

## JEE MAIN ANSWER KEY &amp; SOLUTIONS

SUBJECT :- CHEMISTRY

CLASS :- 11<sup>th</sup>

CHAPTER :- MOLE CONCEPT

PAPER CODE :- CWT-1

ANSWER KEY											
1.	(B)	2.	(B)	3.	(A)	4.	(A)	5.	(C)	6.	(B)
8.	(A)	9.	(C)	10.	(A)	11.	(C)	12.	(B)	13.	(C)
15.	(C)	16.	(B)	17.	(C)	18.	(C)	19.	(D)	20.	(D)
22.	2	23.	10	24.	5	25.	50	26.	64	27.	20
29.	1	30.	40								

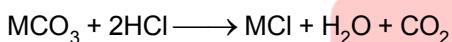
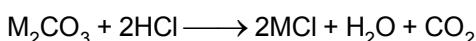
## SOLUTIONS

1. (B)

**Sol.** Mass dependent unit does not change on change of temperature  
 (i) ppm  
 (ii) %w/w  
 (iii) % labelling

2. (B)

**Sol.** Reactions of both carbonates are



$$n_{\text{CO}_2} = \frac{12.315}{24.63} = 0.5 \text{ moles}$$

From options Li Be Mg

$$\begin{cases} \text{Li}_2\text{CO}_3 = \frac{74}{2} = 37 \\ \text{BeCO}_3 = \frac{68}{2} = 34 \\ \text{MgCO}_3 = \frac{84}{2} = 42 \end{cases}$$

$$\text{Mass of Mixture} = 40 \text{ gm}$$

$$\begin{cases} \therefore \text{Li}_2\text{CO}_3 = 37 \text{ gm} \\ \text{unreacted part (impurity)} = 3 \text{ gm} \end{cases}$$

3. (A)

**Sol.** mole % of  $\text{NO}_2 = \frac{34 - 30}{46 - 30} = \frac{4}{16} \times 100 = 25\%$   
 Ans. ]

4. (A)

**Sol.**  $10 \times 20 = 200$   
 $4 \times 480 = 1920$   
 $\Rightarrow 2120 \text{ gm Ans. } ]$

5. (C)

**Sol.**  $\text{C}_2\text{H}_4\text{O}_2 + 2\text{O}_2 \longrightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$   
 moles should be in 1 : 2 ratio  
 $60x + 32(2x) = 620$   
 $124x = 620$   
 $x = 5$   
 moles of  $\text{CO}_2$  produced = 10 mol

$$W_{\text{CO}_2} = 440 \text{ gm } ]$$

6. (B)

**Sol.**  $\text{Ag}_2\text{SO}_4 + 2\text{NaCl} \longrightarrow 2\text{AgCl} + \text{Na}_2\text{SO}_4$   
 $2 \times 2 = 4 \quad 4 \times 1 = 4 \quad 4 \quad 2$   
 Remaining L.R.  
 $4 - 2 = 2$   
 Total ions in solution  $\Rightarrow 4 + 2 + 4 + 2 = 12$   
 (from  $\text{Ag}_2\text{SO}_4$  &  $\text{Na}_2\text{SO}_4$ )  
 Sum of molar conc. =  $\frac{12}{6} = 2 \text{ M Ans. } ]$

7. (C)

**Sol.** Let the volume (x) CO, (y)  $\text{CO}_2$  & (z)  $\text{N}_2$   
 $2\text{CO} + \text{O}_2 \longrightarrow 2\text{CO}_2$   
 $x \quad x/2 \quad x$

$$\therefore \Delta V = x \left(1 + \frac{1}{2} - 1\right) = 40$$

$$\frac{x}{2} = 40 \Rightarrow x = 80 \text{ ml}$$

$$\therefore V_{\text{CO}_2} = y \quad \therefore (V_{\text{CO}_2})_T = 80 + y$$

$$\therefore V_{\text{N}_2} = 120 - y$$

$$\Rightarrow 80 + y = 200 \times \frac{50}{100}$$

$$y = 20$$

$$\therefore V_{\text{N}_2} = 100 \text{ ml}$$

$$\therefore V_{\text{CO}} : V_{\text{CO}_2} : V_{\text{N}_2} :: 80 : 20 : 100$$

$$\therefore 4 : 1 : 5 ]$$

8. (A)

**Sol.**  $M_1 V_1 = M_2 V_2$

$$8 \times V = \frac{7.3 \times 10}{36.5} \times 2 \quad M_2 = \frac{(w/v)\% \times 10}{M_{\text{solute}}}$$

$$V = \frac{1}{2} \text{ lit.}$$

Volume of water added is initial solution = 2 – 0.5 ⇒ 1.5 lit. Ans. ]

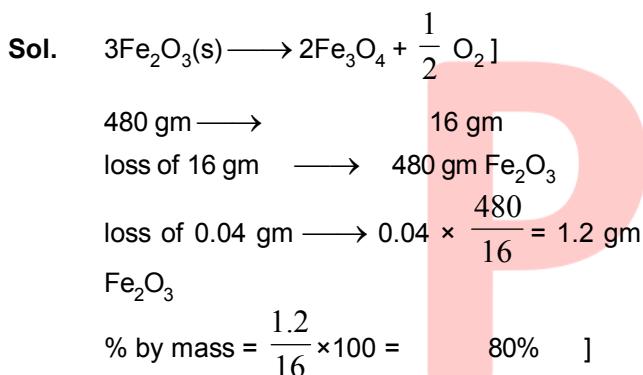
9. (C)

**Sol.** Mass of liquid in 2 ml =  $v \times d = 2 \times 1.2 = 2.4 \text{ gm}$

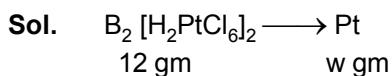
$$\text{Number of moles of liquid} = \frac{2.4}{70}$$

$$\text{Number of molecules of liquid} = \frac{2.4}{70} \times N_A = \frac{1.2}{35} \times N_A ]$$

10. (A)



11. (C)



POAc for Pt

$$\frac{12 \times 2}{2 \times 58 + 410 \times 2} = \frac{w}{195}$$

or w = 5 gm Ans. ]

12. (B)



C = 0.5 M, α = degree of dissociation

$$[\text{H}^+] = \text{Cα} = 2.5 \times 10^{-4}$$

$$\alpha = \frac{2.5 \times 10^{-4}}{0.5} = 5 \times 10^{-4}$$

$$\% \text{ dissociation} = 5 \times 10^{-4} \times 100 = 0.05 \text{ Ans. } ]$$

13. (C)

**Sol.** Mass of 1 mole electron (in kg) =  $9.1 \times 10^{-31} \times 6 \times 10^{23}$   
 1 amu =  $1.67 \times 10^{-27} \text{ kg}$   
 $\therefore$  Mass of 1 electron in (amu) =  $\frac{9.1 \times 10^{-31} \times 6 \times 10^{23}}{1.67 \times 10^{-27}}$   
 $= 3.27 \times 10^{20} \text{ amu } ]$

14. (D)

**Sol.**  $2(+1) + 2x = 0$   
 $\therefore x = -1$

15. (C)

**Sol.** No. of moles =  $\frac{PV}{RT} = \frac{\frac{760}{760} \times 44.8 \times 10^{-3}}{0.0821 \times 273} = 2 \times 10^{-3}$   
 No. of atoms = moles × atomicity ×  $N_A = 2 \times 10^{-3} \times 1 \times N_A = 0.002 N_A ]$

16. (B)

**Sol.**  $n = \frac{\text{M.F.M}}{\text{E.F.M}} = \frac{120}{30} \Rightarrow n = 4$   
 $\Rightarrow \text{M.F.} = n \times \text{CH}_2\text{O}$   
 $= 4 \times \text{CH}_2\text{O}$   
 $= \text{C}_4\text{H}_8\text{O}_2$

17. (C)

**Sol.** mole of solute =  $\frac{6.02 \times 10^{22}}{6.02 \times 10^{23}}$   
 mole =  $\frac{1}{10}$  mole  
 $\text{conc} = \frac{\frac{1}{10}}{\frac{500}{1000}} = 0.2 \text{ M}$

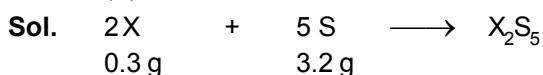
18. (C)

**Sol.** Mole fraction (water) =  $\frac{\frac{900}{18}}{\frac{900}{18} + \frac{117}{18}} = \frac{50}{50+2} = 0.9615$

19. (D)

**Sol.** m = 0.2 mole / kg  
 weight of solvent = 1000 gram  
 weight of solute =  $0.2 \times 98 = 19.6 \text{ gram}$   
 Total weight of solution =  $1000 + 19.6 = 1019.6 \text{ ml.}$

**20.** (D)

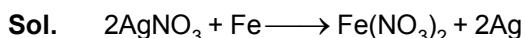


$$n = \frac{0.3}{M_X} \quad 0.1 \text{ mol}$$

$$\therefore \frac{0.3}{2M_X} = \frac{0.1}{5}$$

$$\therefore M_X = \frac{3 \times 5}{2} \text{ g/mol} = 7.5 \text{ g/mol} \quad \text{Ans.}$$

**21.** 3



$$M \times 0.1 \quad \frac{11.2}{56}$$

$$\left( \frac{11.2}{56} - \frac{M \times 0.1}{2} \right) \frac{M}{2} \times 0.1 \quad M \times 0.1$$

Total mass of solid

$$\left( \frac{11.2}{56} - \frac{M \times 0.1}{2} \right) \times 56 + M \times 0.1 \times 108 = 35.2$$

$$11.2 - 28 \times M \times 0.1 + 108 \times 0.1 \times M = 35.2$$

$$80 \times M \times 0.1 = 24$$

$$M = 3 \quad \text{Ans.}]$$

**22.** 2

$$\text{Sol. mole} = \frac{\text{mass}}{\text{at. wt.}} = \frac{46}{23} = 2 \text{ mole.}$$

**23.** 10

**Sol.** Maximum volume is required in case of  $\text{H}_3\text{PO}_4$



$$\frac{1.96}{98} = 0.2 \quad 0.06$$

$$56 \times 0.06 = V \times \frac{33.6}{100}$$

$$V = 10 \text{ ml} \quad \text{Ans.}]$$

**24.** 5

$$\text{Sol. Moles of solute (CH}_3\text{COOH}) = \frac{20 \times 0.75}{60}$$

$$\Rightarrow 0.25$$

$$\text{molality (m)} = \frac{0.25}{50} \times 1000 \Rightarrow 5 \quad ]$$

**25.** 50%



$$\text{Mole} \quad 1 \quad 3 \quad 4$$

$$\text{Mole/S.C.} \quad 0.5 \quad 1 \quad 1$$

$$\% \text{ yield} = \frac{1.25}{2.5} \times 100 = 50 \% \quad \text{Ans.}]$$

**26.** 64

$$\text{Sol. } V.D = \frac{\text{Mwt volatile substance}}{\text{M.wt.CH}_4}$$

$$4 = \frac{x}{16}, \quad x = 64$$

Here x is M. wt of volatile substance

**27.** 20 kg

$$\text{Sol. Moles of Na}_2\text{CO}_3 = \frac{21.2 \times 10^3}{106} = 200$$

$$\text{So moles of CO}_2 = 200$$

$$\& \text{ so moles of CaCO}_3 \text{ reqd} = 200$$

$$\therefore \text{wt of CaCO}_3 \text{ reqd} = 200 \times 100 = 20 \text{ kg.}$$

**28.** 6 g



$$\text{Given moles } \left( \frac{8}{2} \right) \quad \left( \frac{16}{32} \right)$$

$$4 \quad 0.5$$

So  $\text{O}_2$  is the limiting reagent

$$\text{moles used of H}_2 = 1$$

So unreacted moles = 6 gm.

**29.** 1 M

$$\text{Sol. } M_1 V_1 + M_2 V_2 = M_R [V_1 + V_2]$$

$$1 \times 500 + 1 \times 500 = M_R [500 + 500]$$

$$M_R = 1.$$

**30.** 40 ml

$$\text{Sol. } V_f = \frac{1600 \times 0.205}{0.2} \text{ ml} = 1640 \text{ ml}$$

∴ Volume of water added =  $(1640 - 1600)$  ml = 40 ml Ans