SAFALTA CLASS™

An Initiative by अमर उजाला

DELHI POLICE
CONSTABLE

By

ONE OF THE MOST EXPERIENCED
FACULTY TEAM FROM DELHI

100+ Hrs | 60 Days

DELHI POLICE – CONSTABLE - 60 DAYS COURSE

NEW BATCH STARTS 17th AUGUST 2020

Session Time - SESSION -1: 3:30 PM TO 4:30 PM & SESSION- 2: 5: 00 - 6:00 PM

Course *Benefits*

SAFALTA CLASS™
An Initiative by अमर उजाला

- Live Interactive Classes on Zoom
- Accessible from Desktop or Mobile
- Access to recorded classes
- Weekly mock tests to evaluate progress
- PDF Study material to boost your preparation
- Special Q&A Sessions
- Daily Current Affairs
- Special Vocabulary Sessions
- Dedicated Telegram group
- Personalized Counselling Sessions

For more details follow the link or Scan the QR Code

https://bit.ly/33MNcpb

ATOM

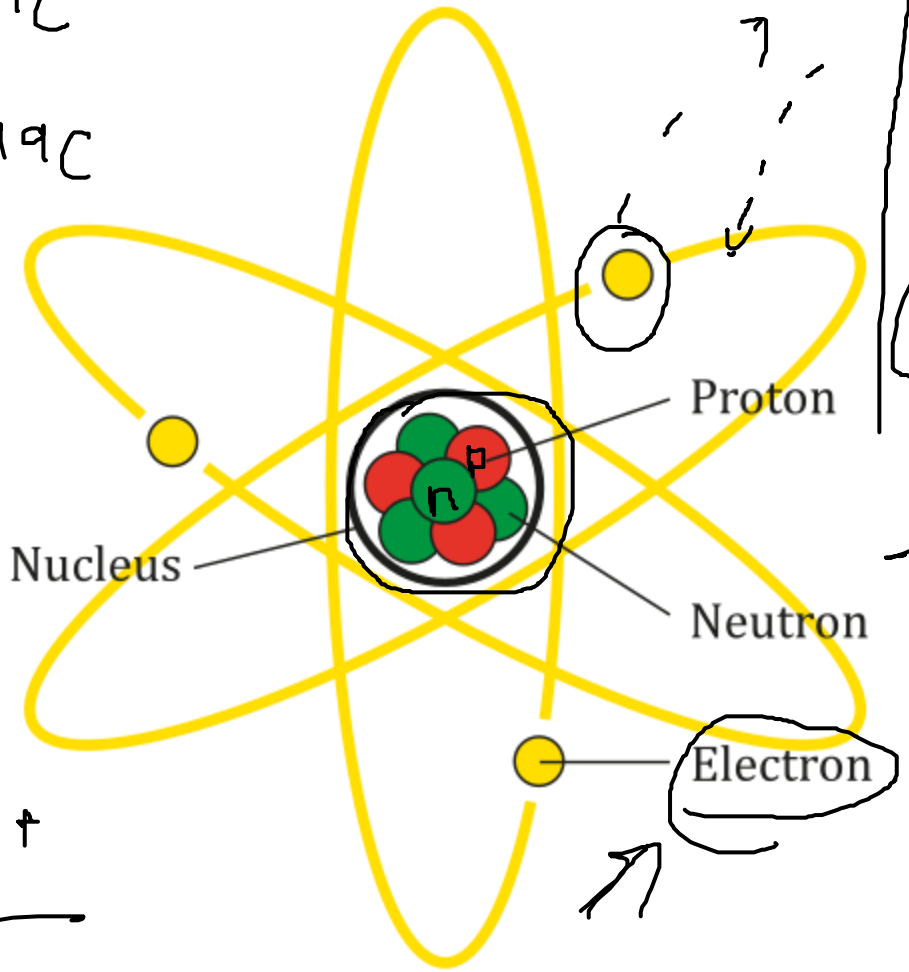
Neutron ⇒ charge 0

proton ⇒ $+1.6 \times 10^{-19} C$

electron ⇒ $-1.6 \times 10^{-19} C$

Atom ⇒ Neutral

No. of e^- = No. of p^+



Atom ⇒ (+ve)
(e^- emitted)

Atom → (-ve)
(e^- enters)

(1, 2, 3) ✓ Metal ⇒ < 4e⁻ (outermost orbit)

(5, 6, 7) Non-metal ⇒ > 4e⁻ (" ")

(4) Metalloids ⇒ = 4e⁻ (" ")

Octate ⇒ valance shell ⇒ (8)

Table 4.1: Composition of Atoms of the First Eighteen Elements with Electron Distribution in Various Shells

Name of Element	Symbol	Atomic Number	Number of Protons	Number of Neutrons	Number of Electrons	Distribution of Electrons				Valency
						K	L	M	N	
Hydrogen	H	1	1	-	1	1	-	-	-	1
Helium	He	2	2	2	2	2	-	-	-	0
Lithium	Li	3	3	4	3	2	1	-	-	1
Beryllium	Be	4	4	5	4	2	2	-	-	2
Boron	B	5	5	6	5	2	3	-	-	3
Carbon	C	6	6	6	6	2	4	-	-	4
Nitrogen	N	7	7	7	7	2	5	-	-	3
Oxygen	O	8	8	8	8	2	6	-	-	2
Fluorine	F	9	9	10	9	2	7	-	-	1
Neon	Ne	10	10	10	10	2	8	-	-	0
Sodium	Na	11	11	12	11	2	8	1	-	1
Magnesium	Mg	12	12	12	12	2	8	2	-	2
Aluminium	Al	13	13	14	13	2	8	3	-	3
Silicon	Si	14	14	14	14	2	8	4	-	4
Phosphorus	P	15	15	16	15	2	8	5	-	3.5
Sulphur	S	16	16	16	16	2	8	6	-	2
Chlorine	Cl	17	17	18	17	2	8	7	-	1
Argon	Ar	18	18	22	18	2	8	8		0

Atomic Mass and Valency of First 30 Elements

ELEMENT	ATOMIC NUMBER	ATOMIC MASS	VALENCY
Hydrogen	1	1.0079	(-1), +1
Helium	2	4.0026	0
Lithium	3	6.941	+1
Beryllium	4	9.0122	+2
Boron	5	10.811	-3, +3
Carbon	6	12.0107	(+2), +4
Nitrogen	7	14.0067	-3, -2, -1, (+1), +2, +3, +4, +5
Oxygen	8	15.9994	-2
Fluorine	9	18.9984	-1, (+1)
Neon	10	20.1797	0
Sodium	11	22.9897	+1
Magnesium	12	24.305	+2
Aluminum	13	26.9815	+3
Silicon	14	28.0855	-4, (+2), +4
Phosphorus	15	30.9738	-3, +1, +3, +5
Sulfur	16	32.065	-2, +2, +4, +6
Chlorine	17	35.453	-1, +1, (+2), +3, (+4), +5, +7
Argon	18	39.948	0
Potassium	19	39.0983	+1
Calcium	20	40.078	+2
Scandium	21	44.9559	+3
Titanium	22	47.867	+2, +3, +4
Vanadium	23	50.9415	+2, +3, +4, +5
Chromium	24	51.9961	+2, +3, +6
Manganese	25	54.938	+2, (+3), +4, (+6), +7
Iron	26	55.845	+2, +3, (+4), (+6)
Nickel	27	58.6934	+2, +3, (+4)
Cobalt	28	58.9332	(+1), +2, (+3), (+4)
Copper	29	63.546	+1, +2, (+3)
Zinc	30	65.39	+2

CHARGED PARTICLES

⇒ आवेशित कण

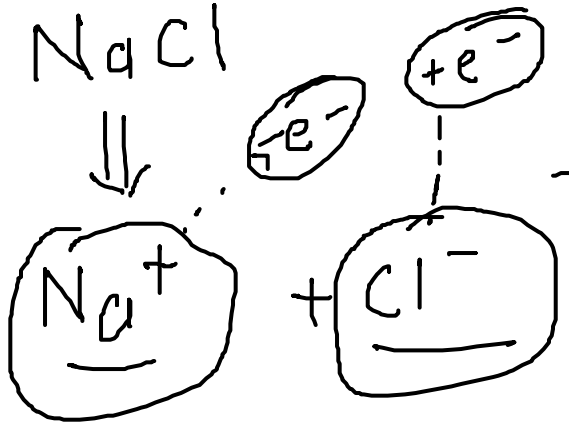
ions

⇒ Metal + Nonmetal ⇒ compound (ionic compound)

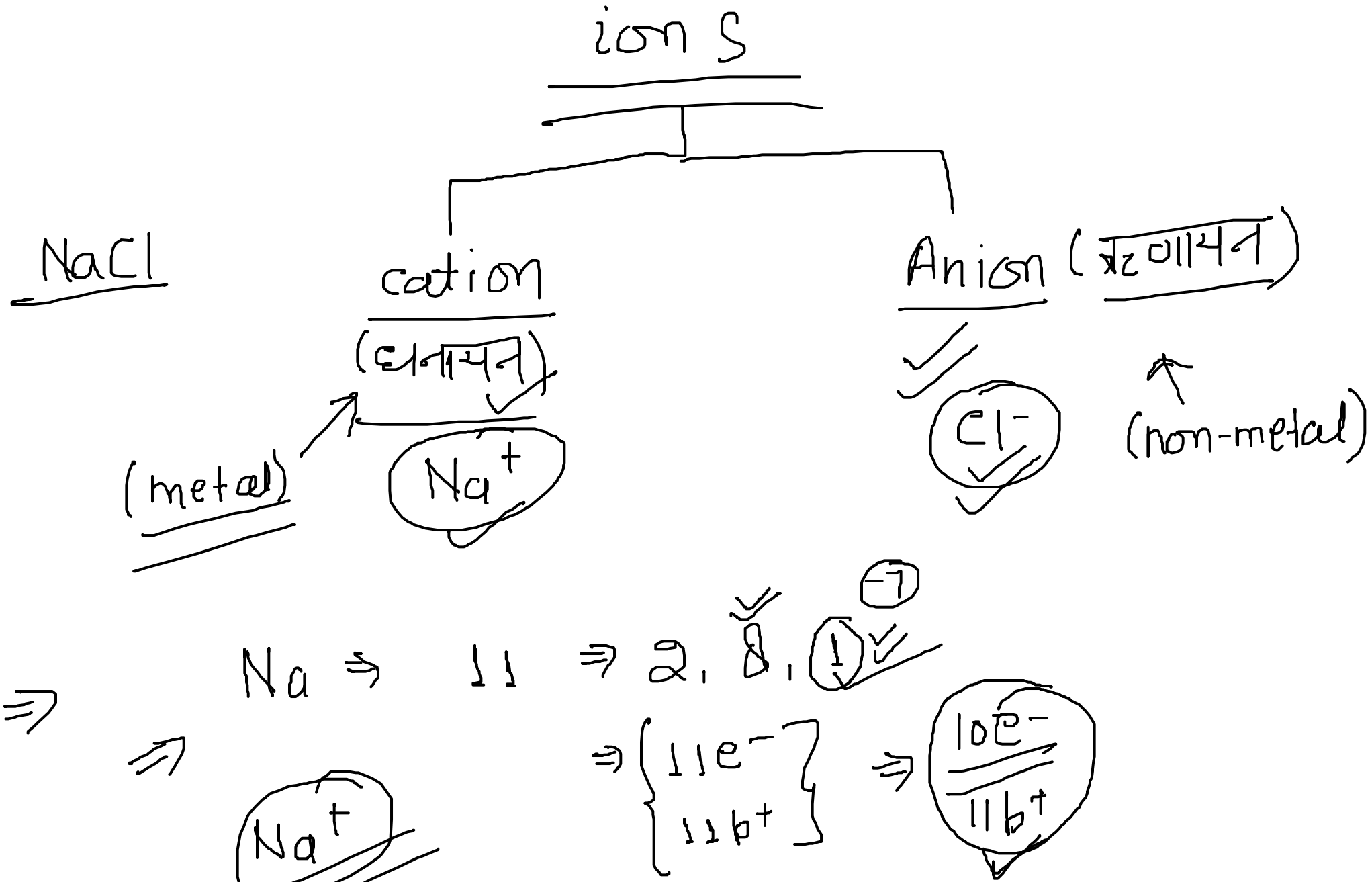
e.g.. Na + Cl ⇒ NaCl

Na ⇓ metal

Cl ⇓ non-metal



आयनिक यौगिक


ions
NaCl
cation
(धनायन)
Anion (ऋणायन)
(metal)
Na+
Cl-
(non-metal)
Na ⇒ 11 ⇒ 2, 8, 1
-1
⇒
⇒
Na+
⇒ { 11e-
11p+ }
⇒ 10e-
11p+

$Mg \Rightarrow 12 \Rightarrow 12e^-$

$12p^+$

$> 2, 8, 2$

$Mg^{2+} \Rightarrow$ $12p^+$, $10e^-$

$\Rightarrow$ Anion:- $Cl \Rightarrow 17 \Rightarrow 2, 8, 7$ ($1e^-$)

$\Rightarrow 17e^-] = 0$

$17p^+]$

$Cl^- = \frac{18e^-}{17p^+} \Rightarrow Cl^-$

$(N-m)$

$N \Rightarrow 7 \Rightarrow 2, 5$

metal

Na^{+}

Mg^{2+}

Al^{3+}

non-metal

$\Rightarrow$ Cl^{-} [chloride]

O^{-2} [oxide]

N^{-3} [Nitride]

e.g:-

$3NaN$

m

Na^{+}

Na^{+}

Na^{+}

h-w

N^{-3}

$\Rightarrow Na_3N$ $\Rightarrow$ Sodium Nitride

Na^{+} → O^{-2}

Na^{+}

$\Rightarrow Na_2O$ (Sodium oxide)

Na_2O

$\Rightarrow Al^{3+}$ O^{2-}

$\Rightarrow Al_2O_3$

✓

Al^{3+} O^{-2}

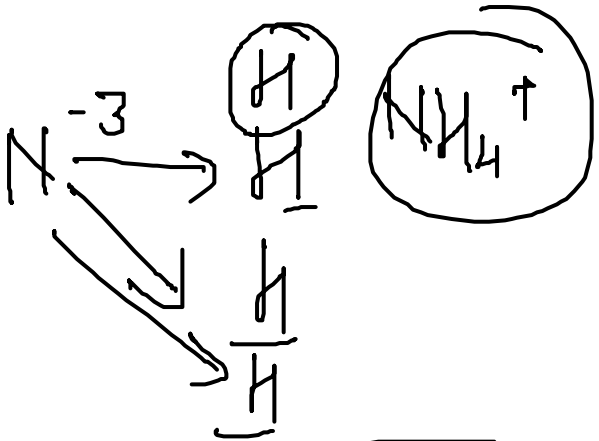
Al_2O_3

$N^{-3} - H^{+}$, H^{+}, H^{+} $\Rightarrow$ NH_3

Polyatomic Ions

(बहुपरमाणविक आयन)

e.g.:-

Ammonium $\Rightarrow$ NH_4^{+} $\Rightarrow$ 

NH_4^{+}

Sulphate $\Rightarrow$ SO_2^{4-}

Sulphite $\Rightarrow$ SO_3^{2-}

Sulphide $\Rightarrow$ S^{-2}

Carbonate $\Rightarrow$ CO_3^{-2}

Phosphate $\Rightarrow$ PO_4^{-3}

e.g.. Copper [II] Sulphate

Cu^{2+} SO_4^{2-}

$CuSO_4$ ⇒ Blue vitriol (Cupric Sulphate)

(नीला थोथा)

⇒ Copper (I) Sulphate

Cu^{+} SO_4^{2-} ⇒ Cu_2SO_4 ⇒ Cuperous Sulphate

* Ammonium Chloride:-

⇒ NH_4^+ Cl^-

NH_4Cl (नौसादर)

⇒ Ca^+ CO_3^-

$CaCO_3$

Imp.

MOLE CONCEPT

1. Molecular Mass (आणविक द्रव्यमान)
2. Molar Mass (मोलर द्रव्यमान)
3. Equivalant Weight (तुल्यांकी भार)
4. Mole Concept (मोल अवधारणा)
5. Molarity (मोलरता)
6. Molality (मोललता)
7. Normality (नार्मलता)

* N (Atom) = At. mass ⇒ 14 unit ⟶ 1 Atom of N

N_2 (Gas) = 2N ⇒ 28 unit ⟶ 1 molecule of N_2 Gas

mass of Atom

↳ mass of molecule

N = 14 unit ⇒ 14 gm = M = 1 mole of N atom

= 6.022 × 10^{23} No. of atom of N

N_2 = 28 unit = 28 gm = M = 1 mole of N_2 molecules

⇒ O ⇒ A.W. ⇒ 16 unit ⇒ Atomic weight (mass)

⇒ 16 gm = M = 1 mole of O atom

O_2 ⇒ molecular mass = 32 unit ⇒ 1 molecule

= 32 gm ⇒ M ⇒ 1 mole of O_2 molecule

1 Dozon = 12 Banana

1 mole = 6.022×10^{23}

= N_A = Avogadro Number

$\Rightarrow H_2O \Rightarrow 2H + O$

$\Rightarrow 2u + 16u = 18u$ (molecular mass) H_2O

18g = M = 1 mole of H_2O molecules

= = 6.022×10^{23} H_2O molecule

$H_2SO_4 \Rightarrow$ $2H + S + 4O$

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

$\Rightarrow 2u + 32u + 64u \Rightarrow$ 98 unit

$\Downarrow$

molecular mass of H_2SO_4

$\Rightarrow 98$ gm $\Rightarrow$ M = 1 mole of H_2SO_4 molecule

$= 6.022 \times 10^{23}$ No. of H_2SO_4 molecules

Molar mass ⇒ gm में (व्यवहार)

molecular mass a unit में (व्यवहार) ($N_2, O_2 \Rightarrow H_2$)

Atom mass ⇒ unit

(H, N, O,)

Mole Concept

$$\Rightarrow (1)\ n = \frac{m}{M} = \frac{(\text{mass given to us})}{(\text{molar mass})}$$

$$(2)\ n = \frac{N}{N_A} = \frac{(\text{No. of molecules Given})}{(\text{Avogadro No.})}$$

[No. of moles]

$$\frac{m}{m} = \frac{N}{N_A} \Rightarrow (3)\ N = N_A \cdot \frac{m}{M}$$

① How many No. of moles present in 28 gm of N atom?

$n = ?$

$$n = \frac{m}{M} = \frac{28}{}$$

$N \Rightarrow$ 14 unit

molar mass $\Rightarrow$ 14 gm

$$n = \frac{28}{14} = 2 \Rightarrow n = 2$$

$\Rightarrow$ No. of molecules:- $N = N_A \frac{m}{M} \Rightarrow 6.022 \times 10^{23} \times \frac{2}{28}$

$$N = 12.044 \times 10^{23}$$

Q2: 176 gm of CO_2 ⇒ (i) No. of moles ?

(ii) No. of molecules ?

$CO_2 \Rightarrow C + 2O \Rightarrow 12 + 32 = 44$ unit

$= 44$ gm

(i) $n = \frac{176}{44} = 4$

(ii) $\Rightarrow N = 6.022 \times \frac{176}{44}$

$= 24.088 \times 10^{23}$

*

Equivalant Weight

$$\text{Eq. Wt.} = \frac{\text{Molecular Weight}}{\text{X factor}}$$

⇒ X factor →

Acid

Base

Salt

Total Positive charge on cation

e.g.:- H_2SO_4 → Eq. wt?

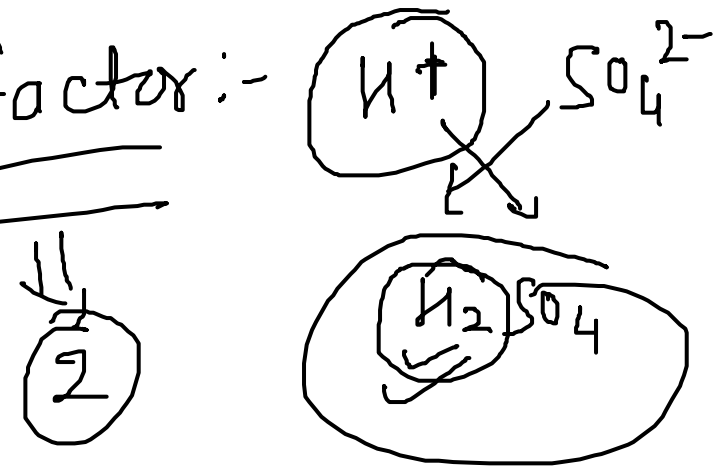
Acid ⇒ H_2SO_4 ⇒

$$\text{Eq. Wt} = \frac{\text{molecular mass}}{X}$$

mol. mass ⇒ 2H + S + 4O

⇒ 2 + 32 + 64 ⇒ 98 gm

X factor:-



$$\text{Eq Wt.} = \frac{98}{2} = 49 \text{ gm}$$

* HCl

$\Rightarrow$ mol. mass

$\Rightarrow H + Cl$

$\Rightarrow 1 + 35.5$

$M \Rightarrow 36.5\ gm$

X factor $\Rightarrow$ H^+ $Cl^- \Rightarrow 1\ H^+$

$$Eq.\ W. = \frac{36.5}{1} = 36.5\ gm$$

* $(COOH)_2 \cdot 2H_2O$ [oxalic Acid]

H_2O ⇒ H^+X

Eq. wt = ? $[C_2H_2O_4 \cdot 2H_2O]$

$\Rightarrow 2[12 + 32 + 1] + 2[2 + 16]$

$\Rightarrow$ 126 gm

X-factor $\Rightarrow \frac{126}{2} = 63$ gm

e.g:- NaOH → eq. Wt?

⇒ M. = 23 + 16 + 1

⇒ 40 gm

X - factor:- Eq. Wt = $\frac{40}{1}$

= 40 gm

$Ca(OH)_2 \Rightarrow$ Base

$M = 74$

X-Factor = 2

$Eq\ W = \frac{74}{2}$

$= 37$

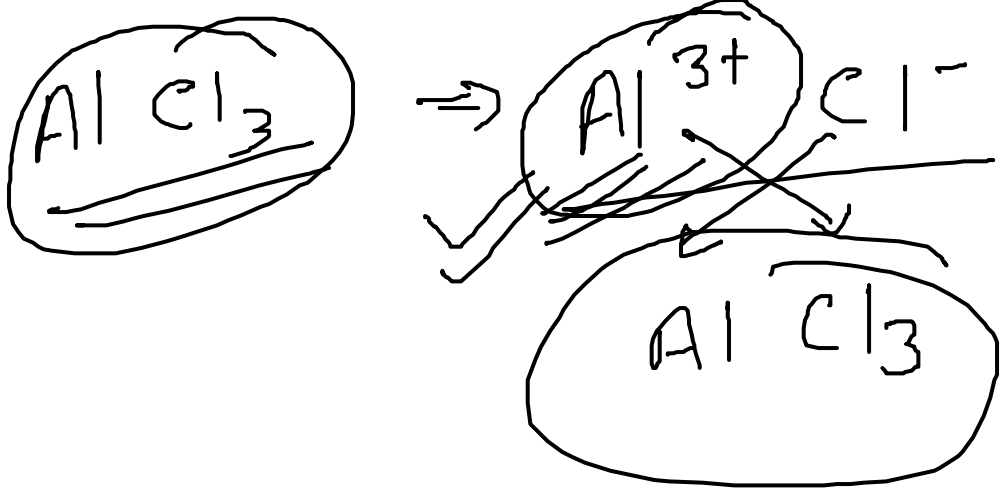
* Salt :- [NaCl]

$M = 23 + 35.5$

$= 58.5\ gm$

X-factor :- $Na^{+} + Cl^{-}$ $\Rightarrow \frac{58.5}{1}$

$Eq. = 58.5$



$$m \Rightarrow \frac{27 + 3 \times 35.5}{3}$$

$$\Rightarrow \frac{133.5}{3}$$

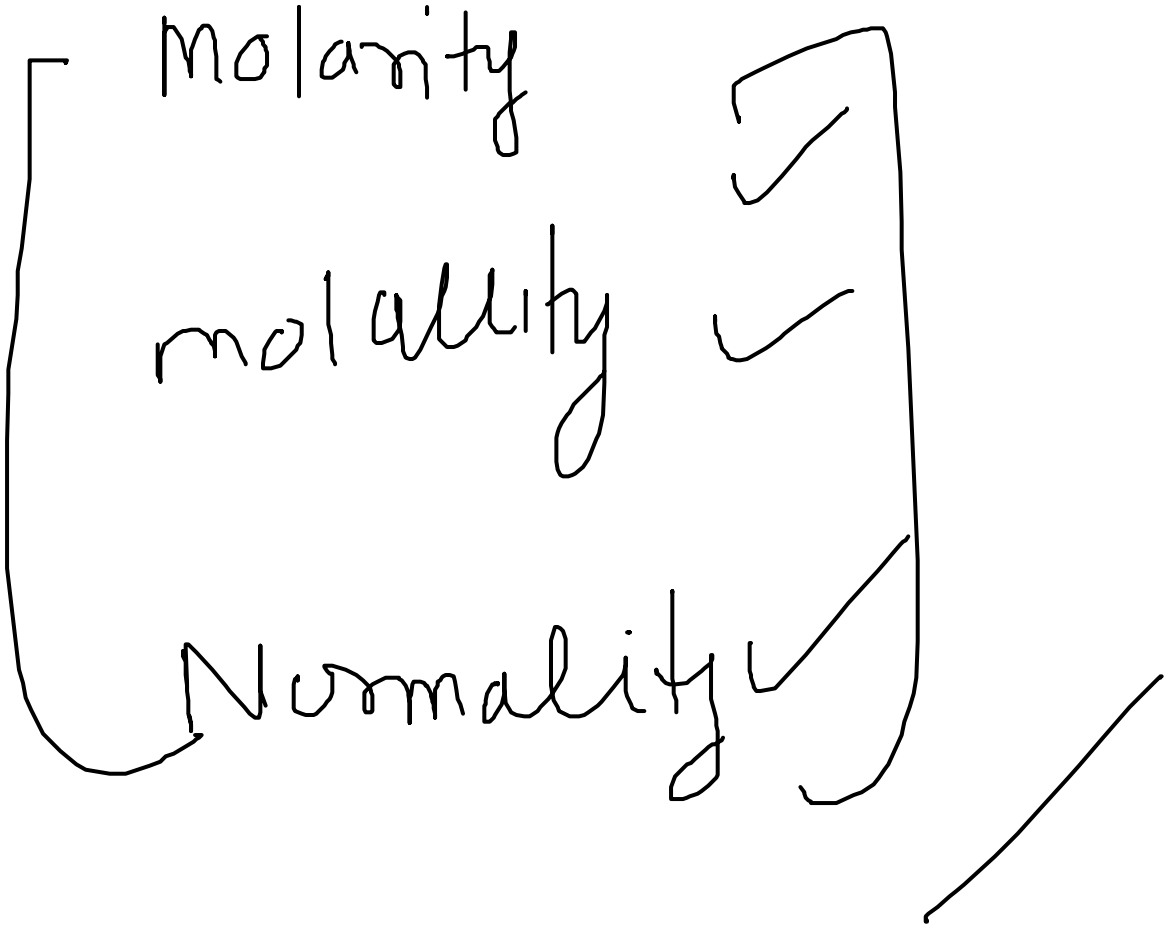
$$= \checkmark$$

$\Rightarrow$ H_2SO_4 + NaOH $\longrightarrow$ $NaHSO_4$ + H_2O

Eq. Wt = ?

M = 98 gm

X-factor $\Rightarrow$ $\frac{98}{1}$ = 98 gm


Molarity
molality
Normality

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