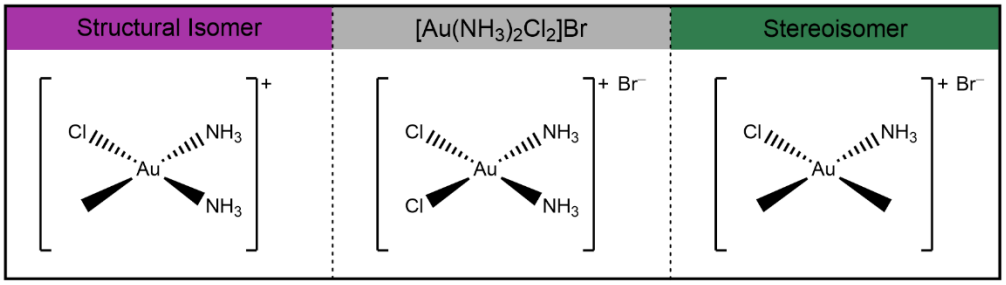
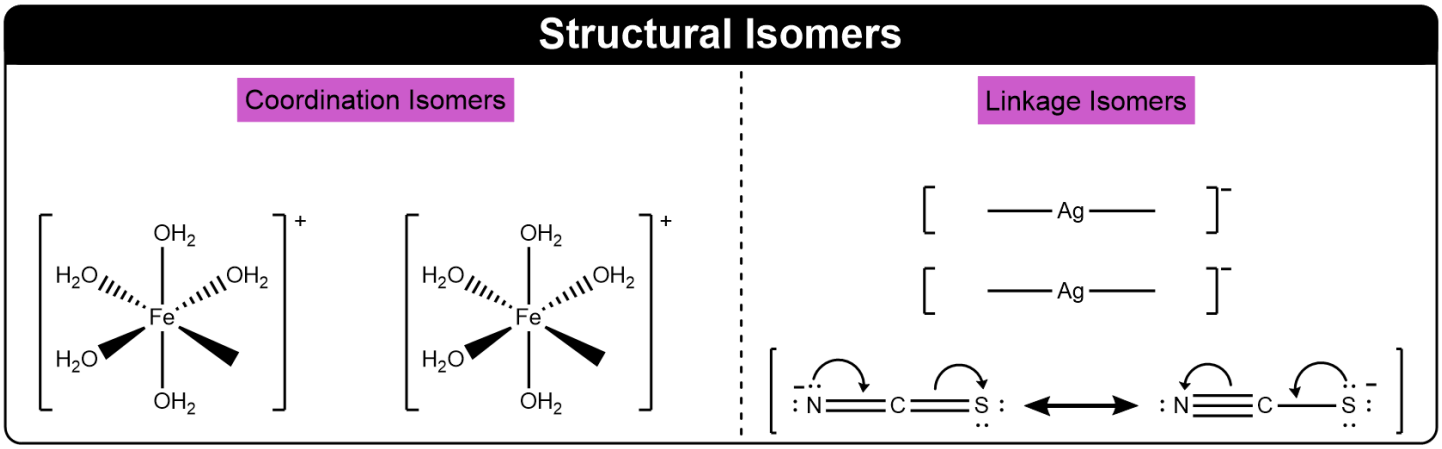
CONCEPT: ISOMERISM IN COORDINATION COMPLEXES

- **Recall:** Isomers are molecules with the _____ molecular formula, but different connectivity or spatial orientation.

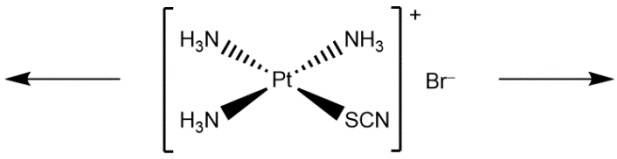


Structural Isomers

- Consist of (1) Coordination Isomers, or (2) Linkage Isomers.
  - **1) Coordination Isomers:** molecules where anionic _____ and _____ have switched places.
  - **2) Linkage Isomers:** molecules where the connectivity between the _____ and the _____ is different.



EXAMPLE: Draw one coordination isomer and one linkage isomer of the following complex:



CONCEPT: ISOMERISM IN COORDINATION COMPLEXES

Geometric Isomers

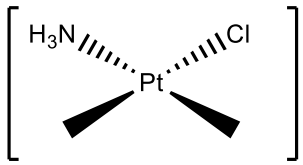
● Ligand has different spatial orientation around the metal.

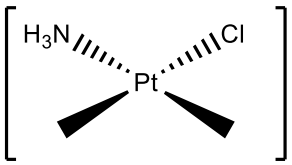
□ Occurs in complexes of formula _____ or _____.

- ***cis*** = ligand pair on _____ side - ***trans*** = ligand pair on _____ sides

Geometric Isomers

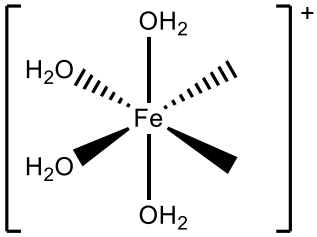
MX_2Y_2

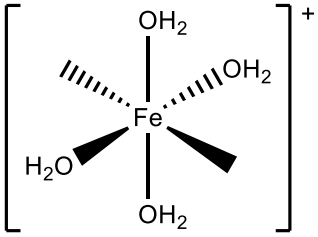




_____ _____

MX_2Y_4

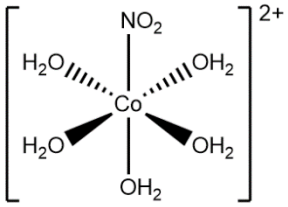


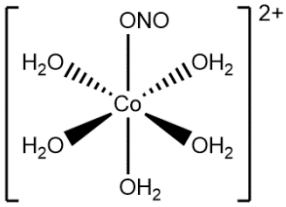


_____ _____

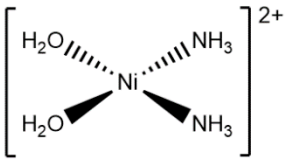
EXAMPLE: Identify the following pairs of complexes as coordination, linkage, or geometric isomers.

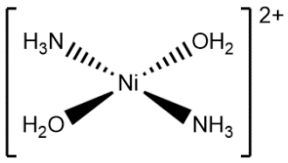
i)





ii)





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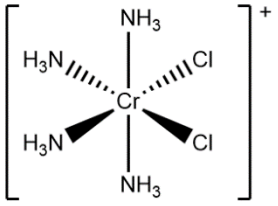
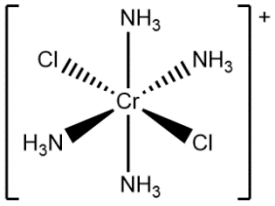
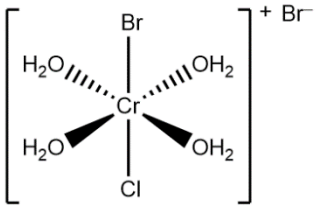
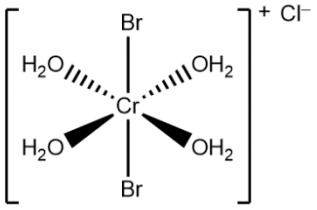




iv)





CONCEPT: ISOMERISM IN COORDINATION COMPLEXES

PRACTICE: Which of the following complexes cannot have geometric isomers?

i) $[PtCl_2(NH_3)_2]$

ii) $K_4[Fe(CN)_4(OH)_2]$

iii) $[Ag(NH_3)_2]Cl$

iv) $[Ni(H_2O)_2(NH_3)_2]Br_2$

PRACTICE: The complex $[Fe(NH_3)_5OCN]^{2+}$ has two isomers. Draw their structures.

PRACTICE: How many isomers are possible for $[Cu(H_2O)_2(NH_3)_2]SO_4$? Draw their structures.