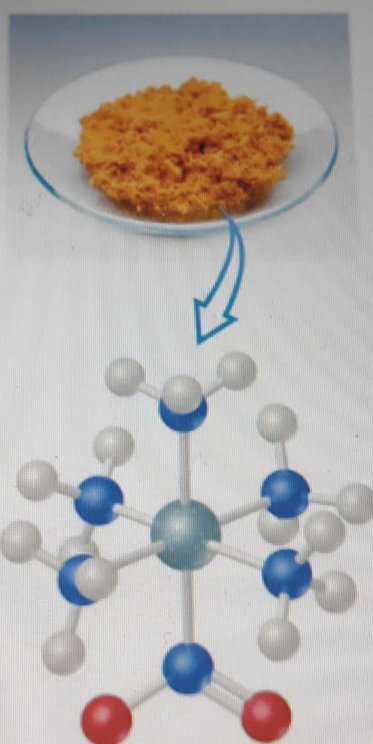
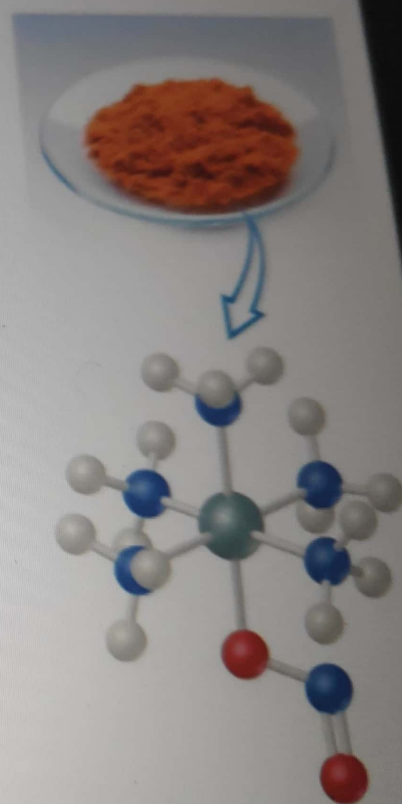


Structural Isomers

If a ligand (like the NO_2 group at the bottom of the complex) can bind to the metal with one or another atom as the donor atom, linkage isomers are formed.



Nitro isomer

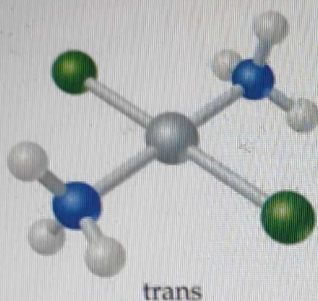
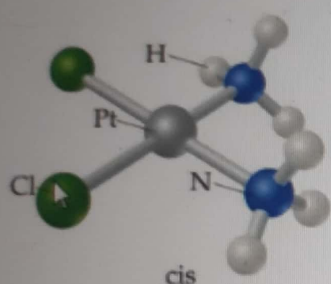


Nitrito isomer

Structural Isomers

- Some isomers differ in what ligands are bonded to the metal and what is outside the coordination sphere; these are coordination-sphere isomers.
- Three isomers of $\text{CrCl}_3(\text{H}_2\text{O})_6$ are
 - The violet $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$,
 - The green $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$, and
 - The (also) green $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2 \text{H}_2\text{O}$.

Geometric isomers



- With these geometric isomers, two chlorines and two NH_3 groups are bonded to the platinum metal, but are clearly different.

➤ *cis*-Isomers have like groups on the same side.

➤ *trans*-Isomers have like groups on opposite sides.

of each atom the same

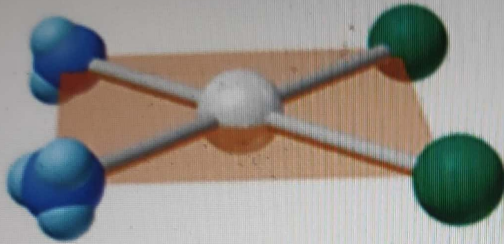
Bonding the same

Arrangement in space different

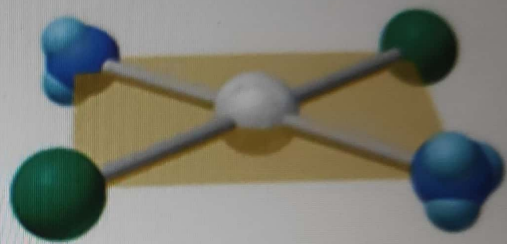
Chem
Coord
Comp

0
DN POCO F1

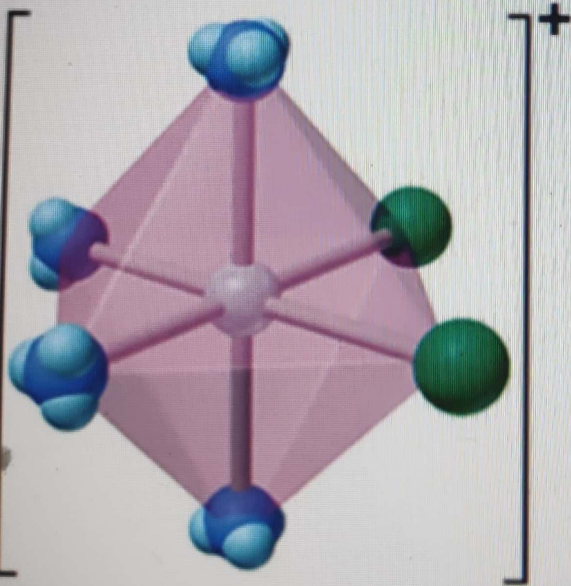
Geometric (*cis-trans*) Isomerism



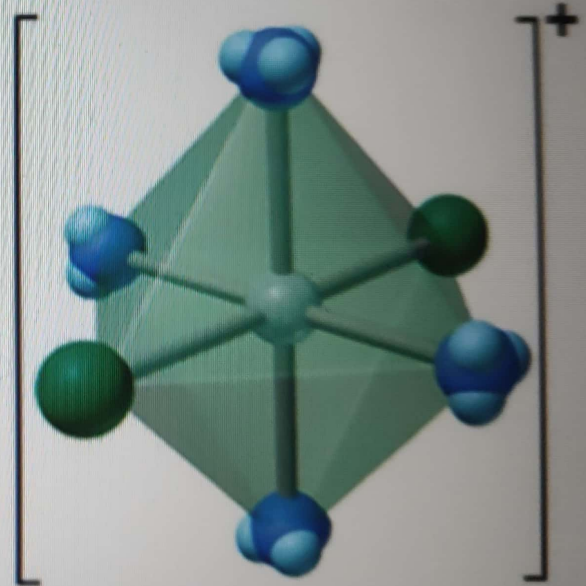
A *cis* - $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$



trans - $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$

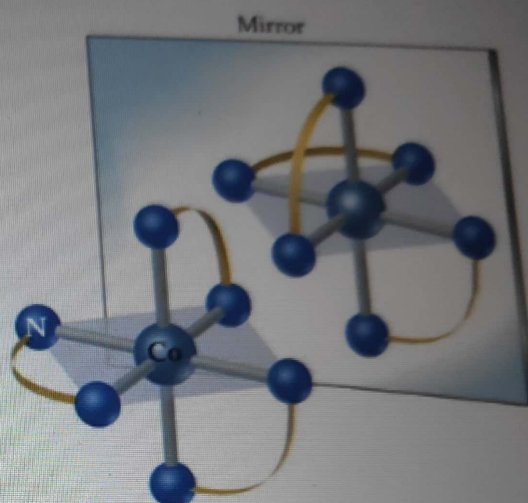
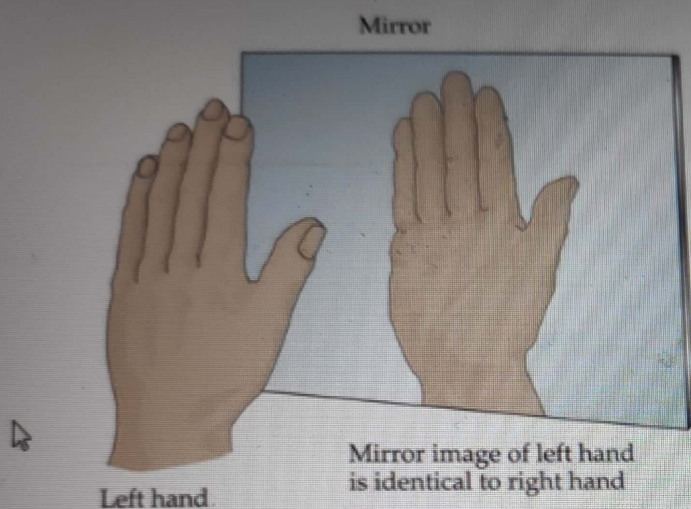


B *cis* - $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$



trans - $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$

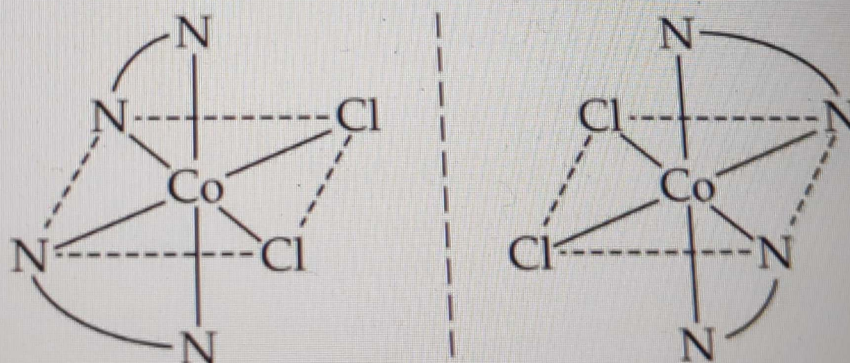
Stereoisomers



- Other stereoisomers, called **optical isomers** or **enantiomers**, are mirror images of each other.
- Just as a right hand will not fit into a left glove, two enantiomers cannot be superimposed on each other.

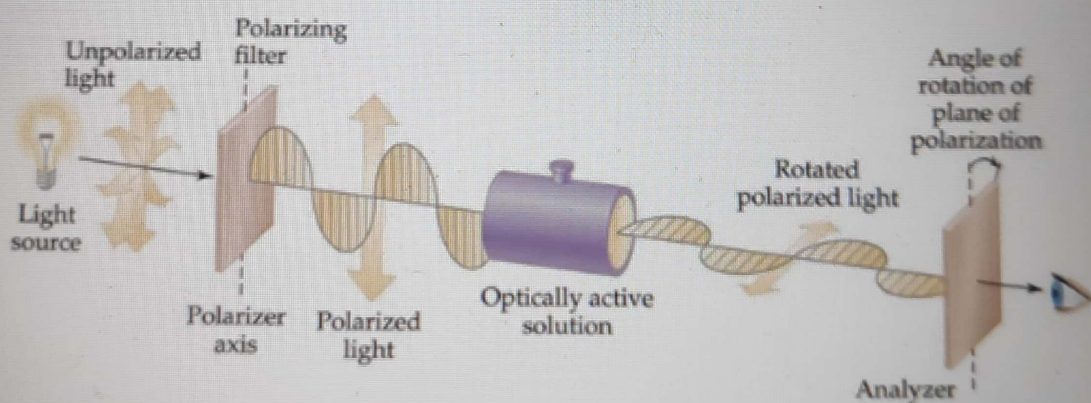
Enantiomers

A molecule or ion that exists as a pair of enantiomers is said to be **chiral**.



Enantiomers

- If one enantiomer of a chiral compound is placed in a polarimeter and polarized light is shone through it, the plane of polarization of the light will rotate.
- If one enantiomer rotates the light 32° to the right, the other will rotate it 32° to the left.



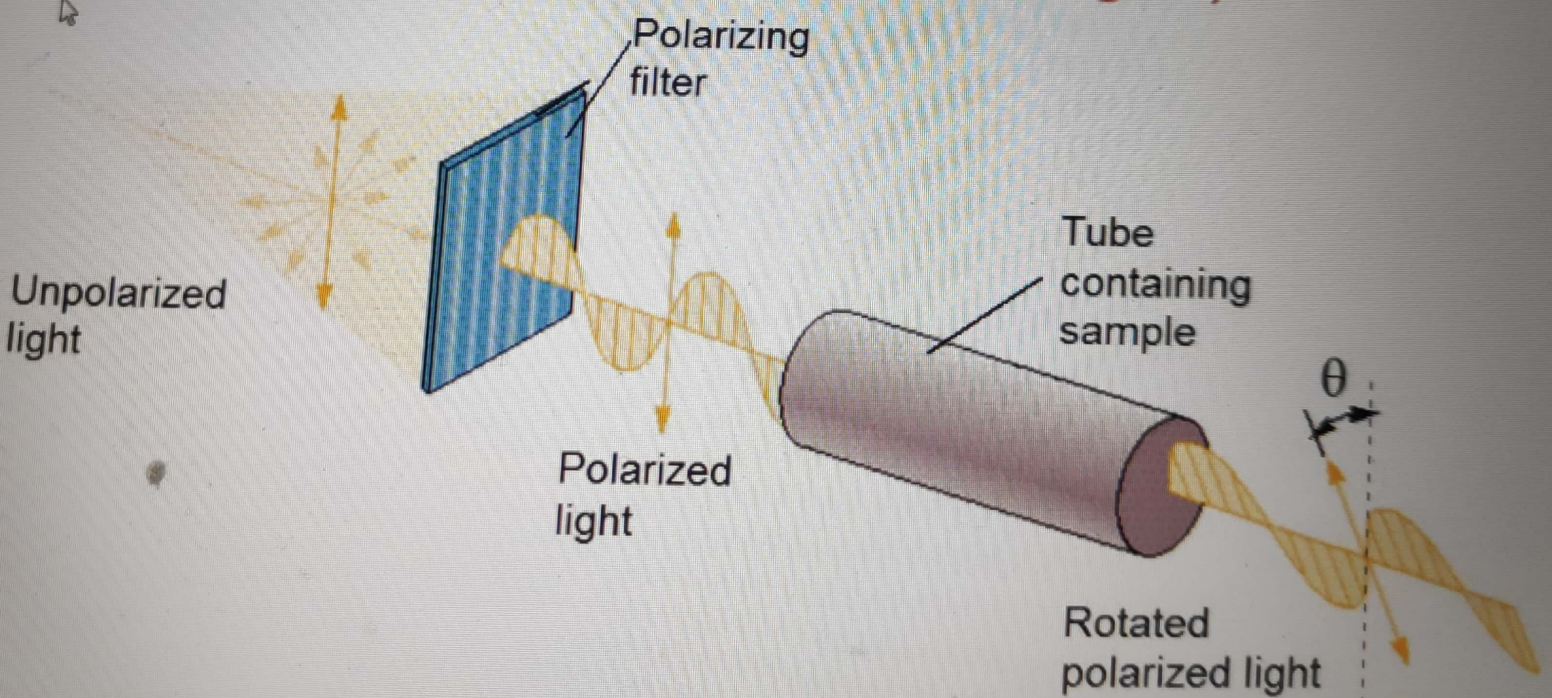
Chemistry
Coordination
Compounds

Stereoisomerism

Optical isomerism:

Have opposite effects on plane-polarized light

(no superimposable mirror images)



Optical Isomerism in an Octahedral Complex Ion

