

# Chromatography

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## The possibilities of amino acid ionic liquids as a chiral selectors at separation of enantiomers of amino acids and $\beta$ -blockers

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Chiral separation is an important subject in science as well as in technology. Various chiral selectors, such as cyclodextrins, antibiotics and crown ethers have been widely used in separation of enantiomers because of their chiral recognition abilities. However, the application of many current chiral selectors is often limited due to their low solubility, difficult synthesis, thermal instability as well as high cost. In addition, most of selectors need to be dissolved in other solvents or in a solvent system as work solution. Therefore, using chiral ionic liquids as chiral selector is promising. Amino acids ionic liquids [C4Mim][L-Pro], [C8Mim][L-Pro], [C12Mim][L-Pro] were synthesized and characterized by NMR-spectrums. In the course of the optimization of chiral separation conditions were varied: the composition background electrolyte, the structure of selectors and the concentration of ionic liquid in the modified buffer electrolytes. IL [C4Mim][L-Pro] was the most effective ionic liquid for the chiral amino acids separation under ligand-exchange capillary electrophoresis. The highest enantioselectivity factors ( $\alpha=5.2$ ) were achieved for tryptophane when complexing metal was copper. Synergetic effect was observed at simultaneously addition 2-OH-propyl- $\beta$ -cyclodextrin and chiral IL to the running buffer as a result enantiomers of propranolol and carvedilol were separated. Analysis of drug formulation "Carvedilol zentiva" and "Anaprilin" was performed.

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## New pre-concentration techniques in capillary electrophoresis for determination of bioactive compounds in complex mixtures

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Our report is focused on the development of new analytical approaches for electrophoretic determination of biologically active substances with traditional CE and developed microfluidic chip-analyzer with different variants of on-line pre-concentration. The use of hypercrosslinked polystyrene as a sorption material in the preparation of urine and blood serum for analysis provided the decrease in detection limits for hydrophobic and hydrophilic analytes. Application of water-soluble oligosaccharide derivatives hyperbranched polyethylenimine (PEI) as a covalent coating of silica fused capillary and combination of focusing principles of different variants on-line pre-concentration for analysis of proteins resulted in a 1100-fold improvement in sensitivity. The potential of long chain ionic liquids for on-line sample concentration techniques of ionogenic and neutral analytes in biological objects by different modes of capillary electrophoresis: zone (CZE) and micellar (MEKC) modes with normal and reversed polarity were investigated. The compounds chosen were biogenic amines and steroid hormones. Imidazolium-based ionic liquids C<sub>12</sub>MImCl, C<sub>16</sub>MImCl were used both as modifiers of electrophoretic systems and as pseudostationary phase. Sweeping with C16MImCl micelles in BGS has provided 83-112-fold sensitivity enhancement factors for catecholamines. It was found out that using highly conductivity sample matrix in sweeping leads to a significant increase in efficiency of analytes up to 1·10<sup>6</sup> t.p. Chemometric processing of the obtained characteristic profiles of biologically active analytes of blood serum and urine samples from healthy donors and patients with endocrine diseases proved to be informative as an additional diagnostic criteria.

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