QB365 Question Bank Software Study Materials

Solutions Important 2 Marks Questions With Answers (Book Back and Creative)

11th Standard

Chemistry

Total Marks : 60

2 Marks

30 x 2 = 60

1) If 5.6 g of KOH is present in

(a) 500 mL and

(b) 1 litre of solution

Calculate the molarity of each of these solutions.

Answer : No.of moles ; n = $\frac{m}{M} = \frac{5.6}{56} = 0.1$ mol

(i) V = 500 ml = $\frac{500}{1000} = 0.5$ L

Molarity = $\frac{n}{v} = \frac{0.1}{0.5} = 0.2M$

(ii) V = IL

Molarity = $\frac{n}{v} = \frac{0.1}{1} = 0.1M$

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

Answer : No. of, moles of glucose ; $n_2 = \frac{m}{M} = \frac{2.82}{180} = 0.016$ mol

No. of. moles of water ; $n_1 = \frac{30}{18} = 1.67$ mol

$X_1 = \frac{n_1}{n_1+n_2} = \frac{1.67}{1.67+0.016} = 0.99$

$X_1 + X_2 = 1$

$\therefore X_2 = 1 - X_1 = 1 - 0.99 = 0.01.$

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

Answer : Molar mass = $\frac{mass\ of\ unknown\ solute \times RT}{osmotic\ pressure \times volume\ of\ solution}$

$= \frac{1.5 \times 8.314 \times 10^{-2} \times 400}{0.3 \times 1.5}$

= 110.85 gram mol^{-1}.

4) What is the mass of glucose ($C_6 H_{12}O_6$) in it one litre solution which is isotonic with 6 g L^{-1} of urea ($NH_2 CO NH_2$) ?

Answer : Osmotic pressure of urea solution (π_1) = CRT

$= \frac{W_2}{M_2 V} RT$

$= \frac{6}{60 \times 1} \times RT$

Osmotic pressure of glucose solution $(\pi_2) = \frac{W_2}{180 \times 1} \times RT$ For isotonic solution,

$\pi_1 = \pi_2$

$\frac{6}{60} RT = \frac{W_2}{180} RT$

$\Rightarrow W_2 = \frac{6}{60} \times 180$

$W_2 = 18\ g$

5) 0.2 m aqueous solution of KCl freezes at -0.68°C calculate van't Hoff factor. k_f for water is 1.86 K kg mol^{-1}.

Answer : i = $\frac{observed\ property}{Theoritical\ property\ (calculated)}$

Given ΔT_f = 0.680 K

m = 0.2 m

ΔT_f (observed) = 0.680 K

ΔT_f (calculated) = K_f m

= 1.86 K Kg mol^{-1} × 0.2 mol Kg^{-1}

= 0.372 K

i = $\frac{(\Delta T_f)\ observed}{(\Delta T_f)\ calculated} = \frac{0.680\ K}{0.372\ K} = 1.82$

6) Define molality

Answer : **Molality** : It is the number of moles of the solute present one kg of the solvent

Molality = $\frac{No.of\ moles\ of\ solute}{Mass\ of\ the\ solvent\ (in\ kg)}$

7) What is osmosis ?

Answer : Osmosis, which is a spontaneous process by which the solvent molecules pass through a semi permeable membrane from a solution of lower concentration to a solution of higher concentration.

8) Define the term 'isotonic solution'.

Answer : Two solutions having same osmotic pressure at a given temperature are called isotonic solutions.

9) A sample of 12 M Concentrated hydrochloric acid has a density 1.2 gL^{-1} Calculate the molality.

Answer : Given: M = 12 M;

d = 1.2 gL^{-1}

In 12 M - HCI means 12 mole of HCI in 1 litre of the solution (i.e)

n = 12 mole

Calculation of mass of 1L of HCI solution:

Mass of 1 L of HCl solution = d x v

= 1.2 x 1000 = 1200 g

Mass of HCI (m) = No. of moles of HCl x Molar mass of HCl

= nm

= 12 x 36.5

= 438 g

∴. Mass of water (solvent) = 1200 - 438

= 762 g = 762 x 10^{-3} kg

$\therefore$ Molality $= \frac{\text{No.of moles of solute}}{\text{Mass of solvent (kg)}}$

$= \frac{12}{762\times10^{-3}}$

= 15.75 m.

10) How much volume of 6 M solution of NaOH is required to prepare 500 mL of 0.250 M NaOH solution ?

Answer : $C_1 V_1 = C_2 V_2$

$6M(V_1) = 0.25\ M \times 500\ ml$

$V_1 = \frac{0.25\times500}{6}$

V_1 = 20.83 ml

11) Define Normality

Answer : **Normality** : Normality is defined as number of gram equivalents of solute present in one litre of solution.

Normality = $\frac{No\ of\ gram\ equivelent\ of\ solute}{Volume\ of\ solution\ (in\ L)}$

12) What is K_H in $P_{solute} = K_H X_{solute}$?On what does the value of K_H depend ?

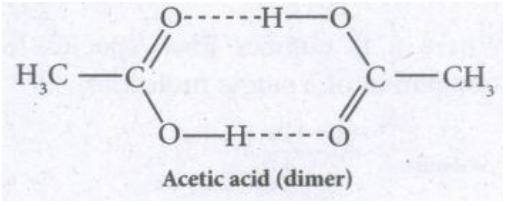
Answer : K_H is a empirical constant with the dimensions of pressure. The value of 'K_H' depends on the nature of the gaseous solute and solvent.

13) Define evaporation.

Answer : Generally, liquids have a tendency to evaporate. If the kinetic energy of molecules in the liquid state overcomes the intermolecular force of attraction between them, then the molecules will escape from the liquid state. This process is called 'evaporation' and it happens on the surface of the liquid.

14) why acetic acid deviates from ideal behaviour in solutions ?

Answer : In solution, acetic acid exists as a dimer by forming intermolecular hydrogen bonds, and hence deviates from Raoult's law.



Acetic acid (dimer)

15) How are the degree of dissociation or association related to vatrt Hoff factor ?

Answer : The degree of dissociation or association can be related to Van't Hoff factor (i) using the following relationships

$\alpha_{dissociation} = \frac{i-1}{n-1}$

(Where n is number ions /species formed by the dissociation of a single molecule)

$\alpha_{dissociation} = \frac{(1-i)n}{n-1}$

(here, n is the number of solute involved in association.)

16) Define solution with an example.

Answer : (i) A solution is a homogeneous mixture of two or more substances consisting of atoms, ions or molecules.

(ii) For example, when a small amount ofNaCI is dissolved in water, a homogeneous solution is obtained. In this solution, Na + and Cl" ions are uniformly distributed in water. Here NaCI is the solute and water is the solvent.

17) What do you mean by "mass by volume percentage''.

Answer : $Mass\ by\ voIume = \frac{Mass\ of\ the\ solute(ing)}{Volume\ of\ the\ solution(inmL} \times 100$

18) What are ideal solution? Give example.

Answer : An ideal solution is a solution in which each component i.e., the solute as well as the solvent obeys the Raoult's law over the entire range of concentration.

19) What do you mean by volume percentage?

Answer : $\text{Volume percentage } = \frac{\text{Volume of the solute }_{(mL)}}{\text{Volume of the solution }_{(mL)}} \times 100.$

20) Mention the factors which influence the solubility.

Answer : 1. Nature of solute and solvent

2. Temperature

3. Pressure.

21) What happens to a balloon when it is put over soda bottle and when the same experiment is carried over a soda bottle in hot water ?

Answer : The balloon is inflated much faster now. This shows the decrease in solubility of gases in solution with increase in temperature.

22) What is a binary solution ?

Answer : The solution which contains only two components (one solvent and one solute) is called a binary solution.

23) What are the factors responsible for deivation from Raoult's law ?

Answer : 1. solute-solvent interaction

2. Dissociation of solute

3. Association bf solute

4. Temperature

5. Pressure

6. Concentration.

24) Define Freezing point.

Answer : Freezing point is defined as "the temperature at which the solid and the liquid states of the substance have the same vapour pressure".

25) What do you mean by depression in freezing point ?

Answer : The lowering of the freezing point of the solvent when a solute is added is called depression in freezing point (ΔT_f).

$\Delta T_f = T_f^{o-T_f}$.

26) Write Vant Hoff's equation.

Answer : π = CRT

Where π = Osmotic Pressure

C = Concentration of the solution in molarity

R = Gas constant

T = Temperature

27) Calculate the TDS value in ppm when 50mL of tap water contain 20 mg of dissoved solids.

Answer : $\text{ppm} = \frac{\text{Mass of the dissolved solids} \times 10^6}{\text{Mass of water}}$

$= \frac{20 \times 10^{-3} \times 10^6}{20} = 400\text{ppm}$

28) 50 mL of tincture benzoin, an antiseptic solution contain 10 mL of benzoin. What is the volume percentage of benzoin ?

Answer : vofume percentage of benzoin = $\frac{Volume\ of\ the\ benzoin(in\ mL)}{Volume\ of\ solution(in\ mL)} \times 100$

$\frac{10}{50} \times 100$ = 20% v/v

29) Calculate the molality of a solution containing 45 g of glucose in 2 kg of water.

Answer : $\text{Molality} = \frac{\text{No. of moles of solute}}{\text{Mass of the solvent in Kg}}$

$= \frac{\text{m/M}}{\text{Mass of the solvent in kg}} = \frac{45/180}{2} = 0.125\ \text{m}$

[Note: Molar mass of glucose = 180 g/mol]

30) 3.15 g of oxalic acid dihydrate [Crystatline oxalic acid] is dissolved in water and the solution was made up to 100 mL using a standard flask What is the strength of the solution in Normality ?

Answer : $\text{No. of gram equivalents of solute} = \frac{\text{Mass of solute}}{\text{Eq.wt.of solute}}$

$= \frac{\text{mass of crystallineoxalicacid}}{\text{Eq.wt.of crystallineoxalicacid}} = \frac{3.15}{63} = 0.05$

Volume of solution = 100 ml

$= \frac{100}{100}\ \text{L} = 0.1\ \text{L}$

$\therefore\ \text{Normality} = \frac{\text{No.of grams equivalence}}{\text{Volume of solution in L}} = \frac{0.05}{0.1} = 0.5\ \text{N}$

[Note Eq.wt. of Crystalline oxalic acid = 63]