

EVALUATION OF IONIC LIQUIDS AS ADDITIVES TO CYCLODEXTRINS FOR ENANTIOMERIC SEPARATIONS BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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Cyclodextrins are a family of three well known, industrially produced, major cyclic oligosaccharides. These three major cyclodextrins – α -, β -, γ - cyclodextrin are crystalline, homogeneous, nonhygroscopic substances which have a torus like macroring shape, built up from glucopyranose units. Cyclodextrins are natural chiral substances with 100% enantiomeric purity and as such they are excellent molecular sorbent with a high enantioselectivity.

One of the limitations of their use is insolubility in non-aqueous solvents as well as in aqueous solutions particularly for one of them - β - cyclodextrin. Ionic liquids are specific kind of solvents and, as it is apparent from preliminary experiments, they show the promising abilities of cyclodextrins dissolution.

Room temperature ionic liquids are molten salts at ambient temperature. With many novel properties, such as low volatility, no flammability and good thermal stability, they are also promising “green” solvents for replacing the traditional toxic solvents in many fields.

Presently, ionic liquids attract great interest in separation science and analytical chemistry. Several reports have been found about the use of ionic liquids as additives to mobile phase in high performance liquid chromatography [1]. It has been proved that the presence of ionic liquids in mobile phases improve the separation quality leading to changes in retention times and increase in peak efficiency [2]. There are also few literature news concerning the application of chiral and achiral ionic liquids as additives to cyclodextrins for enantiomeric separation in capillary electrophoresis [3,4], however, no report has been found in high performance liquid chromatography.

In this study two ionic liquids: 1-butyl-3-methylimidazolium chloride, 1-hexyl-3-methylimidazolium chloride and two cyclodextrins: β -, γ - were used together as additives to mobile phases in high performance liquid chromatography. The aim of this study was to examine whether the presence of ionic liquids has an influence on the host guest interactions in inclusion complexes and if they affect the enantioselectivity of complex formation. For this reason four chiral substances were investigated: (\pm) - ephedrine, (\pm) – homoatropine, atropine and (\pm) – scopolamine.

[1] J. Chromatogr. A, 1125 (2006) 182-188

[2] J. Sep. Sci., 32 (2009) 4126-4132

[3] J. Chromatogr. A, 1155 (2007) 134-141

[4] J. Chromatogr. A, 1217 (2010) 7949-7955

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