Avg Atomic Mass & Avg Molecular Mass

Course on Mole Concept for Class XI

akhilesh • Lesson 7 • June 17, 2021

$$\left(\frac{2}{3} \times 15 \times 10^{-3}\right)$$

$$= \frac{0.01}{300}$$

$$\frac{1}{122.5} - \frac{1}{300}$$

$$5 \times 10^{-3}$$

$$n_{KClO_4} = \frac{3}{4} \times \left[\frac{1}{122.5} - \frac{1}{300}\right] \times 138.5$$

$$\times 100$$

$$1 - 5 \times 10^{-3} \times 32$$

KCl

$KClO_4$

8

$$\underbrace{[\overset{+3}{Cr}(H_2O)_5\overset{-1}{Cl}]Cl_2}\cdot H_2O + 2AgNO_3 \rightarrow 2AgCl$$

$$[Cr(H_2O)_5Cl]^{2+} + 2Cl^-$$

$$= \frac{5.33\times10^{-3}}{266.5}\times 2\times 143.5$$

9

X, Y

M_2CO_3

$$\frac{3 \times 16}{2M + 60} \times 100 = 48$$

$$M = 20$$

(12)

$$P_4S_3 + 8O_2 \longrightarrow P_4O_{10} + 3SO_2$$

1 mol   3 mol

284 gm   192 gm

~~1 gm~~   1 gm

64

$$\frac{1}{64} \times \frac{1}{3} \times 220$$

$$2NH_3 \longrightarrow N_2 + 3H_2$$

$$a - x \qquad x/2 \qquad 3x/2$$

$$a \qquad 0 \qquad 0$$

$$\rightarrow a(1-\alpha) \qquad a\alpha/2 \qquad 3a\alpha/2$$

$$M_{avg} = \frac{\text{Total mass}}{\text{Total moles}} = \frac{\cancel{a} \times 17}{\cancel{a}\left[1 - \alpha + \alpha/2 + 3\alpha/2\right]}$$

$$= \frac{17}{1 + \alpha}$$

Q <u>find</u> 'α' of NH_3 if M_{avg} is 12

<u>Given</u>

$$2NH_3 \longrightarrow N_2 + 3H_2$$

$$12 = \frac{17}{1+\alpha}$$

$$\boxed{\alpha = 5/12}$$

Find M_{avg} of Reaction mixture when 40% N_2O_4 decomposes into NO_2.

$$N_2O_4 \longrightarrow 2NO_2$$

$$1-\alpha \qquad\qquad 2\alpha$$

$$M_{avg} = \frac{92}{1+\alpha} = \frac{92}{1.4}$$

$$\left[M_{avg} = \frac{460}{7}\right]$$

Empirical & Molecular formula :→

Molecular formula: It shows the actual no. of atoms of each element in a molecule.

→ $C_6H_{12}O_6$

→ C_6H_6

Empirical formula :- $\longrightarrow$ It shows the no. of atoms in their simplest whole no. ratio.

MF

$C_6H_{12}O_6$

EF

CH_2O

C_6H_6

CH

C H O $C_{15}H_2O_8$

60% 8% 32% by mass

let we 100 gm sample

15	2	8
60 gm	8 gm	32 gm
60/12	8/1	32/16
5	8	2
120/12	16 gm/1	64/16
10	1.6	4

EF

$C_5H_8O_2$

C_3H

by mass

(A) C_3H

(B) CH_4

(C) None

C	H
75	25%
75 gm	25 gm
75/12	25/1
6.25	25
1	4

NH_3

1 gm 3 gm

1 mol 3 mol

find EF of given Comp. if

compound contains 36%, 21%, 32% & 11%

C, N, O & H by mol.

(A) $C_{36}N_{21}O_{32}H_{11}$

(B) $C_6N_3O_4H_{22}$

(C) None

How to determine MF from EF

1. If molecular mass of compound is given.

   EF $C_5H_8O_2$

   Mol. mass = 300

   Mol. F

   $C_{15}H_{24}O_6$

2. If actual no of atoms of an element is given

(3) If vapour Density is given.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \qquad gm/cm^3 \text{ or } kg/m^3$$

Relative density

solid / liq

$$R.D = \frac{\text{density of sub}}{\text{density of ref}}$$

$$\text{Specific gravity} = \frac{\text{density of sub}}{\text{density of } H_2O \text{ at } 4^\circ C} \quad = 1\,gm/ml$$

$= \text{density of sub}$

gases

$$\underline{\underline{V.D}} = \frac{\text{Density of gas}}{\text{Density of ref gas at same T \& P}}$$

JM

&

JA

$$PV = nRT$$

$$PV = \frac{W}{M} RT$$

$$PM = \frac{W}{V} RT$$

$$PM = dRT$$

$$V.D = \frac{\left(PM/RT\right)_{gas}}{\left(PM/RT\right)_{ref}}$$

$$= \frac{M_{gas}}{M_{ref}}$$

By default ref gas is H_2

$$V.D = \frac{M_{gas}}{2}$$