(23) **Today**

Section 6.4.6: Halogen Bonds

Section 9.1 - 9.3
Introduction to Coordination Chemistry,
Nomenclature and Ligands

Next Class (24)

Section 9.3 – 9.5
Nomenclature and Ligands, Isomerism,
Coordination Number and Structures

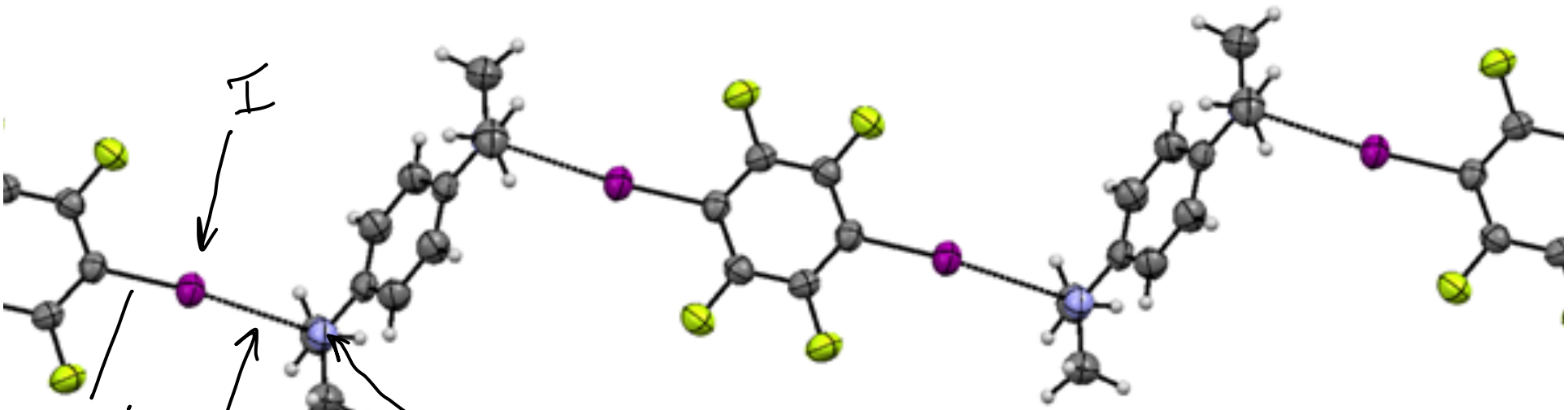
(25) **Second Class from Today**

9.5 Coordination Number and Structures

Chap 10

Third Class from Today (26)

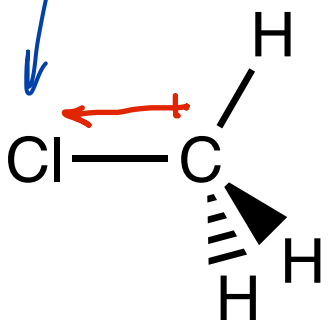
Test 2



halogens on drugs were being attracted to C=O O atoms in peptides

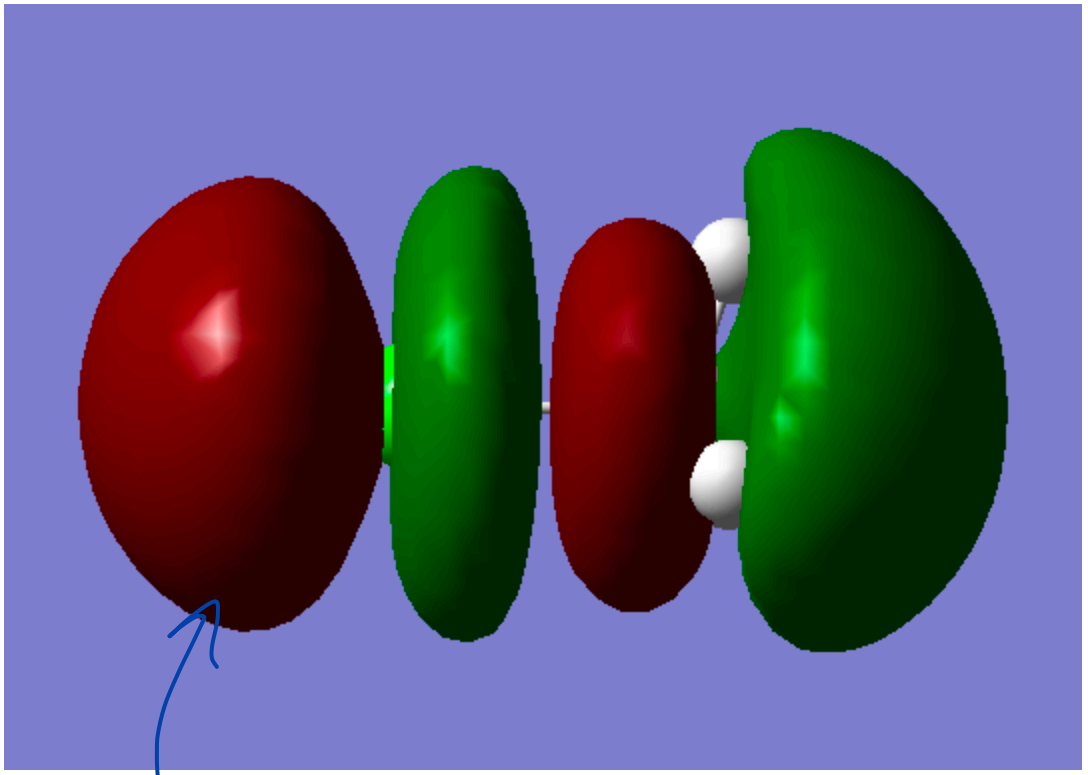
https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Inorganic_Chemistry_(LibreTexts)/06:_Acid-Base_and_Donor-Acceptor_Chemistry/6.04:_Lewis_Concept_and_Frontier_Orbitals/6.4.06:_Lewis_base_strength_may_also_be_estimated_by_measuring_structural_or_energy_changes_on_formation_of_a_Lewis_acid-base_complex_as_illustrated_by_efforts_to_spectroscopically_assess_of_the_strengths_of_halogen_bonds

if Cl is e⁻ rich why would it



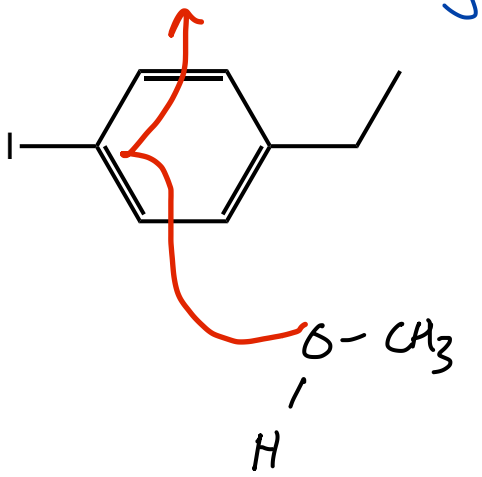
accept e⁻'s from an e⁻ rich atom

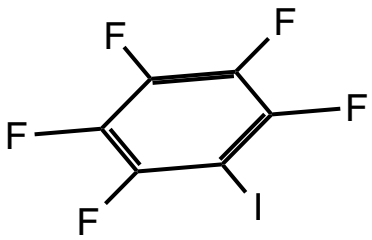
LUMO

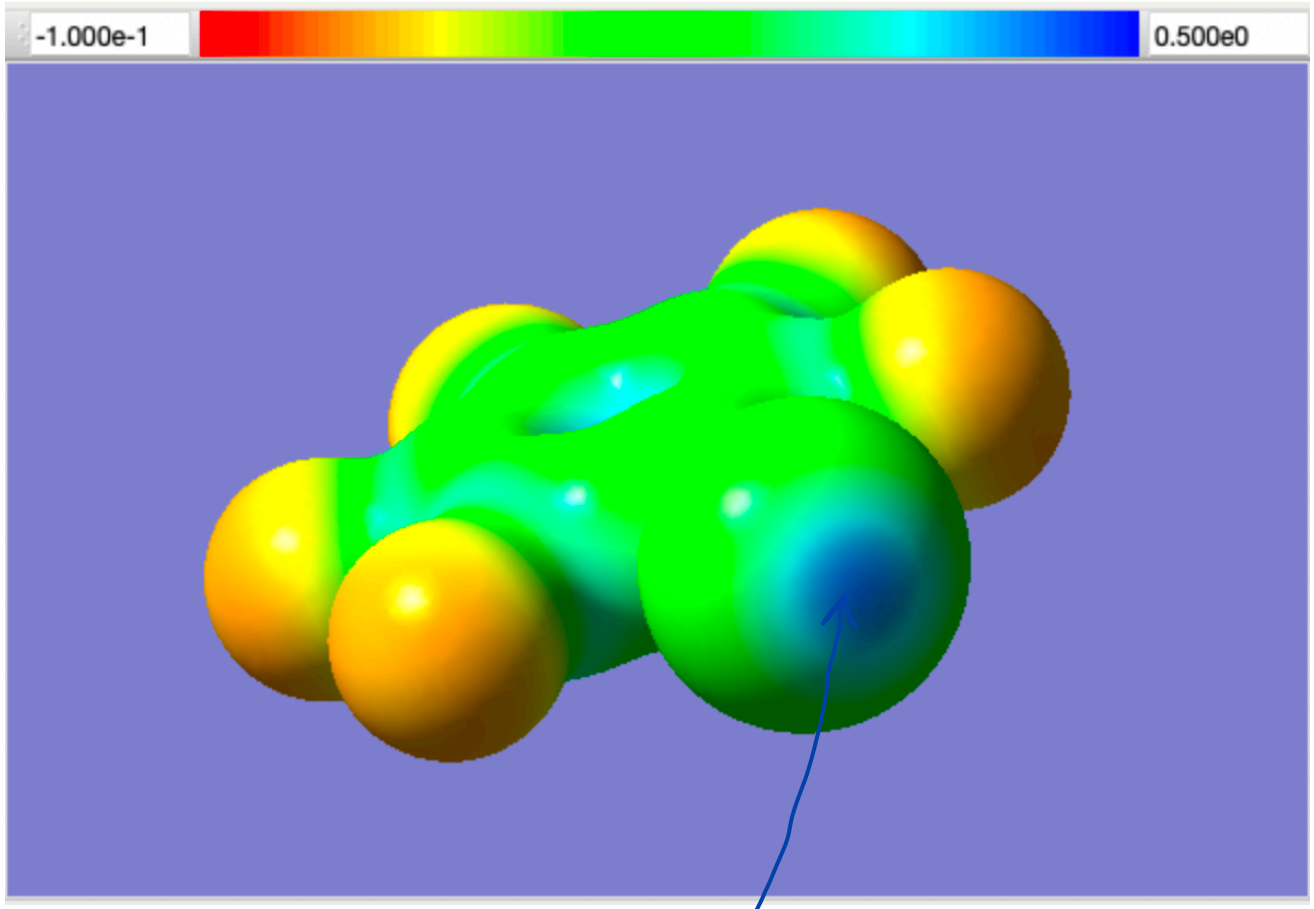


the Cl end of the LUMO can accept e⁻ density, too.

repelled by e⁻ density in the π cloud







δ^+ spot on the I

a σ-hole so e^- rich atoms can be attracted to the σ-hole

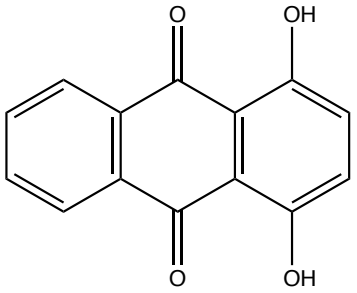
Prussian Blue
$KFe[Fe(CN)_6]$

https://en.wikipedia.org/wiki/Prussian_blue

Aureolin
$K_3[Co(NO_2)_6]$

https://en.wikipedia.org/wiki/Potassium_cobaltinitrite

Alizarin
Ca^{2+} salts of



https://en.wikipedia.org/wiki/Alizarin

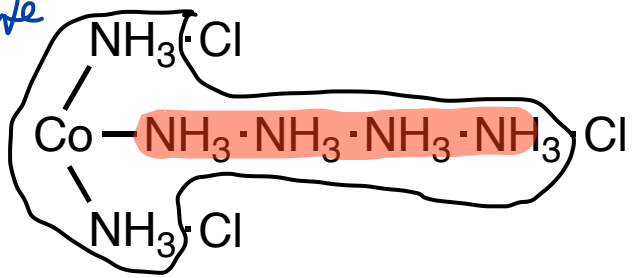
becomes an anion in compounds w/ metals

NaCl Na^+ Cl^-

$FeCl_3$ Fe^{3+} Cl^- Cl^- Cl^-

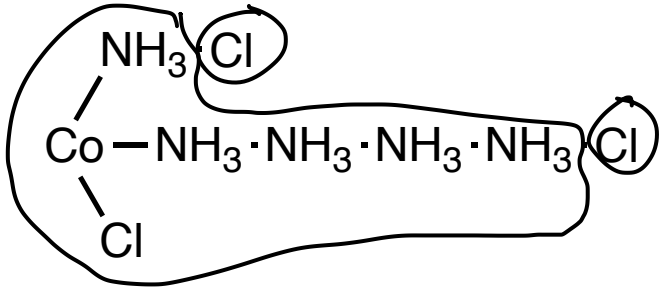
valence = oxidation state

$CoCl_3 \cdot 6\ NH_3$



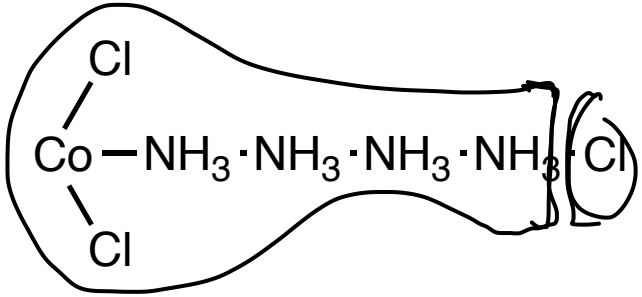
4 ions

$CoCl_3 \cdot 5\ NH_3$



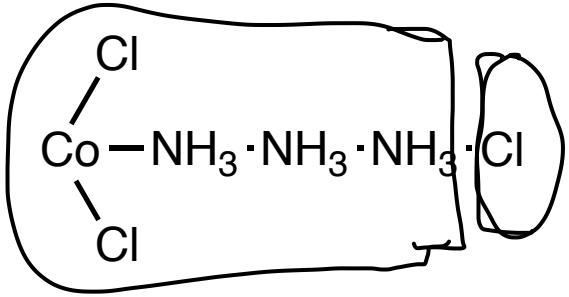
3 ions

$CoCl_3 \cdot 4\ NH_3$



2 ions

$CoCl_3 \cdot 3\ NH_3$



2 ions

	Cl^- ions precipitated by Ag^+
$PtCl_4 \cdot 6NH_3$	4
$PtCl_4 \cdot 5NH_3$	3
$PtCl_4 \cdot 4NH_3$	2
$PtCl_4 \cdot 3NH_3$	1
$PtCl_4 \cdot 2NH_3$	0

$Co(NH_3)_4Cl_3$

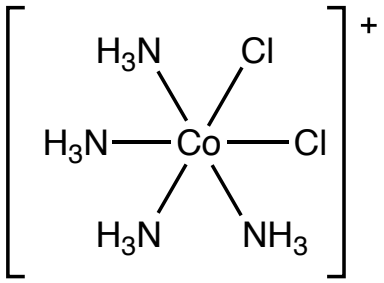
two forms of $Co(NH_3)_4Cl_3$

$Co(NH_3)_4Cl_3$ purple

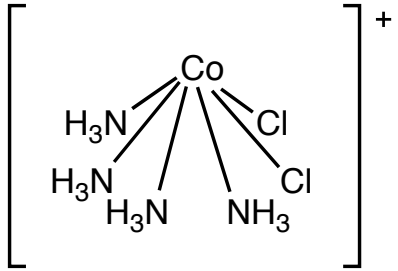
$Co(NH_3)_4Cl_3$ green

Same chemical formulas but different structures 'cuz one version is green & the other is purple

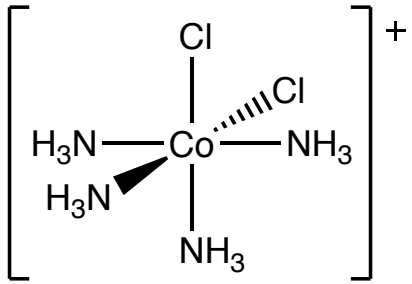
possible 6-coordinate models



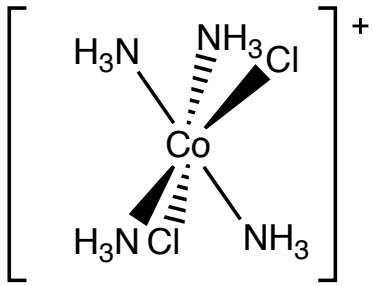
hexagonal



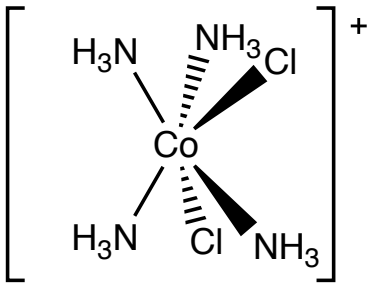
hexagonal pyramidal



Octahedral

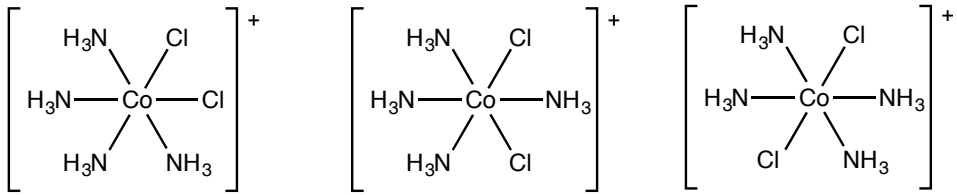


trigonal antiprismatic



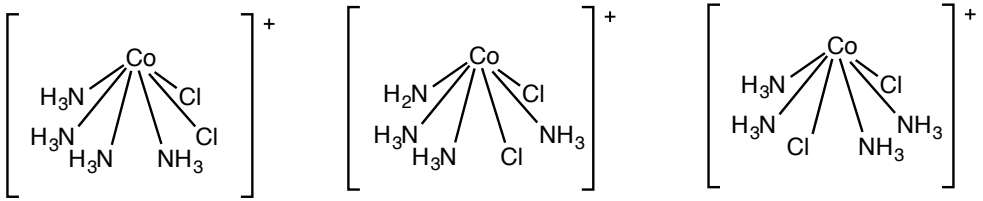
trigonal prismatic

possible 6-coordinate models

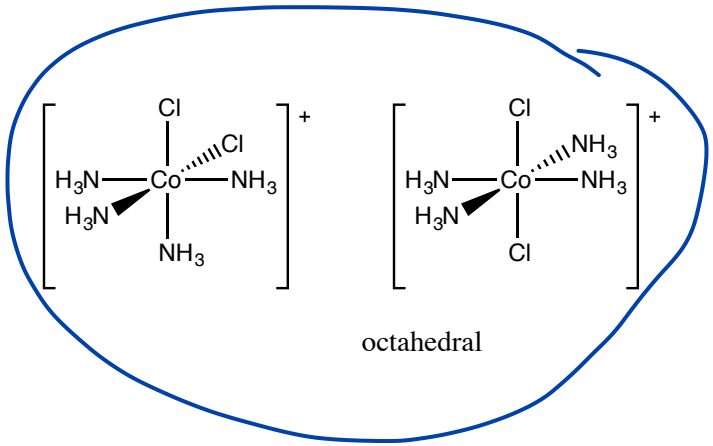


hexagonal

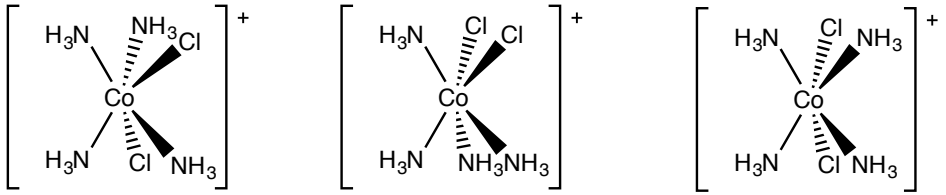
Models suggest 3 isomers, only 2 observed



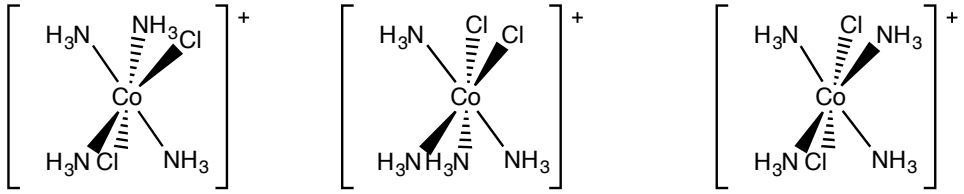
hexagonal pyramidal



octahedral

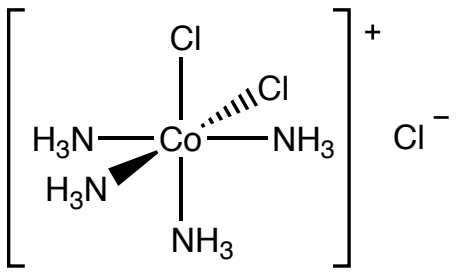


trigonal prismatic

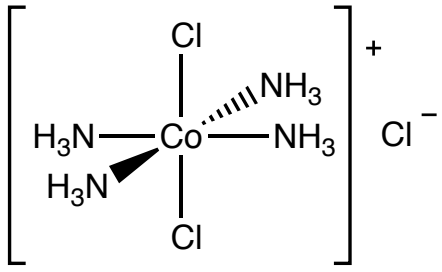


trigonal anti prismatic

$[Co(NH_3)_4Cl_2]Cl$



cis

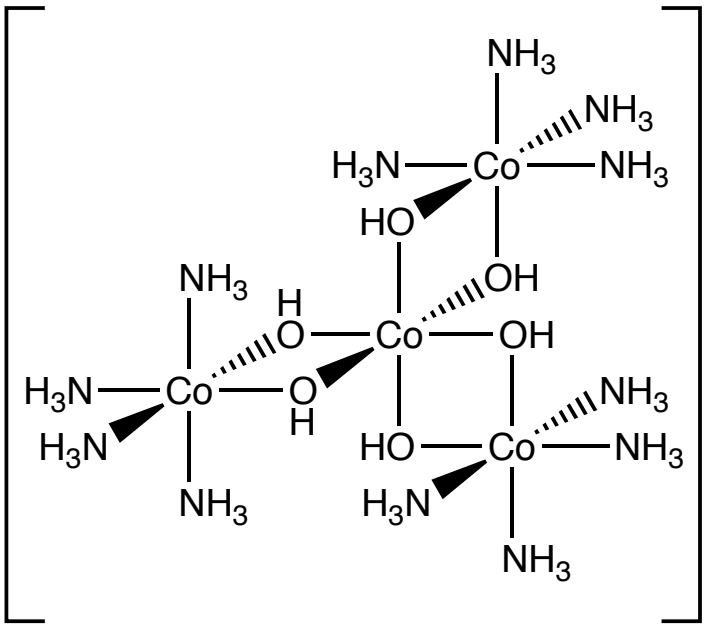


trans

$S_1 = \sigma$

$S_2 = i$

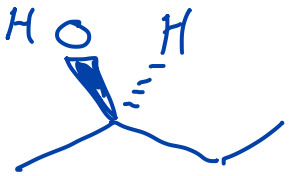
$S_3 \ldots$



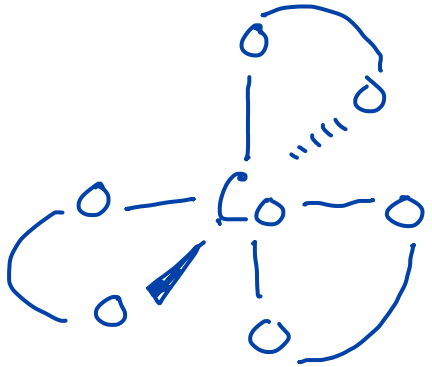
6+

6 Br^-

chiral



neither has a plane of symmetry

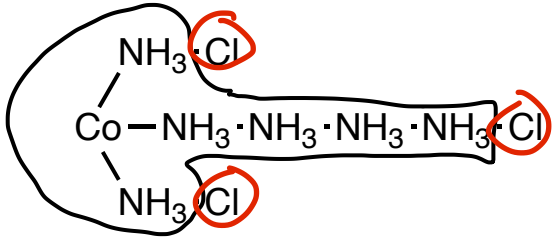


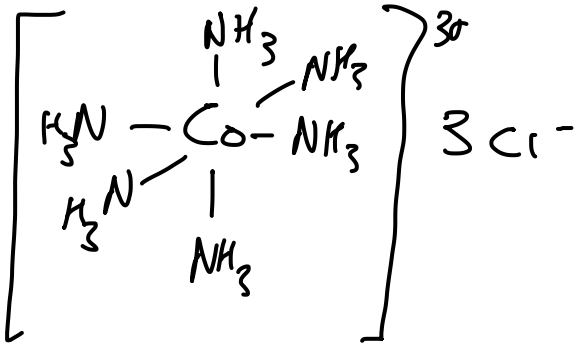
propeller

only the octahedral shape would create a pair of enantiomers for this molecule

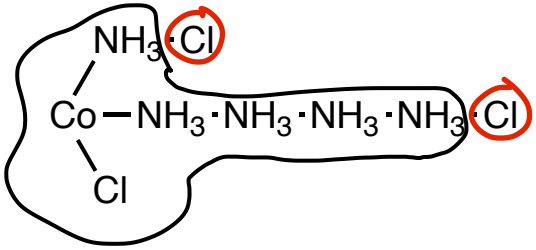
complex ion

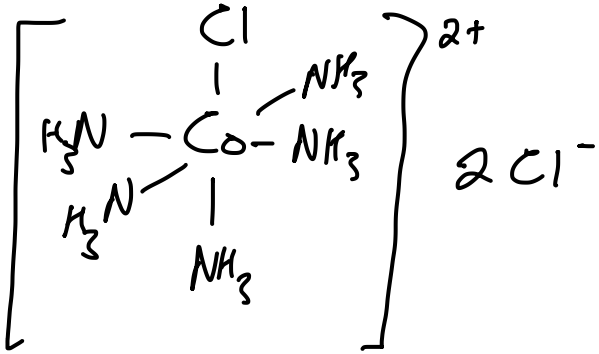
$CoCl_3 \cdot 6\ NH_3$



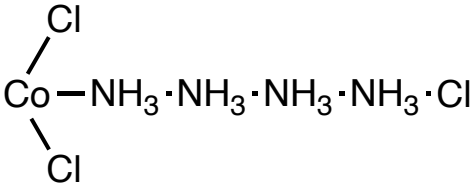


$CoCl_3 \cdot 5\ NH_3$

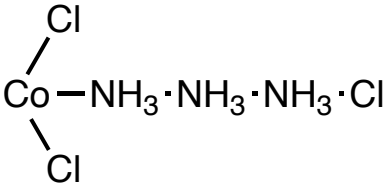




$CoCl_3 \cdot 4\ NH_3$



$CoCl_3 \cdot 3\ NH_3$

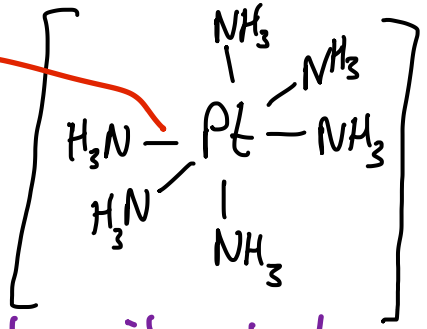


$[(NH_3)_5 Cl\ Co]^{2+}\ 2\ Cl^{\ominus}$

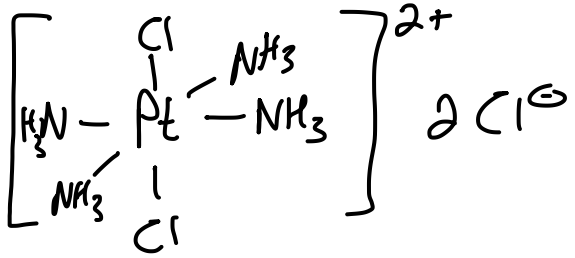
to precipitate 4 Cl^-'s the Cl^-'s must not be directly bonded to the octahedral metal (octahedral = 6 coordinate)

	Cl^- ions precipitated by Ag^+
$PtCl_4 \cdot 6\ NH_3$	4
$PtCl_4 \cdot 5\ NH_3$	3
$PtCl_4 \cdot 4\ NH_3$	2
$PtCl_4 \cdot 3\ NH_3$	1
$PtCl_4 \cdot 2\ NH_3$	0

dative or coordinate covalent bond



the N shares its e⁻'s but maintains ownership of both of them



or $[Pt(Cl)_2(NH_3)_4]Cl_2$