Solutions

1. Types of solutions

Q1. Among the following mixtures, dipole-dipole as the major interaction is present in :

(A) Benzene and ethanol

(B) KCl and water

(C) Acetonitrile and acetone

(D) Benzene and CCl_4

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q2. An azeotropic mixture of two liquids has boiling point lower than either of them, when it

(A) Shows a negative deviation from Raoult's law

(B) Shows no deviation from Raoult's law

(C) Shows positive deviation from Raoult's law

(D) Is saturated

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q3. An example of a solution having liquid in gas is:

(A) Moist air

(B) Dry air

(C) Au-Hg

(D) $C_2 H_5 OH + H_2 O$

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q4. Azeotropic mixture is

(A) Constant temperature boiling mixture

(B) Those which boils at different temperatures

(C) Mixture of two solids

(D) None of the above

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q5. In two Solutions having different osmotic pressure, the solution of higher osmotic pressure is called :

(A) Isotonic solution

(B) Hypertonic solution

(C) Hypotonic solution

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q6. Isotonic solution have the same

(A) Normality

(B) Density

(C) Molar concentration

(D) None of these

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q7. The azeotropic mixture of water (b. pt.100℃) and HCl (b.pt. 85℃) boils at 108.5℃.When this mixture is distilled it is possible to obtain

(A) Pure HCl

(B) Pure water

(C) Pure water as well as HCl

(D) Neither HCl nor H_2 O in their pure states

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q8. The distribution law holds good for :

(A) Heterogeneous systems

(B) Homogeneous systems

(C) Both (a) and (b)

(D) None of these

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q9. The natural semipermeable membrane is :

(A) Gelatinous Cu_2 $[Fe(CN)_6]$

(B) Gelatinous Ca_3 $[(PO_4)_2]$

(C) Plant cell

(D) Phenol layer

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q10. The phenomenon in which cells are shrinked down if placed in hypertonic solution is called :

(A) Plasmolysis

(B) Haemolysis

(C) Endosmosis

(D) None of these

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q11. The phenomenon in which cells are swelled up and then burst if placed in hypotonic solution is called :

(A) Plasmolysis

(B) Haemolysis

(C) Exosmosis

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q12. Two Solutions have different osmotic pressure. The solution of lower osmotic pressure is called :

(A) Isotonic solution

(B) Hypertonic solution

(C) Hypotonic solution

(D) None of these

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q13. When a solute distributes itself between two immiscible liquids in contact with each other, a mathematical constant ratio exists between :

(A) The weight of the solute in the two liquids

(B) The concentration of solute in the two liquids

(C) The number of mole of the solute in the two liquids

(D) The number of atoms of the solute in the two liquids

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q14. Which of the following associated with isotonic Solutions is not correct?

(A) They will have the same osmotic pressure

(B) They will have the same vapour pressure

(C) They have same weight concentrations

(D) Osmosis does not take place when the two Solutions are separated by a semipermeable membrane

Correct Answer: **(C)** Level: **Easy** Tagging: **Analyzing**

2. Expressing Concentration of Solutions

Q15.

Iodine was added to a system of water and CS_2. The concentrations of iodine in water and CS_2 were found to be c_1 and c_2 respectively. The ratio c_1/c_2 will not change only if :

(A) More iodine is added

(B) More water is added

(C) More CS_2 is added

(D) The temperature is changed

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q16. 25 mL of 3.0 M HNO_3 are mixed with 75 mL of 4.0M HNO_3. If the volumes are additive, the molarity of the final mixture would be-

(A) 3.25M

(B) 4.0M

(C) 3.75M

(D) 3.50M

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q17. 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) 1/2

(B) 1/3

(C) 1/5

(D) 1/6

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q18. 0.2 g of an organic compound containing C, H and O on combustion yielded 0.147 g CO_2 and 0.12 g water. The percentage of oxygen in it is:

(A) 73.34%

(B) 78.45%

(C) 83.23%

(D) 89.50%

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q19. 100 cc of 0.6 N $H_2 SO_4$ and 200 cc of 0.3 N HCl were mixed together. The normality of the solution will be

(A) 0.2 N

(B) 0.4 N

(C) 0.8 N

(D) 0.6 N

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q20. 100 mL of 0.3 HCl is mixed with 200 mL of 0.6 N $H_2 SO_4$. The final normality of the resulting solution will be

(A) 0.3 N

(B) 0.2 N

(C) 0.5 N

(D) 0.1 N

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q21. 13 g of a hydrocarbon contains 1.0 g of hydrogen. Its formula is:

(A) $C_2 H_2$

(B) $C_2 H_3$

(C) $C_3 H_4$

(D) $C_4 H_7$

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q22. 2.5 L of NaCl solution contain 5 moles of the solute.What is the molarity ?

(A) 5M

(B) 2M

(C) 2.5M

(D) 12.5M

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q23. 3.65 g of HCl is dissolved in 16.2 g of water. The mole fraction of HCl in the resulting solution is

(A) 0.1

(B) 0.2

(C) 0.3

(D) 0.4

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q24. 35.4 mL of HCl is required for the neutralisation of a solution containing 0.275 g of sodium hydroxide. The normality of hydrochloric acid is

(A) 0.97 N

(B) 0.142 N

(C) 0.194 N

(D) 0.244 N

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q25. 5 L of a solution contains 25 mg of $CaCO_3$. What is its concentration in ppm? (mol. wt. of $CaCO_3$ is 100)g/mol

(A) 25

(B) 1

(C) 5

(D) 2500

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q26. 5% (wt./vol.) aqueous NaCl solution and 5% (wt./vol.) aqueous KCl solution are :

(A) Isotonic

(B) Isomolar

(C) Equinormal

(D) None of these

Correct Answer: **(A)** Level: **Easy** Tagging: **Analyzing**

Q27. 6.02×10^{20}molecules of urea are present in 100 mL of its solution. The concentration of urea solution is

(A) 0.1 M

(B) 0.01 M

(C) 0.001 M

(D) 0.02 M

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q28. A 5% solution of sugarcane (mol. wt. = 342) is isotonic with 1% solution of X under similar conditions. The molecular weight of X is (in g/mol)

(A) 136.2

(B) 689.4

(C) 34.2

(D) 171.2

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q29. A solution containing 4 g of polyvinyl chloride polymer in one litre of dioxane was found to have an osmotic pressure of 4.1×10^{-4} atm at 27℃ . The approximate molecular weight of the polymer is (in g/mol)

(A) 1.5×10^{3}

(B) 2.4×10^{5}

(C) 1.0×10^{4}

(D) 2×10^{12}

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q30. A solution is prepared by dissolving 24.5 g of sodium hydroxide in distilled water to give 1L solution. The molarity of NaOH in the solution is (Given, that molar mass of NaOH = 40.0 g mol^{-1})

(A) 0.2450 M

(B) 0.6125 M

(C) 0.9800 M

(D) 1.6326 M

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q31. A solution is prepared by dissolving 24.5 g of sodium hydroxide in distilled water to give 1L solution. The molarity of NaOH in the solution is (Given, that molar mass of NaOH = 40.0 g mol^{-1})

(A) 1000 g of solvent

(B) 1 L of solvent

(C) 1 L of solution

(D) 1000 g of solution

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q32. A solution of 4.5 g of a pure non-electrolyte in 100 g of water was found to freeze at 0.465℃ . The molecular weight of the solute closest to (k_f=1.86)

(A) 135.0 g/mol

(B) 172.0 g/mol

(C) 90.0 g/mol

(D) 180.0 g/mol

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q33. An aqueous solution of 6.3 g oxalic acid dihydrate is made up to 250 mL. The volume of 0.1 N sodium hydroxide required to completely neutralise 10 mL of this solution is

(A) 40 ML

(B) 20 ML

(C) 10 ML

(D) 4 ML

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q34. ConcH_2 SO_4 has a density of 1.98 g/mL and is 98% H_2 SO_4 by weight. Its normality is

(A) 19.6 N

(B) 29.6 N

(C) 39.6 N

(D) 49.6 N

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q35. Density of a 2.05 M solution of acetic acid in water is 1.02 g/mL. The molality of the solution is

(A) 23.077%

(B) 230.77%

(C) 2.3077%

(D) 0.23077%

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q36. Dilute 1 L one molar H_2 SO_4 solution by 5 L water, the normality of that solution is

(A) 0.33 N

(B) 33.0 N

(C) 0.11 N

(D) 11.0 N

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q37. How many gram of NaOH will be required to prepare 500 g solution containing 10%w/w NaOH solution?

(A) 100 g

(B) 50 g

(C) 0.5 g

(D) 5.0 g

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q38. How many grams of dibasic acid (mol. wt. 200) should be present in 100 mL of the aqueous solution to give 0.1 N?

(A) 10 g

(B) 20 g

(C) 2 g

(D) 1 g

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q39. How many moles of $Al_2 (SO_4)_3$ would be in 50 g of the substance?

(A) 0.083 mol

(B) 0.952 mol

(C) 0.481 mol

(D) 0.140 mol

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q40. How much of 0.1 M H_2SO_4 solution is required to neutralise 50 mL of 0.2 M NaOH solution?

(A) 50 mL

(B) 5.0 mL

(C) 0.50 mL

(D) 100 mL

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q41. If 117 g NaCl is dissolved in 1000 g of water the concentration of the solution is said to be

(A) 2 molar

(B) 2 molal

(C) 1 normal

(D) 1 molal

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q42. If a 5.25% (wt./vol.) solution of a non-electrolyte is isotonic with 1.50% (wt./vol.) solution of urea, (mol-wt = 60) is the same solvent then the molecular weight of non-electrolyte is :

(A) 210.0 g mol^{-1}

(B) 90.0 g mol^{-1}

(C) 115.0 g mol^{-1}

(D) 105 g mol^{-1}

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q43. If for a sucrose solution elevation in boiling point is 0.1℃ then what will be boiling point of NaCl solution for the same molal concentration?

(A) 0.1

(B) 0.2

(C) 0.16

(D) 0.26

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q44. If P_0 and P_s are the vapour pressure of solvent and solution respectively and N_1 and N_2 are the mole of solute and solvent then :

(A) $(P_0 - P_s)/P_0 = N_1/(N_1 + N_2)$

(B) $(P_0 - P_s)/P_s = N_1/N_2$

(C) $P_s = P_0 . N_2/(N_1 + N_2)$

(D) All of the above

Correct Answer: **(D)** Level: **Easy** Tagging: **Analyzing**

Q45. Molarity of 0.2 N $H_2 SO_4$ is

(A) 0.2

(B) 0.4

(C) 0.6

(D) 0.1

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q46. Mole fraction (X) of any solution is equal to

(A) (no.of moles of solute)/(volume of solution in litre)

(B) (no.of gram-equivalent of solute)/(volume of solution in litre)

(C) (no.of moles of solute)/(mass of solvent in kg)

(D) (no.of moles of any constituent)/(total number of moles of all constituents)

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q47. Molecular weight of glucose is 180. A solution of glucose which contains 18 g/L, is

(A) 0.1 molal

(B) 0.2 molal

(C) 0.3 molal

(D) 0.4 molal

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q48. Partition coefficient of benzoic acid-ether-water in favour of ether is 2. A solution containing 8 g/litre benzoic acid in ether layer is shaken with 2 litre water. The concentration of acid in water layer is :

(A) 1

(B) 2

(C) 3

(D) 4

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q49. The amount of anhydrous $Na_2 CO_3$ present in 250 mL of 0.25 M solution is

(A) 6.625 g

(B) 66.25 g

(C) 662.5 g

(D) 6625 g

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q50. The density (in g mL^{-1}) of a 3.60 M sulphuric acid solution that is 29% H_2SO_4 (molar mass=98 g mol^{-1}) by mass will be

(A) 1.64

(B) 1.88

(C) 1.22

(D) 1.45

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q51. The mole fraction of the solute in one modal aqueous solution is

(A) 0.018

(B) 0.027

(C) 0.036

(D) 0.048

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q52. Volume of 0.1 M $K_2 Cr_2 O_7$ required to oxidise 35 mL of 0.5 M $FeSO_4$ solution is

(A) 29.2 mL

(B) 17.5 mL

(C) 175 mL

(D) 145 mL

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q53. What is the total number of moles of $H_2 SO_4$ needed to prepare 5.0 L of a 2.0 M solution of H_2SO_4 ?

(A) 2.5

(B) 5.0

(C) 10

(D) 20

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q54. Which of the following concentration term is/are independent of temperature?

(A) Molarity

(B) Molarity and mole fraction

(C) Mole fraction and molality

(D) Molality and normality

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q55. Which of the following shows negative deviation from Raoult's law?

(A) $CHCl_3$ and acetone

(B) $CHCl_3$ and C_2H_5OH

(C) $C_6H_5CH_3$ and C_6H_6

(D) C_6H_6 and CCl_4

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q56. Which one of the following is the incorrect form of Raoult's law

(A) $\frac{P_s}{P^\circ} = \frac{N}{n+N}$

(B) $\frac{P^\circ}{P^\circ - P_s} = 1 + \frac{N}{n}$

(C) $\frac{P^\circ - P_s}{P_s} = \frac{n}{n+N}$

(D) $\frac{P_s}{P^\circ - P_s} = \frac{N}{n}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q57.

A mixture of ethane and ethene occupies 41 L at 1 atm and 500 K. the mixture reacts completely with $\frac{10}{3}$ mole of O_2 to produce CO_2 and H_2O. The mole fraction of ethane and ethene in the mixture are $(R = 0.082L \text{ atm } K^{-1} \text{ mol}^{-1})$ respectively

(A) 0.50, 0.50

(B) 0.75, 0.25

(C) 0.67, 0.33

(D) 0.25, 0.75

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q58. 40% by weight solution will contain how much mass of the solute in 1L solution, density of the solution is 1.2 g/mL?

(A) 480 g

(B) 48 g

(C) 38 g

(D) 380 g

Correct Answer: **(A)** Level: **Moderate** Tagging: **Applying**

Q59. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of urea solution is

(A) 0.1 M

(B) 0.01 M

(C) 0.001 M

(D) None of these

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q60. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of urea solution is (Avogadro constant, $N_A = 6.02 \times 10^{23}$ mol^{-1})

(A) 0.001 M

(B) 0.01 M

(C) 0.02 M

(D) 0.1 M

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q61. An organic compound has C and H percentage in the ratio 6 : 1 and C and O percentage in the ratio 3 : 4. The compound is:

(A) HCHO

(B) CH_3 OH

(C) CH_3 CH_2 OH

(D) $(COOH)_2$

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q62. The plots of $1/X_A$ vs. $1/Y_A$ (where X_A and Y_A are the mole fraction of liquid A in liquid and vapour phase respectively) is linear with slope and intercepts respectively:

(A) P_A^0/P_B^0 and $\frac{(P_A^0 - P_B^0)}{P_B^0}$

(B) P_A^0/P_B^0 and $\frac{(P_B^0 - P_A^0)}{P_B^0}$

(C) P_B^0/P_A^0 and $\frac{(P_A^0 - P_B^0)}{P_B^0}$

(D) P_B^0/P_A^0 and $\frac{(P_B^0 - P_A^0)}{P_B^0}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q63. Two Solutions of glucose have osmotic pressure 1.0 and 3.5 atm. If 1 L of first solution is mixed with V L of second solution, the osmotic pressure of the resultant solution becomes 2.5 atm. Volume of second solution is

(A) 1.0 L

(B) 1.5 L

(C) 2.5 L

(D) 3.5 L

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q64. 50 $cm^3$of 0.2 N HCl is titrated against 0.1 N NaOH solution. The titration is discontinued after adding 50 $cm^3$of NaOH. The remaining titration is completed by adding 0.5 NKOH. The volume of KOH required for completing the titration is

(A) 12 cm^3

(B) 10 cm^3

(C) 25 cm^3

(D) 10.5 cm^3

Correct Answer: **(B)** Level: **Difficult** Tagging: **Evaluating**

3. Solubility

Q65.
The distribution coefficient of I_2 in between CCl_4 and H_2O is 85 in favour of CCl_4 at 25°C. If solubility of I_2 in H_2O at 25°C is 0.33 g litre^{-1}, the solubility of I_2 in CCl_4 is .....g litre^{-1}.

(A) 28.05

(B) 30.05

(C) 40.05

(D) 26.05

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q66.
The K for I_2 between CS_2 and H_2O is 588 in favour of CS_2. One litre of aqueous solution containing 1 g of I_2 is shaken with 50 mL of CS_2. What will be the amount of I_2 in aqueous layer?

(A) 0.035 g

(B) 0.010 g

(C) 0.05 g

(D) 0.04 g

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q67.
Some of the following gases are soluble in water due to formation of their ions :
I : CO_2 ; II : NH_3 ; III : HCl ; IV : CH_4 ; V : H_2
Water insoluble gases can be :

(A) I, IV , V

(B) I, V

(C) I, II, III

(D) IV, V

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q68. As the temperature of a solvent increases, what generally happens to the solubility of most solid solutes?

(A) Solubility increases

(B) Solubility decreases

(C) Solubility remains constant

(D) Solubility becomes unpredictable

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q69. Henry's Law is primarily concerned with the solubility of:

(A) Solids in liquids

(B) Liquids in liquids

(C) Gases in liquids

(D) Gases in solids

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q70. How does an increase in pressure typically affect the solubility of a gas in a liquid?

(A) Pressure has no effect on gas solubility in liquids.

(B) Solubility decreases with increasing pressure.

(C) Solubility increases with increasing pressure.

(D) The effect of pressure on gas solubility varies depending on the gas and solvent.

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q71. The energy that opposes the dissolution of a solute in a solvent is called :

(A) Solvent energy

(B) Hydration energy

(C) Lattice energy

(D) Ionization energy

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q72. The solubility of a gas in water depends on :

(A) Nature of the gas

(B) Temperature

(C) Pressure of the gas

(D) All of these

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q73. The solubility of gas in liquid depends upon :

(A) Nature of gas

(B) Nature of solvent

(C) Temperature and pressure

(D) All of the above

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q74. The solubility of iodine in water is 0.8 g/L. If the partition coefficient of iodine between CCl_4 and water (in favour of CCl_4) is 82, the solubility of iodine in CCl_4 is :

(A) 102.5 g/L

(B) 65.6 g/L

(C) 0.009 g/L

(D) 81.2 g/L

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q75. The substances whose solubility decreases with increase in temperature :

(A) $Ca(OH)_2$

(B) $Na_2\ CO_3$

(C) $Na_2\ SO_4$

(D) All of these

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q76. What is solubility?

(A) The ability of a substance to conduct electricity

(B) The maximum amount of a substance that can dissolve in a given solvent at a specific temperature and pressure

(C) The rate at which a substance evaporates

(D) The ability of a substance to change its physical state

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q77. Which of the following factors does NOT affect the solubility of a substance in a liquid?

(A) Temperature

(B) Pressure

(C) Color of the solute

(D) Nature of the solute and solvent

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q78. Which statement is wrong for distribution law?

(A) The two solvents should be mutually immiscible

(B) The substance should not chemically react with any of the two solvents

(C) The temperature should not change during experiment

(D) The concentration of the solute in both the solvents must be kept high

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

4. Vapour pressure of liquid solutions

Q79. A and B are ideal gases. The molecular weights of A and B are in the ratio of 1:4. The pressure of a gas mixture containing equal weight of A and B is p atm. What is the partial pressure (in atm) of B in the mixture?

(A) P/5

(B) P/2

(C) P/2.5

(D) 3P/4

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q80. A substance will be deliquescent if its vapour pressure is :

(A) Equal to the atmospheric pressure

(B) Equal to that of water vapour in the air

(C) Greater than that of water vapour in the air

(D) Lesser than that of water vapour in the air

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q81. At 80°C , the vapour pressure of pure liquid 'A' is 520 mm Hg and that of pure liquid 'B' is 1000 mm Hg. If a mixture solution of 'A' and 'B' boils at 80° C and 1 atm pressure, the amount of 'A' in the mixture is (1 atm = 760 mm Hg)

(A) 52 mole percent

(B) 34 mole percent

(C) 48 mole percent

(D) 50 mole percent

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q82. At high altitude the boiling of water occurs at low temp. because :

(A) Atmospheric pressure is low

(B) Temperature is low

(C) Atmospheric pressure is high

(D) None of the above

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q83. Boiling point of water is defined as the temperature at which :

(A) Vapour pressure of water is equal to one atmospheric pressure

(B) Bubbles are formed

(C) Steam comes out

(D) None of the above

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q84. If 0.1 M Solutions of each electrolyte are taken and if all electrolytes are completely dissociated, then whose boiling point will be highest ?

(A) Glucose

(B) KCl

(C) $BaCl_2$

(D) $K_2\,[Fe(CN)_6]$

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q85. If the temperature increase from 0°C to 50°C at atmospheric pressure, which of the following processes is expected to take place more in case of liquids?

(A) Freezing

(B) Vaporization

(C) Sublimation

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q86. On a humid day in summer, the mole fraction of gaseous H_2 O (water vapour) in the air at 25° C can be as high as 0.0287. Assuming a total pressure of 0.977 atm. What is the partial pressure of dry air?

(A) 94.9 atm

(B) 0.949 atm

(C) 949 atm

(D) 0.648 atm

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q87. One mole of non-volatile solute is dissolved in two mole of water. The vapour pressure of the solution relative to that of water is :

(A) 2/3

(B) 1/3

(C) 1/2

(D) 3/2

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q88. The atmospheric pressure is sum of the

(A) Pressure of the biomolecules

(B) Vapour pressure of atmospheric constituents

(C) Vapour pressure of chemicals and vapour pressure of volatiles

(D) Pressure created on to atmospheric molecules

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q89. The vapour pressure (VP) of a dilute solution of non-volatile solute is P and the VP of pure solvent is P_0, the lowering of the VP is :

(A) +ve

(B) –ve

(C) P/P_0

(D) P_0/P

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q90. The vapour pressure of a dilute aqueous solution of Glucose is 750 mm of mercury at 373 K. The mole fraction of solute is -

(A) $\frac{1}{10}$

(B) $\frac{1}{7.6}$

(C) $\frac{1}{35}$

(D) $\frac{1}{76}$

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q91. The vapour pressure of a dilute solution is not influenced by :

(A) Temperature of solution

(B) Melting point of solute

(C) Mole fraction of solute

(D) Degree of dissociation of solute

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q92. The vapour pressure of a pure liquid A is 40 mm Hg at 310 K. The vapour pressure of this liquid in a solution with liquid B is 32 mm Hg. What is the mole fraction of A in the solution if it obeys the Raoult's law?

(A) 0.5

(B) 0.6

(C) 0.7

(D) 0.8

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q93. The vapour pressure of benzene at 90°C is 1020 torr. A solution of 5 g of a solute in 58.5 g benzene has vapour pressure 990 torr. The molecular weight of the solute is :

(A) 78.2

(B) 178.2

(C) 206.2

(D) 220

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q94. The vapour pressure of benzene at a certain temperature is 640 mm of Hg. A non-volatile and non-electrolyte solid weighing 2.175 g is added to 39.08 g of benzene. If the vapour pressure of the solution is 600 mm of Hg, what is the molecular weight of solid substance in g/mol

(A) 49.50

(B) 59.60

(C) 69.6

(D) 79.82

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q95. The vapour pressure of two liquids P and Q are 80 torr and 60 torr respectively. The total vapour pressure obtained by mixing 3 mole of P and 2 mole of Q would be :

(A) 68 torr

(B) 20 torr

(C) 140 torr

(D) 72 torr

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q96. The vapour pressure of water depends upon :

(A) Surface area of container

(B) Volume of container

(C) Temperature

(D) All of these

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q97. Vapour pressure of dilute aqueous solution of glucose is 750 mm of mercury at 373 K. The mole fraction of solute is

(A) 1/76

(B) 1/7.6

(C) 1/38

(D) 1/10

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q98. Vapour pressure of a solvent containing non-volatile solute is :

(A) More than the vapour pressure of a solvent

(B) Less than the vapour pressure of solvent

(C) Equal to the vapour pressure of solvent

(D) None of the above

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q99. Vapour pressure of pure A = 100 torr, moles = 2 mol; vapour pressure of pure B=80 torr, moles = 3 mol. Total vapour pressure of the mixture is

(A) 440 torr

(B) 460 torr

(C) 180 torr

(D) 88 torr

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q100. Water will boil at 101.5°C at which of the following pressure?

(A) 76 cm of Hg

(B) 76 mm of Hg

(C) > 76 cm of Hg

(D) < 76 cm of Hg

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q101. When an ideal binary solution is in equilibrium with its vapour, molar ratio of the two components in the solution and in the vapour phase is :

(A) Same

(B) Different

(C) May or may not be same depending upon volatile nature of the two components

(D) None of the above

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q102. Which solution will have least vapour pressure?

(A) 0.1 M $BaCl_2$

(B) 0.1 M urea

(C) 0.1 M $Na_2\ SO_4$

(D) 0.1 M $Na_3\ PO_4$

Correct Answer: **(D)** Level: **Easy** Tagging: **Analyzing**

Q103. Vapour pressure of CCl_4 at 25°C is 143 mm of Hg and 0.5 g of a non-volatile solute (mol. wt=65) is dissolved in100 mL CCl_4. Find the vapour pressure of the solution. (Density of $CCl_4 = 1.58\ g/cm^2$)

(A) 94.39 mm

(B) 141.93 mm

(C) 134.44 mm

(D) 199.34 mm

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q104. At 88°C benzene has a vapour pressure of 900 torr and toluene has a vapour pressure of 360 torr. What is the mole fraction of benzene in the mixture with toluene that will boil at 88°C at 1 atm pressure, benzene-toluene form an ideal solution?

(A) 0.416

(B) 0.588

(C) 0.688

(D) 0.74

Correct Answer: **(D)** Level: **Moderate** Tagging: **Evaluating**

Q105. The highest temperature at which vapour pressure of a liquid can be measured is :

(A) b.p. of liquid

(B) Critical temperature (Tc)

(C) Critical solution temperature

(D) Inversion temperature

Correct Answer: **(A)** Level: **Moderate** Tagging: **Remembering**

Q106. The partial pressure of ethane over a saturated solution containing 6.56×10^{-2}g of ethane is 1 bar. If the solution contains 5.0×10^{-2} g of ethane, the partial pressure of ethane will be :

(A) 0.762 bar

(B) 1.762 bar

(C) 0.1 bar

(D) 0.2 bar

Correct Answer: **(A)** Level: **Difficult** Tagging: **Evaluating**

5. Ideal and Non-ideal Solution

Q107. An ideal solution is that which

(A) Shows positive deviation from Raoult's law

(B) Shows negative deviation from Raoult's law

(C) Has no connection with Raoult's law

(D) Obeys Raoult's law

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q108. Binary liquid Solutions which exhibit negative deviations from Raoult’s law boil at temperature ….than the expected value :

(A) Lower

(B) Higher

(C) Same

(D) Cannot be said

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q109. If molecular interaction of two different liquid molecules are stronger than the molecular interactions of the same liquid molecules the mixture is expected to show :

(A) Positive deviation

(B) Negative deviation

(C) No deviations

(D) Positive as well as negative deviations

Correct Answer: **(B)** Level: **Easy** Tagging: **Understanding**

Q110. When attraction between A-B is more than that of A-A and B-B, the solution will show…..deviation from Raoult’s law

(A) Positive

(B) Negative

(C) No

(D) Cannot predicted

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q111. When two liquids A and B are mixed then their boiling points becomes greater than both of them. What is the nature of this solution?

(A) Ideal solution

(B) Normal solution

(C) Negative deviation with non-ideal solution

(D) Positive deviation with non-ideal solution

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q112. Which of the following is not correct for ideal solution?

(A) $\Delta V_{mix}=0$

(B) $\Delta H_{mix}=0$

(C) $\Delta S_{mix}=0$

(D) Obeys Raoult's law

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q113. Which of the following is true when components forming an ideal solution are mixed?

(A) $\Delta H_m = \Delta V_m = 0$

(B) $\Delta H_m < \Delta V_m$

(C) $\Delta H_m = \Delta V_m = 1$

(D) $\Delta H_m > \Delta V_m$

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q114. Which of the following liquid pair shows a positive deviation from Raoult's law?

(A) Water-nitric acid

(B) Acetone-chloroform

(C) Water-hydrochloric acid

(D) Benzene-methanol

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q115. Which of the following liquid pairs shows a positive deviation from Raoult's law

(A) Water-nitric acid

(B) Benzene-methanol

(C) Water-hydrochloric acid

(D) Acetone-chloroform

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q116. Which of the following will form an ideal solution?

(A) C_2H_5OH and water

(B) HNO_3 and water

(C) $CHCl_3$ and CH_3COCH_3

(D) C_6H_6 and $C_6H_5CH_3$

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q117. Which one of the following mixtures can be separated into pure components by fractional distillation?

(A) Benzene - toluene

(B) Water - ethyl alcohol

(C) Water - nitric acid

(D) Water - hydrochloric acid

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

6. Colligative Properties and Determination of Molar Mass

Relative lowering in vapour pressure of a solution containing 1 mole K_2SO_4 in 54 g H_2O is : (K_2SO_4 is 100% ionised)

Q118.

(A) $\frac{1}{55}$

(B) $\frac{3}{55}$

(C) $\frac{3}{4}$

(D) $\frac{1}{2}$

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q119.

Mole fraction of solute in an aqueous solution which boils at 100.104. K_b for $H_2O = 0.52$ K molality^{-1}:

(A) 3.6×10^{-3}

(B) 0.004

(C) 5.6×10^{-3}

(D) 0.996

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q120.

The freezing point (in°C) of solution containing 0.1 g of $K_3[Fe(CN)_6]$(mol. wt 329) in 100 g of water ($K_f = 1.86$ K kg mol^{-1})is

(A) -2.3×10^{-2}

(B) -5.7×10^{-2}

(C) -5.7×10^{-3}

(D) -1.2×10^{-2}

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q121. 0.1 molal aqueous solution of NaBr freezes at -0.335°C at atmospheric pressure k_f for water is 1.86℃. The percentage of dissociation of the salt in solution is

(A) 90

(B) 80

(C) 58

(D) 98

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q122. 1.0 g of a non-electrolyte solute (molar mass 250 g mol^{-1}) was dissolved in 51.2 g of benzene. If the freezing point depression constant of benzene is 5.12 K kg mol^{-1}, the lowering in freezing point will be :

(A) 0.5 K

(B) 0.2 K

(C) 0.4 K

(D) 0.3 K

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q123. A 0.5 molal aqueous solution of a weak acid (HX) is 20 per cent ionized. The lowering in freezing point of this solution is : (K_f=1.86 K/m for water)

(A) 0.56 K

(B) -0.56 K

(C) 1.12 K

(D) -1.12 K

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q124. A thermometer which can be used only for accurate measurement of small differences in temperature is known as a:

(A) Beckmann thermometer

(B) Contact thermometer

(C) Clinical thermometer

(D) Platinum resistance thermometer

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q125. According to phase rule, if P=3,C=1, then F must be equal to :

(A) 2

(B) 1

(C) Zero

(D) 4

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q126. At 25°C , the highest osmotic pressure is exhibited by 0.1 M solution of

(A) Urea

(B) Glucose

(C) KCl

(D) $CaCl_2$

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q127. At certain temperature a 5.12% solution of cane sugar is isotonic with a 0.9% solution of an unknown solute. The molar mass of solute is

(A) 60

(B) 46.17

(C) 120

(D) 90

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q128. Beckmann thermometer is used to measure :

(A) Boiling point of the solution

(B) Freezing point of the solution

(C) Any temperature

(D) Elevation in boiling point or depression in freezing point

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q129. Camphor is used as solvent to determine mol. wt. of non-volatile solute by Rast method because for camphor :

(A) Is readily available

(B) Is volatile

(C) has high molal depression constant

(D) Is solvent for organic substances

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q130. Choose the correct statement. When concentration of a salt solution is increased

(A) Boiling point increases while vapour pressure decreases.

(B) Boiling point decreases while vapour pressure increases.

(C) Freezing point decreases while vapour pressure increases.

(D) Freezing point increases while vapour pressure decreases.

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q131. Colligative properties are used for the determination of

(A) Molar mass

(B) Equivalent weigh

(C) Arrangement of molecules

(D) Melting and boiling points

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q132. Elevation in boiling point was 0.52°C when 6 g of a compound was dissolved in 100 g of water. Molecular weight of X is (k_b of water is 5.2°C per 100 g water)

(A) 120 g mol^{-1}

(B) 60 g mol^{-1}

(C) 600 g mol^{-1}

(D) 180 g mol^{-1}

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q133. Equimolal Solutions will have the same boiling point, provided they do not show :

(A) Electrolysis

(B) Association

(C) Dissociation

(D) Association or dissociation

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q134. For an aqueous solution, freezing point is -0.186℃. Elevation of the boiling point of the same solution is $(k_f = 1.86° \, mol^{-1} \text{ kg and } k_b = 0.512° \, mol^{-1} \, kg)$

(A) 0.186°

(B) 0.0512°

(C) 1.86°

(D) 5.12°

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q135. If 0.15 g of a solute, dissolved in 15 g of solvent, is boiled at a temperature higher by 0.216°C than that of the pure solvent. The molecular weight of the substance (molal elevation constant for the solvent is 2.16°C) is

(A) 100

(B) 10.1

(C) 10

(D) 1.001

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q136. If sodium sulphate is considered to be completely dissociated into cations and anions in aqueous solution, the change in freezing point of water (ΔT_f), when 0.01 mole of sodium sulphate is dissolved in 1 kg of water, is (k_f=1.86 Kkg

(A) 0.0372 K

(B) 0.0558 K

(C) 0.0744 L

(D) 0.0186 K

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q137. If α is the degree of dissociation of $Na_2 SO_4$ the van't Hoff factor (i) used for calculating the molecular mass is

(A) 1-2 α

(B) 1+2 α

(C) 1-α

(D) 1+ α

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q138. In a 0.2 molal aqueous solution of a weak acid HX, the degree of ionization is 0.3. Taking $K_f$for water as 1.85, the freezing point of the solution will be nearest to

(A) -360℃

(B) 0.260℃

(C) +0.480℃

(D) -0.480℃

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q139. In the case of osmosis, solvent molecules move from :

(A) Higher vapour pressure to lower vapour pressure

(B) Higher concentration to lower concentration

(C) Lower vapour pressure to higher vapour pressure

(D) Higher osmotic pressure to lower osmotic pressure

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q140. Increasing the temperature of an aqueous solution will cause

(A) Decrease in molarity

(B) Decrease in molality

(C) Decrease in mole fraction

(D) Decrease in % w/w

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q141. Lowering in vapour pressure is the highest for:

(A) 0.2 m urea

(B) 0.1 m glucose

(C) 0.1 m $MgSO_4$

(D) 0.1 m $BaCl_2$

Correct Answer: **(A)** Level: **Easy** Tagging: **Analyzing**

Q142. Molal elevation constant of a liquid is :

(A) The elevent in b.p. which would be produced by dissolving one mole of solute in 100 g of solvent

(B) The elevation of b.p. which would be produced by dissolving 1 mole solute in 10 g of solvent.

(C) Elevation in b.p. which would be produced by dissolving 1 mole of solute in 1000 g of solvent

(D) None of the above

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q143. Osmatic pressure is 0.0821 atm at temperature of 300 K. Find concentration in mole per litre

(A) 0.33

(B) 0.22×10^{-2}

(C) 0.33×10^{-2}

(D) 0.44×10^{-2}

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q144. Phenol dimerises in benzene having van't Hoff factor 0.54. What is the degree of association?

(A) 1.92

(B) 0.98

(C) 1.08

(D) 0.92

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q145. Relative lowering of vapour pressure of a dilute solution is 0.2. What is the mole fraction of the non-volatile solute ?

(A) 0.8

(B) 0.5

(C) 0.3

(D) 0.2

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q146. Solution A contains 7 g/L of $MgCl_2$ and solution B contains 7 g/L of NaCl. At room temperature, the osmotic pressure of

(A) Solution A is greater than B

(B) Both have same osmotic pressure

(C) Solution B is greater than A

(D) Cannot be determine

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q147. The amount of ice that will separate out on cooling a solute containing 50 g of ethylene glycol in 200 g water to -9.3°C will be

(A) 8.37 g

(B) 161.3 g

(C) 3.87 g

(D) 38.7 g

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q148. The conditions for the validity of Henry's law is/are :

(A) The pressure should not be too high

(B) The temperature should not be too low

(C) The gas should neither dissociate not enter into chemical combination with solvent

(D) All of the above

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q149. The depression in f. p. of 0.01 m aqueous solution of urea, sodium chloride and sodium sulphate is in the ratio :

(A) 1 : 1 : 1

(B) 1 : 2 : 3

(C) 1 : 2 : 4

(D) 2 : 2 : 3

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q150. The distribution law was given by :

(A) Henry

(B) Nernst

(C) van't Hoff

(D) Ostwald

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q151. 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 of the above

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q152. The elevation of boiling point method is used for the determination of molecular weight of:

(A) Non-volatile and soluble solute

(B) Non-volatile and insoluble solute

(C) Volatile and soluble solute

(D) Volatile and insoluble solute

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q153. The Henry's law constant for the solubility of N_2 gas in water at 298 K is 1.0 × 105 atm. The mole fraction of N_2 In air is 0.8 The number of moles of N_2 from air dissolved in 10 moles of water of 298 K and 5 atm pressure is

(A) 4×10^{-4}

(B) 4.0×10^{-5}

(C) 5.0×10^{-4}

(D) 4.0×10^{-6}

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q154. The increase in boiling point of a solution containing 0.6 g urea in 200 g water is 0.50° C.Find the molal elevation constant.

(A) 10 K kg mol^{-1}

(B) 10 K g mol^{-1}

(C) 10 K kg mol

(D) 1.0 K kg mol^{-1}

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q155. 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 increase. This is because :

(A) Ice is less denser than water

(B) Pressure generates heat

(C) The bonds break under pressure

(D) Ice is not a true solid

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q156. The modal elevation constant of water is 0.52℃. The boiling point of 1.0 modal aqueous KCl solution (assuming complete dissociation of KCl), therefore, should be

(A) 98.96℃

(B) 100.52℃

(C) 101.04℃

(D) 107.01℃

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q157. The molal boiling point constant of water is 0.53°C. When 2 mole of glucose are dissolved in 4000 g of water, the solution will boil at :

(A) 100.53 °C

(B) 101.06 °C

(C) 100.265 °C

(D) 99.47 °C

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q158. The molal elevation constant for water is 0.52 K m^{-1}. 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°C

(B) 5.2°C

(C) 0.52°C

(D) 0.052°C

Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q159. The molal elevation constant for water is 0.52. What will be the boiling point of 2 molar sucrose solution at 1 atm pressure? (Assume b.p. of pure water is 100°C)

(A) 101.04°C

(B) 100.26°C

(C) 100.52°C

(D) 99.74°C

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q160. The molal elevation/depression constant depends upon :

(A) Nature of solvent

(B) Nature of solute

(C) Temperature

(D) ΔH solution

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q161. The osmatic pressure of 0.4% urea solution is 1.66 atm. and that of a Solution of sugar of 3.42% is 2.46 atm. When both the Solutions are mixed then the osmatic pressure of the resultant solution will be

(A) 1.02 atm

(B) 2.06 atm

(C) 3.04 atm

(D) 0.02 atm

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q162. The osmotic pressure (At27°C) of an aqueous solution (200 mL) containing 6 g of a protein is 2×10^{-3} atm . If R=0.080 L atm mol^{-1} K^{-1}, the molecular weight of protein is

(A) 7.2×10^5

(B) 3.6×10^5

(C) 1.8×10^5

(D) 1.0×10^5

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q163. The relative lowering of vapour pressure of a dilute aqueous solution containing non-volatile solute is 0.0125. The molality of the solution is about

(A) 0.70

(B) 0.50

(C) 0.90

(D) 0.80

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q164. The relative lowering of vapour pressure produced by dissolving 71.5 g of a substance in 1000 g of water is 0.00713. The molecular weight of the substance will be :

(A) 180

(B) 18

(C) 342

(D) 60

Correct Answer: **(A)** Level: **Easy** Tagging: **Evaluating**

Q165. The statement "the relative lowering of the vapour pressure is equal to the ratio of moles of the solute to the total number of the moles in the solution" refers to

(A) Hess's law

(B) Dalton's law

(C) Raoult's law

(D) Charles's law

Correct Answer: **(C)** Level: **Easy** Tagging: **Understanding**

Q166. The temperature at which vapour pressure of a solvent in its liquid and solid phase becomes same is called :

(A) b. p.

(B) f. p.

(C) Krafft point

(D) None of these

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q167. The van't hoff factor for 0.1 m $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is

(A) 91.3%

(B) 87%

(C) 100%

(D) 74%

Correct Answer: **(B)** Level: **Easy** Tagging: **Evaluating**

Q168. The van't Hoff factor i for a compound which undergoes dissociation in one solvent and association in other solvent is respectively :

(A) Greater than one and greater than one

(B) Less than one and greater than one

(C) Less than one and less than one

(D) Greater than one and less than one

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q169. Van't hoff factor of $Ca(NO_3)_2$ is

(A) One

(B) Two

(C) Three

(D) four

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q170. What is the freezing point of a solution containing 8.1 g HBr in 100 g water assuming the acid to be 90% ionised ($k_f$for water =1.86 kg mol^{-1})?

(A) -0.35°C

(B) -1.35°C

(C) -2.35°C

(D) -3.53°C

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q171. When 10 g of a non-volatile solute is dissolved in 100 g of benzene, it raises boiling point by 1°C then molecular mass of the solute is (k_b for C_6 H_6=2.53 kg-mol^{-1})

(A) 223 g

(B) 233 g

(C) 243 g

(D) 253 g

Correct Answer: **(D)** Level: **Easy** Tagging: **Evaluating**

Q172. When mercuric iodide is added to the aqueous solution of potassium iodide, the

(A) Freezing point is raised

(B) Freezing point is lowered

(C) Freezing point does not change

(D) Boiling point does not change

Correct Answer: **(A)** Level: **Easy** Tagging: **Understanding**

Q173. Which is a colligative property ?

(A) Osmotic pressure

(B) Free energy

(C) Heat of vaporisation

(D) Change in pressure

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q174. Which is not a colligative property in the following?

(A) pH ofa buffer solution

(B) Boiling point elevation

(C) Freezing point depression

(D) Vapour pressure lowering

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q175. Which of the following aqueous Solutions produce the same osmotic pressure? (i)0.1 M NaCl solution (ii) 0.1 M glucose solution (iii)0.6 g urea in 100 mL solution (iv)1.0 g of a non-electrolyte solute (X) in 50 mL solution (molar mass of X=200)

(A) (i), (ii), (iii)

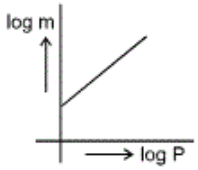
(B) (ii), (iii), (iv)

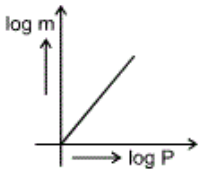
(C) (i), (ii), (iv)

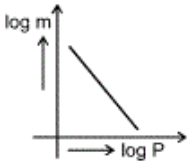
(D) (i), (iii), (iv)

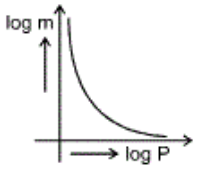
Correct Answer: **(C)** Level: **Easy** Tagging: **Evaluating**

Q176. Which of the following curves represents the Henry's law ?

(A) 

(B) 

(C) 

(D) 

Correct Answer: **(B)** Level: **Easy** Tagging: **Analyzing**

Q177. Which of the following is incorrect?

(A) Relative lowering of vapour pressure is independent

(B) Vapour pressure of a solution is lower than the vapour pressure of the solvent

(C) The vapour pressure is a colligative property

(D) The relative lowering of vapour pressure is directly proportional to the mole fraction solute

Correct Answer: **(A)** Level: **Easy** Tagging: **Analyzing**

Q178. Which of the following is incorrect?

(A) Relative lowering of vapour pressure is independent of the solute and the solvent.

(B) The relative lowering of vapour pressure is a colligative property.

(C) Vapour pressure of a solution is lower than the vapour pressure of the solvent.

(D) The relative lowering of vapour pressure is directly proportional to the original pressure.

Correct Answer: **(D)** Level: **Easy** Tagging: **Analyzing**

Q179. Which of the following is not a colligative property?

(A) Optical activity

(B) Osmotic pressure

(C) Depression of freezing point

(D) Elevation of boiling point

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q180. Which of the following shows maximum depression in freezing point?

(A) $K_2 SO_4$

(B) NaCl

(C) Urea

(D) glucose

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q181. Which of the following solution highest boiling point?

(A) 0.1 M urea

(B) 0.1 M sucrose

(C) 0.1 M $NaNO_3$

(D) 0.1 M $Al(NO_3)_3$

Correct Answer: **(D)** Level: **Easy** Tagging: **Analyzing**

Q182. Which of the following Solutions will have the highest boiling point ?

(A) Camphor

(B) Naphthalene

(C) Benzene

(D) Water

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q183. Which of the given Solutions has highest osmotic pressure?

(A) 1N $NaNO_3$

(B) 1N $Ba(NO_3)_2$

(C) 1N $Al(NO_3)_3$

(D) 1 N $Th(NO_3)_4$

Correct Answer: **(D)** Level: **Easy** Tagging: **Applying**

Q184. Which one is a colligative property?

(A) Raoult's law states that the vapour pressure of a component over a solution is proportional to its mole fraction

(B) The osmotic pressure (π)of a solution is given by the equation π = MRT, where , M is the molarity of the solution

(C) The correct order of osmotic pressure for 0.01 M aqueous solution of each compound is $BaCl_2$>KCl>CH_3 COOH> sucrose

(D) Two sucrose Solutions of same molality prepared in different solvents will have the same freezing point depression

Correct Answer: **(D)** Level: **Easy** Tagging: **Analyzing**

Q185. Which one of the following aqueous Solutions will exhibit highest boiling point?

(A) 0.01 M $Na_2 SO_4$

(B) 0.01 M KNO_3

(C) 0.015 M urea

(D) 0.015 M glucose

Correct Answer: **(A)** Level: **Easy** Tagging: **Analyzing**

Q186. Which one of the statements given below concerning properties of Solutions, describes a colligative effect?

(A) Vapour pressure of pure water decreases by the addition of nitric acid

(B) Boiling point of pure water decreases by the addition of ethanol

(C) Boiling point of pure benzene increases by the addition of toluene

(D) Vapour pressure of pure benzene decreases by the addition of naphthalene

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q187. Which solution would exhibit abnormal osmotic pressure?

(A) Aqueous solution of urea

(B) Aqueous solution of common salt

(C) Aqueous solution of glucose

(D) Aqueous solution of sucrose

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q188.

When 20 g of naphthoic acid ($C_{11}H_8O_2$) is dissolved in 50 g of benzene ($k_f = 1.72\ K\ \text{kg mol}^{-1}$), a freezing point depression of 2 K is observed. The van't Hoff factor (i) is

(A) 0.5

(B) 1

(C) 2

(D) 3

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q189.

The freezing point depression of 0.001 m, $K_x[Fe(CN)_6]$ is 7.10×10^{-3}K. If for water, k_f is 1.86 K Kg mol^{-1}, value of x will be

(A) 4

(B) 3

(C) 2

(D) 1

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q190.

The freezing point (in °C) of a solution containing 0.1 g of $K_3[Fe(CN)_6]$ (mol.wt.329) in 100 g of water is : ($K_f = 1.86\ K\ \text{kg mol}^{-1}$)

(A) -2.3×10^{-2}

(B) -5.7×10^{-2}

(C) -5.7×10^{-3}

(D) -1.2×10^{-2}

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q191.

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

(A) 0.381

(B) 2.05

(C) 2.63

(D) 3.11

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q192.

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 $-2.8°C$?

(A) 93 g

(B) 39 g

(C) 27 g

(D) 72 g

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q193. Glucose is added to 1 litre water to such an extent that $\frac{\Delta T_f}{K_f}$ becomes equal to $\frac{1}{1000}$, the weight of glucose added is :

(A) 180 g

(B) 18 g

(C) 1.8 g

(D) 0.18 g

Correct Answer: **(D)** Level: **Moderate** Tagging: **Evaluating**

Q194. 20 g of binary electrolyte (mol. wt. =100) is dissolved in 500 g of water. The depression in freezing point of the solution is 0.74℃ (k_f=1.86 Km^{-1}), the degree of ionisation of the electrolyte is

(A) 0%

(B) 100%

(C) 75%

(D) 50%

Correct Answer: **(A)** Level: **Moderate** Tagging: **Evaluating**

Q195. Depression in freezing point is 6 K for NaCl solution if k_f for water is 1.86 K/kg mol, amount of NaCl dissolved in 1 kg water is

(A) 3.42

(B) 1.62

(C) 3.24

(D) 1.71

Correct Answer: **(B)** Level: **Moderate** Tagging: **Evaluating**

Q196. In an osmotic pressure measurement experiment, a 5% solution of compound 'X' is found to be isotonic with a 2 % acetic acid solution . The gram molecular mass of 'X' is

(A) 24

(B) 60

(C) 150

(D) 300

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q197. The freezing point of aqueous solution that contains 5% by mass urea, 1.0% by mass KCl and 10% by mass of glucose is : (K_f H_2 O=1.86 K molality^{-1})

(A) 290.2 K

(B) 285.5 K

(C) 269.93 K

(D) 250 K

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q198. Two Solutions of KNO_3 and CH_3 COOH are prepared separately. Molarity of both is 0.1 M and osmatic pressures are p_1 and $p_2$respectively. The correct relationship between the osmatic pressures is

(A) $p_1 = p_2$

(B) $p_1 > p_2$

(C) $p_2 > p_1$

(D) $\frac{p_1}{p_1+p_2} + \frac{p_2}{p_1+p_2}$

Correct Answer: **(B)** Level: **Moderate** Tagging: **Understanding**

Q199. A solute when distributed between two immiscible phases remains associated in phase II and dissociated in phase I. If α is the degree of dissociation and n is the number of molecules associated then :

(A) $K = \frac{c_I}{c_{II}}$

(B) $K = \frac{c_I}{\sqrt[n]{c_{II}(1-\alpha)}}$

(C) $K = \frac{c_I}{c_{II}\,(1-\alpha)}$

(D) $K = \frac{c_I(1-\alpha)}{\sqrt[n]{c_{II}}}$

Correct Answer: **(D)** Level: **Difficult** Tagging: **Evaluating**

7. Abnormal Molar Masses

Q200. Abnormal molar mass is a term used to describe a molar mass that is:

(A) Accurately determined

(B) Equal to the true value

(C) Lower or higher than the expected or normal value

(D) Affected by interionic attractions

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q201. Abnormal molar mass is produced by :

(A) Dissociation of solute

(B) Association of solute

(C) Both association and dissociation of solute

(D) Separation by semipermeable membrane

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q202. Acetic acid associates as dimers in benzene. What is the Van't Hoff factor (i) if the degree of association of acetic acid is 50%?

(A) 0.25

(B) 0.50

(C) 0.75

(D) 0.40

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q203. In the formula for calculating the van't Hoff factor (i), what does "Observed colligative property" refer to?

(A) The expected colligative property

(B) The experimentally determined molar mass

(C) The colligative property considering dissociation or association

(D) The total number of moles of solute particles

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q204. The Van't Hoff factor i for a 0.2 molal aqueous solution of urea is

(A) 0.2

(B) 1.2

(C) 0.1

(D) 1.0

Correct Answer: **(D)** Level: **Easy** Tagging: **Remembering**

Q205. The van't Hoff factor, denoted as "i," is introduced to account for the extent of dissociation or association in a solution. What is the value of "i" for ethanoic acid in benzene?

(A) Approximately 2

(B) Approximately 0.5

(C) Exactly 1

(D) Zero

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q206. What happens to the boiling point of a solution when one mole of KCl is dissolved in one kg of water, assuming no interionic attractions?

(A) It decreases

(B) It remains unchanged

(C) It increases by 1.04 K

(D) It increases by 0.52 K

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q207. What is the value of the Van't Hoff factor (i) for solutes that dissociate in water?

(A) > 1

(B) < 1

(C) $= 0$

(D) Not defined

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q208. What is the Van't Hoff Factor for 1 mole of $BaCl_2$, assuming 100% dissociation?

(A) 0.33

(B) 1

(C) 3

(D) 2

Correct Answer: **(C)** Level: **Easy** Tagging: **Remembering**

Q209. When an ionic compound dissolves in water, it dissociates into:

(A) Cations and anions

(B) Molecules and atoms

(C) Neutral particles

(D) Electrons and protons

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q210. When benzoic acid is dissolved in benzene, the observed molecular mass is

(A) 244

(B) 61

(C) 366

(D) 122

Correct Answer: **(A)** Level: **Easy** Tagging: **Applying**

Q211. Which of the following aqueous solutions should have the least boiling point?

(A) 1.0 M KOH

(B) 1.0 M $(NH_4)_2SO_4$

(C) 1.0 M K_2CO_3

(D) 1.0 M K_2SO_4

Correct Answer: **(A)** Level: **Easy** Tagging: **Remembering**

Q212. Which of the following statements is correct?

(A) Solutes that dissociate in water have molar mass higher than the molar mass of the solute calculated theoretically

(B) Solutes that associate in water have molar mass higher than the molar mass of the solute calculated theoretically

(C) Solutes that dissociate in water experience a decrease in colligative properties

(D) Colligative properties are independent of the number of particles of the solute in the solution

Correct Answer: **(B)** Level: **Easy** Tagging: **Remembering**

Q213. The depression of freezing point of a solution of acetic acid in benzene is – 0.2°C. If the molality of acetic acid is 0.1 m, then find the ratio of the normal mass to the abnormal mass. (Assume Kf of acetic acid = 4.0°C m^{-1})

(A) 1.5

(B) 0.8

(C) 0.5

(D) 0.2

Correct Answer: **(C)** Level: **Moderate** Tagging: **Evaluating**

Q214. The pH of a 2 M solution of a weak monobasic acid (HA) is 4. What is the value of the Van't Hoff factor?

(A) 0.00005

(B) 1.005

(C) 1.0005

(D) 1.00005

Correct Answer: **(D)** Level: **Moderate** Tagging: **Evaluating**