Abstract

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Title of Thesis: The employment of HPLC in the field of chiral separations III.

Boron cluster compounds are completely synthetic inorganic structures posessing unique properties. Exceptional characteristics allow them to prove competent among organic molecules predominantely used in medicine. Basic structure is made of boron and hydrogen atoms forming three-dimensional polyhedron with triangular planes. The atoms B-H-B are forming electrondeficient three-centred two-electron bond. Cloud of electrons that is shared inside polyhedron structure is the cause of delocalized negative charge of a whole molecule. Boron cluster compounds are likely to loose hydrogen proton in both, protic and aprotic solvents, ending in formation of an anion. Among their typical characteristics belong extreme hydrophobicity, metabolic and thermal stability. Considering stability and reactivity *closo-, nido-* and *arachno*-clusters with 11-12 vertices are largely used. Either of endo- or exoskeletal substitution might impair symmetry of a boron cluster molecule resulting in a formation of a chiral species.

Nowadays boron cluster compounds are used as radiopharmaceuticals, stereoselective catalysts, extract reagents in disposal of radioactive waste and in production of thermally stable stationary phases for gas chromatography. The usage of boron cluster compounds as pharmacophores is brought about their properties such as metabolic stability, rigidity of the structure, hydrophobicity, delocalised negative charge. They usually replace phenyl ring or heterocycle in order to modify characteristics of a molecule.

Owing to growing interest in boron cluser compounds, their predisposition to formation of enantiomers and the importance of chirality in pharmaceutical industry there is a need for deeper study of appropriate conditions for chiral discrimination in HPLC. The aim of this work was to elucidate discrepancy between the ability of a chiral discrimination of a cluster anions using capillary electrophoresis and HPLC. Capillary electrophoresis using β-cyclodextrin as a chiral selector proved to be able to provide separation of boron cluster anions. Furthermore we explored various conditions (constitution of mobile phase and chiral stationary phases) that might influence chiral separation of tested anions and zwitterion.