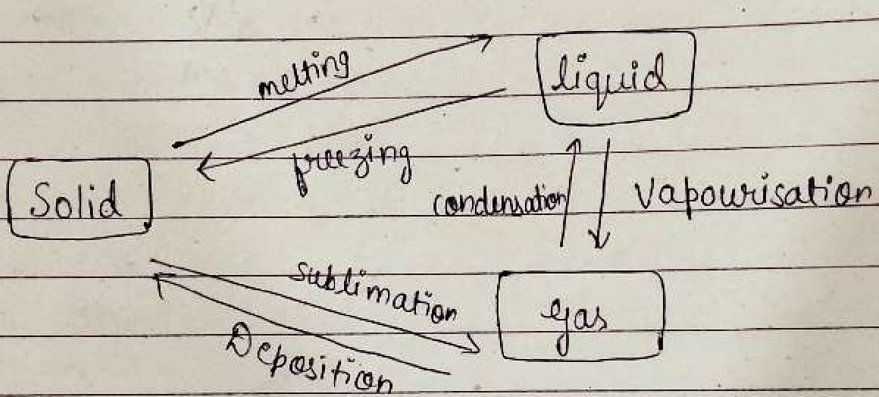
Chemistry ⇒ is defined as a study of composition
science bcoz they interact with

What is chemistry?

Chemistry

- Inorganic (elements)
- Organic (Carbon and its compound)
- Physical (Energy)



Measurement

which can measure e.g energy (J) Kal), weight (kg), distance (m/km)
time (sec).

Physical Quantity

Numeric value	+ unit
1	Km
2	m
3	inch
4	cm

proper ...
other branch like science, bio, chemistry, medicines, analytical chemistry
quantative and qualitative. Determination of composition of substance

⊛ Accuracy and precision
Art of measurement

Accuracy: The closest value of the measurement is called Accuracy

Precision: The closeness of two or more measurement to each other is known as precision.

$$T = \frac{T_1 + T_2 + T_3 + T_4 + T_5}{5}$$

Precision can be refined by Repeatation

⊛ Significance Number

I. 234982 = Sig. No. = 6	I. 6000 = sig no. = 1 6×10^3
II. 293 = 3	II. 4839234 = 3 4.84×10^6
III. 5430000 = 54.3 = 3.	III. 24693 = 3 2.47×10^4
IV. 5439824 = 5.44 = 7.	IV. 0.00023467 = 3. 2.35×10^{-4}
V. 3800 = 2	V. 0.103246 $\times 10^3$ = 3 1.03×10^{-1}
V. 52300000 = 5.23×10^7	
VI. 54392000 5.44×10^7.	
VIII. .0234 = 2.34×10^{-2}	

viii. 234982 = 2.34×10^5

ix. 6300000 = 6.30×10^6

x. 9.438468 = 9.44 = 9438468 = 9.43×10^5

xi. 2458 = 2.46×10^3

xii. 0.000092384 = 9.23×10^{-5}

Unit — English System
— Metric System

S.I Unit = International Standard Unit

I. Length → m
II. mass → kg
III. Time — sec
IV. Temperature → k (kelvin)
V. Current → Ampere (A)
VI Intensity of light → Candella
VII. Amount of substance → mole

Derived unit Joule, watt

$N = F = ma$

$kg \ \frac{m}{sec^2}$

Convertions

sec — min

60 sec — 1 min

60 min — 1 hr

24 hr — 1 day

30 days — 1 month

365 days — 1 year

Temperature

K °C °F

$K = °C + 273.15\ K$

$F = \frac{9}{5}°C + 32$

Length

1 miles = 1760 yard

1 yard = 3 feet

1 feet = 12 inches

1 inche = 2.54 cm

1 Angstrom = $1\ \text{Å} = 10^{-10}$ m

1 fermi = 1 ferm = 10^{-15} m

(smallest unit of length)

Weight

1 amu / 1u = 1.67×10^{-24} g

1 Kg = 1000g
1 g = 1000mg
1 quintal = 100 Kg
1 ton = 1000 Kg

Volume

1 m^3 = 1000 lit
1000 cm^3 = 1 lit

1 Litre = 1000 ml
1 cm^3 = 1 cc = 1 ml
1 dm^3 = 1 Litre

Pressure

1 atm = 760 mm of Hg
= 76 cm of Hg
= 760 torr
= 1.013 bar
= 1.013×10^5 pascal
= 1.013×10^5 N/m^2

Energy

J cal

1 cal = 4.18 J

1 J = 10^{7} erg

1 L atm = 101.3 J

1 eV = 1.6×10^{-19} J

Prefix

10^{-1} = deci (d)

10^{-2} = centi (c)

10^{-3} = milli (m)

10^{-6} = micro (u)

10^{-9} = nano (n)

10^{-12} = pico (p)

10^{-15} = femto (f)

10^{1} = deca (D)

10^{2} = hecto (H)

10^{3} = kilo (K)

10^{6} = Mega (M)

10^{9} = giga (G)

10^{12} = Tera (T)

$$\text{Density} = \frac{\text{mass}}{\text{volume}} \quad \frac{kg}{m^3} = \frac{kg}{m^3} = \frac{1000\,g}{100 \times 100 \times 100\,cm^3} = 10^{-3}\,g/cm^3$$

Water = 1000 g/cm³

Body temperature.

$37°C$

$K = °C + 273.15\ K$

$= 310.15\ K$

$F = \frac{9}{5} \times 37°C + 32$

$= \frac{493}{5}\ °C$

⊛ Law of Chemical Combination

(I) Law of conservation of Mass (by Lavoisier)

"Mass neither be created nor be destroyed"

$$A + B = C + D$$

According to him, in any chemical Reaction mass of reactant are always equal to mass of product.

$$W_A + W_B = W_C + W_D$$

Que If a reaction A+B that gives C+D then, the mass A is 90g, B is 30g and mass of C is 45g. Find D

$W_C + W_D = 120$

$W_D = 120 - 45$

$= 75g$

Que A compound $CaCO_3$ burned in high temperature give the mass of $CaCO_3$ 100g.

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

100g → 56g

$$CaO + CO_2 = 100g$$

$$\cancel{CaO}\ 56 + CO_2 = 100g$$

$$CO_2 = 44g$$

II. Law of Definate Proportion (given by Proust)

The ratio in which two or more element combine to form a compound remains fixed and it is independent ~~of~~ the source of compound. are in fixed ratio

~~* is fixed ratio~~

$$H_2O \longrightarrow 2H + O$$

$$2 \times 1 : 16$$

$$2 : 16$$

$$\boxed{1 : 8}$$

III. **Law of Multiple Proportion** (given by John Dalton)

When Two elements compound and form two or more compound, then, the ratio of masses of one element that combine with a fixed mass of other element in the two compound is a simple whole no. ratio

N & O

$N_2 + \frac{1}{2} O_2 \longrightarrow N_2O$ 28 : 16

$N_2 + O_2 \longrightarrow 2NO$ 28 : 32

$N_2 + \frac{3}{2} O_2 \longrightarrow N_2O_3$ 28 : 48

$N_2 + 2O_2 \longrightarrow N_2O_4$ 28 : 64

$N_2 + \frac{5}{2} O_2 \longrightarrow N_2O_5$ 28 : 80

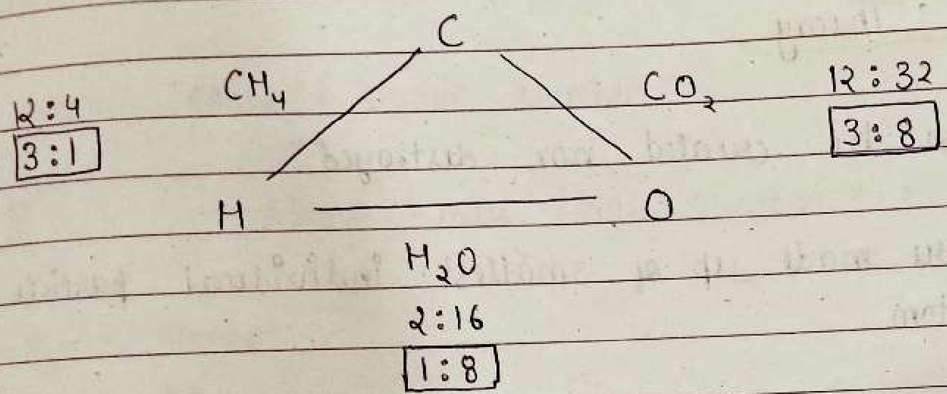
fixed

$\frac{16 : 32 : 48 : 64 : 80}{16} = 1 : 2 : 3 : 4 : 5$

Simple whole no.

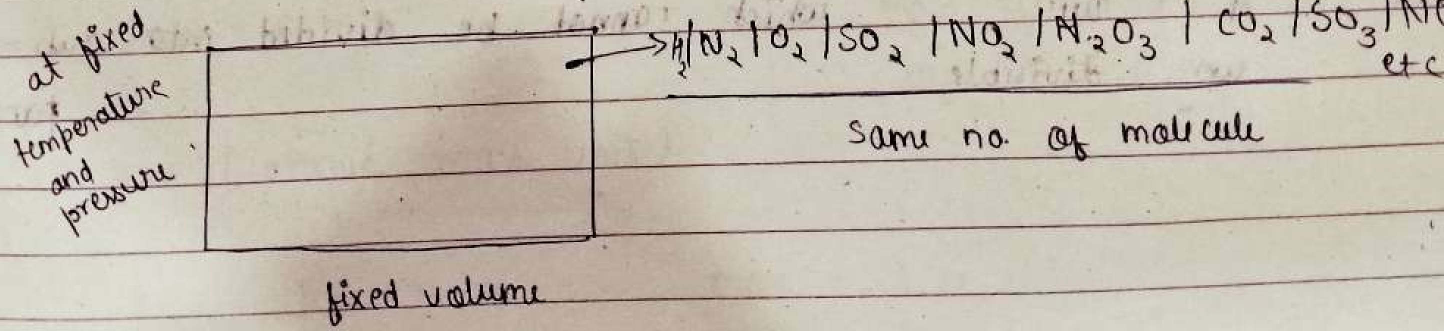
IV. Law of Reciprocal Proportion (Given by Richter)

When three element combine with each other and form 2 or more compounds, then the ratio of mass of 1 element that combine with a fixed mass of other two element, then the ratio of their masses which they combine with eachother ~~bear~~ ~~where they~~ a simple whole no. ratio to each other.



V. Avagadro's Law

The law says that the equal valume of gases at same temp and pressure should contain equal no. of molecules.



VI. Gay Lusac's Law of Gaseous volume

The law says that the ratio of their moles are same as the ratio of volume at fixed temperature and pressure

$2\ SO_2(g) + O_2(g) \longrightarrow 2\ SO_3(g)$

2 moles + 1 mole $\longrightarrow$ 2 moles
2 lit + 1 lit $\longrightarrow$ 2 lit

VII. Dalton's Atomic Theory

I. " Atom can neither be created nor destroyed"

II. All the matter are made up of smallest individual particle that is called Atom

III. Same types of atom have same (physical, chemical, size, weight) properties.

IV. During any chemical reaction, complete atom can participate.

V. A + tom which cannot be divided into sub-atomic
un divisible particles

Fundamental particles

Name	Charge	mass	Discovered by	Home
electron (e^-)	-1.6×10^{-19} g	9.1×10^{-28} g	J.J Thomson	Shell/orbit
proton (p^+)	$+1.6\times10^{-19}$ g	1.677×10^{-24} g	Goldstein	Nucleus
Neutron (n^0)	0	1.678×10^{-24} g	J Chadwick	Nucleus

Atomic Mass / Atomic Number

$_zX^A \longrightarrow$ Atomic mass / Mass number = no. of proton + no. of neutron

↳ Atomic number
no. of proton
no of ~~neutron~~ electron

$_6C^{12}$

	e	p	n
	6	6	6

Atomic mass = 12u
Atomic number = 6

mass of electro very small
$m_{e^-} <<< m_{p^+}$

u = amu (atomic mass unit)

$_1H^1$

e	p	n
1	1	0

mass = 1 u
$= 1\times1.6\times10^{-24}$
$= 1e + 1p$
$= (9.1\times10^{-28} + 1\times1.6\times10^{-24})$ g

Que The number of proton, neutron and electron in $_{71}^{175}Lu$ [Neet 2020]

(d) 71, 104 and 71 (c) 175, 104 and 71

(a) 104, 71 and 71

(b) 71, 71 and 104

$u = 1.67 \times 10^{-24}$ g

Atomic mass $_6C^{12}$

e^-	p^+	n
6 ~~X~~ very small	6	6

$6 \times 1.6 \times 10^{-24} + 6 \times 1.6 \times 10^{-24}$

$12 \times 1.6 \times 10^{-24}$

$12\ u$

$_{16}S^{32} = 32u$ $_{26}Fe^{56} = 56u$ $_8O^{16} = 16u$

$_{13}Al^{23} = 32u$ $_7N^{14} = 14u$

Molecular Mass

$H_2O = 2 \times H + 1 \times O$

$= 2 \times 1 + 1 \times 16$

$= 18u$

$H_2SO_4 = 2 \times H + 1 \times S + 4 \times O$

$= 2 \times 1 + 1 \times 16 + 4 \times 16$

$= 2 + 32 + 64$

$= 98u$

Formula Mass

The real mass of an molecule which is available in formula that is called formula mass.

$H_2O_2 \longrightarrow 2 \times H + 2 \times O$
$= 2 \times 1 + 2 \times 16$
$34g$

Mole Concept

What is mole ?
Mole is a unit (Amount of substance)

Value
- Weight $\longrightarrow$ molar mass in g
- Number $\longrightarrow 6.02 \times 10^{23} \longrightarrow N_A$
- Volume $\longrightarrow$ 22.4 lit at STP/NTP

STP $\longrightarrow$ Standard Temperature and Pressure

273 K / 0°C
1 atm

NTP - Normal Temperature & Pressure
298 K / 25°C
1 atm

1 Mole

H_2SO_4 weight

$2 \times H + 1 \times S + 4 \times O$

$2 \times 1 + 1 \times 32 + 4 \times 16$

$2 + 32 + 64$

98g

1 mole no. $= 6.02 \times 10^{23}$

1 H_2O weight

$2 \times H + 1 \times O$

18u

1 Mole $= 6.02 \times 10^{23}$

1 $H_2O = 18u$

2 $H_2O = 2 \times 18u$

3 $H_2O = 3 \times 18u$

6.02×10^{23} H_2O weight

$= 6.02 \times 10^{23} \times 18u$

$= 6.02 \times 10^{23} \times 1.67 \times 10^{-24} \times 18g$

$= 6.02 \times 1.67 \times 10^{-1} \times 18g$

$= 10 \times 10^{-1} \times 18g = 1 \times 18g$

$= 18g$

⊛ Empirical Mass

(Easy formula)

$$\frac{C_6H_{12}O_6}{6} \Rightarrow CH_2O$$

$\Downarrow$

mass

$= 12 + 2 + 16$

$= 30g$

$1\ H_2O$ mole = 18u
1 mole weight = 18g

1 molecule = u
1 Mole → g

1 Mole $CaCO_3$

1 × Ca + 1 × C + 3 × O
1 × 40 + 1 × 12 + 3 × 16
40 + 12 + 48
100g

1 mole of $MgSO_4$

1 × 24 + 1 × 32 + 4 × 16
24 + 32 + 64
120 g

1 mole of methane (CH_4)

1 × 12 + 1 × 4
12 + 4
16g

⇒ 1 mole of sugar $C_{12}H_{22}O_{11}$

12 × 12 + 22 × 1 + 11 × 16
144 + 22 + 176
342g

⇒ 1mole of glucose ($C_6H_{12}O_6$)

6 × 12 + 1 × 12 + 6 × 16
72 + 12 + 90
180g

⇒ 1 mole of HNO_3

1 × 1 + 1 × 14 + 3 × 16
1 + 14 + 48
63g

⇒ 1 mole of $CaCl_2$

1 × 40 + 2 × 35.5
40 + 71
111g

चूंकि Method

10 ₹ के 3 केले

1 Dozan केले ?

3 केले = 10 ₹

1 केला = $\frac{10}{3}$

12 केले = $\frac{10}{\cancel{3}} \times \cancel{12}^{4}$

= 40 ₹

Que 9.8 g of H_2SO_4 have how many no. of mole?

Sol^n Mole concept

M_w in g = 1 mole

H_2SO_4 = 1 mole

98g = 1 mole

98 g of H_2SO_4 = 1 mole

1g of H_2SO_4 = $\frac{1}{98}$ mole

9.8 of H_2SO_4 = $\frac{1}{\cancel{98}_{10}} \times \cancel{9.8}^{1}$

= 0.1 mole

Que 9 g of glucose have how many mole ?

M_w = 1 mole

180g of glucose = 1 mole

1 g of glucose $\frac{1}{180}$

9 g of glucose = $\frac{1}{\cancel{180}_{20}} \times \cancel{9}^{1}$

= 0.05 mole

Que! 5g of N_2O_3 have how many no. of mole.

M_w = 1 mole

$2 \times 14 + 3 \times 16$ = 1 mole

28 + 48 of N_2O_3 = 1 mole

76g of N_2O_3 = 1 mole

1 g of N_2O_3 = $\frac{1}{76}$ mole

5g of N_2O_3 = $\frac{1}{76} \times 5$ mole

= $\frac{5}{76}$ mole

g $\longrightarrow$ mole

$$\boxed{\text{mole} = \frac{\text{Weight given}}{\text{Molar mass in g}}}$$

No. of Atom
No. of molecule
No. of ions
No. of e^-
No. of p^+
No. of n°

$\Rightarrow$ NO_2

Atom = 3
Molecule = 1
e^- = 23
p^+ = 23
n° = 23

	e	p	n
${}^{14}_{7}N$	7	7	7
${}^{16}_{8}O$	8	8	8

$1 \times N + 2 \times O$
$1 \times 7 + 2 \times 8 = 23$

$\rightarrow$ H_2O

molecule 1
Atom 3
e^- 10
p^+ 10
n° 8

	e	p	n
${}^{1}_{1}H$	1	1	0
${}^{16}_{8}O$	8	8	8

e, p^+
$2 \times 1 + 1 \times 8 = 10$
n°
$2 \times 0 + 1 \times 8 = 8$

$\Rightarrow$ CO_2

	e^-	p^+	n°	$1\times6+2\times8$
$^{12}_{6}C$	6	6	6	$22\ p^+, e$
$^{16}_{8}O$	8	8	8	

Molecule - 1
Atom - 3
p^+ - 22
e^- - 22
n° - 22

$\Rightarrow$ SO_2

	e^-	p^+	n°	$16+16$
				32
$^{32}_{16}S$	16	16	16	
$^{16}_{8}O$	8	8	8	

Molecule = 1
Atom = 3
p^+ = 32
e^- = 32
n° = 32

g $\longrightarrow$ No. of ____

$\frac{\text{given weight}}{\text{molar mass}} \times N_A$ — atom
molecule
e^-
p^+
n°

Que 8g of CO_2 have how many no of molecule, atom, e^-, p^+, n°

$CO_2 \longrightarrow$ molecule - 1
Atom - 3
p^+ - 22
e^- - 22
n° - 22

Molecule $\frac{w}{M_w} \times N_A = \frac{8}{44} \times 6.02 \times 10^{23}$

Atom $= 3 \times \frac{8}{44} \times 6.02 \times 10^{23}$

$p^+ = 22 \times \frac{8}{44} \times 6.02\ 10^{23}$

$e^- = 22 \times \frac{8}{44} \times 6.02 \times 10^{23}$

$n^\circ = 22 \times \frac{8}{44} \times 6.02 \times 10^{23}$

Que 20g of H_2O

$H_2O \longrightarrow$ molecule - 1
Atom - 3
$p^+ = 10$
$e^- = 10$
$n^\circ = 8$

molecule $= \frac{20g}{18} \times 6.02 \times 10^{23}$

Atom - $3 \times \frac{20}{18} \times 6.02 \times 10^{23}$

$p^+ = 10 \times \frac{20}{18} \times 6.02 \times 10^{23}$

$n^\circ = 8 \times \frac{20}{18} \times 6.02 \times 10^{23}$

$e^- = 10 \times \frac{20}{18} \times 6.02 \times 10^{23}$

Que $30g$ of N_2O_3

$N_2O_3 \rightarrow$ molecule - 1
Atom - 5
p^+ - 38
e^- - 38
n° = 38

molecule = $\frac{30}{76} \times 6.02 \times 10^{23}$

atom = $5 \times \frac{30}{76} \times 6.02 \times 10^{23}$

$p^+ = 38 \times \frac{30}{76} \times 6.02 \times 10^{23}$

$e^- = 38 \times \frac{30}{76} \times 6.02 \times 10^{23}$

$n^\circ = 38 \times \frac{30}{76} \times 6.02 \times 10^{23}$

Volume (gas) at STP/NTP

$$\boxed{\frac{\text{given weight}}{\text{Molar Mass}} \times 22.4\ l}$$

Que $8g$ of SO_2 how many lit at STP

$\frac{8}{64} \times 22.4\ l$

Que $25g$ of CO_2 how many litre at STP

$\frac{25}{44} \times 22.4\ l$

Formula

I. Que in gram $\longrightarrow$ mole

$$\frac{\text{given weight}}{\text{molar mass}}$$

II. Que in g $\longrightarrow$ Number

$$\frac{\text{given weight}}{\text{Molar mass}} \times N_A$$

III. Que in g $\longrightarrow$ lit at STP/NTP for gas

$$\frac{\text{given weight}}{\text{molar mass}} \times 22.4\ l$$

IV. Que in lit $\longrightarrow$ mole.

$$\frac{\text{given lit}}{22.4}$$

V. Que in lit $\longrightarrow$ Number

$$\frac{\text{given lit}}{22.4} \times N_A$$

VI. given Number $\longrightarrow$ mole

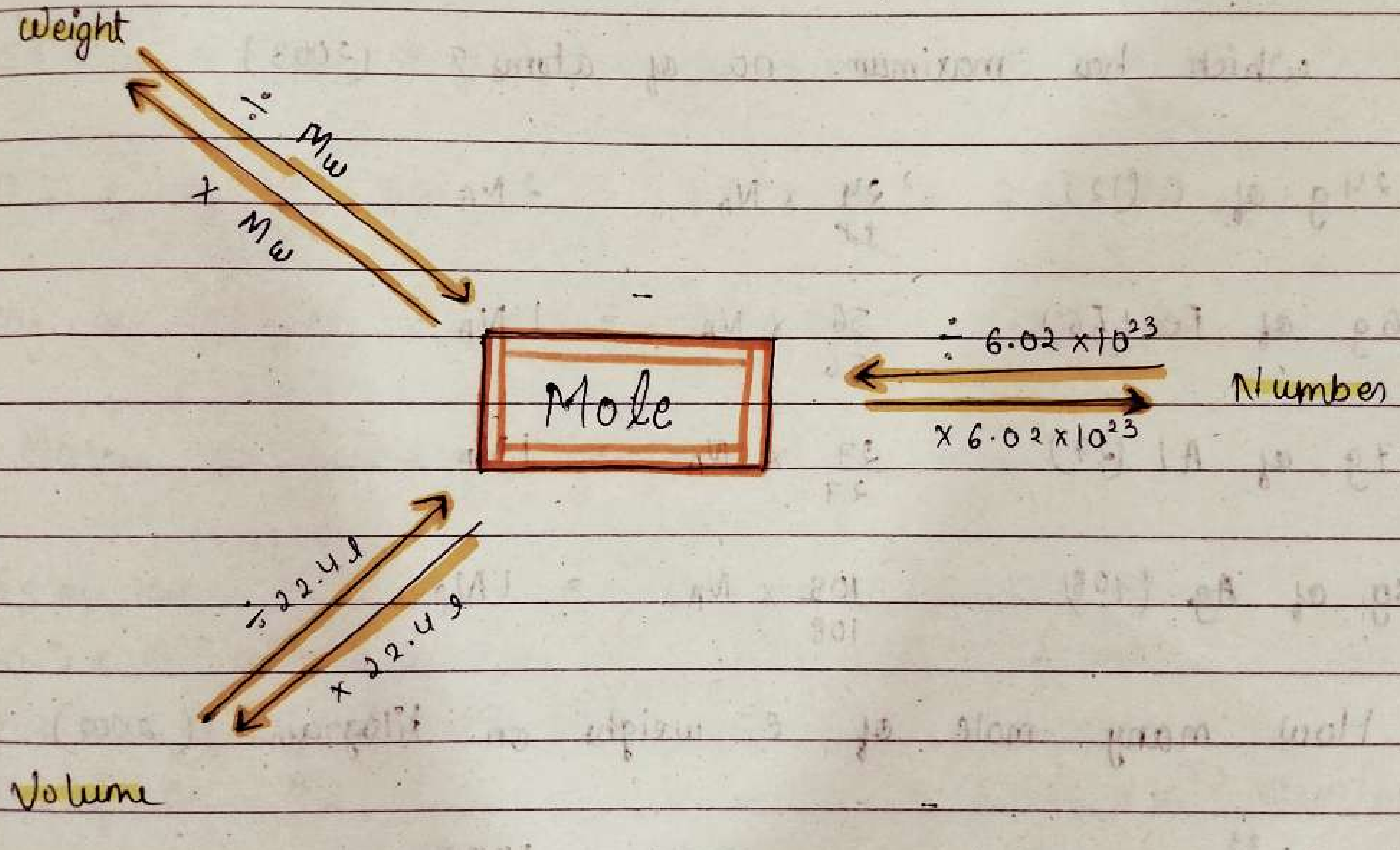
$$\frac{\text{given no.}}{6.02 \times 10^{23}}$$

VII given no. $\longrightarrow$ gram

$$\frac{\text{given No.}}{6.02 \times 10^{23}} \times \text{molar mass}$$

VIII. given no. $\longrightarrow$ lit

$$\frac{\text{given no.}}{6.02 \times 10^{23}} \times 22.4\ l$$



Que Which one of the following has maximum number of atoms?

(a) 1g of Mg (Atomic mass = 24) $\frac{1}{24} \times N_A$

(b) 1g of O_2 (Atomic mass - 16) $\frac{1}{32} \times N_A$

✓(c) 1g of Li (Atomic mass = 7) $\frac{1}{7} \times N_A$

(d) 1 g of Ag (Atomic mass = 108) $\frac{1}{108} \times N_A$

Que which has maximum no. of atoms? (2003)

✓(a) 24g of C (12) $\frac{\cancel{24}^{2}}{\cancel{12}} \times N_A = 2 N_A$

(b) 56g of Fe (56) $\frac{56}{56} \times N_A = 1 N_A$

(c) 27g of Al (27) $\frac{27}{27} \times N_A = 1 N_A$

(d) 108g of Ag (108) $\frac{108}{108} \times N_A = 1 N_A$

Que How many mole of e^- weighs on kilogram? (2002)

(a) 6.023×10^{23}

$$\text{mole} = \frac{1000 g}{9.1 \times 10^{-28} g}$$

✓(b) $\frac{1}{9.108} \times 10^{31}$

$$= \frac{10^3}{9.1} \times 10^{28} g = \frac{1}{9.1} \times 10^{31}$$

(c) $\frac{6.02 \times 10^{54}}{9.108}$

(d) $\frac{1}{9.108 \times 6.023} \times 10^{8}$

Que The maximum no. of moles are present in AIPMT 2004

(a) 15 L of H_2 gas at STP $\frac{15}{22.4} \times N_A = 0.66\ N_A$

(b) 5 L of N_2 gas at STP $\frac{5}{22.4} \times N_A = 0.223\ N_A$

(c) 0.5 g of H_2 gas $\frac{0.5}{2} \times N_A = 0.25\ N_A$

(d) 10g of O_2 gas. $\frac{10}{32} \times N_A = 0.3125\ N_A$

15. Match the following

A. 46g of Na $\frac{46}{23} = 2$
B. 6.022×10^{23} molecule of H_2O
C. 0.224 L of O_2 at STP $\frac{0.224}{22.4}$ 0.01
D. 84 g of N_2 $\frac{84}{28} = 3$
E. 1 mole of any gas

1. 0.01 mol
2. 2 mol
3. 1 mole
4. 6.022×10^{23} atom/molecule
5. 3 mol

Code

	A	B	C	D	E
(a)	2	3	1	5	4

Que If 5 lit gas content 24 g at STP so how many no. of molecules and molar mass of substance?

Sol^n)

$$\frac{5 \ l}{22.4 \ l} = \text{mole}$$

$0.22 = \text{mole}$

$0.22 \text{ mole} = 24g$

$$1 \text{ mole} = \frac{24}{0.22}$$

$= \boxed{109.09 \ g}$ molar mass

$$\text{No. of mole} = \frac{5}{22.4} \times 6.02 \times 10^{23}$$

$= 0.22 \times 6.02 \times 10^{23}$

$= 1.32 \times 10^{23}$

Que what is the no. of molecules and no. of moles and weight in 1.12 lit of SO_2 at STP?

$SO_2 \rightarrow 32+16\times2 = 64g$

(i) for mole $\frac{1.12\ l}{22.4\ l} = 0.05$ moles

(ii) for number, $\frac{1.12}{22.4} \times 6.02\times10^{23}$

$= 0.05 \times 6.02\times10^{23}$

$= 3.01\times10^{22}$ no. of molecules

(iii) for weight

$\frac{1.12}{22.4} \times 64g = 3.2g$

Que at STP a gas content 2.24 lit and the weight of gas are 24g so what is the molar mass of this gas?

Solⁿ $\frac{2.24\ l}{22.4\ l} =$ mole

$0.01 =$ mole

If 0.1 mole $= 24g$

1 mole $= \frac{24}{0.1}$

$\boxed{1 \text{ mole} = 240g}$

Que A substance contest 3.01×10^{22} no. of molecules for 16 g of substance. what is the molar mass and volume of substance at STP. if it is a gas?

Sol) $\frac{3.01 \times 10^{22}}{6.02 \times 10^{23}} = \frac{1}{2} \times 10^{-1}$

$= 0.5 \times 10^{-1}$

$= 0.05$ mole

If 0.05 mole = 16g

1 mole $= \frac{16}{0.05}$

$= 320g$

for volume

$\frac{3.01 \times 10^{22}}{6.02 \times 10^{23}} \times 22.4\ l$

$\Rightarrow 0.05 \times 22.4\ l$

$\Rightarrow 1.12\ l$

Que 8 g of substance have 10 lit at STP so what is

(a) molar mass
(b) no. of moles
(c) no. of molecules.

(a) $\frac{10}{22.4} = 0.44$ mole.

0.44 mole $= 8g$

1 mole $= \frac{8}{0.44} = \cancel{3.52}\ 18.1\ g$ molar mass

(b) $\frac{10}{22.4} \times 6.02 \times 10^{23}$

$0.44 \times 6.02 \times 10^{23} = 2.64 \times 10^{23}$

Percentage Composition

Que CH_4 = C %

$CH_4 = 1 \times 12 + 4 \times 1$
$= 12 + 4$
$= 16g$

% of C = $\frac{C \text{ weight}}{\text{weight}} \times 100$

$= \frac{\cancel{12}^{3}}{\cancel{16}_{4}} \times \cancel{100}^{25}$

$= 75\%$

% of H $= \frac{\cancel{4}^{1}}{\cancel{16}_{4}} \times \cancel{100}^{25}$

$= 25\%$

Que $C_6H_{12}O_6$

$C_6H_{12}O_6 = 6 \times 12 + 1 \times 12 + 16 \times 6$
$= 72 + 12 + 96$
$= 180g$

% of C $= \frac{72}{180} \times 100$

$= 40\%$

$\% \text{ of } H = \frac{\cancel{12}}{\cancel{180}} \times 100$

= 6.66 %

$\% \text{ of } O = \frac{96}{180} \times 100$

= 53.33 %

Que H_2SO_4

$H_2SO_4 = 1 \times 2 + 32 + 16 \times 4$

$= 2 + 32 + 64$

$= 98g$

$\% \text{ of } H = \frac{2}{98} \times 100$

$= 2.04g$

$\% \text{ of } S = \frac{32}{98} \times 100$

$= 32.65 \%$

$\% \text{ of } O = \frac{64}{98} \times 100$

$= 65.3 \%$

Que $MgSO_4$

$MgSO_4$ $24 + 32 + 64$

$= 120g$

$Mg\ \% = \frac{24}{120} \times 100 = 20\%.$

$S\ \% = \frac{32}{120} \times 100 = 26.66.$

$O\ \% = \frac{64}{120} \times 100 = 53.33$

Que $CaCO_3$

$CaCO_3$ $= 40 + 12 + 48$

$= 100g$

$\%$ of $Ca = \frac{40}{100} \times 100 = 40\%$

$\%$ of $C = \frac{12}{100} \times 100 = 12\%.$

$\%$ of $O = \frac{48}{100} \times 100 = 48\%.$

Que 10 g of O_2 have how many volume at STP

$\Rightarrow \frac{\cancel{10}^{5}}{\cancel{32}_{16}} \times 22.4$ l

Que 20 g of N_2O_3 have how many volume at STP

$\Rightarrow \frac{20}{76} \times 22.4$ l

N_2O_3
$2 \times 14 + 3 \times 16$
$28 + 48$
76

Que 32g of HCl have how many volume at STP

$\frac{32}{36.5} \times 22.4$

HCl
$1 + 35.5$

Que 80g of N_2O_5 have how many volume at STP

$\frac{80}{108} \times 22.4$

$28 + 80$
108

Que 96 g of SO_3 have how many volume at STP

$\frac{96}{80} \times 22.4$

32×48
80

* Stoichiometry

Balanced chemical equation moles ratio

e.g $N_2(g) + O_2(g) \longrightarrow 2NO(g)$ at STP

Stoi. of mole : 1 1 2

Stoi of weight: 1x28g 1x32g 2x30g.

Stoi of Number: $1 \times N_A$ $1 \times N_A$ $2 \times N_A$

Stoi of volume: 1x22.4 l 1x22.4 l 2x22.4 l

$2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$ at STP

Stoi of mole 2 1 2

Stoi of weight 2x64g 1x32 g 2x80 g

Stoi of volume 2x22.4 l 1x22.4 l 2x22.4 l

Stoi of Number $2 \times N_A$ $1 \times N_A$ $2 \times N_A$

$2H_2(g) + O_2(g) \longrightarrow 2H_2O\ l$ at STP.

	$2H_2(g)$	$O_2(g)$	$2H_2O\ l$
mole	2	1	2
weight	$2 \times 2\,g$	$1 \times 32\,g$	$2 \times 18\,g$
volume	$2 \times 22.4\,l$	$1 \times 22.4\,l$	$\cancel{2 \times 22.4\,l}$
Number	$2 \times N_A$	$1 \times N_A$	$2 \times N_A$

$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$ at STP

	$N_2(g)$	$3H_2(g)$	$2NH_3(g)$
mole	1	3	2
weight	1×28	3×2	2×17
volume	$1 \times 22.4\,l$	$3 \times 22.4\,l$	$2 \times 22.4\,l$
Number	$1 \times N_A$	$3 \times N_A$	$2 \times N_A$

(*). Balancing of fuel (Hydrocarbon)

$CH_4 + \frac{4}{2} O_2 \longrightarrow CO_2 + 2H_2O$

$C_2H_6 + \frac{7}{2} O_2 \longrightarrow 2CO_2 + 3H_2O$

$C_6H_8 + \frac{10}{2} O_2 \longrightarrow 3CO_2 + 4H_2O$

$C_4H_{10} + \frac{13}{2} O_2 \longrightarrow 4CO_2 + 5H_2O$

$C_2H_4 + \frac{6}{2} O_2 \longrightarrow 2CO_2 + 2H_2O$

$C_3H_6 + \frac{9}{2} O_2 \longrightarrow 3CO_2 + 3H_2O$

$C_6H_6 + \frac{15}{2} O_2 \longrightarrow 6CO_2 + 3H_2O$

$C_7H_8 + \frac{18}{2} O_2 \longrightarrow 7CO_2 + 4H_2O$

$C_2H_2 + \frac{5}{2} O_2 \longrightarrow 2CO_2 + H_2O$

Que 10 g of H_2 mix with excess of N_2. How many mole of NH_3 form and also find weight of N_2 used and NH_3 form

$N_2 + 3H_2 \longrightarrow 2NH_3$

1 3 2

mole of $H_2 = \frac{W}{M_w} = \frac{10}{2} = 3.33$ mol

चूंकि

3 mole of H_2 = 2 mole of N_2

1 mole of $H_2 = \frac{2}{3}$ mole of N_2

5 mole of $H_2 = \frac{2}{3} \times 5$ mol of N_2

= 3.33 mole

mole of NH_3 = 33.3 mole

weight of N_2 = 46.86 g.

weight of NH_3 = 3.33 × 17

= 56.61 g.

चूंकि

if 3 mole of H_2 $\longrightarrow$ 1 mole of H_2

1 mole of H_2 $\rightarrow$ $\frac{1}{3}$ mole of N_2

5 mole of H_2 $\rightarrow$ $\frac{5}{3}$ mol of N_2

$= \frac{5}{3} \times 28 = 46.66g$

DPP-05

Que 1. $2Mg + O_2 \longrightarrow 2MgO$

2 1 2

1 g. 0.5 g

$1 \times 24 = 24g$

Que 2. $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

1 1 1

$mole = \frac{M}{M_m} = \frac{56000}{56}$ (56 Kg)

$= 1000$ mole

1×1000 mole

1000×100 gm $= 100000g. = \frac{100000}{1000}$ kg

$= 100$ kg.

$CaCO_3$

$40+12+48$

100 g

Que $\cancel{4}Al + 3O_2 \longrightarrow 2Al_2O_3$

$\div 2$

$2Al + \frac{3}{2}O_2 \longrightarrow Al_2O_3$

चूंकि

2 mole of Al $\longrightarrow \frac{3}{2}$ mol O_2

1 mole of Al $\longrightarrow \frac{3}{2\times 2} \times 2$ mole of O_2

$\frac{1}{3}$ mole of Al $= \frac{3}{2\times 2} \times \frac{1}{3}$

$= \frac{1}{4}$ mole O_2

$\frac{1}{\cancel{4}} \times \cancel{32}^{8} = 8$ gm of O_2

Que 4. $Ag_2CO_3 \longrightarrow 2Ag + CO_2 + \frac{1}{2}O_2$ $\qquad$ Ag_2CO_3

1 $\quad$ 2 $\quad$ 1 $\quad$ $\frac{1}{2}$ $\qquad$ $2 \times 108 + 12 + 48$

$276g$

2.76

mole = $\cancel{\frac{2.76}{276} = 0.01 mol}$ $\qquad$ 1 mole of $Ag_2CO_3 \longrightarrow$ 2 ~~mole~~ of Ag

$= \frac{216}{276} \times 2.76 = 2.16g$

~~0.01 mole~~ of

Ques $CaC_2 + 2H_2O_{(l)} \longrightarrow Ca(OH)_2 + C_2H_{2(g)}$ at NTP

1 $\quad$ 2 $\quad$ 1 $\quad$ 1

$40 + 24$

100g. $\qquad$ 64g.

no. of mole $= \frac{100}{64}$

$24 + 2$

1 mole of $CaC_2 \rightarrow$ 1 mole of C_2H_2

no. of mole $= \frac{100}{64}$ ~~22~~.

Volume $= \frac{100}{64} \times 22.4 = 35.$

6. $2SO_2 + O_2 \longrightarrow 2SO_3$

32 16 48

80

2 1 2

64g

no. of mole = $\frac{64}{32} = 2$

1 mole of $O_2 \rightarrow$ 2 mole of SO_3

volume = $\cancel{\frac{64}{32} \times 22.4}$ $\frac{4}{\cancel{1}} \times 22.4 = 89.6$ lit.

Average Atomic Mass

${}_{Z}X^{A}$ → large no. → Atomic Mass
→ no. of proton + no. of neutron

Z → Atomic Number

$Cl^{35.5}$ → Atomic mass ✗
avg atomic mass

Isotopes : Atomic number same but different atomic mass

${}_{Z}X^{A}$

A → different

Z → same

e.g. ${}_{1}H^{1}$ ${}_{1}H^{2}$ ${}_{1}H^{3}$

$$\text{Avg. atomic mass} = \frac{1^{st}\text{ isotope \%} \times \text{At. mass} + 2^{nd}\text{ isotope \%} \times \text{At. mass}}{100}$$

Que ${}_{17}Cl^{35}$ → 75%

${}_{17}Cl^{37}$ → 25%

$$\text{Avg. atomic mass} = \frac{75 \times 35 + 25 \times 37}{100} = 35.5$$

${}_{17}Cl^{35.5}$

Que An element X has the following isotopic composition. (AIPMT 2007)

$^{200}X \rightarrow 90\%$.
$^{199}X \Rightarrow 8.0\%$.
$^{202}X \longrightarrow 2.0\%$.

- The weighted average atomic mass of the naturally occurring element X is closesent to

(a) 201 u (b) 202 u (c) 199 u ~~(d)~~ 200 u

Avg atomic mass $= \frac{90\times200 + 8\times199 + 2\times202}{100} = 199.98$

Que given that the abundance of isotopes $_{54}Fe$, $_{56}Fe$, $_{57}Fe$ are 5%, 90% and 5% respectively, the atomic mass of Fe is [JEE Mains 2011]

(a) 55.85 (b) 55.95 (c) 55.75 (d) 56.05

$$\frac{5\times54 + 90\times56 + 5\times57}{100} = 55.75$$

Que Boron has two stable isotopes ^{10}B (19%) and ^{11}B (8 Calculate average atomic weight of Boron is the periodic table (AIPMT 1990)

~~(a)~~ 10.8 (b) 10.2 (c) 11.2 (d) 10.0

$$\frac{10\times19 + 11\times81}{100} = 10.81$$

Emphrerical formula
(Easy formula)

$C_6H_{12}O_6 \longrightarrow CH_2O$

$H_2O \longrightarrow H_2O$

$H_2O_2 \longrightarrow HO$

$C_2H_6 \longrightarrow CH_3$

$Cu_2O_2 \longrightarrow CuO$

$Ca_2Cl_2 \longrightarrow CaCl_2$

Percentage Composition

$CH_4 \longrightarrow \frac{\text{weight}}{\text{Molar mass}} \times 100\%$

What is % weight of Carbon $\longrightarrow \frac{1 \times C}{CH_4} = \frac{1 \times 12}{1 \times 12 + 4 \times 1}$

$= \frac{\cancel{12}^{3}}{\cancel{16}_{4}} \times \cancel{100}^{25}$

$= 75\%$

What is % weight of H ?

$\frac{4 \times H}{CH_4} \times 100 = \frac{\cancel{4} \times 1}{\cancel{16}_{4}} \times \cancel{100}^{25} = 25\%$

$C_6H_{12}O_6 \rightarrow$ $C = \frac{12 \times 6}{180} \times 100 = 40\%$

$H = \frac{12 \times 1}{180} \times 100 = 6.66\%$

$O = \frac{16 \times 6}{180} \times 100 = 53.33\%$

$NH_3 = N = \frac{14}{17} \times 100$

$H = \frac{3}{17} \times 100$

$H_2O = O \rightarrow \frac{16}{18} \times 100$

$H = \frac{2}{18} \times 100$

$H_2SO_4 = H = \frac{2}{98} \times 100$

$S = \frac{32}{98} \times 100$

$O = \frac{64}{98} \times 100$

% given $\longrightarrow$ formula $\longrightarrow$ Empherical formula

Que A organic compound contain 75% of C and remain are hydrogen. What is the empharical formula.

Atom	Sign	% given	Atomic weight	$\frac{\%}{At\ mas}$ = Ratio	$\frac{volume}{lowest}$ = Ratio	Formula
Carbon	C	75%	12	$\frac{75}{12} = 6.27$	$\frac{6.25}{6.25} = 1$	1C
Hydrogen	H	25%	1	$\frac{25}{1} = 25$	$\frac{25}{6.25} = 4$	4H

CH_4

12. A organic compound contains C = 40%, O = 53.34% and H = 6.60%. The empirical formula of the compound is [AIPMT 1994]

C	40%	12	$\frac{40}{12} = 3.33$	$\frac{3.33}{3.33}$	= 1	CH_2O
H	53.60%	1	$\frac{6.6}{1} = 6.6$	$\frac{6.60}{3.33}$	= 2	
O	53.3%	16	$\frac{53.3}{16} =$	$\frac{3.34}{3.33}$	= 1	

Que An organic compound containing C, H and N gave the following result an analysis C = 40%, H = 13.33% N = 46.67%.

It is empherical formula would be [AIPMT 1999, 98, 200

C	40	$\frac{40}{12}$	$= \frac{3.33}{3.33}$	= 1	CH_4N
H	13.33	$\frac{13.33}{1}$	$= \frac{13.33}{3.23}$	= 4	
O	46.67	$\frac{46.67}{14}$	$= \frac{3.33}{33}$	- 1	

Que The empirical formula and molar mass of a compound are CH_2O and 180g respectively. What will the molecula formula of the compound?

(a) $C_9H_{18}O_9$ (b) CH_2O (c) $C_6H_{12}O_6$ (d) $C_2H_4O_2$.

$$V.F = \frac{\text{Molecular}}{\text{Emphanical}} = \frac{180}{30} = 6$$

V.f × (E formula) = Molecular formula

1 C = 1×12
2 H = 2×1
1 O = $\underline{1 \times 16}$
30g

6 (CH_2O)
$C_6H_{12}O_6$

CH_2O → m. mass = 180g
→ CH_2O
→ E M = 30g
→ W.F = 6

H_2O_2 E formula - HO
Molecula mass = 34g
E mass = 17
V.F = 2

Vapour density = $\frac{\text{molar mass}}{2}$

Que Find empirical formula of the compound if M = 68% (atomic mass = 34) and remaining 32% oxygen.

$M = 68\%$ $\frac{68}{34} = 2$ $M_2O_2 \Rightarrow MO$ $\frac{\%}{\text{molar mass}}$

$O = 32\%$ $\frac{32}{16} = 2$

(a) MO (b) M_2O (c) MO_2 (d) M_2O_3

Que An organic compound on analysis was found to contain 10.06% carbon, 0.84% hydrogen and 89.10% chlorine what will be the empirical formula of the substance?

(a) CH_2Cl_2 (b) $CHCl_3$ (c) CCl_4 (d) CH_3Cl

C – 10.06 $\frac{10.06}{12} = \frac{0.84}{0.84} = 1$

H – 0.84 $\frac{0.84}{1} = \frac{0.84}{0.84} = 1$ $CHCl_3$

Cl – 89.10 $\frac{89.10}{35.5} \quad \frac{2.5}{0.84} = 3$

Que An Organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option of empirical formula of this compound is (At. wt of C is 12, H
(NEET-202

C – 78 $\frac{78}{12} = \frac{6.5}{6.5} = 1$ CH_3.

H = 22 $\frac{22}{1} = \frac{22}{6.5} = 3.38$

(a) CH (b) CH_2 (c) CH_3 (d) CH_4

* **Limiting Reagent**

→ A Reagent which is completely vanished during any reaction that is called limiting Reagent.

→ Excess Reagent – A reagent which is left behind any reaction that is called Excess Reagent.

Que. 2 mole of A ; 5 mole of B so.

I. which is limiting Reagent. = A

II. which is Excess Reagent = B

III. How much mole of C form in given Reaction = 6 mole of

$$A + 2B \longrightarrow 3C$$

	A	B	C
Stoic of mole	1	2	3
	2 mole	4 mole	6 mole
Available	2 mole	5 mole	0 mole
(–)			
Answer	0 mole	1 mole	6 mole

Ans

Que 10 moles of H_2 mix with 10 mole of N_2 and form NH_3

i. which is LR $\rightarrow H_2$

ii. which is excess $\longrightarrow N_2$ (6.67 mole

iii. How much mole of NH_3 form 6.66 mole of NH_3

$N_2 + 3H_2 \longrightarrow NH_3$

Stoic	1 mole	3 mole	2 mole	start with H_2 bcoz. 30 mole of H_2 not avai
Reaction	3.33	10 mole	6.67 mole	
Ini	10 mole	10 mole	0 mole	
Remain	6.67 mole	0 mole	6.67 mole	

Que 10 g of hydrogen and 64 g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be [AIPMT 2009]

(a) 2 moles (b) 3 moles (c) 4 moles (d) 1 mole

$\text{mole} = \frac{w}{M_w}$; $H_2 = \frac{10}{2} = 5$ mole ; $O_2 = \frac{64}{32} = 2$ mole

$$2H_2 + O_2 \longrightarrow 2H_2O$$

	$2H_2$	O_2	$2H_2O$
Stoi	2 mole	1 mole	2 mole
Balance	4 mole	2 mole	4 mole
Available	5 mole	2 mole	0 mole
Ans.	1 mole	0 mole	4 mole

Que How many moles of lead(II) chloride will be formed from a reaction between 6.5 g of PbO and 3.2 g of HCl ? [AIPMT 2008]

(a) 0.044 (b) 0.333 (c) 0.011 (d) 0.029

$PbCl_2 = ?$

$$PbO = \frac{w}{M_w} = \frac{6.5}{207+16} = \frac{6.5}{223} = 0.29$$

$$HCl = \frac{w}{M_w} = \frac{3.2}{36.5} = 0.088$$

$PbO + 2HCl \longrightarrow PbCl_2 + H_2O$

Stoi	1 mole	2 mole	1 mole
Given	0.029	0.06	0.29
Av.	0.29	0.09	0
Ans	0	0.03	0.29

Que The number of moles of hydrogen molecules required to produce 20 mole of ammonia through Haber's process is (Neet 2019)

(a) 20 (b) 30 (c) 40 (d) 10

$N_2 + 3H_2 \longrightarrow 2NH_3$

	1 mole	3 mole	2 mole
Ans.	10 mole	30 mole	20 mole

Que In Haber process 30 L of dihydrogen and 30 L of dinitrogen were taken for reaction which yielded only 50 %. of the expected product. what will be the composition of gasous mixture under the aforesaid condition in the end? (AIPMT 2003)

(d) 10 L ammonia, 25 L nitrogen, 15 L of hydrogen

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

3 mole 1 mole 2 mole

Gay Lusac's = Ratio → mole / L volume

3 lit 1 lit 2 lit

50 %. initial का only 50 %. use करता है।

15 lit 5 lit 10 lit

avil 30 lit 30 lit 0 lit

Ans 15 lit 25 lit 10 lit

Que $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$ [JEE main 2022]

Consider the above reaction, the limiting reagent of the reaction and number of mole of NH_3 formed respectively are. (JEE 22)

(a) H_2, 1.42 mole (b) H_2, 0.71 mole

(c) N_2, 1.42 mole (d) N_2, 0.71 mole

mole = 2

$N_2 = \frac{20}{28} = 0.71$ mole

$H_2 = \frac{5}{2} = 2.5$ mol

$N_2 + 3H_2 \longrightarrow 2NH_3$

1 mol	3 mol	2 mol
0.71 mol	2.13 mol	1.42 mol
0.71	2.5	0
0	0.37	1.42 mol

Que 12 g of Mg will react compeletely with HCl to give

(a) One mole of H_2
(b) 1/2 mole of H_2
(c) 2/3 mole of O_2
(d) both 1/2 mol of H_2 and 1/2 mole of O_2

$$Mg \rightarrow \frac{W}{M_W} = \frac{12}{24} = 0.5 \text{ mole}$$

$$Mg + 2HCl \longrightarrow MgCl_2$$

1 mole   1 mole
0.5 mole   0.5 mole

Que 10 mol. SO_2 and 15 mole O_2 were allowed to react over a suitable catalyst. 8 mole of SO_3 were formed, The remaining mole of SO_2 and O_2 respectively are

(a) 2 moles, 11 mole

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

2 mole	1 mol	2 mole
8 mol	4 mole	8 mole
10 mol	15 mole	8 mole
Ans 2 mole	11 mole	0 mole

Que 2 $2H_2 + O_2 \longrightarrow 2H_2O$

	2 mole	1 mole	2 mole
Stoi	0.2.5	0.125	2.5
avai	20	1.25	0
Ans	17.5	0	2.5

40 g of H_2 $= \frac{40}{2} =$

40g of O_2 $= \frac{40}{32}$ 0.

Que 3 $A + 5B \longrightarrow C + 3D$

	1 mol	5 mol	1 mol
	2 mol	10 mole	2 mol
	10 mol	10 mol	0 mol
Ans	8 mol	0 mol	2 mol

Que 4 $2H_2S + SO_2 \longrightarrow 2S + 2H_2O$

	2 mol	1 mol	2 mole
	0.5	0.025	0.5
	2.5	0.025	0 mole
Ans	2	0	0.5

$SO_2 = 64 = 0.025$m

$H_2S = \frac{1.5 \times 10^{22}}{6.02 \times 10^{23}}$

$= \frac{1.5}{6.02} \times 10^{-1}$

$= 0.25$ Ans.

Ques $H_2 + Cl_2 \longrightarrow 2HCl$ $10^5 = H_2$ $10^4 = Cl_2 = 446.43$

1 mol 1 mol 2 mol

60 ml 60 ml 120 L

~~446.43~~ ~~446.43~~ ~~892.85~~ $\frac{120}{1000}$ L = 1.120 lit

4464.28 44643 0

Que What is the volume of CO_2 liberated (in L) at 1 atmosphere and 0°C when 10g of 100% pure calcium carbonate is treated with excess dilute sulphuric acid?

(a) 0.224 (b) 2.24 (c) 22.4 (d) 224.

purity = $\frac{10 \times 100}{100}$ = 10g. at STP. $CaCO_3$ = 100g.

$CaCO_3 + H_2SO_4 \longrightarrow CaSO_4 + CO_2 + H_2O$

1 mole 1 mole

0.1 mole × 22.4 L

22.4 lit.

$\frac{w}{M_w}$ $\frac{10}{100}$ = 0.1 mole

Que Assuming fully decomposed, the volume of CO_2 released at STP on heating 9.85 g of $BaCO_3$ (Ba = 137) will be

(a) 1.12L (b) 2.24 L (c) 4.06 L (d) 0.84L

$137+12+48 = 197g$

$$BaCO_3 \xrightarrow{\Delta} BaO + CO_2$$

1 mole 1 mol 1 mole

$\frac{9.85}{197}$ $\frac{\cancel{197}}{\cancel{9.85}}$ = 0.05 mole

0.05 mole × 22.4 L = 1.12L

Que The amount of zinc required to produced 224 ml of H_2 at STP on treatment with dil H_2SO_4 will be

(a) 6.5g (b) 0.65g (c) 65g (d) 0.065g

$$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$$

1mole 1mole

$\frac{224 \times \cancel{1mole}}{22.4 \times 1000}$ $\frac{224 \text{ ml}}{22400} = \frac{1}{100}$ ml

65g × 0.1 mole

0.65g

Step I - find mole of each given reactant, product

$\left(\frac{gram}{M_w}, \frac{Vol}{22.4}, \frac{no.}{6.02 \times 10^{23}} \right)$

Step II = Write equation stochiometric

Step III find LR

Step IV = Look out the option and find whatever they ask

Que How many mole of potassium chlorate to be heated to produce 11.2 L oxygen.

(1) $\frac{1}{2}$ mole ✓(2) $\frac{1}{3}$ mole (3) $\frac{1}{4}$ mole (4) $\frac{2}{3}$ mole

$$2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$$

2 mole 2 mole 2 mole

चूंकि → 3 mole of O_2 — 2 mole of $KClO_3$

1 mole of O_2 — $\frac{2}{3}$ mole of $KClO_3$

0.5 mole of O_2 = $\frac{2}{3} \times 0.5$ mole of $KClO_3$ = $\frac{1}{3}$ mo

Que $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$, identify dihydrogen ($H_2$) as a limiting reagent in the following reaction mixture.

(a) 56g of N_2 + 10g of H_2
(b) 35g of N_2 + 8g of H_2
(c) 14g of N_2 + 4g of H_2
(d) 28g of N_2 + 6g of H_2

(a) $N_2 = \frac{56}{28} = 2$ mole, $H_2 = \frac{10}{2} = 5$ mole

(b) $N_2 = \frac{35}{28} = 1.25$ mole, $H_2 = \frac{8}{2} = 4$ mole

(c) $N_2 = \frac{14}{28} = 0.5$ mole, $H_2 = \frac{4}{2} = 2$ mole

(d) $N_2 = \frac{28}{28} = 1$ mole, $H_2 = \frac{6}{2} = 3$ mole

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

1 mole 3 mole

(a) 1.66 mole 5 mole = H_2 is LR
(b) 1.25 mole 3.75 mole = N_2 is LR
(c) 0.5 mole 1.5 mole = N_2 is LR

(d) 1 mole , 8 mole → NO LR

Que 1.0 g of Mg is burnt with 0.56 g of O_2 in a closed vessel. Which reactant is left in excess and how much?

(a) Mg, 0.16g (b) O_2, 0.16g (c) Mg, 0.44g (d) O_2, 0.28g

Mg $\frac{1}{24}$ = 0.041 , O_2 = $\frac{0.56}{32}$ = 0.0175.

$2Mg + O_2 \longrightarrow 2MgO$

2 mole 1 mole

0.035 mol 0.0175

0.84

0.035 mole of Mg
0.035 × 24
= 0.84g
1 − 0.84 = 0.16g.

Que The number of molecules in 8.96 L of a gas at 0°C and 1 atm pressure is approximately

(a) 6.023×10^{23} (b) 12.04×10^{23} (c) 18.06×10^{23} (d) 24.08×10

$\frac{8.96}{22.4}$ = 0.4 = 2.408×10^{23} = 24.08×10^{22}

SOME BASIC CONCEPT IN CHEMISTRY

Solution → Mixture

$$\text{Solution} \rightarrow \text{Solute (less amount)},\ \text{Solvent (more amount)}$$

Solute
(less amount)

Solvent
(more amount)

20g of sugar mix in 100g of water
less (solute) more (solvent)

I. $\frac{w}{w}$ % or $\frac{\text{weight}}{\text{weight}}$ % or $\frac{\text{mass}}{\text{mass}}$ %

II. $\frac{\text{volume}}{\text{Volume}}$ % $= \frac{V}{V}$ %

III. $\frac{w}{V}$ % $= \frac{\text{weight}}{\text{Volume}}$ %

IV. Mole fraction

V. Molarity (M)

VI. Molality (m)

VII. Normality (N)

VIII. Parts per million (PPM)

Que

I. $\frac{\text{Weight}}{\text{Weight}}$ % or $\frac{\text{mass}}{\text{mass}}$ %

A = solute
B = solvent

$$\frac{w}{W}\% = \boxed{\frac{\text{Weight of solute}}{\text{Weight of solution}} \times 100\%}$$

$$\frac{w}{W}\% = \frac{w_A}{w_A + w_B} \times 100\%$$

<u>Que</u> If weight of sugar is 20g mix in 100g of water. So what is $\frac{w}{W}$ %?

Given $w_A = 20g$
$w_B = 100g$
$w_A + w_B = 120g$

$$\frac{w}{W}\% = \frac{w_A}{w_A + w_B} \times 100$$

$$= \frac{20}{120} \times 100\%$$

$$= \frac{2000}{120}$$

$$\boxed{\frac{w}{W}\% = 16.66\%}$$

Que If $\frac{w}{w}$ %. are 30%. and weight of solute 60g so what is weight of solvent?

$w_A = 30g$
$w_B = ?$
$\frac{w}{w}\% = 30\%$.

$\frac{w}{w}\% = \frac{w_A}{w_A + w_B} \times 100\%$.

$30 = \frac{60}{30 + w_B} \times 100$

$\frac{30}{100} = \frac{60}{60 + w_B}$

$1200 + 30 w_B = 6000$
$30 w_B = 6000 - 1200$
$w_B = \frac{4800}{30}$

Que If $\frac{w}{w}$ % are 40 % and wt of solvent is 100g. What is weight of solute ?

Given $\frac{w}{w}\% = 40$

$w_A = ?$

$w_B = 100g.$

$$\frac{w}{w}\% = \frac{w_A}{w_A + w_B} \times 100\%.$$

$$40 = \frac{w_A}{w_A * 100} \times 100$$

$$\frac{40}{100} = \frac{w_A}{w_A + 100}$$

$$\frac{40w_A + 4000}{100} = w_A$$

$$66.66g = w_A$$

Date

· Volume % = $\frac{V}{V}$ %
Volume

A = solute
B = solvent.

$\frac{V}{V}$ % = $\boxed{\frac{\text{Vol. of solute}}{\text{Vol. of solution}} \times 100\ \%}$

$\frac{V}{V}$ % = $\frac{V_A}{V_A + V_B} \times 100\%$

Que What is the $\frac{V}{V}$ % of solution which have 40 mL of solute mix in 125 mL of water.

$\frac{V}{V}$ % = $\frac{40}{40+125} \times 100$

$\frac{V}{V}$ % = $\frac{40}{165} \times 100$

$\frac{V}{V}$ % = 24.24 %

Que What is the $\frac{V}{V}$ % of solution which have 60 mL of solute mix in 120 g of ~~solvent~~ solution and have a density of sol^n are 1.2 g/mL

$$\text{Density} = \frac{\text{mass}}{\text{Volum}}$$

$$1.2 = \frac{120}{\text{Volume}}$$

$$\text{Volume} = 100\,mL$$

$$\frac{V}{V}\% = \frac{60}{100} \times 100\%$$

$$= 60\%.$$

Que What is the volume of solute when $\frac{V}{V}$ % of solution is 60%.

$$\frac{V}{V}\% = \frac{V_A}{V_A + V_B} \times 100\%$$

$$60 = \frac{V_A}{V_A + V_B} \times 100$$

$$\frac{60}{100} = \frac{V_A}{V_A + V_B}$$

$V_A = 60\,mL$

$V_A + V_B = 100$

$V_B = 100 - 60 = 40\,mL$

Weight / Volume % or $\frac{W}{V}$ %

$$\frac{W}{V}\% = \frac{\text{weight of solute}}{\text{Volume of solution}} \times 100\%$$

$$\frac{W}{V}\% = \frac{W_A}{V_A + V_B} \times 100\%$$

(*) Weight/Vol % are only used for ointments, dermitologial creams and cosmetic cream because their base are made up of oil

Que What is the weight/vol % of solution contains 50g of solute mix in 100 g of sol. have a density of 0.8 g/mL

$$\text{Density} = \frac{100}{V_0}$$

$$\frac{W}{V}\% = \frac{\cancel{50g}^{10}}{\cancel{125\,mL}_{5}} \times \cancel{100}^{4}$$

$$Vol = \frac{100}{0.8} = 125\,mL$$

$$= 40\%$$

✱ Mole Fraction (x)

$\boxed{A+B}$

$\frac{\text{उसका mole}}{\text{सबका mole}}$

$\boxed{X_A = \frac{n_A}{n_A + n_B}}$; $X_B = \frac{n_B}{n_A + n_B}$

$\boxed{X_A + X_B = 1}$

$\frac{n_A}{n_A + n_B} + \frac{n_B}{n_A + n_B} = 1$

$\frac{\cancel{n_A + n_B}}{\cancel{n_A + n_B}} = 1$

$\boxed{A+B+C}$:

$X_A = \frac{n_A}{n_A + n_B + n_C}$; $X_B = \frac{n_B}{n_A + n_B + n_C}$; $X_C = \frac{n_C}{n_A + n_B + n_C}$

$X_A + X_B + X_C = 1$

$\text{mole} = \frac{\text{given weight (in g)}}{\text{molecular mass (in g)}}$

Que 5 mole of A mix with 3 mole of B. What is the mole fraction of A & B.

= $n_A = 5$

$n_B = 3$

$X_A = \frac{n_A}{n_A + n_B} = \frac{5}{8}$

$X_A + X_B = 1$

$X_B = 1 - \frac{5}{8} = \frac{3}{8}$

Que 40g of NaOH mix in 90 mL of H_2O if density of H_2O is 1 g/mL. Calculate mole fraction of H_2O and NaOH.

NaOH = 23 + 16 + 1

= 40g

Density = $\frac{mass}{90}$

1×90 = mass

90g =

$\frac{90}{18} = H_2O$

5 = H_2O g mole

$n_A = \frac{40}{40} = 1$

$n_B = \frac{90}{18} = 5.$

$X_A = \frac{1}{6}$ = NaOH

$X_B = \frac{5}{6}$ = H_2O

Que $40g$ of $NaOH$

$w_A = 40$, $M_{wA} = 40$, $n_A = \frac{40}{40} = 1$

$180 g$ of H_2O

$w_B = 180$, $M_{wA} = 18$ = $n_B = \frac{180}{18} = 10$

$$X_A = \frac{n_A}{n_A + n_B} = \frac{1}{1+10} = \frac{1}{11}$$

$$X_B = 1 - X_A \Rightarrow 1 - \frac{1}{11} = \frac{10}{11}$$

Que What is the mole fraction content 32% of $CaCO_3$ $\frac{w}{w}$ % in water?

Sol:- $$\frac{w}{w}\% = \frac{W_A}{W_A + W_B} \times 100$$

$M_{wA} = CaCO_3$
$= 1\times40 + 1\times12 + 3\times16$
$= 100g$

$$32 = \frac{W_A}{W_A + W_B} \times 100$$

$$\frac{32}{100} = \frac{W_A}{W_A + W_B}$$

$M_{wB} = H_2O$
$= 1\times2 + 16\times1$
$= 18g$

$W_A = 32g$,
$W_A + W_B = 100$
$W_B = 100 - 32 = 68g$

$n_A = \frac{W_A}{M_{wA}} = \frac{32}{100} = 0.32$ mol $n_B = \frac{W_B}{M_{wA}} = \frac{68}{18} = 3.77$ mol

$X_A = \frac{n_A}{n_A + n_B}$

$= \frac{0.32}{0.32 + 3.77} \Rightarrow 0.078$

$X_B = 1 - 0.078$

$= 0.92$

⊛ Molarity (M)

Concentration C

Active Mass

Solubility S

w

M_w

mole $= \eta$

$\eta = \frac{w}{M_w}$

$$M = \boxed{\frac{\text{moles of solute}}{\text{Volume of solution (in lit)}}} = \frac{\text{mole}}{\text{lit}}$$

$$\boxed{M = \frac{w_A \times 1000}{M_{wA} \times V\,(\text{in ml})}}$$

Que 4g of NaOH mix in 100 ml of solution. what is its molarity?

Given, $w_A = 4g$

$M_{wA} = NaOH = 1 \times 23 + 1 \times 16 + 1 \times 1 = 40g$

$V = 100\ ml$

$$M = \frac{W_A \times 1000}{M_{WA} \times V} = \frac{4 \times 1000}{40 \times 100} = 1\,M$$

1 molar

1 mol/lit

Qu 10 g of $CaCO_3$ mix in 90 g of water. What is the mole fraction and molarity of solution if solution density is 0.8 g/ml

Sol

$$V = \frac{m}{\rho} = \frac{10+90}{0.8} = \frac{100}{0.8} = 125\,mL$$

$$M = \frac{W_A \times 1000}{M_{WA} \times V} = \frac{10 \times 1000}{100 \times 125} = \frac{100}{125} = 0.8 \text{ molar}$$

$W_A = 10g$ $\qquad n_A = \frac{10}{100} = 0.1$

$M_{WA} = 100$

$W_B = 90g$ $\qquad n_B = \frac{90}{18} = 5 \text{ mole}$

$M_{WB} = 18g$

$$X_A = \frac{n_A}{n_A + n_B} = \frac{0.1}{0.1+5} = \frac{0.5}{5.1} = 0.0196$$

$$X_B = 1 - 0.0196$$
$$= 0.98$$

Que What is the molarity of solution contains $10\%\ \frac{w}{v}\%$ of NaOH

Sol. $\frac{w}{v}\% = 10\%$

$$10\% = \frac{w_A}{V_A + V_B} \times 100\%$$

$$\frac{10}{100} = \frac{w_A}{V_A + V_B}$$

$w_A = 10g$
$V = 100mL$
$M_{w_A} = 40 = NaOH$

$$M = \frac{w_A \times 1000}{M_{w_A} \times V} = \frac{1\cancel{0} \times 10\cancel{00}}{4\cancel{0} \times 1\cancel{00}} = \frac{10}{4} = 2.5 \text{ molar / M / mol/lit}$$

Concept of $H_2O_2 \longrightarrow$ hydrogen peroxide

$2H_2O_2 \longrightarrow H_2O + O_2$ at STP/NTP

2 mole 22.4 l O_2

* Strength % of H_2O_2 = $\frac{17}{56}$ x Volume strength

* Volume strength = $11.2 \times M$

* Volume strength = $5.6 \times N$

Qu If a strength of H_2O_2 are 3 b mix in 100 mL of solution. What is the weight of H_2O_2 required for this strength

given, $V_s = 3$

Volume = 100 mL

$M_w = H_2O_2 = 34g$

$M \times 11.2 = V_s$

$M = \frac{3}{11.2}$

$M = \frac{W \times 1000}{M_{WA} \times V} =$

$W = \frac{M \times M_{WA} \times V}{100}$

$W_A = \frac{3 \times 34 \times 100}{11.2 \times 100}$

$\boxed{W_A = 0.91g}$

(i) given $V_s = 1.3$ N

$M_w = H_2O_2$

$= 34$

Volume strength = 5.6×1.5

$V_s = 8.4$

opt = 4

(Mixing of two liquid | Dilution

$M_1V_1 = M_2V_2 \rightarrow$

$(V_1 + \text{add water}$

$M_2 = \frac{M_1V_1}{V_2}$ dilution

(mixing)

$m_1V_1 + m_2V_2 = m_3 + m_3$

$\Downarrow$

$V_1 + V_2$

H_2SO_4 only for H_2SO_4 $N = M, 2$

Que Dissolving 120g of urea (mol wt 60) in 1000g of water gave a solution of density 1.151 g/mL. The molarity of a solution is (Jee Main 2011)

given $W_A = 120g$

$M_{WA} = 60$

$H_2O = 1000g$

$\rho = \frac{m}{V}$

$V = \frac{m}{\rho} = \frac{1000+120}{1.15} = \frac{1120}{1.15} = 973.9$

Que Dissolving 120 g of urea (mol. wt 60) in 1000g of water gave a solution of density 1.15 g/ml The molarity of the [JEE Main 2011]

(a) 1.78M (b) 2.00M ✓(c) 2.05M (d) 2.22M

Sol Given $W_A = 120g$

mass = urea + H_2O
= 1000 + 120
= 1120

$M_{WA} = 60g$

$H_2O = 1000g = 1000\,ml = V$

$\rho = \frac{m}{V}$

$V = \frac{m}{\rho} = \frac{1120}{1.15} = 973.9$

$M = \frac{W_A \times 1000}{M_{WA} \times V(\text{in mL})} = \frac{\overset{2}{\cancel{120}} \times 1000}{\cancel{60} \times 973.9} = \frac{2000}{973.9} = 2.05M$

Que The amount of sugar ($C_{12}H_{22}O_{11}$) required to prepare 2L of its 0.1 M aqueous solution is : (JEEMain 2019)

✓(a) 68.4g (b) 17.1g (c) 34.2g (d) 136.8g

Sol $V = 2L$

Molarity(M) = 0.1

$C_{12}H_{22}O_{11} = 12 \times C + 22 \times H + 11 \times O$

$= 12 \times 12 + 22 \times 1 + 11 \times 16$

$= 144 + 22 + 176$

$= 342g$

$$M = \frac{W_A}{M_{W_A} \times V(\text{in } L)}$$

$W_A = M \times M_{W_A} \times V \text{ in } L$

$= 0.1 \times 342 \times 2$

$= 68.4$

Molality (m)

It is independent from temperature.

M → molarity → depends upon temperature $\propto \frac{1}{\text{temperature}}$

concentration

$$m = \frac{\text{moles of solute}}{\text{weight of solvent (in Kg)}}$$

$$m = \frac{n_A}{W_B \text{ (in Kg)}}$$

$$\boxed{m = \frac{W_A}{M_{W_A} \times W_B \text{ (in Kg)}}}$$

$$\boxed{m = \frac{W_A \times 1000}{M_{W_A} \times W_B \text{ (in g)}}}$$

Relationship between M and m → density

$$\boxed{\frac{1}{m} = \frac{d}{M} - \frac{Mw_A}{1000}}$$

Que 8 g of NaOH is dissolved in 18g of H_2O. Mole fraction of NaOH in solution and molality (in mol kg^{-1}) of the solution respectively are: (JEE Mains 2019)

(a) 0.167, 11.11 (b) 0.2, 22.20 (c) 0.2, 11.11 (d) 0.167, 22.20

Sol:- given $w_A = 8g$ $n_A = \frac{8}{40} = 0.2$

$Mw_A = NaOH = 40g$

$w_B = 18g$ $n_B = \frac{18}{18} = 1$

$Mw_B = H_2O = 18g$

$$x_A = \frac{n_A}{n_A + n_B} = \frac{0.2}{0.2+1} = \frac{0.2}{1.2} = 0.167$$

$$m = \frac{w_A \times 1000}{wM_A \times w_B \text{ (in g)}}$$

$$= \frac{8 \times 1000}{40 \times 18} = \frac{800}{4 \times 18} = 11.11$$

(*) Normality (n)

$$N = \boxed{\frac{\text{gram equivalent of solute}}{\text{Volume of solution}}}$$

$$\text{gram equivalent} = \frac{\text{weight}}{\text{equivalent weight}}$$

$$\text{eq. wt} = \frac{Mw}{\text{Valency factor}}$$

$$N = \frac{\text{gram equ} = \dfrac{w}{\text{equivalent } w = \dfrac{Mw}{V.F}}}{\text{Vol. of solution}}$$

$$\boxed{N = \frac{w \times V.F \times 1000}{M_w \times v \text{ (in ml)}}}$$

Relationship between molarity and Normality

$$\boxed{N = V.F \times M}$$

Valency factor

Acid → H^+ देने की capacity.

$HNO_3 = 1$

Exception

$H_3PO_2 = 1$

$HCl = 1$

$H_2SO_4 = 2$

$H_3PO_3 = 2.$

$H_3PO_4 = 3$

$CH_3 \cdot COOH = 1$

Base → OH^- capacity.

$NaOH - 1$

$Ca(OH)_2 - 2$

$Al(OH)_3 - 3$

Ions → charge

$O^{-2} = 2$

$N^{-3} - 3$

$Ca^{+2} = 2$

$Al^{+3} = 3$

$Mg^{2+} = 2$

Metals / compound $\longrightarrow$ oxidation number

$MgSO_4 \longrightarrow ON = +2 = 2$

$K_2Cr_2O_7 \longrightarrow ON = +6 = 6$

$KMnO_4 \longrightarrow O.N = +7 = 7$

For any reaction $\longrightarrow$ no. of e^- transfer

$Fe^{+3} \longrightarrow Fe^{+2}$

$+3 \qquad +2$

$\underbrace{\qquad\qquad}_{+1e^-}$ V.F 1

$MnO_4^- \longrightarrow MnO_2$

$+7 \qquad +4$

$\underbrace{\qquad\qquad}_{+3e^-}$ V.F = 3

DPP-01.

1. given $M = 0.2$

$V = 400\ mL$

$M_w = HNO_3 = 63g$

$$M = \frac{w \times 1000}{M_w \times V}$$

$$w = \frac{M \times M_w \times V}{100}$$

$$= \frac{0.2 \times 63 \times 40\cancel{0}}{100\cancel{0}} = 5.04g.$$

2. $NaBr = 23 + 80 = 103$

$$M = \frac{w \times 1000}{M_w \times V\,(mL)}$$

$$M = \frac{20.6 \times 1\cancel{000}}{103 \times \cancel{500}} = 0.4$$

3. $M_{w_n} = 58.5$

$w = 11.7\ g.$

$V = 500g = 500.$

$$M = \frac{58.5}{} \quad \frac{11.7 \times 1\cancel{000}}{58.5 \times \cancel{500}} = 0.4\ m$$

4. $$\frac{1}{m} = \frac{d}{M} - \frac{M_{wA}}{1000}$$

$$\frac{1}{m} = \frac{1.017}{2.03} - \frac{60}{1000}$$

$$\frac{1}{m} = \frac{1017 - 121.8}{2030}$$

$$m = \frac{2030}{1017 - 121.8} = \frac{2030}{895.2} = 2.267$$

6. $N = 1 \times 2$

$= 2$

7. $1 = V.F \times M$

$1 = 2 \times M$

$\frac{1}{2} = M$

$0.5 = M$

8. $N = 3 \times 3$

$= 9$

9. $W_A = 171$

$M_{W_A} = 342$

$M = \frac{W_A}{M_{W_A} \times 1} = \frac{171}{342} = 0.5\ M$

10. $W_A = 5.6$

$M_{W_A} = 56$

$N = \frac{5.6 \times 1 \times \cancel{1000}}{\cancel{56} \times \cancel{40}} = \cancel{28}\ \frac{25}{10} = 2.5$

$N.F - 2.$

$COOH-COOH \rightarrow 90\,g.$

1. 11 (a) $N = \frac{\cancel{63 \times 2}}{90 \cancel{\times 100}}$

~~M~~

$M = \frac{N}{10} = \frac{1}{10}$

$N = \frac{w \times V.F \times 1000}{MW_A \times V}$ $- 1400\,ml =$

Que 5 litres of Ethan burn in air. How many gram of CO_2 produce?

$C_2H_6 + \frac{7}{2} O_2 \longrightarrow 2\,CO_2 + 3H_2O$

1 mole $\quad \frac{7}{2}$ mole $\quad$ 2 mole

$\frac{5}{22.4} = 0.223$ mole

$0.223 \times 2 = 0.446$ mole $\times M_w$

$= 0.446$ mole $\times 44\,g$

$= \boxed{19.64\ gm}$

Habber process

Que 5 mole of NH_3 form by ^ How many litre of N_2 and H_2 required during this reaction:

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

1 mole	3 mole	2 mole
$\frac{1}{2}$ mole	$\frac{3}{2}$ mole	1 mole
$\frac{1}{2} \times 5$ mol	$\frac{3 \times 5}{2}$ mole	5 mole
2.5 mole	7.5 mole	5 mole
$\times$ 22.4 l	$\times$ 22.4 l	
= 56 lit	= 168 lit.	

Que How many gram of H_2 to form 30 g of H_2O.

Sol $$2H_2 + O_2 \longrightarrow 2H_2O$$

2 mole 1 mole 2 mole

$\frac{30}{18} = 1.66$ mole

1.66 mole

$1.66 \times 2 = 3.32$ g

litre of O_2 at STP

15 g of N_2O_5 require. How many

Que

$$2N_2 + 5O_2 \longrightarrow 2N_2O_5$$

2 mole 5 mole 2 mole

1 mole $\frac{5}{2}$ mole 1 mole

$\frac{15}{108}$ = 0.138 mole

$\frac{5}{2} \times 0.14$

= 0.35 mole × 22.4

= 7.728 l

1.6 g of methane burn in Air. How many litre of air required for this burning

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

1 mole 2 mole 1 mole

$\frac{1.6}{16}$ = mole 2×0.1

= 0.2 mole

= 0.1 mole in litre

0.2 × 22.4

4.48 lit

☆ 21 lit O_2 = 100 lit of air

1 litre O_2 = $\frac{100}{21}$ lit of air

4.48 lit = $\frac{100}{21} \times 4.48$ of air = 21.33 lit of air

Qu. 5.8 g of Butane burn in Air

I. How many l of O_2 required

II. How maby l of Air required.

III. How many l of CO_2 required at STP

IV. How many g of H_2O form during reaction

$$C_4H_{10} + \frac{13}{2}O_2 \longrightarrow 4CO_2 + 5H_2O$$

1 mole $\quad \frac{13}{2}$ mole $\quad$ 4 mole $\quad$ 5 mole

$\frac{5.8}{58} = 0.1 \quad \frac{13}{2} \times 0.1$ mole

1. $0.65 \text{ mole} \times 22.4$
$= 14.56$ l.

II. 21 lit of O_2 = 100 lit of Air

14.56 of $O_2 = \frac{100}{21} \times 14.56 = 69.33$ l. of Air

III. $4 \times 0.1 \times 22.4 = 8.96$ l

IV. ~~$\frac{5 \times 0.1 \times 8}{18} = 0.027$~~ g

$0.5 \times 18 = 9$ g

1 mole → 3 ... 2 mole

weight of one molecule = $\frac{\text{molecular mass}}{N_A}$

Que 10 mole SO_2 react with 10 mole of O_2.
i. How many ~~mol~~ l of SO_3?
ii. Limiting Reagent
iii. E.R

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

	$2SO_2$	O_2	$2SO_3$
	2 mole	1 mole	2 mole
Need	10 mole	5 mole	10 mole
Available	10 mole	10 mole	0 mole
Ans	0 mole	5 mole	10 mol × 22.4 = 224 lit
	LR	E.R	

Que 56 g of N_2 react with 10 g of H_2
1. How many lit NH_3 form? ⇒ 44.8 l
ii LR ⇒ H_2
ii. E.R ⇒ 0.34 mole of N_2

$\frac{10}{2}$ = 5 mol of H_2

$\frac{56}{28}$ = 2 mole of N_2

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

	N_2	$3H_2$	$2NH_3$
	1 mole,	3 mole	2 mole
Need	$\frac{1}{3}\times5$ 1.66 mole	5 mole	$\frac{2\times5}{3}$ mole
Avai	2 mole	5 mole	0 mole
Ans	0.34 mole	0 mole	2 mole × 22.4 l 44.8 l

74.66 l