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 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

Copyr$_2\text{Cl}_2$
Square Planar

cisplatin - cis-Pt(NH$_3$)$_2$Cl$_2$

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

Coordination Number 5

Square pyramid

Trigonal Bipyramid

[NI(CN)$_5$]$^{3-}$

Coordination Number 6

Hexagonal planar

Trigonal prism

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

The ReS6 geometry is perfectly trigonal prismatic.

Octahedral

Hexol

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

[Co(en)$_3$]Cl$_3$

mirror images

The classic example of optical isomerism in octahedral coordination complexes (H atoms not shown).
Coordination Number 7

Capped octahedron ($C_{3v}$)

$K_3[NbOF_6]$

Capped trigonal prism ($C_{2v}$)

$[V(III)(Hedta)(H_2O)]H_2O$

Pentagonal Bipyramid ($D_{5h}$)

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

The UO$_7$ geometry fits a pentagonal bipyramid.

Coordination Number 8

Dodecahedron ($D_{2d}$)

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

$[Zr(C_2O_4)$_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 $\text{Eu(H}_2\text{O)}_9^{3+}$

Coordination Number 10

Bicapped square antiprism ($D_{4d}$)

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

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

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 -(\(\text{NH}_4\))$_2\text{Ce(NO}_3]_6$

Contributors

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