Abstract

This bachelor thesis focuses on the enantioseparation of selected thermotropic chiral rod-shaped liquid crystals using ultra-high-performance liquid chromatography on a chiral stationary phase working in a reverse mode. The studied chiral liquid crystals are mesogens that form a smectic mesophase. They differ in chemical structure (lengths of alkyl chains, substituents) and have a chiral center derived from two substances - 2-octanol and lactic acid. The current study consists of testing the enantioselective potential of a new UHPLC column Chiralpak IB-U with tris (3,5-dimethyl phenyl carbamate) cellulose as a chiral selector. The optimization of the chromatographic conditions, i.e., temperature and mobile phase flow rate, is performed. Acetonitrile, methanol, ethanol, and deionized water in various ratios are used as mobile phases. The influence of the structure of liquid crystals (namely the presence and the position of fluorine atoms on the benzene nucleus, length of the alkyl chain, nature of the chiral center) on the course of separations, i.e., on retention, enantioselectivity, and resolution, is assessed. The results are compared with published data from similar studies. The influence of the stationary phase on the enantioseparations of interest is discussed.

Keywords: ultra-high performance liquid chromatography, chiral liquid crystals, separation of enantiomers, chiral stationary phases, reversed-phase chromatography