

Solutions Teaching Task.

Q1) Ans:- B.

Solution:-

25% of solute in 200gms of solution = 50gms $\rightarrow$ A

40% of solute in 300gms of solution = 120gms $\rightarrow$ B

30% of solute in 400gms of solution = 120gms $\rightarrow$ C

Total solute = 50 + 120 + 120 = 290gms.

Total weight of solution = 200 + 300 + 400 = 900gms.

$$\% \text{ of solute} = \frac{290}{900} \times 100 = 32.22\%$$

$$\begin{aligned} \% \text{ of solvent} &= 100 - (\% \text{ of solute}) \\ &= 100 - 32.22 = 67.78\% \end{aligned}$$

Q2) Ans:- C

Solution:- Given solute = 25 g, (w/w)% = 10%

$$\text{Mass percentage } \left(\frac{w}{w}\right)\% = \frac{\text{Weight of solute}}{\text{wt. solution}} \times 100.$$

$$10 = \frac{25}{\text{wt. solution}} \times 100$$

$$\text{wt. solution} = 250.$$

Q3) Ans:- A

Solution:- PPb means parts per billion.

$$\text{density} = 1.0 \text{ g/mL}$$

i.e., 1 L of solution has a mass of 1000 gms

$$\text{Concentration in } \mu\text{g/L} = \text{Concentration in ppb} \times$$

$$\frac{\text{mass of solution (kg)}}{\text{volume of solution (L)}}$$

$$75 \text{ ppb} = 75 \mu\text{g/L}$$

Q4) Ans:- A

Solution:- Molarity = 0.1 M.

$$\text{Volume} = 10 \text{ mL} = 0.01 \text{ Litres.}$$

$$\text{No. of moles} = \text{Molarity} \times \text{Volume (in Litres)}$$

$$= 0.1 \times 0.01 = 10^{-3}$$

$$\text{No. of molecules} = \text{No. of moles} \times \text{Avogadro number}$$

$$= 10^{-3} \times 6.023 \times 10^{23}$$

$$= 6.023 \times 10^{20} \text{ molecules}$$

Q5) Ans:- A

Solution:- $1 \mu\text{g} = 10^{-6} \text{ gms}$

$$2.4 \text{ ppb} = 2.4 \times 10^{-6} \text{ g/L}$$

$$\text{Molarity} = \frac{\text{Mass of solute}}{\text{Molar mass of solute}} = \frac{2.4 \times 10^{-6} \text{ g/L}}{207 \text{ g/mol}}$$

$$= 1.16 \times 10^{-8} \text{ M.}$$

$$\approx 1.2 \times 10^{-8} \text{ M}$$

Q6) Ans: A

Solution: Phenol concentration = 45 ppm

i.e., 45 mg of phenol per 1 kg (1000 g) of solution.

→ Density of solution = 1.0 g/mL

→ This means 1 gm of solution corresponds to 1 mL

$$45 \text{ mg per } 1000 \text{ mL} = 45 \mu\text{g/mL}$$

Q7) Ans: C

Solution: Solution mass = 100 gms.

$$\text{mass percentage } \frac{w}{w} = 1\%$$

This means 1.00 gm of sodium carbonate (Na_2CO_3) per 100 gms of solution.

$$\text{Molar mass of } \text{Na}_2\text{CO}_3 = 106 \text{ gms}$$

$$\begin{aligned} \text{Molar mass of } \text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O} &= 106 + (7 \times 18) \\ &= 232 \text{ g/mol.} \end{aligned}$$

$$\begin{aligned} \text{Mass of } \text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O} &= \frac{1 \times 232}{106} = 2.188 \text{ g.} \\ &\approx 2.19 \text{ gms} \end{aligned}$$

Q8) Ans: B.

Solution: Molarity of solution

$$M = \frac{w_B \times 1000}{m_B \times V} = \frac{2.65 \times 1000}{106 \times 250} = 0.1$$

$$M_1 V_1 = M_2 V_2$$

$$0.1 \times 10 = 0.001 (10 + x)$$

$$x = 990 \text{ mL.}$$

Q9)

Ans:- B

Solution:- Molarity = $\frac{\text{Wt}}{\text{GMW}} \times \frac{1000}{V}$
 $= \frac{10.6}{106} \times \frac{1000}{100} = 1 \text{ M.}$

$$M_1 V_1 = M_2 V_2$$

$$\Rightarrow 1 \times 10 = M_2 (1000)$$

$$M_2 = \frac{10}{1000}$$

$$M_2 = 10^{-2} \text{ M.}$$

Q10)

Ans:- B

Solution:- 100 ml of solution = 6.023×10^{21} molecules
 1000 ml of solution = 6.023×10^{21} molecules
 10 ml of solution = x

$$1000x = 10 \times 6.023 \times 10^{21}$$

$$x = \frac{6.023 \times 10^{21}}{100} = 6.023 \times 10^{19}$$

Q11)

Ans:- B.

Solution:- $M_1 = \frac{2.65}{106} \times \frac{1000}{250} = 0.1 \text{ M.}$

$$M_1 V_1 = M_2 V_2$$

$$0.1 \times V_1 = (10 + 15) 0.001$$

$$0.1 \times 10 = 0.01 + 0.001 x$$

$$1 - 0.01 = 0.001 x$$

$$x = \frac{0.99}{0.001} = 990$$

Q12) Ans:- B.

Solution:- Specific gravity = density = 1.8g.

$$\text{Mass of } \text{H}_2\text{SO}_4 = 1.8 \times \frac{9.8}{100} = 0.1764 \text{ g/mL}$$

$$\text{No. of moles} = \frac{w}{\text{GMW}} = \frac{0.1764}{98} = 0.0018 \text{ mol/mL}$$

Total no. of moles required for 1000mL of 0.18M solution.

$$\begin{aligned} \text{Total moles} &= \text{Molarity} \times \text{Volume in litres} \\ &= 0.18 \times 1 = 0.18 \text{ mol.} \end{aligned}$$

$$V = \frac{\text{Total moles}}{\text{moles per mL}} = \frac{0.18}{0.0018} = 100 \text{ mL}$$

Q13) Ans:- D.

Solution:- $M = \frac{10g}{\text{GM. wt}} = \frac{10 \times 36.5}{36.5} = 1.$

$$M_1 V_1 = M_2 V_2$$

$$1 \times 10 = M_2 \times 1000$$

$$M_2 = \frac{10}{1000} = 10^{-2} \text{ M.}$$

Q14) Ans:- B

Solution:- Given $V_1 = x \text{ L}$, $V_2 = y \text{ L}$, $V = 2 \text{ litres}$.

$$M_1 = 1 \text{ M}, M_2 = 5 \text{ M}, M = 2 \text{ M.}$$

$$M V = M_1 V_1 + M_2 V_2$$

$$2 \times 2 = 1x + 5y.$$

$$4 = x + 5y \Rightarrow 4 = x + 5(2-x)$$

$$4 = x + 10 - 5x \Rightarrow 4 = 10 - 4x \Rightarrow 4x = 10 - 4 = 6$$

$$x = 1.5 \text{ then } y = 0.5$$

Q15) Ans: B, C

Solution:

A) Concentration = $\frac{\text{Amount of solute}}{\text{volume of solution}}$ ✓

B) $\text{ppb} = \frac{\text{mass of solute}}{\text{total mass of solution}} \times 10^9$

C) $\text{weight \%} = \frac{\text{weight of solute}}{\text{weight of solution}} \times 100$

Q16) Ans: D

Solution:

$$\begin{aligned} M &= \frac{w}{\text{GMW}} \times \frac{1000}{V} \\ &= \frac{222.6}{62} \times \frac{1000}{V_{\text{solvent}}} \\ &= \frac{222.6}{62} \times \frac{1000}{200} \\ &= 17.95 \end{aligned}$$

Ethylene glycol.

$$\begin{aligned} &\text{C}_2\text{H}_6\text{O}_2 \\ &= (2 \times 12) + 6 + 32 \\ &= 24 + 38 = 62 \end{aligned}$$

$$V_{\text{water}} = ?$$

$$d = \frac{m}{V}$$

$$V = 200 \times 1 = 200 \text{ ml}$$

Q17) Ans: C

Solution:

$$M_1 V_1 = M_2 V_2$$

$$\boxed{V = V_1 + V_2}$$

$$M(1000) = 1.5(480) + 1.2(520) \quad V = 480 + 520 = 1000 \text{ ml}$$

$$= 720 + 624$$

$$M = \frac{1344}{1000} = 1.344$$

$$= 1.344$$

Q18) Ans:- B

Solution:- To determine concentration, calculate molarity.

a) 5.3 gm of Na_2CO_3 in 500 ml solution

$$\text{Na}_2\text{CO}_3 = 46 + 12 + 48 = 106 \text{ gmp}$$

$$M = \frac{5.3}{106} \times \frac{1000}{500} = 0.1 \text{ M.}$$

b) 5 gm of NaOH in 100 ml solution.

$$M = \frac{5}{40} \times \frac{1000}{100} = \frac{5}{4} = 1.25 \text{ M} \checkmark$$

c) 3.65 gm of HCl in 750 ml solution

$$M = \frac{3.65}{36.5} \times \frac{1000}{750} = \frac{4}{10 \times 3} = 0.133 \text{ M}$$

d) 4.9 gm of H_2SO_4 in 1000 ml solution

$$M = \frac{4.9}{98} \times \frac{1000}{1000} = 0.05 \text{ M}$$

Q19) Ans:- A

Solution:- Weight of solute = 1 mg = $\frac{1}{1000} = 10^{-3}$ gm.

weight of solvent = 10 gm

$$\begin{aligned} \text{w\%} &= \frac{10^{-3}}{10 + 0.001} \times 100 = \frac{1}{1000(10.001)} \times 100 \\ &= \frac{1}{100.01} = 0.00999 \\ &\approx 0.01 \\ &= 0.01 \end{aligned}$$

Matrix Matching

Q20) Ans: A

Solution:-

1) Proton conc. of 1 litre
made solution with 200ml
of 1M H_2SO_4 , 300ml 3M HCl &
100ml of 2M HCl.

→ Q) 1.5 M.

In H_2SO_4

$$Moles = 2 \times 0.2 = 0.4 \text{ moles}$$

300ml of 3M HCl.

$$3 \times 0.3 = 0.9 \text{ moles}$$

100ml of 2M HCl.

$$2 \times 0.1 = 0.2 \text{ moles}$$

$$\text{Total moles} = 0.4 + 0.9 + 0.2 = 1.5 \text{ moles}$$

$$M = \frac{\text{moles}}{L} = \frac{1.5}{1} = 1.5M$$

2) Molarity of mixing of

100ml of 1M HCl, 200ml 2M HCl, &
300ml of 3M HCl.

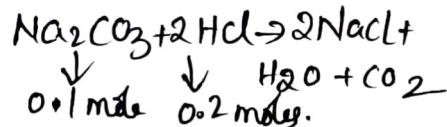
→ R) 2.33 M.

$$MV = M_1V_1 + M_2V_2 + M_3V_3$$

$$M = \frac{(100 \times 1) + (2 \times 200) + (3 \times 300)}{600} = 2.33M$$

3) Molarity of 200ml of HCl
solution which can neutralise
10.6g. of anhydrous Na_2CO_3

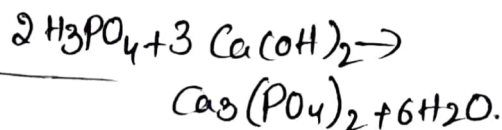
→ S) 1M.



$$M = \frac{\text{no. of moles}}{V} = \frac{0.2}{0.2} = 1M$$

4) Molarity of 0.6ml $Ca(OH)_2$
solution which can neutralise
100ml of $10^{-4}M H_3PO_4$.

→ P) 0.025 M.



2 moles H_3PO_4 react with

3 moles of $Ca(OH)_2$

$$M_{\text{moles of } Ca(OH)_2} = \frac{3}{2} \times 10^{-5}$$

$$M = \frac{1.5 \times 10^{-5}}{0.0006} = 0.025M$$

Q21) Ans: D

Solution:

D) No. of moles of Solute present in vml of solution $\rightarrow Q) n = \frac{V \times M}{1000}$

2) GMW

$$\rightarrow P) = \frac{10 \times \text{S.P. gr} \times \left(\frac{w}{W}\right) \%}{M.}$$

3) Strength

$$\rightarrow S) = \frac{\text{Mass of solute in gram}}{\text{Volume of solution in litres}}$$

4) w (of solute)

$$\rightarrow R) W = M \times V \times \text{GMW.}$$

Learners Task

Q1) Ans: B

Solution: $w_{\text{Glucose}} = 16 \text{ gm}$ $w_{\text{Water}} = 64 \text{ gm}$

$$\frac{w}{W} \% \text{ of Glucose} = \frac{16}{80} \times 100 = 20\%$$

$$\text{Water } \% = 100 - 20 = 80\%$$

Q2) Ans: A

Solution: $\% w/v = \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$

$$= \frac{16}{50} \times 100 = 32\%$$

Q3) Ans: B

Solution: Units of Molarity are moles/litre
moles $\cdot \text{litre}^{-1}$.

Q4) Ans:- D

Solution:- If we double the total volume of solution, molarity is halved.

Q5) Ans:- A

Solution:- $\text{CaCl}_2 \rightarrow \text{Ca}^{2+} + 2\text{Cl}^-$

1 mole $\text{CaCl}_2 \rightarrow 3$ moles of ions

Given $M = 0.1\text{M}$, $V = 1\text{ml} = 0.001\text{L}$

Moles $= M \times V = 0.1 \times 0.001 = 1.0 \times 10^{-4}$ moles

Moles of ion $= 1.0 \times 10^{-4} \times 3 = 3 \times 10^{-4}$ moles

Moles to no. of ions

$$= 3 \times 10^{-4} \times N_A$$

$$= 3 \times 10^{-4} \times 6 \times 10^{23}$$

$$= 18 \times 10^{19} = 1.8 \times 10^{20}$$

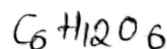
Q6) Ans:- A

Solution:- $\frac{w}{V} \% = 18\%$

$$\text{Molarity} = \frac{w}{\text{GMW}} \times \frac{1000}{V}$$

$$V = 100\text{ml} = 0.1\text{L}$$

$$M = \frac{18}{180} \times \frac{1}{0.1} = \frac{18}{18} = 1\text{M}$$



$$\text{GMW} = 72 + 12 + 96 = 180$$

Q7) Ans:- B

Solution:- $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
1 mole 1 mole

$$M = 0.05, V = 100\text{ml} = 0.1\text{L}$$

$$\text{Moles of CuSO}_4 = M \times V = 0.1 \times 0.05 = 0.005$$

Cu & CuSO₄ are 1:1 ratio.

$$0.005 \text{ moles of Cu} = 0.005 \times 63.54 = 0.3177\text{gms}$$

Q8) Ans:- B.

Solution:- Mass of solute = 10.6 g.

$$\text{No. of moles} = \frac{\text{mass}}{\text{GMM}} = \frac{10.6}{106} = 0.1 \text{ moles.}$$

$$\text{Molarity} = \frac{\text{moles}}{\text{Volume (L)}} = \frac{0.1}{0.1} = 1 \text{ M}$$

10 mL of the 1 M solution is taken & diluted to 1000 mL (1 L)

$$M_1 V_1 = M_2 V_2$$

$$M_1 = 1 \text{ M} \quad , \quad V_1 = 10 \text{ mL} = 0.01 \text{ L}$$

$$M_2 = ? \quad , \quad V_2 = 1000 \text{ mL}$$

$$1 \times 0.01 = M_2 \times 1000 \text{ (1 Litre)}$$

$$M_2 = \frac{0.01}{\frac{1000}{1000} \text{ Litre}} = \frac{0.01}{1} = 10^{-2} \text{ M.}$$

Q9) Ans:- B.

Solution:-

$$M_1 = 10 \text{ M} \quad , \quad V_1 = ?$$

$$M_2 = 5 \text{ M} \quad , \quad V_2 = 2 \text{ dm}^3 = 2 \text{ L}$$

$$M_1 V_1 = M_2 V_2$$

$$10 V_1 = 5 \times 2$$

$$V_1 = \frac{10}{10} = 1 \text{ L.}$$

Q10) Ans:- C

Solution:-

A) 2.12, 0.05

$$\lambda = M \times \text{Molar mass} \times V$$

$$M = \frac{\lambda}{\text{GMM} \times V} = \frac{2.12}{106 \times 0.1} = 0.2 \text{ M.}$$

B) 1.06, 0.2

$$M = \frac{1.06 \times 0.01}{106 \times 0.1} = 0.1 \text{ M}$$

C) 1.06, 0.1

$$M = \frac{1.06 \times 0.01}{106 \times 0.1} = 0.1 \text{ M} \quad \checkmark$$

D) 2.12, 0.1

$$M = \frac{2.12 \times 0.02}{106 \times 0.1} = 0.2 \text{ M.}$$

JEE Main Level Questions

Q1) Ans:- A.

Solution:- $100\text{ml. of } 0.3\text{M} = \frac{100 \times 0.3}{1000} = 0.03 \text{ moles of NaCl}$

$100\text{ml of } 0.4\text{M} = \frac{100 \times 0.4}{1000} = 0.04 \text{ moles of NaCl.}$

Moles of NaCl to be added $= 0.04 - 0.03$
 $= 0.01 \text{ mole}$

$\text{NaCl} \rightarrow 1 \text{ mole} \rightarrow 58.5 \text{ gms.}$
 $0.01 \text{ moles} \rightarrow x \quad x = 0.585 \text{ gms}$

Q2) Ans:- B.



1 mole of H_2SO_4 produces 2 moles of H_3O^+
and 1 mole of SO_4^{2-}

Moles in 2L $= 0.020 \times 2 = 0.040 \text{ moles of } \text{H}_2\text{SO}_4.$

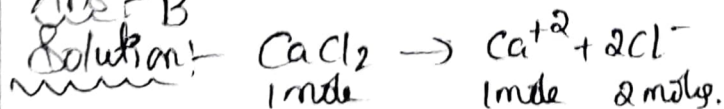
1 mole of H_2SO_4 produces 2 moles of $\text{H}_3\text{O}^+.$

$0.04 \times 2 = 0.080 \text{ moles of } \text{H}_3\text{O}^+.$

1 mole of H_2SO_4 produces 1 mole of $\text{SO}_4^{2-},$

So $0.040 \text{ moles of } \text{SO}_4^{2-}$

Q3) Ans:- B

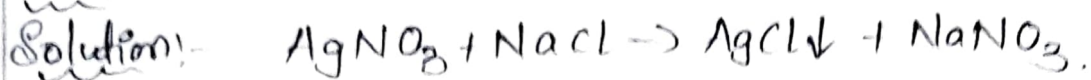


CaCl_2
1 mole $\rightarrow 111 \text{ gms}$
 $x \rightarrow 11.1 \text{ gms}$
 $x = 0.1 \text{ moles}$

Molarity $= \frac{\text{moles}}{\text{volume (L)}}$
 $= \frac{0.1}{0.1}$
 $= 1\text{M}$

For 1M $\text{CaCl}_2 \rightarrow$
2M Cl^- ions
produced

Q4) Ans - B.



$\rightarrow 100 \text{ ml } (0.1 \text{ L})$ of $1 \text{ M } \text{AgNO}_3$

$$\text{Moles of } \text{NO}_3^- = 1 \times 0.1 = 0.1 \text{ mole.}$$

$\rightarrow 100 \text{ ml } (0.1 \text{ L})$ of $1 \text{ M } \text{NaCl}$ does not contribute to NO_3^- ions.

$$\text{Total volume} = 100 \text{ ml} + 100 \text{ ml} = 200 \text{ ml} = 0.2 \text{ L}$$

$$\text{Molarity} = \frac{\text{Moles of } \text{NO}_3^-}{\text{Total volume (L)}} = \frac{0.1}{0.2} = 0.5 \text{ M.}$$

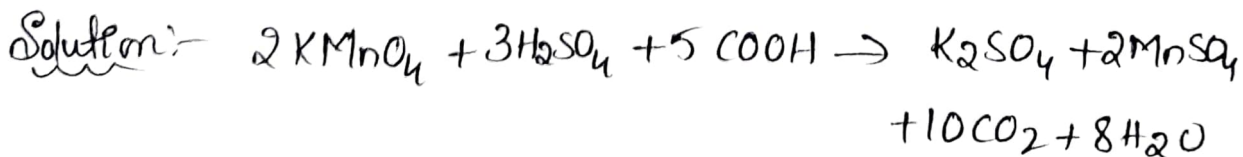
Q5) Ans - C.

Solution:- $MV = M_1V_1 + M_2V_2$

$$M = \frac{1.5(480) + 1.2(520)}{1000}$$

$$= \frac{720 + 624}{1000} = 1.344$$

Q6) Ans - D.



$$\frac{M_1V_1}{n_1} [\text{KMnO}_4] = \frac{M_2V_2}{n_2} [\text{COOH}]$$

$$\frac{10^{-4} \times V_1}{2} = \frac{10^{-2} \times 0.5 \times 0.1}{5}$$

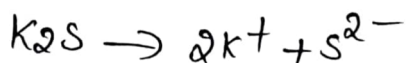
$$V_1 = \frac{2 \times 10^{-3}}{10^{-4}}$$

$$V_1 = \frac{2}{10^{-1}} = 20$$

Q7) Ans: C

Solution:-

(A) 1M K_2S + 1M HNO_3 .



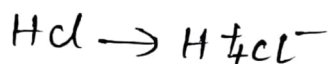
2M K^+ + 1M S^{2-} , Total ion = 3M.



1M + 1M = 2M.

Total ion = 3 + 2 = 5M

B) 2M HCl + 0.5M NH_4Cl .



2M + 2M = 4M.



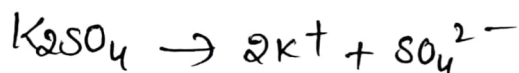
0.5 + 0.5 = 1M

Total ion = 4 + 1 = 5M

C) 2M K_2S + 2M K_2SO_4 .



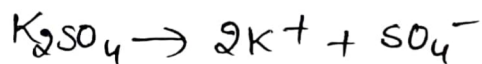
2x2=4 2M = 6M.



4M 2M = 6M

Total ion = 6 + 6 = 12M. ✓

D) 2M K_2SO_4 + 2M NH_4Cl .



4M 2 = 6M.



2M 2M = 4M

Total ion = 6 + 4 = 10M

Q8) Ans: B, C

Solution:

A) If volume increases x times, molarity decreases x times.

B) 1 mole = 1000 millimoles.

$$\text{Millimoles} = M \times V (\text{in mL})$$

C). As temperature increases, the solution expands, leading to decrease in molarity.

D) Added volume = $V_2 - V_1 = \frac{M_1 V_1}{M_2} - V_1$.

Q9) Ans: A, B.

$$A) M = \frac{10 \times d \times \left(\frac{w}{W}\right) \%}{\text{GMW.}}$$

Solution: $w/w \% = \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$.

Q10) Ans: A, B, C

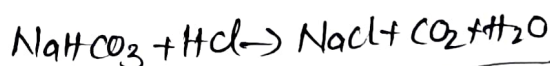
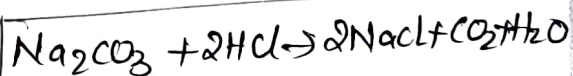
Solution:

A) $M\% = \frac{6.5}{456.5} \times 100 = 1.424\%$

B) Total mass = 1.0 g.

$$x(106) + 1(84) = 1.$$

$$x = \frac{1.0}{190} = 0.00526 \text{ moles}$$



Na_2CO_3 needs 2 moles of HCl per mole $\rightarrow 2 \times 0.00526 = 0.01052$

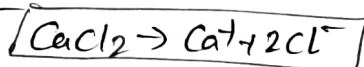
NaHCO_3 needs 1 mole of HCl per mole $\rightarrow 0.00526$

$$\text{Total moles} = 0.01052 + 0.00526 = 0.01578 \text{ moles}$$

$$M = \frac{\text{moles}}{\text{litre}} \Rightarrow 0.1 = \frac{0.01578}{V} \Rightarrow V = 157.9 \text{ mL}$$

C) Moles = $0.5 \times \frac{500}{1000} = 0.25$ moles of CaCl_2

1 mole of CaCl_2 produces 2 moles of Cl^-



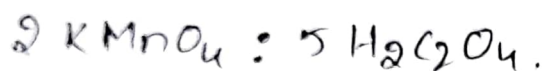
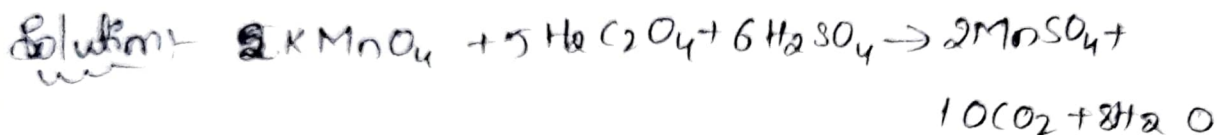
0.25 moles of CaCl_2 produces $\rightarrow 0.25 \times 2 = 0.5$ moles of Cl^-

Q11) Ans:- A

Solution:- Molarity = $\frac{\text{Moles of Solute}}{\text{Volume of Solution in Litres}}$

When temperature increases, the solution expands, increasing volume changes with temperature.

Q12) Ans:- D.



$$\begin{array}{ccc} 2 & \xrightarrow{\quad} & 5 \\ 2 & \xrightarrow{\quad} & 20 \end{array} \quad x = \frac{408}{5}$$

For 20 mL we need 0.0008 moles of KMnO_4 .

$$\text{Volume} = \frac{\text{Moles}}{\text{Molarity}} = \frac{0.0008}{0.1} = 0.008 \text{ L} = 8 \text{ mL}$$

A is incorrect

B) 2 moles of $\text{KMnO}_4 \rightarrow$ React with 5 moles of H_2SO_4

B is correct

Q13) Ans:- B.

Solution:- $\frac{w}{V} \% = \frac{w}{V} \times 100$

$$5 \% = \frac{w}{250} \times 100$$

$$125 = 10w$$

$$w = \frac{125}{10} = 12.5 \text{ g.}$$

Integer Type

Q14) Ans:- 1

Solution:-

$$M = \frac{w}{GMW} \times \frac{1000}{V_{mL}}$$
$$= \frac{18}{180} \times \frac{1000}{100} = 1M.$$

Q15) Ans:- 1

Solution:-

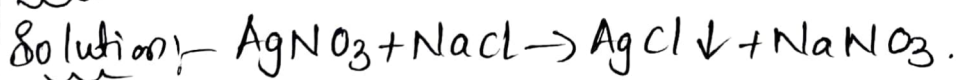
$$M = \frac{w \% \times d \times 10}{\text{Mol. wt}}$$
$$5 = \frac{20 \times d \times 10}{40}$$
$$20 = 20 \times d$$
$$d = \frac{20}{20} = 1$$

Q16) Ans:- 1

Solution:-

$$M_1 V_1 = M_2 V_2$$
$$M_1 = 5M, V_1 = 2, M_2 = 10$$
$$V_2 = \frac{M_1 V_1}{M_2} = \frac{5 \times 2}{10} = 1 \text{ litre}$$

Q17) Ans:- 5



$$\text{Total volume} = 100 + 100 = 200 \text{ mL}$$

100 mL of 1M $AgNO_3$ was initially present 0.1 moles of $NaNO_3$ formed.

$$M = \frac{\text{Moles}}{V(L)} = \frac{0.1}{0.2} = 0.5M$$
$$= 5 \times 10^{-1} M.$$

KEY

TEACHING TASK

1	2	3	4	5	6	7	8	9	10
B	C	A	A	A	A	C	B	B	B
11	12	13	14	15	16	17	18	19	20
B	B	D	B	BC	D	C	B	A	A
21									
D									

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

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

JEE MAIN AND ADVANCED LEVEL

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