Co-ordination Compound

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

* Ligand or Nucleophile or Base :→ Those species which having excess $\bar{e}$ in form of $-q$. [Cl^-, H^-, OH^-, CN^-, etc]. Lone pair $\bar{e}$ ($H_2\ddot{O}$, $\ddot{N}H_3$, $H_2\ddot{S}$, $\ddot{P}H_3$) having π-bond (Benzene, O_2, N_2, EDT 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 Hunds rule hence pairing of $\bar{e}$ occur

from initial. (Not filling e singly), it use inner hybrid orbital. (dsp), Make low spin Complex Compound because Less no. of unpaired e present hence ↑se diamagnetic character and ↓se paramagnetic character as well as magnetic moment.

eg → CN, Co. NO2 but H_2O and NH_3 acts as Strong Ligand with cobalt ad Copper. All Ligand (Strong & weak) acts as Strong ligand with 5th, 6th, 7th period element (Pd, Pt, etc).

(II) weak ligand :→ Those Ligand which obey Hunds rule hence firstly fill Single 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 es are present Hence ↑se paramagnetic character and M. Moment and ↓se diamagnetic character.

eg :→ All ligand other than strong ligand.
OH, en, Oxalate, EDTA, Cl, Br, I, F etc.

(III) Neutral ligand :→ Those Ligand which having zero oxidn no.

eg → NH_3, H_2O, en, pyridine, alkyl group benzene.

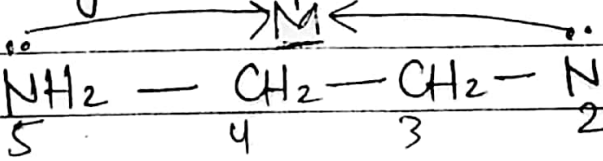
(IV) Monodentate Ligand :→ Topic →

1 Teeth or Donor

Those Ligand which donate 1-$\bar{e}$ pair.

eg → H_2O, NH_3, OH^-, CN, CO, H_2O, NH_3 etc.

(V) Bidentat Ligand :→ Those Ligand which donate 2-$\bar{e}$ pair at a time. and make 5 or 6-member stable ring. (Not 3 and 4 meber ring).

eg :→ 

[M = metal]

ethylene diamine (en)

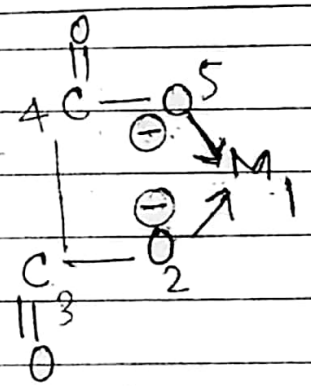
→ eg: en

DMG

Oxalate $C_2O_4^{--}$ (ox)

Acetyl acetonato (acac)

dipyridial



(VI) Ambidentat ligand :→ Those Ligand in which 2 donar site present but only 1 donar site donate $\bar{e}$ pair at a time.

eg → CN ⇒ NC → Isocyano

ONO → NO2

cyano O-nitrito → N-Nitrito

Selinium CN → selinium NC

SCN → SNC