INVESTIGATION OF THE EFFECT OF UREA ON VARIOUS CYCLODEXTRINS BY CAPILLARY ELECTROPHORESIS

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A signficant part of biological processes is based on chiral recognition. Therefore, the mechanisms of intermolecular recognition are widely studied. One of the valuable instrumental methods for such studies is capillary electrophoresis (CE). The addition of chiral selector is necessary to separate the enantiomers. For this purpose, native and substituted cyclodextrins (CD) can be used. CDs can bind enantiomers selectively and thus lead to a difference in their migration speed. Thus, the thermodynamic selectivity of recognition 1.01 is sufficient for observing baseline resolved peaks in CE while this is not the case in chromatographic techniques even with the most advanced packing materials, column technologies and instrumentation.

The goal of this research was to investigate the effect of urea on the enantioseparation ability of various cyclodextrins. The cyclodextrins used in this study were β-CD and its derivative, heptakis-(2,3-di-O-methyl)-β-CD, heptakis-(2,3-di-O-acetyl)-β-CD and heptakis-(2-O-methyl-3-O-acetyl)-β-CD as chiral selectors. Separation of enantiomers was performed in fused-silica capillary of 50 μm ID and 24 and 32.5 cm, effective and total lengths, respectively. The background electrolyte was 100 mM triethanolamine phosphate with pH=3.0. According to the results, it was observed that in experiments conducted using a buffer containing 5 M urea, the migration times of tetramisole enantiomers decreased in the presence of three cyclodextrins — β-cyclodextrin, heptakis(2,3-di-O-acetyl)-β-cyclodextrin, and heptakis(2-O-methyl-3-O-acetyl)-β-cyclodextrin. An exception to this trend was observed with heptakis(2,3-di-O-methyl)-β-cyclodextrin, where no significant decrease in migration time was detected.