Saturday, 3 August 2024 10:27 PM

Electronegativity :-

* It is a qualitative measure of the ability of an atom in a chemical compound to attract shared electrons to itself.
* Unlike ionisation ethalpy and electron gain enthalpy, it is not a measureable quantity. However, a number of numerical scales of EN of element viz., Pauling scale, Mulliken-Jaffe scale, Allred-Rochow scale have been developed. The one which is the most widely used is the Pauling Scale. He assigned arbitararily a value of 4.0 to fluorine, the element considered to have the greatest ability to attract electrons.

Table 3.8(a) Electronegativity Values (on Pauling scale) Across the Periods

Atom (Period II)	Li	Be	B	C	N	O	F
Electronegativity	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Atom (Period III)	Na	Mg	Al	Si	P	S	Cl
Electronegativity	0.9	1.2	1.5	1.8	2.1	2.5	3.0

Table 3.8(b) Electronegativity Values (on Pauling scale) Down a Family

Atom (Group I)	Electronegativity Value	Atom (Group 17)	Electronegativity Value
Li	1.0	F	4.0
Na	0.9	Cl	3.0
K	0.8	Br	2.8
Rb	0.8	I	2.5
Cs	0.7	At	2.2

*** Electronegativity of any given element is not constant. It varies depending on the element to which it is bound.

* E.N. generally ↑ses across the period from left to right & ↓ses down a group in the periodic table.

Factors affecting EN :-

(i) Effective nuclear charge :- Higher Effective nuclear charge, Higher EN.

(ii) Screening effect :- More screening effect, less EN

(iii) Size of atom :→ Size ↑ses EN ↓ses

(iv) oxidation State :- Higher ox. state, Higher EN

(v) Hybridisation :- s-char. ↑es , EN ↑es

$sp > sp^2 > sp^3$

Applications of EN

(i) In deciding nature of bond

% ionic character of bond = $[16(x_A - x_B) + 3.5(x_A - x_B)^2]$

x_A = EN of A x_B = EN of 'B' element

$x_A - x_B = 0$ A–B → 100% covalent, non-polar bond

$x_A - x_B \approx 1.7$ A–B → 50% –"– , polar bond

$x_A - x_B < 1.7$ A–B is more covalent, less ionic

$x_A - x_B > 1.7$ A–B is more ionic, less covalent.

(s-f ⇒ ionic (max. value of Δx)

(ii) Strength of bond :- ↑es in differences in EN, makes the bond more strong.

eg Bond strength of H–X

HF > HCl > HBr > HI

(iii) Color of salt :- compound containing bond which is > 20% ionic is generally colorless. If % ionic character is less than 20%, compound will be coloured eg.

	% ionic character	color
AgCl	80%	White
AgBr	24%	Light Yellow
AgI	15%	Yellow
Ag_2S	4%	Black.

(iv) To decide whether X–OH molecule act as acid or base in aqueous solution.

(a) when X—O—H molecules act as base

$x_O - x_X > x_O - x_H$

eg. Na⫶O–H

(b) when X–O–H compound act as acid

$x_O - x_X < x_O - x_H$

eg. H⫶O–Cl

Generally, non-metal hydroxides are acids.

**✓ HI > HBr > HCl > HF (Acid strength)

* EN is directly related to that non-metallic properties of elements..

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