

ANOMALOUS BEHAVIOUR OF FLUORINE :

Ionization enthalpy, electronegativity, and electrode potentials are all higher for fluorine than expected from the trends set by other halogens. Also, ionic and covalent radii, m.p. and b.p., enthalpy of bond dissociation and electron gain enthalpy are quite lower than expected.

The anomalous behaviour of fluorine is due to its small size, highest electronegativity, low F-F bond dissociation enthalpy, and non availability of d- orbitals in valence shell.

Most of the reactions of fluorine are exothermic (due to the small and strong bond formed by it with other elements).

It forms only one oxoacid while other halogens form a number of oxoacids. Hydrogen fluoride is a liquid (b.p. 293 K) due to strong hydrogen bonding. Other hydrogen halides are gases.

- Other halogens except fluorine have d- orbitals and therefore, can expand their octets and show + 1, + 3, + 5 and + 7 oxidation states also.
- Each halogen has one electron less than the nearest noble gas and hence has a strong tendency to share its unpaired

electron with another atom of the same halogen to form diatomic molecules.

- The acidic strength of HF, HCl, HI acid in water is,
 $\text{HF} < \text{HCl} < \text{HI}$,

because the bond dissociation energy of H-X bond decreases as size of halogen increases.

- ICl is more reactive than I_2 , because I-Cl bond is weaker than I-I bond.

- Although the electron gain enthalpy of fluorine is less negative as compared to chlorine, fluorine is a stronger oxidizing agent than chlorine, because the standard reduction potential of fluorine (i.e. +2.87 V) is more positive than chlorine (i.e. =1.36 V).

- The decreasing order of bond dissociation enthalpies of different diatomic halogens is $\text{Cl}_2 > \text{Br}_2 > \text{F}_2 > \text{I}_2$.

- Bleaching of substances by chlorine is permanent while that by sulphur dioxide is temporary, it is because chlorine bleaches coloured materials by oxidation and hence permanent on the other hand, sulphur dioxide bleaches coloured materials by reduction and hence bleaching is temporary because when the bleached material is exposed to air, it gets oxidized and colour is restored.

- More metal fluorides are ionic than metal chlorides, because Cl^- is bigger in size than F^- ion so it get easily polarized (Fajan's rule).
