

(25) **Today**

Section 9.3 – 9.5
Isomerism, Coordination Number and
Structures

Next Class

Test 2

(26) **Second Class from Today**

Section 9.3 – 9.5
Isomerism, Coordination Number and
Structures

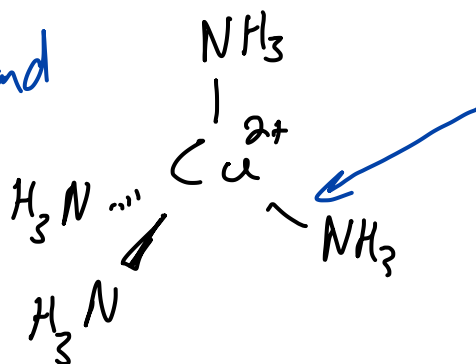
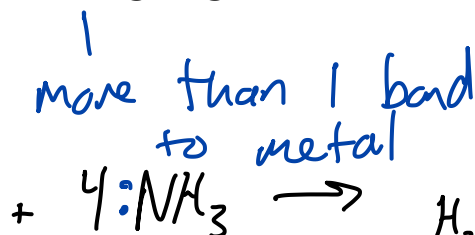
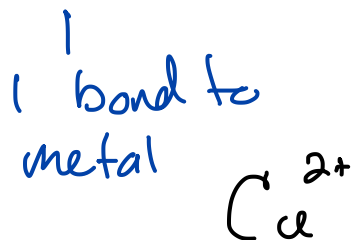
Third Class from Today (27)

Chap 10

Review session here, tomorrow 7:30 – 9:00

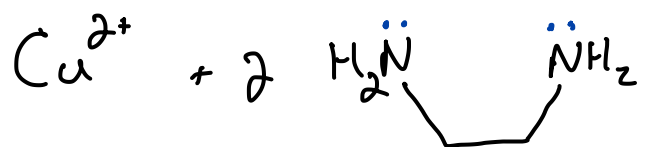
Monodentate and Chelating Ligands

Section 9.3

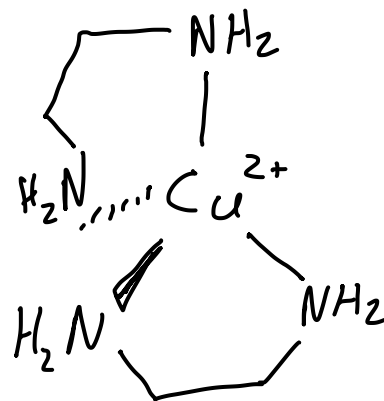


1 bond from ligand to metal

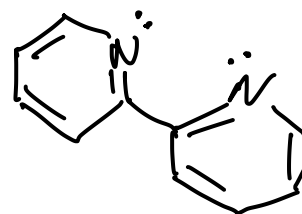
monodentate, 1 bond bite onto the metal



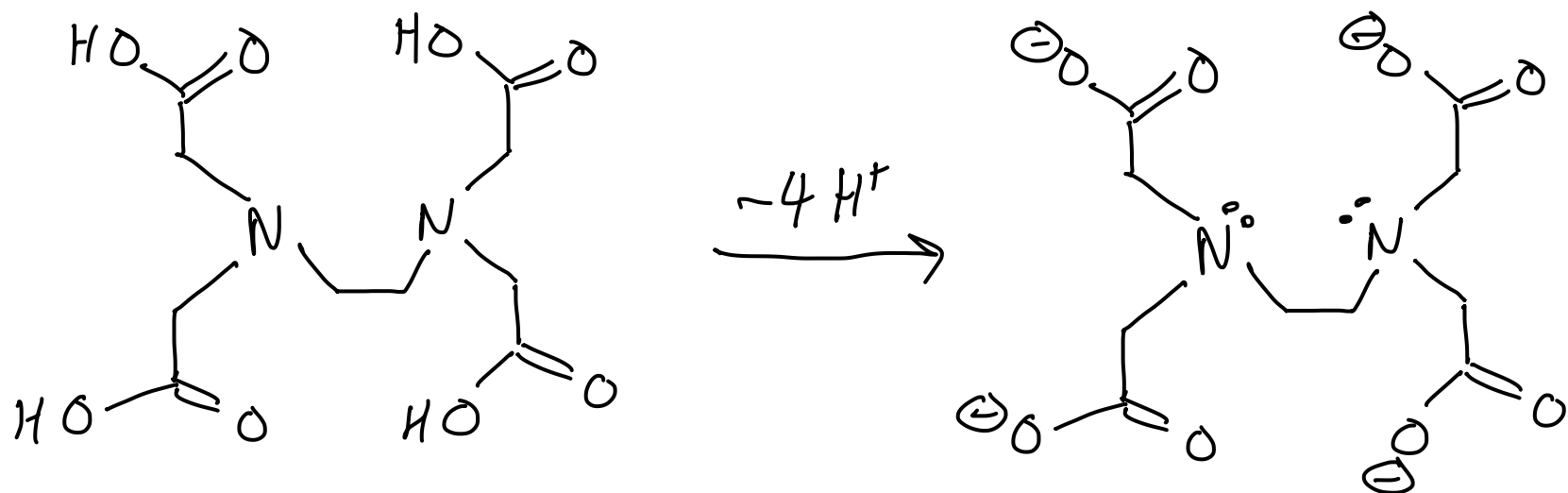
ethylenediamine
 a chelating ligand



bidentate, because two N's each have lone pair e⁻s



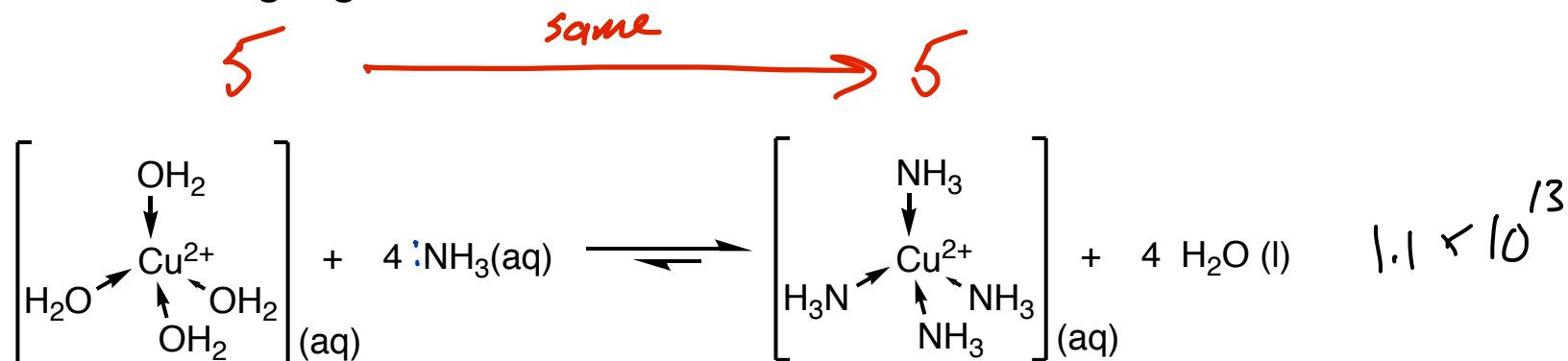
ethylene diamine tetraacetic acid



hexadentate

6 bonds to metal

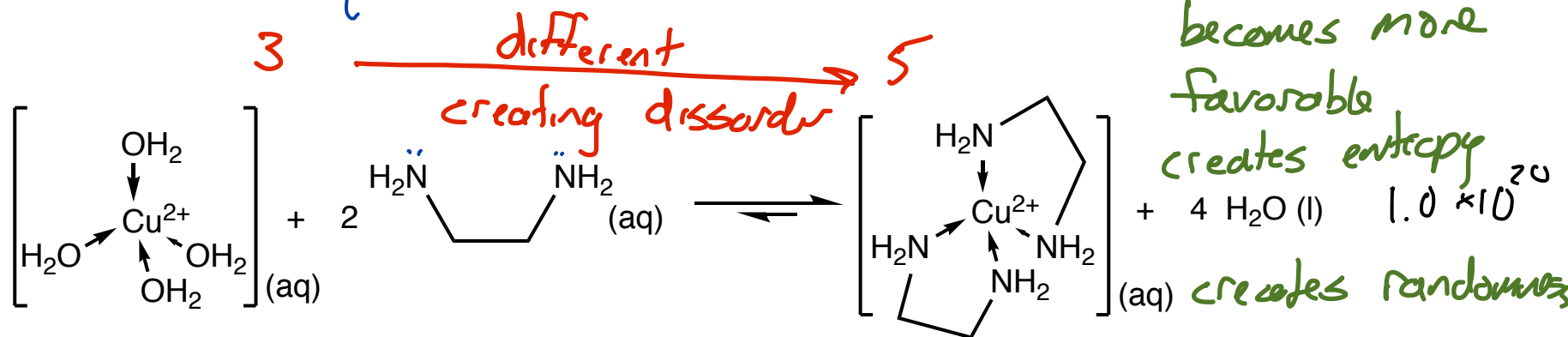
coordinates metals & doesn't let go ... treat heavy metal poisoning



$$\Delta G^\circ = -RT \ln K_{eq}$$

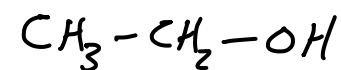
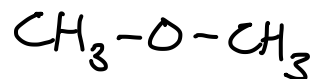
$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

as ΔS gets
larger rxn
becomes more
favorable
creates entropy



equilibrium constants are much greater for chelating ligands
as compared to simpler monodentate ligands in large
part because the rxns create more disorder

Isomerism: Constitutional isomers
Structural Isomers



Hydrate/Solvate

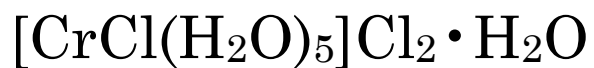


different
solvent
molecules
associated
with metal

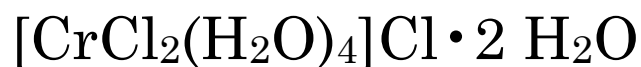
when the
solvent is
water



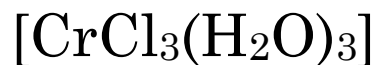
violet



blue-green



dark green



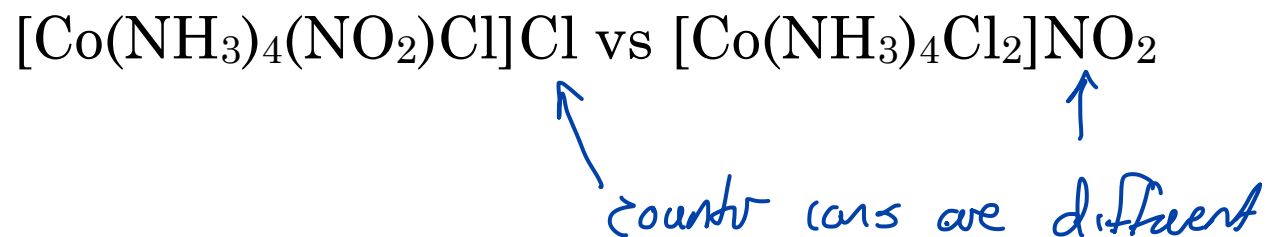
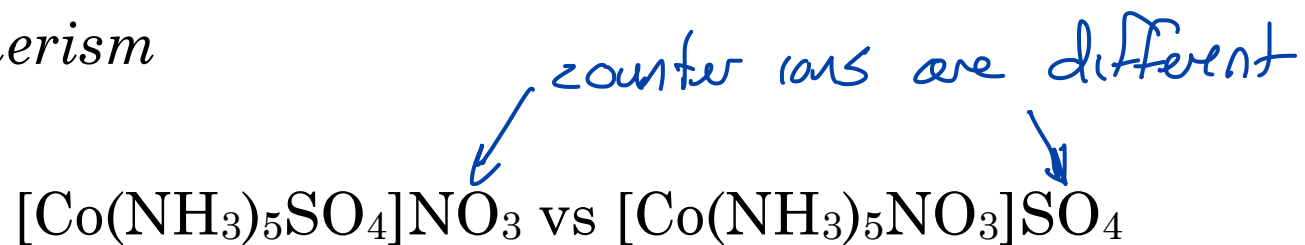
yellow-green

6 water molecules in coordination
sphere. ... purple

from
water

Isomerism: Constitutional isomers

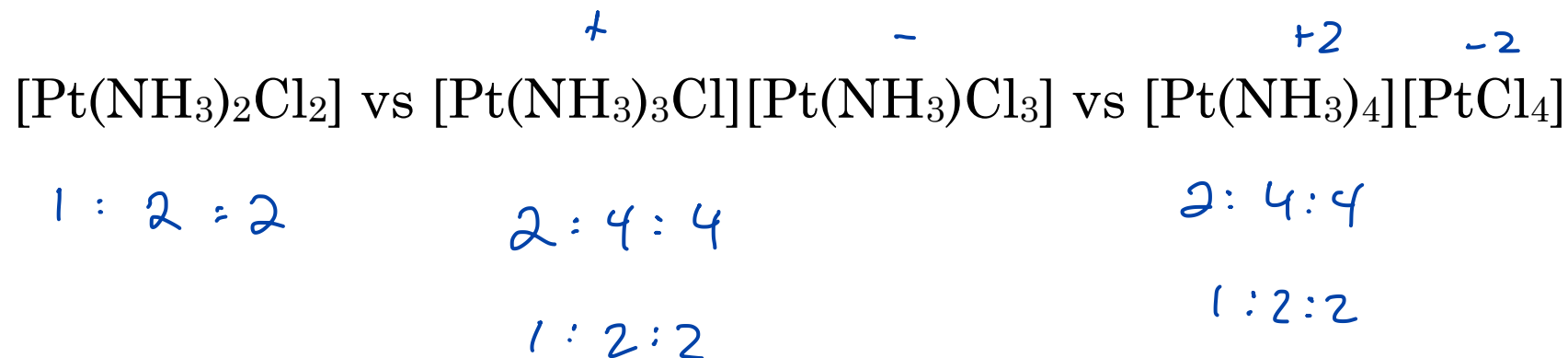
Ionization Isomerism



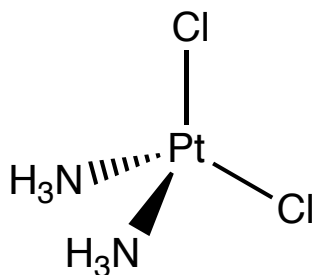
Isomerism: Constitutional isomers

Coordination isomerism

Total ratio of ligands to metal remains the same, but the actual arrangement changes

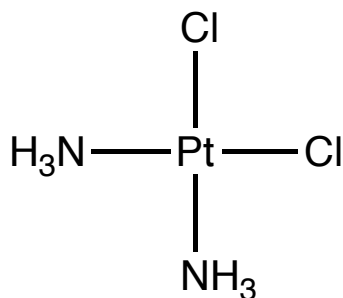


Isomerism: Stereochemistry

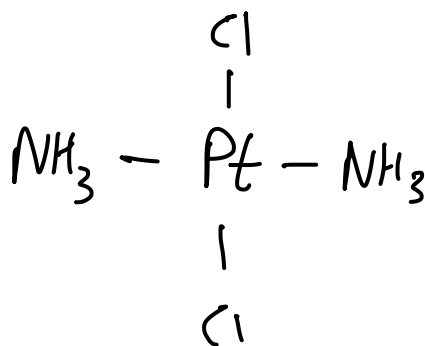


not possible to have 2 different stereo isomers
with a tetrahedral Pt structure

complex with formula $\text{Pt}(\text{NH}_3)_2\text{Cl}_2$ had two stereo isomers



cis-platin



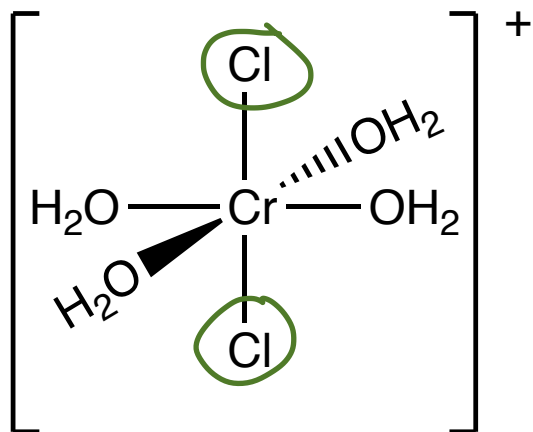
trans-platin

square planar

antitumor drug

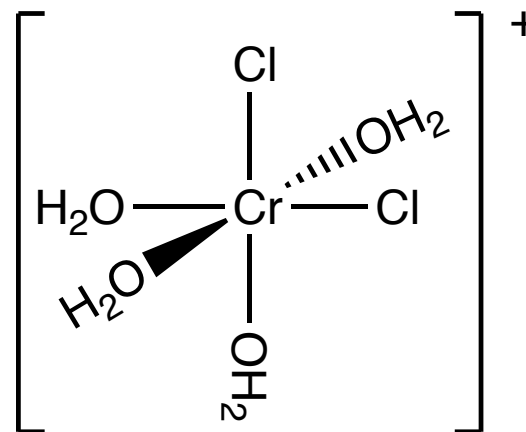
Isomerism: Stereoisomers

two groups

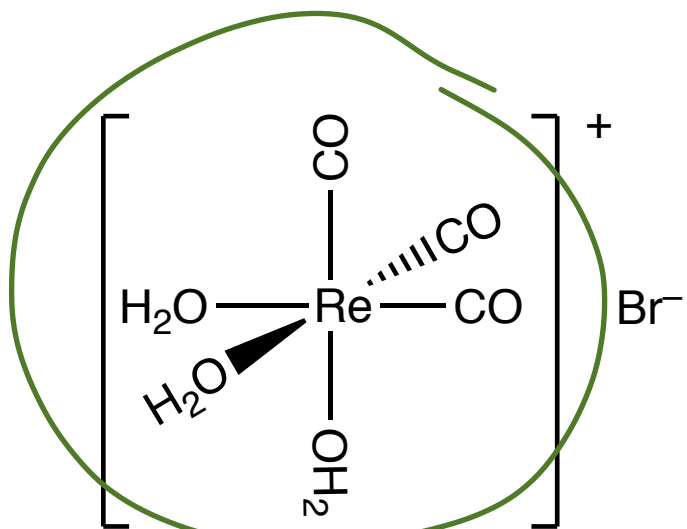


2 Cl
4 H₂O

trans

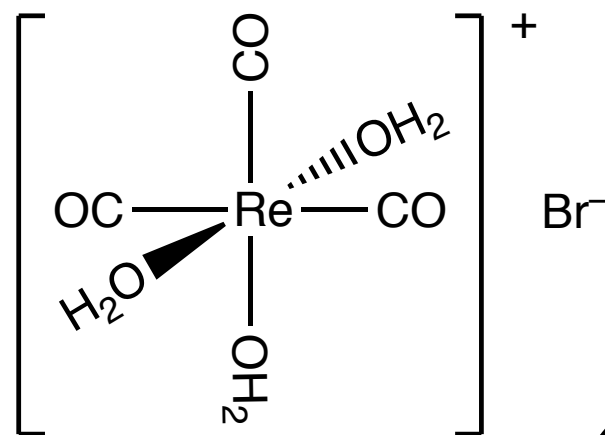
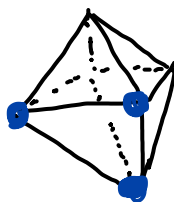


cis

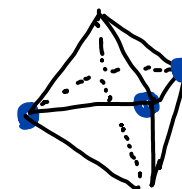


3 CO
3 H₂O

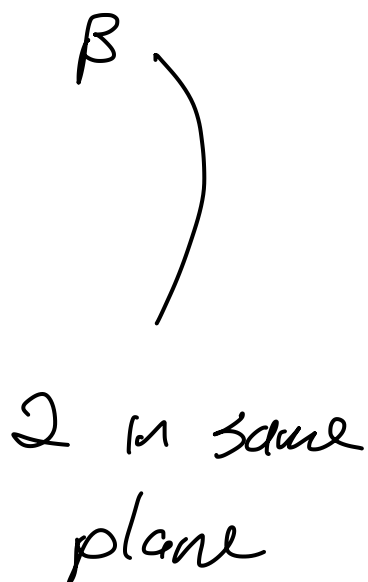
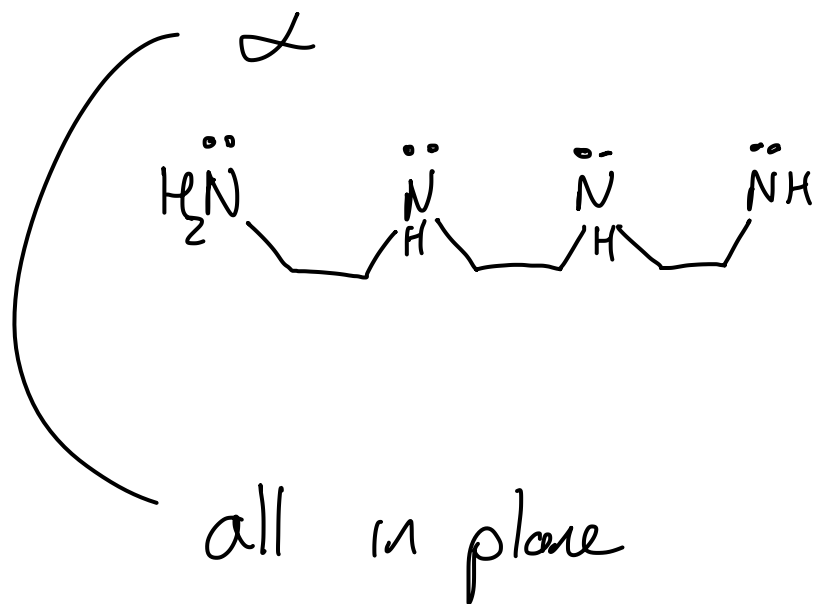
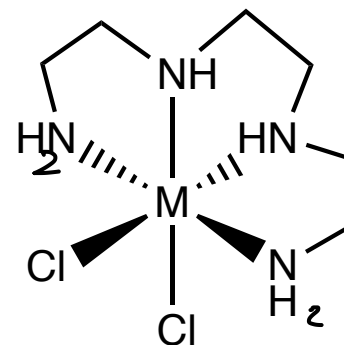
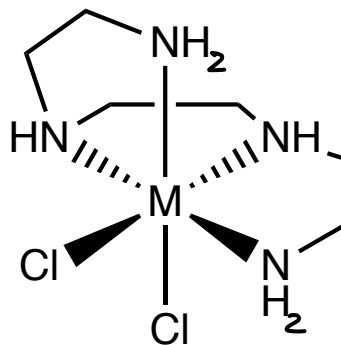
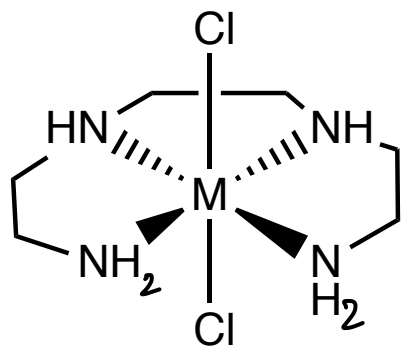
facial or fac



meridinal mer



Isomerism: Stereoisomers



trans
none
are in the
same