Abstract

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Title of thesis: Chiral separation of boron cluster compounds

The boron atom has the ability to form electro-deficientient bonds, when only two electrons participate in the three bonds. Significant delocalization of electrons over the three-center bond is responsible for the formation of three-dimensional clusters. Boron cluster compounds have an abiotic character. They are characterized by their specific properties, such as thermal and metabolic stability, high lipophilicity and delocalized negative charge. These compounds are investigated as isosteric to phenyl group in the field of medicinal chemistry. They have anti-cancer activity, the ability to inhibit HIV-proteases and anti-rheumatoid activity. Furthermore, boron cluster compounds have been used in neutron capture therapy in the treatment of cancer. Some boron cluster compounds studied as new potential drugs are chiral, therefore it is necessary to get enantiomerically pure substances to further expand their use in pharmacy and medicine. The recent investigations in our research group have been focused on the chiral separation of boron clusters in HPLC. Capillary electrophoresis can be used as the alternative separation method to HPLC, e.g., in the methods concerning the enantiopurity of the studied sample. This diploma thesis focuses on testing the suitability of various cyclodextrin derivatives as chiral selectors for enantioseparation of 17 selected boron cluster compounds in a non-aqueous medium and compares the obtained outcomes with the results of previous studies. The thesis also deals with the effect of different separation conditions on the chiral separation of analytes, i.e., change in ammonium acetate concentration, addition of 3% HFIP to the background electrolyte, injection at the shorter end of the capillary and change in voltage.