Class 11th | Chemistry

प्रारंभ BATCH

Unit : 1

Some Basic

Concepts of Chemistry

Lecture - 2

Multiplication & Division in Scientific Notations

Rohit

1- $(5.6 \times 10^5) \times (6.9 \times 10^8)$

Power ↑ Power ↓

$38.64 \left(10^{5+8}\right)$

$38.64 \times 10^{13+1}$

$N \times 10^n$

1-10

3.864×10^{14} Ans.

5 5.6
× 6.9 3
504
336 x
38.6 4

Multiplication & Division in Scientific Notations

2- $(9.8 \times 10^{-2}) \times (2.5 \times 10^{-6})$

$$\begin{array}{r} {}^{4} \\ 1\ 9.8 \\ \times 2.5 \\ \hline 490 \\ 19'6\times \\ \hline 2550 \\ \hline \end{array}$$

$2550\ (10^{-2} \times 10^{-6})$

$(10^{-2+(-6)})$

$25.50 \times 10^{-8+1}$

2.450×10^{-7}

1-10

$n \times 10^{n}$

Multiplication & Division in Scientific Notations

$$3 - \frac{2.7 \times 10^{-3}}{5.5 \times 10^{4}} \Rightarrow \frac{2.7}{5.5} = 0.490$$

$$\frac{10^{-3}}{10^{4}} \xrightarrow{\text{subtract}} 10^{-3-4} \Rightarrow 10^{-7}$$

$$0.490 \times 10^{-7-1}$$

$N \times 10^{n}$

$1 - 10$

$$4.90 \times 10^{-8}$$

Ans.

Next Toppers

Addition & Subtraction in Scientific Notations

Add 6.65×10^4 & 8.95×10^3

$8.95 \times 10^3 \rightarrow 0.895 \times 10^4$

same

6.650×10^4 → common

$+ \ 0.895 \times 10^4$

7.545×10^4 Ans.

∴

Addition & Subtraction in Scientific Notations

Subtract $(2.5 \times 10^{-2}) - (4.8 \times 10^{-3})$

same

$0.48 \times 10^{-3+1}$

0.48×10^{-2}

2.50×10^{-2}

-0.48×10^{-2} → common.

2.02×10^{-2} Ans.

Multiplication & Division in Significant Figures

→ same

→ Min S.F. → Ans → overall utne S.F. ✓

In these operations, the result must be reported with no more significant figures as in the measurement with the few significant figures.

1. $2.5^{2} \times 1.5^{2} \rightarrow 3.8$

2- $6.2 \times 0.12 \rightarrow 0.74$

2 S.F. 2 S.F.

→ min → Ans → 2 S.F.

1. $1.25 \rightarrow 3$

$\times 2.5 \rightarrow 2$

625

$-250\times$

3.125

3.1 Ans.

Next Toppers

Addition & Subtraction in Significant Figures

→ After Decimal → Min S.F → Ans → ut ne A.D. S.f ✓

The result cannot have more digits to the right of the decimal point than either of the original numbers.

1- $12.\underline{11} + 18.\underline{0} + 1.\underline{012} \rightarrow 31.1$ Ans.

(2 S.F. ↷ 1 S.F. ↷ 3 S.F.)

2- $2.\underline{42} + 1.\underline{32} + 0.\underline{2}$

→ 2, 2, 0 (Min)

$$\begin{array}{r} 2.42 \\ 1.32 \\ 0.20 \\ \hline 3.94 \end{array}$$

→ 3.9 Ans.

very good ✓

// M/D ⟶ overall Min S.F.

A/S ⟶ after Decimal Min S.F.

LAWS OF CHEMICAL COMBINATIONS

The chemical reactions take place according to the certain laws. These are called laws of chemical combination.

1. Law of conservation of mass
2. Law of definite or constant proportions
3. Law of multiple proportions
4. Gay Lussac's Law
5. Avogadro's Law

1. LAW OF CONSERVATION OF MASS

In a physical or chemical change, the total mass of the products is equal to the total mass of the reactants.

OR

Matter can neither be created nor destroyed.

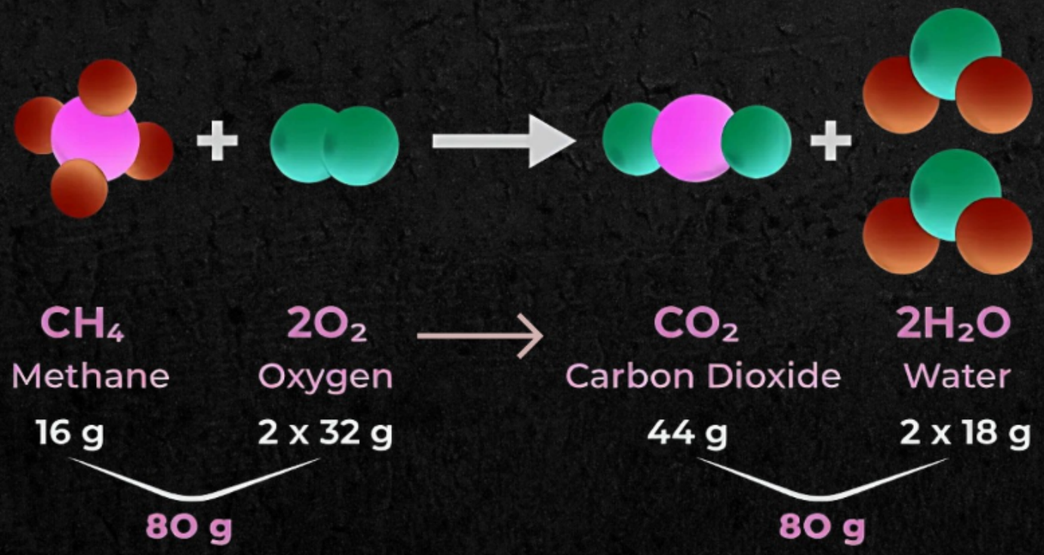
This Law was put forth by Antoine Lavoisier in 1789.

$C + O_2 \rightarrow CO_2$

12 + 16×2 → 12+16×2

12+32 = 12+32

44 = 44



Law of Conservation of Mass.

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

$12+1\times4 \quad 2\times16\times2 \quad 12+16\times2 \quad 2\times(1\times2+16)$

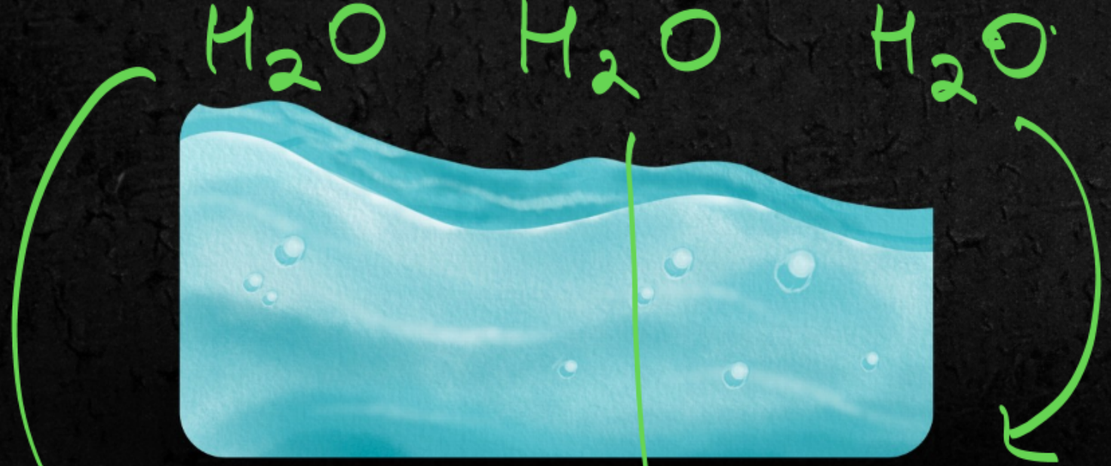
$= 16 + 64 \longrightarrow 44 + 36$

$80 = 80$

2. LAW OF DEFINITE OR CONSTANT PROPORTIONS

Definition: A chemical compound always contains same elements and their proportion by mass is always definite and constant.

This law was given by Proust.



2:16 2:16 2:16

1:8 = 1:8 = 1:8

$CaCO_3$ → NCERT.

↓

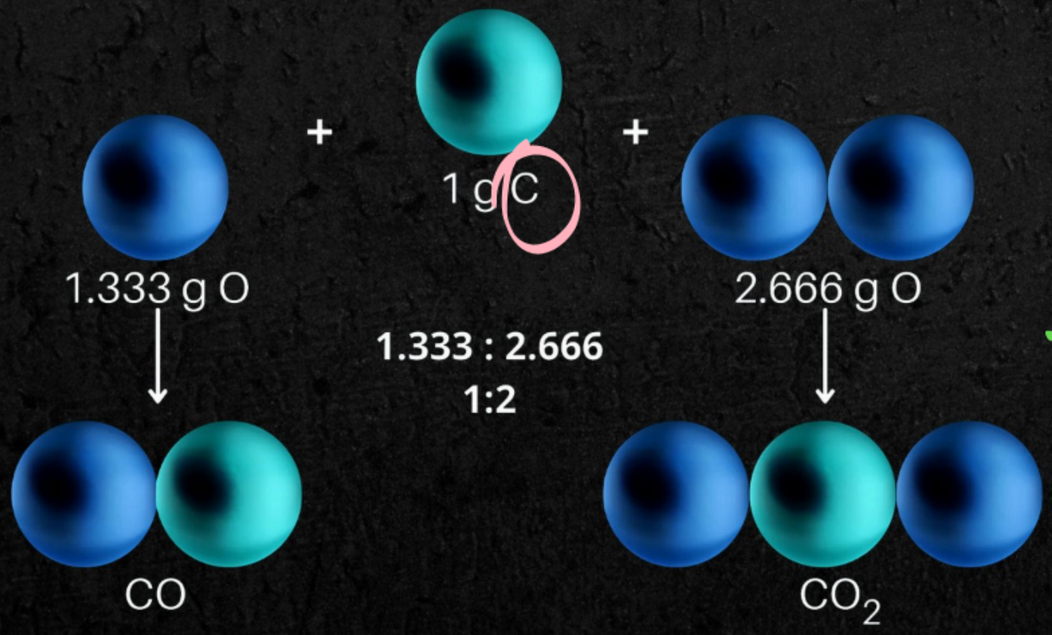
Natural Sample

Synthetic Sample:

3. LAW OF MULTIPLE PROPORTIONS

Definition: When two elements combine to form two or more compounds, then the different masses of one element which combine with the same mass of other element are in simple ratio of whole numbers.

This law was given by Dalton in 1803



N + O

NO_2

14, 32

NO

14 16

2 : 1

S.W.R.

Law of Multiple Proportion.

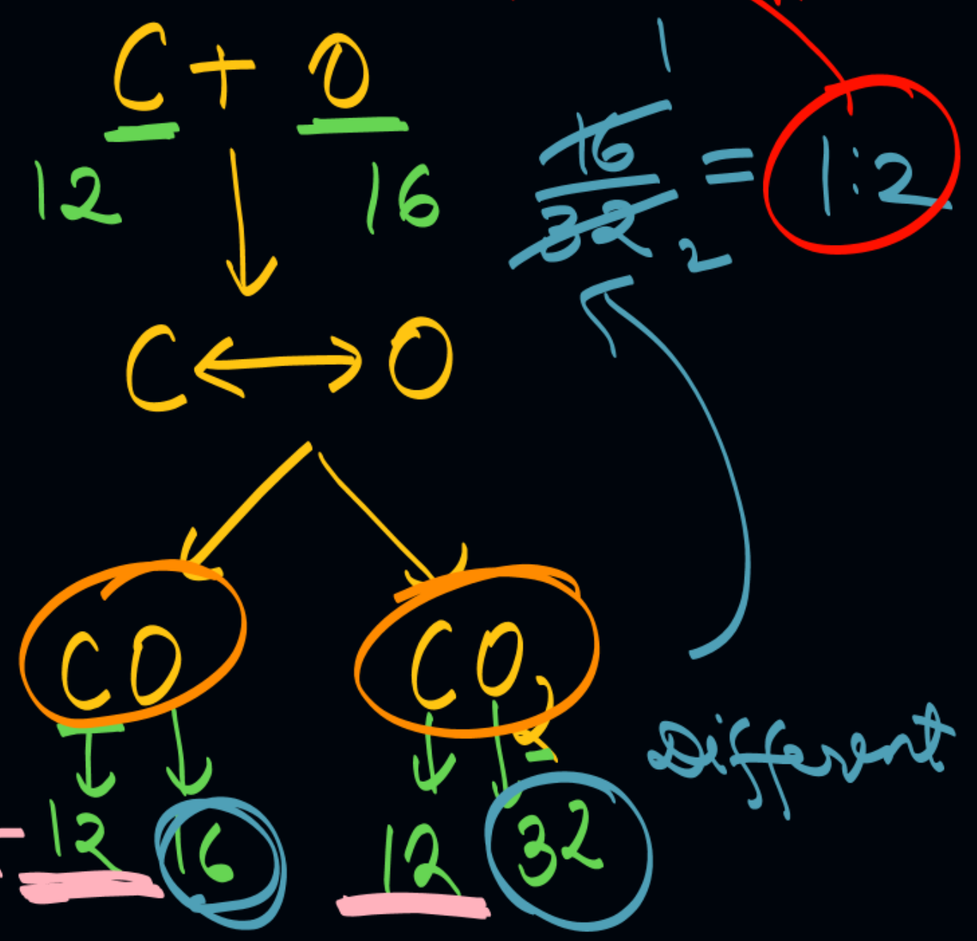
2 or more Elements.

↓

Combine

↓

2 or more products



4. GAY-LUSSAC LAW OF GASEOUS VOLUMES

Definition: When gases react they do so in simple multiple ratio of volumes and if the products formed are also gases, all the volumes bear a simple ratio provided all the volumes are measured at same temperature and pressure.
This law is applicable to gaseous reactions.
Itwas given by Gay Lussac in 1808

$$\underset{\text{2 volume}}{2H_2\,(g)} + \underset{\text{1 volume}}{O_2\,(g)} \longrightarrow \underset{\text{2 volume}}{2\,H_2O\,(g)}$$

S.W.R. 2:1

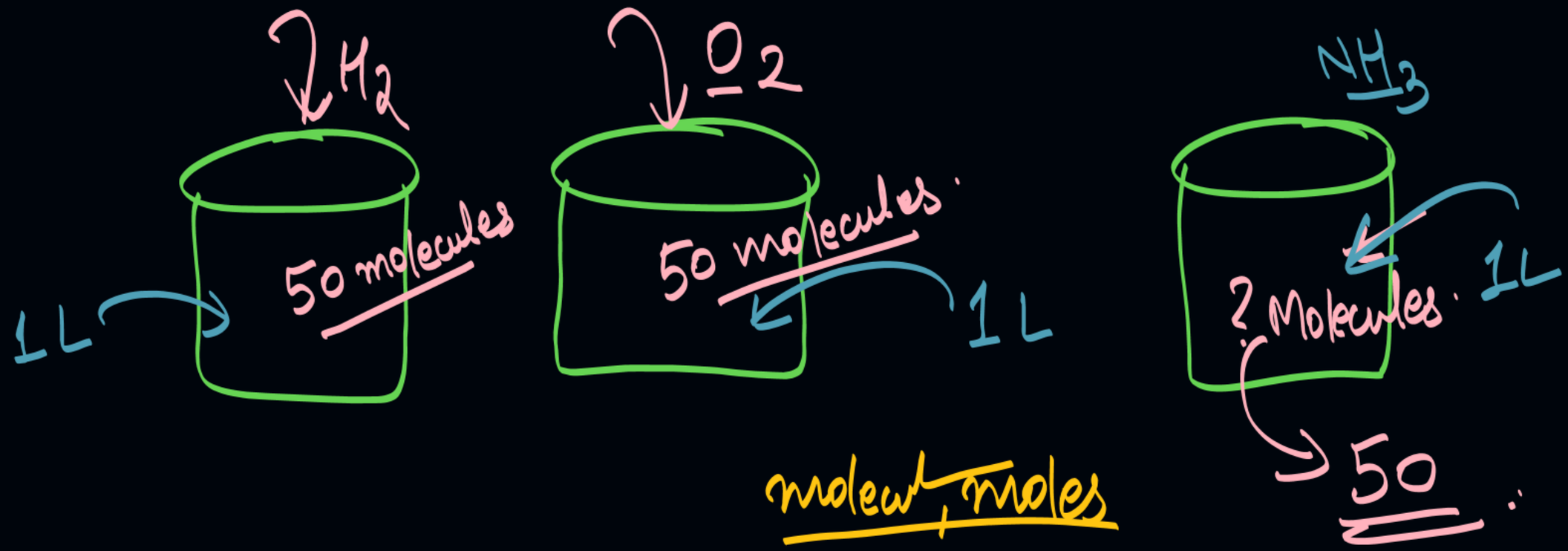
AVOGADRO'S LAW

First definition: Equal volume of all gases under the same conditions of temperature and pressure contain equal number of molecules.

Second definition: The volume of a gas at constant temperature and pressure is proportional to the number of moles or molecules of the gas present.

$$\underset{\substack{2\text{ mole}\\ 2\times6.02\times10^{23}\\ \text{molecules}}}{2H_2\,(g)} + \underset{\substack{1\text{ mole}\\ 1\times6.02\times10^{23}\\ \text{molecules}}}{O_2} \longrightarrow \underset{\substack{2\text{ mole}\\ 2\times6.02\times10^{23}\\ \text{molecules}}}{2\,H_2O\,(g)}$$

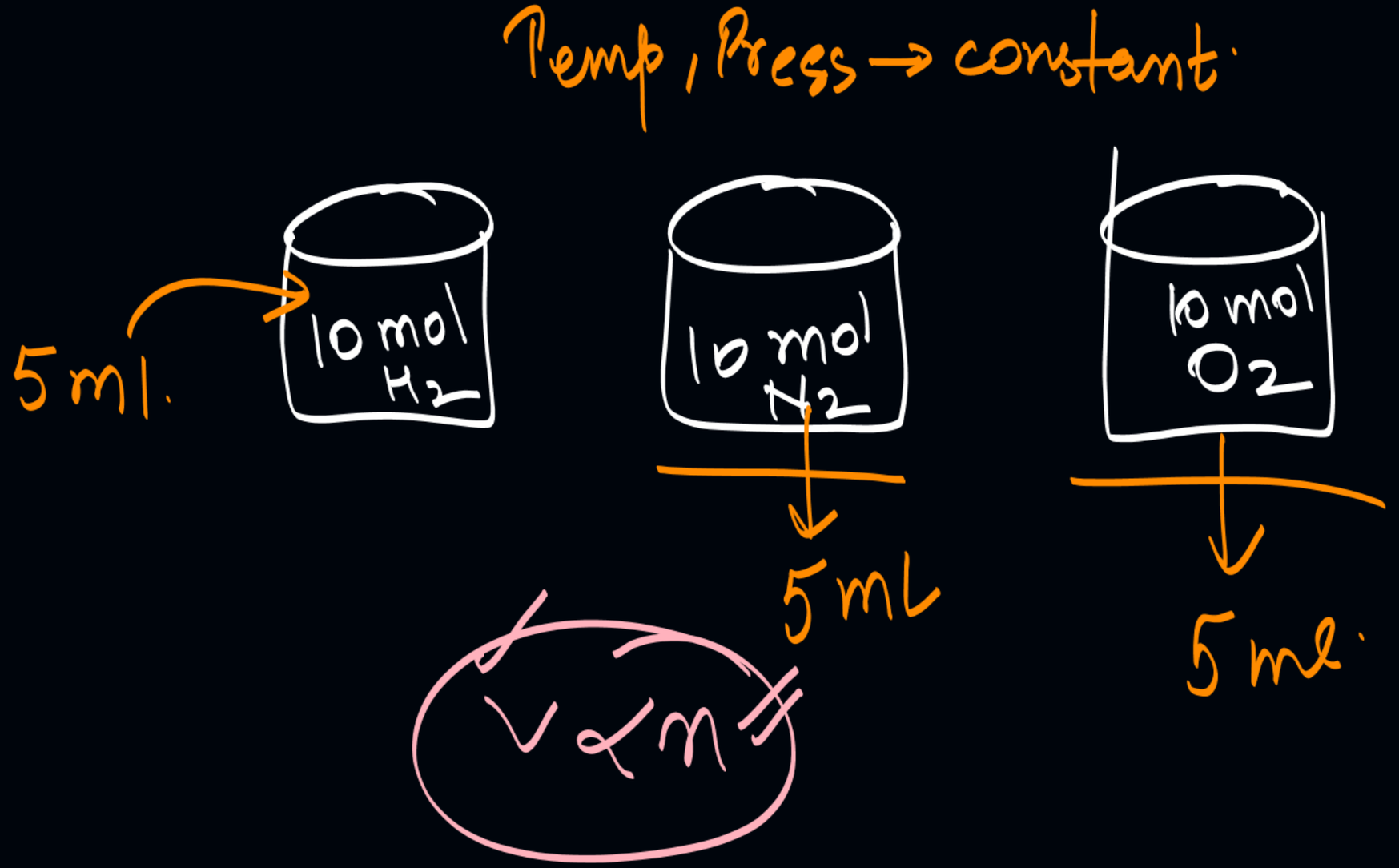
२ H → २ mole १O → १ mole २H_2O → २ mol.



molecules, moles

Same Temp & Pressure.

$V \propto n$


Temp, Press → constant.
5 ml.
10 mol H2
10 mol H2
10 mol O2
5 mL
5 mL.
V ∝ n

DALTON'S ATOMIC THEORY

Although the origin of the idea that matter is composed of small indivisible particles called 'a-tomio' → indivisible.

In 1808, Dalton published 'A New System of Chemical Philosophy', in which he proposed certain postulates.

POSTULATES OF DALTON'S ATOMIC THEORY

1. Matter is made up of extremely small indivisible and indestructible ultimate particles called atoms.

2. Atoms of the same element are identical in all respects i.e. in shape, size, mass and chemical properties.

isotopes

3. Atoms of different elements are different in all respects and have different masses and chemical properties.

Isobars

POSTULATES OF DALTON'S ATOMIC THEORY

4. Atom is the smallest unit that takes part in chemical combinations.

5. Atoms of two or more elements combine in a fixed ratio to form compound.

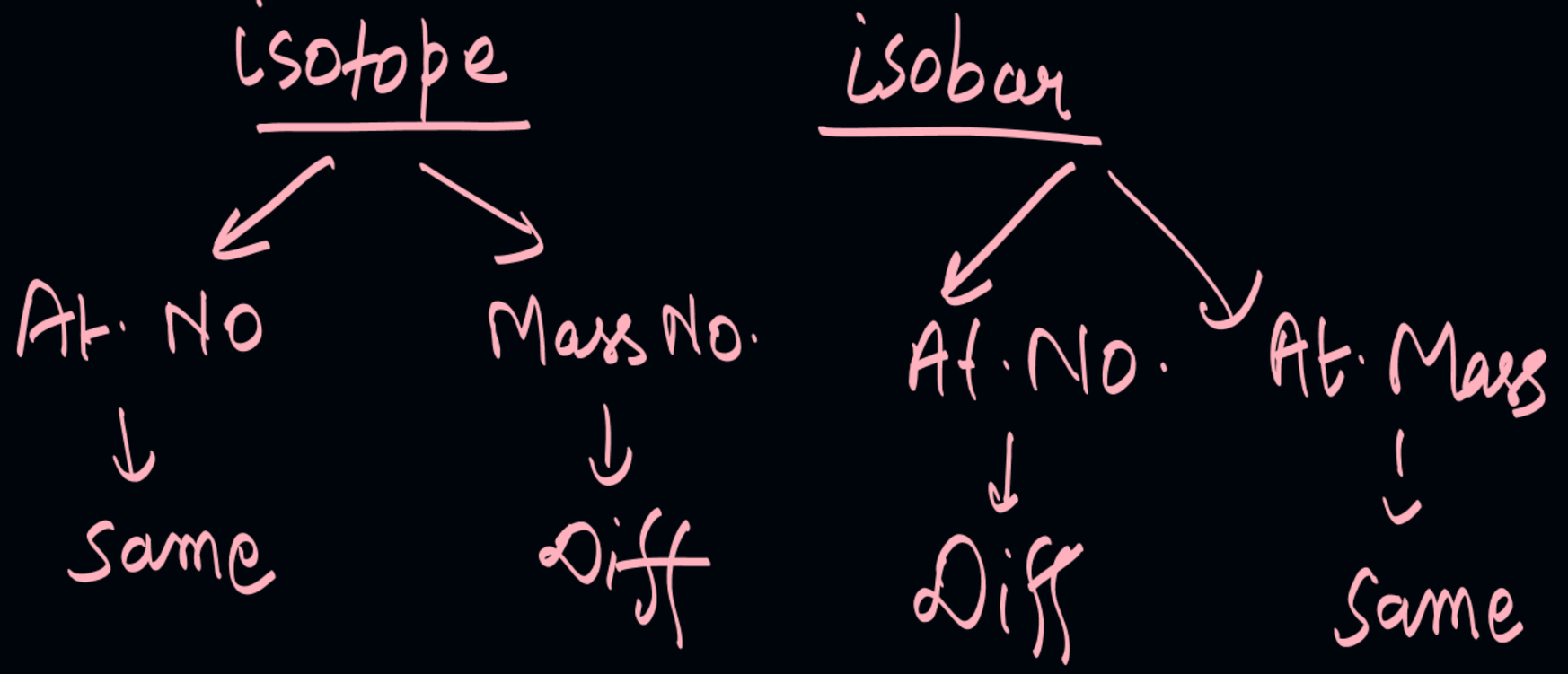
6. Atom can neither be created nor be destroyed during any physical or chemical change.

7. Chemical reactions involve only combination, separation or rearrangement of atoms.

$H_2 + O_2 \longrightarrow H_2O$

LIMITATIONS OF DALTON'S ATOMIC THEORY

- It could not explain why do atoms of different elements differ in their mass, size, valence etc.
- Discovery of isotopes → Atoms → same element → same Z, Diff A
- Discovery of nuclear reactions show that mass can be converted into energy and vice-versa.
- An atom is divisible.
- It could not explain why do atoms combine to form compounds (molecules).
- By nuclear reactions, atoms of one element can be converted into atoms of other elements.
- It is called transmutation of elements.
- Atoms of different elements may have same mass e.g., atomic mass of
- calcium (Ca) and argon (Ar) is 40.
- Such elements are called isobars.
- The atoms may not combine in simple ratio as suggested by Dalton's theory e.g., in sugar the ratio of atoms is 12: 22 : 11. It is not a simple ratio.


isotope
At. No
Same
Mass No.
Diff
isobar
At. No.
Diff
At. Mass
Same

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KHATAM !
TATA !!
BYE-BYE !!!

Fir Mileinge....

Next Toppers