INVESTIGATION OF ENANTIOSELECTIVE HPLC SEPARATIONS OF FLUORINATED β^3-PHENYLALANINE DERIVATIVES

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Many chiral compounds are involved in processes that take place in living organisms. Typically only one enantiomer of the image-mirror image pairs of chiral molecules occurs in nature, such as the L-enantiomers in case of amino acids. The two members of the enantiomer pairs may have significantly different biological effects, so it is important to either synthesize the pure enantiomers or separate the racemate mixtures.
The L-enantiomer of phenylalanine, a biologically active amino acid, can better (than the D-enantiomer) cross the blood-brain barrier and is involved in the synthesis of neurotransmitters with antidepressant and analgesic effects in human body. It also plays a significant role in biosynthesis of flavonoids in plants.
Studying the bioactivity of drugs after the replacement of certain atoms or functional groups with fluorine became an intensively researched topic in the second half of the last century. Fluorine-containing active ingredients were only present in 2% of pharmaceutical medicines in the ‘70s, while it can be estimated at around 25% nowadays. Incorporation of fluorine can alter many of the properties of the compounds, such as the steric interaction of the functional groups, lipophilicity or the ability to make H-bridge interactions, thus increasing the efficacy of a drug by orders of magnitude.
In this study, ion-exchanger type chiral stationary phases were utilized to separate fluorinated β^3-phenylalanine derivatives. We examined the effect of mobile phase composition, quality of the base additive, concentration of acid and base additives, and temperature on the chromatographic properties. The elution order was determined in all cases. We also studied the relationships between structural peculiarities, retention and thermodynamic parameters.

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