5, 6, 7, 8, 10, 11 ←

14 – 16, 18, 21

$C_6H_5COOH + Br_2 \rightarrow C_6H_4BrCOOH + HBr$

7.8 gm

$\frac{6.1\ gm}{122} \times \frac{1}{10}$

$= \frac{1}{20}$

$\frac{1}{20} \times 201$

$= 10\ gm$

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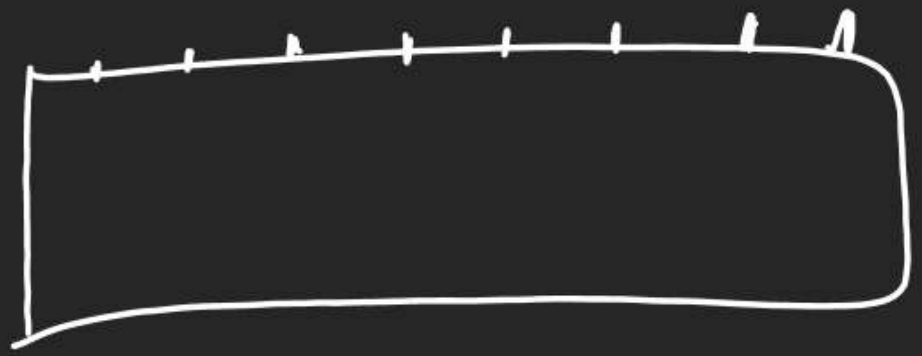
20% sites

4 2



6.023×10^{14} per cm^2

$$\frac{6.023 \times 10^{17} \text{ surface sites} \times \frac{20}{100}}{n N_A}$$

$$0.001 \times 2.46 \times 10^{-3} = n \times 0.0821 \times 298$$

no. of N_2 atoms $= n N_A$

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$$PbS + O_2 \longrightarrow Pb + SO_2$$

$$\frac{1000}{32} \qquad \frac{1000}{32} \times 207$$

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Fe^{54} Fe^{56} Fe^{57}

5% 90% 5%

$$= \frac{5 \times 54 + 90 \times 56 + 5 \times 57}{100}$$

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M_{avg}

% by mol — 50%

% by mass — 100/3, 200/3

CH_4 — O_2

16 — 32

M_{avg}

24

$$\boxed{\text{\% by mol of } M_1 = \frac{M_2 - M_{avg}}{(M_2 - M_1)} \times 100} = \frac{32-24}{16} \times 100$$

$$= 50\%$$

$$\text{\% by mol of } O_2 = \frac{24-16}{16} \times 100 = 50\%$$

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N_2 $\quad$ O_2

28 $\quad$ 32

$$M_{avg} = \frac{x M_1 + (100-x) M_2}{100}$$

$M_{avg} = 29$

$$\% \text{ by mol } N_2 = \frac{32-29}{4} \times 100 = 75\%$$

$$\% \text{ by mol } O_2 = \frac{29-28}{4} \times 100 = 25\%$$

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$$\boxed{\text{\% by mass of } M_1 = \text{\% by moles of } M_1 \times \frac{M_1}{M_{avg}}}$$

CH_4 O_2

$M_{avg} = 24$

$$= 50 \times \frac{16}{24} = \frac{100}{3} \text{ \% by mass } CH_4$$

$$\text{\% by mass } O_2 = 50 \times \frac{32}{24} = \frac{200}{3}$$

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Degree of dissociation (α) :- It is equal to the no. of moles dissociated or reacted per mole of reactant

$$A \longrightarrow B + C$$

$$10 - 3$$

$$\alpha = \frac{3}{10} = 0.3$$

$$A \longrightarrow B + C$$

$$a - x \qquad x \qquad x$$

$$\alpha = x/a \qquad x = a\alpha$$

$$a - a\alpha \qquad a\alpha \qquad a\alpha$$

$$a(1-\alpha)$$

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A	$\longrightarrow$	B	$+$	C
a		0		0
$\boxed{a-x}$		x		x
$a(1-\alpha)$		$a\alpha$		$a\alpha$

A	$\longrightarrow$	$2B$	$+$	$3C$
$a-x$		$2x$		$3x$
$a(1-\alpha)$		$2a\alpha$		$3a\alpha$

a = initial moles of A taken

x = moles of A reacted

$a-x$ = remaining moles of A

$a(1-\alpha)$ = " " "

$2A$	$\longrightarrow$	B	$+$	$2C$
a				
$a-x$		$x/2$		x
$a(1-\alpha)$		$a\alpha/2$		$a\alpha$
$\cancel{a(1-2\alpha)}$				

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Q. find no. of moles of each substance if α is 0.6 and initially 10 moles of NH_3 are taken

170 gm

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

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

$$10(1-0.6) \qquad 10\times0.6/2 \qquad 3\times10\times0.6/2$$

$$=4 \qquad 3 \qquad 9$$

find initial and final total mass.

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$$2NO_2 \longrightarrow N_2O_4$$

As Rxn proceeds total moles $\downarrow$

Total mass remain same

$\|$

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Relationship betn M_{avg} and α :→

$$A \longrightarrow nB$$

$$a \qquad\qquad 0$$

$$a(1-\alpha) \qquad\qquad an\alpha$$

$$M_{avg} = \frac{\text{Total mass}}{\text{Total moles}} = \frac{\cancel{a} \times M_A}{\cancel{a}\left[1-\alpha+n\alpha\right]}$$

$$= \frac{M_A}{\left[1+(n-1)\alpha\right]}$$

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find M_{avg} of the reaction mixture if α is 0.5.

$$N_2O_4 \longrightarrow 2NO_2$$

$$1$$

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

32

61.33

36.8

$$M_{avg} = \frac{1 \times 92}{1+(2-1)\alpha} = \frac{92}{1.5} = \frac{184}{3}$$

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find α of NH_3 if $M_{avg} = 10$ of Rxn mixture

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

1	0	0
$1-\alpha$	$\alpha/2$	$3\alpha/2$

$$10 = \frac{17}{1-\alpha+\alpha/2+3\alpha/2} = \frac{17}{1+\alpha}$$

$$1+\alpha = \frac{17}{10} \qquad \alpha = 0.7$$

$$1NH_3 \longrightarrow \frac{1}{2}N_2 + \frac{3}{2}H_2$$

$1-\alpha$	$\alpha/2$	$3\alpha/2$

$$= \frac{17}{1+(2-1)\alpha}$$

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$$n_1 A \longrightarrow n_2 B + n_3 C$$

$$M_{avg} = \frac{M_A}{1 + (n-1)\alpha}$$

$$n = \frac{n_2 + n_3}{n_1}$$

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Absolute density = Density = $\frac{\text{mass}}{\text{Volume}}$

$gm/ml = gm/cm^3$

$1\ gm/ml = 10^3\ kg/m^3$

Relative density

Solid/liq

Relative density = $\frac{\text{density of substance}}{\text{density of ref}}$

Unitless

Specific gravity = $\frac{\text{density of sub}}{\text{density of } H_2O \text{ at } 4°C}$

Sp. gravity = $\frac{\text{density of sub}}{1\ gm/ml}$

Gases

Vapour Density = $\frac{\text{density of gas}}{\text{density of ref gas at same T \& P}}$

$= \frac{(PM/RT)_{gas}}{(PM/RT)_{ref}}$

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

by default ref is H_2

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

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$$PV = nRT$$

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

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

$$PM = dRT$$

$$\left(d = \frac{PM}{RT} \right)$$

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(10) $M_2CO_3 + 2HCl \longrightarrow 2MCl + CO_2 + H_2O$

$$\frac{1}{2M+60}$$

$$\frac{1}{2M+60} = 0.01186$$

$$2M+60 = \frac{1}{0.01186}$$

$$2M+60 = 84.31$$

Ans B

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75 kg

7.5 kg

Hydrogen

$_1H^1$

15 kg

$_1H^2$