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India's Number 1 Education App

## CHEMISTRY

## NCERT - FULL MARKS CHEMISTRY(TAMIL)

## SOLUTIONS

## Example Problem

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

D View Text Solution
2. 0.24 g 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.

## D View Text Solution

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 $P_{A}^{\circ}$ is 1.013 bar?
4. 0.75 g of an unknown substance is dissolved in 200 g water. If the elevation of boiling point is $0.15 K$ and molal elevation constant is $7.5 \mathrm{KKgmol}^{-1}$ then, calculate the molar mass of unknown susbstance?

## D View Text Solution

5. Ethylene glycol $\left(\mathrm{C}_{2} \mathrm{H}_{6} \mathrm{O}_{2}\right)$ 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
$=1.86 \mathrm{KKgmol}^{-1}$ and molar mass of ethylene glycol is $62 \mathrm{gmol}^{-1}$ ?

## - View Text Solution

6. At $400 \mathrm{~K} 1.5 g$ of an unknown substance is dissolved in solvent and the solution is made to $1.5 L$ 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 $0.24 K$ obtained by dissolving 1 g NaCl in 200 g water.

Calculate van't-Hoff factor. The molal depression constant is $1.86 \mathrm{KKgmol}^{-1}$.

## D View Text Solution

## 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.

## D View Text Solution

3. The antiseptic solution of iodopovidone for the use of external application contains $10 \% \mathrm{w} / \mathrm{v}$ 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 $\left(O_{2}\right)$. Express the concentration of dissolved oxygen in ppm.

## - View Text Solution

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

1 I of aqueous solution of $1.5 \mathrm{MCoCl}_{2}$
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.

## D View Text Solution

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 $20 \% \mathrm{O}_{2}$ and $\mathrm{N}_{2}$ by volume is in equilibrium with it at 1 atm pressure. Henry's law constants for two
gases are
$K_{H}(O)_{2}=4.6 \times 10^{4} \mathrm{~atm}$ and $K_{H}\left(N_{2}\right)=8.5 \times 10^{4}$
atm.

## - View Text Solution

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 .

## D View Text Solution

10. Vapour pressure of a pure liquid $A$ is 10.0 torr at $27^{\circ} \mathrm{C}$. 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 100 g of carbon disulphide. The solution boils at 319.692 K . What is the molecular formula of Sulphur in solution The boiling point of $C S_{2}$ is 319.450 K . Given that $K_{b}$ for

$$
C S_{2}=2.42 \mathrm{Kkgmol}^{-1}
$$

## - View Text Solution

12. 2 g 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 $5.12 \mathrm{KKgmol}^{-1}$. Find the molar mass of the solute.

## - View Text Solution

13. What is the mass of glucose $\left(\mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}\right)$ in it one litre solution which is isotonic with $6 \mathrm{~g} L^{-1}$ of urea $\left(\mathrm{NH}_{2} \mathrm{CONH}_{2}\right)$ ?

## D View Text Solution

14. $0.2 m$ aqueous solution of KCI freezen at $-0.68^{\circ} C$ calculate van't Hoff factor. $k_{1}$ for water is
$1.86 \mathrm{Kkgmol}^{-1}$.

## - View Text Solution

## Evaluation

1. The molality of a solution containing $1.8 g$ of glucose dissolved in 250 g of water is
A. 0.2 M
B. 0.01 M
C. 0.02 M
D. 0.04 M

## D View Text Solution

2. Which of the following concentration terms is/are independent of temperature
A. molality
B. molarity
C. mole fraction
D. (a) and (c )

## - View Text Solution

3. Stomach acid, a dilute solution of HCl can be neutralised by reaction with Aluminium hydroxide
$\mathrm{Al}(\mathrm{OH})_{3}+3 \mathrm{HCI}(\mathrm{aq}) \rightarrow \mathrm{AlCl}_{3}+3 \mathrm{H}_{2} \mathrm{O}$
How many milliliters of $0.1 \mathrm{MAl}(\mathrm{OH})_{3}$ solution are needed to neutralise 21 mL of 0.1 MHCl ?
A. 14 mL
B. 7 mL
C. 21 mL
D. none of these

## D View Text Solution

4. The partial pressure of nitrogen in air is 0.76 atm and its Henry's law constant is $7.6 \times 10^{4}$ atm at 300 K . What is the molefraction of nitrogen gas in the solution obtained when air is bubbled through water at 300K?
A. $1 \times 10^{-4}$
B. $1 \times 10^{-6}$
C. $2 \times 10^{-5}$
D. $1 \times 10^{-5}$

## Answer: D

## - View Text Solution

5. The Henry's law constant for the solubility of Nitrogen gas in water at 350 K is $8 \times 10^{4}$ 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 350 K and 4 atm pressure is

$$
\text { A. } 4 \times 10^{-4}
$$

B. $4 \times 10^{4}$
C. $2 \times 10^{-2}$
D. $2.5 \times 10^{-4}$

## Answer: D

## D View Text Solution

6. Which one of the following is incorrect for ideal solution?
A. $\triangle H_{m i x}=0$
B. $\triangle U^{m i x}=0$

## C.

$$
\triangle P=P_{\text {observed }}-P_{\text {Calculated by raoults law }}=0
$$

D. $\triangle G_{m i x}=0$

## Answer: D

## D View Text Solution

7. Which one of the following gases has the lowest value of Henry's law constant?
A. $N_{2}$
B. He
C. $\mathrm{CO}_{2}$
D. $\mathrm{H}_{2}$

## Answer:

## D View Text Solution

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. $P_{1}+x_{1}\left(P_{2}-P_{1}\right)$
B. $P_{2}-x_{1}\left(P_{2}+P_{1}\right)$
C. $P_{1}-x_{2}\left(P_{1}-P_{2}\right)$
D. $P_{1}+x_{2}\left(P_{1}-P_{2}\right)$

## Answer: C

## D View Text Solution

9. Osometic pressure $(\pi)$ of a solution is given by the relation

$$
\text { A. } \pi=n R T
$$

B. $\pi V=n R T$
C. $\pi R T=n$
D. none of these

## Answer: B

## D View Text Solution

10. Which one of the following binary liquid mixtures exhibits positive seviation from Raoults law?
A. Acetone + chloroform
B. Water + nitric acid
C. $\mathrm{HCl}+$ water
D. ethanol + water

## Answer: D

## D View Text Solution

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. $\frac{2 x}{y}$
B. $\frac{y}{0.2 x}$
C. $\frac{0.2 x}{y}$
D. $\frac{5 x}{y}$

## Answer: D

## D View Text Solution

12. At $100^{\circ} C$ the vapour pressure of a solution containing 6.5 g a solute in 100 g water is 732 mm . If
$K_{b}=0.52$, the boiling point of this solution will
A. $102^{\circ} \mathrm{C}$
B. $100^{\circ} \mathrm{C}$
C. $101^{\circ} \mathrm{C}$
D. $100.52^{\circ} \mathrm{C}$

## Answer:

## D View Text Solution

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

## D View Text Solution

14. At same temperature, which pair of the following solutions are isotonic?
A. $0.2 M B a C l_{2}$ and $0.2 M$ urea
B. 0.1 glucose and 0.2 M urea

## C. 0.1 M NaCl and $0.1 \mathrm{~K}_{2} \mathrm{SO}_{4}$

D. $0.1 \mathrm{M} \mathrm{Ba}\left(\mathrm{NO}_{3}\right)_{2}$ and $\mathrm{MNa}_{2} \mathrm{SO}_{4}$

## Answer: D

## D View Text Solution

15. The empirical formula of a non-electrolyte $(X)$ is
$\mathrm{CH}_{2} \mathrm{O}$. 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. $\mathrm{C}_{2} \mathrm{H}_{4} \mathrm{O}_{2}$
B. $\mathrm{C}_{8} \mathrm{H}_{16} \mathrm{O}_{8}$
C. $C_{4} H_{8} O_{4}$
D. $\mathrm{CH}_{2} \mathrm{O}$

Answer: B

## D View Text Solution

16. The $K_{H}$ for the solution of oxygen dissolved in water is $4 \times 10^{4}$ 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. $4.6 \times 10^{3}$
B. $1.6 \times 10^{4}$
C. $1 \times 10^{-5}$
D. $1 \times 10^{5}$

Answer: C

D View Text Solution
17. Normality of 1.25 M sulphuric acid is
A. 1.25 N
B. 3.75 N

## C. 2.5 N

D. 2.25 N

## Answer: C

## D View Text Solution

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
C. ideal and shows negative deviation from

Raoults Law

## D. non-ideal and shows negative deviation from

Raoults Law

## Answer: D

## D View Text Solution

19. The relative lowering of vapour pressure of a sugar solution in water is $3.5 \times 10^{-3}$. The mole fraction of water in that solution is
A. 0.0035
B. 0.35
C. $0.0035 / 18$
D. 0.9965

## Answer: D

## D View Text Solution

20. The mass of a non-voltaile solute (molar mass
$80 \mathrm{~h} \mathrm{~mol}^{-1}$ ) which should be dissolved in 92 g of toluene to reduce its vapour pressure to $90 \%$
A. 10 g
B. 20 g
C. $9.2 g$
D. $8.89 g$

## Answer: D

## D View Text Solution

21. For a solution, the plot of osmotic pressure ( $\pi$ )
versers 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. $310 \times 0.082 K$
B. $310^{\circ} \mathrm{C}$
C. $37^{\circ} C$
D. $\frac{310}{0.082} K$

Answer: C

- View Text Solution

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 $2.52 \times 10^{-3}$ bar. The molar mass of protein will be $\left(R=0.083 L\right.$ bar $\left.\mathrm{mol}^{-1} K^{-1}\right)$
A. $62.22 \mathrm{kgmol}-1$
B. $12444 \mathrm{gmol}^{-1}$
C. $300 \mathrm{gmol}^{-1}$
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 $10 \% \mathrm{~W} / \mathrm{W}$ aqueous sodium hydroxide solution?
A. 2.778
B. 2.5
C. 10
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

$$
\begin{aligned}
& \text { A. } \alpha=\frac{n(i-1)}{n-1} \\
& \text { B. } \alpha^{2}=\frac{n(1-i)}{(n-1)} \\
& \text { C. } \alpha=\frac{n(i-1)}{1-n} \\
& \text { D. } \alpha=\frac{n(1-i)}{n(1-i)}
\end{aligned}
$$

Answer: C

## D View Text Solution

26. Which of the following aqueous solutions has the highest boiling point ?
A. 0.1 M KNO 3
B. $0.1 \mathrm{M} \mathrm{Na} \mathrm{NO}_{4}$
C. 0.1 M BaCl 2
D. $0.1 \mathrm{M} \mathrm{K}_{2} \mathrm{SO}_{4}$

Answer: B
27. The freezing point depression constant for water is $1.86^{\circ} \mathrm{KKgmol}^{-1}$. If $5 \mathrm{~g} \mathrm{Na} \mathrm{KO}_{4}$ is dissolved in 45 g water, the depression in freezing point is $3.64^{\circ} \mathrm{C}$. The Vant Hoff factor for $\mathrm{Na}_{2} \mathrm{SO}_{4}$ 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. $-2^{\circ} \mathrm{C}$
> B. $-4^{\circ} \mathrm{C}$
> C. $-1^{\circ} \mathrm{C}$
> D. $0^{\circ} \mathrm{C}$

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
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

## - View Text Solution

31. A sample of 12 M Concentrated hydrochloric acid has a density $1.2 g L^{-1}$ Calculate the molality

## D View Text Solution

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

## - View Text Solution

33. Calculate the molality of a solution containing
7.5 g of glycine $\left(\mathrm{NH}_{2}-\mathrm{CH}_{2}-\mathrm{COOH}\right)$ dissolved in 500 g of water.

## D View Text Solution

34. Which solution has the lower freening point?

10 g of methanol $\left(\mathrm{CH}_{3} \mathrm{OH}\right)$ in 100 g of water (or)
20 g of ethanol $\left(\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}\right)$ in 200 g of water.

## D View Text Solution

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

## - View Text Solution

36. Henry's law constant for solubility of methane in benzene is $4.2 \times 10^{-5} \mathrm{~mm} \mathrm{Hg}$ at a particular 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 $1.86 \mathrm{KKgmol}^{-1}$

## D View Text Solution

38. The vapour pressure of pure benzene $\left(\mathrm{C}_{6} \mathrm{H}_{6}\right)$
at a given temperature is $640 \mathrm{~mm} \mathrm{Hg} .2 .2 g$ 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 ?

- View Text Solution

