

Like organic molecules, transition metal complexes can form different isomers. These include geometric (cis/trans), optical as well as facial and meridional (fac/mer) isomers.

Geometric Isomers

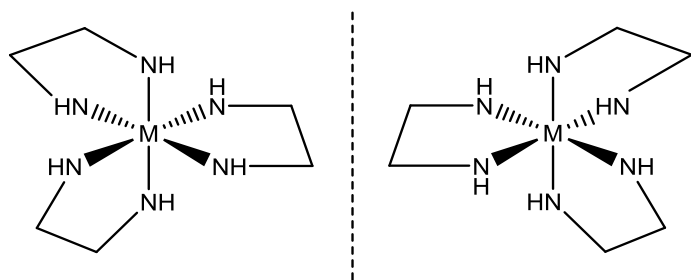
Transition metals form cis/trans isomers like alkenes. These can be explained using the same principles.

- **Trans** - Same groups directly opposite sides of the metal. (situated 180° from each other)
- **Cis** - Same groups are on the same side of the metal (90° from each other)

Fac/Mer Isomers

Fac/Mer isomers arise when there are two equal types of ligand in an octahedral metal complex.

- **Fac** - When one type of ligand occupies one face of the octahedron.
- **Mer** - Each set of identical ligands occupy a plane of the octahedron (2 of the same ligands are trans to each other, the other ligand is cis to these.)

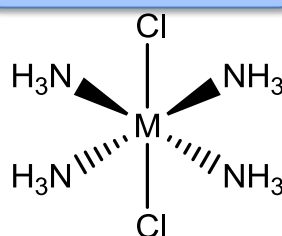


TOP TIP!

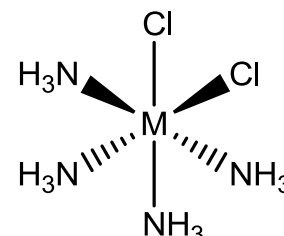
An isomer has the same molecular formula with a different arrangement of atoms.



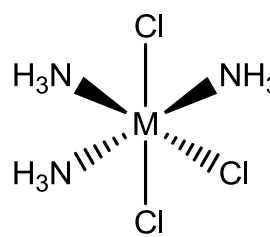
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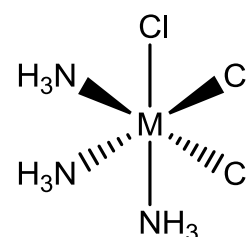
Trans



Cis



Mer



Fac

Optical Isomers

Transition metals also form optical isomers (two or more forms of a compound with the same structure but different mirror images). This often occurs in octahedral complexes with bidentate ligands. **The complexes will have the same molecular formula with mirror images which cannot be super-imposed onto one another.**