

## Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Second Year)

Subject: Chemistry

Paper Code: CHC 104

Paper Title: Physical Chemistry and Inorganic Chemistry

Unit: 02

Module Name: Different types of structural isomerism

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### Notes

#### Isomerism

The compounds which have same molecular formula but different structural arrangement of their atoms are called Isomer and the phenomenon is called Isomerism.

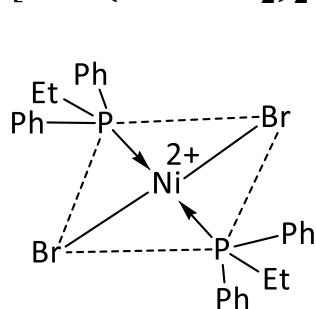
**Isomerism: Structural Isomerism and Stereo (space) isomerism**

#### Structural Isomerism

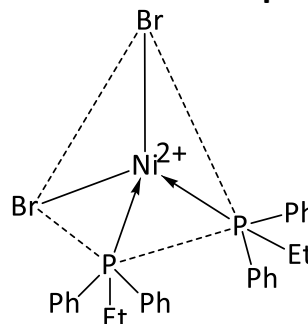
##### 1. Conformation Isomerism

Two isomers have different structural geometries.

Example:  $[Ni^{2+}(P.Et.Ph_2)_2Br_2]$  four coordinated complex



**Brown and diamagnetic**

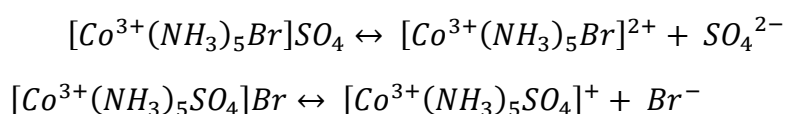


**Green and paramagnetic**

## 2. Ionisation Isomerism

Isomers are produced by interchanging position of ligands inside the coordination sphere with outside anions.

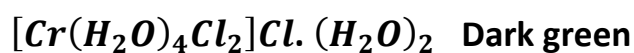
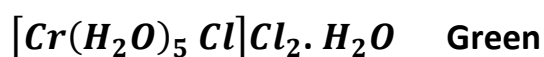
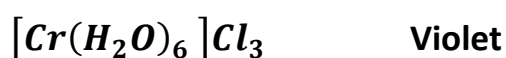
❖ Different ions are form in solution on ionisation.



## 3. Hydrate Isomerism

Isomer is form based on different disposition of water molecules inside and outside the coordination sphere.

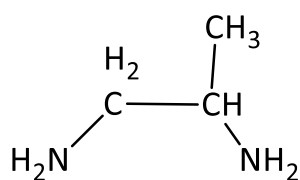
For example,  $[Cr(H_2O)_6]$



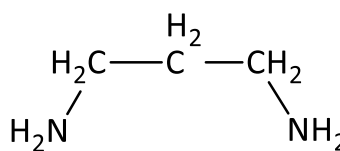
## 4. Ligand Isomerism

Some ligands are also exist as isomers

Examples,

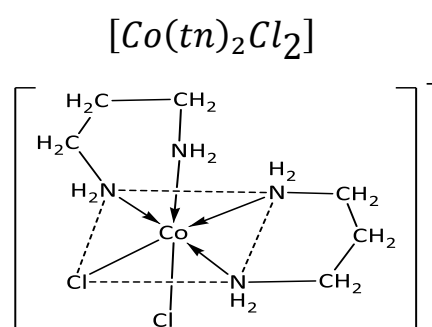
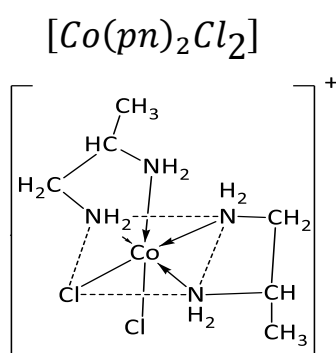


1,2-diamminopropane (pn)



1,3-diamminopropane (tn)

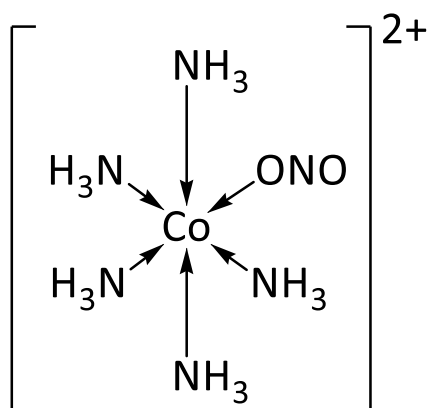
When ligands exist as isomer forms complexes, the complexes are isomers of each other



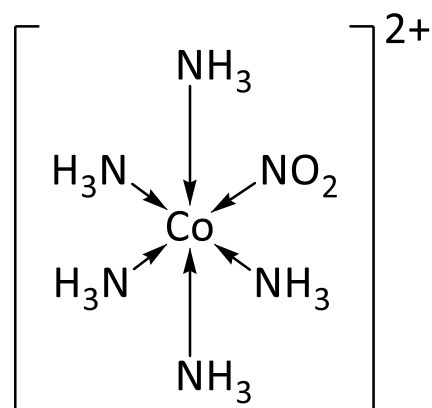
## 5. Linkage Isomerism

Certain ligands behave as ambidentate ligands, due to which they can be linked to metal ion in two different ways.

Example: ambidentate ligands such as  $\text{NO}_2^-$ ,  $\text{SCN}^-$ ,  $\text{CN}^-$



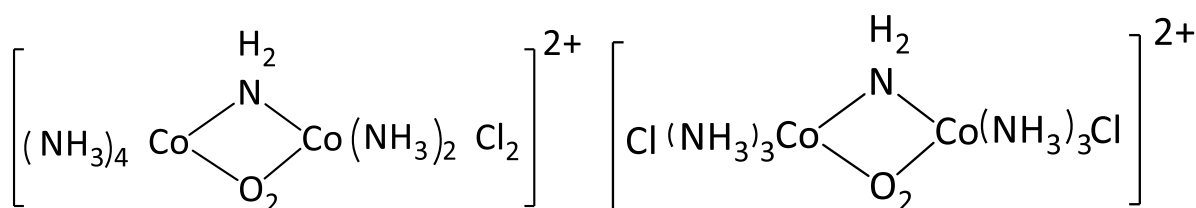
nitritopentamminecobalt(III) ion



nitropentamminecobalt(III) ion

## 6. Coordination Position Isomerism

In some complexes, ligands interchange between the metal atoms.



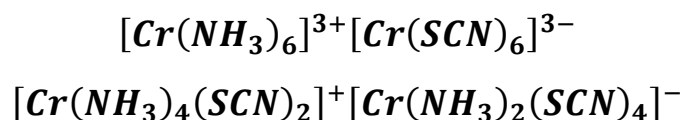
Unsymmetrical form

Symmetrical form

## 7. Coordination Isomerism

In Coordination Isomerism both cation and anion are complexes of a complex compound, where ligands are exchange with two coordination spheres.

Example:



## 8. Polymerisation Isomerism

In polymerisation isomerism formula of complex compound appear to be polymer of simple complex.

❖ The ratio of different metal atoms and ligands are same.

	Number of	$\text{Co}^{3+}$	$\text{NH}_3$	$\text{NO}_2^-$
$[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$		1	3	3
$[\text{Co}(\text{NH}_3)_6][\text{Co}(\text{NO}_2)_6]$		2	6	6
$[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2][\text{Co}(\text{NH}_3)_2(\text{NO}_2)_4]$		2	6	6
$[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]_3[\text{Co}(\text{NO}_2)_6]_2$		5	15	15