YAKEEN

Some Basic Concepts of Chemistry & Redox reaction

BY 'AMIT MAHAJAN SIR'

Experience and Achievements

- 18+ years of teaching experience
- Worked as H.O.D of chemistry JEE Wing
- Ex Professor & Academic Head (Non-Medical) in Aakash Institute.
- Ex Professor & H.O.D. of Chemistry in Sri Chaitanya Institute
- UGC NET Qualified (AIR 67)
- GATE Qualified (AIR 511)
- Mentored many single digit and double digit ranks in (IIT-JEE, NEET, AIIMS, JEE-Main, KVPY and Olympiads)

Books To Be Reffered



① Problems in Physical Chemistry for NEET by N. awasthi (SBT Publication)

② PW modules

③ NCERT at your fingertips (mtg publications)


④ NCERT must

⑤ NCERT exemplar

Strategy ÷ How to study in whole year

① Classes → regularly

② Revision → D.P.P.

③ Practise → D.P.P.

④ Test → regularity

⑤ Goldust

⑥ Quality

D.P.P. → 15Q

30 min →

10 p.m. ⟶ 2 p.m.

$P = \frac{W}{t}$ ✓

Ch-1

1, 2, 3, 4 ✓

Ch-8

Ch-1 to Ch-7

Particles → 3 types

AMIt

- Atoms
- Molecules
- Ions

Na

HNO_3

SO_4^{2-}

H_2

Atoms

Smallest particle of an element which may or may not have independent existance

H → 1 atom of Hydrogen

but it does not thv independent existance

H_2

Cl_2

Cl → 1 atom of Chlorine

it does not thv independent existance.

He, Ne, Ar, Kr, Xe, Rn
Na

→ they all have independent existance

↓

1 atom of He

P → 1 atom of Phosphorous P_4

S → 1 atom of Sulphur S_8

O → 1 atom of oxygen O_2

Family Ram

2 year old → Sonu

↓

does not hv independent existance

Family Shyam

25 years

↓

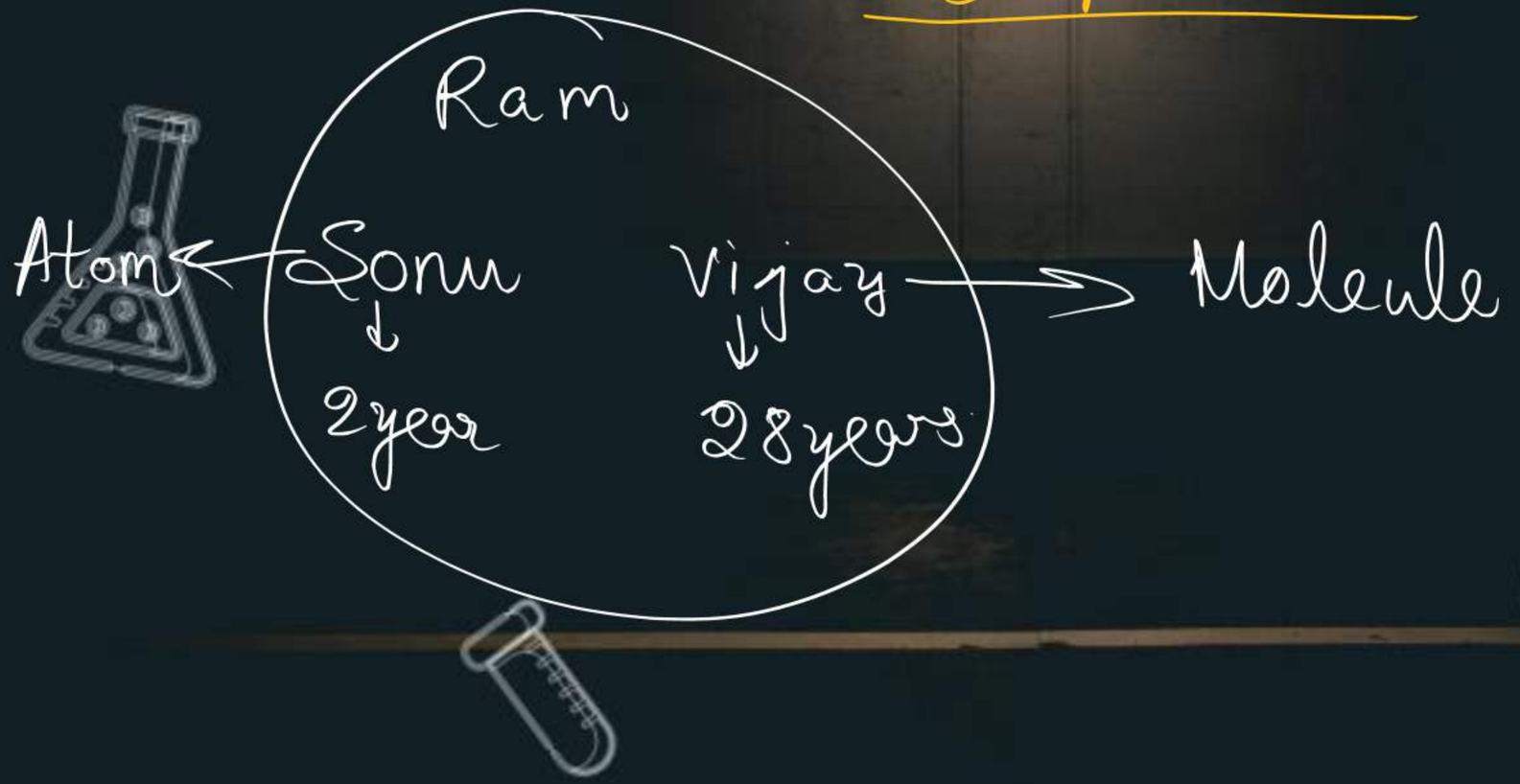
Monu → atom & Molecule

↓

it has independent existance

Molecules

Smallest particle of element / Compound which must have independent existance.



Hydrogen → H_2 → 1 molecule of Hydrogen.

↳ H → 1 atom of Hydrogen.

Helium → He
↳ He

} → Both atom & molecule are same.

Sulphur → atom → S

↳ molecule → S_8

1 molecule of Sulphur has atoms = 8

Chlorine → atom → Cl

↳ molecule → Cl_2

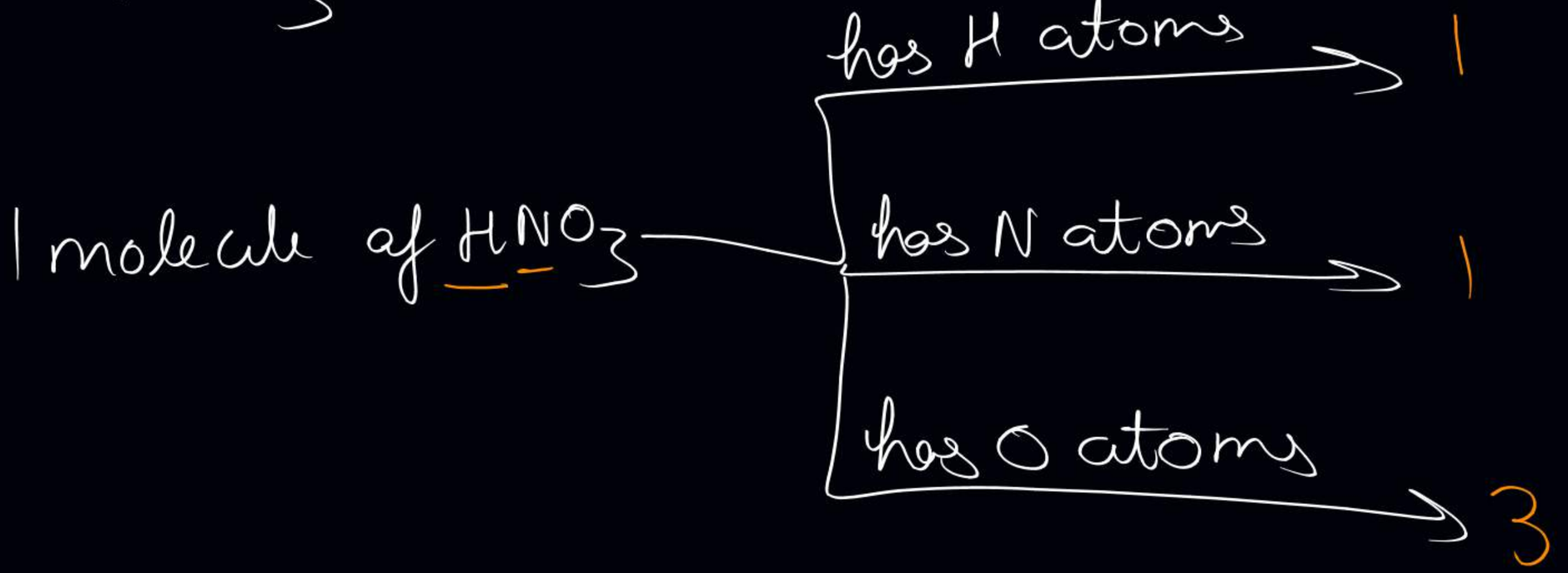
1 molecule of Chlorine has atoms = 2

Water → H_2O → 1 molecule of water

1 molecule of water has 2 atoms of Hydrogen

1 " " " " " 1 atom of oxygen.

HNO_3 (Nitric acid → 1 molecule)



1 molecule of HNO_3 has total atoms = 5

H_2SO_4

1 molecule of H_2SO_4 — has H atoms → 2
— has S atoms → 1
— has O atoms → 4

1 molecule of H_2SO_4 has total atoms = 7

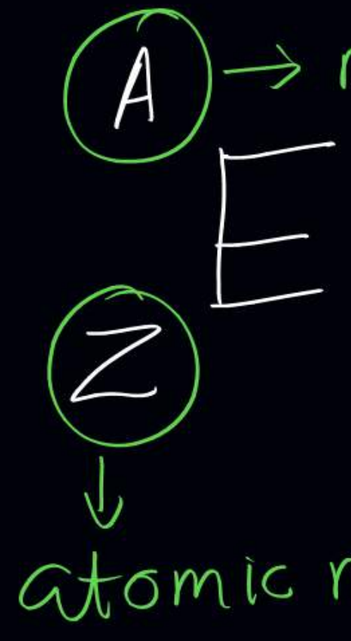
10 molecule of H_2SO_4 has total atoms = $7 \times 10 = 70$

Ions

Ions - Charged particles → formed after gaining or lossing an electron.

2 types ions

- Cation → when electron is lost
  - ↓
  - (+)vely Charged
- Anion → when electron is gained
  - ↓
  - (−)vely Charged



E = element.

Z = atomic no. = no. of Protons

atom or molecule

no. of Protons = no. of electrons

no. of neutrons = A − Z

$^{23}_{11}Na$

$Z = 11$

$A = 23$

no. of Protons $= Z = 11$

no. of electrons $= 11$

no. of neutrons $= A - Z$

$= 23 - 11 = 12$

Atom

$Na \longrightarrow$ Cation $Na^+ + 1e^-$

- ✓ 11 P
- ✓ 11 e^-
- 12 neutrons

Cation:
- 11 P
- 10 e^-
- 12 neutrons

Charge on electron $= -1.6 \times 10^{-19}$ C

$^{23}_{11}Na^+$

$Cl + 1e^- \longrightarrow Cl^{-1}$

Chlorine atom

17 P

17 e^-

Chloride ion

17 P

18 e^-

$^{35}_{17}Cl$

NH_2^- , SO_4^{2-}

Find no of atoms in a molecule

ⓐ HNO_3 ⓑ H_2SO_4 ⓒ CO_2 ⓓ NH_3

ⓐ HNO_3 → 1 molecule

1 atom of Hydrogen

1 atom of Nitrogen

3 atoms of oxygen

ⓑ H_2SO_4

1 molecule of H_2SO_4 has 2 atoms of Hydrogen

1 atom of Sulphur

4 atoms of oxygen

© CO_2

↓

1 molecule of CO_2 → has total 3 atoms

has 1 atom of Carbon

has 2 atoms of Oxygen

Question - Find number of atoms of each element and total no of atoms in 10 molecules of water?

Ans $1\ H_2O$

↓

10 molecule of H_2O has 20 atoms of Hydrogen & 10 atom of oxygen & total atoms = 30

Find no of Protons, Electrons & Neutrons in particle

no of protons in particles $= \sum$ Z of each element $\times$ no of particles of each element

$^{14}_{7}N$ ✓

no of protons = no of electrons

per same atom & molecule

no of Protons in N atom $= 7 \times 1 = 7$

no of electrons in N atom $= 7$

NO_2

$^{14}_{7}N$, $^{16}_{8}O$

no. of Protons in One molecule

$= 7 \times 1 + 8 \times 2 = 23 =$ no. of electrons in 1 molecule of NO_2.

NO_2^+ $\quad {}^{14}_{7}N, \; {}^{16}_{8}O$

no of Protons in 1 ion of NO_2^+

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

No. of neutrons $= \sum (A - Z) \times$ no. of particles

in atom, molecule

ions.

$^{19}_{9}F$

No. of neutrons $= 10 \times 1 = 10$

in atom of Fluorine

CO_2

C: 12 ✓ → 6 ✓ ✓

O: 16 ✓ → 8 ✓

no of neutrons in 1 molecule of CO_2

$= 6 \times 1 + 8 \times 2 = 22$

$$\text{no. of electrons} = \sum Z \times \text{no. of particles} - C + A$$

C = Charge on Cation → (+)vely charged

A = Charge on Anion → (−)vely charged

NO_3^- $\quad {}^{14}_{7}N$, $\quad {}^{16}_{8}O$

no. of electrons in 1 ion of NO_3^-

$= (7 \times 1 + 8 \times 3) - 0 + 1 = 32$

Find number of electrons, protons and neutrons in

(a) $Cl \rightarrow$ no of P = 17 × 1

No. of electrons = 17

No of neutrons = (35 − 17) × 1 = 18

35 Cl 17

(b) Cl_2

No. of Protons = 17 × 2 = 34

No. of electrons = 34 | No. of neutrons = 18 × 2 = 36

(c) Cl^-

No. of protons in Cl^- = 17 × 1 = 17

No of neutrons in Cl^- = 18 × 1 = 18

no. of electrons in Cl^- = $17 \times 1 - C + A$

= $17 \times 1 - 0 + 1 = 18$

(d) HNO_3

no of Protons in $HNO_3 = 1 \times 1 + 7 \times 1 + 8 \times 3$

$= 32$

no of electrons in $HNO_3 = 32$

no of neutrons in $HNO_3 = 0 \times 1 + 7 \times 1 + 8 \times 3$

$= 32$

H: 1, 1

N: 14, 7

O: 16, 8

32, 32, 16

(e) SO_4^{2-} $\quad {}^{32}_{16}S$, ${}^{16}_{8}O$

no. of protons in $SO_4^{2-} = 16 \times 1 + 8 \times 4 = 48$

no. of electrons in $SO_4^{2-} = 48 - 0 + 2 = 50$

no. of neutrons in $SO_4^{2-} = 16 \times 1 + 8 \times 4 = 32$

(g) H_2SO_4

$^{1}_{1}H$, $^{32}_{16}S$, $^{16}_{8}O$

THANK YOU !!

YAKEEN