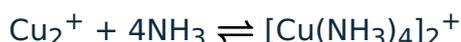


# Complex compounds

(also look for Coordination covalent bond)

**Complex compounds**, coordination compounds (complexes) can be molecules or ions that contain a central particle, atom or ion to which ligands are bound by a coordination covalent bond. Central particles are usually atoms or ions of transition elements with unoccupied valence orbitals that can accept free electron pairs, they are **electron acceptors**. For the cores of the complexes are usually best d or f-elements, the p-elements are worse and the s-elements the worst. The **ligands (electron donors)** can be anions, e.g. Cl<sup>-</sup> – chloro, Br<sup>-</sup> – bromo, CN<sup>-</sup> – kyano, OH<sup>-</sup> – hydroxo, or also neutral molecules, that have an atom with a free electron pair, e.g. H<sub>2</sub>O – aqua, NH<sub>3</sub> – ammin, NO – nitrosyl, CO – karbonyl. The maximum number of monovalent ligands around the central particle is called the **coordination number** of the compounds, the most often is the number 6,4,8,2. Coordination compounds can contain a complex cation, anion or both. The nomenclature of these compounds is discussed in <sup>[1]</sup>.

Complex compounds are mostly water-soluble, less dissociated and due to coordination bonds, differ from their original components in color and solubility. They are therefore widely used in analytical chemistry. Chemical equilibrium is established in solutions of complex compounds, e.g.



V tomto případě platí

$$K_k = \frac{[\text{Cu}(\text{NH}_3)_4]^{2+}}{[\text{Cu}^{2+}] \cdot [\text{NH}_3]^4}$$

$K_k$  is **the stability constant of the complex** ; the larger the value of  $K_k$ , the more stable the complex and vice versa.

To complex compounds also belong chelate complexes (**chelates**). In these complexes, the ligand is usually an organic molecule that can simultaneously occupy several coordination sites around the central atom and contains several free electron pairs. A chelating agent is an organic substance that provides at least two free electron pairs to form a dative bond. Some of these reagents are used in analytical chemistry in titration determination and otherwise, e.g. chelating agent EDTA (ethylenediaminetetraacetic acid and its salts), biuret and other. A number of chelating agents are used in medicine for acute poisoning by the cations of some divalent and trivalent metals, to bind them and remove them from the body. Physiologically significant are also the chelate structures of many enzymes, as well as eg. hemoglobin, chlorophyll and other biological pigments.

## Links

## References

1. HIRŠOVÁ, Danuše. *Chemické názvosloví. Základní pravidla českého, tradičního latinského a mezinárodního latinského lékopisného názvosloví*. 2. edition. Univerzita Karlova v Praze, Nakladatelství Karolinum, 2004. ISBN 80-246-0761-1.