

Consider the balanced reaction



What can be concluded from the coefficients of species in this balanced equation?

- (A) For this reaction, exactly 2 g of Cl_2O_7 must be taken to start the reaction**
- (B) For this reaction, exactly 2 mol of Cl_2O_7 must be taken to start the reaction**
- (C) Mole ratio of Cl_2O_7 , ClO_2 and O_2 during a chemical reaction at any instant (excluding any negative sign) are 2,4 and 3 respectively**
- (D) The ratio of change in number of moles of Cl_2O_7 , ClO_2 and O_2 is 2:4:3 (excluding any negative sign)**

0-1	26-37
5-1	28-34

(27)

 P, V, T

$$n = \frac{PV}{RT}$$

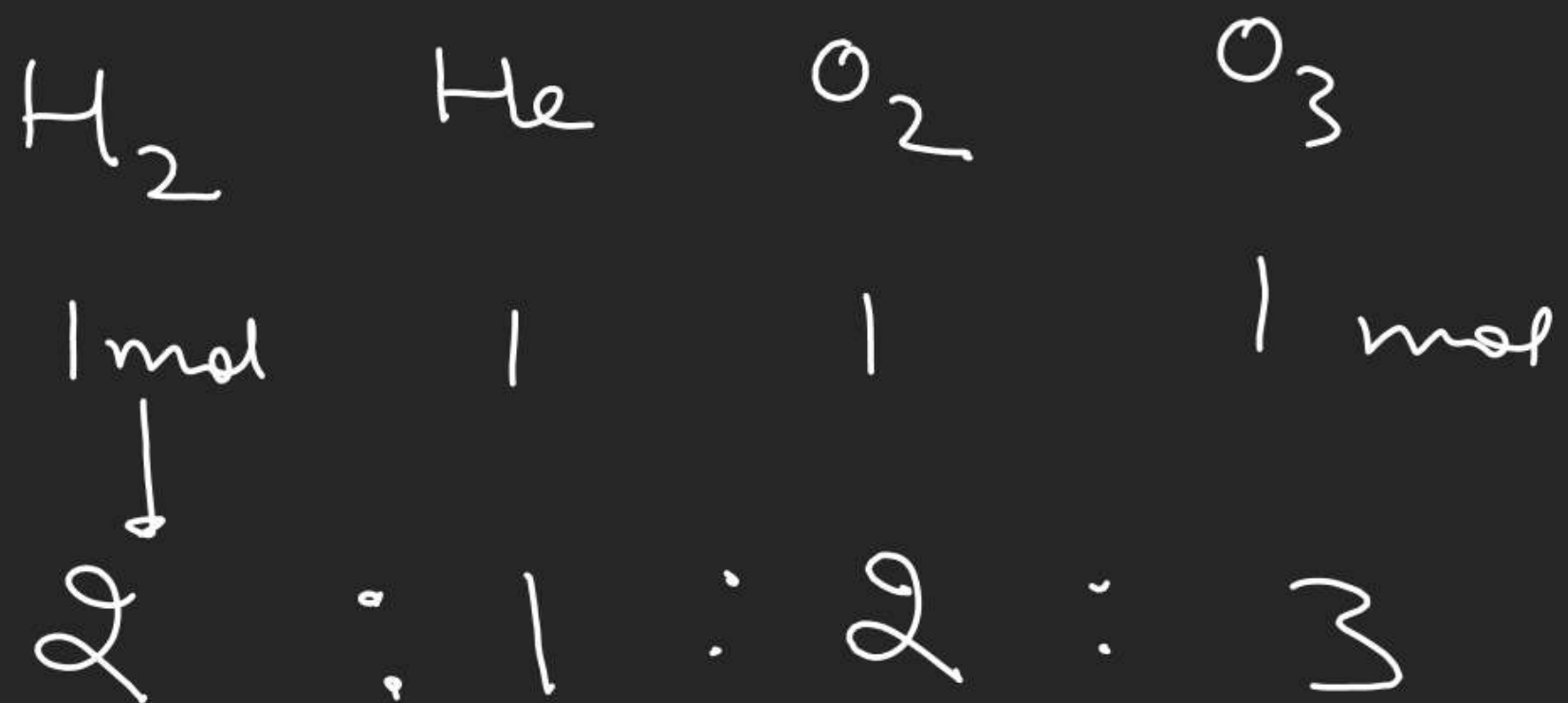
$$\frac{m}{M} = \frac{1}{32}$$
 O_2 gas

$$n_{O_2} = n_{gas}$$

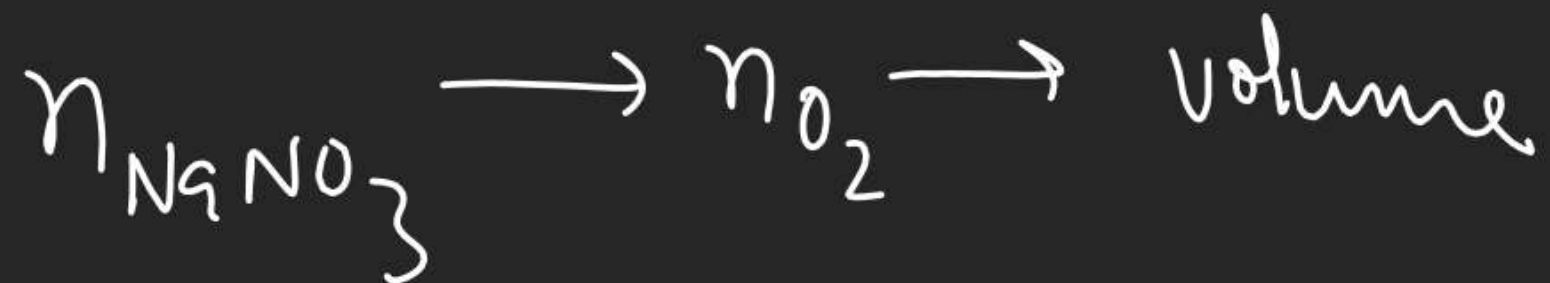
$$\frac{W_1}{32} = \frac{W_2}{M}$$

$$\frac{1}{32} = \frac{2.375}{M}$$

(28)



(31)

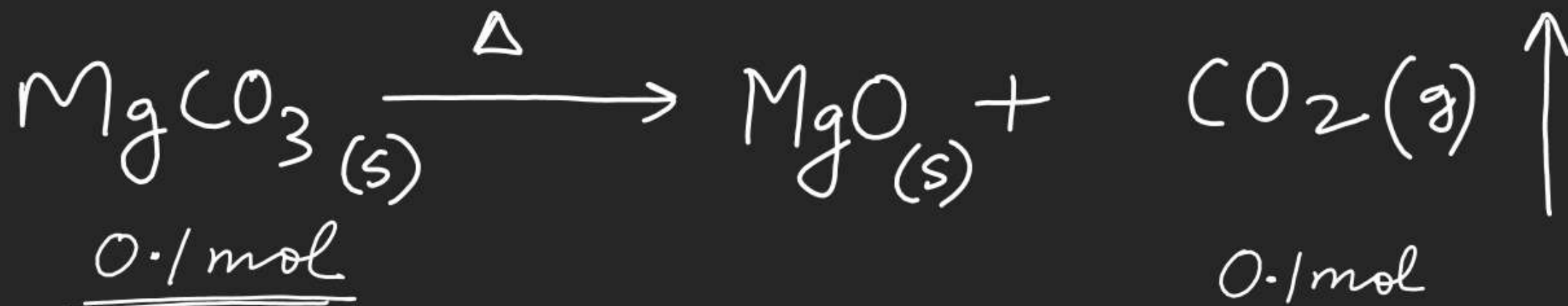


(32)

mass of N_2

$$= \underline{368 \times 1.12 \text{ gm}}$$

(37)

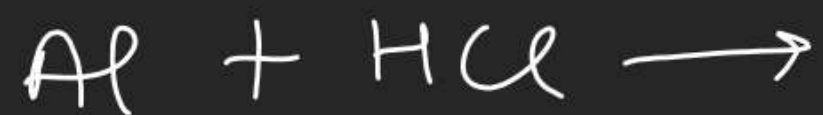


$$\begin{aligned} \text{mass of MgCO}_3 &= 0.1 \times 84 \\ &= 8.4 \text{ gm} \end{aligned}$$

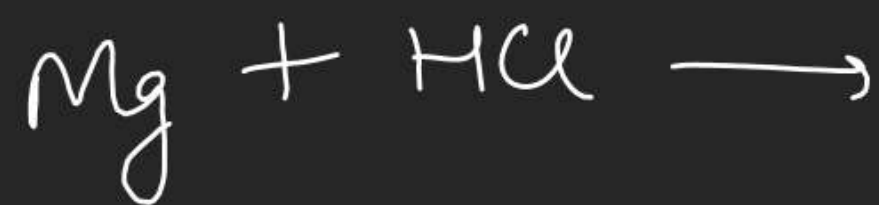
$$\text{mass of MgO} = 12.46 - 8.4$$

$$\text{mass of CO}_2 = 4.4 \text{ gm}$$

$$\text{moles} = \frac{4.4}{44} = 0.1$$



$$27x + 24y = W = 1$$



$$\left(\frac{3}{2}x + y\right) \times 2 = W_1 = \frac{1}{10}$$

$$\eta_{\text{H}_2} = \frac{1.12}{22.4} = \frac{1}{20}$$

$$\text{max } q_{\text{H}_2} = \frac{1}{20} \times 2 = \frac{1}{10}$$

Carbonates of 1st group (Na, K--)



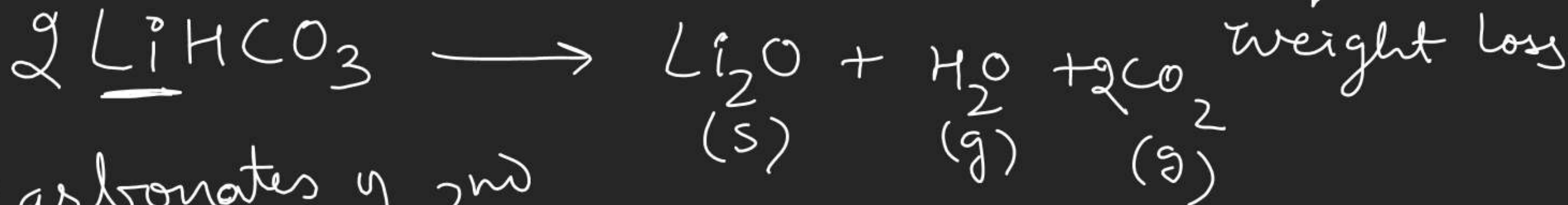
Carbonates of 2nd (Be, Mg, Ca--)



Bicarbonates of 1st group



Except



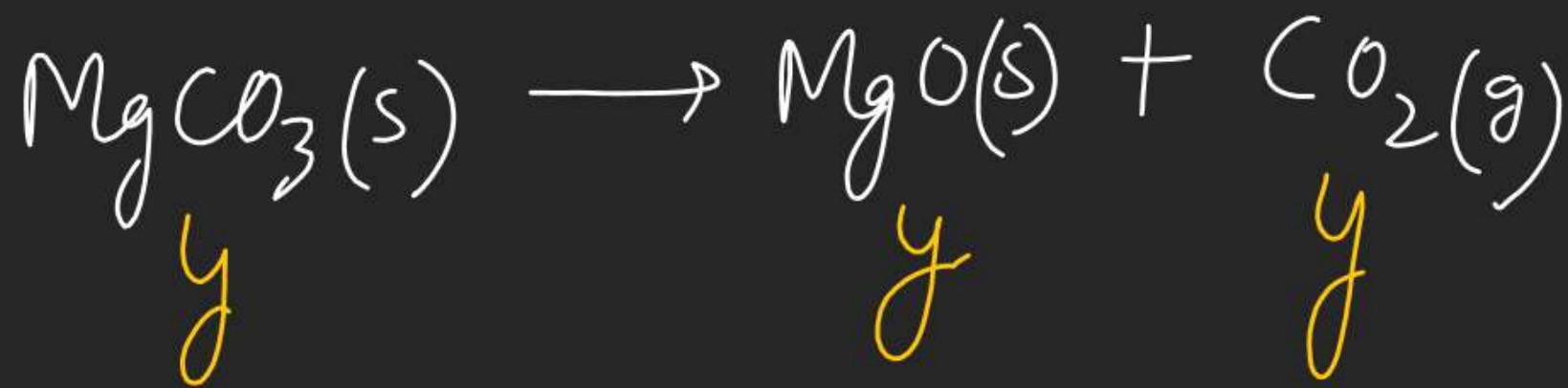
Bicarbonates of 2nd





720 gm mixture $\text{CaCO}_3(\text{s})$ & $\text{MgCO}_3(\text{s})$ is heated.

If weight loss equals to 352 gm, find mass of each in original mixture.



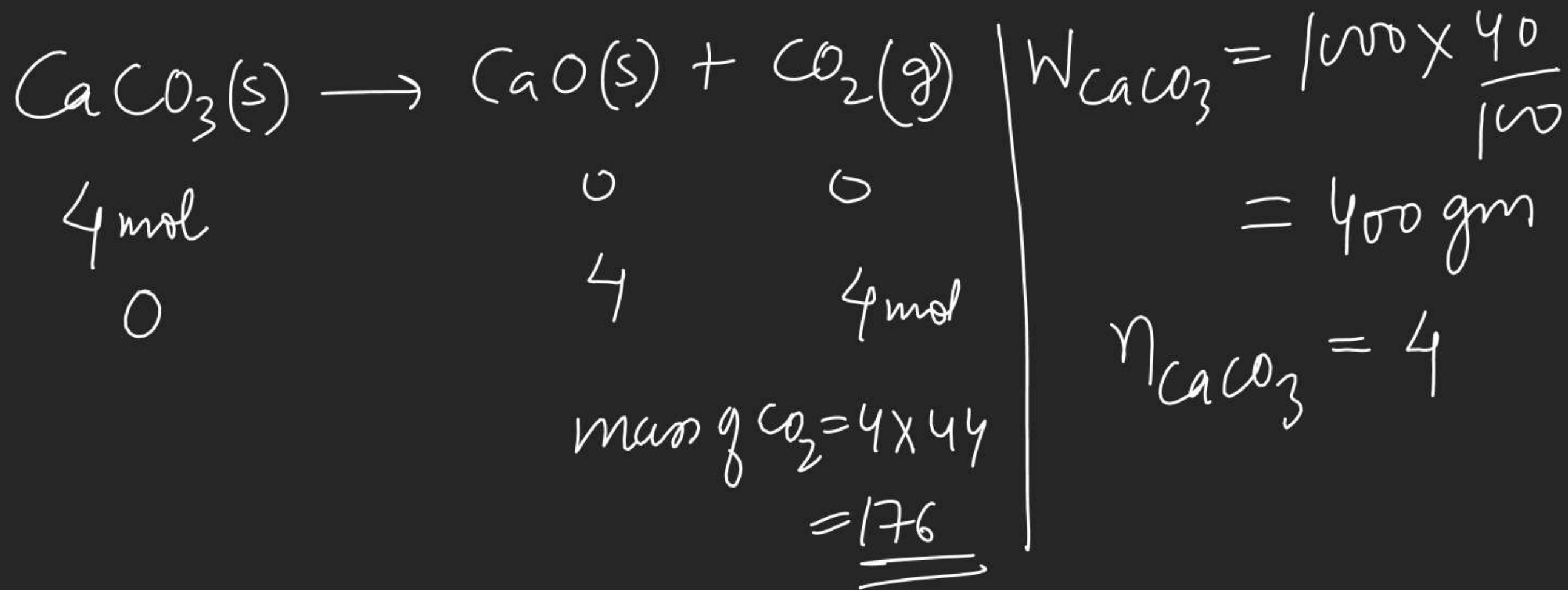
$$100x + 84y = 720 \quad \text{--- (1)}$$

$$(x+y) \times 44 = 352 \quad \text{--- (2)}$$

$$\boxed{\begin{matrix} x=3 \\ y=5 \end{matrix}}$$

Type-4 Problems:- Problems related with % purity & % yield.

Q. 1000 gm sample of CaCO_3 of purity 40% is heated. find the mass of CO_2 produced



% yield10 mol5 mol15 mol

Expected

3 mol9 molactual moles
produced% yield =

(actual moles produced)

Expected moles

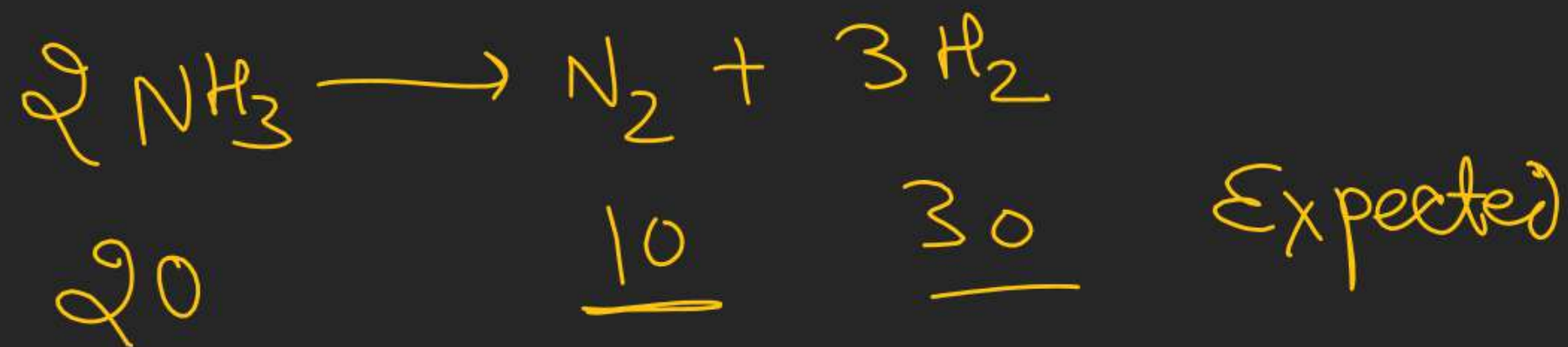
 $\times 100$

$$= \frac{3}{5} \times 100$$

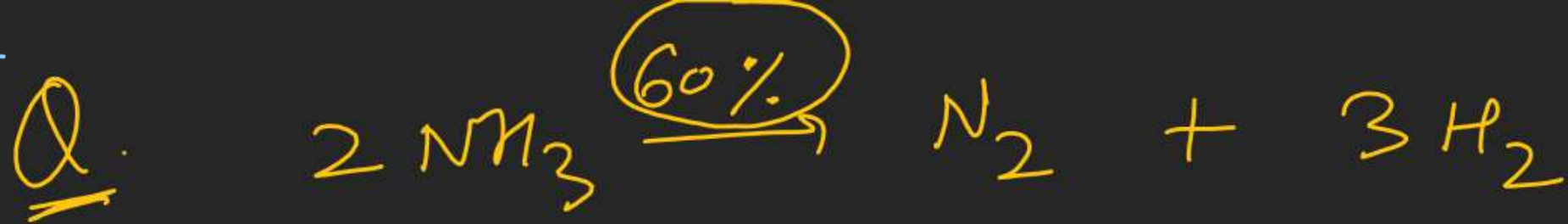
$$= \underline{\underline{60\%}}$$

$$\text{actual moles produced} = \frac{\% \text{ yield}}{100} \times \text{expected moles}$$

Q. Calculate % yield of Rxn if 20 moles of NH_3 produce 8 moles of N_2 .



$$\% \text{ yield} = \frac{8}{10} \times 100 = 80\%$$



10 mol

$$5 \times \frac{60}{100}$$

$$= 3$$

$$15 \times \frac{60}{100}$$

$$= 9$$

$$n_{\text{N}_2} =$$

$$n_{\text{H}_2} =$$

find mass of H_2 produced by 255 gm NH_3

Given

$$n_{NH_3} = \frac{255}{17} = 15$$



15 mol

$$\frac{3}{2} \times 15 \times \frac{25}{100}$$

$$= \frac{45}{8} \text{ mol}$$

$$\begin{aligned} \text{mass} &= \frac{45}{8} \times 2 = \frac{45}{4} \\ &= \underline{11.25 \text{ gm}} \end{aligned}$$

11.25

10.5

1.25

63.75

7.5 gm

45 gm

2.5 gm

In a certain operation 358 g of TiCl_4 is reacted with 96 g of Mg. Calculate % yield of Ti if 32 g of Ti is actually obtained [At. wt. Ti = 48, Mg = 24]

Q: 35.5

Given: $\text{TiCl}_4 + 2\text{Mg} \rightarrow \text{Ti} + 2\text{MgCl}_2$

(A) 35.38%

(B) 66.6%

(C) 100%

(D) 60%

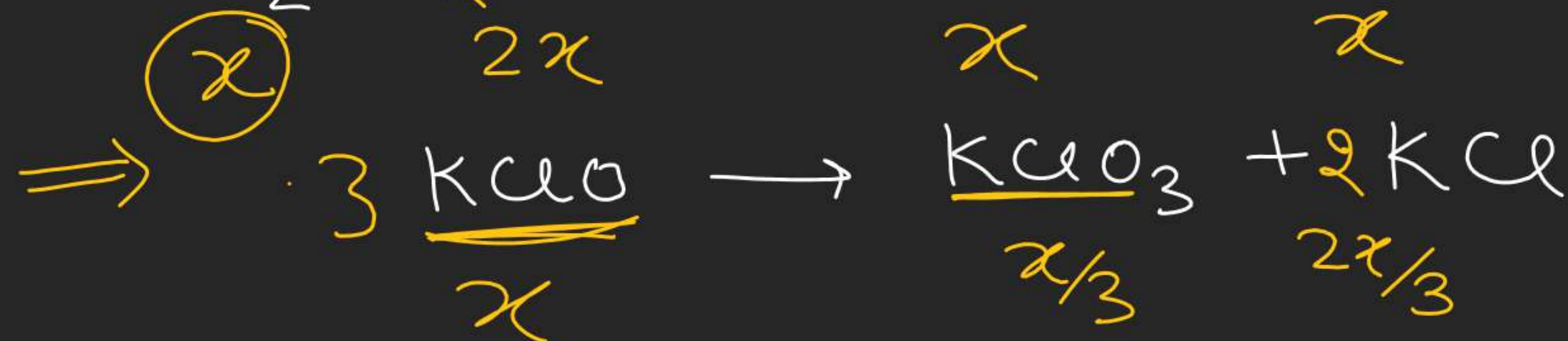


$$\frac{358}{190} \text{ mol} \quad 4 \text{ mol}$$

% yield = $\frac{32}{\frac{358}{190} \times 48} \times 100 = 35.38\%$

$\frac{358}{190} \text{ moles} \leftarrow \text{Expected}$

Type-5 problems :- Problems involving Series of reaction



Intermediate product
= KClO



x
 $x/3$
 $3x$

= $x/4$

$\left[\begin{array}{l} \text{Reactant} \\ \text{Cl}_2, \text{KOH} \end{array} \right]$

product: KCl, KClO₄, H₂O

$O-\underline{I}$	38 —	44
$S-\underline{I}$	35 —	42
$O-\underline{II}$	9, 10, 11	

11th



1 mol