

## COORDINATION CHEMISTRY WITH SELECTED TOPICS IN BIOINORGANIC CHEMISTRY

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### **Abstract:**

The lecture starts with the brief outline of the history of coordination chemistry. The basic concepts of coordination chemistry are defined including coordination compound, central atom, ligands, coordination bond, coordination number and coordination sphere. Special attention is given to the supramolecular ligands and multinuclear metal complexes especially 1D, 2D and 3D coordination polymers. The contemporary nomenclature of coordination compounds is discussed.

A certain part of the lecture is sacrificed to the description of the nature of intra- and intermolecular interactions. The interactions: chemical bonds and intermolecular forces will be defined and sorted by their energies to illustrate the relative strength of coordination bond on the energy scale. The qualitative description of the valence bond and molecular orbital theories is presented.

The crystal field (CFT) and ligand field (LFT) theories have been developed to explain structural and spectroscopical properties of transition metal coordination compounds. Important concepts introduced by CFT are: crystal field stabilization energy and *d*-orbitals splitting diagrams that explain the occurrence of high-spin and low-spin complexes. LFT applies the molecular orbital theory to the description of  $\sigma$ - and  $\pi$ -type bonding in the coordination complexes.

The synthesis of coordination compounds requires the knowledge and comprehension of equilibrium processes that have to be optimized to obtain the individual species. The important equilibria in solutions of complex compounds are defined and influence of thermodynamic and kinetic factors on the formation of complex compounds is considered. The impact of the properties of metal ions (charge density, polarisability, number of *d* electrons) and ligands (basicity, aromaticity, polarisability, chelating ability) on the complex stability must be taken into account while formulating strategies.

The final part of the lecture is devoted to the selected metal-catalyzed processes in living organisms. The roles of iron complex in the transfer and storage of oxygen, copper complexes in the transfer of oxygen and electrons and zinc complexes in the transfer of hydrogen as proton or hydride (carbonic anhydrase, alcohol dehydrogenase) are described.

<b>Termin</b>	<b>Dzień tygodnia</b>	<b>Godzina</b>	<b>Miejsce</b>
12.12.2017	Wtorek	9.15 – 12.00	Minicentrum Konferencyjne (Luwr)
19.12.2017	Wtorek	9.15 – 12.00	Minicentrum Konferencyjne (Luwr)
09.01.2018	Wtorek	9.15 – 12.00	Minicentrum Konferencyjne (Luwr)
16.01.2018	Wtorek	9.15 – 12.00	Minicentrum Konferencyjne (Luwr)
23.01.2018	Wtorek	9.15 – 12.00	Minicentrum Konferencyjne (Luwr)