Coordination Number 2

The linear \([\text{Ag(NH}_3\text{)}_2]^+\) ion

Although \([\text{Ag(en)}]\text{ClO}_4\) involves a normally bidentate ligand, in this case the structure is polymeric and the silver ion still retains a \(\text{CN}=2\) with the N atoms (from different ligands) at \(~180\) degrees to each other.

Coordination Number 3

Trigonal planar - \(D_{3h}\)

\([\text{Cu(CN)}_3]^{2-}\)

\([\text{Cu(PPh}_3\text{)}_2\text{Br}]\)

To help view more easily, the H atoms are turned off.

Trigonal pyramid

T-shaped

\([\text{Rh(PPh}_3\text{)}_3]^+\)

To help view more easily, the H atoms are turned off.

Coordination Number 4

Tetrahedral

\(\text{Copyr}_2\text{Cl}_2\)
Square Planar

cisplatin - cis-Pt(NH\textsubscript{3})\textsubscript{2}Cl\textsubscript{2}

The cis- isomer is a powerful anti-cancer drug whereas the trans- is inactive.

Coordination Number 5

Square pyramid

Trigonal Bipyramid

\[\text{Ni(CN)}\textsubscript{5}\textsuperscript{3-}\]

Coordination Number 6

Hexagonal planar

Trigonal prism

tris(cis-1,2-diphenylethene-1,2-dithiolato)rhenium

The ReS\textsubscript{6} geometry is perfectly trigonal prismatic.

Octahedral

Hexol

The first 'truly' inorganic complex to be resolved into its optical isomers.

\[[\text{Co(en)}\textsubscript{3}]\text{Cl}_3\]

mirror images

The classic example of optical isomerism in octahedral coordination complexes (H atoms not shown).
[Co(NH$_3$)$_5$CO$_3$]$^+$

Coordination Number 7

Capped octahedron (C$_{3v}$)

K$_3$[NbOF$_6$]

Capped trigonal prism (C$_{2v}$)

[V(III)(Hedta)(H$_2$O)]H$_2$O

Pentagonal Bipyramid (D$_{5h}$)

bis-(tert-butylacac)$_2$(DMSO)di-oxoUranium

The UO$_7$ geometry fits a pentagonal bipyramid.

Coordination Number 8

Dodecahedron (D$_{2d}$)

Zr(acac)$_2$(NO$_3$)$_2$

[Zr(C$_2$O$_4$)$_4$]$^{4-}$ is reported to have this shape as well.

Cube (O$_h$)

Square antiprism (D$_{4d}$)

U(acac)$_4$

Hexagonal bipyramid (D$_{6h}$)

UO$_2$(OAc)$_3$
Coordination Number 9

Three-face centred trigonal prism (D$_{3h}$)

Hydrated salts of the lanthanide elements eg Eu(H$_2$O)$_9^{3+}$

Coordination Number 10

Bicapped square antiprism (D$_{4d}$)

Tetrakis(nitrato-O,O')-bis(triphenylphosphine oxide) cerium(IV)

Another example is [Ce(NO$_3$)$_5$]$^{2-}$

Coordination Number 11

All-faced capped trigonal prism (D$_{3h}$)

This is not a common stereochemistry.
In aqua-(12-crown-4)-tris(nitrato-O,O')-cerium(III) (12-crown-4) solvate and (15-crown-5)-tris(nitrato-O,O')-cerium(III) the Cerium ion is 11 coordinate.

Coordination Number 12

cuboctahedron (Oh)

Ceric ammonium nitrate -(NH$_4$)$_2$Ce(NO$_3$)$_6$

Contributors and Attributions

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