VICTORY ZONE CHEMISTRY CLASSES

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CHAPTER SCHEDULE

PERIODICITY

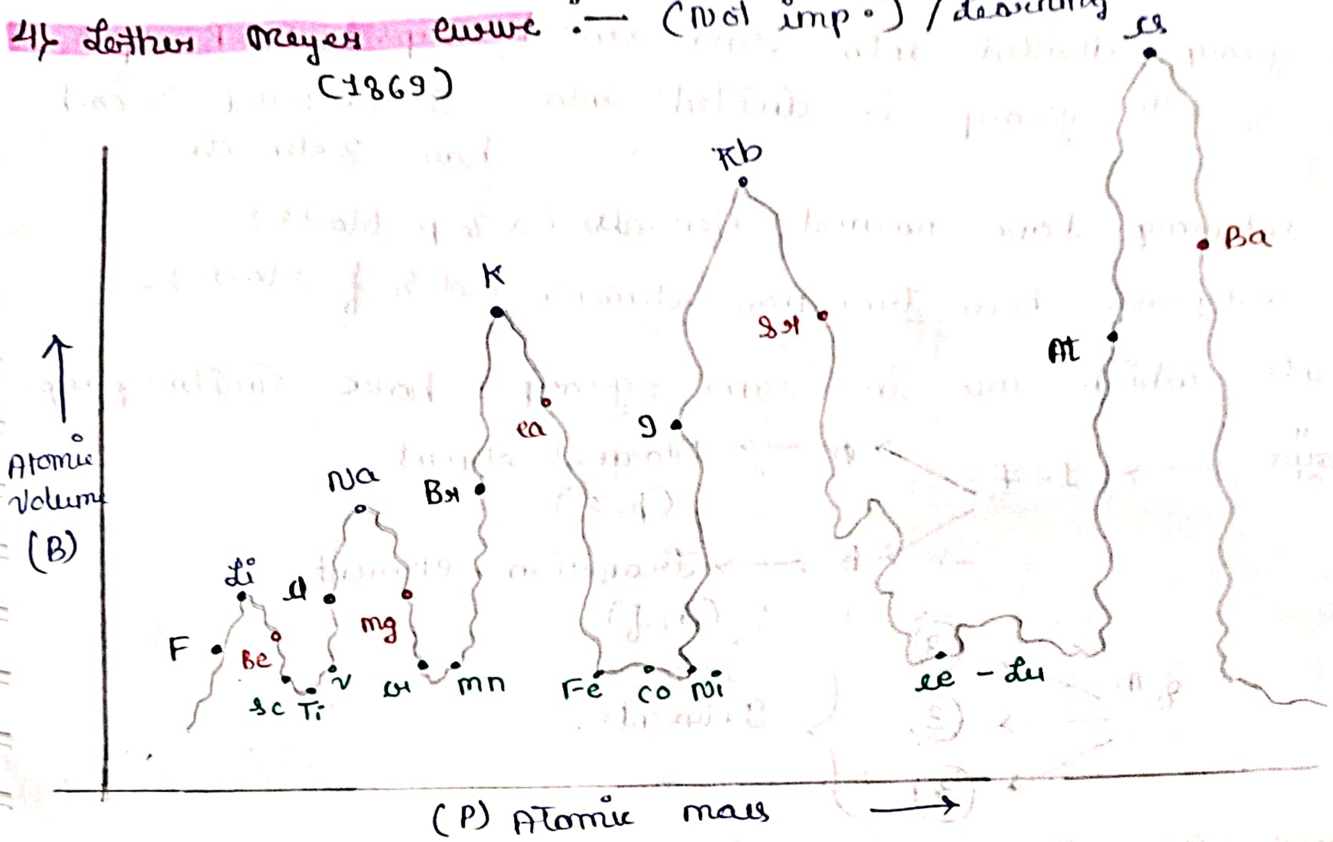
16 JUNE 2025 TO 6 JULY 2025

S. NO	CLASS DETAIL	TOPICS DETAILS	CHECK LIST
1.	LECTURE NO. 1	DEVELOPMENT OF PERIODIC TABLE HISTORY	✓
2.	LECTURE NO. 2	MODERN PERIODIC TABLE 20Q	✓
3.	LECTURE NO. 3	MODERN PERIODIC TABLE 20Q	✓
4.	LECTURE NO. 4	IUPAC ABOVE 100 ATOMIC NUMBER 20Q	✓
5.	LECTURE NO. 5	PERIODIC PROPERTIES RADIUS 30Q	✓
6.	LECTURE NO. 6	PERIODIC PROPERTIES RADIUS & IP's 30Q	✓
7.	LECTURE NO. 7	PERIODIC PROPERTIES IP's, EA 30Q	✓
8.	LECTURE NO. 8	NCERT BACK QUESTIONS	✓
9.	LECTURE NO. 9	PERIODIC PROPERTIES EN & OTHER PROPERTIES 20Q	✓
10.	LECTURE NO. 10	SELF ANALYSIS PAPER IN CLASS	✓
11.	TEST NO. 5	04/07/2025 MCQS 30Q MM:120 (YOUR MARKS)	✓
12.	TEST NO. 6	06/07/2025 THEORY 16Q MM:30 (YOUR MARKS)	✓
13.	HOME WORK	NUMBER OF QUESTION DONE BY YOUR SELF	✓
14.	HOME WORK	NCERT BOOK READING LINE TO LINE	✓

* Drawback of Newlands / Limitations :-

i) This rule was only valid for first 20 elements because calcium there is entry of D-block.
↳ after

4) Lothar Meyer Curve :— (Not imp.) / Learning
(1869)



$$\text{Slope} = \tan\theta = \frac{P}{B} = \frac{\text{mass}}{\text{Volume}} = \text{density}.$$

Alkali metals :- Li, Na, K, Rb, Cs → Peak of the Graph
↑ density

Halogens :- F, Cl, Br, I, At → Ascendings of graph.

Alkali Earth Metal :- Be, Mg, Ca, Sr, Ba → Descendings of graph.

d & f block Elements :- Bottom of the Graph.

* **Mendeleev Periodic Table** :- Imp. ∞ from this school (1865)

"All Physical & Chemical properties of an elements are periodic function of Atomic Mass"

→ only 63 elements were known

→ Noble gas was not discovered at that time.

→ Verticle (Column) → Groups

→ Horizontal (Row) → Periods.

→ No. of periods are 7 & No. of Groups are 8.

→ each group divided into two sub-groups A & B. upto 1-7 & 8th group is divided into 3 subgroups & each have 3 elements.

→ A subgroup have normal elements (s & p blocks)

→ B subgroup have transition elements (d & f block).
work as a catalyst

→ Elements which are in same group have similar prop.

→ 8 groups → 1-7 → A → Normal element (p, s)
→ B → Transition element (d, f)

8th → ③ ③ ③ } 9 elements.

→ **MERITS OF MENDLEEV'S PERIODIC TABLE :-**

1) Study of Elements -
i) study of Elements becomes easier because elements are arranged in groups & periods.

2) Prediction of new Elements -

*Eka Al	Eka B	*Eka Si	*Eka Mg
↓	↓	↓	↓
$\boxed{Ga}$	$\boxed{Sc}$	$\boxed{Ge}$	$\boxed{Tc}$

* Demerits of Mendleev's periodic Table :-

1) Position of Hydrogen are uncertain (today also). It put under alkali metal or with Halogen.

2) Position of Isotopes : mendleev put different positions of isotopes

in their periodic table.
eg → $^{12}_{6}C$ & $^{14}_{6}C$ } in place of Nitrogen.

** There is no such place for isotopes

3) Some elements like Au, Ag, Pt are placed in the same group. (in 8th group).

4) There are no such place for Lanthanoids & Actonoids.

* **MOSELEY PERIODIC TABLE** :- "Modern periodic Table"

" All the physical & chemical properties of elements are periodic function of their Atomic Number "

$\nu \propto Z^2$ X-Ray Diffraction Method.

$Z \propto \sqrt{\nu}$

Long Term of Periodic Table :- Based on Atomic Number.

→ 7 periods
→ 18 Groups
→ 4 blocks

Smallest → 1st period → 2 element → Gas.
Short → 2nd period → 8 element

4 gas
Ne, O, N, F

4 solid.
C, Li, B, Be.

3rd period → 8 elements → short
2 gas → Cl, Ar.

4th period → 18 elements → long.

5th period → 18 elements → long.

6th period → 32 elements → longest. (complete)

7th period → 24 elements → Incomplete period. (rest are in Lab they exist for less than 1sec).

Important :- (Elements found are 118 but naturally only 112)

Periodic table → 11 gas → H, F, Cl, N, O → 6 Noble gas
He, Ne, Ar, Kr, Xe, Rn

5 liquids → Cs, Fr, Hg, Br, 112 Uub.
(Ga at 303K)

* Br → Liquid & Non-metal.

* Rang, Werner, Bohr, Query :- Scientist contribute for P.T.

* 18 Groups :-

→ Group - 1st IA (ns^1)

Alkali metals

H है

Li ली

Na ना ने

K की

Rb रब

Cs से

Fr फरिमाद

→ Group - 2nd

IIA (ns^2)

Alkali Earth Metal.

Be बेचारी

Mg मुर्गी

Ca का

Sr सर

Ba बड़ा

Ra रसीला

→ Group - 13th

III A ($ns^2 np^1$)

Boron - family

B बैंगन

Al आलू

Ga गाजर

In In

Tl थैला

→ Group - 14th

IV A ($ns^2 np^2$).

Carbon family

C → Chemistry

Si → Sir

Ge → Give very

Sn → Shorty

Pb → Problem

→ Group - 15th

V A ($ns^2 np^3$)

Nitrogens

N → नाना

P → पापा

As → आशा

Sb → सब

Bi → बीमार

→ Group 16th

Chalcogens.

VI A ($ns^2 np^4$)

O → Old

S → Style

Se → Se

Te] Tapo, टापो
Po]

→ Group - 17th

VII A ($ns^2 np^5$)

Halogens

F → फिर

Cl → क्ल

Br → बाहर

I → आई

At → अंटी

→ Noble Gas

Zero Group

Inert Group

Non - Reactive group

($ns^2 np^6$)

(He (s block)) X

10 Ne → $1s^2 2s^2 2p^6$

18 Ar → $3s^2 3p^6$

36 Kr

54 Xe

86 Rn.

1 - 30 *

Sc सुनो

Ti तुम

V विवाह

Cr करलो

Mn मुझसे

Fe फिर

Co कोई

Ni नहीं

Cu कहेगा

Zn जानू

Cu, Ag, Au → Coinage Metal

Zn, Cd, Hg → Non-transition Element.

4 Blocks → s, p, d, f

1) s block → 14 element

13 element + last He $_2He \rightarrow 1s^2$

last e^- in s block

common e^- configuration

ns^{1-2}

14 element
2 gas
2 liquid
10 solid
12 metal
2 non-metal

Ra } Radio active
Fr → expensive (most)
↳ half life - 23 min

* Every Radio active element 've half life.

2) p block → 30 Elements.

All type of Elements.

Metal + Non-metal + Gas + liquid + solid.

Gas → 9 → N, O, F, Cl, Ne, Ar, Kr, Xe, Rn.

liquid → 2 → Br, Ga

3) d block → 40 elements

→ e^- configuration → $(n-1)d^{1-10}$ ns^{1-2}

→ All are metal

→ All are solid exp. Hg, Cn

Most, not all Elements are used Catalyst.

3d series → Sc → Zn

4d series → Y → Cd

5d series → La, Hf → Hg

6d series → Ac, Rf → Cn

4) f block → $(n-2)f^{1-14}$ $(n-1)d^{0-1}$ ns^{0-2}

→ Lanthanoids → Ce - Lu

Lanthanum starts it

→ Actanoids → Th - Lr

Actinium starts.

→ After Uranium → All elements are called Trans-Uranium elements.

because they are radioactive.

* Representative elements : Elements which are found in p & s block is called Representative elements. The main element of the family

*.25.

Above 100 atomic number Nomenclature :-

IUPAC

(International Union of Pure & Applied Chemistry).

0 - Nil (n)
1 → Un (u)
2 → Bi (b)
3 → Tri (t)
4 → quord (q)

5 - pent (p)
6 - hex (h)
7 - sept (s)
8 - oct (o)
9 - enn (e)

eg :- 101 - 120
101 - Unnilunium (Unu)
112 → Ununbium (Uub)
117 → Ununsephium (Uus)

Atomic no.	Name acc^n to IUPAC	Symbol	IUPAC official name	IUPAC symbol.
101	Unnilunium	Uun	Mendelevium	Md
102	Unnilbium	Unb	Nobelium	No
103	Unniltrium	Unt	Laurenium	Lr.
104	Unnilquadium	Unq	Rutherfordium	Rf
105	Unnilpentium	Unp	Dubnium	Db
106	Unnilhexium	Unh	Seaborgium	Sg
107	Unnilseptium	Uns	Bohrium	Bh
108	Unniloctium	Uno	Hasium	Hs.
109	Unnilennium	Une	Meitherium	Mt
110	Unnilium	Uuu	~~Ro~~ Darmstadtium	Ds
111	Unununnium	Uuu	Rontgenium	Rg.
112	Ununbium	Uub	Copernicium	Cn.
113	Ununtrium	Uut	Nihonium	Nh
114	Ununquadium	Uuq	Flerovium	Fl
115	Ununpendium	Uup	Moscovium	Mc
116	Ununhexium	~~Uup~~ Uuh	Livermorium	Lv
117	Ununseptium	Uus	Tennessine	Ts
118	Ununoctium	Uuo	Oganesson	Og

* Magical Numbers :-

Group period :-

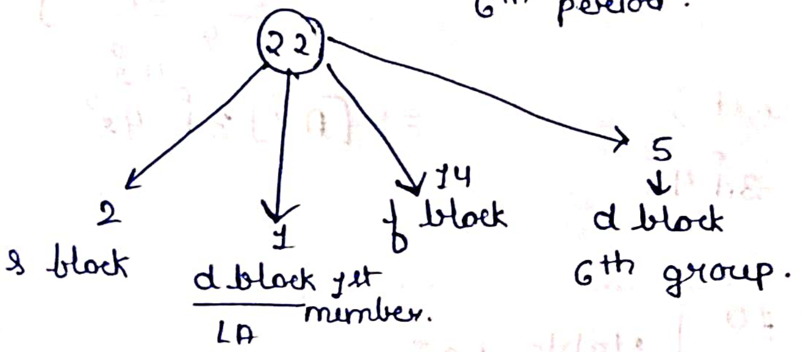
2, 8, 8, 18, 18, 32, 32

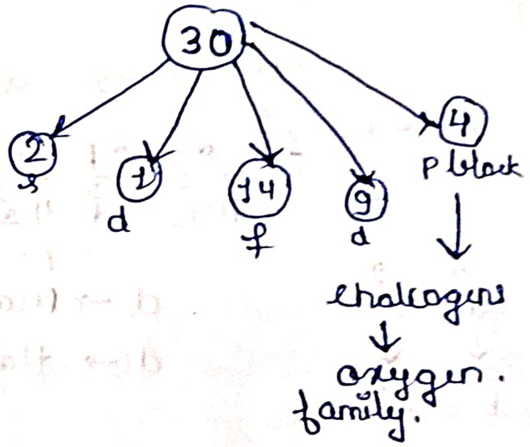
$19 \rightarrow \overset{1}{2}, \overset{2}{8}, \overset{3}{8}, \overset{4}{(1)}$ ← 1st group
↓
4 period

24 → 2, 8, 8, (6) ← group
↓
4th period

76 → 2, 8, 8, 18, 18, (22)
↓
6th period.

84 → 2, 8, 8, 18, 18, 30
6th period





Que → 17 → 2, 8, (7)
↓
3rd period
↓
17th group.
~~d block~~ ×
p block ✓

7 group is not possible.

(16) → 2, 8, (6) → 16th group
↓
3rd period

~~d block~~ ×
p block ✓

not 6th group.

Que → 27 → 2, 8, 8, (9) → 9th group
↓
4th period

Electronic Configuration.

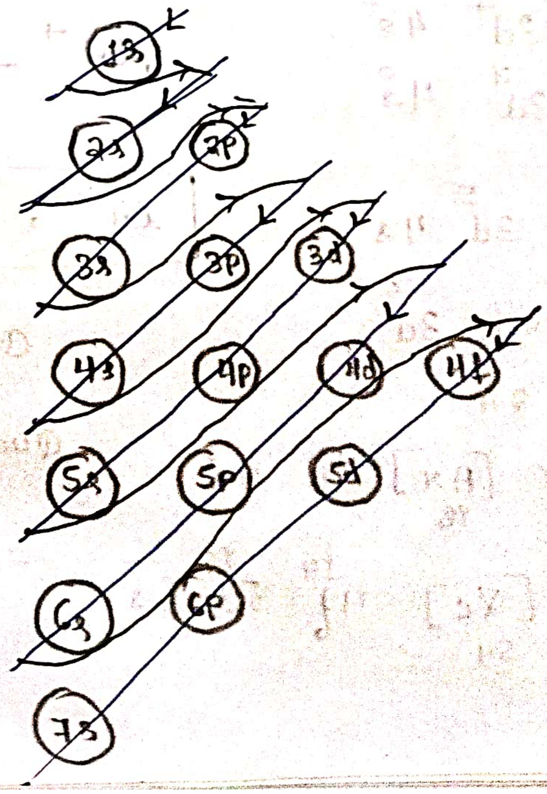
Aufbau Rule :-

$1s^2$ $2s^2$ $2p^6$ $3s^2$

$3p^6$ $4s^2$ $3d^{10}$ $4p^6$

$5s^2$ $4d^{10}$ $5p^6$ $6s^2$

$4f^{14}$ $5d^{10}$ $6p^6$ $7s^2$.



$16 \rightarrow \underbrace{1s^2\ 2s^2\ 2p^6}_{10}\ \underbrace{3s^2\ \boxed{3p^4}}_{6}$ → 3rd period
→ p block but 16th group.

$31 \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ \boxed{4p^1}$ → 1st member of p 13th group Boron family.
↓ 4th period

Electron filling Rule :-

$3 \rightarrow 1s^2\ 2s^1$
$[He]\ 2s^1$

$12 \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2$
$[Ne]\ 3s^2$.

$23 \rightarrow \underbrace{1s^2\ 2s^2\ 2p^6}_{10}\ \underbrace{3s^2\ 3p^6}_{8}$ } 18
$4s^2$
$\Rightarrow [Ar]\ 3d^6\ 4s^2$

(ns² always at the last)

$24 \rightarrow 1s^2\ 2s^2\ 2p^6\ 3p^6\ 4s^2\ \ 3d^5\ 4s^1$
$[Ar]\ 3d^5\ 4s^1$

$d^4 \rightarrow d^5$
$d^9 \rightarrow d^{10}$

d → Max → 10
d → Half → 5] stable no.

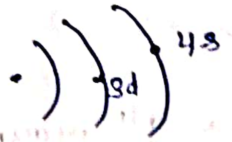
$27 \rightarrow [Ar]\ 3d^7\ 4s^2$

$25 \rightarrow 1s^2\ 2s^2\ 2p^6\ 3p^6\ 4s^2\ \ 3d^5\ 4s^2$
$[Ar]\ 3d^5\ 4s^2$.

$26 \rightarrow [Ar]\ 3d^6\ 4s^2$

H.W = pg-60
Both section - A (13 Que.)

$22 \rightarrow [Ar]\ \cancel{4s^2}\ 3d^2\ 4s^2$



$29 \rightarrow [Ar]\ 3d^{10}\ 4s^1$

$27 \rightarrow Co^{+2}$
$[Ar]\ 3d^7\ 4s^2$
$[Ar]\ 3d^7\ 4s^0$

$_{24}Cr^{\cancel{+}} \rightarrow [Ar]\ 3d^5\ 4s^1$
$_{24}Cr^{+} \rightarrow [Ar]\ 3d^5\ 4s^0$.

$\boxed{Cr^{+2},\ Mn^{+2}}$

$_{25}Mn \rightarrow [Ar]\ 3d^5\ 4s^2$

$Mn^{+2} \rightarrow [Ar]\ 3d^5$

Que.3) $_{29}Cu \rightarrow [Ar]\ 3d^{10}\ 4s^1$

DPP - 04 pg - 24

Que.5) $_{33}As = [Ar]\ 3d^{10}\ 4s^2\ 4p^3$
$\Rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^3$

Que-1) $_{24}Cr \rightarrow \underset{18}{[Ar]}\ 3d^5\ 4s^1$

Que.2) $_{80}Hg = \underset{54}{[Xe]}\ 4f^{14}\ 5d^{10}\ 6s^2$

$\boxed{4s^2}$ → s 2nd no.
→ 4th period.

$_{20}Ca \rightarrow (ns) \Rightarrow 4s \Rightarrow 1s\ 2s\ 2p \dots 4s$

$_{14}Si \rightarrow$ (14th group) $(ns^2 np^2) \Rightarrow 3s^2\ 3p^2 \Rightarrow [Ne]\ 3s^2 3p^2$

$_{15}P \rightarrow$ (15th group) $(ns^2 np^3) = 3s^2\ 3p^3 \Rightarrow [Ne]\ 3s^2\ 3p^3$

$_{17}Cl \rightarrow$ (17th group) $(ns^2 np^5) = 3s^2\ 3p^5 \Rightarrow [Ne]\ 3s^2\ 3p^5$

s = 1 p = ?
d = 5×10 = 10
s − 2
p − ·
0
1

$_{25}Mn \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ \cancel{4}\,3d^5$

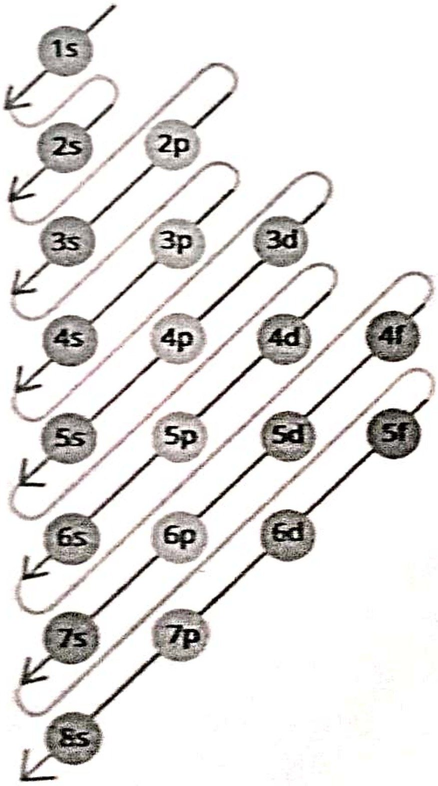
$\Rightarrow \underline{1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^2} = [\overset{Ar}{Mn}]\ 3d^5\ 4s^2$

$_{26}Fe \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^2$

$_{29}Cu \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^9\ 4s^2$ $[Ar]\ 3d^{10}\ 4s^1$ **

$\Rightarrow \underline{1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1}.$

$_{30}Zn \rightarrow \underline{1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2}$ $[Ar]\ 3d^{10}\ 4s^2$.



$_{22}Ti \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^2$
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^2\ 4s^2$

$_{33}As \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$
10
$4s^2\ 4p^3$

$_{58}Ce \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$
$4s^2\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ \cancel{6s^2}\ 4f^2\ 6s^2$

→ f bharne se pehle d me 1e⁻ fill karna zaroori

$\rightarrow (n-2)f^{1-14}\quad (n-1)d^{0-1}\quad ns^{0-2}$

$\rightarrow 1s^2\ 2s^2\ 6p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2$
$4p^6\ 5s^2\ 4f^1\ 5d^1\ 6s^2.$

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* Typical elements :- All the elements which are in 3rd period are called Typical element.

Na, Mg, Al, Si, P, S, Cl, Ar

* Electronic configuration :- (Once)

ns^1

$_3Li$ = [He] $2s^1$

$_{11}Na$ – $\underset{10}{[Ne]}$ $3s^1$

$_{19}K$ – [Ar] $4s^1$

$_{37}Rb$ – $\underset{36}{[Kr]}$ $5s^1$

ns^2

$_{38}Sr$ = $\underset{36}{[Kr]}$ $5s^2$

$_{12}Mg$ = $\underset{10}{[Ne]}$ $3s^2$

$ns^2 np^1$

$_{31}Ga$ – $\underset{18}{[Ar]}$ $3d^{10} 4s^2 4p^1$

$_{13}Al$ – $\underset{10}{[Ne]}$ $3s^2 3p^1$

$\boxed{ns^2 np^4}$

$_8O \rightarrow 1s^2 2s^2 2p^4$

$_{16}S \rightarrow 1s^2 2s^2 2p^4 3s^2 3p^4$

$_{34}Se \rightarrow 1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^4$

$_{52}Te \rightarrow 5s^2 5p^4$

$\boxed{ns^2 np^2}$

$_6C \rightarrow 1s^2 2s^2 2p^6$

$_{14}Si \rightarrow 3s^2 3p^2$

$Pb \rightarrow 6s^2 6p^2$

$\boxed{ns^2 np^3}$

$N \rightarrow 2s^2 2p^3$

$P \rightarrow 3s^2 3p^3$ $Bi \rightarrow 6s^2 6p^3$

$As \rightarrow 4s^2 4p^3$

$Sb \rightarrow 3s^2 5p^3$

$ns^2 np^5$

$F \rightarrow 2s^2 2p^5$

$Cl \rightarrow 3s^2 3p^5$

$Br \rightarrow 4s^2 4p^5$

$I \rightarrow 5s^2 5p^5$

$At \rightarrow 6s^2 6p^5$

$\underline{_2He \rightarrow 1s^2}$

$ns^2 np^6$

$_{10}Ne \rightarrow 1s^2 2s^2 2p^6$

$Ar \rightarrow 3s^2 3p^6$

$Kr \rightarrow 4s^2 4p^6$

$Xe \rightarrow 5s^2 5p^6$

$Rn \rightarrow 6s^2 6p^6$

DPP-05 pg-25

Que-1) Chalogen – oxygen

O, S, Se option-4 //

Que-2) N, P, As

P-nicogens

Que·3) $ns^2 np^2$

Que·4) 3rd period
$3s^2 3p^6$ ⟹ zero

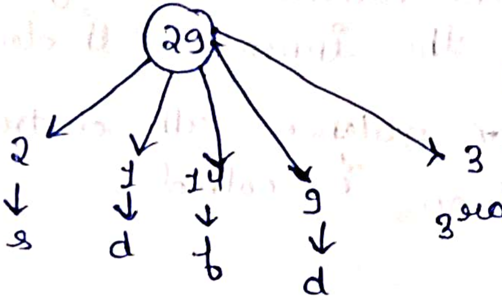
4th period
$3d^{10} 4s^2 4p^6$

Que·5) long = 4th, 5th period

DPP – 06 pg – 26.

Que·2) Magical No·

115 → 2, 8, 8, 18, 18, 32, 29
↓
P- Nicogen



3rd member.

Que·3) Acc^n to Aufbau.

Que·5) $4s^2 4p^2$
$ns^2 | np^2$ → e
→ 4th period 4th A
14 th group.

DPP – 07 pg – 27

Que·1) 100 – 103 → f block
104 – 112 → d block
113 – 118 → p block

1) Unt → 103
2) Unp → 105
3) Unq → 104 ✓
4) Unb → 112

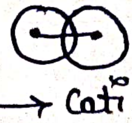
Que·2) 105 $\xrightarrow{\text{after}}$ 106
unnilhexium opt = 3.

Que·3) 93 – 112 Uub → 112.
$\underbrace{93 - 112}_{\text{20 elements}}$

pg – 20 Book – 2 Que· 1 – 31

*** Periodic Properties :– (4)**

1) Radius → Atomic Radius

→ Molecular Radius

→ Ionization Radius → Cation Na^+
└→ anion Cl^-

2) Ionization potential IP or IE·

3) Electron gain enthalpy (Electron Affinity)
EA

4) Electronegativity

Periodicity :- Properties withfacts which are repeated after some elements are called Periodicity.

→ Cause of Periodicity.

1) Increasing no. of e^- in a period.

2) No. of proton increases.

3) No. of shell increases in a group.

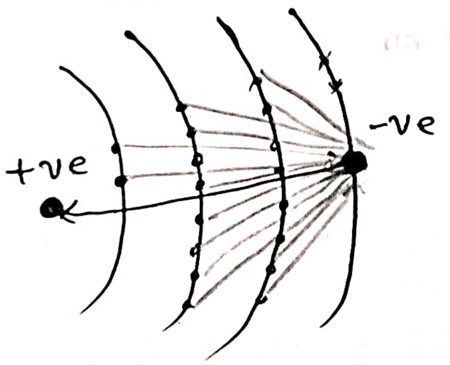
* **SCREENING EFFECT** :- It is denoted by σ. (attractive force) valence shell electron suffers force of electron due to the nucleus and force of repulsion due to the inner cell electron.

or shielding effect

→ The decrease in force of attraction on valence cell electron due to the inner the shell of electron is called Screening Effect.

→ The (कुल) net attraction force felted by any electron is called effective nuclear charge that is denoted by (Z_{eff})

* Effective Nuclear charge (Z_{eff})



$$\left(F_e = \frac{kq_1q_2}{r^2}\right)$$

Z = attraction force.

σ = repulsion force

= screening force.

$$\boxed{Z_{eff} = Z - \sigma}$$

Zeff - increases

Z increases rapidly

σ decreases.


Li


Be


B


C

no effect of repulsion of electron to the electron in the same orbit.

eg in Be. x e⁻ will face less repulsion but more attraction so the orbits get close.

Not in NCERT   Slateri Rule. – ↓ 3 Li → Zeff

x σ screening effect / si value $Li = Z = 3 = 1s^2 2s^1$

$n \rightarrow 0.35$

↑ as inside e^- will harm more.

$(n-1) \rightarrow 0.85$

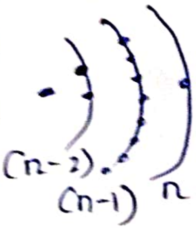
$(n-2) \rightarrow 1$

$(n-3) \rightarrow 3$

$\sigma = 0.85 \times 2$
$= 1.10$

$$Z_{eff} = Z - \sigma$$
$$= 3 - 1.7 = 1.3 //$$

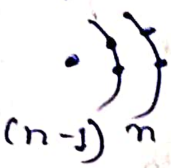
$_{11}Na = Z = 11 = 1s^2 2s^2 2p^6 3s^1$



$\sigma = 0.85 \times 8 + 1 \times 2$
$= 8.8$

$Z_{eff} = 11 - 8.8$
$= 2.2.$

$_4Be \rightarrow Z = 4 \quad 1s^2 2s^2$



$\sigma = 1 \times 0.35 + 2 \times 0.85$
$= 0.35 + 1.7$
$= 2.05$

$Z = 4 - 2.05$
$= 1.95 //$

***RADIUS** :- we can't calculate Radius of Atom.

i) The distance from nucleus to valence shell is called radius.

we cannot calculate the size of any atom because :-

ii) The single isolated atom are not found, easily exp. Noble gas.

iii) So we calculate the accurate size of bond (length) & half of this bond is called atomic radius, but it is not the accurate radius.

iiii) Based on the chemical Bond Atomic radius is divided into 4 category :-

- Covalent r.
- Ionic r.
- Metallic r.
- Vander waals bond.

iv) It is cleary shown that from going left to right decreases (in a period) due to Zeff increases.

v) From going top to bottom size of atom increases due to No. of shell increases, (Zeff constant)

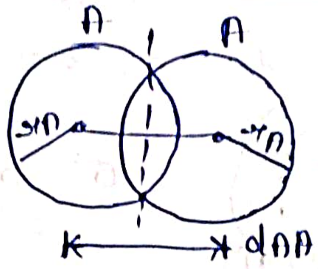
H.W → pg-38 ques. 1-47 (Book-1)

Atom → single
× H → H2
× O → O2
× N → N2
× Na → Metallic

≃ tle

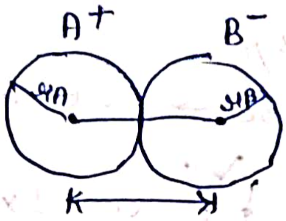
Molecule → distance → $\frac{\text{Nucleus to Nucleus}}{2}$ = Atomic radius.

1) Covalent Bond :-



$\Rightarrow \frac{d_{AA}}{2}$

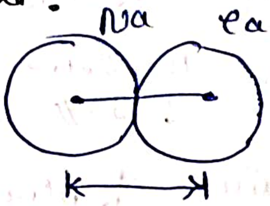
2) Ionic Bond :-



$\frac{d_{ionic}}{2} = r_{ionic}$

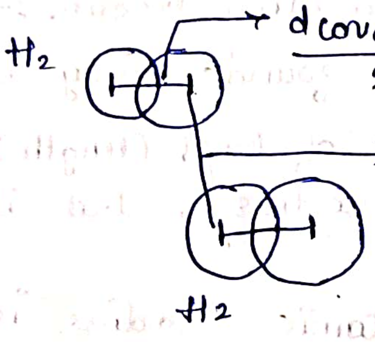
r^+ or r^- = r_{ionic}.

3) Metallic Bond :-



$\frac{d_{metallic}}{2} = r_{metallic}$

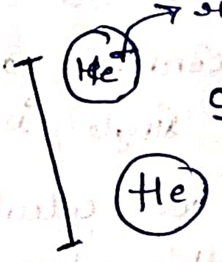
4) Vander's Wall Bond :- only for gas.



$\frac{d_{covalent}}{2} = r_{covalent}$

$\frac{d_{vanderwalls}}{2} = r_{van}$.

Imp°

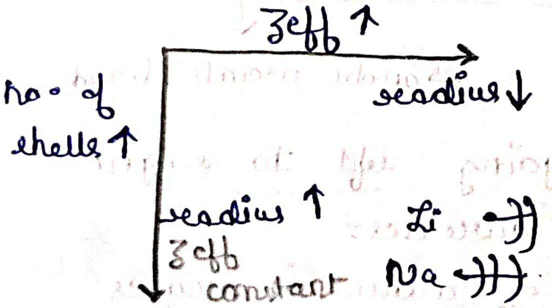


r He×

$\frac{d_{van}}{2} = r_{van}$

not only applicable for noble gas.

* Series Of Radius :- $r_{van} >> r_{ionic} \simeq r_{metallic} > r_{covalent}$.



radius ∝ n^2 ∝ $\frac{1}{Z_{eff}}$

eg) At 2nd period

Ne >> Li > Be > B > C > N > O > F.

↑
size = r_{van}

Li < Na < K < Rb < Cs.

Z_{eff} ↑

{Z_{eff} ↑} {when the entry of f & d}

and

$\boxed{R \propto n^2}$

Z_{eff} constant

Radius ↑

→ ↓ ⟶ In a period → Noble gas $Ne >> Li > Be > B > C > N > O > F$

→ In group → largest → last. $Li < Na < K < Rb < Cs$.

Ionic Radius

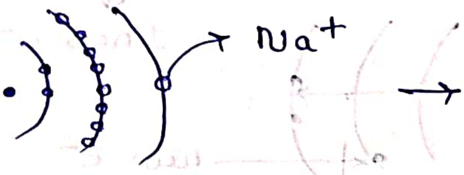
eg:- $Na \rightarrow Na^+ - e^-$ Cation (+)   Anion (−)   eg:- $Cl^- = Cl + e^-$.

e^- Remove ←   ↳ e^- add

size of cation :-

anion = −
cation = +

$_{11}Na \rightarrow 2, 8, 1$



$_{10}Na \rightarrow 2, 8$

Cations are smaller than its parental atom because no. of shell decrease & Z_{eff} increase

$_{13}Al \rightarrow$ e 13 p 13

Al^{+2} e 11 p 13
2, 8, 1

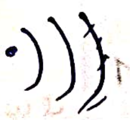
$_{13}Al^+ \rightarrow$ e 12 p 13

Al^{+3} e 10 p 13

size of Anion :-

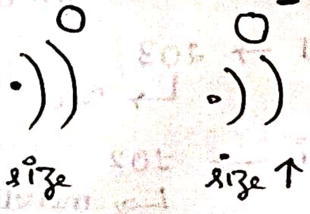
$_8O$ e 8 p 8

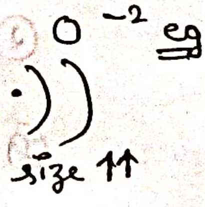
$_8O^-$ e 9 p 8



Anions are larger then its parental atom due to the repulsion of $e^- - e^-$.

eg:- $I^- > I > I^+$





Iso-electronic species :- No. of electrons are same.

Na^{+}, F^{1}, O^{-2}, Mg^{+2}, C^{-4}, Ne.

$Ne > C^{-4} > O^{-2} > F^{-} > Na^{+} > Mg^{+2}$

exception :- 1) Al > Ga

→ अचानक से d block का आना

→ sudden entry of d-block screening effect of d-block decreases that's why Zeff increases & size decreases.

2) Zr ≈ Hf

→ suddenly entry of f block thats why screening effect of f block decreases & Zeff α increases so size decreases

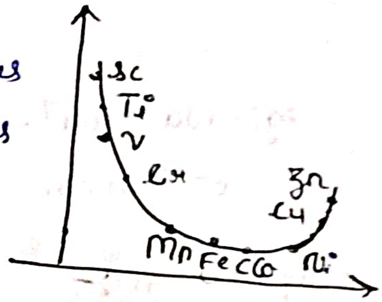
→ "Lathanoid contraction"

3) d block.

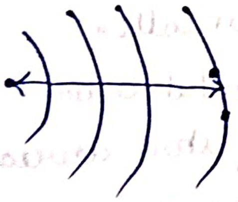
Sc → Mn size ↓

Fe ≈ Co ≈ Ni same

Cu → Zn size ↑



$_{26}Fe \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^2$



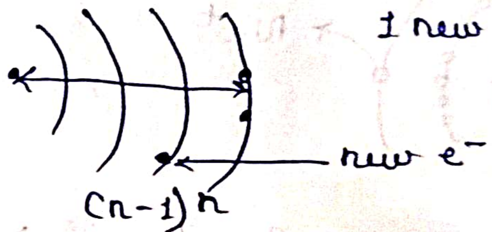
e⁻ enter in ← penultimate shell that's why size same

→

$_{27}Co \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^7\ 4s^2$

↓

1 new e⁻



↳ Pen ultimate shell

$Zeff \propto \frac{1}{Radius}$

$\uparrow Zeff = Z - \sigma$

=> Pg = 28 DPP-08

Que-1)	1) $_2He^{+}$	e 1
	2) $_3Li^{+2}$	1
	3) $_1H$	1
	4) All of these	

Que-2) → in a period Zeff ↑

↓ in a group Zeff constant

Que-3) $Zeff = Z - \sigma$

Que-4) Remains constant

Que-5) $_{11}Na \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^1$

Pg = 29 DPP-09

Que-1) Na > Mg

^
K
^
Rb

Mg < Na < K < Rb

Que-2) ③ Ankur → 100
↳ covalent

② Rohit → 203
↳ van

① Mani → 102
↳ metallic

IX ←

$r_{van} > r_{ionic\ or\ crystalline} \approx r_{metallic} > r_{covalent}$

Qus·3) 1) Li > Be
Mg

Be < Li < Mg

option-2) ✓ $H^+ < {}_3Li^+ < {}_1H^-$
0 2 2

3) Ne > > O > F

4) $Na^+ < F^- < O^{-2}$ } 100 % correct.
10 10 10

DPP-10) Pg-26

Qus·1) i) Zr = Hf ✓
ii) Mo ≈ W ✓
iii) Co ≈ Ni ✓
iv) All

Qus·2) Pt ≈ Pd

Qus·3) Fe, Co, Ni

Qus·4) $Mg^{+2} < Na^+ < F^-$

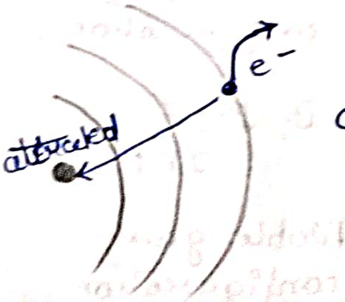
Qus·4) ✓1) $P^{+3} > P^{+5}$
1) $Ti^{4+} > Mg^{2+}$
2) $^{37}Cl^- = {}^{35}Cl^-$ } isotopes
2) $_{19}K^+ < {}_{17}Cl^-$

Qus·5) S^{-2} e
1) $_{18}Ar \rightarrow 18$
2) $_{17}Cl^- \rightarrow 18$
3) $HS^- \rightarrow 1 + 16 + 1 = 18$
✓4) $_{22}Ti^{+3} \rightarrow 19$

Qus·5) 1) $1s^2 2s^2 2p^6 3s^2$ = Mg
2) Al
3) P
4) Cl
Mg > Al > P > Cl as size ↓

* Ionization Potential :-(Energy) / Enthalpy / IPs / IEs

The Energy required to removal of an electron from the outermost shell of any isolated gaseous atom or element.



1) Heat
2) Field
3) hν (light energy)

$IP_{Na_s} \longrightarrow Na_s^+ + e^-$ ✗

$Na(s) \xrightarrow[\uparrow\ \text{sublimation}]{} Na(g) \xrightarrow{IP} Na^+_{(g)} + e^-$

Cl₂ is not applicable only Cl is required.

$Cl(g) \xrightarrow{IP} Cl^+ + e^-$

E → Element.

$E(s) \xrightarrow[\uparrow\ \text{sublimation}]{} E(g) \xrightarrow{I^{st}\ IP} E^+ + e^- \xrightarrow{II^{nd}\ IP} E^{+2} \xrightarrow{III^{rd}\ IP} E^{+3}$.
e^- e^- e^-

$I^{st}\ IP < II^{nd} < III^{rd} < IV^{th}$

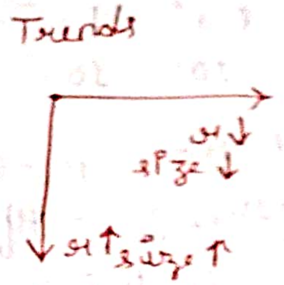
Note :- IPs (1^{st}) e^- configuration of valence shells

→ It depends upon the following 5 :-

1) Penitrating effect $f < d < p < s$.

2) size $\propto \frac{1}{IPs}$

3) $Z_{eff} \propto IPs$



4) stable half filled & full filled orbitals.

$s^2, p^3, p^6, d^5, d^{10}, f^7, f^{14}$

** 5) Noble gas configuration $\underbrace{ns^2 np^6}$. → maximum.

family :-

Li ↓	Mg ↓	B ↓	C ↓	N ↓	O ↓	F ↓	Ne ↓
ns^1	ns^2	$ns^2 np^1$	$ns^2 np^2$	$ns^2 np^3$	$ns^2 np^4$	$ns^2 np^5$	$ns^2 np^6$.

s^2, p^6, d^{10}, f^{14} $_6C \to 1s^2 \underbrace{2s^2 2p^2}_{\text{valence shell.}}$

→ Li	Be	B	C	N	O ↓	F ↓	Ne
$2s^1$	$\underline{2s^2}$	$2s^2 2p^1$	$2s^2 2p^2$	$\underline{2s^2 2p^{3}}$	$2s^2 2p^4$	$2s^2 2p^5$	$\underline{2s^2 2p^6}$

1) Li < Be → size $\propto \frac{1}{IP}$.

2) Be > B → stable s^2 configuration.

3) B < C → size $\propto \frac{1}{IP}$

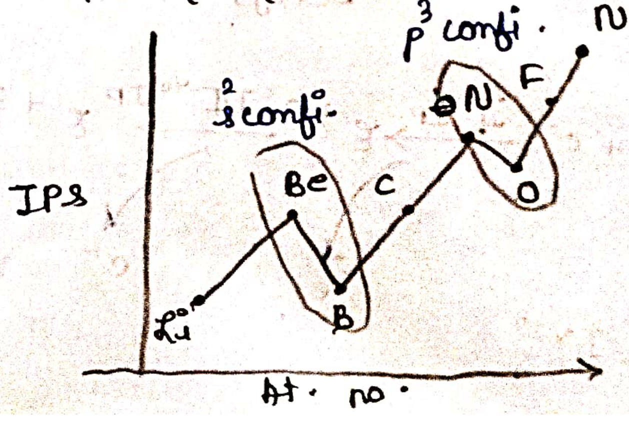
4) C < N → size $\propto \frac{1}{IP}$ or half stable.

5) N > O → stable p^3 configuration.

6) O < F → size $\propto \frac{1}{IP\uparrow}$

7) F << Ne Noble gas configuration.

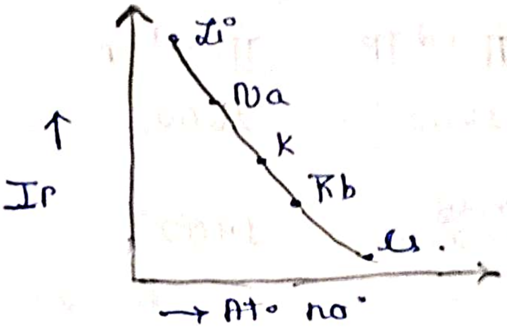
Li < B < Be < C < O < N < F < Ne



3rd period

Na < Al < Mg < Si < S < P < Cl << Ar.

* Li > Na > K > Rb > (Cs) ← used in solar cells.
↓
size is smallest



Que.> II^nd IP.

1> $_{11}$Na $\xrightarrow{I^{st}\ IP}$ Na$^+$ $\xrightarrow{II^{nd}\ \text{for IP}}$ Na^{+2} $1s^2 2s^2 2p^5$

$1s^2 2s^2 2p^6 3s^1$ $\quad$ $\underline{1s^2 2s^2 2p^6}$

Noble gas confi.

Ans> I^st IP
Na < Mg

2> $_{12}$Mg $\xrightarrow{I^{st}\ IP}$ Mg$^+$ $\xrightarrow{II^{nd}\ IP}$ Mg^{+2} but in II^nd IP
~~Mg > < Na~~.

$1s^2 2s^2 2p^6 3s^2$. $\quad$ $1s^2 2s^2 2p^6 3s^1$ $\quad$ $1s^2 2s^2 2p^6$

(I) $\quad$ (II)

Mg$_1$ not Mg$_2$ Na > Mg

* Applications of IPs

1> IP less → Metals
eg:- Li, Na, K, Mg. (size more)
electropositive

2> IP high → Non-metals.
eg:- O, F, Cl (size less)
highly electronegative

3> Reducing Agents.
↳ IPs less

$Mg^{+2} + 2e^- \rightarrow Mg$ gain of e$^-$
↑ Reduction.
Reducing agent

4> IPs having → Oxidizing Agent.

$Na \rightarrow Na^+ + e^-$
↳ Remove.

5> Identification of Valency:-

Al $\xrightarrow{I^{st}\ IP}$ Al$^+$ $\xrightarrow{II^{nd}\ IP}$ Al^{+2} $\xrightarrow{III^{rd}\ IP}$ Al^{+3}

Valency	I^st	II^nd	III^rd	IV^th	
IPs	1000	2000	3000	12000	Al^{+4}
	1000		1000	9000	

Valency → Al^{+3} //

6) Identification of periods (groups have same) :-

eg :- KJ/mole

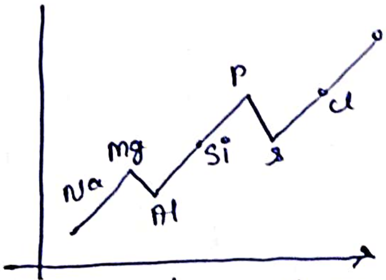
	I^st IP	II^nd IP	III^rd IP	IV^th IP
a)	900 Noble (0) gas (200, 100)	1200	1600	1800
b)	200 Alkaline Na family (1)	1200	1400	1600
c)	200 Be family (2)	400	1600	1800
d)	120 Boron family (3)	240	360	1260

Note :- If only no. are given in que. then it is impossible to identify the element.

DPP-11 pg-31

Que-1) $X_g \xrightarrow{1^{st}} X^+_{(g)} + e^-$

Ans 2)



option-4 II^nd > I^st IP

Ans 3) Always greater

Ans 4) 2nd I.P

$E(g) \xrightarrow[I^{st} IP]{} E^+ \xrightarrow[II^{nd} IP]{} E^{+2}$

Ans 5) $A_1 < A_2 < A_3$.

Exception :-

1) Al < Ga

radius ∝ $\frac{1}{IP}$

2) Zr ≤ Hf lanthanoid contraction

3) Fe ≈ Co ≈ Ni

DPP-12 pg-32 :-

Ans 1) size ∝ $\frac{1}{IP}$

∴ Hf < Zr (size)

Hf IP is maximum.

Ans 2) isotopes → diff. no. of neutron.

IP = same

Ans 3) 1) $Be^{+3} \xrightarrow{4^{th}} Be^{+4}$

2) $H \xrightarrow{1} H^+$

3) $Li^{+2} \xrightarrow{3} Li^{+3}$

4) $He^+ \xrightarrow{2} He^{+2}$

I < II < III < IV.

Ans 5) one is only difference is radius.

↑ all the things

exp:- [illegible].

↓ ↓ 3) Ionization P.

DPP - 13

Ans 1) 7.1 , 14.3 , 34.5 , 46.8 | 162.2
↓ 1st ↓ 2nd ↓ 3rd ~~16~~ ↓ 4th ↓ 5th

14 ← It silicon is added

Ans 2) In diff. $\underline{6.5 - 14.5\ ev}$

high · oxidizing no · stable

$M \rightarrow M^+ + e^- \rightarrow 7.9$

$M^+ \rightarrow M^{+2} + e^- \rightarrow 15.5$

7.6 mid.

Ans 4) I st II nd | III rd
16.5 195 | 556
$\underbrace{16.5 \quad 195}_{35} \quad \underbrace{195 \quad 556}_{400}$,

Valence shell → outermost shell.

$1s^2 2s^2 2p^6 3s^2$.

$1s^2 2s^2 2p^6 3s^2 3p^2$

- Hw = pg - 40 Qu. 54 - 60 (Book - 1)
pg - 62 section - D .

Ans 5) 68,| 370, 400 , 485
valence e^- = 1.

Ans 3) Match

$ns^1 \rightarrow (s)$

$ns^2 \rightarrow (r)$ 2nd IP → high jump

$ns^2 np^1 \rightarrow (q)$ 3rd IP.

$ns^2 np^2 \rightarrow (p)$ 4th IP.

* **ELECTRON AFFINITY** :- Electron gain enthalpy / EA ; $\Delta_{eg}H$ / ΔH_{eg}.

Δ → change
H → enthalpy
eg → Electron gain

Enthalphy (Energy) → +ve (Endothermic) (Required)
Enthalphy (Energy) → −ve (Exothermic) (Removed)

$A \longrightarrow B \quad \Delta H = -50$

$B \longrightarrow A \quad \Delta H = +50$

EA :-
→ Energy removed during Addition of e^- in the Valence shell of isolated gaseous atom / element.

EA = IP value same

−EA = + IP

$A \rightarrow B \quad \Delta H = -ve$

$B \rightarrow A \quad \Delta H = +ve$

Unstable to stable.

$E \xrightarrow{e^-} E^- \quad \Delta H = -ve$
unstable stable

$O + 1e^- \longrightarrow O^- \quad \Delta H = -ve$.
$2s^2 2p^4 \qquad 2s^2 2p^5$

$F + 1e^- \longrightarrow F^- \quad \Delta H = -ve$
$2s^2 2p^5 \qquad ns^2 np^6$
unstable stable

$N + 1e^- \longrightarrow N^-$
$2s^2 2p^3$ Stable → $2s^2 2p^4$ unstable
$\Delta H = +ve$

$Ne + 1e^- \longrightarrow Ne^-$
very stable $2s^2 2p^6$ → $2s^2 2p^6 3s^1$
$\Delta H = +ve$

Trends :- $EA \propto Z_{eff}$

$EA \propto \frac{1}{\text{no. of } e^- \text{ in valence shell}}$

→ $EA \propto Z_{eff} \uparrow$

↓ $EA \downarrow$ (Z_{eff} constant)

* Group → 15 pnicogens or nitrogen family &
Noble gas zero group, 18th Group
$\Delta EA = +ve$

→ EA → Ist EA are generally −ve
IInd EA are always +ve

$O + 1e^- \longrightarrow O^-$
$1s^2 2s^2 2p^4$ → $1s^2 2s^2 2p^5$ $\Delta H = -ve$

$O^- + 1e^- \longrightarrow O^{-2}$
$1s^2 2s^2 2p^5$ → $1s^2 2s^2 2p^6$ $\Delta H = +ve$

Poly anion compounds
EA → IInd EA = +ve
$N^{-3}, O^{-2}, S^{-2}, P^{-3}$

→ Repulsion of e^- & e^-
IInd EA always +ve

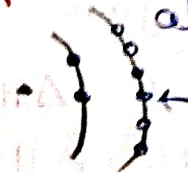
Exception

→ EA ↑

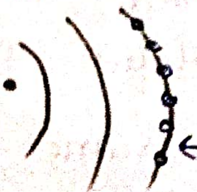
↓ EA ↓

→ Due to smaller size of Oxygen.
S > O

O
$1s^2 2s^2 2p^4$



S
$1s^2 2s^2 2p^6 3s^2 2p^4$



* S > Se > Te > Po > O $EA \propto \frac{1}{\text{radius}}$

F < Cl

→ Due to very smaller size of F
Cl > F > Br > I > At.

* Alkali metals & Alkali Earth metals
EA = least −ve or +ve.

* E-A are always +ve for metals, Nitrogen family + Nobles.

→ DPP - 14

Que. 1) ⟶ EA↑ Be B C N with $\underset{2,2}{Be}$ $\underset{2,3}{B}$ $\underset{2,4}{C}$ $\underset{2,5}{N}$

Be < N < B < C

+ve ↓

$ns^2 np^3$

stable

unstable

Que. 2) 1st EA

↓

$Cl \longrightarrow Cl^-$

⟵

+ve IP

Que. 3) Add. Easy

EA more -ve

$_8O \longrightarrow 8e^-$

$_8O^+ \longrightarrow 7e^-$

$_8O^- \longrightarrow 9e^-$

$_8O^{+2} \longrightarrow 6e^-$

no. of proton is more.

e^- less ∝ Z_{eff} ∝ EA.

→ option - 4

Que. 4) $F < Cl \nless > Br > I$

Que. 5) 3rd

2nd EA → +ve

Poly anion = EA = +ve.

* Electro negativity :- Attraction of shared covalent e- by one atom.

$A \xrightarrow{\;ee\;} B$

↓

covalent Bond

$\overset{+\delta}{A} \xrightarrow{\;ee\;} \overset{-\delta}{B}$

↳ Electronegative

δ → partial

d → differential

∫ → intigral

Trends → ↑

↓ ↓

* Pauling :- H → 2.1 Li → 1.

Li —ee— Li ← 1 times

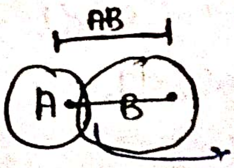
Li —ee— F ← 4 times.

* Application of EN.

1) i) Metal → EN → less ← Electro +ve

ii) Non-metal → EN → more. ← Electronegative.

2) Schomaker & Stevenson law.



→ covalent bond length.

$$d_{AB} = r_A + r_B - 0.09(X_A - X_B)$$

Å

r_A = radius of atom A

r_B = radius of atom B.

X_A = EN of A (Pauling scale)

X_B = EN of B (Pauling scale)

4) Gallius.

$X_A - X_B \geq 1.7$ ionic

$X_A - X_B \leq 1.7$ covalent.

HCl → covalent

2.1 3 = 0.9

NaCl → ionic

1 3 = 2

3) Hany & smith.

% ionic character

$= 16(X_A - X_B) + 3.5(X_A - X_B)^2$

5) Name of compounds

More EN → suffix

Less EN → prefix

Na^+	Cl^-
sodium	chloride
less EN	more EN

6) Bond polarity

Bond polarity ∝ ΔEN

HCl < HF

2.1 − 3 2.1 − 4

0.9 = 1.9

* Mullican scale

$$X_{mullican} = \frac{X_{pauling}}{2.8\text{ ev}}$$

$$X_{mellicon} = \frac{IP + EA}{2}$$

*DPP = 15 page = 36

Que-1) Configuration ↗ IP, ↘ EA

Que-2) H C S I

↓ ↓ ↓ ↓

2.1 2.5 2.5 2.5

Que-3) Si < P < S < Cl

Na < Mg < Al < Si

I < Br < Cl < F all ✓

Que-4) EN ∝ Z_{eff}

$_8O^- \rightarrow 9e^-$

$_8O^{-2} \rightarrow 10e^-$

$_8O^{\cdot} \rightarrow 8e^-$

$O^+ \rightarrow 7e^-$

DPP-16

Ans 1) Polarity = ΔEN

option-3.

Ans 2) Mullican → $\frac{IP + EA}{2}$ option-3.

Ans 3) I Cl

EN less ↙ ↳ EN more.

option -3

Ans 4) less = ΔE = less

more = ΔE = more.

C − I = 0 least

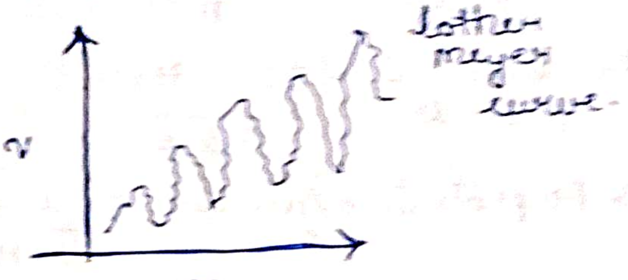
P − F = 1.9 more

Ans 5) $K_2O + CO_2 \rightarrow K_2CO_3$.

* DENSITY :-

$\uparrow \rho = \frac{m \uparrow}{V \downarrow}$ → increases then decreases

density ↑



* Diagond Relationship :- 2nd periods elment property next to the 3rd period resembe property called diagnd relationship.

eg :- Li ↘ Mg ; Be ↘ Al

Reason → Polarization power same = $\frac{\text{charge}}{\text{size}}$.

→ 2nd periods, 3rd periods different / Anamalous.

2nd B → $[BF_4]^-$, 3rd Al → $[AlF_6]^-$

→ very small size

→ high IP, EN

→ absence of d subshell.

2nd period :- pπ - pπ bond

$O=O$; $C\equiv C$; $C\equiv N$; $N=O$; $C=O$

* Valency :-

- → Alkali metals → +1
- → Alkali earth metals → +2
- → Boron family → +3, -3
- → Carbon family → +4, -4, +2
- → Pnicogens family → +3, -3, +5
- → Chalcogens → oxygen family
  -2, +2, +4, +6
- → Halogens → Flourine family
  -1, +1, +3, +5, +7.

eg → Si^{+4} F^{-1} → $[SiF_4]$

- → Hydrides → Reacⁿ with H_2
- → halides → Reacⁿ with halogen X_2
- → oxides → Reacⁿ with O_2

eg → B^{+3} + H^- → BH_3 //

N^{-3} H^+ → NH_3 //

eg → oxides

C^{+2} + O^{-2} → CO //

Cl^{+7} O^{-2} → Cl_2O_7 //

* Types of oxides.

1) Acidic oxides → $\underbrace{EO + H_2O}_{Acid}$

2) Base oxides → $\underbrace{EO + H_2O}_{Base}$

3) Amphoteric oxides → $\underline{EO + H_2O}$
Both
Acid + Base

4) Neutral oxides → No Reaction with water.

→ Acidic oxide ↑

Basic oxide ↑

Na^+ O^{-2}

$Na_2O + H_2O \rightarrow \underline{NaOH}$
Base

$Al_2O_3 + H_2O \rightarrow \underline{Al(OH)_3}$
$\underline{Al_2O_3}$

Both acid & base.

$$\left.\begin{array}{l} \rightarrow SO_2 + H_2O \longrightarrow H_2SO_3 \\ SO_3 + H_2O \longrightarrow H_2SO_4 \end{array}\right\} \text{Acidic behaviour.}$$

$\rightarrow CO_2 + H_2O \longrightarrow H_2CO_3$

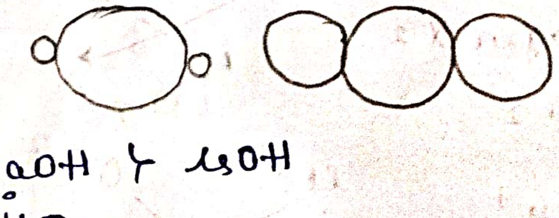
$\underbrace{NO, N_2O, CO}_{\text{Neutral oxides.}}$

Metal	Non-Metals
→ size large	size small
→ IP less	IP more
→ EN less	EN more
→ EA less	EA more
→ good conductor of heat & electricity.	→ bad conductor heat & electricity
→ ductile	→ non-ductile
→ malleable	→ non-malleable
→ tensile.	→ non-tensile.

* stability :- छोटा - छोटे के साथ
बड़ा - बड़े के साथ (stable)

$$\left.\begin{array}{ll} CO_3 & SO_4^- \\ NO_3^- & \\ NO_2^- & \end{array}\right\} \text{large molecules.}$$

$Na_2CO_3 < Cs_2CO_3$



$$\left.\begin{array}{l} H^- \\ OH^- \\ H^+ \end{array}\right] \text{smaller.}$$

stability → NaOH > CsOH
Basic ↘
NaOH < CsOH

Acidic
$NH_3 < BiH_3$

Stability.
$Li_2CO_3 < Na_2CO_3$
↳ $Li_2O + CO_2$

* Inert pair effect

$ns^2 \quad np^{1-6}$

$P \rightarrow 3s^2 3p^3$

↙ ↘

+3   +5

→ $^{+3}Al_2O_3$ $ns^2 np^1$ →

$Tl_2O_3 \xrightarrow{+1} Tl_2O_{\cancel{3}}$

when we go Top to bottom inert pair ↑ effect.

$\cancel{ns^2} \quad np^{1-6}$

$P_2O_5 > Bi_2O_5$

* Mobility $\propto \dfrac{\text{cation size}}{\text{anion size}}$.

$LiCl < NaCl < RbCl < CsCl$.

Cl^- which is more mobile in aq. medium.

→ Anion size same

→ cation size increases

→ cation ∝ mobility.

→ mobility increases.