

Nomenclature of OMC \Rightarrow

systems of nomenclature

Binary type nomenclature

use for salt-like ionic species or salt containing cation & anion

- ① Diethyl aluminium bromide
($(C_2H_5)_2AlBr$)
- ② Methyl magnesium chloride
 CH_3MgCl
- ③ CH_4 = methane
- ④ SbH_3 = stibane
- ⑤ $CrCl_4$ = chromane
- ⑥ PH_3 = phosphane
- ⑦ BH_3 = borane

Substitutive

- ① $B(C_6H_{11})_2H$
dicyclohexylborane
- ② $Si(CH_3)_3Cl$
chlorotrimethyl silane
- ③ $Se(C_6H_5)_2$
diphenyl selenide

Coordination

- ① $[Ni(H_2O)_6]^{2+}$
Hexaqua nickel (II) ion

Ex: \rightarrow ① $K_2 [PdCl_4]$ Potassium tetrachloro palladate (2-)
Dipotassium tetrachloropalladate (II)

② $[Co(en)_3]Cl_3$
tris (ethane-1,2-diamine) cobalt (3+) chloride

③ $[CoCl(NO_2)(NH_3)_4]$
Tetraammine chloro nitrito-N-cobalt

④ $[CuCl_2 \{OC(NH_2)_2\}_2]$, $(PtCl_3(C_2H_5)_2)^{2-}$
Trichloro (1,2-ethane) platinate (II) ion
dichloro bis (urea) copper

⑤ $Li[Cu(CH_3)_2]$ (1-)
Lithium dimethyl cuprate (I)

$Mn(COO)_4$ (4- Al(IV)) tetra
Carboxyl manganese (II)

② Substitutive Nomenclature →

↓
This is use of naming of organometallic compounds of some main-group elements.

The system is based on the concept of a parent hybrid (an alkane in organic nomenclature) ex - SiH_4 = silane, AsH_3 = arsane etc. whose hydrogen atoms have partially or completely been replaced by organic groups (substituents).

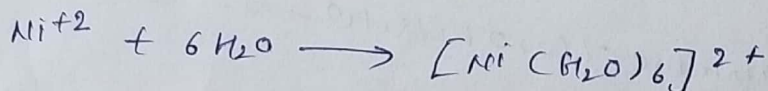
→ This system is used for naming compounds of group 13, 14, 15 etc.
E B A O

- 1) dicyclohexyl borane $\text{B}(\text{C}_6\text{H}_{11})_2\text{H}$
- 2) chlorotrimethyl silane $\text{Si}(\text{CH}_3)_3\text{Cl}$
- 3) triethyl arsane $\text{As}(\text{C}_2\text{H}_5)_3$
- 4) diphenyl selenane $\text{Se}(\text{C}_6\text{H}_5)_2$

③ Coordination Nomenclature ⇒

↓
Coordination compounds are produced by addition reactions. So they were named on an addition principle.

Example: → Addition of ligands to a central atom.

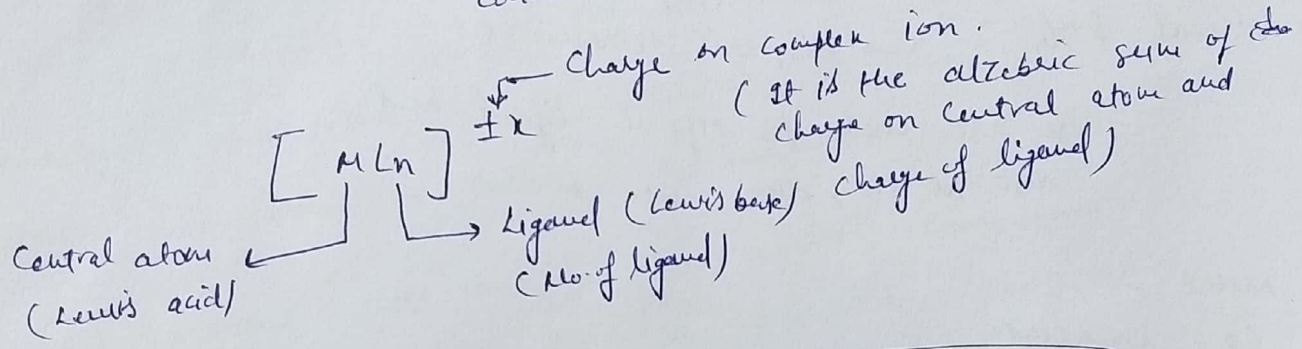
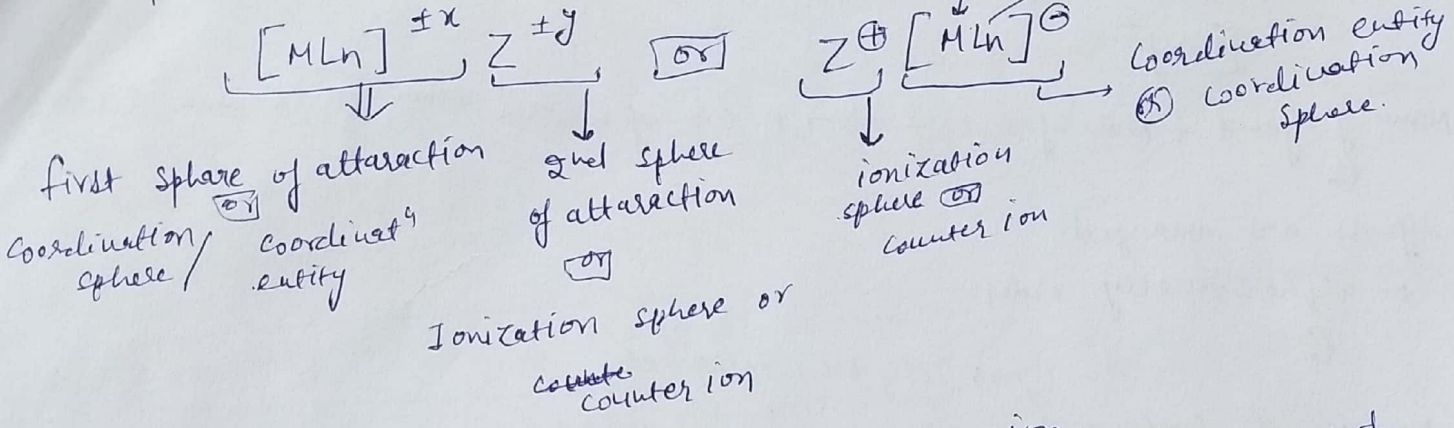


Hexa-aquanickel (II) ion.

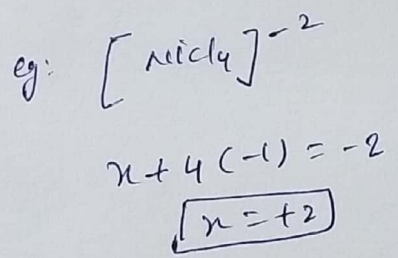
metal ligands → such as CN^- , CO , etc.

Chelation:-

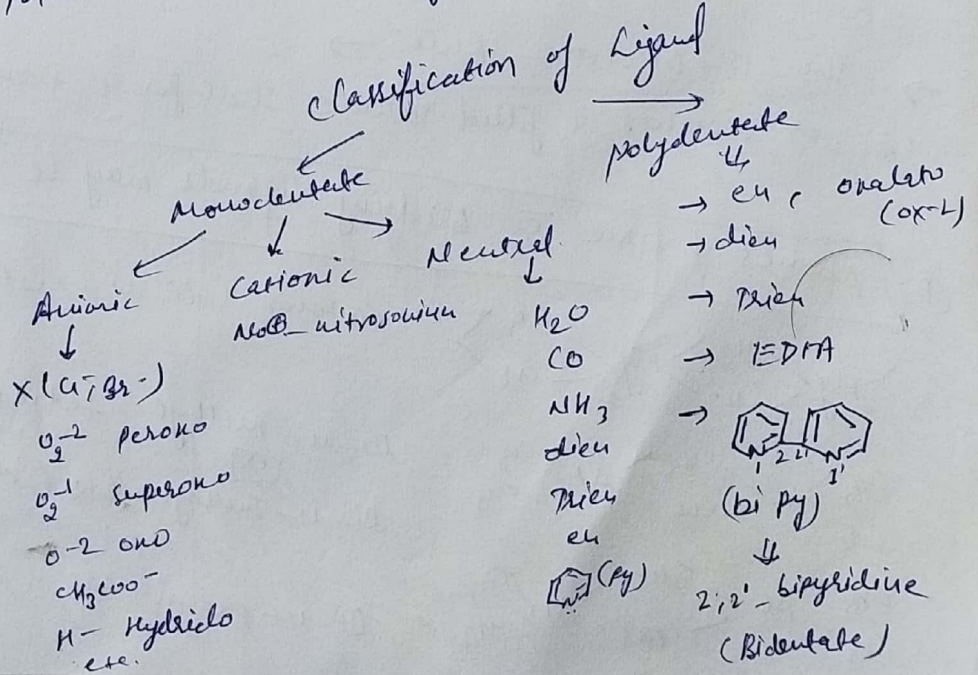
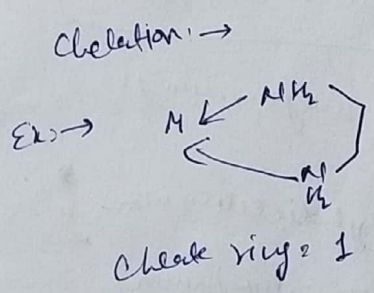
Representation of Coordination



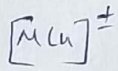
Charge on Complex ion = Charge on central atom + charge on ligand.



Coordination No. \Rightarrow Total no. of σ -bond in the central atom & donor atom of the ligand.



Nomenclature of Coordination Compound: →



Name of ligand + name of central atom + O.S. of central atom in Roman letters

↓
Ligands are arranged
in alphabetical order

↓
Numerical prefix → di, tri, tetra etc.
Bis, tris, tetrakis etc.

These are used for organic ligand and also for en, dien, trien etc.

Metal:-

Co - Cobaltate

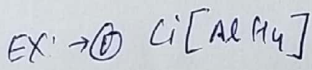
Zn - Zincate

Ni - Niklate

Al - Aluminate

Fe → Ferrate

V → Vanadate.



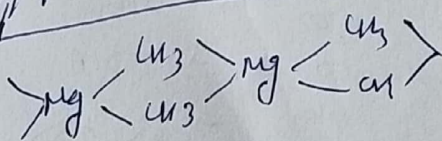
Lithium tetrahydridoaluminate (III)

[see Example from back page]

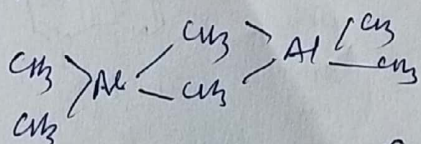
→ The 18-Electron Rule →

→ 18 e⁻ represents a filled valence shell for a transition metal

① Names of σ bridging ligands may be written as follows

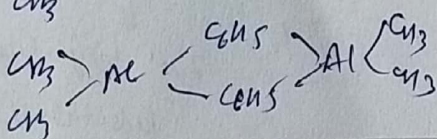


catena - (di- μ -methyl magnesium)



Di- μ -methyl-tetramethyl dialuminium

Di- μ -methyl-bis (dimethylaluminium)



Di- μ -phenyl-bis (dimethylaluminium)

* Characteristics of OMC: →

① Some OMC react very sluggishly even toward acids, whereas others react avidly with water, oxygen, CO_2 , and almost all solvents but alkanes themselves.

→ Reactivity ↑ ∝ ↑ Polarity of M-C bond is determined by the electropositivity of the metal.

→ Strongly electropositive metals, such as Na and K, form largely ionic bonds to carbon, as we have $\text{R-C}\equiv\text{C}^{\ominus}\text{Na}^{\oplus}$.

⇒ More covalent, less ionic, organometallic compounds, such as $(\text{CH}_3)_2\text{Hg}$, are far less reactive, they are stable in air, quite volatile and dissolve in nonpolar solvents.