CHEMISTRY

BOOKS - NIKITA CHEMISTRY (HINGLISH)

SOLUTION & COLLIGATIVE PROPERTIES

Multiple Choice Questions

1. A solution is

A. a mixture of two compounds

B. a homogeneous mixture of two compounds

C. a homogeneous mixture of two compounds

D. all the above

Answer: C

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2. Which of the following statements is incorrect about a solution ?

A. A solution is always a homogeneous mixture.

B. The solute particles in a solution have size less than 10 A.

C. Brass connot be called a solution.

D. An ionic compound dissolves in water if the hydration energy is greater than lattice energy.

Answer: C

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3. Consider the following statements :

1. An alloy is a mixture of two or more metals

2. An alloy is a mixture of a metal or metals with a non metal

Which of the statement given above is/are correct ?

A. a metal and a non-metal

B. two non-metals

C. two metals

D. two or more metals

Answer: D

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4. Out of moalrity (M), molality (m), formality (F) and mole fraction (x) those independent of temperature are:

A. M,m

B. F,x

C. m,x

D. M,F.

Answer: D

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5. Ionic compounds are readily soluble is polar solvents because

A. they have high solubility in water

B. water molecules is polar in nature

C. ionic crystals are easily broken down in the polar solvents

D. of strong electrostatic forces of attraction between ions of crystals and the polar solvent molecules

Answer: D

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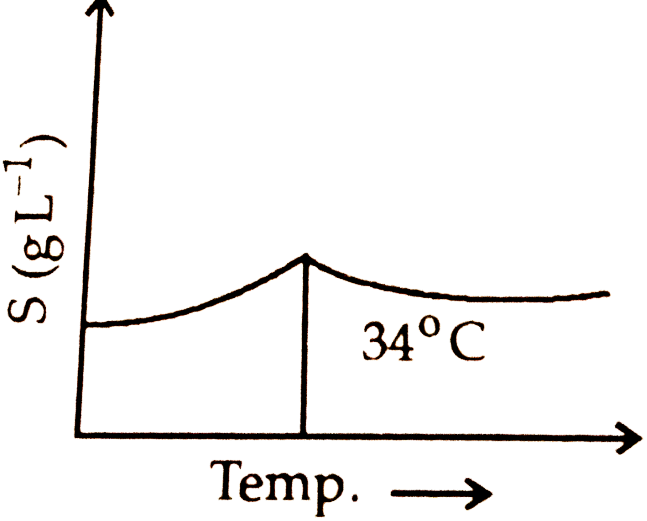
6. Solubility curve of $Na_2SO_4.10H_2O$ in water with temperature is given as



A. Solution process is exothermic

B. Solution proscess is exothermic til 34° C and endothermic after 34°

C. Solution process is endothermic till 34°C and exothermic thereafter

D. Solution process is endothermic.

Answer: C

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7. Two solutions A and B have same mole fractions of the solute. If 1 dm^3 of A is mixed with $2dm^3$ of B, the mole fraction of the solute in the mixture would

A. decrease

B. increase

C. ramain unchanged

D. change

Answer: C

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8. $CuSo_4.5H_2O$ is a

A. solution of a solid in a liquid.

B. solution of liquid in a solid

C. salt only and cannot be called a solution

D. coordination compound of copper with water molecules as the ligands.

Answer: B

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9. Which one of the following statements is true for a solution ?

A. Molarity is always equal to molality

B. Molarity is always less than molality

C. Molarity is always greater than molality

D. none of these

Answer: D

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10. The plot of partial vapour vapour pressure of solvent verses its mole fraction in the solution of a constant temp.is

A. a straight line

B. a straight line parallel to one axis

C. a straight line passing through origin

D. none of the above

Answer: C

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11. The sum of mole fractions of A,B and C in a solution containing 0.1 mole each of A,B and C is:

A. 0.1

B. 0.3

C. 1

D. 1/3.

Answer: C

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12. Which of the following stsrement is corrent about steel (S) and tungsten carbide (WC)?

A. S is a substitutional solid while WC is an interstitial solid solition

B. S is an interstitial solid while WC is an substitutional solid solution

C. Both are interstitial solid solutions

D. Both are substitutional solid solutions

Answer: B

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13. The vapour pressuress of pure solvent and solution are 120 mm and 108 mm respectively. The mole fraction of the solvent in the solution is

A. 0.1

B. 0.9

C. 120/108

D. 1.08

Answer: B

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14. The vapour pressure of solution and pure solvent P and P_0 resp. If $\frac{P}{P_0}$ is 0.15. Then the mole fraction of the solute in the solution is

A. 0.85

B. 0.15

C. $1/0.15$

D. $1/0.85$

Answer: A

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15. Increasing the temperature of an aqueous solution wil case

A. decrease in molality

B. decrease in molarity

C. decrease in mole fraction

D. decrease in % w/w

Answer: B

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16. Which of the following represents a metastable system?

A. A dilute solution

B. An unsaturated solution

C. A saturated solution

D. A supersaturated solution

Answer: D

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17. In which of the following colloidal solution dispersed phase is liquid while dispersion medium is gas?

A. dry air

B. aerated water

C. amalgam

D. moist air

Answer: D

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18. Out of molarity (M), molality (m), normality (N) and mole fraction (x), those independent of temperature are

A. M.m

B. M,N

C. m,x

D. N,x

Answer: C

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19. Which of the following statement is not correct ?

A. 1 ppm of fluoride ions in water pravents tooth decay

B. 1.5ppm of fluoride ions in water causes teeth to become mottled

C. Higgher concentration of fluoride ions acts as a poison for rats

D. Intravenous injectins should have lower ionic conentration than that of our blood plasma

Answer: D

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20. A solid dissolves in water if

A. lattice energy is greater than hydration energy

B. lattice energy is lass than hydration energy

C. lattice energy is equal to hydration energy

D. dissolution is exothermic.

Answer: B

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21. Which one of the following statements is incorrect ?

A. Normality of a solution depends on temperature

B. Molality of a solution depends on temperature

C. Molarity of a solution depends on temeprature

D. Molality of a solution relates to mass of solvent and moles of solute

Answer: B

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22. The factor $\left(\Delta T_f / K_f\right)$ represents

A. Molarity

B. Formality

C. Normality

D. Molality

Answer: D

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23. Iodine is more soluble in alcohol than in carbon tetrachloride because

A. iodine and alcohol both are non-polar

B. randomness factor is greater in alcohol than in CCl_4

C. dissolution of iodine in alcohol is exothermic whereas it is endothermic

D. dissolution of both is endothermic but heat of dissolution in alcohol is less than in CCI_4

Answer: D

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24. An example of a solution having liquid in solid is :

A. Moist air

B. Dry air

C. Au-Hg

D. $C_2H_5OH + H_2O$

Answer: C

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25. Two solutions of KNO_3 and CH_3COOH are prepared separately. The molarity of both is $0.1M$ and osmotic pressure is P_1 and P_2, respectively.

The correct relationship between the osmotic pressure is

A. $P_2 < P_1$

B. $P_1 = P_2$

C. $P_1 > P_2$

D. $\frac{P_1}{P_1 + P_2} = \frac{P_2}{P_1 + P_2}$

Answer: C

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26. For an aqueous solution of the same solute , in terms of concentration,

A. 1 M =1 m

B. 1 M gt 1 m

C. 1 m gt 1 M

D. Any of these is possible

Answer: B

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27. If p° and p_a are the vapour pressures of the solvent and solution respectively and n_1 and n_2 are the mole fractions of solvent and solute respectively. Then,

A. $P = P_0 n_1$

B. $P = P_0 n_2$

C. $P_0 = P n_2$

D. $P = P_0 \left(\frac{n_1}{n_2} \right)$

Answer: A

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28. Solubility of a gas in a liquid solvent increases with

A. increase of pressure and increase of temperature

B. decrease of pressure and increase of temperature

C. increase of pressure and decrease of temperature

D. decrease of pressure and decrease of temperature

Answer: C

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29. Suger is soluble in water due to

A. High solvation energy

B. Lonic character of sugar

C. High dipole moment of water

D. Hydrogen bond formation with water.

Answer: D

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30. An example of solid solution is :

A. Amalgem

B. Steel

C. Na in NH_3

D. Dust in are

Answer: B

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31. If mole fraction of the solvent in a solution decreases than:

A. vapour pressure of solution increases

B. boiling point decreases

C. osmotic point decreases

D. all are correct

Answer: C

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32. Which of the following is incorrect?

A. Mass of the gas dissolved is inversely proportional to its pressure

B. Mass of the gas dissolved is inversely proportional to temperature

C. A soda-water bottle contains oxygen gas dissolved under pressure

D. permanent gases are less soluble than temperature gasses.

Answer: C

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33. Which one of the following is not a colligative property?

A. Refractive index

B. Osmotic pressure

C. Lowering of vapour pressure

D. Elevation in boiling point

Answer: A

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34. HENRY'S LAW

A. $m = K_H P_A$

B. $x_A = K_H P_A$

C. $P_A = K_H x_A$

D. All of these

Answer: D

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35. The use of common salts, e.g., $NaCl$ or $CaCl_2$ anhydrous, is made to clear snow on the rods. This causes:

A. a lowering in f. pt.of water

B. a lowering in m. pt. of ice

C. ice melts at the temperature of atmosphere present at that time

D. all

Answer: A

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36. Which of the following is correct for a solution showing positive deviations from Raoult's law?

A. $\Delta V = +ve, \Delta H = +ve$

B. $\Delta V = -ve, \Delta H = -ve$

C. $\Delta V = +ve, \Delta H = -ve$

D. $\Delta V = -ve, \Delta H = +ve.$

Answer: A

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37. A liquid is kept in a closed vessel. If a glass plate (negligible mass) with a small hole is kept of top the liquid surface, then the vapour pressure of the liquid in the vessel is :

A. more than what would be if the glass plate were removed

B. same as what would be if the glass plate were removed

C. lass than what would be if the glass plate were removed

D. cannot be predicted

Answer: D

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38. 5 mL of acetone is mixed with 100mL of H_2O. The vapour pressure of water above the solution is

A. equal to the vapour pressure of pure water

B. equal to the vapour pressure of the solution

C. less than the vapour prssure of pure water

D. more than tha vapour pressure of pure water

Answer: C

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39. In which of the following molecular weight determination methods, sensitivity of the measurements decreases as the molecular weight of the solute increases?

A. elevation of boiling point /depression in f. pt.

B. viscosity

C. osmotic pressure

D. none

Answer: A

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40. When a crystal of the solute is introduced into a super saturated solution of the solute

A. the solute dissolves

B. the excess solute crystallises out

C. the solution becomes unsaturated

D. the solution remains super saturated

Answer: B

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41. For an ideal binary liquid solution with $p_A^\circ > p_B^\circ$ which of the following relations between x_A (mole fraction of A in liquid phase) and y_A (mole fraction of A in vapour phase) is correctly represented?

A. $x_A = y_A$

B. $x_A > y_A$

C. x_A lt y_A

D. x_A and y_A cannot be correlated with each other

Answer: C

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42. V.P. of a solution containing non-volatile solute is

A. more than the vapour pressure of a solvent

B. lass that the vapour pressure of solvent

C. equal to the vapour pressure of solvent

D. none

Answer: B

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43. 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

Answer: A

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44. 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

Answer: C

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45. When a substance is dissolved in a solvent the vapour pressure of solvent decreases. This brings:

A. an increase in b.bt. Of the solution

B. a decrease in b.pt. of a solution

C. an increase in f.pt. of the solvent

D. none

Answer: A

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46. By adding water to the solution, its

A. concentration remains same

B. concentration increases

C. ionisation decreases

D. concentration decreases

Answer: D

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47. The lowering of vapour pressure of the solvent takes place

A. only when the solute is non-volatile

B. only when the solute is volatile

C. only when the solute is a non-electrolyte

D. in all the above three cases.

Answer: D

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48. Two solutions have different osmotic pressures. The solution of higher osmotic pressure is called:

A. Isotonic solution

B. Hypertonic solution

C. Hypotonic solution

D. None

Answer: C

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49. Which one of the following is an expression of Raoult's law if P_A is the partial pressure of the solvent in a solution, P_A^0 is the partial pressure of the pure solvent and if x_A and x_B are the mole fraction of the solute and the solvent repectively?

A. $P_A = P_A^\circ X_A$

B. $P_A = P_A^\circ X_A(1/X_B)$

C. $P_A = P_A^\circ X_B$

D. $P_A^\circ = P(X_A/X_B)$

Answer: C

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50. The pressure under which liquid and vapour can co-exist at equilibrium is called the

A. normal vapour pressure

B. saturated vapour pressure

C. real vapour pressure

D. limiting of vapour pressure

Answer: B

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51. The relative lowering of vapour pressure in case of dilute solution is directly proportional to:

A. molality

B. molarity

C. mole fraction

D. all

Answer: D

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52. Existance of equatic life is an application of

A. Henry's law

B. Raoult's law

C. Dalton's law

D. Boyle's law

Answer: A

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53. Two solutions have different osmotic pressures. The solution of higher osmotic pressure is called:

A. Isotonic solution

B. Hypertonic solution

C. Hypotonic solution

D. None

Answer: B

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54. When an ideal binary solution is in equilibrium with its vapour, molar ratio of the two components in the solution and in the vapur phase is :

A. same

B. different

C. may or may not be same depending upon volatile nature of the two components

D. all

Answer: C

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55. If Raoult's law is obeyed, the vapour pressure of the solvent in a solution is directly proportional to

A. (1-mole fraction of solute)

B. mole fraction of the solvent and solute

C. the volume of the solution

D. the volume of the solution

Answer: A

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56. The relative lowering of vapour pressure is equal to the ratio between the number of

A. solute molecules to the solvent molecules

B. solute molecules to the total molecules in the solution

C. solvent molecules to the total molecules in the solution

D. solvent molecules to the total molecules ions of the solute.

Answer: B

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57. For determination of molecular mass, Raoult's law is applicable only to

A. dilute solutions of electrolytes

B. concentration solutions of electrolytes

C. dilute solutions of non-electrolytes

D. concentration dolutions of non-electrolytes

Answer: C

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58. 12g of urea is dissolved in 1 litre of water a 68.4g of sucrose is dissolved in 1 litre of water The lowering of vapour pressure of first case is

A. equal to second

B. greater than second

C. less than second

D. double that of second

Answer: A

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59. The solubility of a gas in liquid at a temperature is directly proportional to its

A. Density

B. Melting point

C. Boiling point

D. pressure

Answer: D

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60. The vapour pressure of water depends upon :

A. surface area of container

B. volume of container

C. temperature

D. all

Answer: C

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61. Dust is an example of-

A. solid solution

B. liquid solution

C. gas solution

D. none

Answer: C

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62. The molal elevation/depression constant depends on

A. nature of solvent

B. nature of solute

C. temperature

D. Delta H solution

Answer: A

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63. Which of the following statement is correct?

A. Lowering of vapour pressure takes place only in ideal solutions.

B. Lowering of vapour pressure does not depend upon the solvent at a given concentration of the solute.

C. Lowering of vapour pressure depends upon the nature of the solute.

D. Relative lowering of vapour pressure does not depend upon the solvent at a given concentration of solute.

Answer: D

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64. For a dilute solution, Raoult's law states that

A. the lowering of vapour pressure is equal to the mole fraction of solute

B. the relative lowering of vapour pressure is equal to the mole fraction of solute

C. the relative lowering of vapour pressure is proportional to the amount of solute in solution

D. the vapour pressure of the solution is equal to the mole fraction of solvent

Answer: B

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65. Which is not a colligative property?

A. A tmospheric pressure

B. Lowering of vapour pressure

C. osmotic pressure

D. Elevation of freezing point.

Answer: A

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66. An example of colligative property is

A. Freezing point

B. Boiling point

C. Vapour pressure

D. Osmotic point

Answer: D

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67. The colligative properties of a solution depend on

A. number of solute particles present in it

B. chemical nature of the solute particles present in it

C. nature of the solvent used

D. none

Answer: A

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68. Which method cannot be used to find out the molecular mass of non-volatile solute

A. Victor Mayer's method

B. Osmotic pressure method

C. Cryoscopic method

D. Ebullioscopic method

Answer: A

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69. The vapour pressure of a dilute solution of a solute is NOT influenced by

A. temperature of solution

B. melting point of solute

C. mole fraction of solute

D. degree of dissociation of solute

Answer: B

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70. The vapour pressure (VP) of a dilute solution of non-volatile solute is P and the VP of a pure solvent is P°. The lowering of the VP is

A. $+ve$

B. $-ve$

C. $\frac{P}{P_0}$

D. $\frac{P_0}{P}$

Answer: A

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71. Alcohol has....vapour pressure than water at the same temperature

A. more

B. less

C. same

D. none

Answer: A

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72. V.P. of pure solvent water is .... Than 2 M $CuSO_4$ solution.

A. lower

B. higher

C. same

D. can not be said

Answer: B

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73. Which solution will show the maximum vapour pressure at 300K

A. 1 M NaCl

B. $1MCaCl_2$

C. $1MCH_3COOH$

D. $1MC_{12}H_{22}O_{11}$

Answer: D

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74. If P° and P_s, the V.P. of solvent and solution respectively and N_1 and N_2 are the mole fraction

A. $\frac{P_o - p_s}{P_o} = \frac{N_1}{(N_1 + N_2)}$

B. $\frac{(P_o - P_s)}{P_s} = \frac{N_1}{N_2}$

C. $\frac{(P_o - P_s)}{P_s} = \frac{N_1}{N_2}$

D. All

Answer: D

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75. Which of the following will have the highest F.P. at one atm pressure?

A. 0.1 M NaCl solution

B. 0.1 M sugar solution

C. $0.1MBaCl_2$solution

D. $0.1MFeCl_3$ solution.

Answer: B

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76. A liquid is in equilibrium with its vapour at its boiling point . On an average the molecules in the two phases have equal :

A. potential energy

B. total energy

C. kinetic energy

D. intermolecular forces

Answer: C

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77. If the temperature increases from $0^\circ C$ to $50^\circ C$ at atmospheric pressure, which of the following processes is expected to take place more in case of liquids

A. fusion

B. vaporisation

C. solubilization

D. none

Answer: B

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78. The lubricating action of an oil is more if it possess:

A. High vapour pressure

B. low vapour pressure

C. high surface tension

D. high density

Answer: B

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79. In a solution if the amount of solvent is doubled, keeping the amount of solutes same, the share of solute in the solution

A. become half

B. would decrease but not a half

C. remain unchanged

D. change unpredictably

Answer: B

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80. Which of the following plots does not represent the behaviour of an ideal binary liquid solution?

A. Plot of P_A versus x_A) (mole fraction of A in liquid phase) is linear

B. Plot of $P_B$versus x_B is linear

C. Plot of P_{total} versus $x_A(\text{ or } x_B)$ is linear

D. Plot of P_{total} versus x_A is non -linear.

Answer: D

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81. In very dilute solution the no. of moles of solvent are 10 time more than that of the solute. The V.P. of the solution would be (V.P. of pure

solvent = 80mm)

A. 80mm

B. 88mm

C. 72mm

D. 92mm

Answer: C

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82. When a liquid is heated its vapour pressure

A. continuously increases

B. continuously decreases

C. increase and becomes constant at b.pt of liquid

D. records no predictable change

Answer: C

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83. 0.1 M $NaCl$ and 0.1 M CH_3COOH are found to have osmotic pressures of P_1 and P_2 respectively then what is the correct ststement ?

A. $P_1 > P_2$

B. P_1 if P_2

C. P_1ltP$_2$

D. $P_1 = P_2 = 0$ atm.

Answer: A

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84. Among (P) water (Q) ethanol and (R) mercury the correct order of vapour pressure at room temp is

A. PgtQgtR

B. QgtPgtR

C. RgtQgtP

D. QgtRgtP

Answer: B

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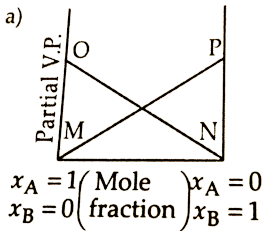
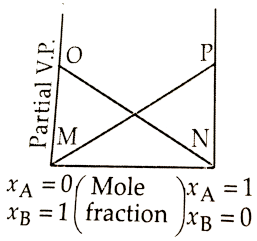
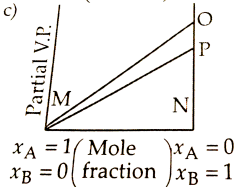
85. In a solution of the miscible volatile liquids A and B, the plots of their partical V.P. V_s their mole fractions is given by (Assume, V.P. of pure Agt V.P. of pure B)

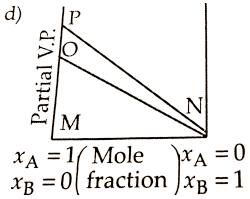
A.



B.



C. 

D. 

Answer: A

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86. Which aqueous will have the highest boiling point?

A. 1% glucose

B. 1% N_aCl

C. 1% sucrose

D. 1 % C_aCl_2

Answer: D

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87. At a boiling point of pure solvent ,solution will not boil because

A. V.P. of solvent is less than that of solution

B. V.P. of solvent is equal to that of solution

C. V.P. of solution is less than that of solution

D. all

Answer: C

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88. The molal elevation constant is the ratio of the elevation in boiling point to :

A. molarity

B. molality

C. mole fraction of solute

D. mole fraction of solvent.

Answer: B

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89. The elevation in boiling point for one molal solution of a solute in a solvent is called

A. Cryoscopic constant

B. Boiling point constant

C. Molal Ebullioscopic constant

D. None

Answer: C

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90. Boiling point of a solution is independent of

A. amount of solution

B. pressure

C. nature of solvent

D. concentration of solution

Answer: A

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91. Which solution will show maximum elevation in b.pt:

A. 0.1 M KCl

B. 0.1M $BaCI_2$

C. 0.1 M $FeCI_3$

D. $0.1MFe_2(SO_4)_3$

Answer: D

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92. Define molal elevation constant or ebullioscopic constant.

A. . $^{\circ} C / m$

B. K/m

C. K kg mol^{-1}

D. K mol kg^{-1}

Answer: D

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93. At the higher altitudes the boiling point of water lowers because

A. atmospheric pressure is low

B. temperature is low

C. atmospheric pressure is high

D. none

Answer: A

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94. A teacher one day pointed out to his students the peculiar fact that water is a unique liquid which freezes exactly at $0^\circ C$.and boils exactly at $100^\circ C$. 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

Answer: C

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95. Boiling point of water is defined as the temperature at which:

A. vapour pressure of water is equal to that of one atmospheric pressure

B. bubbles are formed

C. steam comes out

D. none

Answer: A

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96. If the mass of a nonvolatile, nonelectrolyte dissolved in a solvent is doubled but that of solvent is quadrupled, the elevation in boiling point

of the solvent will be

A. doubled

B. halved

C. four times

D. unchanged

Answer: B

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97. The melting point of most of the solid substances increases with an increase of pressure acting on them . However , ice melts at a temperature lower than its usual melting point when the pressure increases . This is because :

A. ice is lass denser than water

B. pressure generates heat

C. the bonds break under pressure

D. ice is not a true solid

Answer: A

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98. The correct relationship between the boiling points of very dilute solutions of $AlCl_3(t_1)$ and $CaCl_2(t_2)$, having the same molar concentration, is

A. $t_1 = t_2$

B. $t_1 > t_2$

C. $t_2 > t_1$

D. $t_2 \geq t_1$

Answer: B

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99. The highest temperature at which vapour pressure of a liquid can be measured is

A. boiling point of liquid

B. critical temperature(T_c)

C. critical solution temperature

D. inversion temperature

Answer: B

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100. The elevation of boiling point method is used for the determination of molecular mass of

A. non-volatile and soluble solute

B. non-volatile and insoluble solute

C. volatile and soluble solute

D. volatile and insoluble solute

Answer: A

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101. Molal elevation constant.

A. the elevation in b.pt. which would be produced by dissolving one mole of solute in 100 g of solvent

B. the elevation of b.pt. which would be produced by dissolving 1 mole solute in 10 g of solvent

C. elevation in b.pt. which would be produced by dissolving 1 mole of solute in 1000 g of solvent

D. none

Answer: C

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102. The boiling point of $C_6H_6, CH_3OH, C_6H_5NH_2 \text{and} C_6H_5NO_2 \text{are} 80^\circ C, 65^\circ C, 184^\circ C \text{and} 212^\circ C$ respectively. Which will show highest vapour pressure at room temperature :

A. C_6H_6

B. CH_3OH

C. $C_6H_5NH_2$

D. $C_6H_5NO_2$

Answer: B

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103. A pressure cooker reduces cooking time because

A. heat is more evenly distributed

B. b.pt. of water inside the cooker is increased

C. the high pressure tenderiese the food

D. all

Answer: B

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104. Water will boil at $101.5^{\circ} C$ at which of the following pressure:

A. 76 cm of Hg

B. 76 mm of Hg

C. gt76cm of Hg

D. lt76 cm of Hg

Answer: C

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105. Which characterises the weak intermolecular forces of attraction in a liquid?

A. high boiling point

B. high vapour pressure

C. high critical temperature

D. high heat of vaporisation

Answer: B

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106. Addition of common salt to a sample of water will

A. increase its freezing point and increase the boiling point

B. decrease its freezing point and increase the boiling point

C. increase both the boiling and the freezing point

D. decrease both the boiling and the freezing point.

Answer: B

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107. Equimolal solutions will have the same boiling point, provided they do not show

A. electrolysis

B. association

C. dissociation

D. association or dissociation

Answer: D

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108. An aqueous solution is heated until it begins to boil. The atmospheric pressure is 760 mm of Hg. The boiling temperature will be

A. $100^{\circ} C$

B. $> 100^{\circ} C$

C. $< 100^{\circ} C$

D. None

Answer: B

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109. When a substance is dissolved in a solvent the vapour pressure of solvent decreases. This brings:

A. an increase in the b.p. of the solution

B. a decrease in the b.p. of the solvent

C. The solution having a higher freezing point than the solvent

D. the solution having a lower osmotic pressure than the solvent.

Answer: A

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110. On the basic intermolecular force predict the correct order of decreasing bolling point of the compound ?

A. $CH_3OH > H_2 > CH_4$

B. $CH_3OH > CH_4 > H_2$

C. $CH_4 > CH_3OH > H_2$

D. $H_2 > CH_4 > CH_3OH$

Answer: B

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111. Elevation of boiling point is directly proportional to

A. molality of the solution

B. depression of freezing point in the same solution

C. both of these

D. none of these

Answer: C

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112. To determine the elevation of boiling point more accurately. The solvent area should take

A. higher value of K_b

B. lower value of K_b

C. high molar mass

D. low molar mass

Answer: A

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113. The molecular mass of a solute cannot be calculated by one of the following relations

A. $M_2 = \dfrac{K_b \times 1000 \times w_2}{\Delta T_b \times w_1}$

B. $M_2 = \dfrac{w_2 \times RT}{\pi V}$

C. $M_2 = \dfrac{P_0^1 \times W_2 \times M_1}{\left(P_0^1 - P\right) \times W_1}$

D. $M_2 = \dfrac{\Delta T_b}{K_b} \times 1000 \dfrac{W_2}{W_1}$

Answer: D

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114. Assuming complete ionization, which one of the following aqueous solutions will have maxmum boiling point ?

A. $0.2mNaCI$

B. $0.2mCaCl_2$

C. $0.1mBaCl_2$

D. $0.1mFeCI_3$

Answer: B

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115. Some statements are given below

for the same solution $\Delta T_b = \Delta T_f$

5% solution of urea will have more osmotic pressure than 10% solution of glucose

elevation of B. pt. is due to increase in vapour pressure of solution on adding solute

depression of F.pt. is due to decrease in vapoure pressure of solution on adding solute. Among the above

A. B and D are true

B. A,B & D are false

C. B and C are false

D. only D is true

Answer: D

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116. Ebullioscopy is concerned with

A. osmotic pressure

B. lowering of vapour pressure

C. elevation of B. pt

D. depression of F.pt

Answer: C

View Text Solution

117. The temperature at which the vapour pressure of a liquid becomes equals to the external (atmospheric) pressure is its

A. b.pt.

B. f.pt.

C. sublimation point

D. none

Answer: B

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118. To from a supersaturated solution of salt one must:

A. cool slowly

B. cool rapidly

C. add some salt to cold solution

D. use a clear vessel

Answer: B

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119. The freezing point of 1% aqueous solution of calcuim nitrate will be

A. $0^\circ C$

B. Above $0^\circ C$

C. $1^\circ C$

D. $Below 0^\circ C$

Answer: D

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120. The molal depression constant depends upon

A. nature of the solute]

B. nature of the solvent

C. heat of solution of the solute in the solvent

D. vapour pressure of the solution.

Answer: B

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121. n moles of a non volatile solute are dissolved in wg of water. If K_f is the molal depression constant of water, the freezing point of the solution will be

A. $\frac{1000K_fW_2}{W_1}$

B. $\frac{-1000K_fn}{W_1}$

C. $\frac{1000K_fW_1}{n}$

D. $\frac{-1000K_fW_1}{n}$

Answer: B

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122. The depression in freezing point is maximum if the solvent used is

A. camphor

B. naphthalene

C. benzene

D. water

Answer: A

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123. During depression of freezing point in a solution, the following are in equilibrium:

A. liquid solvent - solid solvent

B. liquid solvent - solid solute

C. liquid solute - solid solute

D. liquid solid - solid solvent

Answer: A

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124. What will be the molecular weight of $NaCl$ determined experimentally following elevation in the boiling point or depression in freezing point method?

A. lt 58.5

B. gt58.5

C. 58.5

D. None

Answer: A

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125. On freezing an aqueous solution of sodium chloride, the solid that starts separating out is

A. sugar

B. ice

C. solution with the same composition

D. solution with a different composition.

Answer: B

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126. The value of K_f for water is 1.86°, calculated from glucose solution, The value of K_f for water calculated for NaCl solution will be,

A. 1.86

B. lt 1.86

C. gt1.86

D. Zero

Answer: A

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127. The depression of freezing point is directly proportional to

A. Normality

B. Molality

C. molarity

D. None

Answer: B

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128. Which one of the following ststement is incorrect?

A. Greater the lowering nof vapour pressure, greater is the boiling point of the solution

B. Greater the lowering of vapour pressure, greater is the freezing point of the solution.

C. At the freezing point, the solute and the solvent have same vapour pressure

D. The units of molal depression constant are Km^{-1}.

Answer: B

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129. Which of the following $0.1M$ aqueous solutions will have the lowest freezing point?

A. Potassium sulphate

B. Sodium chloride

C. Urea

D. Glucose

Answer: A

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130. The molal cryoscopic constant for water is

A. $1.86 K \text{molality}^{-1}$

B. 5.26 K $molality_{-1}$

C. $55.5 K \text{molality}^{-1}$

D. $0.52 K \text{molality}^{1}$

Answer: A

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131. When mercuric iodide is added to the aqueous solution of potassium iodide, then:

A. f.pt. is raised

B. f. pt. is lowered

C. f.pt. does not change

D. b.pt. does not change

Answer: A

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132. Molal elevation constant and molal depresion constant for water respectively$(\text{in}\cdot(\circ)C/m)$ are

A. 0.52,1.86

B. 1.86,0.52

C. 1.52,0.86

D. 0.86,1.52

Answer: A

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133. At a suitable pressure near the freezing point of ice, there exists

A. only ice

B. ice and water

C. ice and steam

D. ice, water and steam ,all existing side by side

Answer: D

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134. The reverse of fusion is freezing and it is

A. endothermic

B. exothermic

C. neither exothermic nor endothermic

D. may be exothermic or endothermic

Answer: B

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135. In cold countries, ethylene glycol is added to water in the radiators of cars during winters. It results in:

A. lowering in boiling point

B. reducing viscosity

C. reducing specific heat

D. lowering in freezing point

Answer: D

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136. 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 vapour pressure

B. dissociated

C. associated

D. hydrolysed

Answer: C

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137. 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

Answer: B

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138. At constant temp. the osmotic pressure (pi) and the molarity (M) of the solution are related as

A. $\pi \propto M$

B. $\pi \propto \frac{1}{M}$

C. $\pi \propto \sqrt{M}$

D. $\pi \propto \frac{1}{\sqrt{M}}$

Answer: A

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139. A solution contains non-volatile solute of molecular mass M_2. Which of the following can be used to calculate the molecular mass of solute in terms of osmotic pressure?

Here $n_2 =$ mass of solute, V = volume of solution, $\pi =$ osmotic pressure.

A. $\pi = wRT/m$

B. $m = \pi RT/w$

C. $\pi = wmR/T$

D. $m = wR\pi/T$

Answer: A

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140. Which one of the following ststement is false about osmotic pressure ?

A. It is the pressure of the hydrostatic column set up due to osmosis.

B. It is the pressure applied on the solution to prevent the entry of the solvent into it through the semi- permeable membrane.

C. During osmosis, the flow of solvent is only from dilute solution to concentrated solution.

D. Osmotic pressure is directly proportional to the temperature of the solution.

Answer: C

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141. Assuming the degree of ionization to be equal, the ratio of osmatic pressures of equimolar solution of

$A1_2(SO_4)_3, Na_3PO_4$ and $K_4\left[Fe(CN)_6\right] is$

A. $5:04:05$

B. $4:05:06$

C. $1:0.8:1$

D. $0.8:1:1$

Answer: C

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142. The relationship between osmotic pressure at $273K$ when $10g$ glucose $(P_1), 10g$ urea (P_2) and $10g$ sucrose (P_3) are dissolved in $250mL$ of water is:

A. $P_1 > P_2 > P_3$

B. $P_3 > P_1 > P_2$

C. $P_2 > P_1 > P_3$

D. $P_3 > P_2 > P_1$

Answer: D

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143. If $0.1M$ solution of glucose and $0.1M$ solution of urea are placed on two sides of the semipermeable membrane to equal heights, then it will be be correct to say that

A. there will be no net movement across the membrane

B. glucose will flow towards urea solution

C. urea will flow towards glucose solution

D. water will flow from urea solution to glucose solution .

Answer: A

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144. A solution which has lower osmotic pressure compared to that of other solution is called ..... .

A. Hypotonic

B. Hypertonic

C. Isotonic

D. none of the above

Answer: A

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145. Two solutions A and B are separated by a semi -permeable membrane. As a result to osmosis, the level of solution A is found to rise. It implies thar

A. solution A is more concentrated than solution B

B. solution B is more concentrated than solution A

C. the solute molecules of A are smaller than those of B

D. the solute molecules of B are smaller than those of A.

Answer: A

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146. Who was awarded Nobel prize for chemistry in 1901 for discovering laws of osmotic pressure for solutions

A. van't Hoff

B. Pauling

C. Berkeley

D. Seaberg

Answer: A

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147. Assuming each salt to be 90% dissociated which of the following will have highest osmotic pressure ?

A. decinormal $Al_2(SO_4)_3$

B. decinormal $BaCl_2$

C. decinormal Na_2SO_4

D. a solution obtained by mixing equal volumes of (b) and (c) and filtering

Answer: A

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148. 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

Answer: A

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149. The osmotic pressure of a solution increases if

A. temperture is decreased

B. solution constant is increased

C. number of solute particles in increased

D. volume is increased.

Answer: C

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150. A 0.6% solution of urea (molecular mass =60) would be isotonic with

A. 0.1 M glucose

B. 0.1 M KCl

C. 0.6% glucose

D. 0.6 % KCI

Answer: A

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151. Which of the following colligative property can provide molar mass of proteins (or polymers or colloids) with greatest precision?

A. Relative lowering of vapour pressure

B. Elevation of boiling point

C. Depression in freezing point

D. Osmotic pressure.

Answer: D

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152. The outer shell of an egg was dissolved in hydrochloric acid and than placed in concentrated NaCI solution. Which one of the following will happen ?

A. The egg will swell

B. The egg will shrink

C. Nothing will happen to the egg

D. The inside of the egg will become saltish .

Answer: B

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153. If a thin slice of sugar beet is placed in concentrated solution of $NaCl$, 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

Answer: A

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154. As a result of osmosis the volume of the concentrated solution:

A. gradually decreases

B. gradually increases

C. suddenly increases

D. none

Answer: B

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155. As a result of osmosis the volume of the concentrated solution:

A. gradually decreases

B. gradually increases

C. is not affected

D. any of the three.

Answer: B

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156. Which inorganic precipitate acts as a semipermeable membrane ?

A. Calcium phosphate

B. Nickel phosphate

C. Calcium sulphate

D. Copper ferrocyanide.

Answer: D

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157. The value of osmotic pressure does no depend on :

A. concentration of the solution

B. temperature of the solution

C. number of particles of the solute present

D. structure of the solute particles.

Answer: D

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158. A plant cell shrinks when it is kept in

A. hypotonic solution

B. a hypertonic solution

C. a solution is isotonic with cell sap

D. water.

Answer: B

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159. Dissolution of a solute is an exothermic process if

A. Hydration energy gt Lattice energy

B. Hydration energy lt Lattice energy

C. Hydration energy = Lattice energy

D. None

Answer: A

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160. The phenomenon is which cells are swelled up and then burst if placed in hypotonic solutions is called

A. plasmolysis

B. Haemolysis

C. Exosmosis

D. None

Answer: B

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161. Two aqueous solutions S_1 and S_2 are separated by a semi-permeable membrane. S_2 has lower vapour pressure than S_1. Then

A. more solvent will flow from $S_1 \rightarrow S_2$

B. more solvent will flow from $S_2 \rightarrow S_1$

C. solvent from S_1 and S_2 will flow at equal rates

D. no flow will take place.

Answer: A

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162. The solution which has higher osmotic pressure than some other solution is known as.....

A. Hypotonic

B. Hyperonic

C. Isotonic

D. Normal.

Answer: B

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163. At low concentrations, the statement that equimolal solutions under a given set of experimental conditions have equal osmotic pressure is true for

A. all solutions

B. solutions of non-electrolytes only

C. solutions of electrolytes only

D. none of these.

Answer: B

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164. The phenomenon in which cells are shrinked down if placed in hypertonic solution is called

A. plasmolysis

B. Haemolysis

C. Endosmosis

D. none

Answer: A

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165. Which salt shows maximum osmotic pressure in its $1m$ solution.

A. $AgNO_3$

B. Na_2SO_4

C. $(NH_4)_3PO_4$

D. $MgCl_2$

Answer: C

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166. The natural semipermeable membrane is:

A. Gelatinous $Cu_2Fe(CN)_6$

B. Gelatious $Ca_3(PO)_4 \_ (2)$

C. plant cell

D. Phenol laver

Answer: C

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167. An aqueous solution of sucrose,$C_{12}H_2O_{11}$ containing 34.2 g/L has an osmotic pressure of 2.38 atmospheres at 70^oC. for an aquesous solution of glucose, $C_6H_{12}O_6$ to be istonic with this solution ,it would have :

A. 34.2g/L

B. 17.1 g/L

C. 18.0 g/L

D. 36.0 g/L of glucose

Answer: C

View Text Solution

168. Which involves osmosis

A. Crenation

B. Plasmolysis

C. Heamolysis

D. All

Answer: D

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169. The plant cell shrink when placed in a

A. water

B. a hypotonic solution

C. a hypertonic solution

D. an isotonic solution

Answer: C

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170. The process of getting fresh water from sea water is known as

A. osmosis

B. Fillration

C. Diffusion

D. Reverse osmosis

Answer: D

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171. 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

Answer: B

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172. The molecules which diffuse through a cell membrane are of

A. Fructose

B. Glycogen

C. Haemoglobin

D. Catalase

Answer: A

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173. A perfectly semi-permeable membrane when used 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

Answer: B

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174. At low concentrations, the statement that equimolal solutions under a given set of experimental conditions have equal osmotic pressures is true for

A. all solutions

B. solutions of non-electrolytes which neither dissociates nor associates

C. solutions of electrolytes only

D. none

Answer: B

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175. Blood cells retain their normal shape in solution which are

A. isotonic to blood

B. hypotonic to blood

C. hypertonic to bood

D. equinormal to bood

Answer: A

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176. As a result of osmosis the volume of the concentrated solution:

A. remains constant

B. increases

C. decreases

D. increases or decreases

Answer: D

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177. The osmotic pressure (pi) of a solution is given by reation

A. $\pi = \frac{RT}{C}$

B. $\pi = \frac{CT}{R}$

C. $\pi = \frac{RC}{T}$

D. $\frac{\pi}{C} = RT$

Answer: D

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178. The natural semipermeable membrane is:

A. Calcium phosphate (gelatinous)

B. Phenol layer

C. Copper ferrocyanide (gelatinous)

D. All

Answer: D

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179. Which statement is incorrect about osmotic pressure (P), volume (V) and temperature (T)

A. $P \propto \frac{1}{V}$, if T is constant

B. $P \propto T$, if Vis constant

C. $P \propto V$, if T is constant

D. PV is constant, if T is constant

Answer: C

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180. Solute when dissolved in water:

A. decreases the vapour pressure of water

B. increases the boiling point of water

C. decreases the freezing point of water

D. all of the above

Answer: D

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181. The osmotic pressure of a dilute solution is given by

A. $P = P_0^1 \times N_1$

B. $\pi V = nRT$

C. $\Delta P = P_0^1 N_2$

D. $\frac{\Delta P}{P_0} = \frac{P_0^1 - P}{P_0^1}$

Answer: B

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182. Blood has been found to be isotonic with

A. normal saline solution

B. saturated NaCI solution

C. saturated KCI solution

D. saturated solution of a 1:1 mixture of NaCI and KCI

Answer: A

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183. Isotonic solutions are those which have

A. same osmotic pressure

B. same molarity

C. same density

D. same normality

Answer: A

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184. Osmosis is the spontaneous flow through a semi-permeable membrane of

A. a lass conentrated solution into more concentrated solution

B. the solvent from a solution of lower concentrated solution

C. the solvent from a solution of lower concentration to one of higher concentration

D. solute particles from a solution of higher concentration to one of lower concentration

Answer: B

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185. Two solutions A and B are separated by semipermeable membrane. If liquid flows from A to B then

A. A is more concentrated than B

B. A is less concentrated than B

C. both solutions have same concentration

D. none

Answer: B

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186. One mole each of urea, glucose and sodium chloride were dissolved in one litre of water. Equal osmotic pressure will be produced by

solutions of

A. Urea and glucose

B. Sodium chloride and urea

C. Glucose and sodium chloride

D. None

Answer: A

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187. Who proposed the concept, that solute particles in solution behaves like gaseous molecules

A. Boyle

B. van't Hoff

C. Nollet

D. Charles

Answer: B

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188. Which of the following solutions will have the highest boiling point?

A. $0.1MFeCI_3$

B. $0.1MBaCI_2$

C. $0.1MNaCI$

D. 0.1 M urea

Answer: A

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189. Which aqueous solution has minimum freezing point?

A. 0.01 m NaCl

B. 0.005 m C_2H_5OH

C. $0.005mMgI_2$

D. $0.005mMgS)_4$.

Answer: A

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190. Benzoic acid undergoes dimerisation in benzene solution, the vat't Hoff factor 'I' is related to the degree of association 'x' of the acid as

A. i=(1-x)

B. i=(1+x)

C. i=(1-x/2)

D. i=(1+x/2)

Answer: C

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191. van't Hoff factor (i)

A. Is less than one in case of dissociation

B. is more than one in case of association

C. i=normal molecular mass /oberved molecular mass

D. i=observed molecular mass/normal molecular mass

Answer: C

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192. Acetic acid on dissolution in benzene will show

A. half of its normal molecular mass

B. its normal molecular mass

C. two time of its normal molecular mass

D. none

Answer: C

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193. On mixing $10mL$ of acetone with $40mL$ of chloroform,the total volume of the solution is

A. lt 50mL

B. gt50 mL

C. $= 50mL$

D. cannot be predicted

Answer: A

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194. The substance A when dissolved in solvent B shows the molecular mass corresponding to A_3. The vant Hoffs factor will be:

A. 1

B. $\frac{1}{2}$

C. 3

D. $\frac{1}{3}$

Answer: D

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195. Benzoic acid dissolved in benzene shows

A. its normal molecular mass

B. Double of its normal molecular mass

C. Half of its normal molecular mass

D. Not definite.

Answer: B

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196. Solutions A,B,C and D are respectively $0.1M$ glucose, $0.05MNaCI$, $0.05MBaCI_2$ and $0.1MAICI_3$. Which one of the following pairs is isotonic?

A. A and B

B. B and C

C. A and D

D. A and C

Answer: A

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197. Which of the following solutions will have highest boiling point:

A. 1% solution of glucose in water

B. 1 % solution of sucrose in water

C. 1 % solution of sodium chloride in water.

D. 1 % solution of calcium chloride in water.

Answer: C

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198. On mixing $10mL$ of carbon tetrachloride with $10mL$ of benzene the total volume of the solution is:

A. gt 20 mL

B. lt 20 mL

C. $= 20mL$

D. cannot be predicted

Answer: C

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199. Which of the following is incorrect?

A. Molecular mass of NaCI found by osmotic pressure measurements is half of the theoretical value

B. Molecular mass of CH_3 COOH in benzene found by cryoscopic methods is double of the theoretical value

C. Osmotic pressure of 0.1 M glucose solution is half of the of 0.1 M NaCI solution

D. Molecular mass of HCI found by any colligative property will be same in the aqueous solution and benzene solution.

Answer: D

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200. Relation between degree of dissociation (alpha) and vant Hoff's factor for $BaCI_2$ is

A. $I = 1 + \alpha$

B. $I = 1 + 2\alpha$

C. $i = 1 - \alpha$

D. $I = 1 - 2\alpha$

Answer: B

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201. The van't Hoff factor of $NaCl$ assuming $100\ \%$ dissociation is:

A. $\frac{1}{2}$

B. 2

C. 1

D. 3

Answer: B

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202. The depression in freezing point of $0.1M$ aqueous solution of $HCL, CuSO_4$ and K_2SO_4 are in the ratio.

A. $1:1:1$

B. $1:2:3$

C. $1:1:1.5$

D. $2:4:3$

Answer: C

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203. Which compound corresponds vant Hoff factor (i) to be equal to 2 in dilute solution:

A. K_2SO_4

B. $NaHSO_4$

C. Sugar

D. $MgSO_4$

Answer: D

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204. The van't Hoff 's factor (i) for a 0.2 molal aqueous solution of urea is

A. 0.2

B. 0.1

C. 1.2

D. 1.0

Answer: D

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205. The van't Hoff factor (i) for a dilute aqueous solution of glucose is:

A. Zero

B. 1.0

C. 1.5

D. 2.0

Answer: B

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206. van't Hoff factor more than unity indicates that the solute in solution has

A. dissociated

B. associated

C. both

D. cannot say anything.

Answer: A

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207. What is expected value of van't Hoff factor for $K_3\left[Fe(CN)_6\right]$ in the dilute solution?

A. 10

B. 4

C. 5

D. 0.25

Answer: B

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208. vant Hoff factor for 0.1 M ideal solution is

A. 0.1

B. 1

C. 0.01

D. none of these

Answer: B

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209. Which salt may show the same value of vant Hoff factor (i)as that of $K_4Fe(CN)_6$in very dilute solution state?

A. $Al_2(SO_4)_3$

B. NaCl

C. $Al(NO_3)_3$

D. Na_2SO_4

Answer: A

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210. The experimental molecular weight of an electrolyte will always be less than its calculated value because the value of Van't Hoff factor. $'i,$ is:

A. less than 1

B. greater than 1

C. equivalent to 1

D. zero

Answer: B

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211. The ratio of the value of any colligative property of KCl solution to that of sugar solution is

A. 1

B. 0.5

C. 2

D. 4

Answer: B

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Multiple Choice Questions Numericals

1. A solution has an osmotic pressure of 8.314 pa at 300K. It's concentration would be:

A. 0.056 M

B. 0.56 M

C. 0.0034 M

D. 0.034 M

Answer: C

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2. In a solution of 7.8 g benzene (C_6H_6) and 46.0 g toluene $(C_6H_5CH_3)$ the mole fraction of benzene is :

A. $1/6$

B. $1/5$

C. $1/2$

D. $1/3$

Answer: A

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3. An aqueous solution of urea containing 18 g urea in 1500 cm^3 of solution has a density of 1.5 g/cm^3 . If the molecular weight of urea is 60. Then the molality of solution is:

A. 0.200

B. 0.192

C. 0.100

D. 1.200

Answer: B

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4. The mole fraction of water in a solution containing 50g of water and 50g of ethyl alcohol is :

A. $(C_6H_5CH_3)$

B. $\frac{18}{18+46}$

C. $\frac{1.09}{1.09+2.78}$

D. $\frac{2.78}{1.09+2.78}$

Answer: D

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5. The molarity of an aqueous solution of $NaOH$ containing 8 g in 2L of solution is

A. $0.1M$

B. $0.2m$

C. $0.25M$

D. $0.15M$

Answer: A

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6. A solution containing 3.01×10^{23}HCI molecules is diluted to a volume of 4 litres. The molar concentration of the solution is

A. 1 M

B. 2 M

C. 0.125 M

D. 0.25M

Answer: C

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7. 100 mL of 0.1 M solution of solute A are mixed with 200 mL of 0.1 M solution of solute B. If A and B are non-reacting substances, the molarity of the final solution will be

A. 0.3M

B. 0.4M

C. 0.1M

D. 0.15M

Answer: C

View Text Solution

8. An aqueous solution of glucose is 10% in strength ,The volume in which 1g mole of it dissolved will be

A. 18 litres

B. 9 litres

C. 0.9 litres

D. 1.8 litres.

Answer: D

Watch Video Solution

9. Mole fraction of glucose in 18% (wt./wt.) solution of glucose is

A. 0.18

B. 0.1

C. 0.017

D. 0.021

Answer: D

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10. Calculate the molality of the solution prepared by dissolving 18g of glucose (mol mass = 180) in 500g of water

A. 1 m

B. 0.5 m

C. 0.2 m

D. 2 m

Answer: C

Watch Video Solution

11. At $40^\circ C$, the vapour pressure in torr of methyl and ethyl alcohol solutions is represented by $P = 119X_A + 135$, where X_A is mole fraction of methyl alcohol. The value of $\frac{P_B^\circ}{X_B}$ at lim $X_A \to 0)$, and $\frac{P_A^\circ}{X_A}$ at lim $X_B \to 0$ are:

A. 254 torr

B. 135 torr

C. 119 torr

D. 140 torr

Answer: A

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12. 150 mL of C_2H_5OH(density = 0.78 g $mL^{-1}$is diluted to one litre by adding water, molality of the solution is

A. 2.54

B. 11.7

C. 2.99

D. 29.9

Answer: C

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13. 50g. Of a solute is dissolved in 0.95 kg. of the solvent. The mass percent of the solution is

A. 5

B. 0.9

C. 0.52

D. 0.090

Answer: A

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14. A solution is 0.25% by mass. The weight of solvent containing 1.25g. Of solutes would be

A. 506g

B. 498.75 g

C. 580.25 g

D. 581.25 g

Answer: B

View Text Solution

15. The mole fraction of C_2H_5OH (Molar mass = 46) in 5 molal aqueous ethyl elchol solution is

A. 0.0826

B. 0.826

C. 5

D. 5/55.55

Answer: A

View Text Solution

16. A sugar syrup of weight $214.2g$ contains $34.2g$ of sugar $(C_{12}H_{22}O_{11})$. Calculate

a. the molal concentration.

b. the mole fraction of the sugar in the syrup.

A. 0.55

B. 5.5

C. 55

D. 0.1.

Answer: A

Watch Video Solution

17. To a 4L of 0.2M solution of $NaOH$, $2L$ of $0.5MNaOH$ are added. The molarity of resulting solution is

A. 0.9M

B. 0.3M

C. 1.8M

D. 0.18M

Answer: B

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18. If the mole fraction of solute is 0.5 and molar mass of solvent is 50 than molality of solution will be

A. 20m

B. 0.20m

C. 2m

D. 0.02m

Answer: A

View Text Solution

19. 200g. Of 5% solution (by mass) of the solute A is mixed with 300 g. of a 10% solution (by mass) of solute B. The mass percent of A and B in the mixtures are respectively

A. 3 and 5

B. 5 and 10

C. 2 and 6

D. 6 and 12

Answer: C

View Text Solution

20. Equal volumes of 10% solution (by wt) of the solute A and 15 % solution (by wt) of the solute B are mixed. The mass percent of A and B in the mixture would be respectively

A. 5 and 7.5

B. 10 and 25

C. 5 and 10

D. 20 and 30

Answer: A

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21. $400cm^3$ of water is added to 6% of 600 g (molar mass =36) of a solute. The molarity contain 20 millimoles of the solute is

A. 3

B. 1.5

C. 0.25

D. 1

Answer: C

View Text Solution

22. Volume of 0.2 MH_2SO_4 solution contain 20 millimoles of the solute is

A. $10cm^3$

B. $100cm^3$

C. $20cm^3$

D. $200cm^3$

Answer: B

View Text Solution

23. What volume of 95% H_2SO_4 by weight $\left(d = 1.85gmL^{-1}\right)$ and what mass of water must be taken to prepare $100mL$ of 15% solution of H_2SO_4 $\left(d = 1.10gmL^{-1}\right)$

A. 5 cc

B. 7.5 cc

C. 9.4 cc

D. 12.4 cc.

Answer: C

Watch Video Solution

24. Concentrated sulphuric acid is approximately 18 molar. 5 cc of it are added to make 500 cc of the solution. The approxi mately normality of the solution will be

A. 0.18

B. 0.09

C. 0.36

D. 0.27

Answer: C

View Text Solution

25. 2 mole of ethanol is dissolved in 8 mole of water. The mole fraction of water in the solution is

A. 0.2

B. 0.8

C. 0.4

D. 0.1

Answer: B

View Text Solution

26. 92 g. of ethanol is dissolved in 108g. Of water. The mole fraction of water in the solution is

A. 0.25

B. 0.75

C. 0.5

D. 0.35

Answer: A

View Text Solution

27. dm^3 of water contains 90 g of glucose. The mole fraction of glucose in the solution is

A. 0.33

B. 0.66

C. 0.5/56.05

D. 0.5/55.55

Answer: C

View Text Solution

28. The number of moles of hydroxide $\left(HO^-\right)$ ion in 0.3 litre of 0.005 M solution of $Ba(OH)_2$ is

A. 0.0075

B. 0.0015

C. 0.003

D. 0.005

Answer: C

View Text Solution

29. Rectified spirit contains 95% ethanol by mass. The mole fraction of ethanol will be

A. 0.881

B. 0.99

C. 0.118

D. 0.81

Answer: A

View Text Solution

30. The molarity of pure water is

A. 55.6

B. 50

C. 100

D. 18

Answer: A

Watch Video Solution

31. If 18g of glucose $(C_6H_{12}O_6)$ is present in 1018 g of an aqueous solution of glucose, it is said to be

A. 1 molal

B. 1.1 molal

C. 0.5 molal

D. 0.1 molal

Answer: D

View Text Solution

32. The number of iodine atoms (N) present in $1\mathrm{cm}^3$ of its 0.1 M solution is

A. 6.02×10^{23}

B. 6.02×10^{2}

C. 6.02×10^{19}

D. 1.204×10^{20}

Answer: D

View Text Solution

33. The mole fraction of a solute in its solution in acetic acid is 0.2. The mass of solute (molar mass = 40) in 120g. Of acetic acid would be

A. 2 g

B. 8 g

C. 10 g

D. 20 g

Answer: D

View Text Solution

34. 4.9 g of H_2SO_4 is present in $500cm^3$ of the solution has molarity.

A. 0.2

B. 0.1

C. 0.01

D. 0.02

Answer: B

View Text Solution

35. A centi- molar solution is diluted 10 times. The molaruity would become

A. $\frac{1}{10}$

B. 1/100

C. 1/1000

D. $\frac{1}{1}$

Answer: C

View Text Solution

36. What is the molarity of H_2SO_4 solution that has a density 1.84 g/c c at 35° C and contains 98% by weight?

A. 4.18 M

B. 8.14 M

C. 18.4 M

D. 18 M

Answer: C

Watch Video Solution

37. A 1 L of water sample has 0.1 g fluoride concentration. What is the concentration of fluoring in terms of ppm level ?

A. 250

B. 100

C. 400

D. 1000

Answer: B

View Text Solution

38. If 20 g. of sodium hydroxide is dissolved in $1dm^3$ of water, the molarity of the solution will be

A. 0.5

B. 0.25

C. 0.1

D. 0.2

Answer: A

View Text Solution

39. The volume of water of be added to $50cm^3$ of a decimolar solution to convert it to a centimolar solution will be

A. $500cm^3$

B. $450cm^3$

C. $400cm^3$

D. $100cm^3$

Answer: B

View Text Solution

40. 30 g. of acetic acid is dissolved in $1dm^3$ of a solvent. The molality of the solution will be (Givent, density of solvent =1.25 g cm^{-3}

A. 0.40

B. 0.35

C. 0.55

D. 0.25

Answer: A

View Text Solution

41. If the density of a solvent is greater than 1 kg. dm^{-3} then the molarity (M) and molality (m) are related as

A. M gt m

B. m gt M

C. m = M

D. none of these

Answer: A

View Text Solution

42. For a solution of dibasic acid the molarity (M) and normality (N) are related as

A. N=M/2

B. 2 M = N

C. M =N

D. M gt N

Answer: B

View Text Solution

43. The molality of a 1 molar solution will be (Given, density of solvent = 1.5 kg $.dm^{-3}$

A. 1.5

B. 1

C. 0.66

D. 10.72

Answer: C

View Text Solution

44. If the density of the solvent is 2.5 kg dm^{-3} . The 2 molal solution of a solute in this solvent will be molal solution of a solution of a solute in this solvent will be

A. 5 M

B. 2.5 M

C. 4 M

D. 1.25 M

Answer: A

View Text Solution

45. The m olality of solution is 10m and molar mass of solvent is 100 g mol^{-1} then mole fraction of solute will be

A. 0.5

B. 5

C. 0.005

D. 0.05

Answer: A

View Text Solution

46. A solution of $CaCl_2$ is mol/litre, then the moles of chloride ions in 500 mL will be

A. 0.25

B. 0.5

C. 0.75

D. 1

Answer: B

View Text Solution

47. A molal solution is one that contains one mole of a solute in:

A. 1000 g of solution

B. 1000 g of solvent

C. 1 litre of solution

D. 1 mL of solution

Answer: B

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48. Mole fraction of $C_3H_5(OH)_3$ in a solution of 36 g of water and 46 g of glycerine is :

A. 0.2

B. 0.8

C. 0.46

D. 0.36

Answer: A

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49. A x molal solution of a compound in benzene has mole fraction of solute equals to 0.2. The value of x is

A. 1.4

B. 3.2

C. 1.4

D. 2

Answer: B

Watch Video Solution

50. To 100 ml of a 0.5 M solution, 400 ml of water is added, the final molarity would be

A. 0.125

B. 0.1

C. 0.25

D. 0.15

Answer: B

View Text Solution

51. 800 ml of 0.1 MH_2SO_4 is mixed with 200ml of 0.8 MH_2SO_4 The molarity of the mixture is

A. 0.32

B. 0.24

C. 0.12

D. 0.48

Answer: B

View Text Solution

52. How many grams of methanol would have to be added to water to prepare 150mL of solution which is $2MCH_3OH$?

A. 9.6

B. 2.4

C. 9.6×10^3

D. 4.3×10^2

Answer: A

Watch Video Solution

53. If the density of pure water is $0.999 g cm^3$. The molarity of prue water will be

A. more than 55.5

B. less than 55.5

C. equal to 55.5

D. equal to 1

Answer: C

View Text Solution

54. The wt. of unhydrous sodium carbonate needed to prepare 500 ml of a decinormal solution would be

A. 5.3 g

B. 10.6g

C. 1.06 g

D. 2.65 g

Answer: D

View Text Solution

55. The molarity of a 10% NaOH solution is

A. 2.5

B. 0.5

C. 0.25

D. 0.05

Answer: A

View Text Solution

56. The mole fraction of oxalic acid (Molar mass 63) required to prepare 0.10 m solution in water is

A. 1

B. 0.0018

C. 6.3

D. 0.0992

Answer: B

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57. 120g of urea is present in 5L of solution, the active mass of urea is

A. 0.2

B. 0.06

C. 0.4

D. 0.88

Answer: C

Watch Video Solution

58. The number of moles present in 2 litre of $0.5MNaOH$ is:

A. 2

B. 1

C. 0.5

D. 0.25

Answer: B

Watch Video Solution

59. The mole of fraction of nitrogen, in a mixture of 7 g of N_2 and 16 g of O_2 is

A. 0.5

B. 0.75

C. 0.66

D. 0.33

Answer: D

View Text Solution

60. The wt. percent of NO_3^- in the solute in a solution is 20. The volume of solvent containing 60 g of solute (d = 1.2 g/cc)

A. $0.24dm^3$

B. $0.12dm^3$

C. $1.2dm^3$

D. $0.2dm^3$

Answer: D

View Text Solution

61. Calculate the molarity of each ion in solution after 2.0 litre of 3.0 M $AgNO_3$ is mixed with 3.0 litre of 1.0 M $BaCl_2$.

A. 1.2 M

B. 1.8 M

C. 0.5 M

D. 0.4 M

Answer: A

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62. 0.2 mole of HCI and 0.2 mole of barium chloride were dissolved in water to produce a $500mL$ solution. The molarity of the CI^- ions is :

A. .04 M

B. 0.8 M

C. 0.4 M

D. 0.08 M

Answer: B

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63. What is the concentration of dissolved oxygen at 25^oC at 1 atm pressure if partial pressure of oxygen in 0.22 atm? $\left(K_H = 1.3 \times 10^{-3} \text{ mol } dm^{-3}atm^{-1}\right)$

A. $2.86 \times 10^{-4} M$

B. $5,9 \times 10^{-3} M$

C. 1.7×10^{-4}

D. zero

Answer: A

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64. Partial pressure of N_2 gas at 298 K is 0.987 bar If is bubbled through water at 298 K, how many millimoles of N_2 gas would be dissolved in 1 litre of water ? (Given : K_H for N_2 at 298 K =76.48 bar).

A. 0.85

B. 0.693

C. 0.981

D. 0.453

Answer: B

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65. The mole fraction of saturated solution is 1.2×10^{-6} . The pressure of the above the solution is -$(K_H = 1.44.97^{-})$

A. 0.174 bar

B. 17.4 bar

C. 27.4 bar

D. 0.274 bar

Answer: A

View Text Solution

66. N_2 exerts a pressure of 0.987 bar. The mole fraction of N_2 ia $(K_H = 74.48k\text{bar})$

A. 7.648×10^{-3}

B. 9.87×10^{-5}

C. 1.3×10^{-5}

D. 2.6×10^{-5}

Answer: C

View Text Solution

67. K_H value for Ar(g),CO(g), HCHO(g) and $CH_4(g)$ are 40.39 , 1.67 , 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increastively solubility.

A. $HCHO < CH_4 < CO_2 < Ar$

B. $HCHO < CO_2 < CH_4 < Ar$

C. $Ar < CO_2 < CH_4 < HCHO$

D. $Ar < CH_4 < CO_2 < HCHO$

Answer: C

Watch Video Solution

68. Henry's law constant for the molality of methane in benzene at $298K$ is $4.27 \times 10^5 mmHg$. Calculate the solubility of methane in benzene at $298K$ under $760mmHg$.

A. 1.78×10^{-4}

B. 1.78×10^{-5}

C. 17.8×10^{-4}

D. 1.78×10^{-6}

Answer: C

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69. Air contain O_2 and N_2 in the ration of 1 : 4 The Henry constant for O_2 and N_2 are 3.30×10^7 torr and 6.60×10^7 torr respectively. Ration of solubility of O_2 and O_2 dissolved in water at atomspheric pressure and room temperature is

A. $1:4$

B. $4:1$

C. $1:2$

D. $2:1$

Answer: C

View Text Solution

70. 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. 0.2

B. 0.4

C. 0.6

D. 0.8

Answer: C

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71. The vapour pressure of pure benzene at a certain temperature is $640mm$ of Hg. A non-volatile non-electrolyte solid weighing $2.175g$ added $39.0g$ of benzene. The vapour pressure of the solution is $600mm$ of Hg. What is the molecular weight of solid substance?

A. 6.96

B. 65.3

C. 63.8

D. none of the above

Answer: B

Watch Video Solution

72. Liquid A and B from an ideal solution. If vapour pressure of pure A and B are 500 Nm^{-2} and 200 Nm^{-2} respectively , the vapour pressure of a solution of A in B containint 0.2 mole fraction of A would be

A. $700Nm^{-2}$

B. $300Nm^{-2}$

C. $260Nm^{-2}$

D. $140Nm^{-2}$

Answer: C

View Text Solution

73. The vapour pressure of pure benzene and toluene are 160 and 60 torr respctively. The mole fraction of touene in vapour phase in contact with equimolar solution of benzene and toluene is

A. 0.5

B. 0.6

C. 0.27

D. 0.73

Answer: C

View Text Solution

74. The ratio of the value of any colligative property of KCl solution to that for sugar is nearly 'x' times for water as solvent and same molality. What will be the value of 'x' ?

A. 1

B. 0.5

C. 2

D. 2.5

Answer: C

Watch Video Solution

75. 6g of urea is dissolved in 90g of water. The relative lowering of vapour pressure is equal to

A. 0.0196

B. 0.5

C. 0.1

D. 0.0202

Answer: A

Watch Video Solution

76. Vapour pressure of CCl_4 at $25^\circ C$ is 143 mm Hg . 0.5 g of a non-volatile solute (molar mass = $65 mol^{-1}$) is dissolved in 100 mL of CCl_4 (density = 1.538g mL^{-1}) Vapour pressure of solution is :

A. 141.93 mm

B. 94.39 mm

C. 199.34 mm

D. 143.99 mm

Answer: A

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77. The vapour pressure of benzene at $90^\circ C$ is 1020 torr. A solution of $5g$ of a solute in $58.5g$ benzene has vapour pressure 990 torr. The molecualr weight of the solute is:

A. 78.2

B. 178.2

C. 206.2

D. 220

Answer: D

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78. The vapour pressure of ethanol and methanol are $44.0mmHg$ and $88.0mmHg$, respectively. An ideal solution is formed at the same temperature by mixing $60g$ of ethanol with $40g$ of methanol. Calculate the total vapour pressure of the solution and the mole fraction of methanol in the vapour.

A. 0.467

B. 0.502

C. 0.513

D. 0.556

Answer: C

Watch Video Solution

79. One molar solution of sodium chloride will have the relative lowering of vapour pressure closest to :

A. 5.8% (wt./vol) urea solution (M.M.=60)

B. 5.8 % (wt./vol) glucose solution (M.M.=180)

C. 1.0 M glucose solution (M.M. = 180)

D. 2.0 M urea solution (M.M.=60)

Answer: D

View Text Solution

80. 34.2 g of cansugar is dissolved in 180 g of water. The relative lowering of vapour pressure will be

A. 0.0099

B. 1.597

C. 0.84

D. 0.9901

Answer: A

View Text Solution

81. The vapour pressure of a pure liquid A is 70 torr at 300K. It forms an ideal solution with another liquid B. The mole fration of B in the solution is 0.2 and total pressure of solution is 84 torr at 300K. The vapour pressure of pure liquid B at $26^{\circ}C$ is

A. 14

B. 56

C. 140

D. 70

Answer: C

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82. At 88^oC benzene has a vapour pressure of 900 torr and toluene has a vapour pressure of 360 torr. What is the mole fraction fo benzene in the mixture with toluene that will boil at 88^oC at 1 atm pressure, benzene-toluene from an ideal solution ? (P of mixture = 760 torr)

A. 0.416

B. 0.588

C. 0.68

D. 0.74

Answer: D

View Text Solution

83. The relative lowering of vapour pressure produced by dissolving 71.5 g of substance in 1000g of water is 0.0173. The molecular mass of the substance will be:

A. 74.39

B. 18

C. 342

D. 60

Answer: A

View Text Solution

84. The vapour pressure of water at room temperature is 23.8 mm Hg. The vapour pressure of an aqueous solution of sucrose with mole fraction 0.1 is equal to

A. 23.9 mm Hg

B. 24.2 Hg

C. 21.42 mm Hg

D. 21.44 mm Hg.

Answer: C

Watch Video Solution

85. The vspour preesure of two pure liquids A and B are 5 and 10 torr respectively. Calculte the total pressure of the solution (in torr) obtainrd by mixing 2 mole of A and 3 mole of B.

A. 120 toor

B. 36 toor

C. 88 torr

D. 180 toor

Answer: C

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86. Vapour pressure of CCl_4 at $25^\circ C$ is 143 mm Hg . 0.5 g of a non-volatile solute (molar mass = $65 mol^{-1}$) is dissolved in 100 mL of CCl_4 (density = 1.538g mL^{-1}) Vapour pressure of solution is :

A. 141.93 mm

B. 94.39 mm

C. 199.34 mm

D. 143.99 mm.

Answer: A

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87. A mixture of ethyl alcohol and propyl alcohol has a vapour pressure of 290 mm at 300K. The vapour pressure of propyl alcohol is 200 mm. if the mole fraction of ethyl alcohol is 0.6, its vapour pressure (in mm) at the same temperature will be

A. 350

B. 300

C. 360

D. 700

Answer: A

Watch Video Solution

88. 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

Answer: B

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89. The vapour pressure of a solution of 5g of non-electrolyte in 100g of water at a particular temperature is $2985Nm^{-2}$. The vapour pressure of pure water at that temperature is $3000Nm^{-2}$. The molecular weight of the solute is

A. 180

B. 90

C. 270

D. 200

Answer: A

Watch Video Solution

90. The molal elevation constant of water =$0.52Km^{-1}$. The boiling point of $1.0molal$ aqueous KCl solution (assuming complete dissociation of KCl) should be

A. _273.04 K

B. 374.04 K

C. 37.404 K

D. 273 K

Answer: B

Watch Video Solution

91. The boiling point of a water containing non-valatile solute is $101.04^{\circ}C$ of 2 molal solution, the ebullioscopic constant of water is

A. 0.52 K . Kg mol^{-1}

B. 1.04 K . Kg $\mathrm{mol}^{-}1)$

C. 10.4K . Kg mol^{-1}

D. 5.2 k . Kg mol^{-1}

Answer: A

View Text Solution

92. An aqueous solution containing 1g of urea boils at $100.25^{\circ}C$. The aqueous solution containing 3g of glucose in the same volume will boil be

A. $100.75^{\circ}C$

B. $100.5^\circ C$

C. 100° C

D. $100.25^\circ C$

Answer: D

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93. At certain Hill-station pure water boils at $99.725^\circ C$. If K_b for water is $0.513^\circ C kgmol^{-1}$, the boiling point of $0.69m$ solution of urea will be:

A. $100.079^\circ C$

B. $103^\circ C$

C. $100.359^\circ C$

D. unpredictable.

Answer: A

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94. Elevation in boiling point was $0.52^{\circ}C$ when 6 g of a compound X was dissolved in 100 g of water. Molecular weight of X is (K_b of water is $5.2^{\circ}C$ per 100 g of water)

A. 120

B. 60

C. 180

D. 342

Answer: B

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95. The molal elevation constant for water is 0.52 K. molality^{-}. The elevation caused in the boiling point of water by dissolving 0.25 mole of a non volatile solute in 250 g of water will be :

A. 52°

B. $5.2^\circ C$

C. $0.52^\circ C$

D. $0.052^\circ C$

Answer: C

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96. The molal elevation constant for water is $0.56 K kg mol^{-1}$. Calculate the boiling point of a solution made by dissolving 6.0g of urea (NH_2CONH_2) in 200g of water.

A. $10.028^\circ C$

B. $100.28^\circ C$

C. $50.14^\circ C$

D. none of these.

Answer: B

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97. Y g of non-volatile organic substance of molecular mass M is dissolved in 250 g benzene . Molal elevation constant of benzene is K_b . Elevation in its boiling point is given by :

A. $\frac{M}{K_bY}$

B. $\frac{4K_bY}{M}$

C. $\frac{K_bY}{4}M$

D. $\frac{K_bY}{M}$

Answer: B

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98. The molal boiling point constant of water is $0.573^\circ C kg \text{mole}^{-1}$. When 0.1 mole of glucose is dissolved in $1000g$ of water, the solution boils under atmospheric pressure at:

A. $100.53^\circ C$

B. $101.06^\circ C$

C. $100.265^\circ C$

D. $9.47^\circ C$

Answer: C

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99. A solution containing 3.3 g of a substance in 125g of benzene $(b.\ p80^\circ C)$ boils at $80.66^\circ C$. If K_b for one litre of benzene is $3.28^\circ C$, the molecular mass of the substance shall be

A. 127.2

B. 131.2

C. 137.12

D. 142.72

Answer: B

View Text Solution

100. The boiling point of an aqueous solution of a non-volatile solute is $100.15^\circ C$. What is the freezing point of an aqueous solution obtained by dilute the above solution with an equal volume of water. The values of K_b and K_f for water are 0.512 and $1.86^\circ Cmol^{-1}$:

A. $-0.544^\circ C$

B. $-0.512^\circ C$

C. $-0.272^\circ C$

D. $-1.86^\circ C$

Answer: C

Watch Video Solution

101. The boiling point of 0.1 molal aqueous solution of urea is $100.18^{\circ}C$ atm. The molal elevation constant of water is

A. 1.8

B. 0.18

C. 18

D. 18.6

Answer: A

View Text Solution

102. The 0.1 molal aqueous solution of glucose boils at $100.16^{\circ}C$. The boiling point of 0.5 molal aqueous solution of sucrose will be

A. $500.80^{\circ} C$

B. $100.80^{\circ} C$

C. $20.16^{\circ} C$

D. $20.8^{\circ} C$

Answer: B

View Text Solution

103. The molal b.pt constant for water is $0.513^{\circ} C \mathrm{kg\ mol}^{-1}$. When 0.1 mole of sugar is dissolved in 200g of water, the solution boils under a pressure of 1 atm at :

A. $100.513^{\circ} C$

B. $100.0513^{\circ} C$

C. $100.256^{\circ} C$

D. $101.025^{\circ} C$

Answer:

Watch Video Solution

104. For a solvent $K_b = 5$ kg mol^{-1} using this solvent, the solution records the elevation of boiling point of $0.5^\circ C$ The molality of the solution is

A. 0.25

B. 0.1

C. 10

D. unpredictable.

Answer: B

View Text Solution

105. If the elevation in boiling point of a solution of 10 g of solute (molecular weight = 100) in 100 g of water is ΔT_b, the ebullioscopic constant of water is

A. 10

B. $10\Delta T_b$

C. ΔT_b

D. $\Delta T_b / 10$

Answer: C

Watch Video Solution

106. The freezing point of 0.1 M solution of glucose is $-1.86^\circ C$. If an equal volume of 0.3 M glucose solution is added, the freezing point of the mixture will be

A. $-7.44^\circ C$

B. $-5.58^{\circ}C$

C. $-3.72^{\circ}C$

D. $-2.79^{\circ}C$

Answer: C

Watch Video Solution

107. Pure benzene freezes at $5.45^{\circ}C$ at a certain place but a 0.374m solution of tetrachloroethane in benzene freezes at $3.55^{\circ}C$. The K_f for benzene is

A. 5.08 K kg mol^{-1}

B. 508 K kg mol^{-1}

C. 0.508 K kg mol^{-1}

D. $50.8^{\circ}C\text{kg mol}^{-1}$

Answer: A

Watch Video Solution

108. The freezing point of a 0.05 molal solution of a non-electrolyte in water is:

$(K_f = 1.86 \text{molality}^{-1})$

A. $-1.86^\circ C$

B. $-0.93^\circ C$

C. $-0.093^\circ C$

D. $0.093^\circ C$

Answer: C

Watch Video Solution

109. The freezing point of 1 molal $NaCl$ solution assuming $NaCl$ to be $100\,\%$ dissociated in water is:

A. $-1.86^\circ C$

B. $-3.72^\circ C$

C. $+1.86^\circ C$

D. $+3.72^\circ C$

Answer: B

Watch Video Solution

110. An aqueous solution of a non-electrolyte solute boils at $100.52^\circ C$. The freezing point of the solutiion will be ($K_f = 1.86 K kg \text{mol}^{-1}$, $K_b = 0.52 K kg \text{mol}^{-1}$)

A. $0^\circ C$

B. $-1.86^\circ C$

C. $1.86^\circ C$

D. none of the above.

Answer: B

View Text Solution

111. Molal depression of freezing point of water is 1.86° per 100 g of water. 0.02 mole of urea dissolved in 100 g of water will produce a lowering of temperature of :

A. 0.186°

B. 0.372°

C. 1.86°

D. 3.72°

Answer: B

View Text Solution

112. What should be the freezing point of aqueous solution containing $17g$ of $C_2H(5)OH$ is $1000g$ of water (K_f for water =$1.86degkgmol^{-1}$)?

A. 272.31 K

B. 273.69 K

C. 272 K

D. 27.36 K

Answer: A

Watch Video Solution

113. A solution of 1.25g of a certain non-volatile substance in 20g of water freezes at 271.94K. Calculate the molecular mass of the solute $\left(K_f = 1.86 \ \text{K kg mol}^{-1}\right)$.

A. $179.97g\text{mol}^{-1}$

B. $207.8g\text{mol}^{-1}$

C. $209.6 g \text{mol}^{-1}$

D. $109.6 g \text{mol}^{-1}$

Answer: D

Watch Video Solution

114. A 0.50 molal solution of ethylene glycol in water is used as coolant in a car . If the freezing point constant of water is 1.86° per molal , at which temperature will the mixture freeze?

A. $0.93^{\circ} C$

B. $-0.93^{\circ} C$

C. $1.86^{\circ} C$

D. $-1.86^{\circ} C$

Answer: B

Watch Video Solution

115. A solution of 0.20 g of a non-electrolyte in 2 g of water freezes at 271.14 K . If $K_f = 1.86 K \text{molality}^{-1}$ then the molar mass of the solute is :

A. 207.8 g//mol

B. 179.79 g//mol

C. 200.8 g//mol

D. 100.0 g//mol

Answer: D

View Text Solution

116. A solution containing 10 mole of ethylene glycol dissolved in 1000 g of water ($K_f = 1.86 K molality^{-1}$ will freeze at:

A. 273 K

B. 2.544 K

C. 254.4 K

D. 25.44 K

Answer: C

View Text Solution

117. What is the molality of ethyl alcohol (molar mass = 46) in aqueous solution which freezes at $-10^{\circ}C$:

K_f for water = $1.86 K \text{molality}^{-1}$

A. 3.540

B. 4.567

C. 5.376

D. 6.315

Answer: C

View Text Solution

118. The molal depression constant for a solvent is 4.9. The depression in freezing point for a millimolal solution of a non-electrolyte in the solvent is

A. 0.49

B. 4.9

C. 4.9 + 0.001

D. 0.0049.

Answer: D

View Text Solution

119. The amount of urea to be dissolved in 500 cc of water $\left(K_f = 1.86\right)$ to produce a depresssion of $0.186^\circ C$ in the freezing point is :

A. 0.3 g

B. 0.6 g

C. 6 g

D. 3 g

Answer: D

Watch Video Solution

120. The molecular mass of NaCl determined by studying freezing point depression of it's 0.5% aqueous solution is 30. The apparent degree of dissociantion of NaCl is :

A. 0.95

B. 0.5

C. 0.6

D. 0.3

Answer: A

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121. The depression in f.pt. of $0.01m$ aqueous solution of urea, soldium chloride and soldium sulphate is in the ration:

A. $1:1:1$

B. $1:2:3$

C. $1:2:3$

D. $1:2:4$

Answer: B

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122. 20 g of a binary electrolyte (Molecular mass =100) are dissolved in 500 g of water. The freezing point of the solution is $-0.74^{\circ}C$ and

$K_f = 1.86$ K kg mol^{-1}. The degree of ionisation of eletrolyte as :

A. 0.5

B. 0.75

C. 1

D. zero

Answer: D

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123. For an aqueous solution freezing point is $-0.186^\circ C$. The boiling point of the same solution is $\left(K_f = 1.86^\circ mol^{-1} kg\right)$ and $\left(K_b = 0.512 mol^{-1} kg\right)$

A. 0.186

B. 0.512

C. 0.512//1.86

D. 0.0512

Answer: D

Watch Video Solution

124. The freezing point of a solution prepared from $1.25g$ of non-electrolyte and $20g$ of water is $271.9K$. If the molar depression constant is $1.86Kmol^{-1}$, then molar mass of the solute will be

A. 105.7

B. 106.7

C. 115.3

D. 93.9

Answer: A

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125. A 0.2 molal aqueous solution of weak acid (HX) is 20% ionised. The freezing point of this solution is (Given, $K_f = 1.86^\circ Cm^{-1}$ for water)

A. $-0.45^\circ C$

B. $-0.90^\circ C$

C. $-0.31^\circ C$

D. $-0.53^\circ C$

Answer: A

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126. The freezing point of aqueous solution that contains $5\,\%$ by mass urea. $1.0\,\%$ by mass KCl and $10\,\%$ by mass of glucose is:

$\left(K_f H_2O = 1.86 K \text{molality}^{-1}\right)$

A. 290.2 K

B. 285.5 K

C. 269 93 K

D. 250 K

Answer: C

Watch Video Solution

127. The values of K_f for solvents P,Q,R and S are 1.86, 1.99, 5.12 and 4.7 kg mol^{-1} resp. The equimolal solutions of a solute in these solvents will have the freezing point in order of solvents

A. RgtSgtQgtP

B. PgtRgtSgtQ

C. PgtQgtSgtR

D. RgtQgtPgtS

Answer: C

View Text Solution

128. The solutions containing 6 g of urea (molecular mass =60) per dm_3 of water and another containing 9 g of solute A per dm^3 of water freeze at the same temp. The molecular mass of A is

A. 12

B. 90

C. 54

D. 150

Answer: B

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129. If 15 gm of a solute in 100 gm of water makes a solution that freezes at $-1.0^\circ C$,then 30 gm of the same solution the freezes at

A. $-0.5^\circ C$

B. $-2.0^\circ C$

C. $0^\circ C$

D. $2.0^\circ C$

Answer: B

View Text Solution

130. How many grams of sucrose (molecular weight 342) should be dissolved in $100g$ water in order to produce a solution with $105^\circ C$ difference between the freezing point and the boiling point ? $\left(K_b = 0.51^\circ Cm^{-1}, \left(K_f = 1.86^\circ Cm^{-1}\right)\right.$

A. 34.2 g

B. 72 g

C. 342 g

D. 460 g

Answer: B

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131. The percentage composition by mass of an aqueous solution of a solute (molecular mass 150 which boils at 373.26 is $(K_b = 0.52)$

A. 5

B. 15

C. 7

D. none of the above.

Answer: C

View Text Solution

132. 8 g of HBr is added in 100 g of H_2The freezing point will be $\left(K_f = 1.86, H = 1, br = 80\right)$

A. $-0.75^{\circ} C$

B. 0°

C. $-3.67^{\circ} C$

D. $-7.6^{\circ} C$

Answer: C

View Text Solution

133. Osmotic pressur of blood is 7.65 atm at 310K. An aqueous solution of glucose that will be isotonic with blood is .....wt./vol.

A. 0.0541

B. 0.0354

C. 0.0453

D. 0.534

Answer: A

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134. The osomotic pressure of a solution at $0^\circ C$ is $4atm$. What will be its osmotic pressure at $546K$ under similar conditions?

a.$4atm$, b.$9atm$,c.$8atm$, d.$6atm$

A. 4 atm.

B. 2 atm

C. 8 atm.

D. 1 atm.

Answer: C

Watch Video Solution

135. The osmotic pressure in atmosphere of $10\,\%$ solution of cane sugar at $69^\circ C$is

A. 724

B. 824

C. 8.21

D. 7.21

Answer: C

Watch Video Solution

136. The osmotic pressure of 0.2 molar slution of urea at $300K(R = 0.082)$ litre atm $mol^{-1}K^{-1}$ is

A. 4.92 atm

B. 1 atm

C. 0.2 atm

D. 27 atm.

Answer: A

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137. The osmotic pressure of a $5\,\%\,(weight/volume)$ solution of cane sugar at $150^\circ C$ is

A. 4 atm

B. 3.4 atm

C. 5.078 atm

D. 2.45 atm

Answer: C

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138. The osmotic pressure of a solution containing $0.1mol$ of solute per litre at $273K$ is

A. $\frac{0.1}{1} \times 0.082 \times \text{atm}$

B. $0.1 \times 2 \times 0.082 \times 273\text{atm}$

C. $\frac{1}{0.1} \times 0.082 \times 273\text{atm}$

D. $\frac{0.1}{1} \times \frac{273}{0.082}\text{atm}$

Answer: A

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139. Osmotic pressure of $40\,\%$ (wt./vol.) urea solution is $1.64atm$ and that of $3.42\,\%$ (wt./vol.) cane sugar is $2.46atm$. When equal volumes of the above two solutions are mixed, the osmotic pressure of the resulting solution is:

A. 1.64 atm

B. 2.46 atm

C. 4.10 atm

D. 2.05 atm

Answer: D

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140. Following solutions at the same temperature will be isotonic

A. 3.42 g of cane sugar in one litre water and 0.18 g of glucose in one litre water

B. 3.42 g of cane sugar in one litre water and 0.18 g of glucose in 0.1 litre water

C. 3.42 g of cane sugar in one litre water and 1.17 g of NaCl in one litre water

D. 3.42 g of cane sugar in one litre water and 1.17 g of NaCI in one litre water

Answer: B

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141. $0.6g$of a solute is dissolved in 0.1litre of a solvent which develops an osmotic pressure of 1.23 at m at $27^\circ C$.The molecular mass of the substance is

A. $149.5g\text{mol}^{-1}$

B. $120g\text{mol}^{-1}$

C. $430g\text{mol}^{-1}$

D. None.

Answer: B

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142. The osmotic pressure of decimolar solution of glucose at $30^\circ C$ is :

A. 24.88 atm

B. 2.488 atm

C. 248.8 atm

D. 2488 atm

Answer: B

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143. The osmotic pressure of a solution (density is 1 g mL^{-1}) containing $3g$ of glucose (molecular weight =180) in $60g$ of water at $15^{\circ}C$ is

A. 41.570 kPa

B. 415.70 kPa

C. 41570 kPa

D. 4157 kPa

Answer: C

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144. 100 cc of 1.5% solution of urea is found to have an osmotic pressure of 6.0 atm and 100 cc of 3.42% solution of cane sugar is found to have an osmotic pressure of 2.4 atm. If two solutions are mixed, the osmotic pressure of the resulting solution will be

A. 8.4 atm

B. 4.2 atm

C. 16.8 atm

D. 2.1 atm.

Answer: B

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145. A solution containing $8.6g$ urea in $1L$ was found to be isotonic with $5\ \%\ (weight/volume)$ solution of an organic non-volatile solute. The molecular weight of latter is

A. 348.9

B. 34.89

C. 3489

D. 861.2

Answer: A

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146. A solution containing $4g$ of a non-volatile organic solute per $100mL$ was found to have an osmotic pressure equal to $500cm$ of mercury at $27^{\circ}C$. The molecular weight of solute is

A. 14.97

B. 149.7

C. 1697

D. 1.497

Answer: B

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147. If a $6.84\ \%$ (wt,vol.)solutionof cane sugar(mol.Wt.=342)is isotonic with $1.52\ \%\ (wt.\ /vol.\ )$solution of thiocarbamide ,then the molecular weight of thiocarbamide is

A. 152

B. 76.5

C. 85.5

D. 180

Answer: C

Watch Video Solution

148. What is the volume of a solution containing 2g mole of sugar that will give rise to an osmotic pressure of 1 atmosphere a STP ?

A. 224.0 litre

B. 22.4 litre

C. 2.24 litre

D. none of the above.

Answer: B

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149. osmotic presure of a sugar solution at $27^{\circ} C$ is 2.46 atmosphere. The concentration of the solution in mol per litre is :

A. 1 M

B. 0.01 M

C. 0.0125 M

D. 0.1 M

Answer: D

View Text Solution

150. 1 litre of a solution containing 500 g of a protein exerts an osmotic pressure of 0.82 atm at $27^{\circ}C$. The molecular mass of the protein is :

A. 82000

B. 50000

C. 41000

D. 15000

Answer: D

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151. Osmotic pressure of a solution is $0.0821atm$ at a temperature of 300 K. The concentration in mole/litre will be

A. 0.033

B. 0.066

C. 0.33×10^{-2}

D. 3

Answer: C

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152. The concentration of glucose (in g/litre) solution which is isotonic with a solution of urea containing 6 g per litre will be :

A. 6

B. 34.2

C. 18

D. 1.8

Answer: C

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153. The solute 'A' is a ternary electrolyte and solute 'B' is a non-electrolyte. If 0.1 M solution of solute 'B' produces an osmotic pressure of 2P, then, 0.05 M solution of A at the same temperature will produce an osmotic pressure equal to

A. P

B. 1.5 P

C. $2P$

D. $3P$

Answer: D

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154. A $3.42\ \%$ (wt./vol.) solution of cane sugar is isotomic with a $5.96\ \%$ (wt./vol.) solution of raffinose. The molecular weight of raffinose is:

A. 59.6

B. 596

C. 5.96

D. 5960

Answer: B

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155. The osmotic pressure of a solution containing $40g$ of solute $(\text{molecular mass } 246)$ per litre at $27^\circ C$ is $\left(R = 0.0822 atm L mol^{-1}\right)$

A. 0.1 atm

B. 0.4 atm

C. 0.2 atm

D. 0.8 atm

Answer: B

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156. The vapour pressure of benzene at $80^\circ C$ is lowered by $10mm$ by dissoving $2g$ of a non-volatile substance in $78g$ of benzene .The vapour pressure of pure benzene at $80^\circ C$ is $750mm$.The molecular weight of the substance will be:

A. 15

B. 14.8

C. 1500

D. 148

Answer: D

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157. A solution containing 500 g of a protein per liter is isotonic with a solution containing 3.42 g sucrose per liter. The molecular mass of

protein in 5 x 10^x, hence x is.

A. 5

B. 146

C. 34200

D. 50000

Answer: D

Watch Video Solution

158. The osomotic pressure of a solution at $0^\circ C$ is $4atm$. What will be its osmotic pressure at $546K$ under similar conditions?

a.$4atm$, b.$9atm$,c.$8atm$, d.$6atm$

A. 0.5 atm

B. 2×273atm

C. 4 atm

D. $273/2$ atm

Answer: C

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159. The solution containing $4.0gm$ of a polyvinyl chloride polymer in 1 litre dioxane was found to have an osmotic pressure 6.0×10^{-4} atmosphere at $300K$,the value of R used is 0.082litre atmosphere $\text{mole}^{-1}K^{-1}$.The molecular mass of the polymer was found to be

A. 3×10^3

B. 1.6×10^5

C. 5×10^4

D. 6.4×10^2

Answer: B

Watch Video Solution

160. The relationship between osmotic pressure at $273K$ when $10g$ glucose (P_1), $10g$ urea (P_2) and $10g$ sucrose (P_3) are dissolved in $250mL$ of water is:

A. $P_1 > P_2 > P_3$

B. $P_3 > P_1 > P_2$

C. $P_2 > P_1 > P_3$

D. $P_2 > P_3 > P_1$

Answer: C

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161. Insulin $(C_2H_{10}O_5)_n$ is dissolved in a suitable solvent and the osmotic pressure (π) of solutions of various concentrations $\left(g/cm^3\right)C$ is measured at $20^\circ C$. The slope of a plot of π against C is found to be 4.65×10^{-3}. The molecular weight of insulin is:

A. 4.8×10^5

B. 9×10^5

C. 3×10^5

D. 5.16×10^6

Answer: D

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162. A solution of protein (extracted from carbs) was prepared by dissolving $0.75g$ in $125cm^3$ of an aqueous solution. At $4^\circ C$ and osmotic pressure rise of $2.6mm$ of the solution was observed. Then molecular weight of protein is (assume density of solution is $1.00g/cm^3$):

A. 9.4×10^5

B. 5.4×10^5

C. 5.4×10^{10}

D. 9.4×10^{10}

Answer: B

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163. If π_1 is the osmotic pressure of solution containing 6 g. of acetic acid per dm^3 and π_2 is that of a solution containing 5.85 g. of NaCl per dm^3 at the same temperature then

A. $\pi_1 < \pi_2$

B. $\pi_1 > \pi_2$

C. $\pi_1 = \pi_2$

D. $2\pi 2\pi_1 = \pi_2$

Answer: A

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164. The osmotic pressure (in atm.) of a 1 M solution a non-electrolyte at $0^{\circ} C$ will be

A. 1 atm

B. 22.4 atm

C. 0.0821 atm

D. 76 atm

Answer: B

View Text Solution

165. The osmotic pressure of a 0.5 M solution of NaCl at $0^{\circ} C$ will be

A. 11.2 atm

B. less than 11.7 atm

C. more than 11.2 atm

D. unpredictable.

Answer: C

View Text Solution

166. The solute 'A' is a ternary electrolyte and solute 'B' is a non-electrolyte. If 0.1 M solution of solute 'B' produces an osmotic pressure of 2P, then, 0.05 M solution of A at the same temperature will produce an osmotic pressure equal to

A. 1.5 P

B. $2P$

C. $3P$

D. P

Answer: C

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167. Which compound corresponds vant Hoff factor (i) to be equal to 2 in dilute solution:

A. K_2SO_4

B. $NaHSO_4$

C. Sugar

D. $MgSO_4$

Answer: D

Watch Video Solution

168. The values of observed and calculated molecular weights of silver nitrate are 92.64 and 170 respectively.The degree of dissociation of silver nitrate is:

A. 0.6

B. 0.835

C. 0.467

D. 0.6023

Answer: B

Watch Video Solution

169. The solution containing 4g of KBr dissolved in 100 g of water freezes at $-1.24^{\circ}C$.

The molar mass of KBr is $\left(K_f = 1.86 K kg \text{mol}^{-1}\right.$

A. 102

B. 120

C. 39

D. 60

Answer: B

View Text Solution

170. The values of observed and calculated molecular weights of calcium nitrate are respectively 65.6 and 164. The degree of dissociation of calcium nitrate will be:

A. 0.25

B. 0.5

C. 0.75

D. 0.6

Answer: C

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171. The Van't Hoff factor of very dilute solution of $Ca(NO_3)_2$

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

172. KBr is 80 % dissociated in solution. The freezing point of a 0.5 molal solution is $\left(K_f \text{water} = 1.86^\circ \frac{C}{m}\right)$

A. 273 K

B. 277 K

C. 271.326 K

D. 269 K

Answer: C

View Text Solution

173. The degree of dissociation (α) of a weak electrolyte A_xB_y is related to van't Hoff factor (i) by the expression

A. $\alpha = \dfrac{i-1}{(x+y-1)}$

B. $\alpha = \dfrac{i-1}{x+y+1}$

C. $\alpha = \dfrac{x+y-1}{i-1}$

D. $\alpha = \dfrac{x+y+1}{i-1}$

Answer: A

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174. Acetic acid exists in benzene solution in the dimeric form. In an actual experiment, the van't Hoff factor was found to be 0.52. Then, the degree of dissociation of acetic acid is

A. 0.48

B. 0.88

C. 0.96

D. 0.52.

Answer: C

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175. 0.1 molal aqueous solution of sodium bromide freezes at $-0.335^{\circ}C$ at atmospheric pressure. K_f for water is $1.86^{\circ}C$. The percentage of dissociation of the salt in solution is

A. 90

B. 80

C. 58

D. 98

Answer: B

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Questions From Competition Exam

1. The molal freezing point for water is $1.86^{\circ} Cmol^{-1}$. If 342g of cane sugar is dissolved in 1000 mL of water, the solution will freeze at

A. $1.86^{\circ} C$

B. $-1.86^{\circ} C$

C. $2.42^{\circ} C$

D. $-2.42^{\circ} C$

Answer: B

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2. The $BaCl_2$ ionises to an extent of 80% in aqueous solution, the value of van't Hoff factor is -

A. 2.6

B. 0.4

C. 0.8

D. 2.4

Answer: A

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3. Equal masses of methane and oxygen are mixed in an empty container at $25^\circ C$. The fraction of the total pressure exerted by oxygen is:

A. $1/2$

B. $1/3$

C. $1/4$

D. $1/5$

Answer: B

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4. An aqueous solution is 1.00 molal in KI. Which change will cause the vapor pressure of the solution to increase?

A. Addition of NaCI

B. Addition of Na_2SO_4

C. Addition of 1.00 molal Kl

D. Addition of water

Answer: D

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5. A solution of sucrose (molar mass $= 342 \text{g mol}^{-1}$) has been prepared by dissolving 68.5g of sucrose in 1000g of water. The freezing point of the solution obtained will be :

(K_f for water $= 1.86 \text{K kg mol}^{-1}$)

A. $-0.372^{\circ} C$

B. $-0.520^{\circ} C$

C. $+0.372^{\circ} C$

D. $-0.570^{\circ} C$

Answer: A

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6. If sodium sulphate is considered to be completely dissociated into cations and anions in aqueous solution , the change in freezing point of water $\left(\Delta T_f\right)$ when 0.01 mole of sodium sulphate is dissociated in 1 kg of water is : ($K_f = 1.86$ K kg mol^{-1})

A. 0.0744 K

B. 0.0186 K

C. 0.0372 K

D. 0.0558 K

Answer: D

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7. If $10^{-4}dm^3$ of water is introduced into a $1.0dm^3$ flask to $300K$ how many moles of water are in the vapour phase when equilibrium is established ? (Given vapour pressure of H_2O at $300K$ is $3170PaR = 8.314JK^{-1}mol^{-1}$) .

A. $4.46 \times 10^{-2}\text{mol}$

B. $1.27 \times 10^{-3}\text{mol}$

C. $5.56 \times 10^{-3}\text{mol}$

D. $1.53 \times 10^{-2}\text{mol}$

Answer: B

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8. On mixing, heptane and octane form an ideal solution. At $373K$ the vapour pressure of the two liquid components (heptane and octane) are $105kPa$ and kPa respectively. Vapour pressure of the solution obtained by mixing 25.0 of heptane and $35g$ of octane will be (molar mass of heptane $= 100gmol^{-1}$ and of octane $= 114gmol^{-1}$):-

A. 96.2 k Pa

B. 144.5 kPa

C. 72.0 kPa

D. 36.1 kPa

Answer: C

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9. K_b for water is 0.52 K/m. Then, 0.1 m solution of NaCl will boil approximately at

A. $100.52^{\circ} C$

B. $100.052^{\circ} C$

C. $101.04^{\circ} C$

D. $100.104^{\circ} C$

Answer: B

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10. 138 g of ethyl alcohol is mixed with 72 g of water. The ratio of mole fraction of alcohol to water is

A. $3:4$

B. $1:2$

C. $1:4$

D. $1:4$

Answer: A

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11. Two solutions of a substance (non-electroyte) are mixed in the following manner $480mL$ of $1.5M$ of first solution with $520mL$ or $1.2M$ of second solution. The molarity of final solution is:

A. 2.70M

B. 1.344 M

C. 1.50 M

D. 1.20 M

Answer: B

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12. 20 g of a binary electrolyte (Molecular mass =100) are dissolved in 500 g of water. The freezing point of the solution is $-0.74^{\circ}C$ and $K_f = 1.86$ K kg mol^{-1}. The degree of ionisation of eletrolyte as :

A. 0.5

B. 0.75

C. 1

D. 0

Answer: C

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13. Which one of the following in the ratio of the lowering of V.P. of 0.1 M aqueous solution of $BaCl_2$,NaCl and $Al_2(SO_4\ \_\ (4)$ respectively?

A. $2:3:5$

B. $3:2:5$

C. $5:2:3$

D. $5:1:2$

Answer: B

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14. A 0.1 molal aqueous solution of a weak acid is $30\,\%$ ionized. If K_f for water is $1.86^\circ C/m$, the freezing point of the solution will be.

A. $-0.18^\circ C$

B. $-0.54^\circ C$

C. $-0.36^\circ C$

D. $-0.24^\circ C$

Answer: D

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15. 200 mL of an aqueous solution of a protein contains its 1.26g. The osmotic pressure of this solution at 300K is found to be 2.57×10^{-3} bar. The molar mass of protein will be $\left(R = 0.083 L\overline{m}ol^{-1}K^{-1}\right)$

A. $51022 g \text{mol}^{-1}$

B. $122044 g \text{mol}^{-1}$

C. $31011 g \text{mol}^{-1}$

D. $61038 g \text{mol}^{-1}$

Answer: D

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16. The freezing point depression constant for water is $1.86^{\circ} KKgmol^{-1}$. If $5.00 g Na_2SO_4$ is dissolved in $45.0 g H_2O$, the freezing point is charged by $-3.82^{\circ} C$. Calculate the van't Hoff factor for Na_2SO_4.

A. 2.05

B. 2.63

C. 3.11

D. 0.381

Answer: B

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17. The van't Hoff factor i for a compound which undergoes dissociation in one solvent and association in other solvent is respectively.

A. less than one and greater than one

B. less than one and lass than one

C. greater than one and less than one.

D. greater than one and greater than one.

Answer: C

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18. Mole fraction of a solution in 1.00 molal aqueous solution is

A. 0.1770

B. 0.0177

C. 0.0344

D. `1.7700

Answer: B

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19. The degree of dissociation (α) of a weak electrolyte A_xB_y is related to van't Hoff factor (i) by the expression

A. $\alpha = \frac{i-1}{x+y+1}$

B. $\alpha = \frac{x+y-1}{i-1}$

C. $\alpha = \frac{x+y+1}{i-1}$

D. $\alpha = \frac{i-1}{x+y-1}$

Answer: D

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20. Ethylene glycol is used as an antifreeze in a cold climate. Mass of ethylene glycol which should be added to 4 kg of water to prevent it from freezing at $-6^{\circ}C$ will be $\left(K_f \text{ for water } = 1.86Kkgmol^{-1}\right.$, and molar mass of ethylene glycol $\left. = 62gmol^{-1}\right)$

A. 204.30g

B. 400.00 g

C. 304.60 g

D. 800.00 g

Answer: D

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21. A 5.2 molal aqueous of methyl alcohol, CH_3OH, is supplied. What is the molefraction of methyl alcohol in the solution ?

A. 0.190

B. 0.086

C. 0.050

D. 0.100

Answer: B

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22. A $5\ \%$ solution of cane sugar (molar mass $=342$)is isotonic with $1\ \%$ of a solution of an known solute.The molar mass of unknown solute in g/mol is

A. 136.2

B. 171.2

C. 68.4

D. 34.2

Answer: C

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23. The molality of a urea solution in which $0.0100g$ of urea, $\left[(NH_2)_2CO\right]$ is added to $0.3000dm^3$ of water at STP is

A. 0.555 m

B. $5.55 \times 10^{-4}m$

C. 33.3

D. $3.33 \times 10^{-2}m$

Answer: B

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24. Dissolving $120g$ of urea $(Mw = 60)$ in $1000g$ of water gave a solution of density $1.15gmL^{-1}$. The molarity of solution is:

A. 1.78 M

B. 2.00 M

C. 2.05 M

D. 2.22 M

Answer: C

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25. The freezing point (in $.^{\circ} C$) of a solution containing $0.1g$ of $K_3\left[Fe(CN)_6\right]$ (Mol.wt. 329) in 100 g of water $\left(K_f = 1.86Kkgmol^{-1}\right)$ is

A. -2.3×10^{-2}

B. -5.7×10^{-2}

C. -5.7×10^{-3}

D. -1.2×10^{-2}

Answer: A

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26. If the elevation in boiling point of a solution of 10 g of solute (molecular weight = 100) in 100 g of water is ΔT_b, the ebullioscopic constant of water is

A. $\frac{\Delta T_b}{10}$

B. ΔT_b

C. $10\Delta T_b$

D. $100\Delta T_b$

Answer: B

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27. 1.2 % NaCl solution is isotonic with 7.2 % glucose solution. What will be the van't Hoff factor, i?

A. 0.5

B. 1

C. 2

D. 6

Answer: C

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28. The vapour pressure of two liquid P and Q are 80 torr and 60 torr respectively. The total vapour pressure obtained by mixing 3 moles of P and 2 mole of Q would be

A. 140 torr

B. 20 torr

C. 68 torr

D. 72 torr

Answer: D

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29. A solution of urea boils at $100.18^\circ C$ at the atmospheric pressure. If K_f and K_b for water are 1.86 and $0.512 Kkgmol^{-1}$ respectively, the above solution will freeze at,

A. $-6.54^\circ C$

B. $6.54^\circ C$

C. $0.654^\circ C$

D. $-0.654^\circ C$

Answer: D

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30. Which one of the following aqueous solution will have the lowest freezing point?

A. $0.2MNa_2SO_4$

B. $0.1M\text{Urea}$

C. $0.2MNaNO_3$

D. $0.1MBaCI_2$

Answer: A

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31. The weight in grams of a non-volatile solute (molar mass = 60) to be dissolved in 90g of water to produce a relative of V.P. of 0.02 is

A. 4

B. 8

C. 6

D. 10

Answer: C

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32. The density of a solution prepared by dissolving 120 g of urea (mol. Mass=60 u) in 1000 g of water is 1.15 g/mL. The molarity if this solution is

A. 2.05 M

B. 0.50 M

C. 1.78 M

D. 1.02 M

Answer: A

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33. K_f for water is $1.86 K kg mol^{-1}$. IF your automobile radiator holds $1.0 kg$ of water, how many grams of ethylene glycol $(C_2H_6O_2)$ must you add to get the freezing point of the solution lowered to $-2.8^\circ C$?

A. 27 g

B. 72 g

C. 93 g

D. 39 g

Answer: C

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34. 29.2% (W/W) HCI stock solution has a density of 1.25 g mL^{-1}. The molecular mass of HCI is 36.5 g mol^{-1} Calculate the volume (mL) of stock solution required to prepare 200 mL of 0.4 M HCI

A. 2 mL

B. 4 mL

C. 8 mL

D. 6 mL

Answer: C

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35. For a dilute solution containing $2.5g$ of a non-volatile non-electrolyte solution in $100g$ of water, the elevation in boiling point at 1 atm pressure is $2^{\circ}C$. Assuming concentration of solute is much lower than the concentration of solvent, the vapour pressure (mm of Hg) of the solution is:

(take $k_b = 0.76Kkgmol^{-1}$)

A. 724

B. 740

C. 736

D. 718

Answer: A

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36. P_A and P_B are the vapour pressure of pure liquid components ,Aand B respectively of an ideal binary solution,If x_A represents the mole fraction of component A, the total pressure of the solution will be

A. $P_A + x_A(P_B - P_A)$

B. $P_A + x_A(P_A - P_B)$

C. $P_B + x_A(P_B - P_A)$

D. $P_B + x_A(P_A - P_B)$

Answer: D

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37. Vapour presure of chloroform $(CHCI_3)$ and dichloromethane (CH_2CI_2) at $25^\circ C$ are 200 mm Hg and 41.5 mm Hg respectively Vapour pressure of the solution obtained by mixing 25.5 g or $CHCI_3$ and 40g of CH_2CI_2 at the same temperature will and 40 g of CH_2CI_2 at the same temperature will be $((\text{Molecular mass of} CHCI_3 = 119.5u$ and molecular mass `0 CH_(2)CI_(2) = 85 u)

A. 173.9 mm Hg

B. 615.0 mm Hg

C. 347.9 mm Hg

D. 90.64 mm Hg

Answer: D

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38. The V.P. in mm Hg of an aqueous solution obtained by adding 18 g of glucose to 180 g of water at $100^\circ C$ is

A. 7.60

B. 76.0

C. 759

D. 752.4

Answer: D

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39. Which one of the following is an isotonic pair of solution ?

A. 0.15 M NaCl and $0.1MNa_2SO_4$

B. 0.2 M urea and 0.1 M sugar

C. $0.1MBaCI_2$ and $0.1MNH_4CI$

D. $0.2MMgSO_4$ and $0.1MNH_4CI$

Answer: A

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40. The molarity of a solution obtained by mixing 750 mL of 0.5 M HCl with 250 mL of 2 M HCl will be

A. 0.975 M

B. 0.875 M

C. 1.00 M

D. 1.75 M

Answer: B

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41. A solution of sucrose (molar mass = 342 g/mol) is prepared by dissolving 68.4 g of it per litre of solution, what is its osmotic pressure at 273 K?

$\left(R = 0.081 L atm K^{-1} mol^{-1}\right)$

A. 3.92 atm

B. 4.48 atm

C. 5.92 atm

D. 29.4 atm

Answer: B

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42. At $300K$, $36g$ of glucose present per litre in its solution has an osmotic pressure of 4.98^{-}. If the osmotic pressure of the solution is 1.52^{-} at the same temperature, what would be its concentration?

A. $11gL^{-1}$

B. $22gL^{-1}$

C. $36gL^{-1}$

D. $42gL^{-1}$

Answer: A

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43. The boiling point of solution containing 68.4 g of sucrose $(\text{molar mass} = 342 gmol^{-1})$ in 100 g of water is $(K_b \text{for water} = 0.512 K.\ kgmol^{-1})$

A. $100.02^\circ C$

B. $98.98^\circ C$

C. $101.02^\circ C$

D. $100.512^\circ C$

Answer: C

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