



**SHIVAJI COLLEGE**  
**UNIVERSITY OF DELHI**  
NAAC Accredited 'A' Grade



Department  
of Biotechnology  
Govt. of India

**Department of Chemistry**

**“Coordination Chemistry”**

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## **CHEMICAL BONDING**

- ❖ A coordination complex or metal complex, consists of an atom or ion (usually metallic), and a surrounding array of bound molecules or anions, that are in turn known as ligands or complex agents.
- ❖ • Many metal-containing compounds consist of coordination complexes. • Most of them are colorful, some are magnetic, most of them are reactive.

## BONDING THEORIES

- Coordination compounds: metal compounds formed by Lewis acid-base interactions.
  - Metals are Lewis acid – accepting electron pairs
  - Ligands must be Lewis base – donating electron pairs
- A general form is  $M(L)_n$ ,  $n=6, 4, 2$ 
  - We use square brackets enclose the metal ion and ligands.
  - Coordination Sphere: The area of space encompassing the ligands and metal ion.

# LEWIS SYMBOLS OF ATOMS

## The Structure of Complexes

- Charges, Coordination Numbers and Geometries
- Complex ions can be charged. Example,  $[\text{Ag}(\text{NH}_3)_2]^+$ .
- Charge on complex ion = charge on metal + charges on ligands.
- Donor atom: the atom bonded directly to the metal.
- Coordination number: the number of ligands attached to the metal.

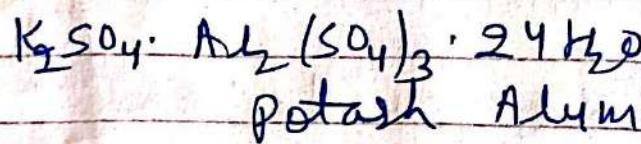
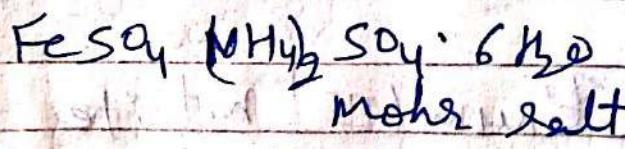
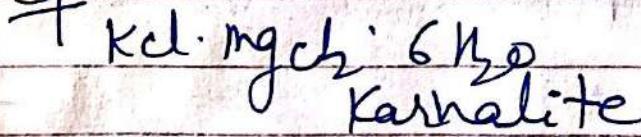
## Co-ordinat<sup>n</sup> chemistry

when a sol<sup>n</sup> of 2 or more neutral compds is mixed in stoichiometric proportion & allowed to stand, a solid is formed which is k/a add<sup>n</sup> compd.

### Double salt

→ loose their identity in ag phase

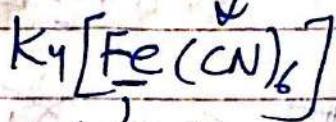
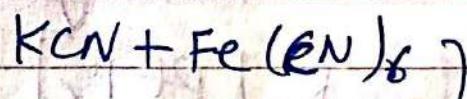
→ Only ionic bond  
eg



### Co-ordinat<sup>n</sup> compd.

→ contain their identity in solid as well as in ag phase

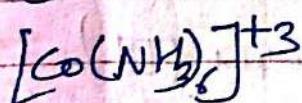
→ Co-ordinate bond



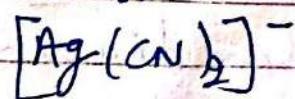
Fe doesn't give its individual test

### Complex

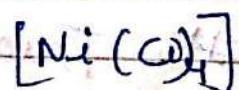
cationic



Anionic

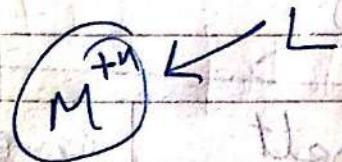


Neutral



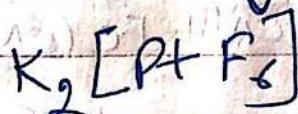
## Important terms used in Coordinat<sup>n</sup> chemistry

① Central metal ion:- The cation to which one or more anions or neutral molecules are attached.

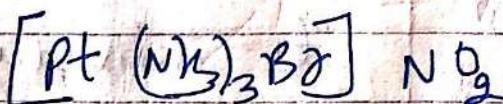


② Ligand are neutral or ionic spp. that have at least 1 l.p. of e<sup>-8</sup>

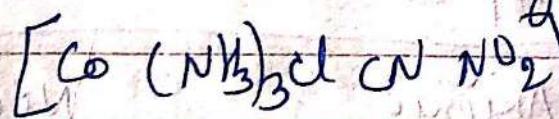
# Pot hexafluoroplatinate (IV)



# Bromotri<sup>o</sup>amine platinum (II) nitrite



# Tri amminechlorocyanonitro cobalt (III)



# Tis (ethylene diamine) chromi<sup>4+</sup> (III)

