Periodic Classification Of Elements
Electronegativity

❖ ELECTRONEGATIVITY

Electronegativity may be defined as the tendency of an atom in a molecule to attract towards itself the shared pair of electrons.

The main factors on which the electronegativity depends are effective nuclear charge and atomic radius.

$$\text{Electronegativity} \propto \text{Effective Nuclear Charge}$$

$$\text{Electronegativity} \propto \frac{1}{\text{size}}$$

Electronegativity have no unit.

In period: electronegativity increases in moving from left to right. This is due to the reason that nuclear charge increases whereas atomic radius decreases as we move from left to right in a period. Halogens have the highest value of electronegativity in their respective periods.

2nd Period Elements

Element	Li	Be	B	C	N	O	F
Electronegativity	1.0	1.5	2.0	2.5	3.0	3.5	4.0

3rd Period Elements

Element	Na	Mg	Al	Si	P	S	Cl
Electronegativity	0.9	1.2	1.5	1.8	2.1	2.5	3.0

In a group: electronegativity decreases on moving down the group. This is due to the effect of increased atomic radius.

Group 1		Group 17	
Element	**Electronegativity**	**Element**	**Electronegativity**
Li	1.0	F	4.0
Na	0.9	Cl	3.0
K	0.8	Br	2.8
Rb	0.8	I	2.5

$$\text{E.N.} \propto \frac{1}{\text{Atomic Size}}$$

E.N. $\propto$ % s-character hybridise atom

E.N. $\propto$ Oxidation State

$Mn^{+2} < Mn^{+4} < Mn^{+7}$

SOME IMPORTANT NOTES:

Based on number of incomplete shells the elements are classified into four types. Inert gases, representative elements, transition elements and inner transition elements.

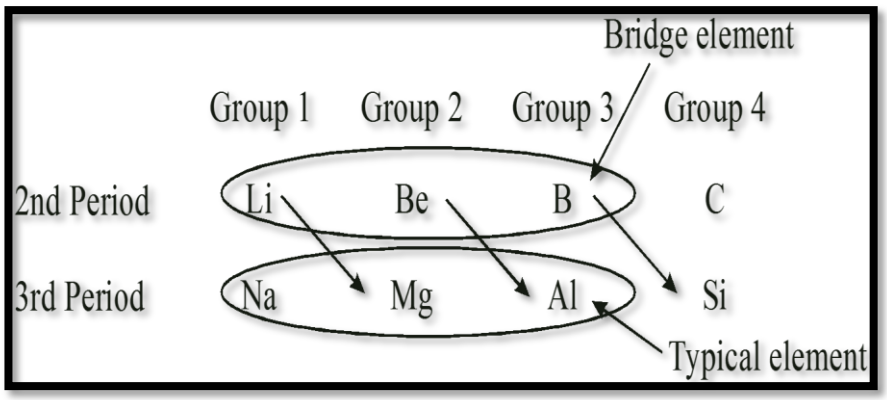
(a) General electronic configuration of inert gases (except He) is ns^2np^6 (outermost shell completely filled.)

(b) In representative elements,only the outermost shell is incomplete. General electronic configurations varies from ns^1 to $ns^2\ np^6$.

(c) In transition elements, two outer most shells are incomplete (nth and (n – 1)th). General electronic configuration is $(n-1)\ d^{1-10}\ ns^{1-2}$.

(d) In inner transition elements, three outer shells are incomplete. General electronic configuration is $(n-2)f^{1-14}\ (n-1)d^{0-1}\ ns^2$.

Diagonal Relationship: - Certain elements of second period exhibit similarty in properties as shown by the elements diagonally placed to them in the third row, e.g. This is called **diagonal relationship.** Li and Mg; Be and Al; B and Si shows diagonal relationship.



This is due to identical ionic radii and polarizing power (i.e., charge/ size ratio of the pairs of these elements). Elements of second period are known as **bridge elements.**

Anomalous behaviour of first element of a group.

The first element of a group exhibits difference in its properties in certain respects from the rest of the elements of its group. This is due to its small size, high electronegativity and non avaiability of d-electrons. This anomalous behaviour is shown by the elements of the second row (period) i.e. , Li to F.

Typical Element: These elements represent the properties of other element of respective group.