Mole Concept

Some Basic Concepts of Chemistry

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① Law of Combinations — 3Q
② Mole concept — 28Q.
③ EF and MF — 6Q.
④ Stio. calculation — 14Q.
⑤ Significant Figures — 1Q

• Law of Combinations:

I. Law of conservation of mass.

① Matter neither created nor destroyed during chemical rxn.

$4Fe + 3O_2 \longrightarrow 2Fe_2O_3$ [100% Balanced]

② Total mass of R = Total mass of P.
Total no. of atoms in R = Total no. of atoms P.
Total no. of each atom in R = Total no. of each atom in P.

- But total no. of molecules / no. of moles / Volumes of R and P may or may not be same.

II. Law of Definite / constant proportion:

① A compound prepared by whatever method / diff sources
→ % of element = constant / same.
→ mass ratio of atoms = constant / same.
→ In all samples, mass ratio, % element } constant / same.

III. Law of Multiple proportions:

① Two elements are chemically combine.
② One element mass fixed can combine with another element in a multiple ratio.

- Note:
  In law of D·P — % atom = same — mass ratio of atom = same
  In law of M·P — % atom = different - mass ratio of atom = multiple

IV. Law of combining values volumes / proportion.
Gay-Lussac's law /
Avagadro's law:

① Gases combine in a simple whole number ratio of their volumes under similar conditions of T and P.
② Volume ratio of R and P —— simple whole number
No of moles of R and P —— ratio and multiple ratio.
No of molecules R and P ——

- condition: All R and P should be in gaseous state.
  No of moles ∝ no. of molecules ∝ Volume.

- Emperical and Molecular Formulae:

Ⓘ MF = Tells about total no. of atoms.
EF = Ratio of atom.
If EF ⟶ same then % element = same.

Ⓘ How to calculate % of element:

$$\% = \frac{\text{at. wt}}{\text{m. wt}} \times 100$$

(III) Find EF with mass of element:

$$n = \frac{wt}{A \cdot wt}$$

(IV) Relation Between EF and MF:

MF = (n) EF $n \longrightarrow$ integer.

(V) Find EF from % of element:

$$\text{element} = \frac{\%}{At \cdot wt} = \text{simplest ratio}$$

- Mole Concept:

① 1 mole = 6×10^{23} atom / molecules / ions / $e^{\ominus}$ / p / n / .....

② 1 mole = Gram atomic wt of atom.

③ 1 mole = Gram molecular weight of molecule.

④ 1 mole of any gas at STP occupied by a volume = 22.4 L GMV

⑤ 1 mole = Atomic weight = one gram atom.
1 mole = Molecular weight = one gram molecule.

⑥ $n = \frac{wt}{\text{Atomic wt}}$ $n = \frac{wt}{\text{molecular wt}}$ $n = \frac{\text{given volume}}{22.4\ L}$

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$n = \frac{\text{given no. of Atom}}{6 \times 10^{23}}$: $n = \frac{\text{given no. of molecule}}{6 \times 10^{23}}$

- No. of atoms
  No. of molecules = $n N x$ = $N = 6 \times 10^{23}$
  No. of Ions
  No. of V.E

  x = Depend on Question
  n = moles

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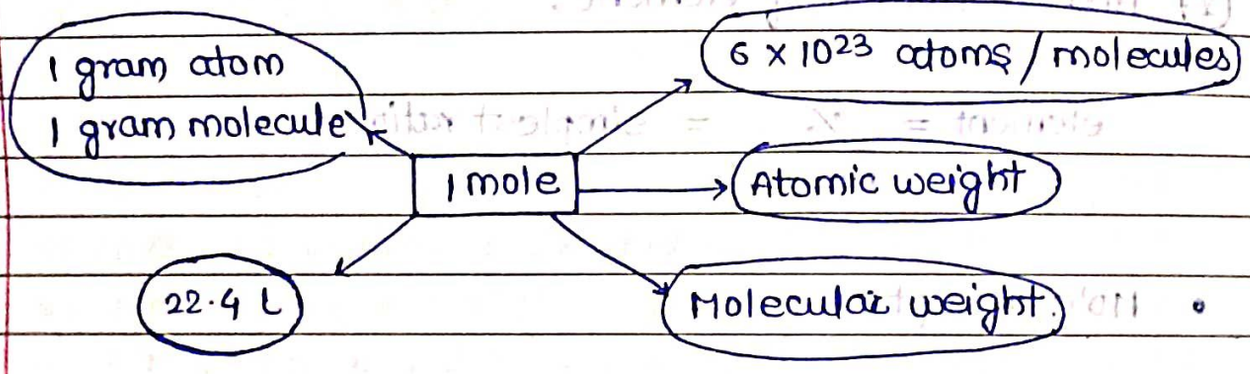

- Stiochemetry equations :

① Trick to Find Leamiting Reagent. —— calculate $\frac{\text{no. of moles}}{\text{sti. coefficient}}$

Highest Value = E.R

Lowest Value = L.R