

Stereoisomerism → Same chemical formula & same chemical bonds but different spatial arrangements.

① Geometrical Isomerism

- Arises in heteroleptic complexes.
- Cis - two ligands adjacent to each other (90°)
- Trans - " " opposite " " (180°)

② Optical Isomerism - Optical isomers are mirror images that cannot be superimposed one on another. These are called as enantiomers (optically active pairs).

* Square planar complex (CN=4)

	Comp	G.I	
Optical X	MA_4	0	-a/b/c/d/e/f
POS ✓	MA_3B	0	Monodentate ligands
G.I ✓	MA_2B_2	2	(AA) → symmetrical
	MA_2BC	2	bidentate (donor atom same [en, ox])
	MA_2B_2C	3	(AB) → unsymmetrical bidentate (d/bb)

* By using Bidentate ligands

	Jugad
$M(AA)_2$	G.I = 0
$M(AA)_2B_2$	G.I = 0 (always)
$M(AA)_2BC$	(AB) for unsymmetrical bidentate
	$M(AB)_2 = 2 \cdot G.I$
	$M(AB)_2B_2 = 0$
	$M(AB)_2BC = 2 \cdot G.I$

* Tetrahedral complex (CN=4)

Optically active is (i) MA_2BCD (ii) $M(AB)_2$

Jugad → (CN=4)

- ① Zn, Cd, Hg → always tetrahedral
- ② Pt, Pd → always sq. planar

* Octahedral complex (CN=6)

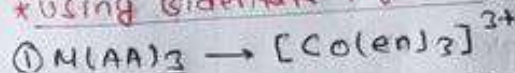
↳ can give both G.I & O.I

Jugad → for optically active/inactive

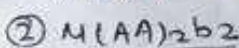
- ① If two same ligands present at any one trans position → POS ✓, O.I
- ② If any two trans position are mutually same → POS ✓, O.I
- ③ If non co-planar rings are present → O.A

Type	No. of G.I	S.I
MA_6	0	0
MA_5b	0	0
MA_4b_2	2	2
MA_4bc	2	2
MA_3b_3	2	2

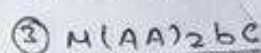
* Using Bidentate ligands



G.I (X) O.I (✓) S.I = 2



G.I = 2 cis & trans
S.I = 3 "cis is active"



G.I = 2 cis & trans
S.I = 3 "cis is active"

Importance & Applications of Coordination compounds

- ① Hardness of water is estimated by simple titration with Na_2EDTA .
- ② In extraction & purification of metals.
- ③ Rhodium complex, $[RhCl(PPh_3)_3]$, a Wilkinson catalyst, is used for the hydrogenation of Alkenes.
- ④ In black & white photography, the developed film is fixed by washing with hypo solution which dissolves the undecomposed $AgBr$ to form a complex ion, $[Ag(S_2O_3)_2]^{2-}$.
- ⑤ EDTA is used in the treatment of lead poisoning.
- ⑥ Cis-platin is used as anticancer.
- ⑦ Chlorophyll (pigment responsible for photosynthesis) → (Mg)
- ⑧ Haemoglobin → Fe
- ⑨ Cyanocobalamin vitamin $B_{12} \rightarrow Co$
- ⑩ Articles can be electroplated with silver & gold much more smoothly & evenly from solutions of the complexes, $[Ag(CN)_2]^-$ & $[Au(CN)_2]^-$ than from a soln of simple metal ions.