

$2 \times 17 \text{ g of NH}_3$ will give 28 g of N_2

$$\therefore 1 \text{ g of NH}_3 \text{ will give } = \frac{28}{2 \times 17} \times 1 = 0.823 \text{ g}$$

19.(C) % of chlorine = 3.55

Thus, in 100 g of chlorohydrocarbon, mass of chlorine = 3.55 g

1 g of chlorohydrocarbon will contain $= \frac{3.55}{100} \text{ g}$ of chlorine

$$\therefore \text{No. of moles of chlorine atoms} = \frac{\text{Mass}}{\text{Atomic mass}} = \frac{3.55}{100} = 1 \times 10^{-3}$$

1 mole of chlorine contains 6.023×10^{23} chlorine atoms.

$\therefore 1 \times 10^{-3} \text{ mole}$ of chlorine will contain

$$1 \times 10^{-3} \times 6.023 \times 10^{23} = 6.023 \times 10^{20} \text{ chlorine atoms}$$

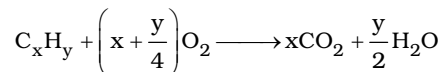
20.(B) Ratio of mass % of C and H in $\text{C}_x\text{H}_y\text{O}_z$ is $6 : 1$

Therefore,

Ratio of mole % of C and H in $\text{C}_x\text{H}_y\text{O}_z$ will be $1 : 2$.

Therefore $x : y = 1 : 2$, Which is possible in options A, B and C.

Now oxygen required to burn C_xH_y



Now z is half of oxygen atoms required to burn C_xH_y .

$$\therefore z = \frac{\left(2x + \frac{y}{2}\right)}{2} = \left(x + \frac{y}{4}\right)$$

Now putting values of x and y from the given options :

Option (B), $x = 2, y = 4$

$$z = \left(2 + \frac{4}{4}\right) = 3$$

Option (C), $x = 3, y = 6$

$$z = \left(3 + \frac{6}{4}\right) = 4.5$$

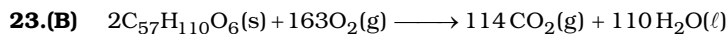
Therefore correct option is B($\text{C}_2\text{H}_4\text{O}_3$)

21.(D) Number of moles = $M \times V = (0.1)(2) = 0.2 \text{ moles}$

Molar mass of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) = 342

$$g_{\text{sugar}} = 0.2 \times 342 = 68.4 \text{ g}$$

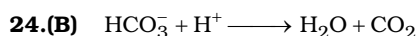
22.(A)
$$\text{Molality} = \frac{\text{Number of moles of solute}}{\text{Mass of solvent in kg}} = \frac{\frac{92}{23} \text{ mol}}{1 \text{ kg}} = 4 \text{ mol / kg}$$



$$\text{Moles of } \text{C}_{57}\text{H}_{110}\text{O}_6 = \frac{445}{890} = \frac{1}{2} = 0.5 \text{ mol}$$

As molar mass of $\text{C}_{57}\text{H}_{110}\text{O}_6 = 890 \text{ g / mol}$

So, mass of $\text{H}_2\text{O} = \frac{110}{2} \times 0.5 = 495 \text{ g}$



$$n_{\text{CO}_2} = \frac{0.25}{25 \times 10^3} = 10^{-5} \text{ mol} = n_{\text{NaHCO}_3}$$

$$\% \text{ of NaHCO}_3 \text{ in each tablet} = \frac{84 \times 10^{-5} \times 10^3}{10} \times 100 = 8.4$$

25.(D) Answer is not in the options hence **BONUS**

Number of gram equivalents of $\text{H}_2\text{C}_2\text{O}_4 = \text{Number of gram equivalents of NaOH}$

$$\Rightarrow 50 \times 0.5 \times 2 = 25 \times x \times 1 \Rightarrow x = \frac{50 \times 0.5 \times 2}{25} = 2\text{M}$$

$$M = 2 = \frac{W}{40} \times \frac{1000}{50} \Rightarrow W = \frac{2 \times 40 \times 50}{1000} = 4 \text{ gm}$$

26.(B)
$$X_{\text{NaOH}} = \frac{8/40}{\left[\frac{8}{40} + 1 \right]} = 0.167$$

$$m = \frac{8/40}{0.018} = 11.11$$

27.(A) For NaHCO_3 titration

meq. of $\text{HCl} = \text{meq. of NaHCO}_3$

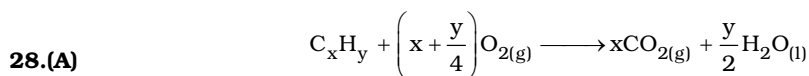
$$25 \times N_{\text{HCl}} = 30 \times 0.1 \times 2$$

$$N_{\text{HCl}} = \frac{6}{25} \text{ N}$$

For NaOH titration

meq of $\text{HCl} = \text{meq of NaOH}$

$$\frac{6}{25} \times V = 30 \times 0.2, \quad V = 25\text{mL}$$



Initial condition 10ml 55ml 0 0

After reaction 0 0 40 ml -

From stoichiometry concept,

$$10 \left(x + \frac{y}{4} \right) = 55 \quad \left| \quad 10x = 40 \Rightarrow x = 4 \right.$$

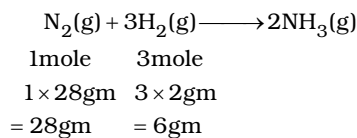
$$\Rightarrow 10x + 10\frac{y}{4} = 55$$

$$10x + \frac{10y}{4} = 55$$

$$y = \frac{15 \times 4}{10} \quad \therefore \quad y = 6$$

$$\text{Hence } C_xH_y \Rightarrow C_4H_6$$

29.(B) from given eq:



for option -1 $\therefore$ 6 gm H_2 reacts $\bar{c}$ 28 gm N_2 i.e. both reactants utilized completely.

for option -2 $\therefore$ 6 gm H_2 reacts $\bar{c}$ 28 gm N_2

$$\therefore 10 \text{ gm } H_2 \text{ reacts } \frac{28}{6} \times 10 \text{ gm } N_2$$

$$= 46.67 \text{ gm } N_2 \text{ required, however amount. of } N_2 \text{ given} = 56 \text{ gm}$$

i.e. N_2 present in excess.

So, H_2 utilizes completely & hence limiting reagent.

for option-3 $\therefore$ 6 gm H_2 reacts $\bar{c}$ 28 gm N_2

$$\therefore 4 \text{ gm } H_2 \text{ reacts } \bar{c} \frac{28 \times 4}{6} \text{ gm } N_2$$

$$= 18.67 \text{ gm } N_2 \text{ required. But } N_2 \text{ given} = 14 \text{ gm.}$$

$\therefore N_2$ is L. R.

for option -4 $\therefore$ 6 gm H_2 reacts $\bar{c}$ 28 gm N_2

$$\therefore 6 \text{ gm } H_2 \text{ reacts } \bar{c} \frac{28 \times 8}{6} \text{ gm } N_2 = 37.33 \text{ gm } N_2 \text{ required but } N_2 \text{ given} = 35 \text{ gm.}$$

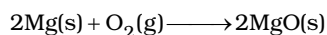
30.(C) Molar mass of $AB_2 = 25 \times 10^{-3} \text{ kg}$

Molar mass of $A_2B_2 = 3 \times 10^{-3} \text{ kg}$

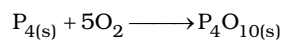
Molar mass of $A = 5 \times 10^{-3}$ and $B = 10 \times 10^{-3}$

31.(A) $4Fe(s) + 3O_2(g) \longrightarrow 2Fe_2O_3(g)$

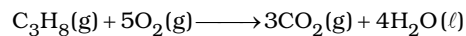
No. of moles of O_2 required for one gram of $Fe = \frac{3}{224}$ moles



No. of moles of O_2 required for one gram of $Mg = \frac{1}{48}$ moles



No. of moles of O_2 required for one gram of $P_4 = \frac{5}{124}$ moles



No. of moles of O_2 required for one gram of $C_3H_8 = \frac{5}{44}$ moles

So least amount is needed for the first reaction and is equal to $\frac{3}{224} \times 32 = 0.4285g$

32.(B) 20% (mass/mass) means

100 gm of solution has 20 gm of KI

$\Rightarrow$ 80 gm of solvent contains 20 gm of KI

$$\begin{aligned} \text{Molality, } m &= \frac{20}{166} \times \frac{1000}{80} \\ &= 1.506 \approx 1.51m \end{aligned}$$

33.(D) CH_4

$n_C = 1$ mole

$n_H = 4$ mole

$$\%C = \frac{n_C}{n_C + n_H} \times 100 = \frac{1}{1+4} \times 100 = 20\%$$