

→ When Metal react with Ligand to form stable co-ordination Compound or Complex Compound or Semipolar Compound or dative Compound or Acid base Compound.

* Ligand or Nucleophile or Base :- → Those species

which having excess e^- in form of $-q$. [Cl^- , H^- , Br^- , OH^- , CN^- , etc]. Lone pair e^- ($H_2\ddot{O}$, $\ddot{N}H_3$, $H_2\ddot{S}$, $\ddot{P}H_3$) having π -bond (Benzene, O_2 , N_2 , EDTA, oxalate etc)

* Types of Ligand :- →

- ✓ (i) Strong Ligand
- (ii) Weak Ligand
- ✓ (iii) Neutral Ligand
- (iv) Monodentate Ligand
- ✓ (v) Bidentate Ligand
- (vi) Ambidentat Ligand.
- (vii) Hexadentat Ligand.

(i) Strong Ligand :- → Those Ligand which doesn't obey Hund's rule hence pairing of e^- occurs

from initial. (Not filling $\bar{e}$ singly), it use inner hybrid orbital. (dsp), Make low spin complex compound because less no. of unpaired $\bar{e}$ present hence $\uparrow$ diamagnetic character and $\downarrow$ paramagnetic character as well as magnetic moment.

eg $\rightarrow$ CN, Co, NO₂ but H₂O and NH₃ acts as strong ligand with cobalt and copper. All ligand (strong & weak) acts as strong ligand with 5th, 6th, 7th period element (Pd, Pt, etc).

(II) weak ligand $\rightarrow$ Those ligand which obey Hund's rule hence firstly fill single $\bar{e}$ then do pairing. it use outer hybrid orbital (s, p, d, f). and Make ~~low~~ High spin complex compound because more no. of unpaired $\bar{e}$ s are present Hence $\uparrow$ paramagnetic character and M.Moment and $\downarrow$ diamagnetic character.

eg $\rightarrow$ All ligand other than strong ligand.

OH, en, oxalate, EDTA, Cl, Br, I, F etc.

(III) Neutral ligand $\rightarrow$ Those ligand which have zero oxidation no.

eg $\rightarrow$ NH₃, H₂O, en, pyridine, alkyl group, benzene.

(iv) Monodentate Ligand $\rightarrow$

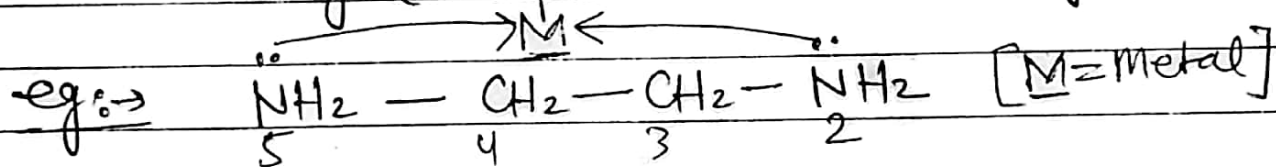
1 Teeth or Donor

Those ligand which donate $1-e^-$ pair.

eg $\rightarrow$ H_2O , NH_3 , OH^- , CN^- , CO , H_2O , NH_3 etc.

(V) Bidentate Ligand $\rightarrow$ Those ligand which donate

2- $\bar{e}$ pair at a time. and make 5 or 6-member stable ring. (Not 3 and 4 member ring).

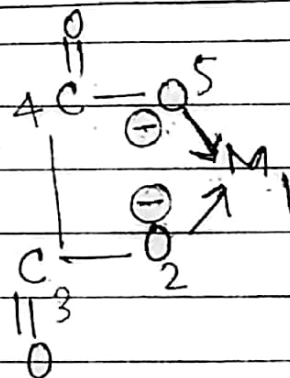


ethylene diamine (en)

geg. en

DMG
Acetyl acetonato (acac)
biphenyl

oxalate $C_2O_4^{2-}$
(ox)



(VI) Ambidentat ligand :- $\rightarrow$ Those ligand in which

2 donor site present but only 1 donor file donate e pair at a time.

eg $\rightarrow$ $\text{CN} \rightarrow \text{NC}_1 \rightarrow$ (Isocyanide)
 $\text{ONO} \rightarrow \text{NO}_2$

cyano O-Nickelto $\rightarrow$ N-Nickelto

Selenium $\text{CN} \rightarrow$ selenium NC

SCN $\rightarrow$ SNC