

Balancing of Reaction & Limiting Reactants

Course on Mole Concept for Class XI

DPP # 01 WITH ANSWER

1.

- Ans. (i) 32 g (ii) 28 g (iii) 46 g (iv) 18 g
(v) 17 g (vi) 92 g (vii) 64 g (viii) 98g
(ix) 44 g (x) 180 g (xi) 60 g (xii) 342 g
(xiii) 249.5 g

2.

- Ans. (i) 1 (ii) 2 (iii) 2 (iv) 4
(v) 3×10^{-3} (vi) 3×10^{-3} (vii) 0.5×10^{-3} (viii) 0.25×10^{-3}

3.

- Ans. (i) 1 (ii) $1 \times N_A$ (iii) 6 (iv) 12
(v) 6 (vi) $6N_A, 12N_A, 6N_A$ (vii) $24N_A$

4.

- Ans. (i) 0.5 (ii) 1, 0.5, 2 (iii) $0.5N_A$ (iv) $N_A, N_A/2, 2N_A$
(v) $3.5N_A$

5.

- Ans. (i) 3 (ii) $3N_A$ (iii) 6, 6, 12 (iv) $6N_A, 6N_A, 12N_A$
(v) $24N_A$

6.

- Ans. (i) $n = 2$ (ii) $n = 2.5$ (iii) $n = 2$ (iv) $P = 50 \text{ atm}$
(v) $P = 74.8 \text{ Pa}$ (vi) $T = 1000 \text{ K}$ (vii) $V = 2 \text{ L}$ (viii) $P = 2500 \text{ Pa}$

7.

- Ans. (i) 45.4 L (ii) 5.675 L (iii) 11.35 L (iv) 90.8 L

8.

- Ans. (i) 1 (ii) 2
(iii) 2×10^{-3} (iv) 5×10^{-4}
(v) 0.1 (vi) 5000

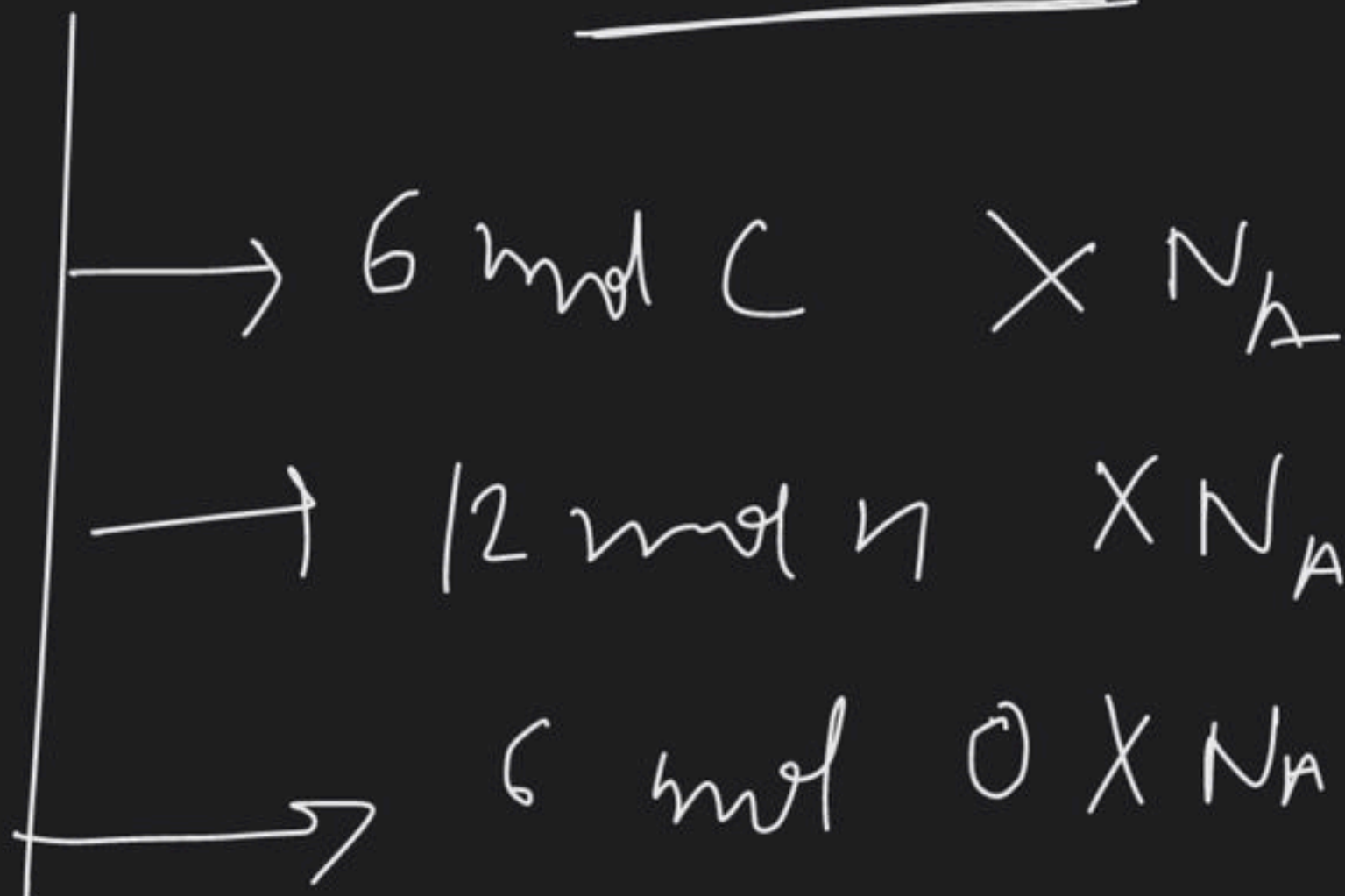
$$\textcircled{2} \quad \underline{28 \text{ gm } \underline{N_2}}$$

$$\frac{28}{\textcircled{28}} \text{ mol of } \underline{N_2} = 1$$

$$28 \text{ gm } N$$

$$\frac{28}{14} \text{ mol of 'N'} = 2$$

$$\textcircled{3} \quad 180 \text{ gm} \equiv \underline{1 \text{ mol } \underline{C_6H_{12}O_6}} \quad N_A$$



mass



Mole



No of atom.

for gases

$$P V = n R T$$

Pressure

Vol.

↑
cont

n

Temp
const

$$1 \text{ atm} = 1.01325 \times 10^5 \text{ Pa}$$

$$= 1.01325 \text{ bar}$$

$$= 760 \text{ mm of Hg} = 76 \text{ cm of Hg}$$

$$= 760 \text{ torr}$$

$$1 \text{ bar} = 10^5 \text{ Pa}$$

$$1 \text{ litre} = 1000 \text{ ml}$$

$$= 1000 \text{ cm}^3$$

$$= 1000 \text{ cc}$$

$$= 1 \text{ dm}^3$$

$$= 10^{-3} \text{ m}^3$$

$$T(\text{K}) = 273 \cdot \cancel{18} + T(^{\circ}\text{C})$$

$$P V = n R T$$

$$\underline{J = Nm}$$

\downarrow
 \downarrow
 $Pa \quad m^3$

$atm \quad lit$

\downarrow
 8.314 J/mol/K

$0.0821 \text{ atm. lit/mol/K}$

$$\frac{8.314}{4.18} \text{ cal/mol/K}$$

$$\approx 2$$

①

$$P = 10 \text{ bar}$$

$$V = 831.4 \text{ lit}$$

$$T = 300 \text{ K}$$

$$\eta = ?$$

$$\underline{\underline{10^6 \text{ Pa}}}$$

$$\underline{\underline{831.4 \times 10^{-3}}}$$

$$= \underline{\underline{n \times 8.314 \times 300}}$$

A

0-50

B

50-100

C

100-500

D

500-1500

$$\underline{\underline{V = 100 \text{ lit}}}$$

STP : standard temp and pressure

↓

$$\underline{\underline{273 \text{ K}}}$$

↓

$$\underline{\underline{1 \text{ bar}}}$$

Volume of 1 mol gas at STP

$$\frac{1}{1.01325} \times V = 1 \times (0.0821 \times 273)$$

$$V = 22.4 \times 1.01325$$

$$V = \underline{\underline{22.7 \text{ lit}}}$$

Vol of 1mol at 1atm, 273K

$$1 \times V = 0.0821 \times 273$$

$$V = \underline{\underline{22.4 \text{ lit}}}$$

SATP (std ambient temp & pressure)
↓
298 ↓
1 bar

$$\frac{1}{1.01325} \times V = 1 \times 0.0821 \times 298$$

$$V = 24.789 \Rightarrow \underline{\underline{24.79}}$$

for
solid &
liquid

$$\underline{\underline{mass}} = V \times \text{density}$$

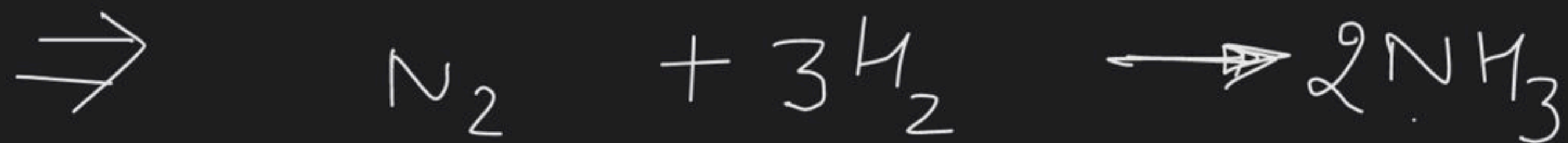
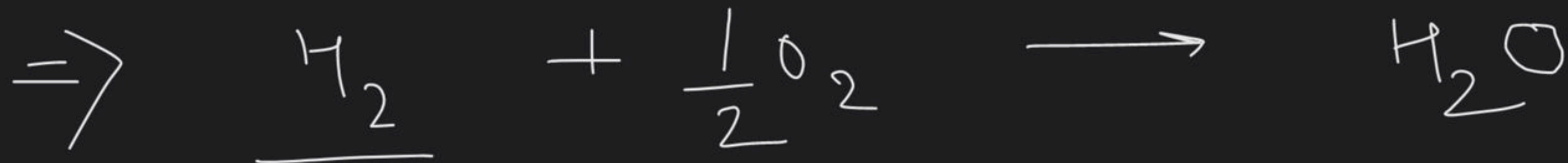
at STP $V_m = 45.4 \text{ L}$

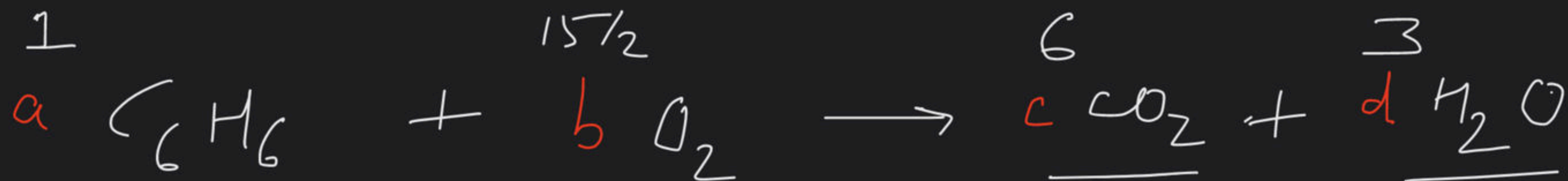
$$\text{moles} = \frac{45.4}{22.7} = 2$$

1 mol 'N' = 1 gm-atom Nitrogen

1 mol N₂ = 1 gm-molecule Nitrogen

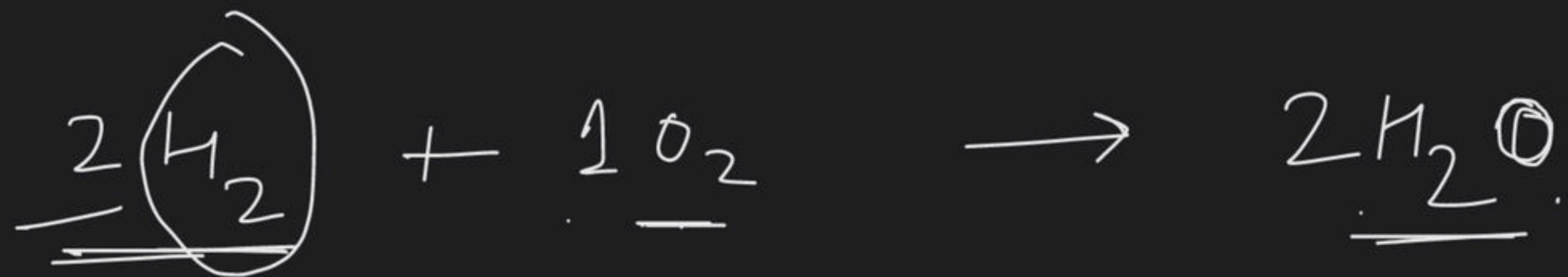
Balancing of Rxn





$$\left[\begin{array}{l} 6a = c \\ 6a = 2d \\ 2b = 2c + d \\ b = 15/2 \end{array} \right. \quad a=1 \quad c=6 \quad d=3$$

Application of mole Concept : →



2 molecule

1 molecule

2 molecule

2 NA molecule

NA

2 NA

2 mol

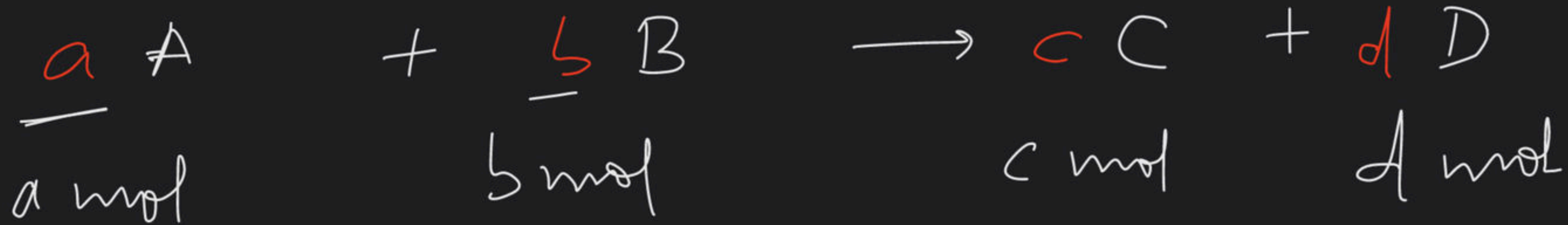
1 mol

2 mol

20 mol

10 mol

20 mol



$$x \text{ mol} \qquad \frac{b}{a} x \qquad \frac{c}{a} x \qquad \frac{d}{a} x$$

$$\frac{a}{b} y \quad \left(\frac{a}{d} z \right) \qquad y \quad \left(\frac{b}{d} z \right) \qquad \frac{c}{b} y \quad \left(\frac{c}{d} z \right) \qquad \frac{d}{b} y \quad z$$

$$a \longrightarrow c$$

$$b \longrightarrow a$$

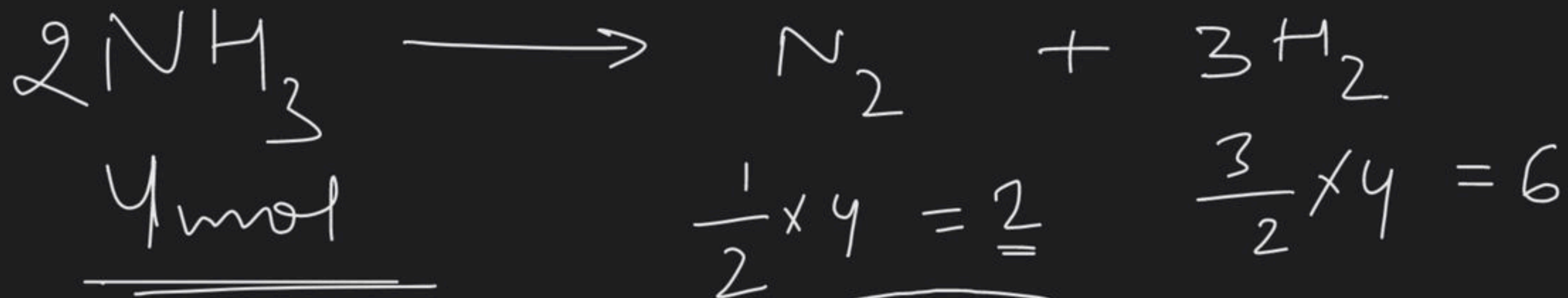
$$1 \longrightarrow \frac{c}{a}$$

$$1 \longrightarrow \frac{a}{b}$$

$$x \longrightarrow \frac{c}{a} x$$

$$y \longrightarrow \frac{a}{b} y$$

Type-1 problems : Rxns involving only
one reactant



$$\frac{1}{2} \times 4 = \underline{2}$$

$$\frac{3}{2} \times 4 = 6$$

$$\textcircled{2 \times 2.8}$$

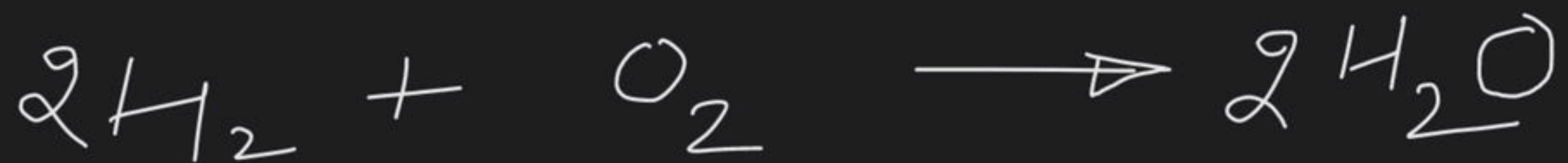
$$\underline{\text{Ans}} = 6 \times 2 = \underline{\underline{12\text{gm}}}$$

Q. find mass of H_2 produced by
68 gm NH_3 as per given rxn.

$$\text{moles of } \text{NH}_3 = 68/17 = 4$$

Q.

Calculate mass of O_2 required to
produce 90 gm H_2O .



5 mol

$\frac{5}{2}$ mol

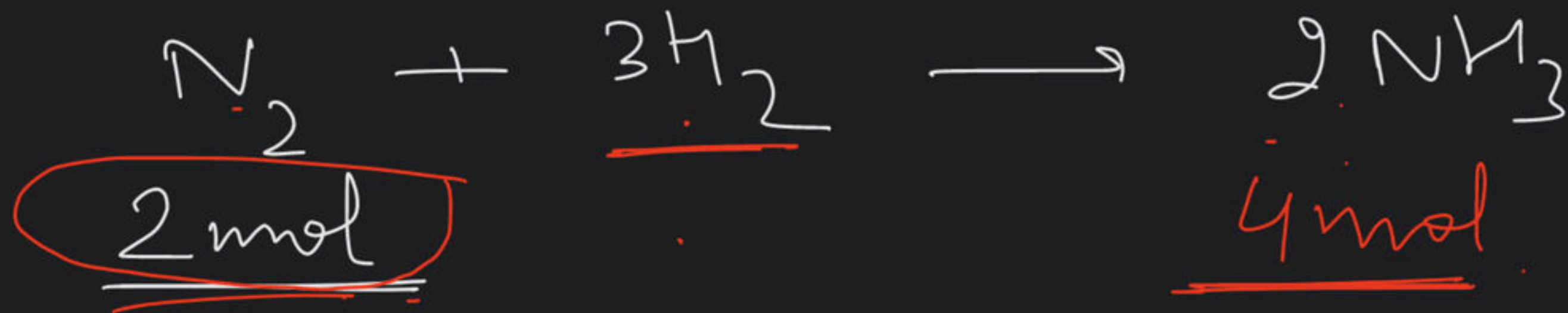
5 mol

$$5 \times 2 \\ = \underline{\underline{10 \text{ gm}}}$$

$$\frac{5}{2} \times 32 \\ = \underline{\underline{80 \text{ gm}}}$$

Type-2 problems :- Rxns involving more than one reactant

(a) Amt of one ^{only} reactant is given



56 gm N_2

mass of $\text{NH}_3 = ?$

S-I



S-II

O-I



Single

O-II



J-M J-Adv

1-21

Remaining

DPP



