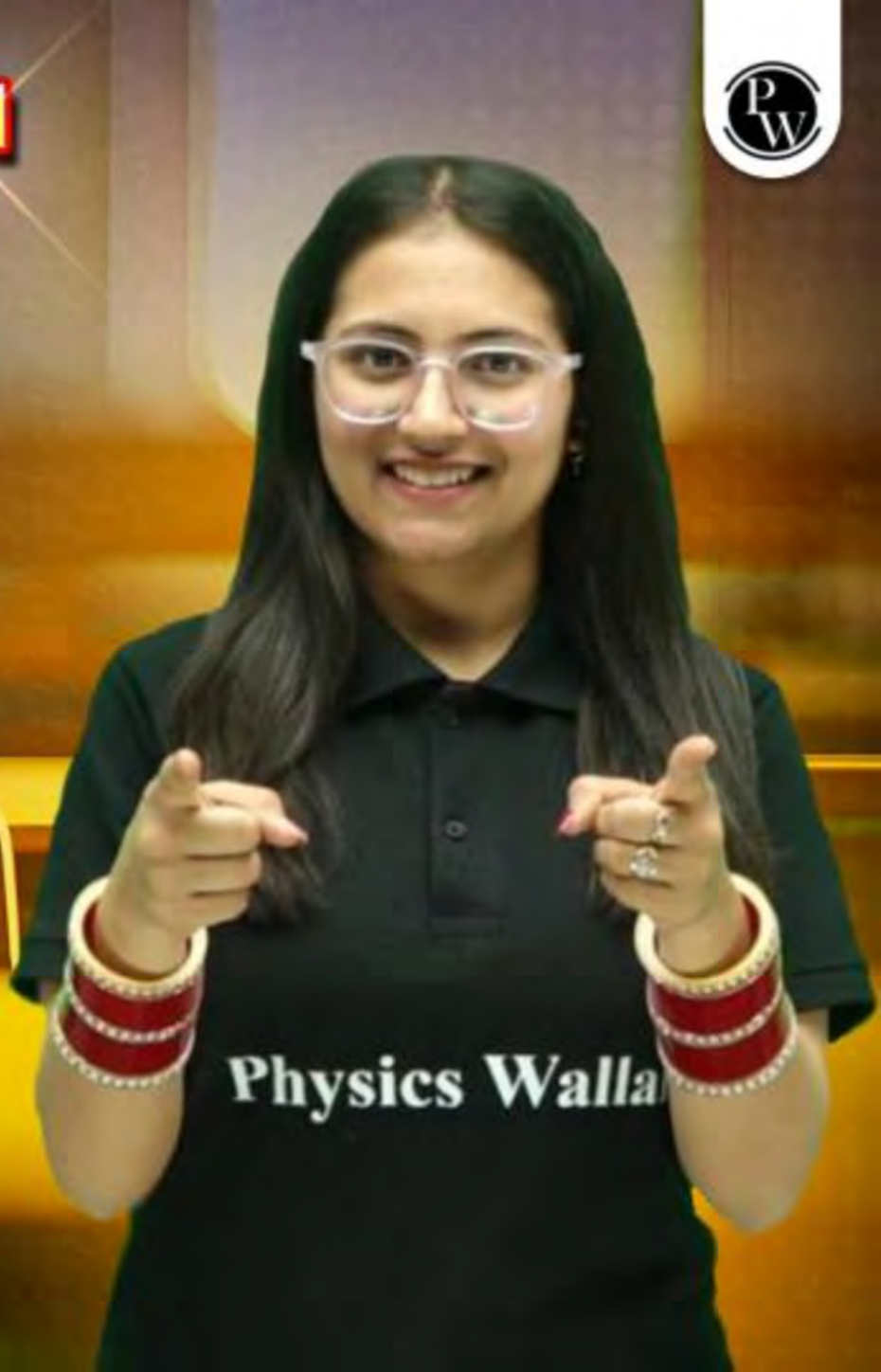
RADIANT 2026

Chemistry

The Language of Chemistry

Lecture - 06

By- Bharti Ma'am



Topics *to be covered*

1. R.A.M
2. R.M.M
3. % Composition
4. Emprical formula
5. Relative atomic mass, relative molecular mass, Percentage composition

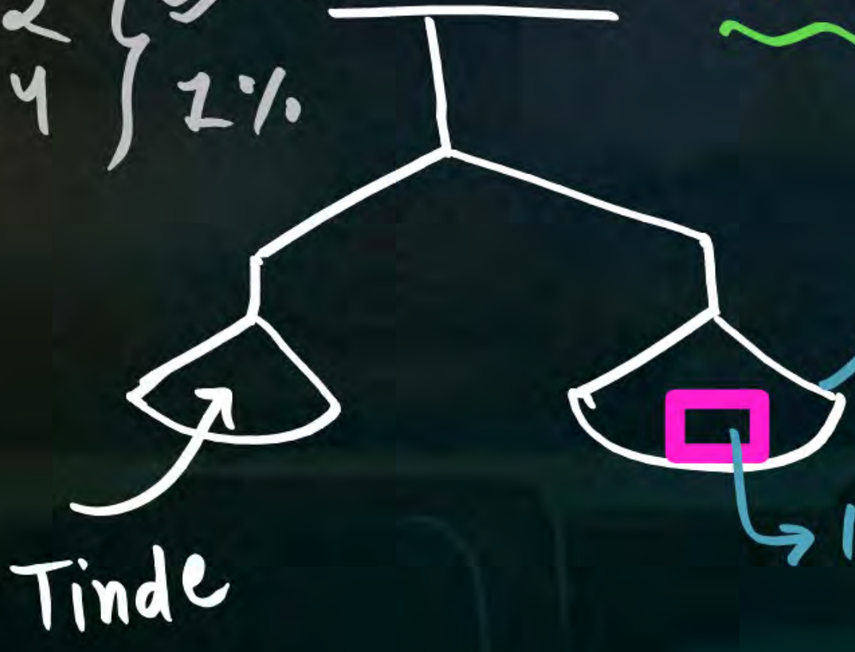
Relative Atomic Mass

C-12 ✓✓

Quick-Revision

'Mass Spectroscopy'

C-12 } ≫ 99%
C-14 } 2%



① Hydrogen ⇒ As Ref.

② Oxygen ⇒ Ref.

③ C-12 ✓✓

Relative Atomic Mass

Imp

The relative atomic mass or atomic weight of an element is the number of times one atom of the element is heavier than $\frac{1}{12}$ times of the mass of an atom of carbon-12. Thus:

$$\text{Relative atomic mass} = \frac{\text{Mass of 1 atom of the element}}{\frac{1}{12}\text{th the mass of one C–12 atom}}$$

H.W

2 decen
2 Binadene

Relative Atomic Mass

a.m.u

Imp.

Atomic mass is expressed in atomic mass units [a.m.u.]. Atomic mass unit is defined as 1/12 the mass of carbon atom C-12.

(A.M.U)

let Mass of one Carbon-12 atom = 12 a.m.u

OR

12 a.m.u = Mass of one C-12 atom

$1\ a.mu = \frac{1}{12}$ (Mass of one C-12 atom)

Relative Molecular Mass

H_2O, CO_2, H_2, Cl_2

The relative molecular mass (or molecular weight) of an element or a compound is the number that represents how many times one molecule of the substance is heavier than 1/12 of the mass of an atom of carbon-12.

R·A·M

R·M·M

2 baar dekh ✓

2 Bina dekhe ✓

Hw

Relative Molecular Mass

a.m.u ⟷ u

The relative molecular mass (RMM) is obtained by adding together the relative atomic masses (atomic weights) of all the various atoms present in a molecule.

H_2 gas R.M.M = 1 a.m.u × 2

= 2 a.m.u OR 2u

R.M.M of H_2O

1u × 2 + 16u

2u + 16u = 18u

Relative Molecular Mass

- Mass of 2 atoms of hydrogen is $1 \times 2 = 2$ amu
- Mass of 1 atom of sulphur is 32 amu
- Mass of 4 atoms of oxygen is $16 \times 4 = 64$ amu
- So mass of H_2SO_4 is $2 \times 1 + 32 + 16 \times 4 = 98$ amu

H_2SO_4

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

$= 98\ u$

Percentage composition

$CaCO_3$ = 100 a.m.u

% by wt.

Percentage composition of a compound is the percentage by weight of each element present in it.

$$\text{Percentage of an element in a compound} = \frac{\text{Total wt. of the element in one molecule (Hydro)}}{\text{Gram molecular weight of the compound}} \times 100$$

R.M.M of the compound

Note: Total percentage of all the elements in a compound is 100.

$$\frac{90}{100} \times 100 = 90\%$$

$$\frac{\text{Mark ob.}}{\text{Total Mark}} \times 100$$

Question

Calculate percentage of hydrogen in water.

Given that the relative atomic masses (in amu)) of H = 1, O = 16.

H_2O

$1 \times 2 = 2$

H_2O

R.M.M (total) = 18 a.m.u

% Composition of Hydrogen in $H_2O = \frac{2}{18} \times 100$

$= 11.11\%$

Solution

Relative molecular mass of H_2O

$= 1 \times 2 + 16$

$= 18$ u

Since 18 g of water contains 2 g of hydrogen

$\therefore$ 100 g of water contains $\frac{2}{18} \times 100 = 11.11$ g of Hydrogen

u ⟷ g

amu ⟷ g

18u ⟷ 18g

gram atomic Mass

gram Molecular Mass

Question

H.W

Calculate the percentage of nitrogen in urea NH_2CONH_2.

Given: R.A.M. of N = 14, C = 12, O = 16, H = 1

NH_2CONH_2

Empirical Formula of a Compound

The empirical formula of a compound is the formula which gives the simplest whole number ratio of atoms of different elements present in one molecule of the compound.

Molecular formula = H_2O_2 (Hydrogen peroxide)

(Real no. of Atom)

↓

Empirical formula → (HO)

1u + 16u = 17u → Empirical formula Mass

Molecular formula → $C_6H_{12}O_6$ → Molecular Mass

CH_2O

Empirical formula mass

$= 12 + 2 \times 1 + 16$

$6 : 12 : 6$

$1 : 2 : 1$ (CH_2O) Empirical formula

↳ Empirical formula Mass

Calculation of Empirical Formula

Step 1. Conversion of mass per cent to grams.

Step 2. Convert into number moles of each element.

Step 3. Divide each of the mole values obtained above by the smallest number amongst them.

Step 4. Write downtheempirical formulaby mentioning the numbers after writing the symbols of respective elements.


KAUN BANEGA
Chemoपुत्र
KAUN BANEGA

Question

What is the relative molecular mass of carbon dioxide (CO_2)?
(Atomic masses: C = 12, O = 16)

A 32

B 28

C 44

D 30

CO_2

$12u + 16u \times 2$

$= 44u$

Question

What is the molecular mass of methane (CH_4)?
(Atomic masses: C = 12, H = 1)

CH4

A 14

B 15

C 16

D 17

CH4

12 + 1x4

= 12 + 4 = 16

Question

Find the molecular mass of ammonia (NH_3).
(Atomic masses: N = 14, H = 1)

A 17

B 18

C 16

D 15

NH_3

$14 + 1 \times 3$

$14 + 3 = 17u$

Question

What is the relative molecular mass of sodium chloride (NaCl)?
(Atomic masses: Na = 23, Cl = 35.5)

A 58·5

B 57.5

C 56

D 59

Nacl (salt)

23u + 35·5

= 58·5

Question

What is the molecular mass of oxygen gas (O_2)?
(Atomic mass of O = 16)

A 16

B 32

C 18

D 48

$O_2 = 16u \times 2$
$= 32$

Question

What is the molecular mass of nitrogen gas (N_2)?
(Atomic mass of N = 14)

H.W

A 14

B 28

C 30

D 24

Question

What is the molecular mass of calcium carbonate ($CaCO_3$)?
(Atomic masses: Ca = 40, C = 12, O = 16)

A 100

B 80

C 74

D 98

$CaCO_3$

$40 + 12 + 16 \times 3$

$= 100$ A.m.u/u

Question

What is the molecular mass of glucose ($C_6H_{12}O_6$)?
(Atomic masses: C = 12, H = 1, O = 16)

H.W

A 180

B 160

C 172

D 162

Question

What is the molecular mass of sulfuric acid (H_2SO_4)?
(Atomic masses: H = 1, S = 32, O = 16)

H.W

A 94

B 98

C 100

D 96

Homework

H.W ✓✓

Task ✓✓

R.A.M
R.M.M
} 3 Que } solve


BHARTI MAAM
JOIN MY OFFICIAL TELEGRAM CHANNEL
Physics Wallah
@CHEMISTRYBYBHARTIMAAM


8:00
50%
YT → 6:00 pm
$\bar{O}H$ ion Polyatomic
H_2O_2
Thank You