

Nomenclature of Coordination compounds

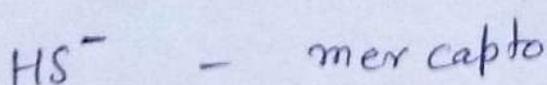
International Union of pure and applied chemistry (IUPAC) provides rules for nomenclature of coordination compounds.

The basic rules are summarized here.

- 1- The positive ion is named first followed by negative ion.
- 2- When writing the name of a complex the ligands are quoted in alphabetical order, regardless of their charge (followed by metal).
- 3- When writing the formula of complexes, ligands are named before the metal.
The coordinated groups are listed in the order:

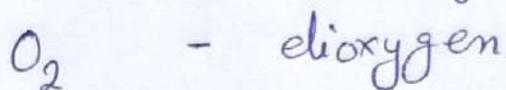
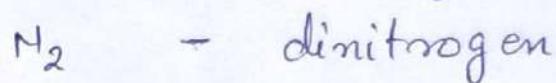
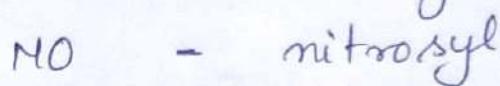
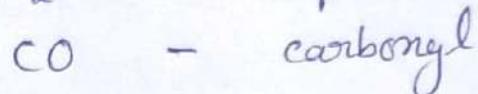
(a) Negative ligand → neutral ligand → positive ligand.
(Alphabetical order should follow in each group)

The name of negative ligand end in -o, for ex.



(b) Neutral groups have no special endings

e.g.



The organic ligands are usually given their common names, e.g. phenyl, methyl, ethylene-diamine, pyridine, triphenylphosphine.

(c) Positive groups end in -ium,



4- Prefix di, tri, tetra, penta and hexa show the number of ligands of same type

An exception occurs when the name of the ligand include a number, e.g. dipyridyl or ethylenediamine To avoid confusion in such cases, bis, tris and tetrakis are used instead of di, tri, tetra and the name of ligand is placed in brackets.

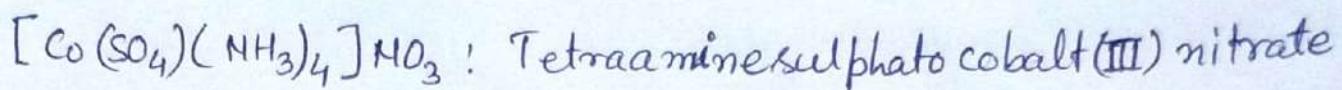
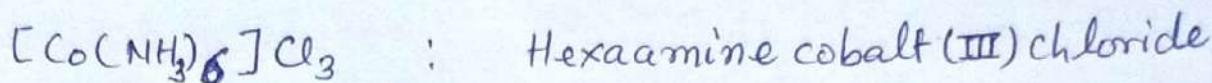
5- The oxidation state of the central metal is shown by a Roman numeral in brackets immediately following its name.

- 6- Complex positive ions and neutral molecules have no special ending but complex negative ions end in -ate.
- 7- For bimetallic or multimetallic complexes, the bridging ligands which link the two metal atoms together are indicated by prefix μ - If there are two or more bridging groups of same kind, this is indicated by di- μ , tri- μ etc. Bridging groups are listed alphabetically with the other groups. If bridging group bridges more than two metal atoms, it is shown as μ_3 , μ_4 , μ_5 or μ_6 ... to indicate how many atoms is bonded to.
- 8- The ambidentate ligands are named based on their bonding atoms. e.g.
- | | |
|------------------|------------------|
| M- NO_2 | - nitro |
| M- ONO | - nitrito |
| M- SCN | - thiocyanato |
| M- NCS | - isothiocyanato |
- 9- If any lattice components such as water or solvent of crystallisation are present, these follow the name, and are preceded by the number of these groups in Arabic numerals.

Examples:

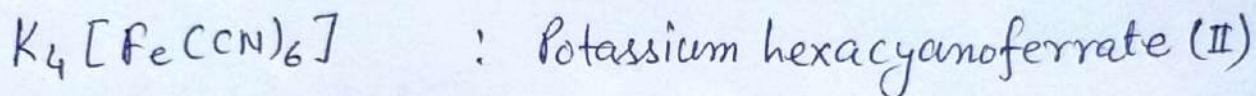
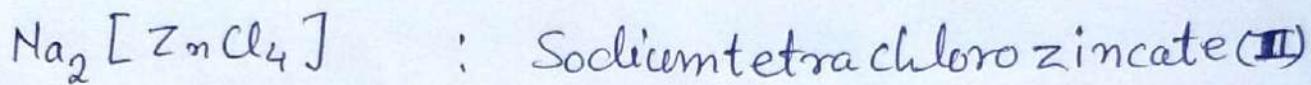
(i)

Complex cation:



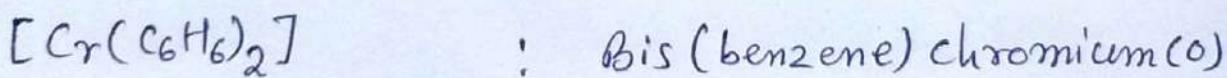
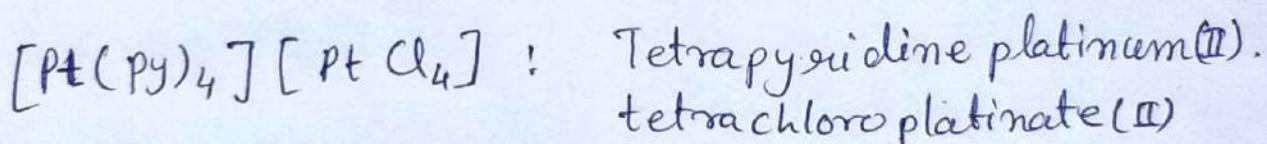
(ii)

Complex anion



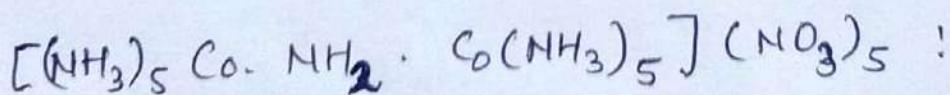
(iii)

Organic groups



(iv)

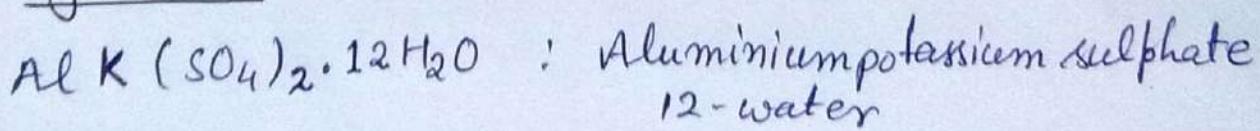
Bridging groups



μ -amido bis [pentaamine cobalt (III)] nitrate.

(v)

Hydrates

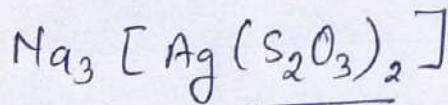
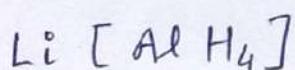
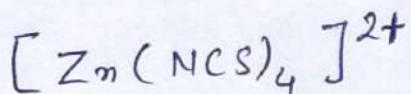
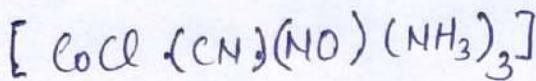
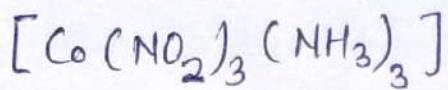
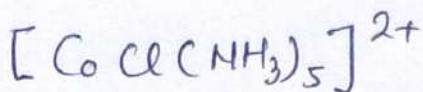


Problems for practice - I

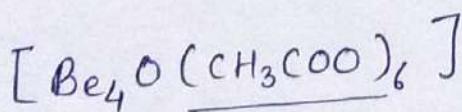
1. Write the IUPAC name of the following metal complexes.

complex

IUPAC Name



↓
hint: thiosulphato



hint: acetato

Problems for Practice - II

1. Write the formula of the following coordination compounds using IUPAC names.

<u>IUPAC Name</u>	<u>formula of coordination compound</u>
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Tetrathio cyanato- ζ -cadmium (II) :

Potassium pentacyanomitosyl ferrate(II) :

Potassium pentachloro nitrido osmate (VI) :

Dichlorobis(dimethyl amine) copper(II) :

Bis(cyclopentadienyl) iron(II) :

Bis(benzene) chromium(0) :

Tri- μ - carbonyl- bis(tricarbonyl iron(0)) :

Suggested Readings:

- 1- Basic inorganic chemistry F. A. Cotton, G. Wilkinson and Paul Gaus, 3rd edition (1995)
- 2- Concise inorganic chemistry , J. D. Lee, 5th edition (1996) Chapman & Hall, London.