

NOMENCLATURE OF COORDINATION COMPOUNDS

1. The cation is named first, followed by the anion regardless of whether the ion is simple or complex. For example

- In $K_4[Fe(CN)_6]$, the cation K^+ is named first followed by $[Fe(CN)_6]^{4-}$.
- In $[Co(NH_3)_6]Cl_3$, the complex cation $[Co(NH_3)_6]^{3+}$ is named first followed by the anion Cl^-
- In $[Pt(NH_3)_4][PtCl_4]$, the complex cation $[Pt(NH_3)_4]^{2+}$ is named first followed by the complex anion $[PtCl_4]^{2-}$

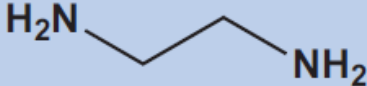
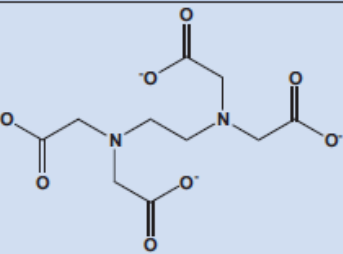
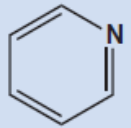
2. The simple ions are named as in other ionic compounds. For example,

Simple cation	Symbol	Simple anion	Symbol
Sodium	Na^+	Chloride	Cl^-
Potassium	K^+	Nitrate	NO_3^-
Copper	Cu^{2+}	Sulphate	SO_4^{2-}

3. To name a complex ion, the ligands are named first followed by the central metal atom/ion. When a complex ion contains more than one kind of ligands they are named in alphabetical order.

a. Naming the ligands:

- i. The name of anionic ligands ends with the letter 'o' and the cationic ligand ends with 'ium'. The neutral ligands are usually called with their molecular names with fewer exceptions namely, H_2O (aqua), CO (carbonyl), NH_3 (ammine) and NO (nitrosyl).
- ii. A κ -term is used to denote an ambidentate ligand in which more than one coordination mode is possible. For example, the ligand thiocyanate can bind to the central atom/ion, through either the sulfur or the nitrogen atom. In this ligand, if sulphur forms a coordination bond with metal then the ligand is named thiocyanato- κS and if nitrogen is involved, then it is named thiocyanato- κN .

Common name	Formula	IUPAC ligand name
Bromide	Br^-	bromido
Chloride	Cl^-	chlorido
Furoride	F^-	fluorido
Cyanide	CN^-	cyanido
Hydroxide	OH^-	hydroxido
Carbonate	CO_3^{2-}	carbonato
Nitrate	NO_3^-	nitrate
Nitrite	NO_2^-	$\leftarrow \text{NO}_2^-$; nitrito-κN
		$\leftarrow \text{ONO}^-$; nitrito-κO
Sulphate	SO_4^{2-}	sulphato
Sulphide	S^{2-}	sulphido
Oxalate (ox)	$\text{C}_2\text{O}_4^{2-}$	oxalato
Ethylenediamine (en)		ethane-1,2-diamine
Ethylenediaminetetraacetate (EDTA)		2,2',2'',2'''-(ethane-1,2-diyldinitrilo)tetraacetato
Triphenylphosphine	P(Ph)_3	triphenylphosphane
Pyridine (py)		pyridine

- iii. If the coordination entity contains more than one ligand of a particular type, the multiples of ligand (2, 3, 4 etc...) is indicated by adding appropriate Greek prefixes (di, tri, tetra, etc...) to the name of the ligand. If the name of a ligand itself contains a Greek prefix (eg. ethylenediamine), use an alternate prefixes (bis, tris, tetrakis etc..) to specify the multiples of such ligands. These numerical prefixes are not taken into account for alphabetising the name of ligands.

b. Naming the central metal: In cationic/neutral complexes, the element name is used as such for naming the central metal atom/ion, whereas, a suffix 'ate' is used along with the element name in anionic complexes. The oxidation state of the metal is written immediately after the metal name using roman numerals in parenthesis.

Element	Name of the metal in	
	cationic complex	anionic complex
Cr	Chromium	Chromate
Zn	Zinc	Zincate
Al	Aluminum	Aluminate
Fe	Iron	Ferrate
Cu	Copper	Cuprate
Co	Cobalt	Cobaltate
Pb	Lead	Plumbate
Ag	Silver	Argentate
Sn	Tin	Stannate
Au	Gold	Aurate
Pt	Platinum	Platinate