CHEMISTRY

BOOKS - U-LIKE CHEMISTRY (HINGLISH)

SOLUTION

Ncert Intext Questions

1. Calculate the mass percentage of benzene (C_6H_6) and carbon tetrachloride (CCl_4) if 22

g of benzene is dissolved in 122 g of carbon tetrachloride.

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

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3. Calculate the molarity of each of the following solutions : (a) 30 g of $Co(NO_3)_2.6H_2O$ in 4.3 L of solution (b) 30 mL of 0.5 M H_2SO_4 diluted to 500 mL.

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

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5. Calculate (a) molality (b) molarity and (c) mole fraction of KI if the density of 20% (mass/mass) aqueous KI is 1.202 gmL^{-1}

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6. 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

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7. Henry's law constant for CO_2 in water is 1.67×10^8 Pa at 298 K. Calculate the quantity of CO_2 in 500 mL of soda water when packed under 2.5 atm CO_2 pressure at 298 K.

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8. The vapour pressure of pure liquids A and B are 450 and 700 mm Hg respectively at 350 K. Find out the composition of the liquid mixture

if total vapour pressure is 600 mm Hg. Also find the composition of the vapour phase.

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9. Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea (NH_2CONH_2) is dissolved in 850 g of water. Calculate the vapour pressure of water for this solution and its relative lowering.

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10. Boiling point of water at 750 mm Hg is $99.63^{\circ}C$. How much sucrose is to be added to 500 g of water such that it boils at $100^{\circ}C$? [Molal elevation constant of water is 0.52 K kg mol^{-1}]

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11. Calculate the mass of ascorbic acid (Vitamin $C, C_6H_8O_6$) to be dissolved in 75 g of acetic acid to lower its melting point by $1.5^{\circ}C. K_f = 3.9Kkg\mathrm{mol}^{-1}$.

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12. Calculate the osmotic pressure in pascals exerted by a solution prepared by dissolving 1.0 g of polymer of molar mass 185,000 in 450 mL of water at $37^{\circ} C$

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Ncert Textbook Exercises

1. Define the term solution. How many types of solutions are formed ? Write briefly about each type with an example.

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2. Give an example of a solid solution in which the solute is a gas.

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3. Define the molality

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4. Define the molarity

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5. Concentrated nitric acid used in the 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 solution is $1.504 gmL^{-1}$?

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6. A solution of glucose in water is labelled as 10% w/w, what would be the molality and mole fraction of each component in the solution ? If the density of the solution is 1.2 g mL^{-1} , then what shall be the molarity of the solution ?

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7. How many mL of 0.1 M HCl are required to react completely with 1 g mixture of Na_2CO_3 and $NaHCO_3$ containing equimolar amounts of both ?

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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.

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9. An antifreeze solution is prepared from 222.6 g of ethylene glycol, $(C_2H_6O_2)$, and 200 g of water. Calculate the molality of the solution. If the density of the solution is 1.072 g mL^{-1} , then what shall be the molarity of the solution ?

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10. A sample of drinking water was found to be severely contaminated with chloroform $(CHCl_3)$, supposed to be carcinogen. The level of contamination was 15 ppm (by mass) : (i) Express this in per cent by mass. (ii) Determine the molality of chloroform in the water sample.

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

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

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13. State Henry's law and mention some important applications.

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14. The partial pressure of ethane over a solution containing 6.56×10^{-3} g of ethane is 1 bar. If the solution contains 5.00×10^{-2} g of ethane, then what shall be the partial pressure of the gas ?

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15. An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molar mass of the solute ?

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16. Heptane and octane form an ideal solution. At 373 K, the vapour pressures of the two liquid components are 105.2 kPa and 46.8 kPa, respectively. What will be the vapour pressure

of a mixture of 26.0 g of heptane and 35 g of octane ?

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17. The vapour pressure of water is 12.3 kPa at 300 K. Calculate the vapour pressure of 1 molal solution of a non-volatile solute in it

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18. Calculate the mass of a non-volatile solute (molar mass 40 g mol^{-1}] which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.

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19. A solution containing 30 g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 kPa at 298 K. Further, 18 g of water is then added to the solution and the

new vapour pressure becomes 2.9 kPa at 298 K. Calculate : (i) molar mass of the solute (ii) vapour pressure of water at 298 K.

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20. A 5% solution (by mass) of cane sugar in water has freezing point of 271 K. Calculate the freezing point of a 5% glucose in water if freezing point of pure water is 273.15 K.

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21. Two elements A and B form compounds having formula AB_2 and AB_4 . When dissolved in 20 g of benzene (C_6H_6), 1 g of AB_2 lowers the freezing point by 2.3 K whereas 1.0 g of AB_4 lowers it by 1.3 K. The molar depression constant for benzene is 5.1 K kg mol^{-1} . Calculate atomic masses of A and B.

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22. At 300 K, 36 g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bars at the same temperature, what would be its concentration ?

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23. Suggest the most important type of intermolecular attractive interaction in the following pairs : (i) n-hexane and n-octane (ii)

I_2 andCCl_4 (iii) $NaClO_4$ and water (iv) methanol and acetone (v) acetonitrile (CH_3CN) and acetone (C_3H_6O).

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24. Based on solute-solvent interactions, arrange the following in order of increasing solubility in n-octane and explain : Cyclohexane, KCI, CH_3OH, CH_2CN .

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25. Amongst the following compounds, identify which are insoluble, partially soluble and highly soluble in water ?

(i) phenol (ii) toluene (iii) formic acid (iv) ethylene glycol (v) chloroform (vi) pentanol.

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

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27. If the solubility product of CuS is 6×10^{-16}, calculate the maximum molarity of CuS in aqueous solution.

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28. Calculate the mass percentage of aspirin $(C_9H_8O_4)$ in acetonitrile (CH_3CN) when 6.5

g of $C_9H_5O_4$ is dissolved in 450 g of CH_3CN

.

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29. Nalorphene $(C_{19}H_{21}NO_3)$, similar to morphine, is used to combat withdrawal symptoms in narcotic users. Dose of nalorphene generally given is 1.5 mg. Calculate the mass of $15 \times 10^{-3}m$ aqueous solution required for the above dose.

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30. Calculate the amount of benzoic acid (C_6H_3COOH) required for preparing 250 mL of 0.15 M solution in methanol

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31. The depression in freezing point of water observed for the same amount of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order given above. Explain, briefly.

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32. Calculate the depression in the freezing point of water when 10 g of $CH_3CH_2CHCICOOH$ is added to 250 g of water.

$K_a = 1.4 \times 10^{-3}, K_f = 1.86 K kg \text{mol}^{-1}$

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33. 9.5 g of CH_2FCOOH is dissolved in 500 g of water. The depression in the freezing point observed is $1.0^\circ C$. Calculate the van't Hoff factor and dissociation constant of fluroacetic acid.

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34. Vapour pressure of water at 293 K is 17.535 mm Hg. Calculate the vapour pressure of

water at 293 K when 25 g of glucose is dissolved in 450 g of water

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35. Henry's law constant for the molality of methane in benzene at 298 K is 4.27×10^5 mm Hg. Calculate the solubility of methane in benzene at 298 K under 760 mm Hg.

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36. 100 g of liquid A (molar mass 140 g mol^{-1}) was dissolved in 1000 g of liquid B (molar mass 180 g mol^{-1}). The vapour pressure of pure liquid B was found to be 500 torr. Calculate the vapour pressure of pure liquid A and its vapour pressure in the solution if the total vapour pressure of the solution is 475 torr.

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37. Vapour pressures of pure acetone and chloroform at 328 K are 741.8 mm Hg and 632.8 mm Hg respectively. Assuming that they form ideal solution over the entire range of composition, plot $P_{\text{total}} P_{\text{chloroform}}$, and P_{acetone} as a function of x_{acetone} . The experimental data observed for different compositions of mixture is :

$100 \times x_{\text{acetone}}$	0	11.8	23.4	36.0	50.8	58.2	64.5	72.1
p_{acetone}/mm Hg	0	54.9	110.1	202.4	322.7	405.9	454.1	521.1
$p_{\text{chloroform}}$/mm Hg	632.8	548.1	469.4	359.7	257.7	193.6	161.2	120.7

Plot this data also on the same graph paper. Indicate whether it has positive deviation or negative deviation from the ideal solution.

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38. Benzene and toluene form ideal solution over the entire range of composition. The vapour pressure of pure benzene and toluene at 300 K are 50.71 mm Hg and 32.06 mm Hg, respectively, Calculate the mole fraction of benzene in vapour phase if 80 g of benzene is mixed with 100 g of toluene.

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39. The air is a mixture of a number of gases. The major components are oxygen and nitrogen with approximate proportion of 20% is to 79% by volume at 298 K. The water is in equilibrium with air at a pressure of 10 atm. At 298 K, if the Henry's law constants for oxygen and nitrogen at 298 K are 3.30 x 10' mm and 6.51×10^7 mm, respectively, calculate the composition of these gases in water.

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40. Determine the amount of $CaCl_2$ (i = 2.47) dissolved in 2.5 litre of water such that its osmotic pressure is 0.75 atm at $27^\circ C$.

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41. Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 litre of water at $25^\circ C$, assuming that it is completely dissociated.

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Case Based Source Based Integrated Questions

1. Read the given passage and answer the questions :

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. When such solutions are separated by semipermeable membrane, no osmosis occurs between them. For example, the osmotic pressure associated with fluid inside the blood cell is equivalent to that of 0.9%

(mass/volume) sodium chloride solution, called normal saline solution and it is safe to inject intravenously. On the other hand, if we place the cells in a solution containing more than 0.9% sodium chloride, water will flow out of the cells and they would shrink. Such a solution is called hypertonic. If the salt concentration is less than 0.9%, the solution is said to be hypotonic. In this case, water will flow into the cells if placed in this solution and they would swell.

What is meant by isotonic solutions ?

View Text Solution

2. Read the given passage and answer the questions :

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. When such solutions are separated by semipermeable membrane, no osmosis occurs between them. For example, the osmotic pressure associated with fluid inside the blood cell is equivalent to that of 0.9% (mass/volume) sodium chloride solution, called normal saline solution and it is safe to

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Which concentration of sodium chloride solution is suitable for transfusion into blood ?

View Text Solution

3. Read the given passage and answer the questions :

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What is a hypertonic solution ?

View Text Solution

4. Read the given passage and answer the questions :

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than 0.9% sodium chloride, water will flow out of the cells and they would shrink. Such a solution is called hypertonic. If the salt concentration is less than 0.9%, the solution is said to be hypotonic. In this case, water will flow into the cells if placed in this solution and they would swell.

What is a hypotonic solution ?

View Text Solution

5. Read the given passage and answer the questions :

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. When such solutions are separated by semipermeable membrane, no osmosis occurs between them. For example, the osmotic pressure associated with fluid inside the blood cell is equivalent to that of 0.9% (mass/volume) sodium chloride solution, called normal saline solution and it is safe to inject intravenously. On the other hand, if we

place the cells in a solution containing more than 0.9% sodium chloride, water will flow out of the cells and they would shrink. Such a solution is called hypertonic. If the salt concentration is less than 0.9%, the solution is said to be hypotonic. In this case, water will flow into the cells if placed in this solution and they would swell.

If a solution of 3 g of sodium chloride dissolved in 500 mL of water is injected into the body, what will happens to the blood cells ?

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6. Read the given passage and answer the questions :

The direction of osmosis can be reversed if a pressure larger than the osmotic pressure is applied to the solution side. That is, now the pure solvent flows out of the solution through the semi permeable membrane. This phenomenon is called reverse osmosis and is of great practical utility. Reverse osmosis is used in the desalination of sea water. When pressure more than the osmotic pressure is

applied, pure water is squeezed out of sea water through the membrane. A variety of polymer membranes are available for this purpose.

What is meant by reverse osmosis ?

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7. Read the given passage and answer the questions :

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applied to the solution side. That is, now the pure solvent flows out of the solution through the semi permeable membrane. This phenomenon is called reverse osmosis and is of great practical utility. Reverse osmosis is used in the desalination of sea water. When pressure more than the osmotic pressure is applied, pure water is squeezed out of sea water through the membrane. A variety of polymer membranes are available for this purpose.

Give one utility of reverse osmosis.

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8. Read the given passage and answer the questions :

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applied, pure water is squeezed out of sea water through the membrane. A variety of polymer membranes are available for this purpose.

What is the function of membrane in reverse osmosis ?

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9. Read the given passage and answer the questions :

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pressure larger than the osmotic pressure is applied to the solution side. That is, now the pure solvent flows out of the solution through the semi permeable membrane. This phenomenon is called reverse osmosis and is of great practical utility. Reverse osmosis is used in the desalination of sea water. When pressure more than the osmotic pressure is applied, pure water is squeezed out of sea water through the membrane. A variety of polymer membranes are available for this purpose.

Give one more example of osmosis in daily use.

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10. Read the given passage and answer the questions :

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pressure more than the osmotic pressure is applied, pure water is squeezed out of sea water through the membrane. A variety of polymer membranes are available for this purpose.

Give one example of a material used in the preparation of membrane.

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11. Read the given passage and answer the questions :

Molecules of ethanoic acid dimerise in benzene due to hydrogen bonding. This normally happens in solvents of low dielectric constant. In this case, the number of particles is reduced due to dimerisation. The molar mass calculated on the basis of this ΔT_b or ΔT_f will, therefore, be twice the expected value. Such a molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass.

What is meant by abnormal molar mass ?

View Text Solution

12. Read the given passage and answer the questions :

Molecules of ethanoic acid dimerise in benzene due to hydrogen bonding. This normally happens in solvents of low dielectric constant. In this case, the number of particles is reduced due to dimerisation. The molar mass calculated on the basis of this ΔT_b or ΔT_f will, therefore, be twice the expected value. Such a molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass.

Under which conditions do we obtain an abnormal molar mass ?

View Text Solution

13. Read the given passage and answer the questions :

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mass calculated on the basis of this ΔT_b or ΔT_f will, therefore, be twice the expected value. Such a molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass.

Write the structure of dimerised ethanoic acid.

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14. Read the given passage and answer the questions :

Molecules of ethanoic acid dimerise in

benzene due to hydrogen bonding. This normally happens in solvents of low dielectric constant. In this case, the number of particles is reduced due to dimerisation. The molar mass calculated on the basis of this ΔT_b or ΔT_f will, therefore, be twice the expected value. Such a molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass.

Shall we obtain a abnormal molar mass if we determine the boiling point of glucose solution ?

View Text Solution

15. Read the given passage and answer the questions :

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called as abnormal molar mass.

Why does ethanoic acid dimerise in benzene solution ?

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Multiple Choice Questions

1. Molecules of ethanoic acid in water dimerise when dissolved in :

A. water

B. benzene

C. glycerine

D. ethyl alcohol

Answer: B

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2. Abnormal colligative properties are obtained when the solute :

A. undergoes association.

B. undergoes dissociation.

C. both (a) and (b).

D. neither (a) nor (b)

Answer: C

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3. When pure solvent flows out of the solution through the semipermeable membrane, the phenomenon is called :

A. reverse osmosis.

B. inverse osmosis.

C. reversible osmosis.

D. irreversible osmosis

Answer: A

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4. Two solutions having the same osmotic pressure are called

A. isochoric solutions.

B. isothermal solutions.

C. isotonic solutions.

D. isobaric solutions.

Answer: C

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

A. Lowering of vapour pressure.

B. Lowering of surface tension.

C. Depression in freezing point.

D. Elevation in boiling point.

Answer: B

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6. The relation between osmotic pressure, concentration and temperature of a solution is given by:

A. $\pi = CRT$

B. $\frac{1}{\pi} = CRT$

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

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

Answer: A

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7. A solution has a _____vapour pressure than the pure solution.

A. same

B. higher

C. lower

D. depends upon the solute and solvent

Answer: C

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8. Relative lowering of vapour pressure is ____ the mole fraction of the solute.

A. equal to

B. equal to half

C. twice

D. three times

Answer: A

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9. The azeotrope of nitric acid and water has a composition by mass :

A. 50% nitric acid and 50% water

B. 25% nitric acid and 75% water.

C. 32% water and 68% water.

D. 68% nitric acid and 32% water.

Answer: D

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10. The enthalpy of mixing $(\Delta_{mix}H)$ and volume of mixing $(\Delta_{mix}V)$ of pure components to form the solution are :

A. $\Delta_{mix} H = 0$

B. $\Delta_{mix} V = 0$

C. $\Delta_{mix} H = 0 \quad \text{and} \quad \Delta_{mix} V = 0$

D. $\Delta_{mix} H \neq 0 \text{and} \quad \Delta_{mix} V \neq 0$

Answer: C

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11. $p = K_H . x$ is the statement of:

A. Avogadro's law.

B. Dalton's law of partial vapour pressure.

C. Raoult's law.

D. Henry's law.

Answer: D

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12. Low concentration of oxygen in the blood and tissues of people living at high altitutes is due to _____

A. low temperature.

B. low atmospheric pressure.

C. high atmospheric pressure.

D. both low temperature and high atmospheric pressure.

Answer: B

View Text Solution

13. Which of the following aqueous solutions should have the highest boiling point ?

A. 1.0 M NaOH

B. $1.0MNa_2SO_4$

C. $1.0MNH_4NO_3$

D. $1.0MKNO_3$

Answer: B

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14. Colligative properties are observed when _____

A. a non-volatile solid is dissolved in a volatile liquid.

B. a non-volatile liquid is dissolved in another volatile liquid.

C. a gas is dissolved in non volatile liquid.

D. a volatile liquid is dissolved in another volatile liquid.

Answer: A::B

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

A. 2.05

B. 2.63

C. 3.11

D. 0.381

Answer: B

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16. Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law.

A. Methanol and acetone.

B. Chloroform and acetone

C. Nitric acid and water

D. Phenol and aniline

Answer: A

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

A. 0.1

B. 0.19

C. 0.086

D. 0.05

Answer: C

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18. Colligative properties depend on _____

A. the nature of the solute particles dissolved in solution.

B. the number of solute particles in solution.

C. the physical properties of the solute particles dissolved in solution.

D. the nature of solvent particles.

Answer: B

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19. The unit of ebullioscopic constant is _

A. $Kkg\text{mol}^{-1}$ or $K(\text{molality})^{-1}$

B. Mol kgK^{-1} or K^{-1} (molality)

C. $kg\text{mol}^{-1}K^{-1}$ or $K^{-1}(\text{molality})^{-1}$

D. K mol kg^{-1} or K (molality)

Answer: A

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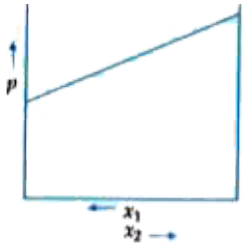
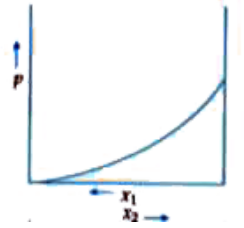
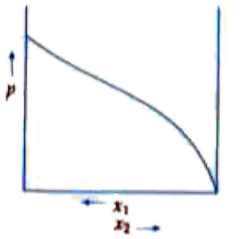
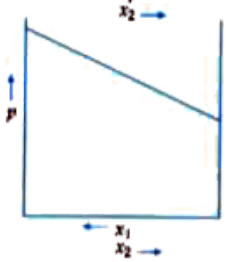
20. For a binary ideal liquid solution, the variation in total vapour pressure versus composition of solution is given by which of the curves ?

A. 

B. 

C. 

D. 

Answer: A::D

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Assertion Reason Questions

1. Assertion (A) : Mole fraction of a gas in the solution is proportional to the partial pressure of the gas over the solution.

Reason (R) : Pressure does not have any significant effect on the solubility of solids in liquids

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not

the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

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2. Assertion (A) : Sodium chloride and sugar readily dissolve in benzene.

Reason (R) : A solution in which no more solid can be dissolved at the same temperature and pressure.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

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3. Assertion (A) : Henry was the first to give a quantitative relation between pressure and solubility of a gas.

Reason (R) : Solubility of a gas in liquids increases with rise in temperature.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

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4. Assertion (A) : Enthalpy of mixing of pure components to form the ideal solution is positive.

Reason (R) : Volume of mixing of pure components to form the ideal solution is zern.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

5. Assertion (A) : Relative lowering of vapour pressure is equal to the mole fraction of the solute.

Reason (R) : The unit of K_f (Cryoscopic constant) is K kg mol^{-1}

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

6. Assertion (A) : The value of van't Hoff factor denotes the extent of association and dissociation of the solute.

Reason (R) : Osmotic pressure is given by the relation $\pi = \frac{CR}{T}$

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

7. Assertion (A) : The total pressure over the solution in a container is equal to the sum of partial pressure of the components.

Reason (R) : The melting point of solution is lowered on addition of a non-volatile solute into it.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

8. Assertion (A) : Elevation in the boiling point of a solution is directly proportional to the molal concentration of solute.

Reason (R) : A solution boils at the temperature at which its vapour pressure is equal to the atmospheric pressure

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

9. Assertion (A) : The vapour pressure of a solution containing non-volatile solute is less than the vapour pressure of pure solvent .

Reason (R) : In the case of a solution of a non-

volatile solute, some of the surface positions are occupied by the solute.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: A

View Text Solution

10. Assertion (A) : The vapour phase is always richer in the component which is less volatile.

Reason (R) : The relative lowering of the

vapour pressure of a solution is proportional to mole fraction of the solvent.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement,

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

Fill In The Blanks

1. A raw mango placed in concentrated salt solution loses water via___and shrivels into pickle.

View Text Solution

2. The properties of solutions which depend upon the number of solute particles and are independent of their chemical identity are called____properties.

View Text Solution

3. The dissolution of a gas in a liquid is governed by _____

View Text Solution

4. The concentration of a solution is expressed in terms of mole fraction, molarity, molality and in____

View Text Solution

5. At a given temperature, the solubility of a gas in a liquid is directly proportional to the _____of the gas.

View Text Solution

6. Colligative properties have been used to determine the____of the solutes.

View Text Solution

True Or False

1. The component that is present in largest quantity is called solvent.

View Text Solution

2. There are several ways in which we can express the concentration of a solution.

View Text Solution

3. If a solution is described as 10% glucose in water by mass, it means that 10 g of glucose is dissolved in 100 g water.

View Text Solution

4. Concentration described by percentage is commonly used in industrial, chemical industries.

View Text Solution

5. A 15% (V/V) solution of ethylene glycol, an antifreeze is used in cars for cooling the engine.

View Text Solution

6. Molality is defined as the number of moles of the solute per kg of the solvent.

View Text Solution

7. The solubility of a solid in a liquid remains unaffected by change of temperature.

View Text Solution

8. Henry's law can be expressed mathematically as : p = $K_H x$

View Text Solution

9. Solubility of a gas in liquid decreases with rise in temperature

View Text Solution

Very Short Answer Questions

1. Give two examples of colligative properties.

View Text Solution

2. The shell of an egg is removed by placing it in a solution of hydrochloric acid. The egg is then placed in a saturated solution of sugar when the egg shrinks considerably. Tell the phenomenon associated with it.

View Text Solution

3. Comment on the enthalpy of mixing and volume of mixing in case of dilute solutions.

View Text Solution

4. What do you mean by ppm mode of concentration ?

View Text Solution

5. Why does molarity change with temperature but molality does not ?

View Text Solution

6. If the mole fraction of X in a solution of X and Y is 0.69, what is the mole fraction of Y?

View Text Solution

7. Give one example of each : (a) Solution in which the solute is a gas and solvent is a liquid. (b) Solution in which the solute is a liquid and solvent is a solid.

View Text Solution

8. Define Henry's law.

View Text Solution

9. What are isotonic solutions ?

View Text Solution

10. Define the term mole fraction.

View Text Solution

11. What is the van't Hoff factor for a compound which undergoes tetramerisation in an organic solvent ?

View Text Solution

12. How is elevation in boiling point related to molal elevation constant ?

View Text Solution

13. What is the significance of Henry's law constant K_H?

View Text Solution

14. Define the term osmotic pressure.

View Text Solution

15. State the main advantage of molality over molarity as the unit of concentration.

View Text Solution

16. State the condition resulting in reverse osmosis.

View Text Solution

17. Two liquids A and B boil at $145^{\circ}C$ and $190^{\circ}C$, respectively. Which of them has a higher vapour pressure at $80^{\circ}C$?

View Text Solution

18. Define mole fraction of a substance in a solution

View Text Solution

19. A mixture of chloroform and acetone forms a solution with negative deviation. Why?

View Text Solution

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

View Text Solution

21. Of 0.1 molal solution of glucose and sodium chloride, respectively which one will have a higher boiling point ?

View Text Solution

22. A and B liquids on mixing produced a warm solution. Which type of deviation is there and why ?

View Text Solution

23. State the formula relating pressure of a gas with its mole fraction in a liquid solution in contact with it.

View Text Solution

24. 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% dissociated ?

View Text Solution

25. Two liquids X and Y boil at $110^\circ C$ and $130^\circ C$, respectively. Which of them has higher vapour pressure at $50^\circ C$?

View Text Solution

26. Which substance is used as a poison for rats?

View Text Solution

27. The mixture whose composition and properties are uniform through is called.

View Text Solution

28. The component present in larger quantity in the solution is called.

View Text Solution

29. Maximum amount of a substance that can be dissolved in a specified amount of a solvent at a specified temperature is called.

View Text Solution

30. When no more solute can be dissolved at the same temperature and pressure, the solution obtained is called.

View Text Solution

31. Out of temperature and pressure, which does not affect the solubility of a solid in the solvent ?

View Text Solution

32. Which law gives a quantitative relation between the pressure and solubility of a gas ?

View Text Solution

33. The dissolution process involves dynamic equilibrium and follows the principle given by.

View Text Solution

34. Which kind of bond is formed between acetone and chloroform ?

View Text Solution

35. What is the name given to the species which have the same composition in liquid and vapour phase ?

View Text Solution

36. What is the other name for freezing point depression constant or molal depression constant ?

View Text Solution

37. Name the phenomenon of flow of solvent through the semi-permeable membrane.

View Text Solution

38. What is the name given to the solutions having the same osmotic pressure ?

View Text Solution

39. What is the name given to properties like lowering of vapour pressure, depression in freezing point and elevation in boiling point ?

View Text Solution

Short Answer Questions

1. Calculate the freezing point of a solution containing 60 g of glucose (Molar mass = $180 g \mathrm{mol}^{-1}$)

View Text Solution

2. Why a mixture of carbon disulphide and acetone shows positive deviation from Raoult's law ? What type of azeotrope is formed in this mixture ?

View Text Solution

3. Define the following terms : (i) Colligative properties. (ii) Molality (m).

View Text Solution

4. What are colligative properties ? Write the colligative property which is used to find the molecular mass of macromolecules.

View Text Solution

5. State Henry's law. Write its one application. What is the effect of temperature on solubility of gases in liquid ?

View Text Solution

6. What is meant by positive deviations from Raoult's law ? Give an example. What is the sign of $\Delta_{mix}H$ for positive deviation ?

View Text Solution

7. Define azeotropes. What type of azeotrope is formed by positive deviation from Raoult's law ? Give an example.

View Text Solution

8. (i) Why are aquatic species more comfortable in cold water than in warm water ? (ii) What happens when we place the blood cell in saline water solution (hypertonic solution) ? Give reasons.

View Text Solution

9. (a) On mixing liquid X and Y, the volume of the resulting solution increases. What type of deviation from Raoult's law is shown by the resulting solution ? What change in temperature would you observe after mixing X and Y ? (b) How can the direction of osmosis be reversed ? Write one use of reverse osmosis.

View Text Solution

10. Calculate the mass of compound (molar mass = $256 g \mathrm{mol}^{-1}$) to be dissolved in 75 g of benzene to lower its freezing point by 0.48 K $\left(K_f = 5.12 K kg \mathrm{mol}^{-1}\right)$.

View Text Solution

11. A 1.00 molal aqueous solution of trichloroacetic acid $(\mathrm{CCl_3}COOH)$ is heated to its boiling point. The solution has a boiling point of $100.18^\circ C$. Determine the van't Hoff

factor for trichloro acetic acid $\left(K_b \text{ for water} = 0.512 K kg \text{mol}^{-1}\right)$.

View Text Solution

12. State the Raoult's law in its general form in reference to solutions.

View Text Solution

13. State the Henry's law about partial pressure of a gas in a mixture.

View Text Solution

14. (i) Gas (A) is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henry's constant) and why ?

(ii) In non-ideal solution, what type of deviation shows the formation of maximum boiling azeotropes ?

View Text Solution

15. Non-ideal solutions exhibit either positive or negative deviations from Raoult's law. What are these deviations and why are they caused ? Explain with one example for each type.

View Text Solution

16. Define the terms, 'osmosis' and 'osmotic pressure'. What is the advantage of using osmotic pressure as compared to other colligative properties for the determination of molar masses of solutes in solutions ?

View Text Solution

17. State Raoult's law for a solution containing volatile liquids. Explain with suitable example the concept of maximum boiling azeotropes.

View Text Solution

18. Which of the following solutions has higher freezing point ?

$0.05MAl_2(SO_4)_3, 0.1MK_3\left[Fe(CN)_6\right]$.

Justify.

View Text Solution

19. Determine the molarity of an antifreeze solution containing 250 g water mixed with 222 g ethylene glycol $(C_2H_6O_2)$. The density of this solution is 1.07 g/mL.

View Text Solution

20. An aqueous solution containing urea was found to have boiling point more than the

normal boiling point of water (373.13 K). When the same solution was cooled it was found that its freezing point is less than the normal freezing point of water (273.13 K). Explain these observations.

View Text Solution

21. Components of a binary mixture of two liquids A and B were being separated by distillation. After some time separation of components stopped and composition of

vapour phase became same as that of liquid phase. Both the components started coming in the distillate. Explain why this happened.

View Text Solution

22. Ethylene glycol (molar mass = $62 g \mathrm{mol}^{-1}$) is a common automobile antifreeze. Calculate the freezing point of a solution containing 12.4 g of this substance in 100 g of water. Would it be advisable to keep this substance in the car radiator during summer ? Given : K_f

for water = 1.86 K kg/mol, K_b for water = 0.512 K kg/mol.

View Text Solution

23. Give reasons for the following: (a) At higher altitudes, people suffer from a disease called anoxia. In this disease, they become weak and cannot think clearly. (b) When mercuric iodide is added to an aqueous solution of KI, the freezing point is raised.

View Text Solution

24. Explain the solubility rule "like dissolves like" in terms of intermolecular forces that exist in solutions.

View Text Solution

25. Concentration terms such as mass percentage, ppm, mole fraction and molality are independent of temperature, however molarity is a function of temperature. Explain.

View Text Solution

26. 0.5 g of KCl was dissolved in 100 g of water and the solution originally at $20^{\circ}C$ froze at $-0.24^{\circ}C$. Calculate the percentage dissociation of salt. Given :K_f for water = 1.86 K kg/mol, At, mass : K= 39 u, Cl = 35.5 u.

View Text Solution

27. Why is the vapour pressure of an aqueous of glucose lower than that of water ?

View Text Solution

28. How does sprinkling of salt help in clearing the snow covered roads in hilly areas ? Explain the phenomenon involved in the process.

View Text Solution

29. Calculate the volume of 80% (by mass) of H_2SO_4 (density = 1.80 g/mL] required to prepare 1 litre of 0.2 molar H_2SO_4 [Relative atomic masses : H = 1, O = 16, S = 32]

View Text Solution

30. What is semi-permeable membrane ?

View Text Solution

Long Answer Questions I

1. Give reasons for Measurement of osmotic pressure method is preferred for the determination of molar masses of

macromolecules such as proteins and polymers.

View Text Solution

2. Give reasons for Aquatic animals are more comfortable in cold water than in warm water.

View Text Solution

3. Give reasons for Elevation of boiling point of 1 M KCl solution is nearly double than that of 1

M sugar solution.

View Text Solution

4. Calculate the freezing point of an aqueous solution containing 10.5 g of Magnesium bromide in 200 g of water, assuming complete dissociation of Magnesium bromide. [Molar mass of Magnesium bromide $= 184 g \text{mol}^{-1}$, K_f, for water = 1.86 K kg mol^{-1} ?]

View Text Solution

5. A 10% solution (by mass) of sucrose in water has freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water, if freezing point of pure water is 273.15 K. [Given : Molar mass of sucrose = $342 g \mathrm{mol}^{-1}$, Molar mass of glucose = 180 g mol^{-1}]

View Text Solution

6. A solution of glucose (Molar mass $= 180 g \mathrm{mol}^{-1}$) in water has a boiling point

of $100.20^{\circ}C$. Calculate the freezing point of the same solution. Molal constants for water K_f and K_b are $1.86 K kg \text{mol}^{-1}$ and $0.512 K kg \text{mol}^{-1}$ respectively.

View Text Solution

7. Calculate the boiling point of solution when 4 g of $MgSO_4 \left(M = 120 g \text{mol}^{-1} \right)$ was dissolved in 100 g of water, assuming $MgSO_4$ undergoes complete ionisation.

View Text Solution

8. Calculate the freezing point of solution when 2 g of $Na-2SO_4\left(M=142g\text{mol}^{-1}\right)$ was dissolved in 50 g of water, assuming Na_2SO_4 undergoes complete ionisation.

View Text Solution

9. 3.9 g of benzoic acid dissolved in 49 g of benzene shows a depression in freezing point of 1.62 K. Calculate the van't Hoff factor and predict the nature of solute (associated or

dissociated). [Given : Molar mass of benzoic acid $= 122 g \text{mol}^{-1}$, K_f for benzene = $4.9 K kg \text{mol}^{-1}$]

View Text Solution

10. A solution is prepared by dissolving 10 g of non-volatile solute in 200 g of water. It has a vapour pressure of 31.84 mm Hg at 308 K. Calculate the molar mass of the solute. [Vapour pressure of pure water at 308 K = 32 mm Hg]

View Text Solution

11. Calculate the mass of NaCl (molar mass = $58.5 g \mathrm{mol}^{-1}$] to be dissolved in 37.2 g of water to lower the freezing point by $2^{\circ} C$, assuming that NaCl undergoes complete dissociation.

View Text Solution

12. Define an ideal solution and write one of its characteristics.

View Text Solution

13. What is meant by positive and negative deviation from Raoult's law ?

View Text Solution

14. What mass of NaCl must be dissolved in 65.0 g of water to lower the freezing point of water by $7.50^{\circ}C$? The freezing point depression constant (Kg) for water is 1.86°

C/m. Assume van't Hoff factor for NaCl is 1.87. [Molar mass of NaCl = 58.5 g]

View Text Solution

15. State Raoult's law for a solution containing volatile components. How does Raoult's law become a special case of Henry's law ?

View Text Solution

16. A decimolar solution of potassium ferrocyanide $K_4Fe(CN)_6$ is 50% dissociated at 300 K. Calculate the value of van't Hoff factor for potassium ferrocyanide.

View Text Solution

17. On dissolving 19,5 g of CH_2FCOOH in 500 g of water, a depression of $1^\circ C$ in freczing point of water is observed. Calculate the van't Hoff factor and dissociation constant

of fluoro acetic acid. Given,

$K_f = 1.86 K kg \text{mol}^{-1}$

View Text Solution

18. Heptane and octane form an ideal solution at 373 K. The vapour pressures of the pure liquids at this temperature are 105.2 kPa and 46.8 kPa, respectively. If the solution contains 25 g of heptane and 28.5 g of octane, calculate (i) vapour pressure exerted by heptane (ii)

vapour pressure exerted by solution (iii) mole fraction of octane in the vapour phase.

View Text Solution

19. Using Raoult's law, explain how the total vapour pressure over the solution is related to mole fraction of components in the following solutions : (i) $CHCl_3(l)$ and $CH_2Cl_2(l)$ (ii) $NaCl(s)$ and $H_2O(l)$

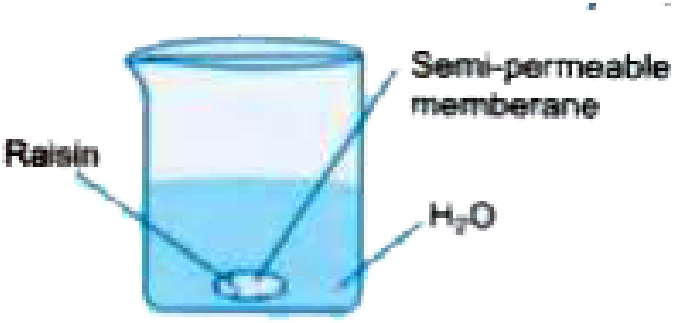
View Text Solution

20. Calculate the mass of a non-volatile solute (molar mass = 40 g/mol) which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.

View Text Solution

21. When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a diagram. Give three

applications of the phenomenon.



View Text Solution

22. An antifreeze solution is prepared from 222.6 g of ethylene glycol $\left[C_2H_4(OH)_2\right]$ and 200 g of water. Calculate the molality of the solution. If the density of this solution be

$1.072 gm L^{-1}$, what will be the molarity of the solution ?

View Text Solution

23. A 0.1539 molal aqueous solution of cane sugar (mol. mass = 342 g mol^{-1}) has a freezing point of 271 K while the freezing point of pure water is 273.15 K. What will be the freezing point of an aqueous solution containing 5 g of glucose (mol. mass = 180 g mol^{-1}) per 100 g of solution ?

View Text Solution

24. At 300 K, 36 g of glucose, $C_6H_{12}O_6$ present per litre in its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of another glucose solution is 1.52 bar at the same temperature, calculate the concentration of the other solution.

View Text Solution

25. Why is the vapour pressure of a solution of glucose in water lower than that of water ?

View Text Solution

26. A 6.90 M solution of KOH in water contains 30% by mass of KOH. Calculate the density of the KOH solution.

View Text Solution

27. Give reasons for the following: (a) When 30 mL of ethyl alcohol and 30 mL of water are mixed, the volume of resulting solution is more than 60 mL. (b) Copper is conducting as such while copper sulphate is conducting only in molten state or in aqueous solution.

View Text Solution

28. Calculate the amount of $CaCl_2$ [molar mass = 111 g mol^{-1}] which must be added to

500 g of water to lower the freezing point by 2 K, assuming $CaCl_2$ is completely dissociated.

View Text Solution

29. A 4% solution of sucrose is isotonic with 3% solution of an unknown organic substance. Calculate the molecular mass of unknown substance.

View Text Solution

30. What is the mole fraction of a solute, in 2.5 m aqueous solution ?

View Text Solution

31. 2 g of benzoic acid (C_6H_5COOH) dissolved in 25 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant for benzene is 4.9 K kg mol^{-1}. What is the percentage association of acid if it forms dimer in solution ?

View Text Solution

32. The freezing point of benzene decreases by 2.12 K when 2.5 g of benzoic acid (C_6H_3COOH) is dissolved in 25 g of benzene. If benzoic acid forms a dimer in benzene, calculate the van't Hoff factor and the percentage association of benzoic acid. [K_f for benzene = 5.12 K kg mol^{-1}]

View Text Solution

Long Answer Questions Ii

1. A solution containing 30 g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 kPa at 298 K. Further 18 g of water is then added to this solution, the new vapour pressure becomes 2.9 kPa at 298 K. Calculate (i) the molar mass of solute, (ii) vapour pressure of water at 298 K.

View Text Solution

2. Give reasons : (i) Aquatic species are more comfortable in cold water than in hot water. (ii) 10 mL of liquid A was mixed with 10 mL of liquid B. The volume of the resulting solution decreases to 19.8 ml.

View Text Solution

3. (a) When 1.5 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point of benzene is raised from 353.23 K to 353.93 K.

Calculate the molar mass of the solute. (b) When fruits and vegetables that have dried up are placed in water, they swell and return to original form. Why? Would temperature increase accelerate the process ?

View Text Solution

4. A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water if the freezing point of pure water is 273.15 K. [Given

: Molar mass of sucrose = 342 g mol^{-1}, Molar mass of glucose = 180 g mol^{-1}]

View Text Solution

5. Define the following terms : (i) Molality (m) (ii) Abnormal molar mass.

View Text Solution

6. 30 g of urea (M = 60 g mol^{-1}) is dissolved in 846 g of water. Calculate the vapour pressure

of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg.

View Text Solution

7. Write two differences between ideal solutions and non-ideal solutions.

View Text Solution

8. Explain why a solution of chloroform and acetone shows negative deviation from

Raoult's law.

View Text Solution

9. Phenol associates in benzene to a certain extent to form a dimmer. A solution containing 20 g of phenol in 1.0 kg of benzene has its freezing point lowered by 0.69 K. Calculate the fraction of phenol that has dimerised. [Given K_f for benzene = 5.1 K m^{-1}

View Text Solution

10. Derive the relationship between relative lowering of vapour pressure and mole fraction of the volatile liquid.

View Text Solution

11. Define Azeotropes and explain briefly minimum boiling azeotrope by taking suitable example.

View Text Solution

12. The vapour pressures of pure liquids A and B are 450 mm and 700 mm of Hg, respectively at 350 K. Calculate the composition of liquid mixture if total vapour pressure is 600 mm of Hg. Also find the composition of the mixture in vapour phase.

View Text Solution

Self Assessment Test Section A Multiple Choice Questions

1. Brass is a mixture of

A. Cu and Sn

B. Cu and Zn

C. Sn and Zn

D. Cu and carbon

Answer: B

View Text Solution

2. Method of expressing concentration of solution is

A. mass percentage.

B. volume percentage.

C. mass by volume percentage.

D. all the above.

Answer: D

View Text Solution

3. If n_A and n_B represent the number of moles of components A and B, the mole fraction of $A(x_A)$ is given by

A. n_A / n_B

B. n_B / n_A

C. $n_A / n_A + n_B$

D. $n_A + n_B / n_A$

Answer: C

View Text Solution

4. For an ideal solution

A. $\Delta_{mix}H = 0, \Delta_{mix}V = 0$

B. $\Delta_{mix}V = 0, \Delta_{mix}V \neq 0$

C. $\Delta_{mix}H \neq 0, \Delta_{mix}V = 0$

D. $\Delta_{mix}H \neq 0, \Delta_{mix}V \neq 0$

Answer: A

View Text Solution

5. The solution A has a higher osmotic pressure than the solution B :

A. Solution A is hypertonic to solution B.

B. Solution A is hypotonic to solution B.

C. Solution A is isotonic to solution B.

D. Solution B is hypertonic to solution A

Answer: A

View Text Solution

6. Assertion (A) : If the solution does not obey Raoult's law over the entire range of concentration, it is called non-ideal solution.

Reason (R) : Azeotropes are binary mixtures which have the same composition in liquid and vapour phase.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

7. Assertion (A) : Solubility of a gas in a liquid is directly proportional to the pressure of the gas.

Reason (R) : Solutions which show positive deviations from Raoult's law from maximum boiling azeotropes at a specific composition.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

Self Assessment Test Section D

1. (a) 30 g of urea (M = 60 g mol^{-1}) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mmHg. (b) Write two differences between ideal solutions and non-ideal solutions.

View Text Solution

2. (a) Derive a relationship between relative lowering of vapour pressure and mole fraction of the volatile liquid. (b) (i) Benzoic acid completely dimerises in benzene. What will be vapour pressure of a solution containing 61 g of benzoic acid per 500 g of benzene when the vapour pressure of pure benzene at the temperature of experiment is 66.6 torr ? (ii) What would have been the vapour pressure in the absence of dimerisation ? (iii) Derive a

relationship between mole fraction and vapour pressure of a component of an ideal solution in the liquid phase and vapour phase.

View Text Solution