

Doctoral dissertation abstract

Synthesis and investigation of physicochemical properties of macrocyclic compounds containing sulfur and oxygen or nitrogen atoms

Author: mgr Hubert Hellwig

Supervisor: dr hab. Piotr Kuś, prof. UŚ

Auxiliary supervisor: dr Maria Książek

Macrocyclic compounds from the family of crown ethers are subject of an enduring interest due to their interesting properties and numerous applications. The most characteristic feature of chemical compounds belonging to this class is their ability to form complexes with metal cations from I and II group, and the dependence of stability of these complexes on the matching of a cation diameter and the size of the cavity in a macrocyclic ring. The changing of part or all oxygen atoms in the crown ether ring by other heteroatoms (for example sulfur or nitrogen atoms) allows the obtaining of macrocyclic compounds with differentiated complexing properties.

During the research, a number of new macrocyclic compounds containing sulfur and oxygen or nitrogen atoms were synthesized. Each of the synthesized macrocyclic compounds also possesses an aromatic moiety in its structure. Complexes of the part of obtained macrocycles with chosen transition metal cations were also synthesized. Obtained compounds were characterized by means of instrumental analytical methods such as NMR, FTIR, UV-Vis spectrometry. Single crystals obtained during research were used to determine crystal structures of large part of obtained compounds by means of the XRD method.

Conducted research aims in broadening of fundamental knowledge in the field of described group of macrocyclic compounds, with emphasis on their crystal structures and crystal structures of their complexes with transition metal cations.