Abstract (EN)

The dissertation thesis is focused on the research and characterization of retention and enantiorecognition mechanisms of chiral stationary phases based on derivatized polysaccharides. The separation systems with a variety of modern stationary phases (both achiral and chiral) were characterized in detail to provide a comprehensive view of the interactions participating in the separation process. The study of the retention/separation behavior significantly facilitates the development and the optimization of new enantioselective methods for a wide variety of compounds.

The work deals with the comparison of enantioselective performance of polysaccharide-based chiral stationary phases. The objectives are to show the differences of separation behavior among these chiral stationary phases, as they differ by the nature of the polysaccharide backbone (amylose *versus* cellulose), by binding of chiral polymer to silica support (coated *versus* immobilized stationary phase) and by the phenyl moiety in the reversed and normal phase HPLC. In both separation modes amylose-based chiral stationary phases exhibited higher enantioselectivity, especially for acidic and bifunctional analytes. Chiral stationary phases based on derivatized cellulose showed higher enantiodiscrimination potential for basic analytes. Comparing the results obtained on the polysaccharide-based chiral stationary phases under reversed and normal phase separation conditions, the coated and immobilized chiral stationary phases had comparable enantiorecognition ability for acidic analytes, while coated chiral stationary phase seemed to be a better choice for the separation of basic enantiomers. The studied polysaccharide-based chiral stationary phases often exhibited complementary separation properties and their combination enabled enantioseparation of structurally diverse compounds.

The dissertation thesis also deals with the separation of a wide range of chiral basic compounds in supercritical fluid chromatography. Various physical and chemical parameters affecting the separation system were studied. The immobilized amylose-based chiral stationary phase proved to be a useful tool for the enantioseparation of a broad spectrum of chiral bases.

In order to demonstrate practical impact of the research carried out in the thesis, two chromatographic methods were developed, optimized and validated: (i) HPLC method for chiral separation and quantification of antidepressant citalopram and its precursor citadiol (ii)

Enantioselective separation of biologically active basic compounds in ultra-performance supercritical fluid chromatography.