

**B.Sc. Semester-IV
Core Course-VIII (CC-VIII)
Inorganic Chemistry**



I. Coordination Chemistry

11. IUPAC Nomenclature of Coordination Compounds-I



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Coordination Chemistry: 20 Lectures

Werner's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, measurement of $10 Dq$ (Δ_o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of $10 Dq$ (Δ_o , Δ_t). Octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry Jahn-Teller theorem, square planar geometry. Qualitative aspect of Ligand field and MO Theory.

IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, polynuclear complexes, Labile and inert complexes.

Coverage:

1. IUPAC Nomenclature of Coordination Compounds-I

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Rules for Naming Coordination Compounds

- As with any ionic compound, *the cation is named before the anion.*
- In naming a complex ion, *the ligands are named before the metal ion.*
- In naming ligands, *an o is added to the root name of an anion.* For example, the halides as ligands are called fluoro, chloro, bromo, and iodo; hydroxide is hydroxo; and cyanide is cyano. *For a neutral ligand the name of the molecule is used, with the exception of H_2O , NH_3 , CO , and NO , as illustrated in Table 20.14.*
- *The prefixes mono-, di-, tri-, tetra-, penta-, and hexa- are used to denote the number of simple ligands.* The prefixes *bis-, tris-, tetrakis-*, and so on, are also used, especially for more complicated ligands or ones that already contain *di-, tri-*, and so on.
- *The oxidation state of the central metal ion is designated by a Roman numeral in parentheses.*
- *When more than one type of ligand is present, ligands are named in alphabetical order.** Prefixes do not affect the order.
- *If the complex ion has a negative charge, the suffix -ate is added to the name of the metal.* Sometimes the Latin name is used to identify the metal

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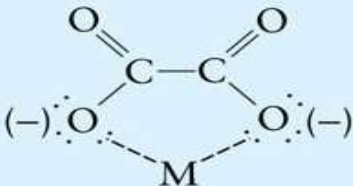
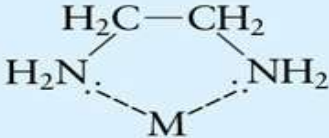
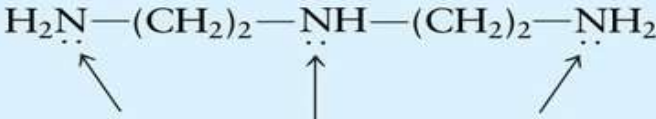
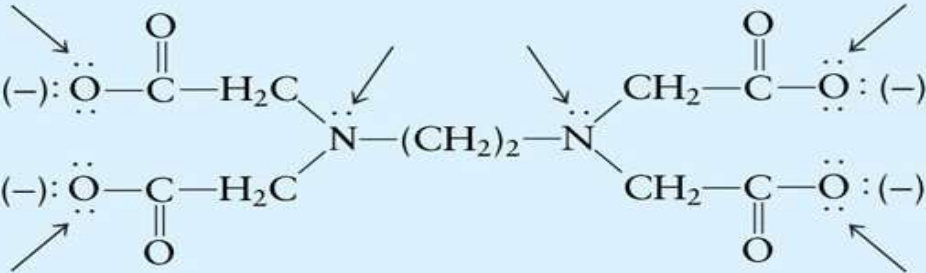
Latin Names Used for Some Metal Ions in Anionic Complex Ions

Metal	Anionic Complex Base Name
Iron	Ferrate
Copper	Cuprate
Lead	Plumbate
Silver	Argentate
Gold	Aurate
Tin	Stannate

Names of Some Common Unidentate Ligands

Neutral Molecules		Anions	
Aqua	H ₂ O	Fluoro	F ⁻
Ammine	NH ₃	Chloro	Cl ⁻
Methylamine	CH ₃ NH ₂	Bromo	Br ⁻
Carbonyl	CO	Iodo	I ⁻
Nitrosyl	NO	Hydroxo	OH ⁻
		Cyano	CN ⁻

Some Common Ligands

Type	Examples	
Unidentate/monodentate	H_2O NH_3 CN^- NO_2^- (nitrite)	SCN^- (thiocyanate) OH^- X^- (halides)
Bidentate	<p>Oxalate</p> 	<p>Ethylenediamine (en)</p> 
Polydentate	<p>Diethylenetriamine (dien)</p>  <p>Three coordinating atoms</p> <p>Ethylenediaminetetraacetate (EDTA)</p>  <p>Six coordinating atoms</p>	

Thank You



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