | 1:2:3 | |
|  | **(C)** |  | | (r) | | 1:1:1 | |
|  | **(D)** | Glucose, | | (s) | | 2:3:3 | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | s | p | q |  |  |
|  | **b)** | s | r | q | p |  |  |
|  | **c)** | p | q | s | r |  |  |
|  | **d)** | q | p | r | s |  |  |

| 221. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Method for the determination of osmotic pressure | | (p) | | Ebullioscopic determination | |
|  | **(B)** | Method for the determination of relative lowering in vapour pressure | | (q) | | Cyroscopic constant | |
|  | **(C)** |  | | (r) | | Berkeley and Hartley | |
|  | **(D)** |  | | (s) | | Ostwald and Walker’s method | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | s | q | p | r |  |  |
|  | **b)** | r | s | p | q |  |  |
|  | **c)** | p | r | q | s |  |  |
|  | **d)** | q | p | s | r |  |  |

| 222. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (p) | | Van’t Hoff factor | |
|  | **(B)** |  | | (q) | | Molal depression | |
|  | **(C)** |  | | (r) | | Elevation in boiling point | |
|  | **(D)** |  | | (s) | |  | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | s | r | q |  |  |
|  | **b)** | s | r | q | p |  |  |
|  | **c)** | q | p | s | r |  |  |
|  | **d)** | r | q | p | s |  |  |

| 223. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | A | | (p) | | (+) deviation | |
|  | **(B)** | B | | (q) | | Ideal | |
|  | **(C)** | C | | (r) | | () deviation | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | q | r | p |  |  |  |
|  | **b)** | r | p | q |  |  |  |
|  | **c)** | p | q | r |  |  |  |
|  | **d)** | q | r | p |  |  |  |

| 224. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Molarity | | (p) | | Number of gram moles of solute per kg of solvent | |
|  | **(B)** | Normality | | (q) | | Number of gram moles of a solute per liter of solution | |
|  | **(C)** | Molality | | (r) | | Number of gram equivalent of solute per liter of solution | |
|  | **(D)** |  | | (s) | |  | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | s | r | q |  |  |
|  | **b)** | r | q | s | p |  |  |
|  | **c)** | s | p | q | r |  |  |
|  | **d)** | q | r | p | s |  |  |

| 225. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (1) | |  | |
|  | **(B)** |  | | (2) | |  | |
|  | **(C)** |  | | (3) | |  | |
|  | **(D)** |  | | (4) | |  | |
|  | **(E)** |  | | (5) | |  | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** | **E** |  |
|  | **a)** | 5 | 4 | 3 | 2 | 1 |  |
|  | **b)** | 3 | 1 | 4 | 2 | 1 |  |
|  | **c)** | 1 | 2 | 3 | 4 | 1 |  |
|  | **d)** | 2 | 4 | 1 | 5 | 1 |  |

| 226. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Hypertonic | | (p) | | Solutions having same osmotic pressure | |
|  | **(B)** | Isotonic | | (q) | | One solution has higher osmotic pressure than the second solution | |
|  | **(C)** | Van’t Hoff | | (r) | | Theory of dilute solution | |
|  | **(D)** | Beckmann | | (s) | | Differential thermometer | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | q | r | s |  |  |
|  | **b)** | r | s | q | p |  |  |
|  | **c)** | q | r | s | q |  |  |
|  | **d)** | s | p | q | r |  |  |

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| **Linked Comprehension Type**  This section contain(s) 24 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **only one** is correct.  **Paragraph for Question Nos. 227 to -227** | | | | | | | | |
| The vapour pressure of the solution is comparatively smaller than that of the pure solvent (Raoult’s law). Consequently, the temperature at which the vapour pressure of solution becomes equal to the external pressure, will be greater than that of pure solvent, rising its boiling point. Since, the decrease in vapour pressure is directly proportional to the amount fraction of the solute in the solution, it is therefore expected that the corresponding increase in the boiling points also depends on the amount fraction of the solute in the solution | | | | |

| 227. | When a non-volatile solute is dissolved in a solvent, the relative lowering of vapour pressure is equal to | | | | | | | |
|  | a) | Concentration of the solute in gram 100 mL | | | b) | Mole fraction of solute | | |
|  | c) | Mole fraction of solvent | | | d) | Concentration of the solute in gram per litre | | |
| **Paragraph for Question Nos. 228 to - 228** | | | | | | | | |

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| The variation of vapour pressure of the solvent and that of the solution with temperature are given by the respective solvent-vapour and solution-vapour curves of the phase diagramFor a given value of the external pressure, the pure solvent will boil at temperature Tb\* and at temperature Tb let pext be equal to p\*, the vapour pressure of pure solventApplying the Clausius-Clapeyron equation to the solution vapour equilibrium for the two values of p, Tb\* and p\*, Tb we haveIn p\*p=∆vapH1mR1Tb\*-1Tb=∆vapH1mR∆TbTb\*Tb | | | | |

| 228. | The phase diagram for the pure solvent and solution are recorded below. The quantity indicated by L in the figure is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 229 to - 229** | | | | | | | | |

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| An aqueous solution freezes at 272.4 K while pure water freezes at 273 K. Given, Kf=1.86 K kg mol-1, Kb=0.512 K kg mol-1 and vapour pressure of water at 298 K = 23.756 mm of Hg. Determine the following | | | | |

| 229. | Molality of the solution is | | | | | | | |
|  | a) | 0.322 | b) | 0.222 | c) | 0.413 | d) | 0.5 |
| **Paragraph for Question Nos. 230 to - 230** | | | | | | | | |

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| A solution of sucrose (molar mass =342) is prepared by dissolving 68.4 g in 1000 g of water. Calculate | | | | |

| 230. | The vapour pressure of solution at 293 K | | | | | | | |
|  | a) | 0.0229 | b) | 0.4 | c) | 0.6 | d) | 0.9 |
| **Paragraph for Question Nos. 231 to - 231** | | | | | | | | |

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| The osmotic pressure π depends on the molar concentration of the solution (π=CRT). If two solutions are of equal solute concentration and, hence, have the same osmotic pressure, they are said to be isotonic. If two solutions are of unequal osmotic pressures, the more concentrated solution is said to be hypertonic and the more diluted solution is described as hypertonic.Osmosis is the major mechanism for transporting water upward in the plants. Answer the following questions: | | | | |

| 231. | A plant cell shrinks when it is kept in: | | | | | | | |
|  | a) | Hypotonic solution | b) | Hypertonic solution | c) | Isotonic solution | d) | Pure water |
| **Paragraph for Question Nos. 232 to - 232** | | | | | | | | |

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| The solutions which boil at constant temperature like a pure liquid and possess same composition in liquid as well as vapour state are called azeotropes. The components of azeotropes cannot be separated by fractional distillation. Only non-ideal solutions form azeotropes. Solutions with negative deviation form maximum boiling azeotrope and the solutions with positive deviation form minimum boiling azeotrope. The boiling point of an azeotrope is never equal to the boiling points of any of the components of the azeotropeAnswer the following questions: | | | | |

| 232. | The azeotropic solutions of two miscible liquids | | | | | | | |
|  | a) | Can be separated by simple distillation | | | | | | | |
|  | b) | May show positive or negative deviation from Raoult’s law | | | | | | | |
|  | c) | Are supersaturated | | | | | | | |
|  | d) | Behave like single pure component and boil at a fixed temperature | | | | | | | |
| **Paragraph for Question Nos. 233 to - 233** | | | | | | | | |

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| A 1.24 M aqueous solution of KI has density of 1.15 g cm-3. Answer the following questions about this solution: | | | | |

| 233. | The percentage composition of solute in the solution is | | | | | | | |
|  | a) | 17.89 | b) | 27.89 | c) | 37.89 | d) | 47.89 |
| **Paragraph for Question Nos. 234 to - 234** | | | | | | | | |

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| The electrolyte solutions show abnormal colligative properties. To account for this effect we define a quantity called the Van’t Hoff factor given byi=Actual number of particles in solution after dissociationNumber of formula units initially dissolved in solutioni=1 (for non-electrolytes)i>1 (for electrolytes, undergoing dissociation)i<1 (for solutes, undergoing association)Answer the following questions: | | | | |

| 234. | Benzoic acid undergoes dimerization in benzene solution. The Van’t Hoff factor is related to the degree of association of the acid as | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 235 to - 235** | | | | | | | | |

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| Compartments A and B have the following combinations of solution: A B0.1 M KCl 0.2 M KCl0.1% mVNaCl 10% mVNaCl18 g L-1 glucose 34.2 g L-1 sucrose20% mV glucose 10% mV glucoseAnswer the following questions: | | | | |

| 235. | Indicate the number of solutions which is/are isotonic | | | | | | | |
|  | a) | 1 only | b) | 3 only | c) | 4 only | d) | 2 only |
| **Paragraph for Question Nos. 236 to - 237** | | | | | | | | |

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| The boiling point elevation and freezing point depression of solutions have a number of practical applications. Ethylene glycol (CH2OH-CH2OH) is used in automobile radiators as an antifreeze because it lowers the freezing point of the coolant. The same substance also helps to prevent the radiator coolant from boiling away by elevating the boiling point. Ethylene glycol has low vapour pressure. We can also use glycerol as an antifreeze. In order for the boiling point elevation to occur, the solute must be non-volatile, but no such restriction applies to freezing point depression. For example, methanol (CH3OH), a fairly volatile liquid that boils only at 65℃, is sometimes used as an antifreeze in automobile radiators | | | | |

| 236. | Which of the following is a better reagent for depression in freezing point but not for elevation in boiling point? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 237 to - 238** | | | | | | | | |

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| A solution M is prepared by mixing ethanol and water, the mole fraction of ethanol in the mixture is 0.9Given : Freezing point depression constant of waterKfwater=1.86 K kg mol-1Freezing point depression constant of ethanolKfethanol=2.0 K kg mol-1Boiling point elevation constant of waterKbwater=0.52 K kg mol-1Boiling point elevation constant of ethanolKbethanol=1.2 K kg mol-1Standard freezing point of water = 273 KStandard freezing point of ethanol = 155.7 KStandard boiling point of water = 373 KStandard boiling point of ethanol = 351.5 KVapour pressure of pure water = 32.8 mm HgVapour pressure of pure ethanol = 40 mm HgMolecular weight of water = 18 g mol-1Molecular weight of ethanol = 46 g mol-1In answering the following questions consider the solutions to be ideal dilute solutions and solutes to be non-volatile and non-dissociative | | | | |

| 237. | The freezing point of the solution M is | | | | | | | |
|  | a) | 268.7 K | b) | 268.5 K | c) | 150.9 K | d) | 268.7 K |
| **Paragraph for Question Nos. 238 to - 239** | | | | | | | | |

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| Properties such as boiling point, freezing point, and vapour pressure of a pure solvent change when solute molecules are added to get homogenous solution. These are called colligative propertiesAnswer the following questions: | | | | |

| 238. | 1. 0.001 m urea 2. 0.001 m   Increasing order of boiling points | | | | | | | |
|  | a) | (ii)<(iv)<(i)<(iii) | b) | (iv)<(i)<(ii)<(iii) | c) | (iii)<(ii)<(i)<(iv) | d) | (i)<(ii)<(iii)<(iv) |
| **Paragraph for Question Nos. 239 to - 240** | | | | | | | | |

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| A certain vessel X has water and nitrogen gas at a total pressure of 2 atm and 300 K. All the contents of vessel are transferred to another vessel Y having half the capacity of the vessel X. The pressure of N2 in this vessel was 3.8 atm at 300 K. The vessel Y is heated to 320 K and the total pressure observed was 4.32 atm. Assume that the volume occupied by the gasses in vessel is equal to the volume of the vessel. Calculate the following: | | | | |

| 239. | Pressure of in X at 320 K | | | | | | | |
|  | a) | 0.1 | b) | 0.2 | c) | 1.0 | d) | 2.0 |
| **Paragraph for Question Nos. 240 to - 241** | | | | | | | | |

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| A system of greater disorder of molecules is more probable. The disorder of molecules is reflected by the entropy of the system. A liquid vapourises to form a more disordered gas. When a solute is present, there is additional contribution to the entropy of the liquid due to increased randomness. As the entropy of solution is higher than that of pure liquid, there is weaker tendency to form the gas. Thus, a solute (non volaile) lowers the vapour pressure of a liquid, and hence a higher boiling point of the solutionSimilarly, the greater randomness of the solution opposes the tendency to freeze. In consequence, a lower temperature must be reached for achieving the equilibrium between the solid (frozen solvent) and the solution. The elevation in boiling point ∆Tb and depression in freezing point ∆Tf of a solution are the colligative properties which depend only on the concentration of particles of the solute and not their identity. For dilute solutions, ∆Tb and ∆Tf are proportional to the molarity of the solute in the solution | | | | |

| 240. | Dissolution of a non-volatile solute into a liquid leads to | | | | | | | |
|  | a) | A decrease of entropy | | | | | | | |
|  | b) | An increase in tendency of the liquid to freeze | | | | | | | |
|  | c) | An increases in tendency to pass into the vapour phase | | | | | | | |
|  | d) | A decrease in tendency of the liquid to freeze | | | | | | | |
| **Paragraph for Question Nos. 241 to - 242** | | | | | | | | |

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| Figure 2.36 (a) represents the distillation of mixture of liquid A and liquid B which gives both of pure liquid A and B. While Fig. 2.36(b) represents the azeotopic mixture of HNO3 and H2O which distillation gives and azeotropic mixture and either of pure liquid. We can not separate both the pure liquid, i.e., H2O and HNO3 | | | | |

| 241. | What is the result of distilling a mixture of 50% and? | | | | | | | |
|  | a) | Pure water and azeotropic mixture can be separated | | | | | | | |
|  | b) | Pure and pure can be separated | | | | | | | |
|  | c) | Pure and azeotropic mixture can be separated | | | | | | | |
|  | d) | None of the above | | | | | | | |
| **Paragraph for Question Nos. 242 to - 242** | | | | | | | | |

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| Addition of non-volatile solute to a solvent always increases the colligative properties such as osmotic pressure, ∆P, ∆Tb and ∆Tf. All these colligative properties are directly proportional to molality if solutions are dilute. The decrease in colligative properties on addition of non-volatile solute is due to increase in number of particles. | | | | |

| 242. | For different aqueous solutions of 0.1 urea, 0.1 NaCl, 0.1 and solution at 27 the correct statements are :  1. The order of osmotic pressure is urea  2. for urea solution  3. Addition of salt on ice increases its melting point  4. Addition of salt on ice brings in melting of ice earlier | | | | | | | |
|  | a) | 2, 3, 4 | b) | 1, 2, 4 | c) | 1, 2, 3 | d) | 3, 4 |
| **Paragraph for Question Nos. 243 to - 243** | | | | | | | | |

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| Addition of a non-volatile solute to a solvent lowers its vapour pressure. Therefore, the vapour pressure of a solution (i.e., V.P. of solvent in a solution) is lower than that of pure solvent, at the same temperature. A higher temperature is needed to raise the vapour pressure upto one atmosphere pressure, when boiling point is attained. However increase in b.p. is small. For example 0.1 molal aqueous sucrose solution boils at 100.05 ͦC.Sea water, an aqueous solution, which is rich in Na+ and Cl- ions, freezes about 1 ͦC lower than frozen water. At the freezing point of a pure solvent, the rates at which two molecules stick together to form the solid and leave it to return to liquid state are equal when solute is present. Fewer solvent molecules are in contact with surface of solid. However, the rate at which the solvent molecules leave the surface of solid remains unchanged. That is why temperature is lowered to restore the equilibrium. The freezing point depression in a dilute solution is proportional to molality of the solute. | | | | |

| 243. | An aqueous solution of 0.1 molal concentration of sucrose should have freezing point of | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |

**Integer Answer Type**

| 244. | The osmotic pressure of a solution in atm obtained on mixing each 50 mL of 1.2% urea solution and 2.4% glucose solution at 300 K : | | | | | | | |
| 245. | A mixture of two immiscible liquids nitrobenzene and water boiling at 99 has a partial pressure of water 733 mm and of nitrobenzene 27 mm. The ratio of weights of water and nitrobenzene in mixture is ………. | | | | | | | |
| 246. | How many g of glucose must be present in 0.5 litre of a solution for its osmotic pressure be same as that of 8 g glucose in 1 litre? | | | | | | | |
| 247. | moles of a non electrolyte are added to moles of solvent. The addition causes a lowering in vapour pressure of solvent by 20%. The ratio of moles of solvent and its solute is ….. | | | | | | | |
| 248. | An aqueous solution of a substance mol. wt. 240 has osmotic pressure 0.2 atm at 300 K. The density of solution in g/ is : (= 0.08 litre atm | | | | | | | |
| 249. | 12.2 g of benzoic acid in 100 g water has elevation in boiling point of 0.27.. If there is 100% polymerization, the number of molecules of benzoic acid in associated state is | | | | | | | |
|  | a) | 2 | b) | 1 | c) | 3 | d) | 4 |
| 250. | The Van’t Hoff factor for a solute which does not dissociate or associate in solution is | | | | | | | |
|  | a) | 0 | b) | 2 | c) | 3 | d) | 1 |
| 251. | The ratio of the value of any colligative property for solution of urea solution under similar condition is | | | | | | | |
|  | a) | 2 | b) | 3 | c) | 1 | d) | 4 |
| 252. | The osmotic pressure of a solute is 600 mm at 300 K. The solution is diluted and the temperature is raised to 400 K and the solution shows an osmotic pressure of 200 mm. the solution was diluted to ……times. | | | | | | | |
| 253. | Compound is a hydrated complex; 1 m aqueous solution of it has freezing point 269.28 K. Assuming 100% ionization of complex, calculate number of ions furnished by complex in the solution | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 4 | d) | 0 |
| 254. | A solution of liquids and having vapour pressure in pure state and . The solution contains 30% mole of which is in equilibrium with 60% mole of in vapour phase. If is 2 cm, the is …..cm. | | | | | | | |
| 255. | A 0.4 molal aqueous solution of has freezing point 3.72 The is 1.86 K . The value of is ………. | | | | | | | |
| 256. | A solution of 6.2 g ethylene glycol in 55 g is cooled to The ice separated from solution is : | | | | | | | |
| 257. | If for a sucrose, elevation in boiling point is , then what will be the boiling point of solution for same molal concentration? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 258. | The osmotic pressure of urea solution at is 200 mm, becomes 105.3 mm when it is diluted and temperature raised to . The extent of dilution is | | | | | | | |
|  | a) | 8 times | b) | 5 times | c) | 4 times | d) | 2 times |
| 259. | The osmotic pressure of a solution containing 40 g of solute (molecular mass 246) per liter at is ( | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 260. | A complex is represented as Its 0.1 molal solution in water shows of is 1.86 K Assuming 100% ionisation, calculate the no. of molecules associated with Co. | | | | | | | |
| 261. | The total number of colligative properties are | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 3 | d) | 4 |
| 262. | 3 mole of liquid (V.P. = 60 mm) and mole of (V.P. = 40 mm) results in a solution having V.P. of 50 mm. The value of is …. | | | | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 20-08-2019 **TEST ID: 493**

**Time :** 15:39:00 **CHEMISTRY**

**Marks :** 928

2.SOLUTIONS

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| **: ANSWER KEY :** |

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| --- | --- | --- | --- | --- |
| **1) c 2) a 3) c 4) a**  **5) a 6) a 7) d 8) c**  **9) c 10) d 11) b 12) c**  **13) a 14) c 15) c 16) a**  **17) b 18) a 19) a 20) a**  **21) c 22) b 23) c 24) a**  **25) a 26) b 27) b 28) a**  **29) a 30) d 31) b 32) b**  **33) c 34) d 35) b 36) d**  **37) c 38) b 39) c 40) a**  **41) a 42) c 43) b 44) d**  **45) a 46) d 47) a 48) a**  **49) d 50) b 51) c 52) a**  **53) b 54) d 55) b 56) d**  **57) a 58) a 59) b 60) a**  **61) b 62) a 63) b 64) b**  **65) a 66) d 67) a 68) d**  **69) b 70) a 71) a 72) a**  **73) c 74) c 75) b 76) a**  **77) c 78) d 79) a 80) a**  **81) a 82) d 83) d 84) d**  **85) a 86) a 87) b 88) c**  **89) c 90) c 91) a 92) a**  **93) d 94) a 95) b 96) d**  **97) a 98) b 99) c 100) d**  **101) c 102) d 103) d 104) b**  **105) a 106) b 107) a 108) c**  **109) a 1) a, b 2) b,d 3) a,b,c 4) a,d**  **5) a,b,c,d 6) a,c,d 7) a,c 8) a,b**  **9) a,d 10) a, b, d 11) a,b 12) a,c,d**  **13) a,c 14) b,d 15) a,b,c 16) c, d**  **17) a, b, d 18) c,d 19) a, b, d 20) a, c**  **21) a,b,d 22) b,c 23) a,b 24) b,c**  **25) a,c,d 26) a, c, d 27) c 28) a,b,c,d**  **29) a, b, c 30) b,c 31) b, c 32) a, b, c**  **33) a,d 34) b, d 35) c, d 36) a, b, d**  **37) b,c,d 38) a, b, c 39) a,b 40) b**  **41) b, c, d 42) a,c,d 43) b, c, d 44) a, b, c, d**  **45) b,d 46) c 47) a, b 48) b,c**  **49) a, d 50) b,d 51) a, b, c 52) b, d**  **53) c, d 54) c,d 55) a, b, c 56) a, b**  **57) a,b,c,d 1) a 2) b 3) c 4) c**  **5) c 6) c 7) c 8) a**  **9) d 10) b 11) a 12) c**  **13) a 14) a 15) d 16) c**  **17) b 18) c 19) c 20) c**  **21) a 22) c 23) e 24) c**  **25) c 26) d 27) b 28) a**  **29) b 30) b 31) c 32) b**  **33) c 34) a 35) c 36) b**  **37) c 38) a 39) b 40) a**  **41) b 42) a 43) a 44) c**  **45) b 46) a 47) a 48) c**  **1) b 2) a 3) a 4) b**  **5) c 6) a 7) b 8) b**  **9) c 10) d 11) a 12) a**  **1) b 2) b 3) a 4) a**  **5) c 6) b 7) a 8) c**  **9) b 10) a 11) c 12) a**  **13) a 14) d 15) a 16) b**  **17) d 1) 4 2) 4 3) 4 4) 4**  **5) 2 6) a 7) a 8) b**  **9) 4 10) b 11) 7 12) 4**  **13) 5 14) d 15) d 16) b**  **17) 5 18) d 19) 3** | | | | |

**ACTIVE SITE TUTORIALS**

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2.SOLUTIONS

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| **: HINTS AND SOLUTIONS :** |

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| 1 | **(c)**  Van’t Hoff factor  For it is 2 and for sugar it is 1 | | | | | | | |
| 2 | **(a)** | | | | | | | |
| 3 | **(c)**  atm  Weight of solution Density | | | | | | | |
| 4 | **(a)** | | | | | | | |
| 5 | **(a)**  The interparticle forces in between and acetone increase due to H-bonding and thus becomes negative | | | | | | | |
| 7 | **(d)**  Osmosis of water and not of ion takes place | | | | | | | |
| 8 | **(c)**  Given  Compare with the given equation, | | | | | | | |
| 9 | **(c)**  Azeotropic mixtures are also known as constant boiling mixtures. They are liquid mixtures which boil over without any change in the composition. Such mixtures cannot be separated into components by fractional distillation. They are of two types: maximum boiling azeotropes and minimum boiling azeotropes  Maximum boiling azeotropes are formed by solutions having negative deviations. Boiling point is maximum  For example,  Water and  Water and nitric acid  Chloride form and acetone  Acetic acid and pyridine  Minimum boiling azeotropes are formed by solutions having positive deviations. Boiling point is minimum. For example,  Acetic acid and toluene  Pyridine and water  Ethanol and benzene  Water and ethanol | | | | | | | |
| 10 | **(d)**  (mix has concentration =1 M) | | | | | | | |
| 11 | **(b)**  For non-electrolytic solution, if isotonic, | | | | | | | |
| 12 | **(c)**  The scaling of zero degree centigrade is based on this fact | | | | | | | |
| 13 | **(a)**  Lowering is always positive | | | | | | | |
| 14 | **(c)** | | | | | | | |
| 15 | **(c)**  No changes in interparticle forces as both are non-polar | | | | | | | |
| 16 | **(a)**  The definition of azeotropic mixture | | | | | | | |
| 17 | **(b)** | | | | | | | |
| 18 | **(a)**  Actual molecular weight of naphthoic acid ()=172  Molecular mass (calculated)    ==344  van’t Hoff factor (*i*) = | | | | | | | |
| 19 | **(a)**  The movement of solvent particles from dilute solution to concentrated one through a semi-permeable membrane is called osmosis | | | | | | | |
| 20 | **(a)**  Mixing of benzene and toluene does not involve any kind of decrease or increase in interaction forces in between molecules | | | | | | | |
| 21 | **(c)**  Colligative properties are properties of solution which depend on the number of particles present in solution and | | | | | | | |
| 22 | **(b)**  furnishes two ions on complete dissociation | | | | | | | |
| 23 | **(c)**  More is , more is boiling point | | | | | | | |
| 24 | **(a)**  More is , lesser is freezing point | | | | | | | |
| 25 | **(a)**  for camphor is maximum (about 40 ) | | | | | | | |
| 26 | **(b)**  For two non-electrolyte solutions, if isotonic, | | | | | | | |
| 27 | **(b)**  (benzoic acid)  (twice of actual molecular weight) | | | | | | | |
| 28 | **(a)**  furnishes maximum number of ions | | | | | | | |
| 29 | **(a)**  and not | | | | | | | |
| 30 | **(d)**  Freezing point is lowered on addition of solution in it | | | | | | | |
| 31 | **(b)**  ; | | | | | | | |
| 32 | **(b)**  ;  ;  dissociates to give experimental molality | | | | | | | |
| 33 | **(c)**  ; | | | | | | | |
| 34 | **(d)** | | | | | | | |
| 35 | **(b)**  The relative lowering of vapour pressure is equal to the mole fraction of the solute | | | | | | | |
| 37 | **(c)**  Vapour pressure of methanol + Water mixture > VP of but less than that of methanol | | | | | | | |
| 38 | **(b)**  A characteristic of azeotropic mixture | | | | | | | |
| 39 | **(c)** | | | | | | | |
| 40 | **(a)**  (at VP =760 torr) | | | | | | | |
| 41 | **(a)**  Osmosis occurs from dilute solution to concentrated solution, i.e., exosmosis | | | | | | | |
| 42 | **(c)**  is 100% ionized while is a weak electrolyte | | | | | | | |
| 43 | **(b)** | | | | | | | |
| 44 | **(d)**  show H-bonding as well as polarity both | | | | | | | |
| 45 | **(a)**    mole-fraction    In 10 mole solubility is | | | | | | | |
| 46 | **(d)**  Addition of salt lowers the freezing point of water and thus snow melts | | | | | | | |
| 47 | **(a)**  Hence, 2 mol NaCl will exists as 1 mol due to 50% ionization | | | | | | | |
| 48 | **(a)**  Urea and glucose do not dissociate in solution. Sodium chloride gives two ions and potassium sulphate gives three ions per formula unit. Therefore, the effective number of particles is maximum in potassium sulphate, and it shows the maximum depression in freezing point | | | | | | | |
| 49 | **(d)**  Azeotropic mixture of conatins 20.4% | | | | | | | |
| 50 | **(b)** | | | | | | | |
| 51 | **(c)**  For an ideal solution  and it should obey Raoult’s law | | | | | | | |
| 52 | **(a)**  For  For glucose,  (isotonic)  or    1 0    Total particles =  or dissociated | | | | | | | |
| 53 | **(b)**  furnishes more ions than and thus shows higher boiling point | | | | | | | |
| 54 | **(d)** | | | | | | | |
| 55 | **(b)**  Positive deviations from Raoult’s law are noticed when  Experimental value of vapour pressure of mixture is more than calculated value  Experimental value of boiling point of mixture is less than the calculated value | | | | | | | |
| 56 | **(d)**    Glucose does not dissociate. So it has the minimum number of particles, and therefore, it shows minimum depression in freezing point. So it has the maximum freezing point | | | | | | | |
| 57 | **(a)**  Minimum freezing point means more number of ions | | | | | | | |
| 58 | **(a)** | | | | | | | |
| 59 | **(b)**  Elevation in boiling point, osmotic pressure, depression in vapour pressure, and depression in freezing point are colligative properties  Colligative properties are properties of solution which depend on the number of particles present in solution | | | | | | | |
| 60 | **(a)**  It is molecule in gelatinous state to work as semipermeable in nature | | | | | | | |
| 61 | **(b)**  The temperature at which a liquid boils increases with increase in pressure | | | | | | | |
| 62 | **(a)**  A solution of is isotonic with M glucose. The required condition is | | | | | | | |
| 63 | **(b)**  ( for urea)  for | | | | | | | |
| 64 | **(b)**  It is the definition of osmosis | | | | | | | |
| 65 | **(a)**  The number of moles of the solute present per kilogram of the solvent is known as its molality | | | | | | | |
| 66 | **(d)**  First three methods involve use of as semi-permeable membrane which will be dissolved in non-aqueous solvent and thus only Townend’s method having semi-permeable membrane of powered glass and clay can be used to determine the osmotic pressure of non-aqueous solutions | | | | | | | |
| 67 | **(a)**  Osmosis will not take place | | | | | | | |
| 68 | **(d)**  Colligative properties are properties of solution which depends on the number of particles present in solution. | | | | | | | |
| 69 | **(b)** | | | | | | | |
| 70 | **(a)**  ; | | | | | | | |
| 71 | **(a)** | | | | | | | |
| 72 | **(a)** | | | | | | | |
| 73 | **(c)**  Molarity =  moles of urea =  weight of solution =weight of solution + weight of solute  =1000 + 120 =1120 g  =0.974 K  Molarity = = 2.05 M | | | | | | | |
| 74 | **(c)**  More is , lesser is freezing point | | | | | | | |
| 75 | **(b)**  Mole fraction of solute | | | | | | | |
| 76 | **(a)**  During complex formation, more number of particles join to form a larger particle which does not break. So the particle number is reduced and the freezing point is elevated | | | | | | | |
| 77 | **(c)**  Mole fraction of solute | | | | | | | |
| 78 | **(d)**  More is , lesser is freezing point | | | | | | | |
| 79 | **(a)** | | | | | | | |
| 80 | **(a)**  (B = Benzene acts as solvent ) | | | | | | | |
| 81 | **(a)**  is characteristic constant for given solvent | | | | | | | |
| 82 | **(d)**  Larger the value of Smaller the freezing point is a case of non-electrolytes, | | | | | | | |
| 83 | **(d)** | | | | | | | |
| 84 | **(d)**  Addition of a solute increases the boiling point of solution | | | | | | | |
| 85 | **(a)**  Normal molecular weight of electrolyte > Experimental molecular weight | | | | | | | |
| 86 | **(a)**  When 0.004 M solution is isotonic with 0.01 M solution of glucose, so their osmotic pressures are equal to each other.  Osmotic pressure of 0.01 M glucose ( =CST  C= concentration of solution =0.01 M  S= solution constant =0.0821 L atm/K/mol  T= absolute temperature  ---(i)    is present in ionic state in solution  So,  At t=0 1 0 0  At equilibrium  (where, is the degree of dissociation of  (= 0.004 0.0821 T ---(ii)  By van’t Hoff facter        Or or 10=4+8    %of= 75% | | | | | | | |
| 87 | **(b)**  Molecular weight of benzoic acid in benzene is determined by the depression in freezing point method, and comes out to be 244. The actual molecular mass is 122. Therefore, it corresponds to the dimers which are formed by hydrogen bonding | | | | | | | |
| 88 | **(c)**  hence complex is binary  Also, CN of Pt is 6 and complex is hydrated | | | | | | | |
| 89 | **(c)**  Molality  Thus, freezing point | | | | | | | |
| 90 | **(c)**  is more as it gives more number of ions, is more for (it is 3) | | | | | | | |
| 91 | **(a)**  Normal saline is 0.16 M solution | | | | | | | |
| 92 | **(a)**  loss in weight of water chamber and loss in weight of solution chamber  or | | | | | | | |
| 93 | **(d)**  Molarity | | | | | | | |
| 94 | **(a)**      At t=0 1 mole 0 0  After ionisation  Thus, number of particles after ionisation  =1-+  van,t Hoff factor (*i*)    The elevation in boiling point (when colligative property is abnormal)    molality of solution  Molality of solution  Thus, | | | | | | | |
| 95 | **(b)**  Perfectly semi-permeable membrane allows the passage of solvent particles only | | | | | | | |
| 96 | **(d)**  All get dissolved with the evolution of heat | | | | | | | |
| 97 | **(a)**  This is Raoult’s law | | | | | | | |
| 98 | **(b)**  VP is decreased | | | | | | | |
| 99 | **(c)**  1 0 0  0 1 2 | | | | | | | |
| 100 | **(d)**  The value of is maximum for | | | | | | | |
| 101 | **(c)**  Osmotic pressure moles:  furnishes 4 ions in solution | | | | | | | |
| 102 | **(d)**  , if equal volumes are mixed, volume of solution becomes double | | | | | | | |
| 103 | **(d)**  furnishes more number of ions | | | | | | | |
| 104 | **(b)**  Mole fraction of in liquid phase  Mole Fraction of in vapour Phase  Thus, mole fraction of in vapour phase | | | | | | | |
| 105 | **(a)**  Colligative properties are properties of solution which depend on the number of particles present in solution | | | | | | | |
| 106 | **(b)** | | | | | | | |
| 107 | **(a)** | | | | | | | |
| 108 | **(c)**  i.e., B should associate to show higher | | | | | | | |
| 109 | **(a)**  For two non-electrolyte solutions, if isotonic | | | | | | | |
| 111 | **(b,d)**  Molality and mole fraction are not affected by temperature because they involve masses of the solute and the solvent which do not change with temperature | | | | | | | |
| 113 | **(a,d)**  **a**. is same as is same  **b**. Since both the solutions have different solvents, vapor pressure will be different  **c**. Solutions are isotonic  **d**. for solution II will be more as | | | | | | | |
| 114 | **(a,b,c,d)**  If heat of solution is negative, the dissolution process is exothermic and heat is released when the crystal dissolves. All the given compounds have negative heat of solution | | | | | | | |
| 115 | **(a,c,d)**  can be written as:    1 0    3 mol of will react with 1 mol of  moles 0    Moles of formed  Weight of formed | | | | | | | |
| 117 | **(a,b)**  Also | | | | | | | |
| 121 | **(a,c,d)**  Greater is the intermolecular force on mixing, more negative will be the deviation  Experimental vapour pressure will be less than calculated vapour pressure | | | | | | | |
| 122 | **(a,c)**  On addition of on-volatile substance, according to the colligative property, the vapor pressure of solution decreases and its boiling point increases | | | | | | | |
| 123 | **(b,d)**  look for ideal solutions | | | | | | | |
| 127 | **(c,d)**  Both and will give 3 ions per molecule in solution and hence, show same colligative properties | | | | | | | |
| 130 | **(a,b,d)**  For immiscible liquids  If , then | | | | | | | |
| 132 | **(a,b)** | | | | | | | |
| 133 | **(b,c)**  We know that osmatic pressure , therefore osmatic pressure is directly proportional to the temperature and molarity | | | | | | | |
| 134 | **(a,c,d)**  **a**. There will be a depression in the freezing point by the ­addition of glucose in water  **b**. increases as concentration decreases  **c**.  () )  **d**. Mixing of solution is always accompained by an increase in entropy (randomness) | | | | | | | |
| 139 | **(b,c)**  . In case of urea, molarity and normality are the same | | | | | | | |
| 142 | **(a,d)**  In the depression in freezing point experiment, it is found that the vapour pressure of a solution is less than that of pure solvent. Only solvent molecules solidify at freezing point. The temperature at which the vapour pressure of the liquid is equal to the vapour pressure of the solid is graphically the temperature at which the vapour pressure curve of the liquid intersects the vapour pressure curve of the solid. When a non-volatile solute is dissolved in a liquid, its freezing point is lowered | | | | | | | |
| 148 | **(a,b)**  Benzene and toluene Ideal solution | | | | | | | |
| 151 | **(a,c,d)**  For electrolyte  for  Also,  molaltiy  Therefore, molecular weight of | | | | | | | |
| 157 | **(b,c)**  Adding into , solution will result into precipitation of which is non-volatile, and therefore boiling point of solution will be increased and its freezing point will decrease | | | | | | | |
| 159 | **(b,d)**  (after dissociation) | | | | | | | |
| 163 | **(c,d)**  Osmotic pressure is a colligative propery, therefore, it depends upon the number of constituents of solution. It also depends upon temperature as | | | | | | | |
| 166 | **(a,b,c,d)**  Also | | | | | | | |
| 167 | **(a)**  This type of association of solute molecules normally happens in solvents of low dielectric constant. | | | | | | | |
| 168 | **(b)**  Henry’s law is for solute while Raoult’s law is for solvent; both are dependent to each other | | | | | | | |
| 169 | **(c)**  Osmotic pressure is a colligative property | | | | | | | |
| 170 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 171 | **(c)**  The boiling point of azeotropic mixture may be higher or lower than the pure components | | | | | | | |
| 172 | **(c)**  If mol. wt. is low, or being low cannot be read out accurately. A little error in measurement of will cause abnormal values of mol. wt. | | | | | | | |
| 173 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 174 | **(a)**  Lowering of vapour pressure is a colligative property, hence it depends upon the number of solute particles | | | | | | | |
| 175 | **(d)**  If a non-volatile solute is added to water its vapour pressure always decreases | | | | | | | |
| 176 | **(b)**  is soluble in non-aqueous solutions. | | | | | | | |
| 177 | **(a)** | | | | | | | |
| 178 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 179 | **(a)**  KCl being an electrolyte provide more number of particles in solution, however urea being a non electrolyte remains as such in solution. | | | | | | | |
| 180 | **(a)**  For ideal solution and are equal to zero | | | | | | | |
| 181 | **(d)**  The dissolution of gases in water requires energy, hence it is endothermic in nature, but during dissolution entropy may increase or decrease | | | | | | | |
| 182 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 183 | **(b)**  For isotonic solutions osmotic pressures are same. Concentrations are same only when solute neither dissociates nor associates. | | | | | | | |
| 184 | **(c)**  Water boils at low temperature at mountains where atmospheric pressure is low, when = atmospheric pressure. | | | | | | | |
| 185 | **(c)**  =  or | | | | | | | |
| 186 | **(c)**  is same for both solutions | | | | | | | |
| 187 | **(a)**  According to colligative property addition of non-volatile solute to volatile solvent, the freezing point of solution decreases | | | | | | | |
| 188 | **(c)**  Extent of dissociation increases steadily with increasing dilution | | | | | | | |
| 189 | **(e)**  Both are incorrect | | | | | | | |
| 190 | **(c)**  When a solution is separated from the pure solvent by mean of semipermeable membrane, the pure solvent passes through the membrane and goes to the solution and a hydrostatic pressure is set up which is called as the osmotic pressure of the solution. So, when red blood cells were placed in pure water, the concentration of salt content would increase in the solution or decrease in cell so to assertion is true but reason is false. | | | | | | | |
| 191 | **(c)**  Since , therefore on increasing the pressure, the freezing temperature decreases | | | | | | | |
| 192 | **(d)**  or  [For dilute solution | | | | | | | |
| 193 | **(b)**  Non-ideal solution with positive deviation *ie,* having more vapour pressure than expected, boil at lower temperature while those with negative deviation boil at higher temperature, than those of the components. | | | | | | | |
| 194 | **(a)**  For , while for glucose, . Hence, osmotic pressure of is higher than that of glucose solution | | | | | | | |
| 195 | **(b)**  In cooker, the vapor pressure of solution increases therefore, its boiling temperature decreases since | | | | | | | |
| 196 | **(b)**  Equimolal solutions of all the substances in the same solvent will show equals elevation in boiling points | | | | | | | |
| 197 | **(c)**  The sum of mole fraction is always unity and it is not temperature dependent | | | | | | | |
| 198 | **(b)**  The given explanation is correct and a reduction in molecular attraction will increase vaporization nature and lead for higher vapour pressure than that calculated by Raoult’s law. Thus, mixture will show positive deviation. | | | | | | | |
| 199 | **(c)**  Both solute and solvent will from the vapour but vapour phase will become richer in more volatile component. | | | | | | | |
| 200 | **(a)**  Depression in freezing point is a colligative property, hence its value depends upon the number of solute particles | | | | | | | |
| 201 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 202 | **(b)**  The water pouch of instant cold pack for testing athletic injuries breaks when squeezed and dissolves lowering the temperature because addition of nonvolatile solute into solvent results into depression of freezing point of solvent so both are true and correct explanation. | | | | | | | |
| 203 | **(c)**  Vapour pressure decreases with decrease in temperature. | | | | | | | |
| 204 | **(a)**  In an open system, equilibrium can never be achieved | | | | | | | |
| 205 | **(b)**  Note that addition of solute to solvent (and not solvent to solute which will show reverse effect) shows a lowering in V.P. due to decrease in relative surface area. | | | | | | | |
| 206 | **(a)**  Like dissolves like, i.e., non-polar solutes are soluble in non-polar solvent and polar solute are soluble in polar solvent | | | | | | | |
| 207 | **(b)**  One molar aqueous solution has 1 mole in less than 1000 g of water. Hence, 1000 g of water will be associated with more than 1 mole while 1 molal has 1 mole in 1000 g of water | | | | | | | |
| 208 | **(a)**  KCl is ionic salt and it dissociates in solution. | | | | | | | |
| 209 | **(a)**  In benzene acetic dimerises but in water it does not this is because benzene is non polar where as water is polar. Hence, moleculard mass determined by depression in freezing point method comes out to be different. | | | | | | | |
| 210 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 211 | **(b)**  Osmosis is net movement of solvent particles from dil. to conc. and conc. to dil., a bilateral process; The more movement is from dil. to conc. Thus net flow from dil. to conc. is noticed. | | | | | | | |
| 212 | **(a)**  An ideal solution of the components and is defined as the solution in which the intermolecular interactions between and are the same magnitude as between the pure components or it is a solution there is no volume change or enthalpy change or mixing | | | | | | | |
| 213 | **(a)**  Learn as a fact. The molecular mass of large molecules is determined using the osmotic pressure technique. The molecular mass of smaller molecules is determined using the freezing point lowering method | | | | | | | |
| 214 | **(c)**  Explanation is correct reason for statement. | | | | | | | |
| 215 | **(b)**  (**a p, r**) = Azeotropic mixture (at a particular composition)  shows positive deviation  (**b q, t**) = ideal solution; obeys Raoult’s law  (**c q, t**) = Ideal solution (with non-volatile solute)  (**d p, s**) Azeotropic mixture (at a particular composition)  shows negative deviation | | | | | | | |
| 216 | **(a)**  (**aq**) Lowering of vapour pressure  = Pressure of pure solvent Pressure of solution  (**b→s**)  (**c→r**)  (**d→p**) | | | | | | | |
| 217 | **(a)**  0.1 COOH in benzene  )  (**b r** ) 0.1 M urea in water  (**c p**) 0.05 M in water  (assuming )  (**d q**) 0.1 M in water | | | | | | | |
| 219 | **(c)**  (aq)Relatives lowering of vapour pressure  (bp (Henry’s law)  (cs) Azeotropic mixture deviates from ideal solution  (dr) For ideal solution | | | | | | | |
| 220 | **(a)**  Osmotic pressure Van’t Hoff factor  (**ar**) is same for glucose, urea, fructose i.e.,  (**bs**)  (**cp**)  (**dq**) Glucose; | | | | | | | |
| 221 | **(b)**  (**ar**) Osmotic pressure was determined experimentally by Berkeley and Hartley  (**bs**) Ostwald and Walker's method is experimentally used for the determination  lowering in vapour pressure  (**cp**)  (**dq**) | | | | | | | |
| 222 | **(b)**  (**as**) ppm (part per million)=  (**br**)  (**cq**) Molal depression constant  (**dp**) = van’t Hoff factor | | | | | | | |
| 226 | **(a)**  (**as**) Hypertonic solutions have higher osmotic pressure than some other solutions  (**bq**)Isotonic solutions have same osmotic pressure than some other solutions  (**cr**)  (**ds**) | | | | | | | |
| 227 | **(b)**  The relative lowering of vapour pressure is equal to the mole fraction of solute | | | | | | | |
| 228 | **(b)**  L represents | | | | | | | |
| 229 | **(a)**  Molarity of solution | | | | | | | |
| 230 | **(a)**  Vapour Pressure of solution can be calculated from the relation:  Here ,  Substituting the values, we get  or  or  or  Vapor pressure of solution | | | | | | | |
| 231 | **(c)**  Hypertonic solutions have higher osmotic pressure and therefore they have higher concentration. When a plant cell is kept in hypertonic solution, water from plant cell moves to hypertonic solution and therefore the plant cell gets shrinked | | | | | | | |
| 234 | **(c)**  2(Benzoic acid) Dimerized (Benzoic acid)  Initial mol 1 0  Mol at  Total moles | | | | | | | |
| 235 | **(b)**  Isotonic solution have same molarity  Molarity of 18 g glucose =  Molarity of 34.2 g sucrose =  The concentration of 18 g glucose is same to sucrose | | | | | | | |
| 236 | **(a)**  and molecular weight. Therefore, larger the molecular weight lesser will be depression in freezing point | | | | | | | |
| 237 | **(c)**  ;  (Solvent (Solute | | | | | | | |
| 238 | **(a)**  Boiling point is higher if is higher which in turn depends on  Urea | | | | | | | |
| 239 | **(a)**  Pressure of in X =1.9 atm  Total pressure of vessel  Pressure of in X at | | | | | | | |
| 240 | **(d)**  Addition of non-volatile solutes decrease the freezing point of solution | | | | | | | |
| 241 | **(a)**  The composition of 50% and 50% will lies in between the azeotropic mixture and pure . Therefore, distillation of such composition will give pure and azeotropic mixture | | | | | | | |
| 242 | **(b)**  1. Molar concentrations are 0.1  and  2. Also and  If Molarity = Molality (for dilute solution)  3. Addition of salt on ice lowers the freezing point.  4. Also addition of salt on ice lowers its melting point and thus, ice melts earlier | | | | | | | |
| 243 | **(d)**  =  Thus, f. p. = | | | | | | | |
| 249 | **(a)**  or  Therefore, benzene associated as dimer, i.e., 2 | | | | | | | |
| 250 | **(a)**  , for non-electrolyte | | | | | | | |
| 251 | **(b)**  For urea, , while for , , therefore, the ratios of any colligative property for solution to urea solution is 3 | | | | | | | |
| 253 | **(b)** | | | | | | | |
| 257 | **(d)**  For solution,  for | | | | | | | |
| 258 | **(d)**  Let  Now,  At …(i)  At …(ii)  Dividing (i) by (ii), we get | | | | | | | |
| 259 | **(b)**  Given, g  K    Substituting all the values, we get | | | | | | | |
| 261 | **(d)**  Total colligative properties are four | | | | | | | |