CHEMISTRY

BOOKS - FULL MARKS CHEMISTRY (TAMIL ENGLISH)

SOLUTIONS

Example Problems Solved

1. What volume of 4M HCl and 2M HCl should be mixed to get 500 mL of $2.5 M HCl$?

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2. $0.24g$ of a gas dissolves in 1 L of water at 1.5 atm pressure. Calculate the amount of dissolved gas when the pressure is raised to 6.0 atm at constant temperature.

3. An aqueous solution of 2% nonvolatile solute exerts a pressure of 1.004 bar at the boiling point of the solvent. What is the molar mass of the solute when P_A° is 1.013 bar ?

4. At 400 K $1.5g$ of an unknown substance is dissolved in solvent and the solution is made to $1.5L$. Its osmotic pressure is found to be 0.3 bar. Calculate the molar mass of the unknown substance.

5. Ethylene glycol $(C_2H_6O_2)$ can be used as an antifreeze in the radiator of a car. Calculate the temperature when ice will begin to separate from a mixture with 20 mass percent of glycol in water used in the car radiator. K_f for water $= 1.86 K kgmol^{-1}$ and molar mass of ethylene glycol is $62 gmol^{-1}$.

6. At 400 K $1.5g$ of an unknown substance is dissolved in solvent and the solution is made to $1.5L$. Its osmotic pressure is found to be 0.3 bar. Calculate the molar mass of the unknown substance.

7. The depression in freezing point is 0.24 K obtained by dissolving $1gNaCl$ in 200 g water. Calculate van't-Hoff factor. The molar depression constant is $1.86Kkgmol^{-1}$.

1. The molality of a solution containing $1.8g$ of glucose dissolved in 250g of water is ....

    A. `0.2m

    B. `0.01m

    C. `0.02m

    D. `0.04m

Answer: D

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

    A. molality

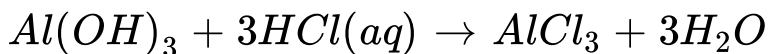   B. molarity

    C. mole fraction

    D. a and c

Answer: A::C::D

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3. Stomach acid, a dilute solution of HCl can be neutralised by reaction with aluminig hydroxide

$$Al(OH)_3 + 3HCl(aq) \rightarrow AlCl_3 + 3H_2O$$

How many milliliters of $0.1MAl(OH)_3$ solution are needed to neutralise 21 mL of $0.1MHCl$?

   A. 1) 14 mL

   B. 2) 7 mL

   C. 3) 21 mL

   D. 4) none of these

Answer: B

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4. The partial pressure of nitrogen in air of 0.76 atm and its Henry's law constant is 7.6×10^4 atm at 300K. What is the mole fraction of nitrogen gas in the solution obtained when air is bubbled through water at 300 K ?

    A. 1×10^{-4}

    B. 1×10^{-6}

    C. 2×10^{-5}

    D. 1×10^{-5}

Answer: D

5. The Henry's law constant for the solubility of Nitrogen gas in water at $350K$ is 8×10^4 atm. The mole fraction of nitrogen in air is 0.5.The number of moles of Nitrogen from air dissolved in 10 moles of water at 350 K and 4 atm pressure is

    A. 4×10^{-4}

    B. 4×10^{x}

    C. 2×10^{-2}

    D. 2.5×10^{-4}

Answer: D

6. Which of the following is incorrect for ideal solution ?

A. 1) $\Delta H_{mix} = 0$

B. 2) $\Delta V_{mix} = 0$

C. 3) $\Delta P = P_{obsetved} - P_{\text{Calculated by raoults law}} = 0$

D. 4) $\Delta G_{mix=0}$

Answer: D

7. Which one of the following statements has truth value F?

A. N_2

B. He

C. CO_2

D. H_2

Answer: C

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8. P_1 and P_2 are the vapour pressures of pure liquid components , 1 and 2 respectively of an ideal binary solution if x_1 represents the mole Traction of component 1, and the total pressure of the solutions formed by 1 and 2 will be

A. $p_1 + X_1(P_2 - P_1)$

B. $P_2 - x_1(P_2 + P_1)$

C. $P_1 - x_2(P_1 - P_2)$

D. $P_1 + x_1(P_1 - P_2)$

Answer: C

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9. What is meant by osmotic regulation?

A. $\pi = nRT$

B. $\pi V = nRT$

C. $\pi RT = n$

D. none of these

Answer: B

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10. Which one of the following binary liquid mixtures

exhibits positive deviation from Raoults law?

A. Acetone + chloroform

B. Water + nitric acid

C. HCl + water

D. ethanol + water

Answer: D

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11. The Henry's law constant for two gases A and B are x and y respectively.The ratio of mole fractions of A to B is 0.2 The ratio of mole fraction of B and A dissolved in water will be

A. $\dfrac{2x}{y}$

B. $\dfrac{y}{0.2y}$

C. $\dfrac{0.2x}{y}$

D. $\dfrac{5x}{y}$

Answer: D

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12. At $100^\circ C$ the vapour pressure of a solution containing 6.5 g a solute in 100 g water is 732mm.If $K_b = 0.52$, the boiling point of this solution will be

A. $102^\circ C$

B. $100°C$

C. $101°C$

D. $100.52°C$

Answer: C

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13. According to Raoults law, the relative lowering of vapour pressure for a solution is equal to ...

A. 1) mole fraction of solvent

B. 2) mole fraction of solute

C. 3) mole fraction of solute

D. 4) number of moles of solvent

Answer: B

14. At same temperature , which pair of the following solutions are Isotonic?

A. $0.2MBaCl_2$ and $0.2M$ ures

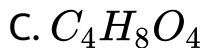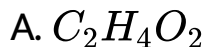B. $0.1M$ glucose and 0.2 M urea

C. $0.1MNaCl$ and $0.1MK_2SO_4$

D. $0.1MBa(NO_3)_2$ and $0.1MNa_2SO_4$

Answer: D

15. The empirical formula of a non-electrolyte (X) is CH_2O. A solution containing six gram of X exert the same osmotic pressure as that of 0.025M. glucose solution at the same temperature. The molecular formula of X is ....

A. $C_2H_4O_2$

B. $C_8H_{16}O_8$

C. $C_4H_8O_4$

D. CH_2O

Answer: B

16. The K_H for the solution of oxygen dissolved in water is 4×10^4atm at a given temperature . If the partial pressure of oxygen in air is 0.4 atm the mole fraction of oxygen in solution is

A. 4.6×10^3

B. 1.6×10^4

C. 1×10^{-5}

D. 1×10^5

Answer: C

17. Normality of 1.25 M sulphuric acid is

A. $1.25N$

B. $3.75N$

C. $2.5N$

D. $2.25N$

Answer: C

18. Two liquids X and Y on mixing gives a warm solution. The solution is

A. 1) ideal

B. 2) non-ideal and shows positive deviation from Raoults law

C. 3) ideal and shows negative deviation from Raoults Law

D. 4) non-ideal and shows negative deviations from Raoults Law

Answer: D

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19. The relative lowering of vapour pressure of a sugar solution in water is 3.5×10^{-3} The mole fraction of water in that solution is

A. 0.0035

B. 0.35

C. $0.0035/18$

D. 0.9965

Answer: D

20. The mass of a non-volatile solute (molar mass 80 g

mol^{-1}) which should be dissolved in 92g of toluene to

reduce its vapour pressure to 90 %

    A. 10g

    B. 20g

    C. $9.2g$

    D. $8.89g$

Answer: D

21. For a solution the plot of osmotic pressure (π) verses the concentration $(c \, in \, mol L^{-1})$ gives a straight line with slope 310 R where 'R' is the gas constant The temperature at which osmotic pressure measured is

A. $310 \times 0.082K$

B. $310°C$

C. $37°C$

D. $\dfrac{310}{0.082}K$

Answer: C

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22. 200 ml of an aqueous solution of a protein contains 1.26 g of protein. At 300 K, the osmotic pressure of this solution is found to be 2.52×10^{-3} bar.The molar mass of protein will be

$$\left(R = 0.083 L \overline{mol}^{-1} K^{-1}\right)$$

    A. 62.22 kg mol^{-1}

    B. $12444 gmol^{-1}$

    C. $300 gmol^{-1}$

    D. none of these

Answer: A

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23. The Van't Hoff factor (i) for a dilute aqueous solution of the strong elecrolyte barium hydroxide is

A. 0

B. 1

C. 2

D. 3

Answer: B

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24. What is the molality of a10 % W/W aqueous sodium hydroxide solution?

A. 2.778

B. 2.5

C. 10

D. 0.4

Answer: B

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25. The correct equation for the degree of an associating solute, 'n' molecules of which undergoes association in solution, is ....

A. 1) $\alpha = \dfrac{n(i - 1)}{n - 1}$

B. 2) $\alpha = \dfrac{n(1-i)}{(n-1)}$

C. 3) $\alpha = \dfrac{n(I-1)}{1-n}$

D. 4) $\alpha = \dfrac{n(1-i)}{n(1-i)}$

Answer: C

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26. which of the following aqueous solution has the highest bolling point?

A. $0.1 M K N O_3$

B. $0.1 M N a_3 P O_4$

C. $0.1 M B a C l_2$

D. $0.1MK_2SO_4$

Answer: A

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27. The freezing point depression constant for water is $1.86°\,Kgmmol^{-1}$. If $5gNa_2SO_4$ is dissolved in 45 g water, the depression in freezing point is $3.64°\,C$. The van't Hoff factor for Na_2SO_4 is ......

A. 2.50

B. 2.63

C. 3.64

D. 5.50

Answer: A

28. Equimolar aqueous solutions of NaCl and KCl are prepared. If the freezing point of NaCl is $-2°C$, the freezing point of KCl solution in expected to be ....

A. 1) $-2°C$

B. 2) $-4°C$

C. 3) $-1°C$

D. 4) $0°C$

Answer: A

29. Phenol dismerises in benzene having Van,t Hoff factor 0.54 What is the degree of association?

A. 0. 46

B. 92

C. 46

D. 0.92

Answer: D

30. Assertion : An ideal solution obeys Raoults Law

Reason: In an ideal solution , solvent-solvent as well as solute-solute interactins are similar to solute-solvent interactions.

   A. both assertion and reason are true and reason is the correct explanation of assertion

   B. both assertion and reason are true but reason is not the correct explanation of assertion

   C. assertion is true but reason is false

   D. both assertion and reason are false

Answer: A

Textual Evaluation Soved Short Answer Type Question

1. Define (i) Molality (ii) Normality

2. What is a vapour pressure of liquid ? What is relative lowering of vapour pressure ?

3. State and explain Henry's law

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4. State Raoult law and obtain expression for lowering of vapour pressure when nonvolatile solute is dissolved in solvent.

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5. What is molal depression constant? Does it depend on nature of the solute ?

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6. What is osmosis?

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7. What are isotonic solutions?

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Textual Evaluation Soved Long Answer Questions

1. You provided with a solid 'A' and three solutions of A dissolved in water- one saturated, one unsaturated,

and one super saturated. How would you determine each solution ?

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2. Explain the effect of pressure on the solubility.

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3. A sample of 12 M concentrated hydrochloric acid has a density 1.2 gL^{-1} Calculated the molality.

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4. A 0.25 M glucose solution at 370 . 28 K has approxmately the pressure as blood does what is the osmotic pressure of blood?

5. Calculated the molality of a solution containing 7.5 g of glycine $(NH_2 - CH_2 - COOH)$ dissolved in 500g of water

6. Which solution has the lower freezing point ? 10 g of methanol $(CH_3OH_\square)$ in 100 g of water (or) 20 g of ethanol (CH_2H_5OH) in 200 g of water

7. How many moles of solute particles are present in one litre of 10^{-4} M potassium sulphate ?

8. Henry's law constant for solubility of methane In benzene is $4.2 \times 10^{-5} mm$ Hg at a particular constant

temperature At this temperature calculate the solubility of methane at

(i) 750 mm Hg (ii) 840 mm Hg

9. The observed depression in freezing point of water for a particular solution in $0.093° k$ calculate the concentration of the solution in molality Given that molal depression constant for water is $1.86 KKGmol^{-1}$

10. The vapour pressure of pure benzene (C_6H_6) at a given temperature is 640 mm Hg . 2.2 g of non -volatile solute is added to 40 g of benzene. The vapour pressure of the solution is 600 mm Hg . Calcultaed the molar mass of the solute?

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In Text Question Evaluate Yourself

1. If 5.6 of KOH is present in (a) 500 mL and (b) 1 litre of solution, calculate the molarity of each of these solutions.

2. 2.82 g of glucose is dissolved in 30 g of water. Calculate the mole fraction of glucose and water.

3. The antiseptic solution of iodopovidone for the use of external application contains 10% w/v of iodopovidone. Calculate the amount of iodopovidone present in a typical dose of $1.5mL$.

4. A litre of sea water weighing about $1.05kg$ contains 5 mg of dissolved oxygen (O_2). Express the concentration of dissolved oxygen in ppm.

5. Describe how would you prepare the following solution from pure solute and solvent

(a) 1 L of aqueous solution of $1.5 M CoCl_2$.

(b) 500 mL of 6.0% (v/v) aqueous methanol solution.

6. How much volume of 6 M solution of NaOH is required to prepare 500 mL of 0.250 M NaOH solution.

7. Calculate the proporation of $O_2 N_2$ dissolved in water at 298K. When air containing $20\% O_2$ and $80\% N_2$ by volume is in equilibrium with water at 1 atm pressure. Henry's law constants for two gases are $K_H(O_2) = 4.6 \times 10^4 atm$ and $K_H(N_2) = 8.5 \times 10^4 atm$.

8. Explain why the aquatic species are more conmfortable in cold water during winter season rather than warm water during the summer.

9. Calculate the mole fraction of benzene and naphthalene in the vapour phase when an ideal liquid solution is formed by mixing 128 g of naphthalene with 39 g of benzene. It is given that the vapour pressure of pure benzene is 50.71 mm Hg and the vapour pressure of pure naphthalene is 32.06 mm Hg at 300 K.

10. Vapour pressure of a pure liquid A is 10.0 torr at $27°C$. The vapour pressure is lowered to 9.0 torr on dissolving one gram of B in 20g of A. If the molar mass of A is 200 g mol^{-1} then calculate the molar mass of B.

11. $2.56g$ of Sulphur is dissolved in 100g of carbon disulphide. The solution boils at $319.692K$. What is the molecular formula of Sulphur in solution? The boiling point of CS_2 is $319.450K$. Given that K_b for $CS_2 = 2.42Kkgmol^{-1}$

12. 2g of a non electrolyte solute dissolved in 75g of benzene lowered the freezing point of benzene by 0.20 k. The freezing point depression constant of benzene is $5.12KKgmol^{-1}$. Find the molar mass of the solute.

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13. What is the mass of glucose $(C_6H_{12}O_6)$ in it one litre solution which is isotonic with $6gL^{-1}$ of urea (NH_2CONH_2) ?

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14. $0.2m$ aqueous solution of KCl freezes at $-0.68°C$ calculate van't Hoff factor. K_f for water is $1.86 K kgmol^{-1}$.

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Additional Questions Solved Choose The Correct Answer

1. Among the following, which one is mostly present in sea water ?

   A. NaCl

   B. NaI

C. KCl

D. $MgBr_2$

Answer: A

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2. Statement I: The most common property of sea water and air is homogeneity.

Statement II: The homogeneity implies uniform distribution of their constituents through the mixture.

A. Statement I and II are correct and II is the correct explanation of I.

B. Statements I and II are correct but II is not the

correct explanation of I.

C. Statement I is correct but II is wrong.

D. Statement I is wrong but II is correct.

Answer: A

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3. Which one of the following is a homogeneous

mixture ?

A. Sea water

B. Air

C. Alloys

D. All the above

Answer: D

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4. Statement I: Salt solution is an aqueous solution.

Statement II: If water is used as the solvent, the resultant solution is called an aqueous solution.

A. Statements I and II are correct but II is not the correct explanation of I.

B. Statement I and II are correct and II is the correct

explanation of I.

C. Statement I is correct but statement II is wrong.

D. Statements I and II are correct and II is the

correct explanation of I.

Answer: B

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5. Statement I: The dissolution of ammonium nitrate

increase steeply with increase in temperature.

Statement II: The dissolution process of ammonium nitrate is endothermic in nature.

A. Statement I and II are correct and statement II is the correct explanation of statement I.

B. Statement I and II are correct but II is not the correct explanation of I.

C. Statement I is wrong but II is wrong.

D. Statement I is wrong but II is correct.

Answer: A

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6. In which of the following compound the solubility decreases with increase of temperature ?

    A. sodium chloride

    B. ammonium nitrate

    C. ceric sulphate

    D. calcium chloride

Answer: C

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7. Which of the following is not an ideal solution ?

A. Benzene & toluene

B. n-Hexane & n-Heptane

C. Ethyliodide & ethyl bromide

D. Ethanol and water

Answer: D

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8. Which of the following shows positive deviation from

Raoult's law ?

A. Ethyloidide and Ethyl bromide

B. Ethyl aclochol and cyclohexane

C. Chloro benzene & cyclohexane

D. Benzen & toluene

Answer: B

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9. Which of the following is not an non-ideal solution showing positive deviation?

A. Benzene & acetone

B. $CCl_4 \& CHCl_3$

C. Acetone & ethyl alcohol

D. Benzene and toluene

Answer: D

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

A. Phenol and aniline

B. Benzene and toluene

C. Acetone and ethanol

D. Benzene and acetone

Answer: A

11. Which of the following is not an non-ideal solution showing negative deviation?

    A. Phenol and aniline

    B. Ethanol and water

    C. Acetone + Chloroform

    D. n-Heptane and n-Hexane

Answer: D

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12. Statement I: A solution of potassium chloride in water deviates from ideal behaviour.

Statement II: The solute dissociates to give K^+ and Cl^- ion which form strong ion dipole interaction with water molecules.

A. 1) Statement I & II are correct and II is the correct explanation of I

B. 2) Statement I & II are correct but II is not correct explanation of I

C. 3) Statement I is wrong but statement II is correct

D. 4) Statement I & II are correct and II is the correct explanation of I

Answer: A

13. Statement I: Acetic acid deviates from ideal behaviour.

Statement II: Acetic acid exists as a dimer by forming inter molecular hydrogen bonds and hence deviates from Raoult's law.

A. Statement I & II are correct and II is the correct explanation of I

B. Statement I & II are correct but II is not correct explanation of I

C. Statement I is wrong but statement II is correct

D. Statement I & II are correct and II is the correct explanation of I

Answer: A

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14. Which one of the following has found to have abnormal molar mass ?

A. 1) NaCl

B. 2) KCl

C. 3) Acetic acid

D. 4) All the above

Answer: D

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15. What would be the value of van't Hoff factor for a dilute solution of K_2SO_4 in water.

A. 3

B. 2

C. 1

D. 4

Answer: A

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16. In the determination of molar mass of $A^+ B^-$ using a colligative property, what may be the value of van't Hoff factor if the solute is 50% dissociates ?

A. 0.5

B. 1.5

C. 2.5

D. 1

Answer: B

17. Which of the following solution has the highest boiling point ?

    A. 1) $5.85\,\%$ solution of NaCl

    B. 2) $6.0\,\%$ solution of urea

    C. 3) 18% solution of glucose

    D. 4) All have same boiling point

Answer: A

18. Which one of the following pair is called an ideal solution ?

A. 1) nicotine-water

B. 2) water -ether

C. 3) water-alcohol

D. 4) Chlorobenzene-bromobenzene

Answer: D

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

A. optical activity

B. osmotic pressure

C. elevation boiling point

D. depression in freezzing point

Answer: A

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

A. Sugar crystals in cold water

B. Sugar crystals in hot water

C. Powdered sugar in cold water

D. Powdered sugar in hot water

Answer: D

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Additional Questions Solved Match The Following

1. Match the following.

	List-I		List-II
A.	Gaseous solution	1.	Gold alloy
B.	Liquid solution	2.	Br_2 in CCl_4
C.	Solid solution	3.	Humid oxygen
D.	Non aqueous solution	4.	Carbonated water

A.

A	B	C	D
3	4	1	2

B.

A	B	C	D
3	2	4	1

C.

A	B	C	D
1	2	3	4

D.

A	B	C	D
3	4	1	2

Answer: A

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2. Match the following.

	List-I		List-II
A.	Solution of H_2 in palladium	1.	Aqueous solution
B.	Salt water	2.	Gaseous solution
C.	Camphor in nitrogen gas	3.	Solid solutions
D.	Br_2 in CCl_4	4.	Liquid solution

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

Answer:

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3. Match the following.

	List-I		List-II
A.	Complexometric titration	1.	Mole fraction
B.	Redox titration	2.	Molarity
C.	Vapour pressure calculation	3.	ppm
D.	Quantity of solutes in small amount of solution calculation	4.	Normality

A. 1)

A	B	C	D
3	2	4	1

B. 2)

A	B	C	D
1	3	2	4

C. 3)

A	B	C	D
2	4	1	3

D. 4)

A	B	C	D
4	1	3	3

Answer: C

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4. Match the following.

	List-I		List-II
A.	Relative lowering of vapour pressure	1.	$\Delta T_f = i K_f \cdot m$
B.	Elevation of boiling point	2.	$\pi = i \dfrac{W_{solute}}{V} \times \dfrac{RT}{m_{solute}}$
C.	Depression in freezing point	3.	$\Delta T_b = i K_b \cdot m$
D.	Osmotic pressure	4.	$i \dfrac{n_{solute}}{n_{solvent}}$

	A	B	C	D
A.	4	3	1	2

	A	B	C	D
B.	3	2	4	1

	A	B	C	D
C.	2	1	3	4

	A	B	C	D
D.	1	4	2	3

Answer: A

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5. Match the following.

List-I		List-II	
A.	$\dfrac{P^\circ - P}{P^\circ}$	1.	Depression in freezing point
B.	$\Delta T_b = K_b \cdot m$	2.	Lowering of vapour pressure
C.	$\Delta T_f = K_f \cdot m$	3.	Osmotic pressure
D.	$\pi = CRT$	4.	Elevation in boiling point.

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

Answer: B

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Additional Questions Solved Fill In The Blanks

1. .... covers more than 70% of the earth's surface.

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2. .... Is an important natural occurring solution.

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3. An example of solid homogeneous mixture is ....

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4. A mixture of N_2, O_2, CO_2 and other traces of gases is known as ....

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5. Which is a non-aqueous solution ?

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6. .... is an example for gaseous solution.

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7. _____ is used for dental filling .

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8. Carbonated water is an example for ....

9. Hynud oxygen is an example of ....

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10. The concentration of commercially available H_2O_2

is ....

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11. The molality of the solution containing 45 g of glucose in 2 kg of water is ....

12. 5.85 g of NaCl is dissolved in water and the solution was made up to 500 mL using a standard flask. The strengh of the solution in molarity is ....

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13. 3.15 g of oxalic acid dihydrate is dissolved in water and the solution was made up to 100 ml using a standard flask. The strength of the solution in normality is ....

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14. 5.85 g of NaCl is dissolved in water and the solution was made upto 500 ml using a standard flask. The strength of the solution in formality is ....

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15. Neomycin, amino glycoside antibiotic cream contains 300 mg of neomycin sulphate the active ingredient in 30 g of ointment base. The mass percentage of neomycin is ....

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16. 0.5 mole of ethanol is mixed with 1.5 mole of water. Then the mole fraction of ethanol and water are ....

17. 50 mL tincture of benzoin, an antiseptic solution contains 10 ml of benzoin. The volume percentage of benzoin is ....

18. A 60 ml of parcentamol pediatric oral suspension contains 3g of paracetamol. The mass percentage of paracetamol is ....

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19. 50 ml of tap water contains 20 mg of dissolved solids. The TDS value in ppm is ....

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20. The concentration term used in the neutralisation reaction is ....

21. The concentration term is used in the calculation of

vapour pressure of solution is ....

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22. The term used to express the active ingredients

present in therapeutics is ....

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23. When maximum amount of solute is dissolved in a solvent at a given temperature, the solution is called...............

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24. The solvent in which sodium chloride readily dissolves is ....

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25. .... is used by deep-sea divers.

▶ **Watch Video Solution**

26. The mathematical expression of Raoult's law is

....

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27. .... is an ideal solution ?

> ▶ **Watch Video Solution**

28. .... is important in some vital biological systems.

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

30. According to van't Hoff equation, the value of osmotic pressure π is equal to ....

31. The osmotic pressure of the blood cells is approximately equal to .... at $37°C$.

32. Which one of the following is applied in water purification ?

33. In commerical reverse osmosis process, the semi permeable membrane used is ....

34. The degree of dissociation α is equal to ....

35. The degree of association α is equal to ....

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36. The estimated van't Hoff factor for acetic acid solution in benzene is ....

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37. The estimated van't Hoff factor for sodium chloride in water is ....

> ▶ **Watch Video Solution**

38. Number of moles of the solute dissolved per dm^3 of solution is ....

> ▶ **Watch Video Solution**

39. Molarity of pure water is ....

> ▶ **Watch Video Solution**

40. 18 g of glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to ....

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41. When NaCl is dissolved in water, boiling point

....

42. Use of glycol as antifreezer in automobile is an

important application of ....

43. Ethylene glycol is mixed with water and used as

antifreezer in radiators because ....

44. Colligative properties of a solution depend in ....present in it.

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45. Low concentration of oxygen in the blood and tissue of people living at high altitude is due to ....

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Additional Questions Solved Odd One Out

1. Choose the odd one out

      A. Air

      B. Camphor in nitrogen gas

      C. Humid oxygen

      D. Salt water

Answer: D

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2. Choose the odd one out

      A. CO_2 dissolve in water

B. Salt water

C. Solution of H_2 in palladium

D. Ethanol dissolved in water

Answer: C

3. Choose the odd one out

A. 1) Amalgam of potassium

B. 2) Camphor in nitrogen gas

C. 3) Solution of H_2 in palladium

D. 4) gold alloy

Answer: B

4. Choose the odd one out

    A. 1) Vapour pressure

    B. 2) Lowering of vapour pressure

    C. 3) Osmotic pressure

    D. 4) Elevation of boiling point

Answer: A

5. Choose the odd one out

    A. 1) Benzene and toluene

    B. 2) Chlorobenzene and Bromobenzene

    C. 3) Benzene and acetone

    D. 4) n-hexane and n-heptane

Answer: A

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6. Choose the odd one out

    A. 1) Ethyl alcohol and cyclohexane

B. 2) Ethyl bromide and ethyl iodide

C. 3) Acetone and ethyl alcohol

D. 4) Benzene and acetone

Answer: A

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Additional Questions Solved Correct Pair

1. Choose the correct pair

A. Humid oxygen : Liquid solution

B. Gold alloy : Solid solution

C. Salt water : Gaseous solution

D. Solution of H_2 in palladium : Gaseous solution

Answer: B

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2. Choose the correct pair

A. Air : Gaseous solution

B. Amalgam of potassium : Liquid solution

C. Salt water : Solid solution

D. Carbonated water : Solid solution

Answer: A

3. Choose the correct pair

A. 1) Benzene and acetone : Non-ideal solution

B. Benzene and acetone : Non-ideal solution

C. Chlorobenzene and bromo benzene : Non-ideal solution

D. Carbon tetrachloride and Chloroform: Idela solution

Answer: B

4. Choose the correct pair

    A. 1) Benzene and toluene : Ideal solution

    B. 2) Ethyl alcohol+water : Ideal solution

    C. 3) Ethyl iodide and ethyl bromide : Non ideal soluton

    D. 4) Chlorobenzene and bromo benzene : Non-ideal solution

Answer: A

Additional Questions Solved Incorrect Pair

1. Choose the incorrect pair

A. $\pi = CRT$: Osmotic pressure

B. $\Delta T_f = \dfrac{K_f \times W_B \times 1000}{M_B \times W_A}$: Depression in freezing point

C. $\Delta T_b = \dfrac{K_f W_A \times 1000}{M_A \times W_B}$: Elevation in boiling point

D. $\dfrac{\Delta P}{P_A^\circ} = \dfrac{W_B \times M_A}{M_B \times W_B}$: Relative lowering of vapour

pressure

Answer: C

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2. Choose the incorrect pair

A. 1) Benzene and acetone : Ideal solution

B. 2) Ethyl alcohol and cyclohexane : Non-ideal

solution

C. 3) n-hexane and n-heptane : Ideal solution

D. 4) Chloro benzene and bromobenzene : Ideal

solution

Answer: A

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Additional Questions Solved Assertion Reason

1. Assertion : When NaCl is added to water, a depression in freezing point is observed.

Reason: The lowering of vapour pressure of a solution causes the depression in freezing point.

A. Assertion and Reason are correct and R is the correct explanation of A.

B. Both A and R are correct R is not the correct explanation of A.

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

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2. Assertion : Ammonia reacts with water does not obey Henry's law.

Reason : The gases reacting with the solvent does not obey Henry's law.

A. 1) Assertion and Reason are correct and R is the correct explanation of A.

B. 2) Both A and R are correct R is not the correct explanation of A.

C. 3) A is correct but R is wrong

D. 4) A is wrong but R is correct

Answer: A

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3. Statement I: Acetic acid deviates from ideal behaviour.

Statement II: Acetic acid exists as a dimer by forming inter molecular hydrogen bonds and hence deviates from Raoult's law.

A. Assertion and Reason are correct and R is the correct explanation of A.

B. Both A and R are correct R is not the correct explanation of A.

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: B

Additional Questions Solved Correct Statement

1. Choose the correct statement.

A. 1) Raoult's law is applicable to volatile solid solute in liquid solvent

B. 2) Henry's law is applicable to solution containing solid solute in liquid solvent

C. 3) For very dilute solutions, the solvent obeys Raoult's law and the solute obeys Henry's law.

D. 4) For saturated solution containing volatile solid solute in liquid solvent both laws are obeyed.

Answer: C

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Additional Questions Solved 2 Marks Questions

1. What is the common property observed in naturally existing solution? Explain it.

2. Define solution.Explain with an example.

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3. What is aqueous and non - aqueous solution ?

  ▶ **Watch Video Solution**

4. Define

Molality

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5. Define molarity.

  ▶ **Watch Video Solution**

6. Define normality.

  ▶ **Watch Video Solution**

7. Define formality.

  ▶ **Watch Video Solution**

8. Define mole fraction.

9. Show that the sum of mole fraction of a solution is equal to one.

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10. Define Mass percentage?

  ▶ **Watch Video Solution**

11. Define Volume percentage .

  ▶ **Watch Video Solution**

12. Define mass by volume percentage.

▶ **Watch Video Solution**

13. What is meant by ppm? Where is it used ?

▶ **Watch Video Solution**

14. What is mean by stock solution (or) standard solution ? what is meant by working standard?

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15. Define solubility

16. Ammonia is more soluble than oxygen in water. Why

?

17. Solubility of solid solute in a liquid solvent increases

with increase in _____.

18. Dissolution of ammonium nitrate increases with increase in temperature. why ?

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19. Explain the solubilities of ammonium nitrate, 'calcium chloride, ceric sulphate and sodium chloride in water at different temperature with a graph.

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20. In which of the following compound the solubility decreases with increase of temperature ?

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21. Why the carbonated drinks are stored in pressurized container ?

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22. Which of the following processes add water vapour to the atmosphere?

(i) Transpiration (ii) Precipitation (iii) Condensation (iv) Evaporation

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23. state Dalton's law of partial pressure.

> ▶ **Watch Video Solution**

24. Define relative lowering of vapour pressure.

> ▶ **Watch Video Solution**

25. What are ideal solution ? Give example.

> ▶ **Watch Video Solution**

26. What are non-ideal solution ? Give example.

27. What are colligative properties?

 ▶ Watch Video Solution

28. Define the Elevation of boiling point

 ▶ Watch Video Solution

29. Define the Ebullioscopic constant

 ▶ Watch Video Solution

30. What is osmotic pressure?

31. Write the Van't Hoff equation of osmotic pressure.

32. Define Van't Hoff factor.

33. How is degree of dissociation and degree of association are related with van't Hoff factor ?

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34. Given an example of a solid solution in which the solute is gas.

> ▶ **Watch Video Solution**

35. What role does the molecular interaction play in solution of alcohol and water?

> ▶ **Watch Video Solution**

36. Why do gases always tend to be less soluble in liquids as the temperature is raised ?

37. Why is the freezing point depresslon of $0.1M$ NaCl solution nearly twice that of $0.1M$ glocose solution ?

38. Why a person surffering from high blood pressure is advised to take minimum quantity of common salt ?

1. What are gaseous solution ? Give its various types with example.

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2. What are liquid solutions ? Explain with example.

▶ **Watch Video Solution**

3. What are ideal solution ? Give example.

▶ **Watch Video Solution**

4. How will you prepare a standard solution ?

▶ **Watch Video Solution**

5. What are the advantages of standard solution.

▶ **Watch Video Solution**

6. Explain the solubilities of ammonium nitrate, 'calcium chloride, ceric sulphate and sodium chloride in water at different temperature with a graph.

▶ **Watch Video Solution**

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7. What happen in case of gaseous solute in liquid solvent the solibility with increase in temperature?

▶ **Watch Video Solution**

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8. Give reason why aquatic species are less sustained in hot water ?

9. Deep-sea divers use air diluted with helium gas in their tanks. Why ? (or) Justify this statement.

10. What are the limitations of Henry's law?

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

12. Derive the relationship between the elevation of boiling point and molar mass of non-volatile solute.

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13. How would you campare Raoult's law and Henry's law.

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14. What are the necessary conditions for an ideal solution? Give two example.

15. Which of the following shows positive deviation from Raoult's law ?

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

17. Explain why boiling point of solution is greater than that of pure solvent ?
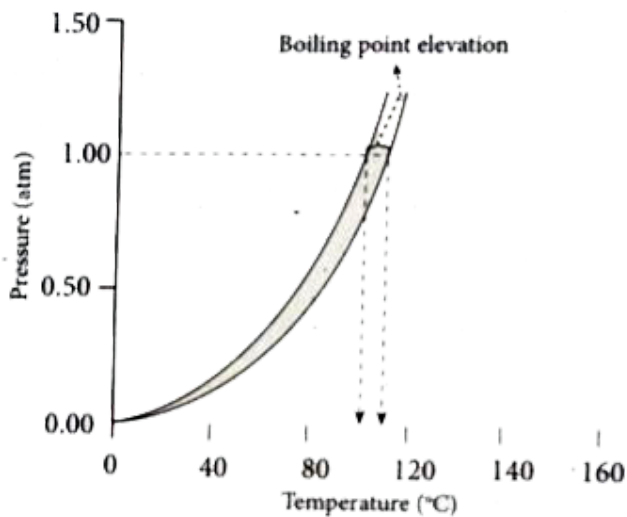
> ▶ **Watch Video Solution**

18. Define relative lowering of vapour pressure.

> ▶ **Watch Video Solution**

19. Explain why boiling point of solution is greater than that of pure solvent ?

> ▶ **Watch Video Solution**

20. Graphically prove that T_b is greater than T_b°.

21. Derive the relationship between the elevation of boiling point and molar mass of non-volatile solute.

22. Write short note an freezing point depression in freezing point and cryoscopic constant.

23. Define (i) cryoscopic constant (ii) ebullioscopic constant

24. Discuss the significances of osmotic-pressure over other colligative properties.

25. What is haemolysis? Why intravenous fluid are isotonic to blood ?

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26. What is reverse osmosis?

> ▶ **Watch Video Solution**

27. Explain about the application of reverse osmosis in water purification.

> ▶ **Watch Video Solution**

28. Acetic acid is found to have molar mass as 120 g mol^{-1}. Prove it.

> ▶ **Watch Video Solution**

29. Prove that the depression in freezing point is a colligative property.

> ▶ **Watch Video Solution**

30. The estimated van't Hoff factor for acetic acid solution in benzene is ....

> ▶ **Watch Video Solution**

31. Distinguish between ideal and non-ideal solution.

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32. The function $f(x) = \begin{cases} 2 & x \le 1 \\ x & x > 1 \end{cases}$ is not

differentiable at ....

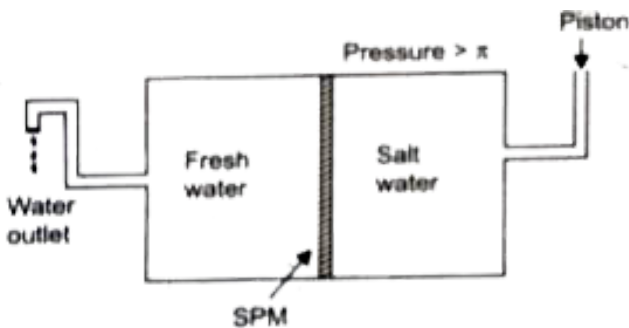> ▶ **Watch Video Solution**

33. State Henry's law and mention some of its

important applications.

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34. What type of non-idealities are exhibited by cyclohexane-ethanol and acetone-chloroform mixture ? Give reason for your answer.

35. Given below is the sketch of a plant for carrying out a process.

(i) Name the process occuring in the above plant.

(ii) To which containeer does the net flow of solvent take place ?

(iii) Name one SPM which can be used in this plant.

(iv) Give one practical use of the plant.

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36. Define the term osmotic pressure. Describe how the molecular mass of a substance can be determined by a method based on measurement of osmotic pressure ?

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37. (a) Menthol is a crystalline substance with peppermint taste. $A.6.2\%$ solution of menthol in cyclohexane freezes at $-1.95°C$. Determine the formula mass of menthol. The freezing point and molar depression constant of cyclohexane are $6.5°C$ and $20.2Km^{-1}$, respectively.

(b) State Henry's Law and mention its two important applications.

(c) Which of the following has higher boiling point and why ? $0.1MNaCl$ or $0.1M$ Glucose

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38. The specific heat of water is

39. State Henry's law for slubility of a gas in a liquid. Explain the significance of Henry's law constnat (K_H). At the same temperatue, hydrogen is more soluble in water than helium. Which of them will have a higer value of K_H and Why?

40. What is meant by positive and negative deviations from Raoult's law and how is the sign of ΔH_{mix} related to positive and negative deviations from Raoult's law?

1. (i) Define solution.

(ii) Explain the types of solutions with suitable example.

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2. (i) Define Solubility

(ii) Explain about the factors that influences the solubility

▶ **Watch Video Solution**

3. Which of the following shows positive deviation from Raoult's law ?

▶ **Watch Video Solution**

4. How would you determine molar mass from relative lowering of vapour pressure.

▶ **Watch Video Solution**

5. How would you determine molar mass from relative lowering of vapour pressure.

▶ **Watch Video Solution**

6. What are non-ideal solution ? Give example.

> ▶ **Watch Video Solution**

7. Which of the following shows positive deviation from

Raoult's law ?

> ▶ **Watch Video Solution**

8. Calculate the gram molecular mass of the following

NH_3

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1. Calculate the mole fraction of benzene is solution containing 30% by mass in carbon tetrachloride.

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2. Calculate the molarity of each of the following solutions:

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

4. H_2S a toxic gas with rotten egg like smell, is used for the qualitative analysis. If the solubility of H_2S in water at STP is 0.195 m. Calculate Henry's law constant.

5. Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea (NH_2CONH_2) is dissolved is 850 g of

water. Calculate the vapour pressure of water for this solution and its relative lowering.

6. Boiling point of water at 750 mm Hg is $99.63°C$. How much sucrose is to be added to 500 g or water such that it boils at $100°$ C ?

7. Concentrated nitric acid used in laboratory work is 68% nitric acid by mass in aqueous solution. What

should be the molarity of such a sample of the acid if the density of the solution is $1.50 gmL^{-1}$?

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

9. A sample of drinking water was found to be severely contaminated with chloroform $(CHCl_3)$ supposed to be a carcinogen. The level of contamination was 15 ppm

(by mass)

(i) express this in percentage by mass

(ii) determine the molality of chloroform in the water sample.

10. An aqueous solution of 2% nonvolatile solute exerts a pressure of 1.004 bar at the boiling point of the solvent. What is the molar mass of the solute when P_A° is 1.013 bar ?

11. $A5\%$ solution (by mass) of cane sugar in water has freezing point of 271 K. Calculatge the freezing point of 5% glucose in water if freezing point of pure water is $273.15K$

12. Calculate the amount of benzoic acid (C_6H_5COOH) required for preparing 250 mL of $0.15M$ solution in methanol.

13. A solution containing 8 g of a substance in 100 g of diethyl ether boils at $36.86°C$, whereas pure ether boils at $35.60°C$. Determine the molecular mass of the solute (For ether $K_b = 2.02 Kkgmol^{-1}$)

14. Ethylene glycol (molar mass = 62 $gmol^{-1}$) is a common automobile antifreeze. Calculate the freezing point of a solution containing 12.4 of this substance in 100 g of water. Would it be advisable to keep this substance in the car radiator during summer? (K_f for water= $1.86 kkg/mol$)(K_b for water $= 0.512 Kkg/mol.$)

15. $15.0g$ of an unknown molecular material is dissolved in 450g of water. The resulting solution freezes at $-0.34°C$. What is the molar mass of the material? $K_f f$ or $water$= 1.86K kg mol^(-1).`