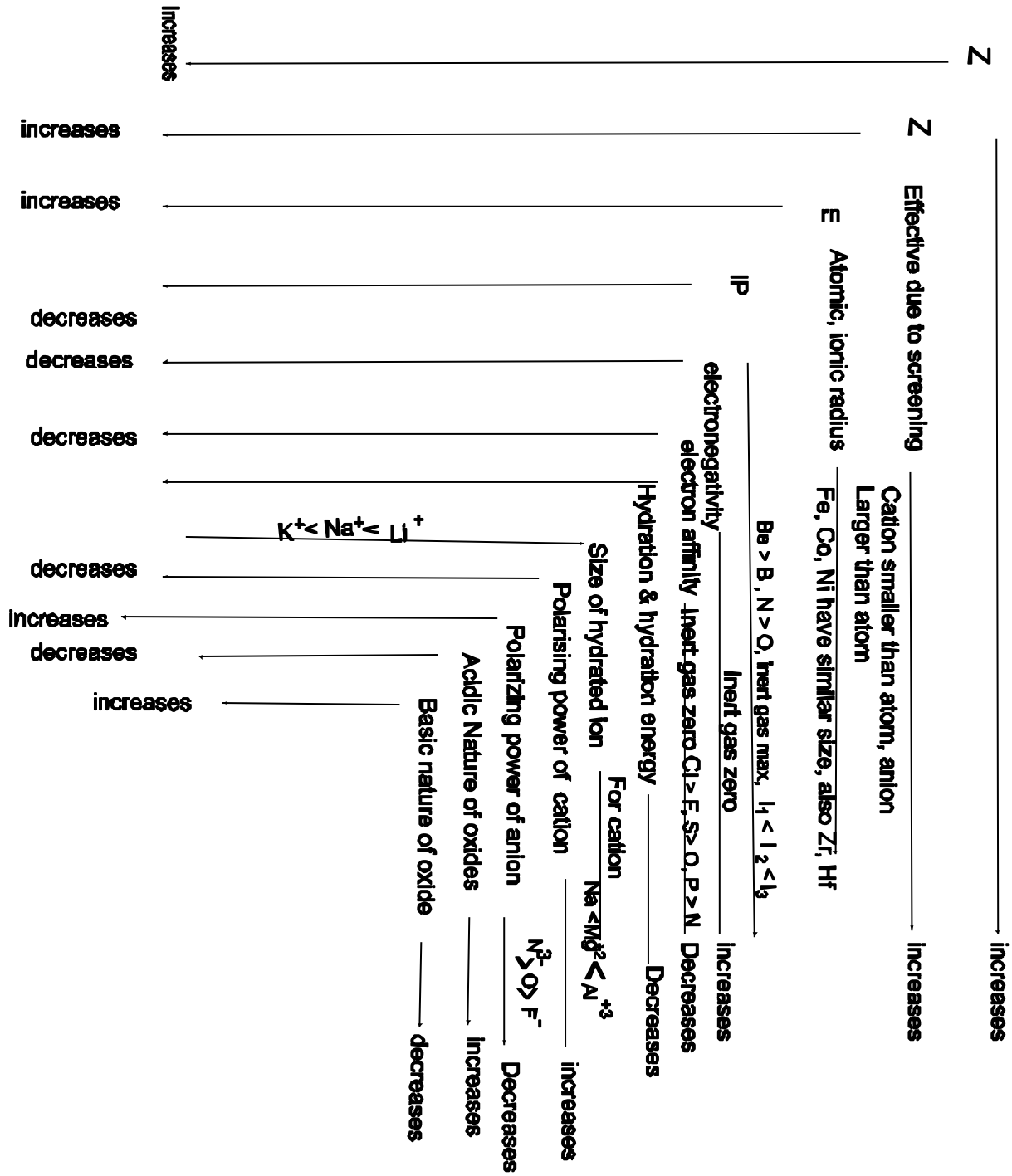

Z
increases
Z
Effective due to screening
Cation smaller than atom, anion
Larger than atom
increases
increases
E
Atomic, ionic radius
Fe, Co, Ni have similar size, also Zr, Hf
increases
IP
Be > B , N > O, inert gas max, $I_1 < I_2 < I_3$
Inert gas zero
increases
decreases
decreases
electronegativity
electron affinity
inert gas zero Cl > F, S > O, P > N
Decreases
decreases
decreases
Hydration & hydration energy
Decreases
$K^+ < Na^+ < Li^+$
Size of hydrated ion
For cation
$Na < Mg^{+2} < Al^{+3}$
decreases
Increases
Polarising power of cation
increases
decreases
Polarizing power of anion
$N^{-3} > O > F^-$
Decreases
increases
Acidic Nature of oxides
Increases
Basic nature of oxide
decreases

Classification of element into Groups and Periods

Group A : s & p block elements , representative elements , I A to VII A & O Group
Group B : d & f block elements, transition and inner transition elements I B to VII B & VIII groups
Total 16 Groups
Period 1 to 7 classified as short, shortest, long, longest and incomplete period.

Classification of elements into s, p, d and f block elements

s block
i) Configuration
ii) last enters in orbital - s orbital
iii) two groups IA OT 1 ; II A or 2

p block-
i) Configuration
ii) Last enters in p orbital
iii) six groups IIIA, IVA, VA, VIA, VIIA, zero or 13, 14, 15, 16, 17, 18

d- block - (Transition elements)
i) configuration
ii) last enters in d orbital
iii) their two outermost shell are incomplete
iv) 10 groups IIIB, IVB, VB, VIB, VIIB, VIII (Triad) IB, IIB or 3, 4, 5, 6, 7, (8, 9, 10) 11, 12
v) four series 3d, 4d, 5d, 6d

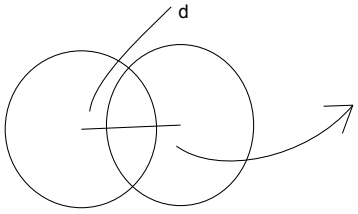
f block -(inner transition elements)
i) configuration
ii) last entere in f orbital
iii) two sereis 4f lanthanides & 5f Actinides

Position of elements from its electronic configuration

The last electron enters which subshell gives idea of its block.
Period no. is equal to valence shell present in the configuration. Also for s & p block elements
Period no.= Valence shell,
for 'd' block = shell +1
for 'f' block = shell +2
and so on.
Group no. for s & p block = valence shell electron
for d block = to [no. of (s+d) (B)]

Atomic Radius - Problem in calculating actual size of atom and hence distance between nuclei is calculated giving rise to three type of radii for atom.

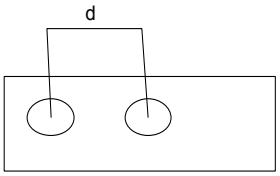
a) **Covalent Radii-**



$C_r = \frac{d}{2}$ C_r < actual atom size/slight difference)

Used for & such molecules

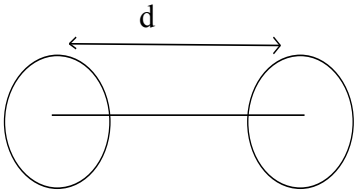
(b) **Metallic radii –**



$M_r = \frac{d}{2}$ M_r > actual size (slight difference)

used for metals

C) **Vanderwaa radius**



$V_r = \frac{d}{2}$ Vr >> actual size (very large difference)

In **In general** $V_R > M_r > C_R$

d) **Ionic radii -** A cation is smaller than parent atom, An anion is larger than parent atom.

Factors affecting atomic size-

1) No. of shells
2) Effective nuclear charge
3) screening effect

Stater's Rule-

a) For calculating on a (s or p) block (other than on 1 s)

Rule 1- Each (ns, np) electron contribute on a screening factor of 0.35

Rule 2- Each $(n-1)^A$ shell electron contribute to a screening factor of 0.85

Rule 3- Each $(n-2)^{nd}$ and deeper shell e^{Θ} contribute to a screening factor of 1

[on 1s, the screening factor due to other electron is taken as 0.3]

b) For calculating σ on (d or f) block

Rule 1- Each screening causing electron (d and f only) of same shell has factor of 0.35

Rule 2- Each electron other than Rule 1 have screening factor of 1.

General Trend-

Along period size decrease ['n' constant, Zeff increases ↑] Along group, size increase ['n' increasing , Zeff constant]

Ionisation energy-

Amount of energy required to remove the most loosely bounded electron from an isolated gaseous atom.

Units - $kJmol^{-1}$, k cal mol^{-1}, eV per atom.

Ionisation is endothermic i.e, requires energy hence ΔH is +ve.

$$M + \text{energy } ({}^{1}E_1) \rightarrow M^{+} + e^{-}$$

$$M \rightarrow M^{+} + e^{-} \qquad \Delta H = IE_1$$

$$M \rightarrow M^{+2} + e^{-} \qquad \Delta H = IE_2$$

$$M^{+2} \rightarrow M^{+3} + e^{-} \qquad \Delta H = IE_3$$

$IE_3 > IE_2 > IE_1$ always

Factors affecting ionsiation energy-

1) I E α $\frac{1}{atomic\ size}$

2) I E α $\frac{1}{screening\ effect}$

3) I E α nuclear charge

4) Electronic configuration of outermost electron (half filled/ fully filled)

5) Type of orbital involved in ionization; s> p> d> f

Along period IE ↑ [with some exceptions] Zeff ↑]
Along group IE ↓ [Zeff content, n ↑]