Class- IX

Normality, Molality and Mole Fraction

Teaching Task

Q1) Ans:- D.

Solution:-

A) 8.0 g of KOH /100ml of solution.

$$N = \frac{8}{56} \times \frac{1000}{100} = \frac{80}{56} = 1.4N.$$

B) 0.5 molar H_2SO_4. → N = Molarity x Basicity.

$$N = M \times 2.$$
$$= 0.5 \times 2 = 1N.$$

C) 1N H_3PO_4

D) 6g of NaOH /100 g of water.

$$N = \frac{6}{23+16+1} \times \frac{1000}{100}$$
$$= \frac{60}{40} = 1.5N$$

Q2) Ans:- B.

Solution:- No. of moles of H_2O, $n = 4M \times 0.05L = 0.2$ moles.

$$Fe + 2HCl \rightarrow Fe^{+2} + H_2 + 2Cl^-$$

2 moles of HCl is required to convert Fe to Fe^{+2}.

No. of moles of

$$Fe^{+2} = \frac{1}{2} \times 0.2 = 0.1 \text{ moles.}$$

Q3) Ans:- B.

Solution:-

A) 0.3 % H_3PO_4

Molar mass = $3+31+16\times4 = 98$.

0.3% in 98gms = 0.294 gms.

B) 0.3M H_3PO_4. for 1 litre

$$M = \frac{w}{GMW} \times \frac{1000}{V\,mL}$$

$$0.3 = \frac{w}{98} \times \frac{1}{1.}$$

$w = 29.4$ gms/in 1 litre.

c) 0.3m H_3PO_4

$$m = \frac{w}{GMW} \times \frac{1}{w(kg)}$$

$$0.3 = \frac{w}{98} \times \frac{1}{1.}$$

$w = 29.4$ gms present in 1kg

d) 0.3N H_3PO_4

$$N = \frac{w}{G.EW} \times \frac{1000}{V\,mL} = \frac{w}{49} \times \frac{1000}{1000}$$

$$0.3 \times 49 = w$$

$w = 14.7$ gms in 1000 mL.

0.3M is more concentrated because 29.4gms present in 1000 mL

Q4) Ans:- D.

Solution:- Given

5ml of N HCl.

$M_1 = 1 \times 5 = 5M$.

20ml of N/2 H_2SO_4.

$M_2 = \frac{1}{2} \times 20 = 10M$.

30ml of N/3 HNO_3.

$M_3 = \frac{1}{3} \times 30 = 10M$.

$M_{eq} = M_1 + M_2 + M_3 = 5 + 10 + 10 = 25M$.

Volume = 1000mL.

$M_{eq} = N \times V$.

$25 = N \times 1000$

$N = \frac{25}{1000} = \frac{1}{40}$.

Normality of solution would be $\frac{N}{40}$.

Q5) Ans:- B.

Solution:- $H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$.

For 1 mole of H_2SO_4, 2 moles of KOH required.

Given 100 ml of 0.1M H_2SO_4.

n = Molarity $\times$ V_{lit} = $0.1 \times 0.1 = 0.01$ moles.

100 ml of of 0.1M KOH

$n = 0.1 \times 0.1 = 0.01$ moles.

For 0.01 moles of H_2SO_4 0.02 moles of KOH required, but we have only 0.01 moles of KOH. So KOH is limiting reagent, For 0.01 moles of KOH 0.005 moles of H_2SO_4 is used.

Remaining $H_2SO_4 = 0.01 - 0.005 = 0.005$ moles.

$$N = \frac{w}{GEW} \times \frac{1000}{V_{mL}}.$$

$$GEW = \frac{GMW}{n} \Rightarrow N = \frac{nw}{GMW} \times \frac{1000}{V_{mL}}.$$

Given $V = 2$ litres $= 2000$ mL.

$$N = \frac{0.005 \times 2 \text{ equivalents } 1 \text{mole}}{2L}$$

$$= 0.005 = 5 \times 10^{-3} N.$$

Q6). Ans:- D

Solution:- $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$

$n = 1$ (Mohr's salt), Equivalent of Fe^{2+} = Equivalent of $K_2Cr_2O_7$.

$= 500 \times 10^{-3} \times 6 \times 1 = 3.0$.

Mole percent of Mohr's salt of 5 moles $= \frac{3}{5} \times 100 = 60$.

Q7) Ans:- A.

Solution:- The valency factor for $K_2Cr_2O_7$ is 6.

$$N_1V_1 = N_2V_2$$

$$0.2 \times 5 = N_2 \times 40$$

$$N_2 = \frac{1}{4}$$

$$N_2 = \frac{w}{M.wt} \times eq.factor \times \frac{1}{Vlit.}$$

$$\frac{1}{4} = \frac{w}{56} \times 1 \times 1.$$

$$w = \frac{56}{4} = 14g.$$

Q8) Ans:- D.

Solution:- Mole fraction of water $= 1 - 0.6 = 0.4$.

No. of moles of water in solution $= n$.

$$\text{Moles of alcohol} = \frac{\text{Given mass}}{\text{Molecular mass}} = \frac{69}{46} = \frac{3}{2}$$

$$\text{Mole fraction of water} = \frac{n}{n+\frac{3}{2}}$$

$$\frac{n}{n+\frac{3}{2}} = 0.4.$$

$$\frac{2n}{2n+3} = 0.4 \Rightarrow 2n = 0.4(2n+3)$$

$$2n = 0.8n + 1.2$$

$$2n - 0.8n = 1.2$$

$$1.2n = 1.2 \Rightarrow n = 1.$$

For 1 mole water, GMW = 18 gms.

Q9) Ans:- B

Solution:- $M = \frac{n}{V \text{ in litres}}$.

Given volume = 500ml = $\frac{500}{1000}$.

$M = \frac{n}{\frac{500}{1000_2}} = 2n \rightarrow$ Molarity = 2 × moles of solute.

No. of moles = $\frac{\text{weight}}{\text{molar mass}} = \frac{\text{Molarity}}{2}$

weight = $\frac{\text{Molarity}}{2}$ × molar mass.

Equivalent weight = $\frac{\text{molar mass}}{\text{basicity}} = \frac{\text{Molar mass}}{2}$.

Weight of acid present in solution =

$$\text{Molarity} \times \frac{\text{molar mass of dibasic acid}}{2}$$

Amount of acid = Molarity × Equivalent weight

= M × E.

Q10) Ans:- B.

Solution:- Moles of solute present in 500ml of solution = $\frac{6}{60} = 0.1$.

Weight of solution = 500 × 1.05 = 525 gm.

weight of solvent = 525 − 6 = 519 gms.

$m = \underset{(\text{moles of solute})}{0.1} \times \underset{(\text{weight of solvent})}{\frac{1000}{519.}} = 0.19$

Q11) Ans:- B.

Solution:- No. of moles of solute (n) $= \frac{16}{32} = \frac{1}{2} = 0.5$ moles

Weight of solution = $d \times V$

$= 0.96 \times 100 = 96.$

Molality = no. of moles of solute $\times \frac{1000}{\text{weight of solvent}}$.

weight of solvent = Wt. Solution − Wt. of Solute

$= 96 - 16 = 80$

$m = 0.5 \times \frac{1000}{80} = \frac{50}{8} = 6.25\,m.$

Q12) Ans:- A

Solution:- $3C_2H_2 \xrightarrow{\text{red hot tube}} X.$

$2Na_2S_2O_3 + Y \rightarrow Na_2S_4O_6 + 2NaI.$

$Y = I_2, \quad X = C_6H_6.$

Mole fraction of $Y = 0.2.$

Total mole fraction of $X \& Y = 1.$

mole fraction of $X = 1 - Y = 1 - 0.2 = 0.8.$

Molality $= \frac{0.2}{0.8 \times 78} \times 1000 = \frac{200}{62.4} = 3.2\,m.$

Q13) Ans:- C, D.

Solution:- Mole fraction, molality & % wt are independent of temperatures.

Q14) Ans:- B, C.

Solution:-

$$M_{Na_2CO_3} = \frac{5.3}{106} \times \frac{1000}{100} = \frac{1}{2} = 0.5\,M$$

$$N_{Na_2CO_3} = 0.5 \times 2 = 1.0\,N.$$

$$M_{H_2C_2O_4 \cdot 2H_2O} = \frac{6.3}{126} \times \frac{1000}{100} = \frac{1}{2} = 0.5\,M$$

$$N_{H_2C_2O_4 \cdot 2H_2O} = 0.5 \times 2 = 1\,N.$$

For Both solutions Molarity & Normality are same.

Q15) Ans:- A.

Solution:- The quantities of the sdute & solvent are expressed in weights, the molality does not change with the change in temperature.

Q16) Ans:- D

Solution:- Equivalent weight = $\frac{\text{Molar mass}}{\text{valency factor}}$.

$$2\,KMnO_4 + 3H_2SO_4 + 5\,H_2C_2O_4 \longrightarrow K_2SO_4 + 2MnSO_4 + 8H_2O.$$

Oxidation number of Mn in $KMnO_4$.

$$1 + Mn + 4(-2) = 0$$
$$Mn = 7$$

In $MnSO_4$ → $Mn + 6 + 4(-2) = 0$

$$Mn = 2$$

Oxidation state of Mn changes from 7 to 2,

So valency factor = 5.

$$\text{Equivalent weight} = \frac{M}{5}.$$

Q17) Ans:- C.

Solution:- Relation b/w molarity & molality

$$m = \frac{1000 \times M}{(1000 \times d) - (M \times GMW)}$$

$$= \frac{1000M}{1000d - MM'}$$

Q18) Ans:- B

Solution:- Molecular weight of $H_2O_2 = 2+32 = 34$.

20% aqueous H_2O_2 means 20gms of H_2O_2 in 100gm of solution.

Mass of water $= 100 - 20 = 80$.

Mole fraction of water $= \frac{n_{water}}{n_{water} + n_{H_2O_2}}$.

$n_{water} = \frac{80}{18}$, $n_{H_2O_2} = \frac{20}{34}$.

$$X_{water} = \frac{\frac{80}{18}}{\frac{80}{18} + \frac{20}{34}} = \frac{\frac{80}{18}}{\frac{(34 \times 80) + 18(20)}{18 \times 34}}$$

$$= \frac{80 \times 34}{2720 + 360}$$

$$= \frac{2720}{3080} = 0.883.$$

$$= \frac{68}{77} = 0.883$$

Matrix Matching

Q19) Ans:- A) A - 4. , B - 1 , C - 2 , D - 3

Solution:-

A) Molality ⟶ 4) $g\,mol.\,kg^{-1}$.

B) Mole fraction → 1) No units.

c) Normality ⟶ 2) $g.\,eq.\,dm^{-3}$.

D) Molarity ⟶ 3) $mol.\,dm^{-3}$.

Q20). Ans:- A) P B) P C) q, S D) q, R, S.

Solution:-

A) Normality ⟶ P) Vary with temperature.

B) Mdarity ⟶ P) Vary with temperature.

c) Molality ⟶ q) Independent of temperature
s) Involves weight variation.

D) Mde fraction → q) Independent of temperature.
R) Involves ratio.
S) Involves weight.

Learner's Task

Q1) Ans:- C.

Solution:- Units of Normality are Gramequivalents/litre.

Q2) Ans:- C

Solution:- Units ofmolality are moles/kg.

Q3) Ans:- C.

Solution:- Relation blw molarity & molality

$$m = \frac{1000 \times M}{(1000 \times d) - (M \times GMW)}$$

$$GMW = M^1$$

$$m = \frac{1000 \times M}{1000 \times d - M M^1}.$$

Q4) Ans:- A.

No. of moles of urea (n) = 0.1 gram mol.

Wsolvent = 100g.

Mass of solvent = 0.1 Kg.

$$\text{Molality} = \frac{\text{Moles (solute)}}{\text{Mass (solvent in kg)}}$$

$$= \frac{0.1}{0.1} = 1 \text{ molal.}$$

Q5) Ans:- C

Solution:- Urea $CH_4N_2O = 12+4+28+16 = 60$.

Given 6gm of urea $\rightarrow n = \frac{6}{60} = 0.1$.

90 gms of water $\rightarrow n = \frac{90}{18} = 5$ moles.

$$X_{urea} = \frac{0.1}{0.1+5} = \frac{0.1}{5.1} = 0.019$$

$$= \frac{1}{51}$$

Q6) Ans:- B.

Solution:- $X_A + X_B + X_C + X_D = 1.$

$X_B = 0.5$

$X_A + X_C + X_D = 1 - 0.5 = 0.5$

X_A is less than 0.5.

Q7) Ans:- A.

Solution:-

$$m = \frac{X_A \times 1000}{(1 - X_A)(GMw)_B}.$$

$$X_S = \frac{m}{m + \frac{1000}{MW \text{ of solvent}}}.$$

Given $m = 0.1$, for water $MW = 18$.

$$X_S = \frac{0.1}{0.1 + \frac{1000}{18}} = \frac{0.1}{\frac{1.8 + 1000}{18}}$$

$$= \frac{0.1 \times 18}{1001.8} = 0.00179.$$

Molefraction of Solvent $= 1 - X_S$

$= 1 - 0.00179 = 0.99821$

Q8) Ans:- D.

Solution:- Given, $m = 1$, $M' = 40$, $d = 1.02 g/ml$.

$$m = \frac{1000 \times M}{1000d - MM'} \Rightarrow 1 = \frac{1000M}{1000(1.02) - 40M}.$$

$1000M = 1020 - 40M.$

$1000M + 40M = 1020.$

$1040M = 1020$

$$M = \frac{1020}{1040} \Rightarrow M = 0.98$$

Q9) Ans:- B.

Solution:- Concentration of NaOH = 10% w/w.

Let 100gms of solution, mass of NaOH = 10 gms.

$$n_{NaOH} = \frac{10}{40} = 0.25 \text{ moles.}$$

Mass of water = 100 - 10 = 90.

$$n_{water} = \frac{90}{18} = 5 \text{ moles.}$$

$$X_{NaOH} = \frac{n_{NaOH}}{n_{NaOH} + n_{water}}$$

$$= \frac{0.25}{0.25+5} = \frac{0.25}{5.25} = 0.0476$$

Q10). Ans:- C.

Solution:- Specific gravity = 1.54.

$H_3PO_4 = 3+31+64 = 98$.

weight % = 70%.

$$N = \frac{10 \times \text{specific gravity} \times \text{weight \%}}{GEW}$$

$$= \frac{10 \times 1.54 \times 70}{\frac{98}{3}} = \frac{1078 \times 3}{98} = 33N.$$

JEE Main Level Questions

Q1) Ans:- D.

Solution:- 1 Mole of acid dissolved in on litre water will giv 1N solution only if the acids having basicity 1.

→ HCl, $HClO_4$ & HNO_3 are all mono basic.

→ H_3PO_4 has basicity value 3, so it won't give 1N solution.

Q2) Ans:- C.

Solution:-

A) 20 ml of 0.1M H_2SO_4 + 20ml of 0.3M NaOH.

No. of moles of H_2SO_4 = 0.1M × 0.020L

= 0.002 moles.

Moles of H^+ = 2 × 0.002 = 0.004 moles

No. of moles of NaOH = 0.3M × 0.02 L.

= 0.006 moles

OH^- = 0.006 moles

$OH^- > H^+$ → It is basic.

B). 10ml of 0.1M H_2SO_4 + 20 ml of 02M NaOH.

n of H_2SO_4 = 0.1 × 0.01 = 0.001

n of H^+ = 2 × 0.001 = 0.002

n of NaOH = 0.2 × 0.02 = 0.004 moles

OH^- = 0.004 moles.

It is also basic.

c). 10ml of 0.1M H_2SO_4 + 10ml of 0.1M NaOH.

n of H_2SO_4 = 0.1 × 0.01 = 0.001.

$[H^+]$ = 2 × 0.001 = 0.002

n of NaOH = 0.1 × 0.01 = 0.001

OH^- = 0.001

$H^+ > OH^-$ ∴ So it is acidic.

D). 20 ml of 0.1M H_2SO_4 + 40ml of 0.1M NaOH.

n of H_2SO_4 = 0.1 × 0.02 = 0.002

$[H^+]$ = 2 × 0.002 = 0.004.

n of NaOH = 0.04 × 0.1 = 0.004.

$[H^+] = [OH^-]$ → It is neutral.

Q3) Ans:- D.

Solution:- $N = \frac{w}{GEW} \times \frac{1000}{V_{in}}$.

I) 1000ml of 0.3N

$$0.3 = \frac{w}{GEW} \times \frac{1000}{1000}$$

$$\frac{w}{GEW} = 0.3.$$

II) 2000ml of 0.15N.

$$0.15 = \frac{w}{GEW} \times \frac{1000}{2000\ 2}$$

$$\frac{w}{GEW} = 2 \times 0.15 = 0.3.$$

III) 2500ml of 0.2N solution.

$$\frac{w}{GEW} = 0.2 \times \frac{2500}{1000} = \frac{5}{10} = 0.5.$$

IV). 3000ml of 0.1N solution.

$$0.1 = \frac{w}{GEW} \times \frac{1000}{3000\ 3}$$

$$\frac{w}{GEW} = 0.1 \times 3 = 0.3.$$

I, II & III are same.

Q4) Ans:- B.

Solution:- $N_{HCl} = \frac{\text{weight} \times 1000}{GEW \times V} = \frac{0.04 \times 1000}{36.5 \times 1} = 1.095$.

$N_{NaOH} = N_{HCl}$

$N_{NaOH} = \frac{w_B \times 1000}{40 \times 1} \Rightarrow \frac{1.095 \times 40}{1000} = w.$

$w_B = 0.0438\ g/mL.$

Q5) Ans:- B.

Solution:- $N = \frac{N_1V_1 + N_2V_2}{V_1 + V_2}$

Valency factor of HCl is 1.

$N = 5$

$5 = \frac{N \times 1.5 + 2 \times 2.5}{1.5 + 2.5}$

$5 = \frac{1.5N + 5}{4}$

$1.5N + 5 = 20$

$1.5N = 20 - 5$

$N = \frac{15}{1.5} = 10$

Q6). Ans:- B.

Solution:- Equivalent mass of $KMnO_4$ = $\frac{\text{Molecular weight}}{\text{No. of Electrons gained by } MnO_4}$

In $KMnO_4$, $Mn = 7$, In $MnO_4^- \Rightarrow Mn = 8$.

Electrons gained = 1.

E.M of $KMnO_4 = \frac{158}{1} = 158$.

Q7) Ans:- B.

Solution:- Solvay process, 'X' is $CaCO_3$ & Y is HCl.

Let V be the volume of HCl that neutralise 25 gms of $CaCO_3$.

$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O$.

Equivalent of X = Equivalent of Y.

$2 \times \frac{25}{100} = V \times 1 \Rightarrow V = \frac{50}{100} = 0.5$ l or 500 ml.

(Q8). Ans:- A.

Solution:- Molecular mass of

$Na_2CO_3 \cdot 10H_2O = 286$.

Equivalent Mass $= \frac{286}{2} = 143$.

100mL solution of sodium carbonate contains 1g

1000mL solution of sodium carbonate = 10g.

$$N = \frac{10}{143}$$

Applying formula,

Normality of acid x its volume =

Normality of sodium carbonate x its volume

Normality of acid $= \frac{10 \times 42.9}{143 \times 30} = 0.1$.

Let V mL be the volume of H_2SO_4.

$8 \times 5 + 4.8 \times 5 + 34 \times V = 0.1 \times 2000$.

$V = 4$ mL.

Amount of

$$SO_4^{2-} = \frac{\text{Normality} \times \text{Eq. mass} \times \text{volume}}{1000}$$

$$= \frac{34 \times 48 \times 4}{1000}$$

$$= 6.528 \text{ g}.$$

Q9) Ans:- C.

Solution:- 0.25 mole of urea are present in 1kg of water

Moles of urea = 0.25 moles

Mass of solvent (water) = 1kg = 1000g

Molar mass of urea ($NH_2(CO)NH_2$) = 60g/mol

0.25 moles of urea = 0.25 × 60g

= 15g

Total mass of solution = 1000 + 15 = 1015g

= 1.015 kg

1.015 kg of solution contain urea = 15g

∴ 2.5 kg of solution will require urea

Mass of urea = $\frac{15g \times 2.5\,kg}{1.015\,kg}$ = 37g.

Q10) Ans:- A.

Solution:- Mass of sugar = 34.2g.

No. of moles of sugar = $\frac{34.2}{\text{Mol. mass}} = \frac{34.2}{342} = 0.1$

Mass of water = 214.2 − 34.2 = 180g = 0.18 kg

No. of moles of water = $\frac{180}{18}$ = 10 moles

→ Molality = $\frac{\text{No. of moles of sugar}}{\text{Mass of water in kg}} = \frac{0.1}{0.18} = 0.5554$

→ Total no. of moles = 10 + 0.1 = 10.1.

Mole fraction of Sugar = $\frac{0.1}{10.1} = 0.0099$

Q11) Ans:- B.

Solution:- 10% means 10g of glucose in 100gms solution.

water = 100 − 10 = 90 gms.

Molar mass

$C_6H_{12}O_6 = 6\times12 + 12\times1 + 6\times16 = 180$ g/mol.

no. of moles of glucose $= \frac{10}{180} = 0.056$ mol.

X_w = molefraction of A.

Molality of solution $= \frac{0.056}{0.09\,kg} = 0.62$ m

No. of moles of water $= \frac{90}{18} = 5$ moles.

$X_g = \frac{0.056}{0.05+5} = 0.011$

mole fraction of water $X_w = 1 - X_g = 1 - 0.011$

$= 0.989$.

Q12) Ans:- C.

Solution:- A → Solute , B → Solvent

$$m = \frac{X_A}{(1-X_A)\,m_B} \times 1000$$

$$= \frac{1-0.849}{0.849\times18} \times 1000$$

$$= \frac{0.151}{15.282} \times 1000$$

$$= \frac{151}{15.282} = 9.8809$$

Q13). Ans:- A, B, C

Solution:- Molality $m = \frac{n_2}{w_2}$

$$n_2 = mw_1$$

$$X_2 = \frac{n_2}{n_1 + n_2} = \frac{mw_1}{\frac{w_1}{M_1} + mw_1} = \frac{mM_1}{1 + mM_1}$$

$$\rightarrow \quad m = \frac{1000 \cdot M}{1000\rho - (M \times GMW)}$$

$$m = \frac{M}{\rho - MM_2}$$

$$\rightarrow \quad X_2 = \frac{mM_1}{1 + mM_1}$$

Q14) Ans:- A

Solution:- 1 M solution means 1 mole solute in 1000mL.

1m solution means 1 mole solute in 1000 gram of solvent.

So concentration of molar aqueous solution is more

Q15). Ans:- D.

Solution:- $E = \frac{\text{Molecular weight}}{\text{change in oxidation state}}$.

Oxidation number of Mn in $KMnO_4 = 7$

In $MnO_4 = 2$.

Change $= 7 - 2 = 5$

$$E = \frac{M}{5} = M/5$$

Q15) Ans:- c.

Solution:- $m = \frac{M \times 1000}{1000d - MM^1}$

Integer Type

Q16) Ans:- 3.

Solution:- H_3PO_4 is tribasic.

$N = 3M$

$= 3 \times 1 = 3.$

Q17) Ans:- 3.

Solution:- n-factor of $H_3PO_4 = 3$.

mass of $H_3PO_4 = 4.9$ g/mol.

molar mass of $H_3PO_4 = 3 + 31 + 64 = 98$.

no. of moles $= \frac{4.9}{98} = 0.05$ mol.

Molarity $= \frac{\text{no. of moles of } H_3PO_4}{\text{volume of solution in Litre}} = \frac{0.05}{0.5}$

$= 0.1M.$

Normality $= n \times$ Molarity $= 3 \times 0.1$

$= 0.3 \Rightarrow 3 \times 10^{-1}$

$x = 3.$

Q18) Ans:- 2.

Solution:- $m = \frac{x}{GMW} \times \frac{1000}{100 - x}$

$= \frac{2}{58.5} \times \frac{1000}{100 - 2} = \frac{2000}{58.5 \times 98} = \frac{2000}{5733}$

$= 0.3488$

$\cong 0.35$

$= 35 \times 10^{-2}$

Q19) Ans:- 1.

Solution:-

$$2\,\overset{+2}{Cu}SO_4 \longrightarrow \overset{+1}{Cu_2}I_2$$

change in oxidation state = 1.

Equivalent weight of $CuSO_4 = \frac{M_{CuSO_4}}{n}$

$= \frac{M}{1}$

Q20) Ans:- 50.

Solution:- $n_{O_2} = \frac{0.8}{32} = 0.025$

$n_{N_2} = \frac{0.7}{28} = 0.025$

mole percent of $O_2 = \frac{0.025}{0.025+0.025} \times 100$

$= \frac{2.5}{0.05} = 50$

Additional Practise Questions

Q1) Ans:- A

Solution:- Equivalent weight equal to molecular weight divided by n-factor.

$$E.W = \frac{M.W}{n\text{-factor}}$$

n-factor in case of $H_3PO_2 = 1$.

$$E.W = \frac{M.W}{1}$$

Q2) Ans:- B.

Solution:- Molality = No. of moles of solute

Molality $\propto$ no. of moles of solute.

Molality $\propto \frac{1}{\text{weight of Solvent}}$

To reduce molality one half, double the weight of solvent.

Q3) Ans:- B.

Solution:- $N = \frac{10y}{GEW.}$

$y = 0.98\%$ $\quad GEW_{(H_2SO_4)} = \frac{GMW}{2} = \frac{98}{2} = 46.$

$$N = \frac{10 \times 0.98}{46} = \frac{9.8}{46} = 0.2\,N.$$

Q4) Ans:- C

Solution:-

$FeSO_4$	$K_2Cr_2O_7$.
0.1 N.	x gms
100 mL	GMW = 294.

no. of GEW of $FeSO_4$ = no. of GEW of $K_2Cr_2O_7$

$$0.1 \times 100 \times 10^{-3} = \frac{w}{GEW.}$$

$$10^{-2} = \frac{w}{GMw/6} \Rightarrow \frac{6.w}{294}$$

$$w = \frac{10^{-2} \times 294}{6.}$$

$$= 0.49.$$

$Cr_2O_7^{2} \rightarrow Cr^{3+}$.

16 $\quad$ 3×2=6 $\quad$ 3

n = 6.

5. Normality, Molality and Mole Fraction
KEY

TEACHING TASK

1	2	3	4	5	6	7	8	9	10
D	B	B	D	B	D	A	D	B	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	A	C,D	B,C	A	D	C	B	A	A

LEARNERS TASK

CUQ'S

1	2	3	4	5	6	7	8	9	10
C	C	C	A	C	B	A	D	B	C

JEE MAIN&ADVANCED LEVEL QUESTION

1	2	3	4	5	6	7	8	9	10
D	C	D	B	B	B	B	A	C	A
11	**12**	**13**	**14**	**15**	**15**	**16**	**17**	**18**	**19**
B	C	A,B,C	A	D	C	3	3	2	1

20-50

ADDITIONAL PRACTISE QUESTIONS FOR STUDENTS

1	2	3	4
A	B	B	C