Mixture Related Problems, Percentage Purity & Yield

Course on Mole Concept for Class XI

akhilesh • Lesson 3 • June 8, 2021

C^{12} = 12

= 12 amu

(4) $\frac{100 \times 14\text{amu}}{}$

(7) → $Na_2SO_4 \cdot 7 \cdot H_2O$

1 mole ≡ 1 mol

$\frac{1}{11} \leftarrow 1$

$\frac{0.1}{11}$ 0.1

(11)

methane	ethane
10 million	N

$$\frac{10^7}{N_A} \times 16 = \frac{N}{N_A} \times 30$$

21

$$2NH_4NO_3 \longrightarrow 2N_2 + O_2 + 4H_2O(g)$$

$$\frac{16}{80} = \frac{1}{5}$$

$$= 0.2$$

$$0.2 \qquad 0.1 \qquad 0.4$$

$$= 0.7$$

$$PV = 0.7 \times 0.0821 \times 873$$

10 NH_3 5 H_2SO_4

30 mol H 16 mol H = 40 mole H

= 20 mol

10 mole 10

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 atm
(v) P = 74.8 Pa (vi) T = 1000 K (vii) V = 2 L (viii) P = 2500 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

⑤ If amount of both reactants are given

20

Limiting Reactant — Excess

$N_2 + 3H_2 \longrightarrow 2NH_3$

10 mol — 40 mol

$\frac{2}{3} \times 40$

0 — 40 − 30 = 10 mol — 20 mol

$\frac{10}{1}$ $\frac{15}{3} = 5$

$N_2 + 3H_2$ (LR) $\longrightarrow 2NH_3$

10 15

10 0

$10 - \frac{1}{3} \times 15$ 0

Stoichiometric amount = $\frac{\text{moles of sub. taken}}{\text{Stoichiometric coeff.}}$

$\frac{2}{3} \times 15 = 10$ mol

less stoichiometric amount will be L.R.

$10/2 = 5$ $18/3 = 6$ $16/4 = 4$

$$2A + 3B + 4C \xrightarrow{LR} D$$

—	10	18	16
D	$10 - \frac{2}{4} \times 16$	$18 - \frac{3}{4} \times 16$	0
	$= 2$	$= 6$	

$\frac{1}{4} \times 16 = 4$

Type-3 problems :⇒ Problems related with mixture

~~x gm (W − x) gm~~

Mg + Al = W gm

HCl = W_1 gm

$Mg + 2HCl \longrightarrow MgCl_2 + H_2$

x mol 2x x $\frac{x}{2}$

$Al + 3HCl \longrightarrow AlCl_3 + \frac{3}{2}H_2$

y mol 3y y $\frac{3}{2}y$

$$24x + 27y = W \quad \text{— (1)}$$

$$(2x + 3y) \times \underline{365} = W_1 \quad \text{— (2)}$$

150 gm mixture C_2H_6 and HCHO is burnt O_2 and required 400 gm O_2. Find mass of each in initial mixture.

90 gm | 60 gm

$C_2H_6 + 7/2\,O_2 \longrightarrow 2CO_2 + 3H_2O$

x mol — $7/2\,x$ — $2x$

$HCHO + O_2 \longrightarrow CO_2 + H_2O$

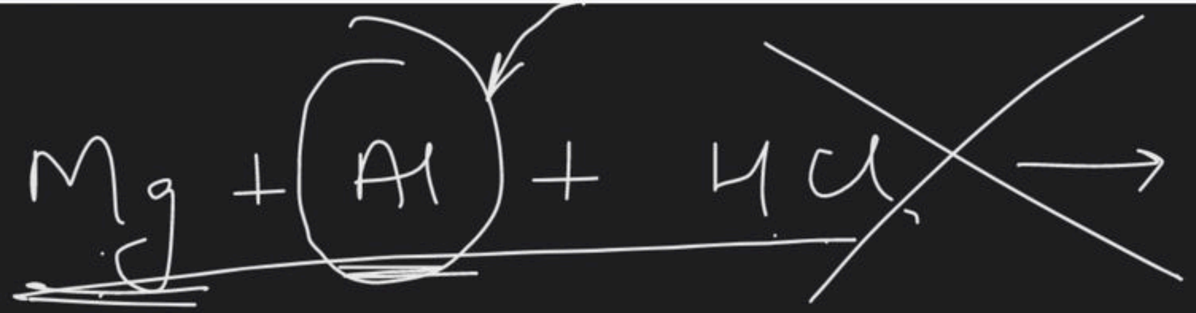
y mol — y — y

$30x + 30y = 150$ — (1)

$(7/2\,x + y) \times 32 = 400$ — (2)

$x = 3$

$y = 2$



$2x + y$

$= 8$

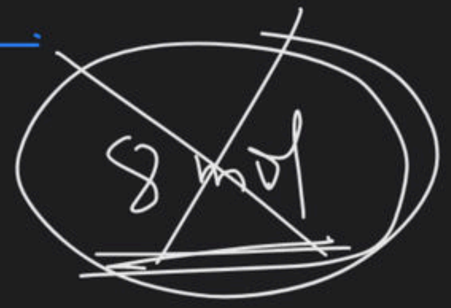
$8 \times 44 = 352$

(A) 220

(B) 352

(C) None

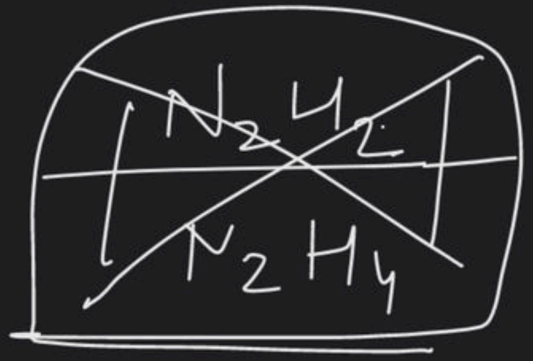
Type 4 problems :→ Problems related with yield of Rxn



$N_2 + 3H_2 \longrightarrow 2NH_3$

6

5 mol | 15 mol | 10 mol



80%

$N_2 + 3H_2 \longrightarrow 2NH_3$

10 mol

$20 \times \left(\frac{80}{100}\right) = 16$

$N_2O_4 \longrightarrow 2NO_2$

460 gm N_2O_4 is heated to produce NO_2. if mass of NO_2 produced is 92 gm. find yield of Rxn

$$N_2O_4 \longrightarrow 2NO_2$$

5 mol → (10 mol)

(A) 10%.

(B) 20%.

(C) 40%.

(D) 80%.

$$\% \text{ yield} = \frac{2}{10} \times 100$$

$$= 20\%$$

$$\text{Yield of Reaction} = \frac{\text{actual moles produced}}{\text{expected moles}} \times 100$$

Limiting. T. + G C ⟶ D

0 60 − 30 5

= 30

S-1 22 — 32, 37, 38

0 - 1 1 — 15