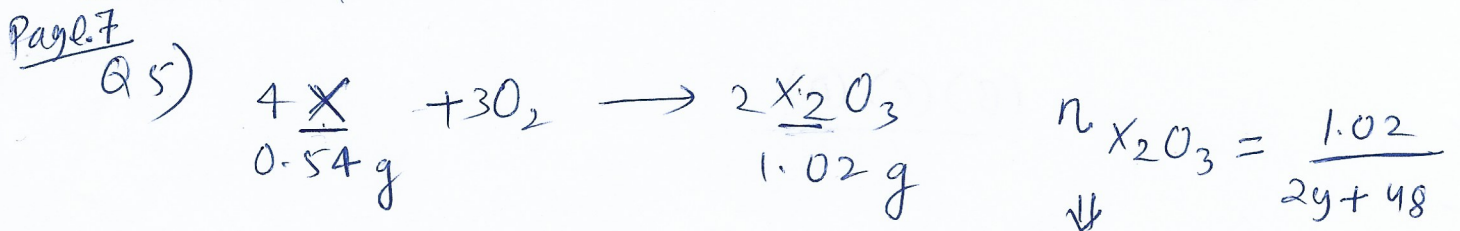


Mole Concept & Stoichiometry

Solved examples



$$n_X = \frac{0.54}{M.W. = ?} \qquad \frac{0.54}{y} = \frac{2 \times 1.02}{2y+48}$$

\nwarrow
moles of X on LHS

$$n_X = \frac{2 \times 1.02}{2y+48}$$

$$\Rightarrow 1.08y + 48 \times 0.54 = 2.04y$$

$$\Rightarrow 48 \times 0.54 = (2.04 - 1.08)y$$

$$\Rightarrow y = \frac{48 \times 0.54}{0.96} = 27$$

$$n_X = \frac{0.54}{27} = \underline{\underline{0.02}}$$



$$\frac{0.54}{y} \rightarrow \frac{0.54}{y} \times \frac{1}{2} \text{ mol } X_2O_3$$

||

$$\frac{1.02}{2y+48}$$

page 1 $\frac{N_2O}{46}$ $N = 14$ $\frac{N_2O}{44}$ CO_2 C_3H_8
 ① $\frac{112}{22400} = \frac{0.22}{MW}$, $MW = 44$

$$\frac{112}{22400} = \frac{0.22}{MW}, MW = 44$$

(B) (P) (P)

② $S = 32, H_2 = 4, N = 14$

(A) $n_{CO_2} = \frac{1}{32}, n_{SO_2} = \frac{2}{64}$

(B) $n_{CO_2} = \frac{1}{44}, n_{N_2O} = \frac{1}{44}$

(C) $n_{O_2} = \frac{112}{22400} \Rightarrow n_{H_2} = \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

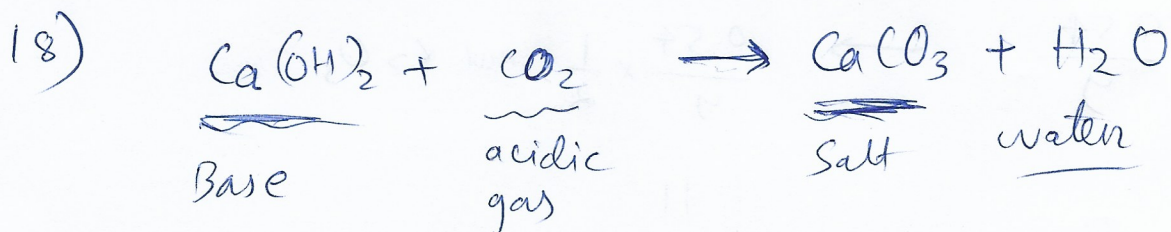
$$\frac{1 \times V}{273} = \frac{0.5 \times 224}{273}$$

$$V = 112$$

$$n_{H_2} = \frac{112}{22400}$$

(D) $n_{O_2} = \frac{1}{32}, n_{O_3} = \frac{1}{48}$

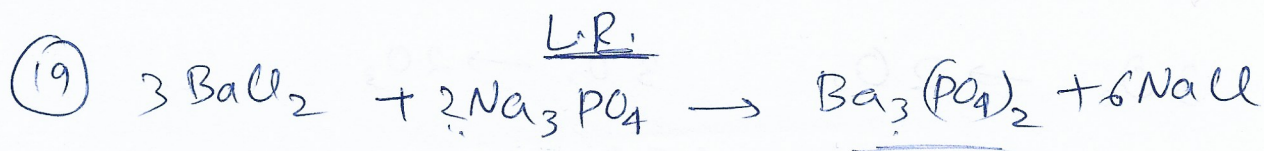
Page 11 Section A



$$\begin{aligned}
 n &= M \times V \\
 &= 0.5 \times \frac{50}{1000} \\
 &= 25 \text{ mmoles}
 \end{aligned}$$

$$1 \text{ mmol} = 10^{-3} \text{ mol}$$

$$\begin{aligned}
 n_{\text{CaCO}_3} &= 25 \times 10^{-3} \\
 \text{mass} &= 25 \times 10^{-3} \times 100 \\
 &= 2.5 \text{ g}
 \end{aligned}$$

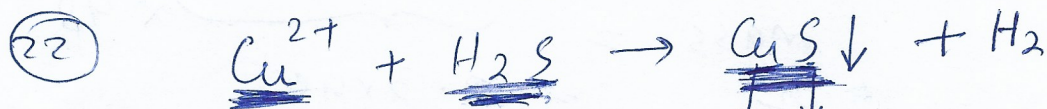


$$0.6 \quad \quad \quad \underline{0.2} \quad \rightarrow \quad \underline{0.1}$$

L.R.



$$0.6 \rightarrow 0.6 \times \frac{2}{3} = \underline{0.4}$$



6.35 g

$\underline{63.5} \quad \underline{32}$

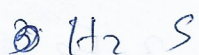
$$\frac{6.35}{63.5} \times 32$$

for 63.5 g Cu \rightarrow 32 g S

$= 3.4 \text{ g}$

$\underline{6.35 \text{ g Cu}} \rightarrow ? \text{ S} = \frac{6.35 \times 32}{63.5 \times 10}$

$= \underline{3.2 \text{ g S}}$

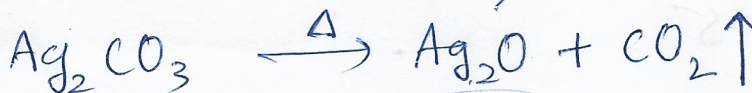
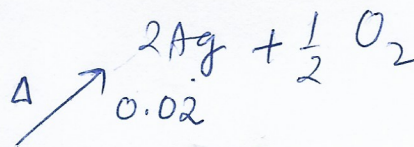
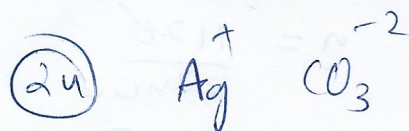


2g H 32g



3.2 g $\rightarrow \frac{3.2 \times 2}{32} = \underline{0.2}$

$\underline{\underline{\text{H}_2\text{S} = 3.4 \text{ g}}}$



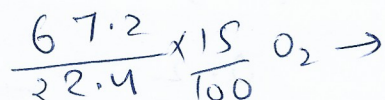
$n = \frac{2.76}{276} = 0.01 \quad \quad 0.01$
 $\quad \quad \quad 1 \times 232$

mass Ag = $0.02 \times 108 = 2.16 \text{ g}$

(25)



$$n = \frac{67.2}{22.4}$$

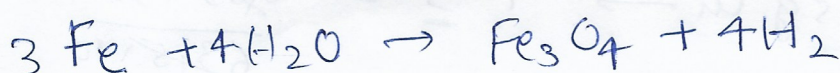


$$n_{actual} = \frac{67.2}{22.4} \times \frac{15}{100}$$

$$= \frac{67.2}{22.4} \times \frac{15}{100} \times \frac{2}{3}$$

$$\begin{aligned} \text{mass of } O_3 &= \text{---} \times 48 \\ &= 0.3 \times 48 \\ &= 14.4 \text{ g} \end{aligned}$$

(26)

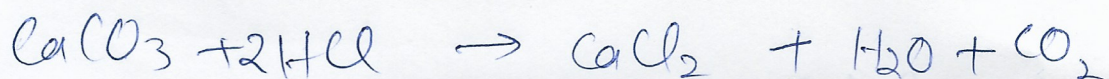


$$n \quad \quad \quad \frac{18 \text{ g}}{18} \quad \quad \quad 1$$



$$\frac{3}{4} \times 56 = \underline{42 \text{ g}}$$

(27)



$$10 \text{ g}$$

$$1120 \text{ cm}^3$$

$$\underline{1 \text{ cm}^3 = 1 \text{ ml}}$$

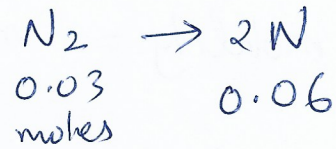
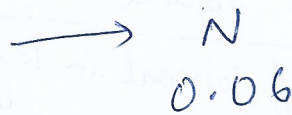
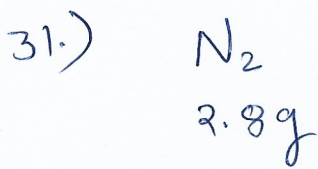
$$\begin{aligned} n &= \frac{1120}{22400} \\ &= 0.05 \end{aligned}$$

$$n_{CaCO_3} = 0.05$$

$$\text{mass } CaCO_3 = 0.05 \times 100 = 5 \text{ g}$$

$$\% CaCO_3 = \frac{5}{10} \times 100 = 50 \%$$

Section B



$$n = \frac{2.8}{28}$$

$$= 0.1 - \underbrace{\frac{30}{100} \times 0.1}_{= 0.03}$$

dissociated into atoms

$$n_{N_2 \text{ left}} = 0.1 - 0.03 \\ = 0.07$$

$$\text{Total no. of moles} = 0.07 + 0.06 \\ = 0.13 \quad (A)$$

$$\text{No. of } N_2 \text{ molecules left} = 0.07 \times 6.022 \times 10^{23} \\ = \cancel{0.42154} \\ = 4.2154 \times 10^{23} \quad (B)$$

32) at STP one mole air = 22400 cm³

$$\text{mass} = \text{density} \times \text{volume}$$

$$\text{mass of one mole air} = 0.001293 \times 22400 \\ = 28.96 \text{ (M.W.)}$$

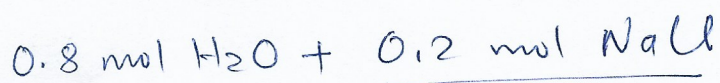
$$2 \times VD = MW$$

$$VD = \frac{28.96}{2} = 14.48$$

(37)

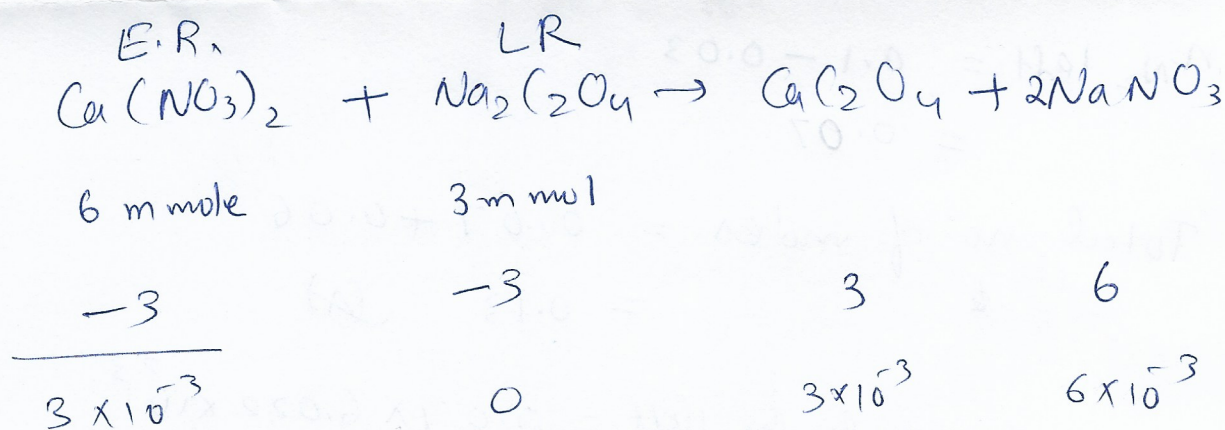
 $m \rightarrow \text{molality}$

$$\text{molality} = \frac{\text{moles of solute}}{\text{mass of solvent in kg}}$$



$$m = \frac{0.2}{0.8 \times 18 / 1000} = 13.9 \text{ m}$$

(38)



A/R ~~A~~ \rightarrow
 ~~R~~ \rightarrow

(A) Both ~~statements~~ Assertion & Reason are correct
 and reason is the correct explanation of
 Assertion

(B) Both A & R are correct
 but reason is not the correct explanation
 of A

(C) If A is true but R is false

(D) If A is false but R is true

(E) Both A & R are false

Section C

(42) relative atomic mass of B

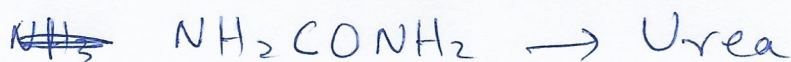
$$(A) \quad = \frac{10 \times 19 + 11 \times 81}{100} = 10.81$$

$$(41) \quad n_{N_2} = \frac{0.28}{28} = 0.01 = n_{gas} = \frac{0.44}{MW}$$

$$\Rightarrow MW = 44$$

(B)

(43)



$$\begin{aligned} \underline{N_2COH_4} \quad \% N &= \frac{28}{28+12+16+4} \times 100 \\ &= 46.6\% \end{aligned}$$