CHEMISTRY

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

SOLUTIONS AND COLLIGATIVE PROPERTIES

Example

1. 10 g if NaOh us dissolved in 200 mL of solution. Calculate the strength.

A. $\dfrac{40g}{L}$

B. $\dfrac{50g}{L}$

C. $\dfrac{30g}{L}$

D. $\dfrac{20g}{L}$

Answer: B

2. Calculate the molarity of KI if the density of 20% (mass/mass) aqueous KI is $1.202\ \mathrm{g\,mL}^{-1}$

    A. $0.004M$

    B. $1.25M$

    C. $0.25M$

    D. $1.45M$

Answer: D

3. Calculate the volume of 2M HCI solution requited to prepare 3L of 3M HCI solution.

    A. 4.5 L

B. 3.5 L

C. 2.5 L

D. 8.5 L

Answer: A

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4. If the density of lake water is 1.25 g mL^{-1} and it contains 92 g of Na^+ ions per kg of water, calculate the molality of Na^+ ions in the lake.

A. 2 m

B. 4m

C. 8 m

D. 10 m

Answer: B

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5. The normality of a solution formed by mixing 0.45 N and 0.60 N N OH

in the ratio of $2:1$ by volume is

A. 0.15 N

B. 0.8 N

C. 0.5 N

D. 0.45 N

Answer: C

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6. The partial pressure of ethane over a solution containing 6.56×10^{-3} g

of ethane is 1 bar. If the solution contains 5×10^{-2} g of ethane, then

what will be the partial pressure of gas ?

A. 4.2 bar

B. 7.6 bar

C. 8.9 bar

D. 9.8 bar

Answer: B

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7. The vapour pressure of a pure liquid A is $40mmHg$ at $310K$. The vapour pressure of this liquid in a solution with liquid B is $32mmHg$. The mole fraction of A in the solution, if it obeys Raoult's law, is:

A. 0.5

B. 0.6

C. 0.7

D. 0.8

Answer: D

8. The vapore pressure of 100 g of water reduces from 17.53 mm to 17.22 mm when 17.10 g of substance 'X' is dissolved in it. Substance X can be

    A. methanol

    B. glucose

    C. carbon dioxide

    D. cannot predict

Answer: B

9. Calculate the boiling point of solution containing $0.456g$ of camphor (molar mass =152) dissolved in $31.4g$ of acetone (boiling point $= 56.30°C$), if the molar elevation constant per 100g of acetone is $17.2°C$.

A. $56.46°C$

B. $36.56°C$

C. $56.14°C$

D. $72.52°C$

Answer: A

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10. Calculate the amount of KCl which must be added to $1kg$ of water so that the freezing point is depressed by $2K$. (K_f for water $= 1.86Kkgmol^{-1}$).

A. 80.25 g

B. 80.75 g

C. 80.15 g

D. 81.15 g

Answer: C

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11. Osmotic pressure of a urea solution at $10°C$ is 500 mm. Osmotic pressure of the solution become 105.3 mm. When it is diluted and temperature raised to $25°C$.The extent of dilution is

A. 4 times

B. 3 times

C. 5times

D. 2 times

Answer: C

12. Determine the osmotic pressure of a solution prepared by dissolving $25mg$ of K_2SO_4 in $2L$ of water at $25°C$, assuming that it is completely dissociated.

A. $5.27 \times 10^{-4} atm$

B. $5.27 \times 10^{-3} atm$

C. $5.27 \times 10^{-2} atm$

D. $5.27 \times 10^{-1} atm$

Answer: B

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13. Determine the amount of $CaCl(i = 2.47)$ dissolved in $2.5L$ of water such that its osmotic pressure is $0.75atm$ at $27°C$.

A. 3.42 g

B. 4.28 g

C. 5.25 g

D. 6.24 g

Answer: A

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Exercise 1 Types Of Solutions And Concentration Of Solutions

1. On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid ?

A. Sugar crystals in cold water

B. Sugar crystals in cold water

C. Powdared sugar in cold water

D. powdered sugar in hot water

Answer: D

2. At equlibirium the rate of dissolutiono of a solid solute in a valatile liquid slvent is ......

    A. less than the rate of crstallisation

    B. greater than the rate of crystallisation

    C. equal to the rate of crystallisation

    D. zero

Answer: C

3. Identify the solute and solvent in the option given below, for a solution as amalgam of mercury with sodium.

	Solute	Solvent
A.	Solid	Liquid
B.	Solute	Solvent
	Solid	Solid
C.	Solute	Solvent
	Liquid	Solid
D.	Solute	Solvent
	Solid	Gas

Answer: C

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4. Match the following Columns and choose the correct option from codes given below.

	Column I		Column II
A.	Chloroform mixed with nitrogen ges.	1.	Gaseous solution
B.	Ethanol disolved in water.	2.	Solid solution
C.	Amalgam pf merciry with soldium.	3.	Liquid solution

A.	*A*	*B*	*C*
	1	2	3

B.	*A*	*B*	*C*
	1	3	2

C.	*A*	*B*	*C*
	2	1	3

	A	B	C
D.	2	3	1

Answer: B

5. Match the tererms given is Column I with the type of solutions given in

Column II.

	ColumnI		ColumnII
A.	Soda water	1.	A solution of gas in solid.
B.	Sugar solution	2.	A slution of gas in gas.
C.	German silver	3.	A solution of solid in liquid.
D.	Air	4.	A solution of solid in solid.
E.	Hydrogen gas in palladium.	5.	A solution of gas in liquid.
		6.	A solution of liquid in solid.

	A	B	C	D	E
A.	5	6	4	2	1

	A	B	C	D	E
B.	5	3	4	2	1

	A	B	C	D	E
C.	1	2	3	4	5

	A	B	C	D	E
D.	1	2	3	4	6

Answer: B

6. In which ratio of volumes 0.4 M HCl and 0.9 M HCl are to be mixed such that the concentration of the resultant solution becomes 0.7 M ?

   A. $4:9$

   B. $2:3$

   C. $3:2$

   D. $1:1$

Answer: B

7. The volume of water to be added to $100cm^3$ of 0.5 NH_2SO_4 to get decinormal concentration is

   A. $400cm^3$

B. $450cm^3$

C. $500cm^3$

D. $100cm^3$

Answer: A

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8. The molarity of a solution having 18g of glucose dissolved in 500 g of water is

A. $0.5m$

B. $0.2m$

C. $2m$

D. $1m$

Answer: B

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9. What Is the number of moles of H_2SO_4 required to prepare 5.0L of a2.0M solution of H_2SO_4 ?

A. 10

B. 5.0

C. 20

D. 2.5

Answer: A

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10. 20 mL of HCI soution requires 19.85 mL of 0.01 M NaOH solution for complete neutralization . The molarity of HCI solution is _____M.

A. 0.0099

B. 0.0099

C. 0.99

D. $0.1M$

Answer: A

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11. Which of the following concentration terms is/are independent of temperature ?

A. Molality

B. Molality and mole fraction

C. Molality and mole fraction

D. Molality and normality

Answer: B

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12. Glucose solution is 25% by weight of solution. Its per cent concentration by weight of solvent is

   A. 20 %

   B. 25 %

   C. 33.3 %

   D. 16.66 %

Answer: C

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13. Mole fraction of the solute in a 1 molal aqueous solution is :

   A. 1.7700

   B. 1.7770

   C. 0.0177

   D. 0.0344

Answer: C

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14. How many grams of H_2SO_4 is/are to be dissolved to prepare 200 mL aqueous solution having concentration of $\left[H_3O^+\right]$ ions is 1 M at $25°C$ temperature?

A. $4.9g$

B. $19.6g$

C. $9.8g$

D. $0.98g$

Answer: C

15. Which one of the following gases has the lowest value of Henry law constant ?

A. N_2

B. He

C. CO_2

D. O_2

Answer: C

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16. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, molar concentration of sodium ions, Na^+ and carbonate ions, CO_3^{2-} are respectively (Molar mass of $NaCO_3 = 106gmol^{-1}$)

A. $0.477M$ and $0.477MM$

B. $0.955M$ and 1.910

C. $1.910M$ and $0.955M$

D. $1.90M$ and $1.910M$

Answer: C

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

A. 1.100

B. 0.190

C. 0.086

D. 0.050

Answer: C

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18. A mixture of ethane and ethene occupies 41 L at atm and 500 K. The mixture reacts compeletly with 10/3 mole of oxygen to produce CO_2 and water. The mole fraction of ethane and ethene in the mixture are (R=0.0821L atm $K^{-1}mol^{-1}$ respectively

A. 0.50, 0.50

B. 0.75, 0.25

C. 0.67, 0.33

D. 0.25, 0.75

Answer: C

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19. The molarity of a 0.2 N Na_2CO_3 solution will be :

A. $0.1M$

B. $0M$

C. $0.4M$

D. 0.2

Answer: A

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20. The sum of mole fractions of A, B and C in an aqueous solution containing 0.2 moles of each A, B and C is

A. 0.6

B. 0.2

C. 1.0

D. 1.2

Answer: C

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21. Dissolving $120g$ of urea (mol wt $= 60$) in 1000g of water gave a solution of density 1.15 g/mL. The molarity of the solution is

A. $1.78M$

B. $2.00M$

C. $2.05M$

D. $2.22M$

Answer: C

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22. 4.0g of caustic soda is dissolved in 100 cc of solution. The normality of solution is

A. $0.1N$

B. $0.5N$

C. $4.0N$

D. $1.0N$

Answer: D

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23. Calculate the mass of urea (NH_2CONH_2) required in making $2.5kg$ of 0.25molal aqueous solution.

A. $37.5g$

B. $73.5g$

C. $53.7g$

D. $75.3g$

Answer: A

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24. $25cm^3$ of oxalic acid completely neutralised 0.064g of soldium hydroxied. molarity of the oxalic acid solution is

A. 0.064

B. 0.045

C. 0.015

D. 0.032

Answer: D

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25. The volume of 0.1M oxalic acid that can be completely oxidised by 20mL of $0.025MKMnO_4$ solution is

A. $25mL$

B. $12.5mL$

C. $37.5mL$

D. $125 mL$

Answer: B

26. The molarity of a solution containing $5.0g$ of NaOH in 250 mL solution is :

A. 0.1

B. 0.5

C. 1.0

D. 2.0

Answer: B

27. $10cm^3$ of 0.1N monobasic acid requires $15cm^3$ of sodium hydroxide solution whose normality is

A. $1.5N$

B. $0.15N$

C. $0.066N$

D. $0.66N$

Answer: C

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28. A mixture has 18 g water and 414 g ethanol . The mole fraction of water in mixture is (assume ideal behaviour of the mixture)_____.

A. 0.1

B. 0.4

C. 0.7

D. 0.9

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

    A. $9N$

    B. $0.3N$

    C. $3N$

    D. $1N$

Answer: A

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

A. $18L$

B. $9L$

C. $0.9L$

D. $1.8L$

Answer: D

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31. The volume strength of $1 \cdot 5$ N H_2O_2 solution is

A. 4.8

B. 8.4

C. 3.0

D. 8.0

Answer: B

32. 5 litre of a solution contains 25 mg of $CaCO_3$. What is its concentration in ppm? (mol.wt of $CaCO_3$ is 100)

A. 25

B. 1

C. 5

D. 2500

Answer: C

33. Mole fraction of solute in benzene is 0.2 then what is the value of molality of solute?

A. 3.2

B. 2

C. 4

D. 3.6

Answer: A

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34. Volume of 3.6 M NaOH required to neutralise $30cm^3$ of $0.4M$ HCl is

A. $20cm^3$

B. $40cm^3$

C. $45cm^3$

D. $30cm^3$

Answer: A

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35. The density (in g mL^{-1}) of a $3.60M$ sulphuric acid solution that is $29\% \ H_2SO_4$ (Molar mass $= 98gmol^{-1}$) by mass will be

A. 1.64

B. 1.88

C. 1.22

D. 1.45

Answer: C

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36. Calculate the mole fraction of ethylene glycol $(C_2H_6O_2)$ in a solution containing 20% of $C_2H_6O_2$ by mass.

A. 0.92

B. 0.76

C. 0.82

D. 0.36

Answer: A

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

A. $0.083mol$

B. $0.952mol$

C. $0.481mol$

D. $0.140mol$

Answer: D

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38. The density of $3M$ sodium of thiosulphate solution $(Na_2S_2O_3)$ is $1.25 gmL^{-1}$. Calculate

a. The precentage by weight of sodium thiosulphate.

b. The mole fraction of sodium thiosulphate.

c. The molalities of $Na^{\oplus}$ and $S_2O_3^{2-}$ ions.

A. 12.65 %

B. 37.92 %

C. 0.87 %

D. 63.21 %

Answer: B

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39. A sample ofsea water contains $5 \times 10^{-3} g$ of dissolved oxygen in 1 kg of the sample. The concentration of O_2 in that sea water sample in ppm is

A. 5×10^{-4}

B. 5×10^{-3}

C. 5

D. 5×10^{-1}

Answer: C

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40. Vapour pressure of pure A is 70 mm of Hg at $25°C$. If it forms an ideal

solution with B in which mole fraction of A is 0.8 and vapour pressure of

the solution is 84 mm of Hg at $25°C$, then the vapour pressure of pure B

at $25°C$ is

A. 56mm

B. 70mm

C. 140mm

D. 28mm

Answer: C

41. The mole fraction of ethyl alcohol in its solution with methyl alcohol is

0.80. The vapour pressure of ethyl alcohol in the solution is 40mm of Hg.

What is its vapour pressure in solution if the solution is ideal ?

A. 25mm

B. 30mm

C. 32mm

D. 20mm

Answer: C

42. Which of the following azeotropic solutions has the boiling point less than boiling point of the constituents A and B ?

A. $CHCI_3$ and CH_3COCH_3

B. CS_2 and CH_3COCH_3

C. CH_3CH_2OH and CH_3COCH_3

D. CH_3CHO and CS_2

Answer: C

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43. At $25°C$, the total pressure of an ideal solution obtained by mixing 3 mole of A and 2 mole of B, is 184 torr. What is the vapour pressure (in torr) of pure B at the same temperature (Vapour pressure of pure A at $25°C$ is 200 torr) ?

A. 180

B. 160

C. 16

D. 100

Answer: B

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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. Two liquids X and Y form an ideal solution. The mixture has a vapour pressure of 400 mm at 300 K when mixed in the molar ratio 1:1. when mixed in the molar ratio of 1:2 at the same temperatre the vapour pressure of the mixture is 350 mm. The vapour pressure of the two pure liquids X and Y respectively are

A. 250mm,550mm

B. 350mm,450mm

C. 350mm,700mm

D. 550mm,250mm

Answer: D

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46. A solution of acetone in ethnol

A. shows a negative deviation from Raoult's law

B. shows a positive deviation from Raoult's law

C. behaves like an ideal solution

D. obeys Raoult's law

Answer: B

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

A. $\dfrac{2}{3}$

B. $\dfrac{1}{3} \times \dfrac{273}{298}$

C. $\dfrac{1}{3}$

D. $\dfrac{1}{2}$

Answer: C

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48. One component of a solution follows Raoult's over the entire range $0 \le x_1 \le 1$. The second component must follow Raoult's law in the range when x_2 is

A. close to zero

B. close to 1

C. $0 \le x_2 \le 0.5$

D. $0 \le x_2 \le 1$

Answer: D

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49. On a humid day in summer, the mole fraction of gaseous H_2O (water vapour) in the air at $25°C$ can be as high as 0.0287. Assuming a total pressure of 0.977atm. What is the partial pressure of dry air ?

A. 94.9atm

B. 0.949atm

C. 949atm

D. 0.648atm

Answer: B

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

A. 68torr

B. 140torr

C. 48torr

D. 72torr

Answer: D

51. At 300 K the vapour pressure of an ideal solution containing 1 mole of liquid A and 2 moles of liquid B is 500 mm of Hg. The vapour pressure of the solution increases by 25 mm of Hg, if one more mole of B is added to the above ideal solution at 300K. Then the vapour pressure of A in its pure state is

    A. 300mm of Hg

    B. 400mm of Hg

    C. 500mm of Hg

    D. 600mm of Hg

Answer: A

52. 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. 700

D. 360

Answer: A

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53. A solution containing components A and B follows Raoult's law, when

A. A - B attraction force is greater than A - A and B - B

B. A - B attraction force remains same as A - A and B - B

C. A - B attraction force remains same as A - A and B - B

D. volume of solution is different from sum of volumes of solute and

solvent

Answer: C

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54. 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 $= 760mmHg$)

A. 52 mole per cent

B. 34 mole per cent

C. 48 mole per cent

D. 50 mole per cent

Answer: D

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

A. 0.8

B. 0.5

C. 0.3

D. 0.2

Answer: D

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56. Which of the following will show a negative deviation from Raoult's law ?

A. Acetone-benzene

B. Acetone-ethanol

C. Benzene-methanol

D. Acetone-chloroform

Answer: D

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57. Mole fraction of vapour of A above solution in mixture of A and $B(X_A = 0.4)$ will be $\left(P_A^\circ = 100mm, P_B^\circ = 200mm\right)$:

A. 0.4

B. 0.25

C. 0.85

D. None of these

Answer: B

58. In which case Raoult's law is not applicable ?

A. 1m NaCl

B. 1M urea

C. 1M glicose

D. 1M sucrose

Answer: A

59. 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

Answer: B

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60. If two substances A and B have $p_A^\circ : p_B^\circ = 1:2$ and have mole fraction in solution as 1:2 then mole fraction of A in vapour phase is

A. 0.33

B. 0.25

C. 0.52

D. 0.2

Answer: D

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61. Relative lowering in vapour pressure of solution containing non-volatile solute is directly proportional to mole fraction of solute. Above statement is

    A. Henry's law

    B. Dulong and petit's law

    C. Raoult's law

    D. Le-Chatelier's principle

Answer: C

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62. 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 these

Answer: B

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63. If M is molecular of solvent, K_b is molal elevation constant, T_b is its boiling point, P° is its vapour pressure at temperature T and P_s is vapour pressure of its solution having a non-volatile solute at T K, then

A. $\dfrac{p^\circ - p_s}{p^\circ} = \dfrac{\Delta T_b}{K_b} \times M$

B. $\dfrac{p^\circ - p_s}{p^\circ} = \dfrac{K_b}{T_b \times M}$

C. $\dfrac{p^\circ - p_s}{p^\circ} = \dfrac{K_b}{T_b} \times \dfrac{M}{1000}$

D. $\dfrac{p^\circ - p_s}{p^\circ} = \dfrac{\Delta T_b}{K_b} \times \dfrac{M}{1000}$

Answer: D

64. Solute is non-volatile and solvent molecule is volatile. Which of the following has maximum contribution in vapour phase ?

A. Solute

B. solvent

C. Solute and solvent both

D. None of these

Answer: B

65. When two liquids A and B are mixed, their boiling points become greater than both of them. The mixture is :

A. Ideal solution

B. Normal solution

C. Negative deviation with non-ideal solution

D. Positive deviation with non-ideal solution

Answer: C

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66. Vapour pressure of CCL_4 at $25°C$ is 143 mmHg 0.05g of a non-volatile solute (mol.wt.=65)is dissolved in $100mlCCL_4$. find the vapour pressure of the solution (density of $CCL_4 = 158g/cm^2$)

A. 94.39mm

B. 141.93mm

C. 134.44mm

D. 199.34mm

Answer: B

67. The vapour pressure of two liquids P and Q are 100 and 50 torr, respectively. The total vapour pressure of solution obtained by mixing 3 moles of P and 2 moles of Q would be

A. 140 torr

B. 20 torr

C. 68 torr

D. 80 torr

Answer: D

68. Which of the following plot obeys the Raoult's law for all concentration ?

A.

B.

C.

D.

Answer: C

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69. At $40°C$ the vapour pressure of pure liquids, benzene and toluene, are $160mmHg$ and $60mmHg$ respectively. At the same temperature, the vapour pressure of an equimolar solution of the liquids, assuming the ideal solution will be:

A. 140mm Hg

B. 110mm Hg

C. 220mm Hg

D. 100mm Hg

Answer: B

70. The solution which shows large positive deviation from Raoult's law form

    A. maximum boiling azeotrope kat a specific composition

    B. miximum freezing azeotrope at a specific composition

    C. minimum boiling azeotrope at a specific composition

    D. minimum freezing azeotrope at a specific composition

Answer: C

71. $1 \times 10^3 m$ solution of Pt $(NH_3)_4 Cl_4$ in H_2O shows depression in freezing point by $0.0054°C$. The structure of the compound will be

$\left(\text{given} \quad K_f(H_2O) = 1.860 km^{-1}\right)$

A. $\left[Pt(NH_3)_4\right]Cl_4$

B. $\left[Pt(NH_3)_3Cl\right]Cl_3$

C. $\left[Pt(NH_3)_2Cl_2\right]Cl_2$

D. $\left[Pt(NH_3)Cl_3\right]Cl$

Answer: C

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72. What happens to freezing point of benzene when nephthalens is added ?

A. Increases

B. Decreases

C. Remains unchanged

D. First decreases and then increases

Answer: B

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73. A 5.25% solution of a substance is isotonic with a 1.5% solution of urea (molar mass $= 60gmol^{-1}$) in the same solvent. If the densities of both the solutions are assumed to be equal to $1.0gcm^{-3}$, molar mass of the substance will be:

A. $90.0g\ mol^{-1}$

B. $115.0g\ mol^{-1}$

C. $105.0g\ mol^{-1}$

D. $210.0g\ mol^{-1}$

Answer: D

74. The difference between the boiling point and freezing point of an aqueous solution containing sucrose (molecular mass $= 342gmol^{-1}$) in 100 g of water is 105.04. If K_f and K_b of water are 1.86 and $0.51Kgmol^{-1}$ respectively, the weight of sucrose in the solution is about

A. 34.2 g

B. 342 g

C. 7.2 g

D. 72 g

Answer: D

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75. A 6% of urea is isotonic with

A. 1 M solution of glucose

B. $0.05M$ solution of glucose

C. 6 % solution of glucose

D. 25 % solution of glucose

Answer: A

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

A. Depression in freezing point

B. Elevation in boiling point

C. Optical activity

D. Relative lawering in vapour pressure

Answer: C

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

    A. 24

    B. 61.5

    C. 151.5

    D. 300

Answer: C

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

    A. $-6.54°C$

B. $6.54°C$

C. $0.654°C$

D. $-0.654°C$

Answer: D

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79. 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. $98.96°C$

B. $100.52°C$

C. $101.04°C$

D. $107.01°C$

Answer: C

80. A solution containing 4g of polyvinyl chloride polymer in 1 L of dioxane was found to have an osmotic pressure of 4.1×10^{-4} atm at $27^\circ C$. The approximate molecular weight of the polymer is

A. 1500

B. 10000

C. 2.4×10^5

D. 2×10^{12}

Answer: C

81. If α is the degree of dissociation of Na_2SO_4 the van't Hoff's factor (i) used for calculating the molecular mass is

A. $1 + 2\alpha$

B. $1 - 2\alpha$

C. $1 - \alpha$

D. $1 + \alpha$

Answer: A

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

of :

A. urea

B. glucose

C. KCl

D. $CaCl_2$

Answer: D

83. Calculate the molal depression constant of a solvent which has freezing point $16.6°C$ and latent heat of fusion $180.75J\ g^{-1}$:

A. 2.68

B. 3.86

C. 4.68

D. 2.86

Answer: B

84. The freezing point of 1% of lead nitrate solution in water will be :

A. $2°C$

B. $1°C$

C. $0°C$

D. below $0°C$

Answer: D

---

85. The relative lowering of vapour pressure of an aqueous solution containing a non-volatile solute, is 0.0125. The molality of the solution is

A. 0.70

B. 0.50

C. 0.90

D. 0.80

Answer: A

86. KBr is 180% dissociated in aqueous solution of $0.5m$ concentration. (Given,K_f for water $= 1.86Kkg\ mol^{-1}$). The solution freezes at

A. $271.326K$

B. 272 K

C. $270.5K$

D. $268.5K$

Answer: A

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87. The vapour pressure of water at $23°C$ is 19.8 mm of Hg 0.1 mol of glucose is dissolved in $178.2g$ of water. What is the vapour pressure (in mm Hg) of the resultant solution?

A. 19.0

B. 19.602

C. 19.402

D. 19.202

Answer: B

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88. Benzoic acid is dissolved in benzene, van't Hoff factor will be

A. 1

B. 0.5

C. 1.5

D. 2

Answer: B

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89. Mark the correct option for the K_f .

I. K_f depends on nature of solvent.

II. K_f is also known as freezing point depression constant or molal depression constant.

III. K_f is known as cryoscopic constant.

IV. Unit of $K_f = Kkg \ \ mol^{-1}$.

V. $M_2 = \dfrac{K_f \times W_1 \times 1000}{\Delta T_f \times W_2}$. where $W - (2)$ is the mass of solute haveing molar mass of M_2 present in W_1 gram of solvent.

    A. I, II and III

    B. I, II, III and IV

    C. I. II, III, IV and V

    D. II, III, IV and V

Answer: B

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90. Osmotic pressure present in the fluid inside the blood cell is equivalent to

    A. $0.9\ \%\ (m/V)NaCl$ solution

    B. less than $0.9\ \%\ (m/V)NaCl$ solution

    C. more than $0.9\ \%\ (m/V)NaCl$ solution

    D. $0.9\ \%\ (m/V)Na_2SO_4$ solution

Answer: A

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91. Match the laws given in Column I with expressions given in Column II.

Select an appropriate answer from the codes given belwo.

Column I		Column II	
$A.$	Raoult's law	1.	$\Delta T - (f) = K_f m$
$B.$	Henry's law	2.	$\pi = CRT$
$C.$	Elevation of boiling point	3.	$p = x_1 p_1^{\circ} + x_2 p_2^{\circ}$
$D.$	Depression infresing point	4.	$\Delta T_b = K_b m$
$E.$	Osmotic pressure	5.	$p = K_H \cdot x$

	A	B	C	D	E
A.	5	3	2	1	4
B.	5	3	4	1	2
C.	3	5	4	1	2
D.	3	5	2	1	4

Answer: C

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92. Lowering of vapour pressure is highest for

A. $0.1M BaCl_2$

B. $0.1M$ glucose

C. $0.1M MgSO_4$

D. urea

Answer: A

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93. 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. $100T_b$

C. ΔT_b

D. $\dfrac{\Delta T_b}{10}$

Answer: C

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94. The vapour pressure of water at $20°C$ is $17.54mm$. When 20g of non - ionic substance is dissolved in 100g of water, the vapour pressure is lowered by $0.30mm$. What is the molecular mass of the substance ?

A. 200.8

B. 206.88

C. 210.5

D. 215.2

Answer: B

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

A. $3.078atm$

B. $4.078atm$

C. $5.078atm$

D. $2.45atm$

Answer: C

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

A. $-7.44°C$

B. $-5.58°C$

C. $-3.72°C$

D. $-2.79°C$

Answer: C

97. At $10°C$, the osmotic pressure of urea solution is $500mm$.The solution is diluted and the temperature is raised to $25°C$.when the

osmotic pressure is found to be $105.3mm$. Determine the extent of dilution.

A. $V_{\text{final}} = 5V_{\text{initial}}$

B. $V_{\text{initial}} > V_{\text{final}}$

C. $V_{\text{final}} = 4V_{\text{initial}}$

D. $V_{\text{final}} = 6V_{\text{initial}}$

Answer: A

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98. An aqueous solution freezes at

$-0.186° C(K_f = 1.86°$,$K_b = 0.512°$. What is the elevation in boiling point?

A. 0.186

B. 0.512

C. 0.86

D. 0.0512

Answer: B

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99. Colligative properties of a solution depends upon

A. nature of solute

B. nature of both solute and solvent

C. number of solute particles

D. number of solvent particles

Answer: C

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100. In coparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M $MgCl_2$ solution is......

A. the same

B. about twice

C. about three times

D. about six times

Answer: C

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101. Which of the following aqueous solution should have the highest boiling point ?

A. $1.0MNaOh$

B. $1.0MNa_2SO_4$

C. $1.0MNH_4NO_3$

D. $1.0 M K N O_3$

Answer: B

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102. In which case van't Hoff factor is maximum ?

A. KCl, 50 % ionised

B. $K_2 SO_4$, 40 % ionised

C. $FeCI_3$, 30 % ionised

D. $SnCI_4$, 20 % ionised

Answer: C

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103. Ratio of $\Delta T_b / K_b$ for 6% AB_2 and 9% $A_2B(AB_2 \text{ and } A_2B$ both are non-electrolytes) is 1 mol/kg in both cases. Hence , atomic masses of A and B are respectively :

A. 60, 90

B. 40, 40

C. 40, 10

D. 10, 40

Answer: C

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104. 60g of urea is dissolved in 1100g solution. To keep $\Delta T / K_f$ as 1 mol$/kg$, water separated in the form of ice is

A. 40 g

B. 60 g

C. 100 g

D. 200 g

Answer: B

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105. Osmotic pressure of insulin solution at 298 K is found to be $0.0072atm$. Hence, height of water Column due to this pressure is

A. $0.76cm$

B. $0.70cm$

C. $7.4cm$

D. $76cm$

Answer: C

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

    A. Depression in freezing point

    B. Osmotic pressrue

    C. Elevation of boilling point S

    D. Freezing point

Answer: D

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107. K_f for water is $1.86 K kgmol^{-1}$. IF your automobile radiator holds $1.0 kg$ of water, how many grams of ethylene glycol $(C_2 H_6 O_2)$ must you add to get the freezing point of the solution lowered to $-2.8°C$?

    A. 72 g

    B. 93 g

    C. 39 g

D. 27 g

Answer: B

108. The highest osmotic pressure corresponds to the which of the following solution

A. M/10 urea

B. M/10 glucose

C. M/10 HCl

D. $\dfrac{M}{10}BaCl_2$

Answer: D

109. The correct order of increasing boiling points of the following aqueous solutions

$0.0001MNaCl(I)$, 0.0001M Urea (II) , $0.001MMgCl_2(III)$, 0.01MNaC

A. $I < II < III < IV$

B. $IV < III < II < I$

C. $II < I < III < IV$

D. $III < II < IV < I$

Answer: C

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110. To observe an elevation of boiling point of $0.05°C$, the amount of a solute (molecular weight = 100) to be added to 100 g of water $(K_b = 0.5)$ is

A. 2 g

B. $0.5g$

C. 1 g

D. $0.75g$

Answer: C

---

111. Which of the following aqueous solutions has the highest freezing point ?

A. $0.1M$ sucrose

B. $0.01MNaCl$

C. $0.1MNaCl$

D. $0.01MNa_2SO_4$

Answer: C

112. After adding non-volatile solute, freezing point of water decreases to $-0.186°C$. Calculate ΔT_b if :

$K_f = 1.86K \text{ kg mol}^{-1}$ and $K_b = 0.521K \text{ kg mol}^{-1}$
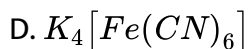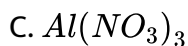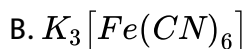
A. 0.512

B. 0.0521

C. 1.86

D. 0.0186

Answer: B

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113. Which of the following electrolytes has the same value of van't Hoff factor (i)is that of $Al_2(SO_4)_3$(if all are 100 % ionised?

A. K_2SO_4

B. $K_3\left[Fe(CN)_6\right]$

C. $Al(NO_3)_3$

D. $K_4\left[Fe(CN)_6\right]$

Answer: D

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1. 60 mL of $\dfrac{N}{5}H_2SO_4$, 10 mL of $\dfrac{N}{2}HNO_3$, 30 mL of $\dfrac{N}{10}$ HCl are are mixed together. The strength of the resulting mixture is

A. $0.10N$

B. $0.2N$

C. $0.3N$

D. $0.4N$

Answer: B

2. Concentrated aqueous solution of sulphuric acid is 98% by mass and has density of 1.80g mL^{-1}. What is the volume of acid required to make one liter $0.1MH_2SO_4$ solution ?

A. $11.10mL$

B. $16.65mL$

C. $22.20mL$

D. $5.55mL$

Answer: D

3. $10cm^3$ of 0.1N monobasic acid requires $15cm^3$ of sodium hydroxide solution whose normality is

A. $1.5N$

B. $0.15N$

C. $0.066N$

D. $0.66N$

Answer: C

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4. Dissolution of 1.5 g of a non-volatile solute $(mol.\ wt.\ =\ 60)$ in 250 g of a solvent reduces its freezing point by $0.01°\ C$. Find the molal depression constant of the solvent.

A. 0.01

B. 0.001

C. 0.0001

D. 0.1

Answer: D

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5. How many grams of H_2SO_4 is/are to be dissolved to prepare 200 mL aqueous solution having concentration of $[H_3O^+]$ ions is 1 M at $25°C$ temperature?

A. $19.6g$

B. $0.98g$

C. $4.9g$

D. $9.8g$

Answer: D

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6. 20g of a binary electrolyte(mol.wt.=100)are dissolved in 500g of water.The freezing point of the solution is $-0.74°C K_f = 1.86 K$molality^{-1}.the degree of ionization of the electrolyte is

A. 0 %

B. 100 %

C. 75 %

D. 50 %

Answer: A

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7. Addition of a non-volatile solute causes lowering in vapour pressure of a solvent from $0.8 atm$ to $0.2 atm$. What is the mole fraction of solvent ?

A. 0.25

B. 0.75

C. 0.50

D. Connot be calculated

Answer: A

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8. If at certain temperature, the vapour pressure of pure water is 25 mm Hg and that of a very dilute aqueous urea solution is 24.5 mm Hg, the molality of the solution is

A. 0.02

B. 1.2

C. 1.11

D. 0.08

Answer: C

9. The average osmotic pressure of human blood is 7.8 bar at $37°C$. What is the concentration of an aqueous $NaCl$ solution that could be used in the blood stream ?

A. $0.16 mol/L$

B. $0.30 mol/L$

C. $0.60 mol/L$

D. $0.45 mol/L$

Answer: B

10. 1mol each of the following solutes are taken in 5mol water,

(a)$NaCl$ (b)K_2SO_4(C)$Na(3)PO_4$(d) glucose

Assuming 100% ionisation of the electrolyte ,relative decrease in vapour pressure will be in order

A. NaCl

B. K_2SO_4

C. Na_3PO_4

D. glucose

Answer: C

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11. The boiling point of $0.2 molkg^{-1}$ solution of X in water is greater than equimolal solution of Y in water. Which of the following statements is true in this case?

A. X is undergoing dissociation in water

B. Molecular mass of X is greater than the molecular mass of Y

C. Molecular mass of X is less than the molecular mass of Y

D. Y is undergoing dissociation in water while X undergoes no change

Answer: A

12. Density of $2.05M$ solution of acetic acid in water is $1.02g/mL$. The molality of same solution is:

A. 1.14mol kg^{-1}

B. 3.28mol kg^{-1}

C. 2.28mol kg^{-1}

D. 0.44mol kg^{-1}

Answer: C

13. 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. $-0.481°C$

    B. $-0.360°C$

    C. $-0.260°C$

    D. $+0.480°C$

Answer: A

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14. By dissolving 5 g substance in 50 g of water, the decrease in freezing point is $1.2°C$. The gram molal depression is $1.85°C$. The molecular weight of substance is

    A. 105.4

B. 118.2

C. 137.2

D. 154.2

Answer: D

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15. The vapour pressure of pure liquid is 1.2 atm. When a non-volatile substance B is mixed in A, then its vapour pressure becomes 0.6 atm. The mole fraction of B in the solution is

A. 0.15

B. 0.25

C. 0.50

D. 0.75

Answer: C

16. How much C_2H_5OH must be added to 1.0L of H_2O, so that solution should not freeze at $-4° F$?

$$[K_f(C_2H_5OH) = 1.86° C/m]$$

    A. $< 10.75g$

    B. $> 494.5g$

    C. $< 20g$

    D. $494.5g$

Answer: B

17. On the basis of information given below mark the correct option.

Information On adding acetone to methanol some of the hydrogen bonds between methanol molecules break.

A. A specific composition of methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoult's law

B. A specific composition of methanol-acetone mixture forms maximum boiling azeotrope and will show positive deviation from Raoult's law

C. A specific composition of methanol-acetone mixture will form minimum boiling azeotrope and will show negative deviation from Raoult's law

D. A specific compsoition of methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoult's law

Answer: A

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18. 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 dissociated in 1 kg of water is : $(K_f = 1.86$ K kg $mol^{-1})$

A. $0.0372K$

B. $0.0558K$

C. $0.0744K$

D. $0.0186K$

Answer: B

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19. The vapour pressure of water at $20°$ is $17.5mmHg$. If $18g$ of glucose $(C_6H_{12}O_6)$ is added to $178.2g$ of water at $20°C$, the vapour pressure of the resulting solution will be

A. $17.675mmHg$

B. $15.750 mmHg$

C. $16.500 mmHg$

D. $17.325 mmHg$

Answer: D

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20. An aqueous solution of 2 per cent $(wt./wt)$ non-volatile solute exerts a pressure of 1.004 bar at the boiling point of the solvent. What is the molecular mass of the solute?

A. 0.3655

B. 36.55

C. 41.34

D. 40.16

Answer: C

21. 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. $72.0kPa$

B. $36.1kPa$

C. $96.2kPa$

D. $144.\ kPa$

Answer: A

22. To neutralize completely $20 mL$ of $0.1M$ aqueous solution of phosphorus (H_3PO_3) acid the volume of $0.1M$ aqueous KOH solution required is:

A. $10 mL$

B. $20 mL$

C. $40 mL$

D. $60 mL$

Answer: C

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23. The degree of dissociation (α) of a weak electrolyte $A_x B_y$ 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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24. A solution of $Al_2(So_4)_3\{d = 1.253gm/ml\}$ contain 22% salt by weight. The molarity , normality and molality of the solution is

A. $0.805M, 0.825m$

B. $0.825M, 0.805m$

C. $4.83M, 4.83m$

D. $4.83M, 48.3m$

Answer: A

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25. A solution is obtained by mixing 300 g of 25% solution and 400 g of 40% solutionby mass. Calculate the mass percentage of solute in the resulting solution.

A. 33.57

B. 66.43

C. 87.23

D. 19.24

Answer: A

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26. 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 kin 100 mL solution

(iv) 0.1 g of a non-electrolyte solute (X) in 50 mL (molar mass of X = 200)

Choose the correct option.

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

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

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

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

Answer: B

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27. 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. $1:1$

Answer: A

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28. The vapour pressure lowering caused by addition of 100 g of sucrose (molecular mass = 342) to 1000 g of wate,if the vapour pressure of pure water at $25°C$ is 23.8mm Hg,is

A. $0.12mm$ of Hg

B. $0.125mm$ of Hg

C. $1.15mm$ of Hg

D. $1.25mm$ of Hg

Answer: B

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29. The mass of a non-volatile solute of molar mass $40g$ mol^{-1} that should be dissolved in 114 g of octane to lower its vapour pressure by 20% is

A. $11.4g$

B. $9.8g$

C. $12.8g$

D. $10g$

Answer: D

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30. 58.5 g of NaCl and 180 g of glucose were separately dissolved in 1000 mL of water. Identify the correct statement regarding the elevation of boiling point (bp) of the resulting solutions.

A. NaCl solution will show higher elevation of bp

B. Glucose solution will show higher elevation of bp

C. Both the solutions will show equal elevation of bp

D. The bp elevation will be shown by neither of the solutions

Answer: A

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31. The vapour pressure of chloroform $(CHCl)_3$ and dichlorocethene (CH_2Cl_2) at $298K$ is $200mmHg$ and $415mmHg$, respectively. Calculate

a. The vapour pressure of the solution prepared by mixing $25.5g$ of $CHCl_3$ and $40g$ of $CH_2 - Cl(2)$ at $298K$.

b. Mole fractions of each components in vapour phase .

A. $173.9mmHg$

B. $615.0mmHg$

C. $347.9mmHg$

D. $90.63mmHg$

Answer: D

32. Two solutions of HCl, A and B have concentration of 0.5 N and 0.1 M respectively . The volume of solutions A and B required to make 2 L of 0.2 N HCl are

A. $0.5L$ of $A + 1.5L$ of B

B. $1.5L$ of $A + 0.5L$ of B

C. $1.0L$ of $A + 1.0L$ of B

D. $0.75L$ of $A + 1.25L$ of B

Answer: A

33. A solution at $20°C$ is composed of $1.5mol$ of benzene and $3.5mol$ of toluene. If the vapour pressure of pure benzene and pure toluene at this temperature are 74.7 torr and 22.3 torr, respectively, then the total

vapour pressure of the solution and the benzene mole fraction in equilibrium with it will be, respectively:

A. 35.0 torr and 0.480

B. 30.5 torr and0.389

C. 38.0 torr and 0.589

D. 35.8 torr and 0.280

Answer: C

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34. The relative lowering of vapour pressure of an aqueous solution containing a non-volatile solute, is 0.0125. The molality of the solution is

A. 0.70

B. 0.30

C. 0.125

D. 0.07

Answer: A

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35. The elevation in boiling point would be highest for

A. $0.08 M BaCl_2$

B. $0.15 M KCl$

C. $0.10 M$ glucose

D. $0.06 M Ca(NO_3)_2$

Answer: B

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36. 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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37. How many grams of concentrated nitric acid solution should be used to prepare $250mL$ of $2.0M HNO_3$? The concentrated acid is $70 \% HNO_3$:

A. $45.0g$ conc. HNO_3

B. $90.0g$ conc. HNO_3

C. $70.0g$ conc. HNO_3

D. $54.0g$ conc. HNO_3

Answer: A

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38. What is the osmotic pressure of 12% solution of can sugar (mol.wt. 342) at $17°C$

A. 2.42atm

B. 4.33atm

C. 8.35atm

D. 16.30atm

Answer: C

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39. $5.5mg$ of nitrogen gas dissolves in 180g of water at 273 K and 1 atm pressure due to nitrogen gas. The mole fraction of nitrogen in 180g of water at 5 atm nitrogen pressure is approximately

A. 1×10^{-6}

B. 1×10^{-5}

C. 1×10^{-3}

D. 1×10^{-4}

Answer: D

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40. A solution of $1.25 of 'P'$ in 50g of water lawers freezing point by $0.3°C$. Molar mass of 'P' is $94. K_{f(water)} = 1.86K \, kg \, mol^{-1}$. The degree of association of 'P' in water is

A. 0.8

B. 0.6

C. 0.65

D. 0.75

Answer: A

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41. What is the volume of ethyl alcohol (density 1.15 g/cc) that has to be added to prepare 100 cc of 0.5 M ethyl alcohol solution in water ?

A. $1.15cc$

B. $2cc$

C. $2.15cc$

D. $2.30cc$

Answer: B

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42. Consider separate solutions of $0.500MC_2H_5OH(aq)$, $0.100MMg_3(PO_4)(aq)$, $0.250MKBr(aq)$, and $0.125MNa_3PO_4(aq)$ at $25°C$. Which statement is true about these solutions, assuming all salts to be strong electrolytes?

   A. They all have the same osmotic pressure

   B. 0.100 M $Mg_3(PO_4)_2(aq)$ has the highest osmotic pressure

   C. 0.125 M $Na_3PO_4(aq)$ has the highest osmotic pressure

   D. $0.500MC_2H_5OH(aq)$ has the highest osmotic pressure

Answer: A

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43. What will be the value of molality for an aqueous solution of 10% w/W NaOH?

A. 5

B. 2.778

C. 10

D. 2.5

Answer: B

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44. $50cm^3$ of $0.04MK_2Cr_2O_7$ in acidic medium oxidises a sample of H_2S

gas to sulphur. Volume of $0.03MHMn \ O_4$ required to oxidise the same

amount of H_2S gas to sulphur in acidic medium is

A. $60cm^3$

B. $80cm^3$

C. $90cm^3$

D. $120cm^3$

Answer: B

45. Among the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression?

A. KCl

B. $C_6H_{12}O_6$

C. $Al_2(SO_4)_3$

D. K_2SO_4

Answer: C

46. Benzene and naphthalene form an ideal solution at room temperature. For this process,the true statement(s) is (are)

A. ΔG is positive

B. ΔS_{system} is positive

C. $\Delta S_{surroundings} = 0$

D. $\Delta H = 0$

Answer: D

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47. Identify the mixture that shows positive deviations from Raoult's law

A. $CHCl_3 + (CH_3)_2CO$

B. $(CH_3)_2CO + C_6H_5NH_2$

C. $CHCl_3 + C_6H_6$

D. $(CH_3)_2CO + CS_2$

Answer: D

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48. An aqueous solution freezes at

$-0.186°C(K_f = 1.86°$,$K_b = 0.512°$. What is the elevation in boiling

point?

    A. $0.0512°C$

    B. $100.0512°C$

    C. $-0.0512°C$

    D. None of these

Answer: A

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49. Vapour pressure of pure water is 40 mm. if a non-volatile solute is

added to it, vapour pressure falls by 4 mm. Hence, molality of solution is

    A. $6.173m$

B. $3.0864m$

C. $1.543m$

D. $0.772m$

Answer: A

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50. Aluminium phosphate is 100% ionised in 0.01 molal aqueous solution . Hence , $\Delta T_b / K_b$ is :

A. 0.01

B. 0.015

C. 0.0175

D. 0.02

Answer: D

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51. Concentrated nitric acid used in the laboratory work is 68% nitric acid by mass in aqueous solution. What should be the molaritiy of such a sample of the acid if the density of solution is $1.504 gmL^{-1}$?

A. 15.23

B. 16.24

C. 12.14

D. 26.3

Answer: B

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52. An antifreeze solution is prepared from $222.6g$ of ethylene glycol $[C_2H_4(OH)_2]$ and $200g$ of water. Calculate the molality of the solution. If the density of the solution is $1.072 gmL^{-1}$ then what shall be the molarity of the solution?

A. 9.10, 17.95

B. 10.90, 16.6

C. 12.04, 17.95

D. 18.2, 16.97

Answer: A

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53. The vapour pressure of water is $12.3kPa$ at $300K$. Calculate vapour pressure of 1 molal solution of a solute in it.

A. 10.08

B. 12.08

C. 18.02

D. 20.10

Answer: B

54. 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. 1.87×10^{-5}

    B. 1.77×10^{-3}

    C. 1.77×10^{-4}

    D. 1.90×10^{-4}

Answer: B

55. The solubility of $N_2(g)$ in water exposed to the atmosphere, when the partial pressure is 593mm is 5.3×10^{-4}M. Its solubility at 760 mm and at the same temperature is

A. $4.1 \times 10^{-4} M$

B. $6.8 \times 10^{-4} M$

C. $1500 M$

D. $2400 M$

Answer: B

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56. Nalorphene $(C_{19}H_{22}NO_3)$, similar to morphine , is used to combat withdrawal symptoms in narcotic users. The dose of nalorphene generally given is $1.5 mg$. Calculate the mass of solution of $1.5 \times 10^{-3} m$ aqueous solution required for the above dose.

A. $3.2 \times 10^{-2} kg$

B. $3.2 \times 10^{-4} kg$

C. $3.2 \times 10^{-3} kg$

D. $3.2 \times 10^{-5} kg$

Answer: C

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

A. $34.2g$

B. $72g$

C. $342g$

D. $460g$

Answer: B

1. 5.0 g of sodium hydroxide `("molar mass 40 g mol"^(-1)) is dissolved in little quanitity of water and the solution is diluted upto 100 mL. What is the molarity of the resulting solution ?

A. 0.1mol dm^{-3}

B. 1.0mol dm^{-3}

C. 0.125mol dm^{-3}

D. 1.125mol dm^{-3}

Answer: D

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2. The relation between solubility of a gas in liquid at constant temperature and external pressure is stated by which law ?

A. Raoult's law

B. van't Hoff- Boyle's law

C. van't Hoff- Charles's law

D. Henry's law

Answer: D

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3. Identify the compound amongst the following of which 0.1 M aqueous solution has highest boiling point.

A. Glucose

B. Sodium chloride

C. Calcium chloride

D. Ferric chloride

Answer: D

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4. The equation that represents general van't Hoff equation is

A. $\pi = \dfrac{n}{V}RT$

B. $\pi = nRT$

C. $\pi = \dfrac{V}{n}RT$

D. $\pi = nVRT$

Answer: A

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5. If M,W and V represent molar mass of solute then mass of solute and volume of solution in litres respecitively which among following equation is true ?

A. $\pi = \dfrac{MWR}{TV}$

B. $\pi = \dfrac{TMR}{WV}$

C. $\pi = \dfrac{TWR}{VM}$

D. $\pi = \dfrac{TRV}{WM}$

Answer: C

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6. What is the volume of water consumed during acid hydrolysis of 1.368

kg of surose ?

A. $0.072 dm^3$

B. $0.720 dm^3$

C. $0.18 dm^3$

D. $0.018 dm^3$

Answer: A

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7. Molarity is defined as

A. the number of moles of solute dessolvedin $1dm^3$ of the solution

B. the number of moles of solute dessolve in 1 kg of solvent

C. the number of molesof solute dissolved in $1dm^3$ of the solvent

D. the number of moles of solute dissolved in 100 mL of the solvent

Answer: A

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8. Van't Hoff factor of a centinormal solution of $K_3[Fe(CN)_6]$ is 3.333. The precentage dissociation of $K_3[Fe(CN_6)_6]$ is :

A. 33.33

B. 0.78

C. 78

D. 23.33

Answer: C

9. What is the molality of solution containing 200 mg of urea $\left(\text{molar mass} 60 \ \text{g mol}^{-1}\right)$ dissolved in 40 g of water ?

A. 0.0833

B. 0.825

C. 0.498

D. 0.0013

Answer: A

10. 6.02×10^{20} molecules of urea are present in 100 ml of its solution.

The concentration of solution is :

A. $0.02M$

B. $0.01M$

C. $0.001M$

D. $0.1M$

Answer: B

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11. 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

---

12. S34.2 g of cane sugar is dissolved in 180 g of water. The relative lowering of vapour pressure will be

A. 0.0099

B. 1.1597

C. 0.840

D. 0.9901

Answer: A

---

13. 450 mg of glucose is dissolved in 100 g of solvent. What is the molality of the solution ?

A. $0.0025m$

B. $0.025m$

C. $0.25m$

D. $2.5m$

Answer: B

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14. Dissolution of 1.5 g of a non-volatile solute $(mol. \ wt. \ = \ 60)$ in 250 g of a solvent reduces its freezing point by $0.01°C$. Find the molal depression constant of the solvent.

A. 0.01

B. 0.001

C. 0.0001

D. 0.1

Answer: D

---

15. $2.5 cm^3$ of $0.2 M H_2SO_4$ solution is diluted to 0.5 dm^3 . Find normality of the diluted solution .

A. $0.2N$

B. $0.02N$

C. $0.002N$

D. $0.04N$

Answer: C

---

16. Ratio of loss in solvent to gain in $CaCl_2$ tube is

A. $\dfrac{p^{\,\circ}}{p}$

B. $\dfrac{p}{p^{\,\circ}}$

C. $\dfrac{p^{\,\circ} - p}{p^{\,\circ}}$

D. $\dfrac{p - p^{\,\circ}}{p}$

Answer: C

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17. The volume of 2N H_2SO_4 solution is $0.1dm^3$. The volume of its

decinormal solution (in dm^3) will be

A. 0.1

B. 0.2

C. 2

D. 1.7

Answer: C

18. Miximum depression in freezing point is caused by

    A. potassium chloride

    B. sodium sulphate

    C. magnesium sulphate

    D. magnesium carbonate

Answer: B

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

    A. Elevation in boiling point

    B. Lowering of vapour pressure

    C. Osmotic pressure

D. Freezing point

Answer: D

---

20. What is the amount of urea dissolved per litre, if aqueous solution is isotonic with 10% cane suger soution (mol. wt. of urea = 60)?

A. 200 g/L

B. $19.2g/L$

C. $17.54g/L$

D. $16.7g/L$

Answer: C

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

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

A. $-0.093°C$

B. $1.83°C$

C. $0.93°C$

D. $0.093°C$

Answer: A

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22. 0.15g of a subatance dissolved in 15g of solvent boiled at a temperature higher at $0.216°$ than that of the pure solvent. Calculate the molecular weight of the substance. Molal elecation constant for the solvent is $2.16°C$

A. 100

B. 10.1

C. 10

D. 1.001

Answer: A

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23. 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. glucose and sodium chloride

B. urea and glucose

C. sodium chloride and urea

D. None of these

Answer: B

---

24. Two solutions A and B are separated by semipermeable membrane. If liquid flows from A to B, than

    A. A is less concentrated than B

    B. A is more concentrated than B

    C. Both have same concentration

    D. None of the above

Answer: A

---

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

A. 9 g

B. 6 g

C. 3 g

D. $0.3g$

Answer: C

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