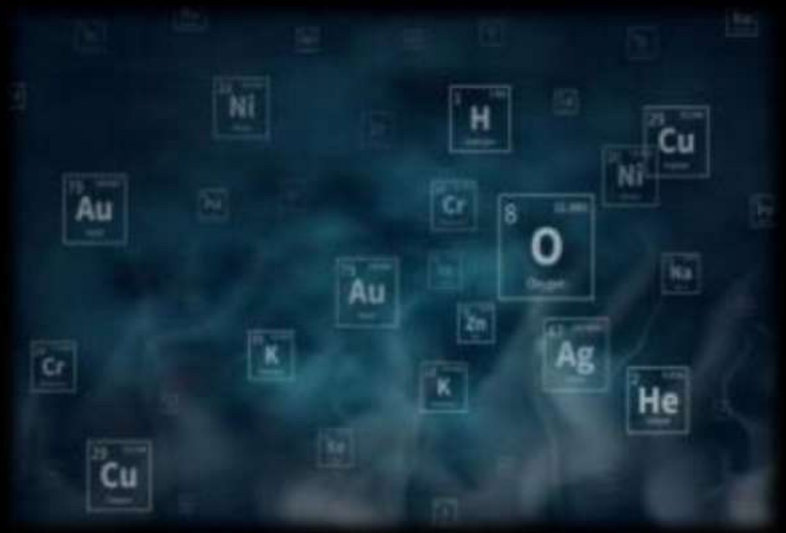
ARJUNA NEET BATCH

Classification of Elements & Periodicity in Properties



LECTURE-02

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Quick Revision:

① Lavisier ⟶ ② Döbereiner's Triad Law ⟶ ③ A.E.B. de Chancourtois (Cylindrical table)

(Li, Na, K)
(Ca, Sr, Ba)
(Cl, Br, I)
(K, Rb, Cs)
(P, As, Sb)
(S, Se, Te)

↓

④ Newlands' Law of Octaves (56)

↓

⑤ Lothar Meyer's Graph

(at wt. v/s at. volume)

Peaks → Alkali metals

Li
Na
K
Rb
Cs

→ (6) Mendeleev's Classificⁿ

(63)

(8 Groups, 7 Periods)

Objective of today's class

Modern Periodic Table

Limitations of Mendeleev's Table

(1) Anomalous Pair of Elements:

eg Co & Ni

(58.9) (58.7)

(2) Position of isotopes

↳ same at. no. but diff. mass no.

H

① $_{1}^{1}H$ ② $_{1}^{2}H$ ③ $_{1}^{3}H$ } → 3 diff. positions

C

^{12}C ^{13}C ^{14}C

6 6 6

Cl

$^{35}_{17}Cl$ $^{37}_{17}Cl$

H_2

H → $1s^1$

H → $H^+ + 1e^-$

H → non-metal

(3) Position of Hydrogen

$Li \xrightarrow{-1e^-} Li^+$

$Na \rightarrow Na^+$

$K \rightarrow K^+$

Rb

Cs

→ Valence $e^- = 1$

Group IA (Alkali metals)

Group VII A (Halogens)

$F \rightarrow F_2$

$Cl \rightarrow Cl_2$

$Br \rightarrow Br_2$

$I \rightarrow I_2$ (diatomic)

$1s^2 2s^2 2p^5$ $1s^2 2s^2 2p^6$

F ⟶ Ne

Cl ⟶ Ar

Br ⟶ Kr

I ⟶ Xe

H ⟶ He

$1s^1$ $1s^2$

$+1e^-$ → H^-

(4) Like elements were placed in diff. groups & unlike elements were placed in same group.

(5) It was difficult to predict the no. of elements to be discovered b/w two elements on the basis of at. mass.

	A			B
at. mass	42.6 u	42.8	~~43.2~~ 43.6	47.8 u

	A			B
atomic no	21	22	23	24

2 elements

Questions:

1. Mendeleev's periodic law is based on -

(1) Atomic number
(2) Atomic weight
(3) Number of neutrons
(4) None of the above

2. The first attempt to classify elements systematically was made by -

(1) Mendeleev (2) Newland (3) Lothar Meyer (4) Dobereiner

3. Atomic weight of an element X is 39, and that of element Z is 132. atomic weight of their intermediate element Y, as per dobereiner triad, will be

(1) 88.5 (2) 93.0 (3) 171 (4) 85.5

X 39
Y ?
Z 132

$Y \longrightarrow \frac{39+132}{2} = \frac{171}{2} = 85.5u$

4. Which of the following is not a dobereiner triad?

(1) Li, Na, K (2) Mg, Ca, Sr (3) Cl, Br, I (4) S, Se, Te

5. The law of triads is applicable to

(1) C, N, O (2) H, O, N (3) Na, K, Rb (4) Cl, Br, I

6. The law of triads is not applicable on

(1) Cl, Br, I (2) Na, K, Rb (3) S, Se, Te (4) Ca, Sr, Ba

7. Which of the following set of elements obeys Newland's octave rule?

(1) Na, K, Rb (2) F, Cl, Br (3) Be, Mg, Ca (4) B, Al, Ga

8. For which of the pair Newland octave rule is not applicable?

(1) Li, Na (2) C, Si (3) Mg, Ca (4) Cl, Br

9. Which element is named as (i) Eka-Silicon : Germanium (Ge)

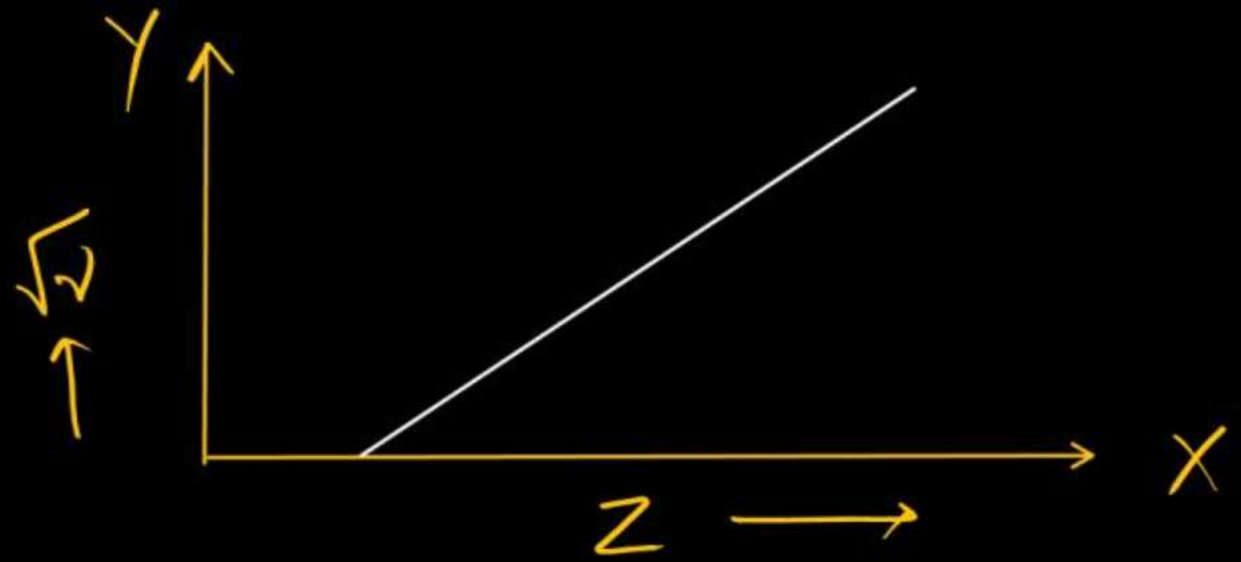
(ii) Eka-Aluminium? : Gallium (Ga)

- **Modern Periodic Table:**
  - was proposed by Henry Moseley
  - is based on atomic no. (Z)
  - Moseley did an experiment where he bombarded high speed e^- on metal surface & obtained X-rays.

$$\sqrt{\nu} = a(Z - b)$$

(a & b → constants)

ν → fregency Z → at. no. (no. of protons)



√ν v/s at. mass

Zig-Zag graph

Moseley concluded that at. no. is a more fundamental property than at. mass

At. No. (Z) forms the basis of Modern Periodic Table.

Modern Periodic Law: The physical & chemical properties of elements are a periodic function of their atomic no. (Z)

⇒ **Characteristics of Modern / Long form of Periodic Table:**

(1) There are 18 vertical columns i.e. 18 Groups

(2) There are 7 horizontal rows i.e. 7 periods

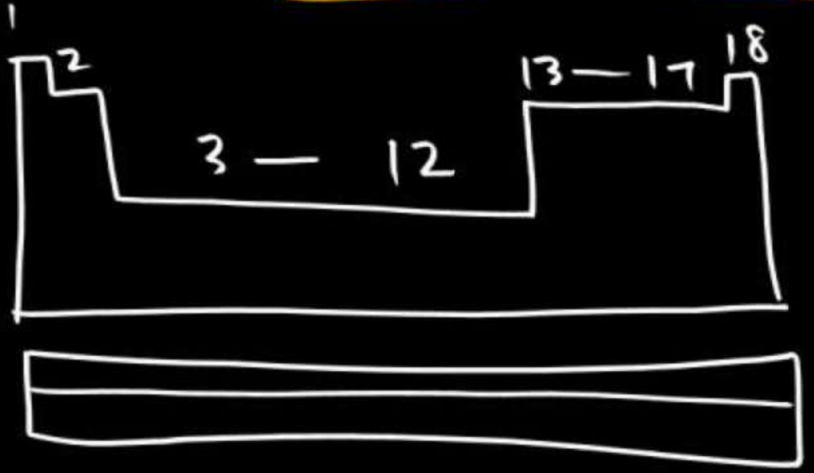
(3) Two rows ie. Lanthanide series & Actinide series are placed below the table.

f-block { Lanthanoids, Actinoids

Lanthanoids: $_{58}Ce - _{71}Lu$ = 14 elements (Cerium – Lutetium)

Actinoids: $_{90}Th - _{103}Lr$ = 14 elements (Thorium – Lawrencium)

Total = 28 elements



IUPAC nomenclature of Elements with At. no. (Z) > 100

0	1	2	3	4	5	6	7	8	9
nil	un	bi	tri	quad	pent	hex	sept	oct	enn

Word root

eg: ① Z = 119 → Ununennium (Uue)

② Z = 126 → Unbihexium (Ubh)

③ 134 → Untriquadium (Utq)

Add Suffix → -ium

④ 142 → Unquadbium (Uqb)

Q Write IUPAC name & symbol of elements having Z equal to :

(1) 129 Unbiennium (Ube)

(2) 138 : Untrioctium (Uto)

(3) 130 : Untrinilium (Utn)

(4) 125 : Unbipentium (Ubp)

(5) 137 : Untriseptium (Uts)

GROUPS

Gp 1

(Alkali Metals)

H (exception → H → non-metal)

Li → Lithium

Na → Sodium

K → Potassium

Rb → Rubidium

Cs → Caesium / Cesium

(Radioactive) Fr → Francium

H Li Na Ki Rab Se Fariyad
or (Cs)

H Li Na Ki Ruby Se Friendship
(Cs)

Gp 2 (Alkaline earth metals)

Be → Beryllium (exception)

Mg → Magnesium

Ca → Calcium

Sr → Strontium

Ba → Barium

(*) Ra → Radium

BeO & $Be(OH)_2$: Amphoteric

Beta Mange Car Santoo

Be Mg Ca Sr

Baap Razi

Ba Ra

Gp 13 (Boron-family)

B → Boron

Al → Aluminium

Ga → Gallium

In → Indium

Tl → Thallium

Baingan Aaloo Gajar

B Al Ga

In Theli

In Tl

Gp 14 (Carbon family)

C → Carbon

Si → Silicon

Ge → Germanium

Latin name

(Stannum) Sn → Tin

(Plumbum) Pb → Lead

Kahe Sita Ji Sunu Poabhu

C Si Ge Sn Pb

or

Chemistry Sir Give Sankhi Problems

C Si Ge Sn Pb

Gp 15 (Pnictogens : poisonous)

N → Nitrogen

P → Phosphorous

As → Arsenic

(Stibium) Sb → Antimony

Bi → Bismuth

Nana Patekar Aishwarya
N P As

Sab Bindaas
Sb Bi

Gp 16 (Chalcogens → ore forming)

O → Oxygen

S → Sulphur / Sulfur

Se → Selenium

Te → Tellurium

* Po → Polonium

O S Se Te Po

Gp 17 (Halogens → salt producing)

F → fluorine
Cl → Chlorine
Br → Bromine
I → Iodine
* At → Astatine

Fir Kal Bahar Aai ± Aunty
F Cl Br At

Gp 18 (Noble Gases / Inert Gases)

He → Helium
Ne → Neon
Ar → Argon
Kr → Krypton
Xe → Xenon
Rn → Radon

Heena Neena Aur Kareena
He Ne Ar Kr

X-Ray
Xe

Rangeen
Rn

→ Gp 1-2 + Gp 13-18 } Normal / Main-Group / Representative elements

(Gp 1-2: s-block; Gp 13-18: p-block)

→ Gp 3-12 } Transition elements / metals (except Zn, Cd, Hg)

(Gp 3-12: d-block)

3d series	Sc — Zn
4d series	Y — Cd
5d series	La — Hg
6d series	Ac — Cn

Lanthanoids
Actinoids
} → f-block → Inner Transition elements

$\left(\underset{58}{Ce} - \underset{71}{Lu}\right)$ → 1st inner Transition series

$\left(\underset{90}{Th} - \underset{103}{Lr}\right)$ → 2nd inner Transition series

THANKYOU