

India's Number 1 Education App

CHEMISTRY

NCERT - FULL MARKS CHEMISTRY(TAMIL)

SOLUTIONS

Example Problem

1. What volume of 4M HCl and 2M HCl should be

mixed to get 500 mL of 2.5M HCl?

2. 0.24g of a gas dissolves in 1L of water at 1.5atm pressure. Calculate the amount of dissolved gas when the pressure is raised to 6.0atm 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. 0.75g of an unknown substance is dissolved in 200g water. If the elevation of boiling point is 0.15K and molal elevation constant is $7.5KKgmol^{-1}$ then, calculate the molar mass of unknown susbstance?

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5. Ethylene glycol $(C_2H_6O_2)$ can be at 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 = $1.86 K K g mol^{-1}$ and molar mass of ethylene glycol is $62 g mol^{-1}$?

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



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



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 iodopovidoe present in a typical dose of 1.5 mL.



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

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5. Describe how would you prepare the following

solution from pure solute and solvent

1 l of aqueous solution of $1.5 MCoCl_2$

6. Describe how would you prepare the following

solution from pure solute and solvent

500 mL of
$$6.0\%\left(\frac{V}{V}\right)$$
 aqueous methanol solution.

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7. How much volume of 6 M solution of NaOH is

required to prepare 500 mL of 0.250 M NaOH

solution.

8. Calculate the proportion of O_2 and N_2 dissolved in water at 298 K. When air containing $20 \% O_2$ and N_2 by volume is in equilibrium with it 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.

9. Calculate the mole fractions 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 mmHg and the vapour pressure of pure naphthalene is 32.06 mmHg at 300 K.

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



11. 2.56 g of Sulphur is dissolved in 100g of carbon disulphide. The solution boils at 319. 692 K. 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 75 g of benzene lowered the freezing point of benzene by 0.20 K. The freezing point depression constant

of benzene is $5.12 K K gmol^{-1}$. Find the molar

mass of the solute.



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

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14. 0.2m aqueous solution of KCI freezen at $-0.68^{\,\circ}C$ calculate van't Hoff factor. k_1 for water is



A. 0.2M

 $B.\,0.01M$

C.0.02M

D. 0.04M



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

A. molality

B. molarity

C. mole fraction

D. (a) and (c)

Answer: D



3. Stomach acid, a dilute solution of HCI can be neutralised by reaction with Aluminium hydroxide $Al(OH)_3 + 3HCI(aq) \rightarrow AlCl_3 + 3H_2O$ How many milliliters of $0.1MAl(OH)_3$ solution are needed to neutralise 21 mL of 0.1MHCl?

A. 14 mL

B. 7 mL

C. 21 mL

D. none of these

Answer: B



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

A.
$$1 imes 10^{-4}$$

B. $1 imes 10^{-6}$

 ${\sf C.2 imes10^{-5}}$

D. $1 imes 10^{-5}$

Answer: D

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

A. $4 imes 10^{-4}$

 $\text{B.}\,4\times\,10^4$

C. $2 imes 10^{-2}$

D. $2.5 imes10^{-4}$

Answer: D

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

A.
$$riangle H_{mix}=0$$

$$\mathsf{B.}\ \bigtriangleup\ U^{mix}=0$$

C.

$$\triangle P = P_{
m observed} - P_{
m Calculated \ by \ raoults \ law}$$
 =

()

D.
$$\triangle G_{mix} = 0$$

Answer: D

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7. Which one of the following gases has the lowest

value of Henry's law constant ?

A. N_2

B. He

 $\mathsf{C}.CO_2$

D. H_2

Answer:



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 fraction of component 1. the total pressure of the solution 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.
$$P_1 + x_2(P_1 - P_2)$$

Answer: C



9. Osometic pressure (π) of a solution is given by the relation

A.
$$\pi = nRT$$

B. $\pi V = nRT$

$$\mathsf{C}.\,\pi RT=n$$

D. none of these

Answer: B

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10. Which one of the following binary liquid mixtures exhibits positive seviation 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 constants 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.
$$\frac{2x}{y}$$

B. $\frac{y}{0.2x}$
C. $\frac{0.2x}{y}$
D. $\frac{5x}{y}$

Answer: D



12. At $100^{\circ}C$ the vapour pressure of a solution containing 6.5g a solute in 100g water is 732mm. If $K_b=0.52$, the boiling point of this solution will A. $102^{\,\circ}\,C$

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

C. $101^{\circ}C$

D. $100.52^{\,\circ}\,C$

Answer:



13. According to Raoults law, the relative lowering

of vapour pressure for a solution is equal to

A. mole fraction of solvent

B. mole fraction of solute

C. number of moles of solute

D. number of moles of solvent

Answer: B

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

A. $0.2MBaCl_2$ and 0.2M urea

B. 0.1 glucose and 0.2 M urea

C. 0.1 M NaCl and $0.1 K_2 SO_4$

 $\mathsf{D}.\,0.1\,\mathsf{M}\,\mathsf{Ba}\,(NO_3)_2$ and MNa_2SO_4

Answer: D



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

A. $C_2H_4O_2$

B. $C_8 H_{16} O_8$

$\mathsf{C.}\,C_4H_8O_4$

D. CH_2O

Answer: B



16. The K_H for the solution of oxygen dissolved in water is 4×10^4 atm 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. $4.6 imes10^3$

B. $1.6 imes 10^4$

 $\text{C.1}\times 10^{-5}$

D. $1 imes 10^5$

Answer: C



17. Normality of 1.25M sulphuric acid is

A. $1.25\ \mathrm{N}$

 $\mathsf{B}.\,3.75~\mathsf{N}$

C.2.5N

 $\mathsf{D}.\,2.25\mathsf{N}$

Answer: C



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

A. ideal

B. non-ideal and shows positive deviation from

Raoults law

C. ideal and shows negative deviation from

Raoults Law

D. non-ideal and shows negative deviation from

Raoults Law

Answer: D



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-voltaile solute (molar mass 80 h mol^{-1}) which should be dissolved in 92g of toluene to reduce its vapour pressure to 90 %

A. 10g

B. 20g

 $\mathsf{C}.\,9.2g$

D. 8.89g

Answer: D



21. For a solution, the plot of osmotic pressure (π) versers the concentration (c in mol L^{-1}) gives a straight line with slope 310R where 'R' is the gas

constant. The temperature at which osmotic

pressure measured is

A. 310 imes 0.082K

B. $310^{\circ}C$

C.
$$37^\circ C$$

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

Answer: C



22. 200ml of an aqueous solution of a protein contains 1.26g of protein. At 300K, the osmotic pressure of this solution is found to be 2.52×10^{-3} bar. The molar mass of protein will be (R = 0.083L bar $mol^{-1}K^{-1})$

A. 62.22 kgmol - 1

B. $12444 gmol^{-1}$

C. $300 gmol^{-1}$

D. none of these

Answer: A



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

A. 0

B. 1

C. 2

D. 3

Answer: B



24. What is the molality of a 10 % W/W aqueous sodium hydroxide solution?

A. 2.778

 $\mathsf{B.}\,2.5$

C. 10

 $\mathsf{D.}\,0.4$

Answer: B

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

A.
$$lpha=rac{n(i-1)}{n-1}$$

B. $lpha^2=rac{n(1-i)}{(n-1)}$
C. $lpha=rac{n(i-1)}{1-n}$
D. $lpha=rac{n(1-i)}{n(1-i)}$

Answer: C



26. Which of the following aqueous solutions has

the highest boiling point ?

A. 0.1 M KNO₃

B. 0.1 M Na_3PO_4

C. 0.1 M $BaCl_2$

D.0.1 M K_2SO_4

Answer: B



27. The freezing point depression constant for water is $1.86^{\circ} KKgmol^{-1}$. If 5g Na_2SO_4 is dissolved in 45g water, the depression in freezing point is $3.64^{\circ}C$. The Vant Hoff factor for Na_2SO_4 is

A. 2.50

B. 2.63

C. 3.64

D. 5.50

Answer: A

28. Equimolal aqueous solutions of NaCl and KCl are prepared. If the freezing point of NaCl is $-2^{\circ}C$, the freezing point of KCl solution is expected to be

A. $-2^\circ C$ B. $-4^\circ C$ C. $-1^\circ C$

D. $0^{\circ}C$

Answer: A





29. Phenol dimerises in benzene having van't Hoff

factor 0.54. What is the degree of association?

A. 0.46

B. 92

C. 46

 $\mathsf{D}.\,0.92$

Answer: D



30. Assertion : An ideal solution obeys Raoults Law Reason : In an ideal solution, solvent-solvent as well as solute-solute interactions 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

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31. A sample of 12 M Concentrated hydrochloric

acid has a density $1.2gL^{-1}$ Calculate the molality

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32. A 0.25 M glucose solution at 370.28 K has approximately the pressure as blood does what is



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

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34. Which solution has the lower freening point? 10 g of methanol (CH_3OH) in 100 g of water (or) 20g of ethanol (C_2H_5OH) in 200g of water.



constant temperature At this temperature. Calculate the solubility of methane at i) 750 mm Hg ii) 840 mm Hg





37. The observed depression in freezing point of water for a particular solution is $0.093^{\circ}C$. Calculate the concentration of the solution in molality. Given that molal depression constant for water is $1.86KKgmol^{-1}$

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38. The vapour pressure of pure benzene (C_6H_6) at a given temperature is 640 mm Hg. 2.2g of nonvolatile solute is added to 40 g of benzene. The vapour pressure of the solution is 600 mm Hg.

Calculate the molar mass of the solute ?

