JEE MAIN ANSWER KEY & SOLUTIONS

SUBJECT :- CHEMISTRY
CLASS :- 11th **PAPER CODE :- CWT-1**
CHAPTER :- MOLE CONCEPT

ANSWER KEY

1.	(B)	**2.**	(B)	**3.**	(A)	**4.**	(A)	**5.**	(C)	**6.**	(B)	**7.**	(C)
8.	(A)	**9.**	(C)	**10.**	(A)	**11.**	(C)	**12.**	(B)	**13.**	(C)	**14.**	(D)
15.	(C)	**16.**	(B)	**17.**	(C)	**18.**	(C)	**19.**	(D)	**20.**	(D)	**21.**	3
22.	2	**23.**	10	**24.**	5	**25.**	50	**26.**	64	**27.**	20	**28.**	6
29.	1	**30.**	40										

SOLUTIONS

1. (B)

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

2. (B)

Sol. Reactions of both carbonates are

$M_2CO_3 + 2HCl \longrightarrow 2MCl + H_2O + CO_2$

$MCO_3 + 2HCl \longrightarrow MCl + H_2O + CO_2$

$n_{CO_2} = \frac{12.315}{24.63} = 0.5$ moles

From options Li Be Mg

Mass of 0.5 mole of $\begin{cases} Li_2CO_3 = \frac{74}{2} = 37 \\ BeCO_3 = \frac{68}{2} = 34 \\ MgCO_3 = \frac{84}{2} = 42 \end{cases}$

Mass of Mixture = 40 gm

$\begin{cases} \therefore Li_2CO_3 = 37\,gm \\ \text{unreacted part (impurity)} = 3\,gm \end{cases}$]

3. (A)

Sol. mole % of $NO_2 = \frac{34-30}{46-30} = \frac{4}{16} \times 100 = 25\%$
Ans.]

4. (A)

Sol. 10 × 20 = 200
4 × 480 = 1920
$\Rightarrow$ 2120 gm Ans.]

5. (C)

Sol. $C_2H_4O_2 + 2O_2 \longrightarrow 2CO_2 + 2H_2O$
moles should be in 1 : 2 ratio
60x + 32(2x) = 620
124x = 620
x = 5
moles of CO_2 produced = 10 mol

W_{CO_2} = 440 gm]

6. (B)

Sol. $Ag_2SO_4 + 2NaCl \longrightarrow 2AgCl + Na_2SO_4$
2×2= 4 4 ×1 = 4 4 2
Remaining L.R.
4–2 = 2
Total ions in solution $\Rightarrow$ 4 + 2 + 4 + 2 = 12
(from Ag_2SO_4 & Na_2SO_4)
Sum of molar conc. = $\frac{12}{6}$ = 2 M Ans.]

7. (C)

Sol. Let the volume (x) CO, (y) CO_2 & (z) N_2

$2CO + O_2 \longrightarrow 2CO_2$
x x/2 x

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

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

$\therefore V_{CO_2} = y$ $\therefore (V_{CO_2})_T = 80 + y$

$\therefore V_{N_2} = 120 - y$

$\Rightarrow 80 + y = 200 \times \frac{50}{100}$
y = 20

$\therefore V_{N_2} = 100$ ml

$\therefore V_{CO} : V_{CO_2} : V_{N_2} :: 80 : 20 : 100$

$\therefore 4 : 1 : 5$]

8. (A)

Sol. $M_1V_1 = M_2V_2$

$8 \times V = \frac{7.3\times10}{36.5} \times 2 \quad M_2 = \frac{(w/v)\%\times10}{M_{Solute}}$

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

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

9. (C)

Sol. Mass of liquid in 2 ml = v × d = 2 × 1.2 = 2.4 gm

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

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

10. (A)

Sol. $3Fe_2O_3(s) \longrightarrow 2Fe_3O_4 + \frac{1}{2} O_2$]

480 gm $\longrightarrow$ 16 gm

loss of 16 gm $\longrightarrow$ 480 gm Fe_2O_3

loss of 0.04 gm $\longrightarrow 0.04 \times \frac{480}{16} = 1.2$ gm Fe_2O_3

% by mass = $\frac{1.2}{16} \times 100 =$ 80%]

11. (C)

Sol. $B_2\ [H_2PtCl_6]_2 \longrightarrow Pt$

12 gm w gm

POAc for Pt

$\frac{12\times2}{2\times58+410\times2} = \frac{w}{195}$

or w = 5 gm Ans.]

12. (B)

Sol.

	CH_3OH		CH_3O^-	+	H^+
t = 0	C				
t = eq.	C–Cα				Cα
	Cα				

C = 0.5 M, α = degree of dissociation

$[H^+] = C\alpha = 2.5 \times 10^{-4}$

$\alpha = \frac{2.5\times10^{-4}}{0.5} = 5 \times 10^{-4}$

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

13. (C)

Sol. Mass of 1 mole electron (in kg) = $9.1 \times 10^{-31} \times 6 \times 10^{23}$

1 amu = 1.67×10^{-27} kg

$\therefore$ Mass of 1 electron in (amu) = $\frac{9.1\times10^{-31}\times6\times10^{23}}{1.67\times10^{-27}}$

$= 3.27 \times 10^{20}$ amu]

14. (D)

Sol. 2(+1) + 2 x = 0

$\therefore$ x = – 1

15. (C)

Sol. No. of moles = $\frac{PV}{RT} = \frac{\frac{760}{760}\times44.8\times10^{-3}}{0.0821\times273} = 2 \times 10^{-3}$

No. of atoms = moles × atomicity × N_A = $2 \times 10^{-3} \times 1 \times N_A = 0.002\ N_A$]

16. (B)

Sol. $n = \frac{M.F.M}{E.F.M} = \frac{120}{30} \Rightarrow n = 4$

$\Rightarrow$ M.F = n × CH_2O

= 4 × CH_2O

= $C_4H_8O_2$

17. (C)

Sol. mole of solute = $\frac{6.02\times10^{22}}{6.02\times10^{23}}$

mole = $\frac{1}{10}$ mole

conc = $\frac{\frac{1}{10}}{\frac{500}{1000}}$ = 0.2 M

18. (C)

Sol. Mole fraction (water) = $\frac{\frac{900}{18}}{\frac{900}{18}+\frac{117}{58.5}} = \frac{50}{50+2}$

= 0.9615

19. (D)

Sol. m = 0.2 mole / kg

weight of solvent = 1000 gram

weight of solute = 0.2 × 98 = 19.6 gram

Total weight of solution = 1000 + 19.6 = 1019.6 ml.

20. (D)

Sol. $2X + 5S \longrightarrow X_2S_5$

0.3 g 3.2 g

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

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

$\therefore M_X = \frac{3\times5}{2} g/mol$ = 7.5 g/mol Ans.

21. 3

Sol. $2AgNO_3 + Fe \longrightarrow Fe(NO_3)_2 + 2Ag$

M ×0.1 $\frac{11.2}{56}$

$\left(\frac{11.2}{56} - \frac{M\times0.1}{2}\right)\frac{M}{2}\times0.1$ M × 0.1

Total mass of solid

$\left(\frac{11.2}{56} - \frac{M\times0.1}{2}\right)\times56 + M \times 0.1 \times 108 = 35.2$

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

$80 \times M \times 0.1 = 24$

M = 3 Ans.]

22. 2

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

23. 10

Sol. Maximum volume is required in case of H_3PO_4

$H_3PO_4 + 3KOH \longrightarrow K_3PO_4 + 3H_2O$

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

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

V = 10 ml Ans.]

24. 5

Sol. Moles of solute $(CH_3COOH) = \frac{20\times0.75}{60}$

$\Rightarrow 0.25$

molality (m) = $\frac{0.25}{50}\times1000 \Rightarrow 5$]

25. 50%

Sol. $2x + 3y + 4z \longrightarrow 5w$

Mole 1 3 4

Mole/S.C. 0.5 1 1

% yield = $\frac{1.25}{2.5}$ × 100 = 50 % **Ans.**]

26. 64

Sol. $V.D = \frac{Mwt_{volatile\ substance}}{M.wt.CH_4}$

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

Here x is M. wt of volatile substance

27. 20 kg

Sol. Moles of $Na_2CO_3 = \frac{21.2\times10^3}{106} = 200$

So moles of $CO_2 = 200$

& so moles of $CaCO_3$ reqd = 200

$\therefore$ wt of $CaCO_3$ reqd = 200 × 100 = 20 kg.

28. 6 g

Sol. $2H_2 + O_2 \longrightarrow 2H_2O$

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

4 0.5

So O_2 is the limiting reagent

moles used of H_2 = 1

So unreacted moles = 6 gm.

29. 1 M

Sol. $M_1V_1 + M_2V_2 = M_R[V_1 + V_2]$

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

M_R = 1.

30. 40 ml

Sol. $V_f = \frac{1600\times0.205}{0.2}$ ml = 1640 ml

$\therefore$ Volume of water added = (1640 – 1600) ml = 40 ml Ans