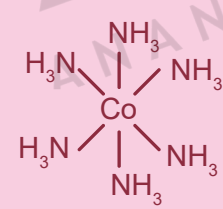


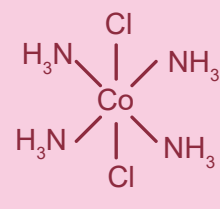
COORDINATION COMPOUNDS

COMPLEX SALT
Doesn't dissociate completely into ions

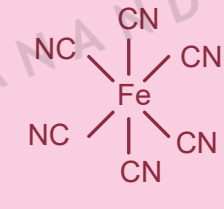
HOMOLEPTIC COMPLEX



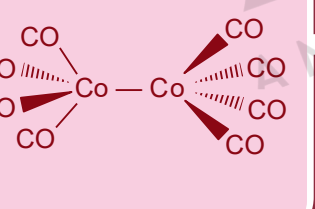
HETEROLEPTIC COMPLEX



HOMONUCLEAR COMPLEX



HETRONUCLEAR COMPLEX



NOMENCLATURE

Naming of Mononuclear Complex

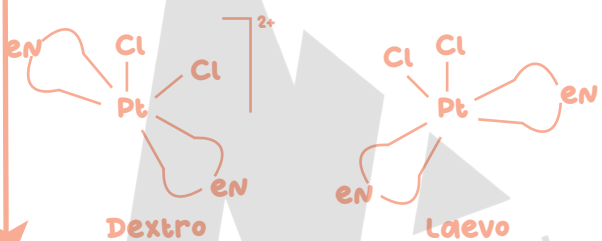
Naming of mononuclear complex
1. Cation is named first
2. Naming of ligands is done in alphabetical order
3. Anionic ligands end in -o. Neutral and cationic are same.
4. Prefixes mono, di, tri, etc are used.
It is followed by roman numeral in parenthesis.
Example: Triamminetriaqua chromium (III) chloride
[Cr(NH₃)₃(H₂O)₃].Cl₃

Formula of Mononuclear Complex

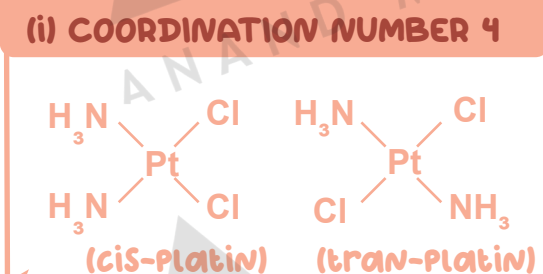
1. Central atom is listed first.
2. Ligands in are placed in alphabetical order.
3. Formula is enclosed in square bracket.
4. No space between ligands and metal.
5. Charge is indicated outside brackets.
6. Charge on cation(s) balanced by charge of anion(s)
Example:

STEREO ISOMERS

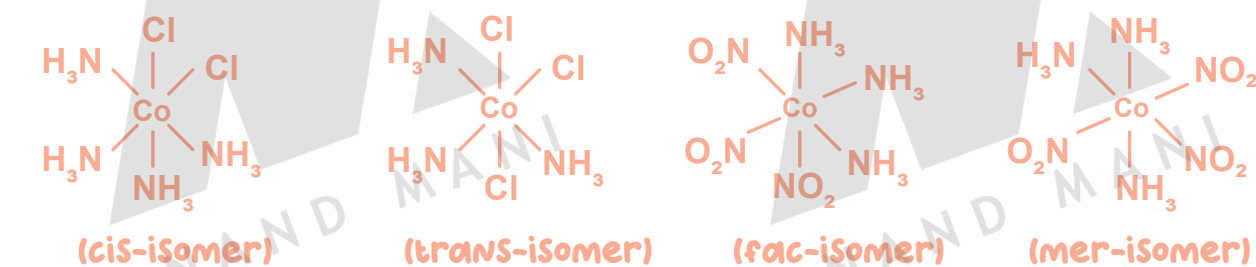
OPTICAL ISOMERS



GEOMETRICAL ISOMERS



(ii) COORDINATION NUMBER 6



STRUCTURAL ISOMERS

Ionisation isomer

Different ions are produced in aqueous solution.
Ex: [Co(NH₃)₅(SO₄)]

Solvate isomer

Different in number of water molecules attached.
Ex: [Cr(H₂O)₆].Cl₃ and [Cr(H₂O)₅Cl].Cl₃.H₂O

LINKAGE ISOMER

Occurs in ambidentate ligands
Ex: [Co(NH₃)₅(NO₂)] and [Co(NH₃)₅(ONO)]

Coordination entities are different.
Ex: [Co(NH₃)₆][Cr(CN)₆] and [Co(CN)₆][Cr(NH₃)₆]

WARNER'S THEORY

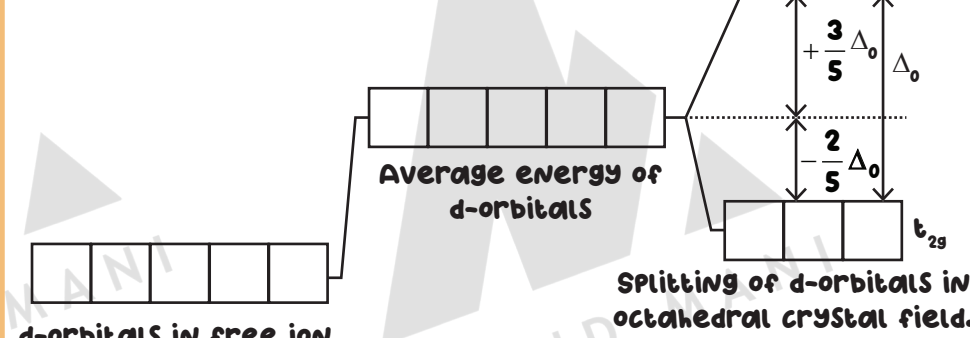
Central metal ion shows primary and secondary valences
Primary valences are ionisable.
Secondary valences are non-ionisable.
Ions bonded to metal via secondary linkages have different spatial arrangement

Limitation
ONLY certain elements form coordination complex
Why coordination bonds have directional property couldn't explain magnetic and optical properties of complex.

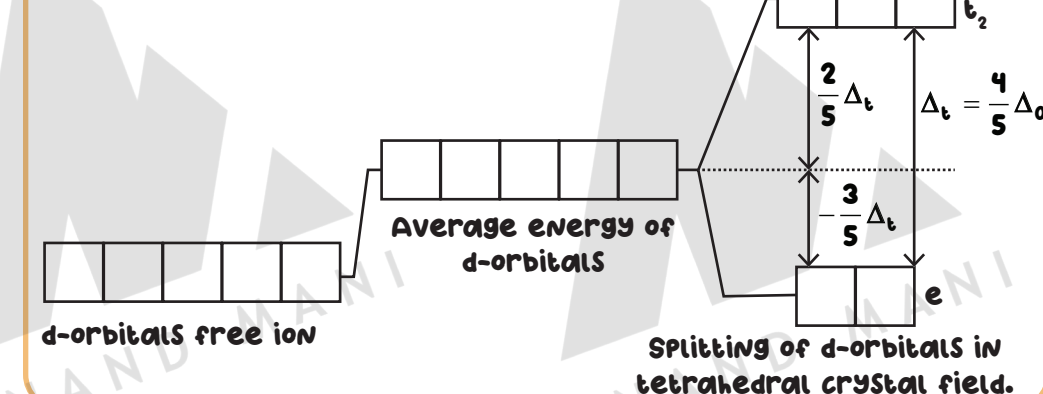
BONDING THEORY

CRYSTAL FIELD THEORY

Octahedral Complex



Tetrahedral Complex



STABILITY



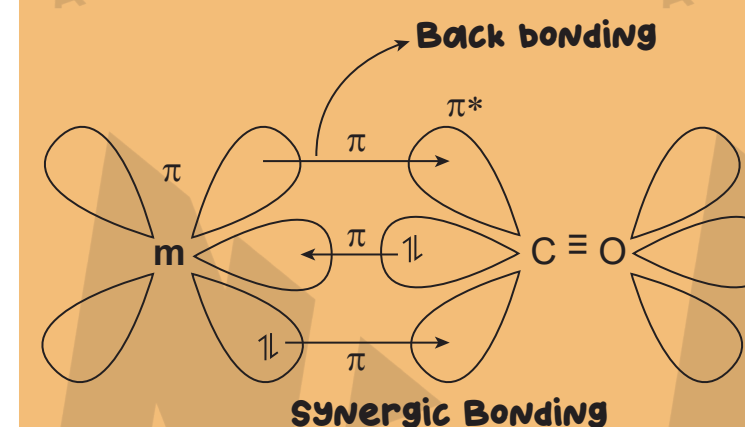
$$\text{Stability constant } K = \frac{[ML_n]^{y-}}{[M^{+}][L^{x-}]^n}$$

FACTOR AFFECTING STABILITY

Charge density on the central metal ion.
Nature of ligands.

METAL CARBONYL

metal Carbonyl posses both S and P bond.



EDTA is used in estimation of hardness of water

Hemoglobin is a coordination compound of Iron.

Coordination compounds are used in extraction of metals like gold.

COLOUR IN COMPLEX

Caused by d-d transition.
colour is complementary to wavelength absorbed.

MAGNETIC PROPERTY

$$\text{Magnetic moment} = \sqrt{n(n+2)} \text{ BM}$$

PARAMAGNETIC

Ex- [CoF₆]³⁻
One or more than one unpaired e- present
Ex- [CoF₆]³⁻

DIAMAGNETIC

No unpaired electron present
Ex- [Ni(CN)₄]²⁻

HIGH SPIN COMPLEX

$\Delta_o < \text{Pairing Energy}$
Ex: [CrCl₆]³⁻

LOW SPIN COMPLEX

$\Delta_o > \text{Pairing Energy}$
Ex: [Cr(CI)₆]³⁺