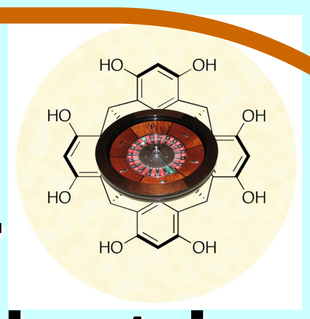

Extraction and transport behaviour of aromatic amino acid by modified cyclodextrins

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Introduction

The interactions involved in cyclodextrin complexes (hydrogen bonding, van der Waals forces, release of conformational strain, change–transfer, electrostatic and hydrophobic interactions) are known to play an important role in pharmaceutical science, biochemistry, immunochemistry, and in analytical chemistry as well. There are studies dedicated to molecular inclusion of biological substrates, like biogenic amines, amino acids, and peptides by these receptors [1-6]. Thus, cyclodextrins and their derivatives form inclusion complexes with aromatic amino acids or their oligopeptides, being well known that the aromatic amino acid residues are responsible for interaction of proteins/peptides. Following our interest in molecular recognition, a study on the solvent extraction and transport through liquid membrane of some aromatic amino acids, native and derivatives, by using heptakis (2,3,6-tri-O-acetyl)-β-cyclodextrin as receptor is presented hereafter.

Experimental

The extractability was calculated as the ratio E[%] = $(A_0\text{-}A)/A_0 x100$, where A_0 and A are the absorbencies of the aqueous phases before and after the extraction of amino acids with heptakis (2,3,6-tri-O-acetyl)-β-cyclodextrin in chloroform. The absorbency was determined by spectrophotometric measurements carried out by means of an UV-Vis Spectrometer JASCO V530. The transport experiments were carried out using a device consisting of two concentric tubes (Fig. 2) .

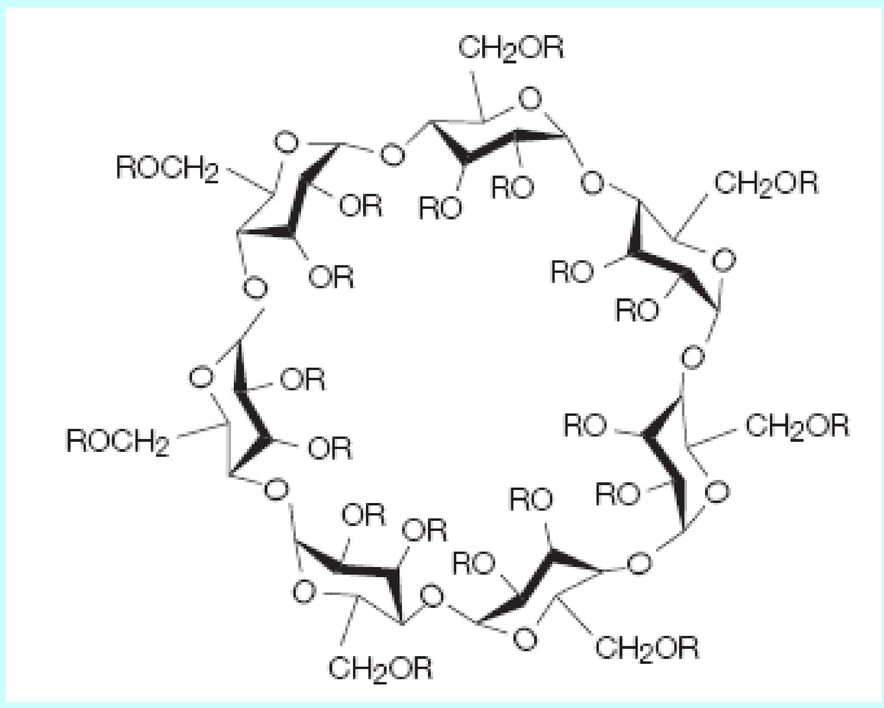

Figure 1. *The chemical structure of modified β-cyclo-dextrin*

Results

The extraction abilities of heptakis (2,3,6-tri-O-acetyl)-β-cyclodextrin upon some aromatic amino acids were investigated. The values of extractability of native amino acids and derivatives from aqueous phases into chloroform phase are presented in Figure 3. As one can see from Figure 3, heptakis (2,3,6-tri-O-acetyl)-β-cyclodextrin proves to be an efficient extractant for the amino acids. The transport yields of aromatic amino acids methylesters through liquid membrane by using modified cyclodextrin were between 20-96% depending on the amino acid. Studies are in progress to optimizing the transport efficiency.

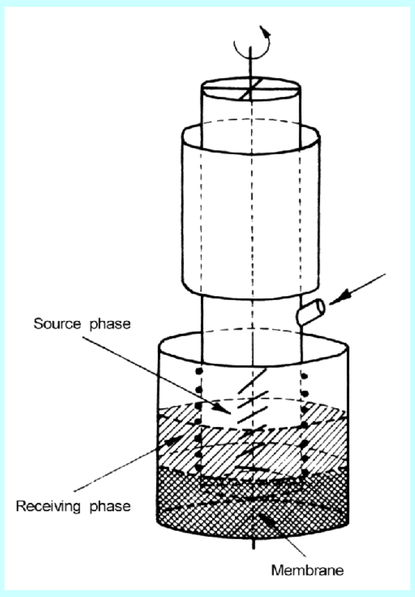

Figure 2. *The device employed in separation of some amino acids through chloroform liquid membrane*.

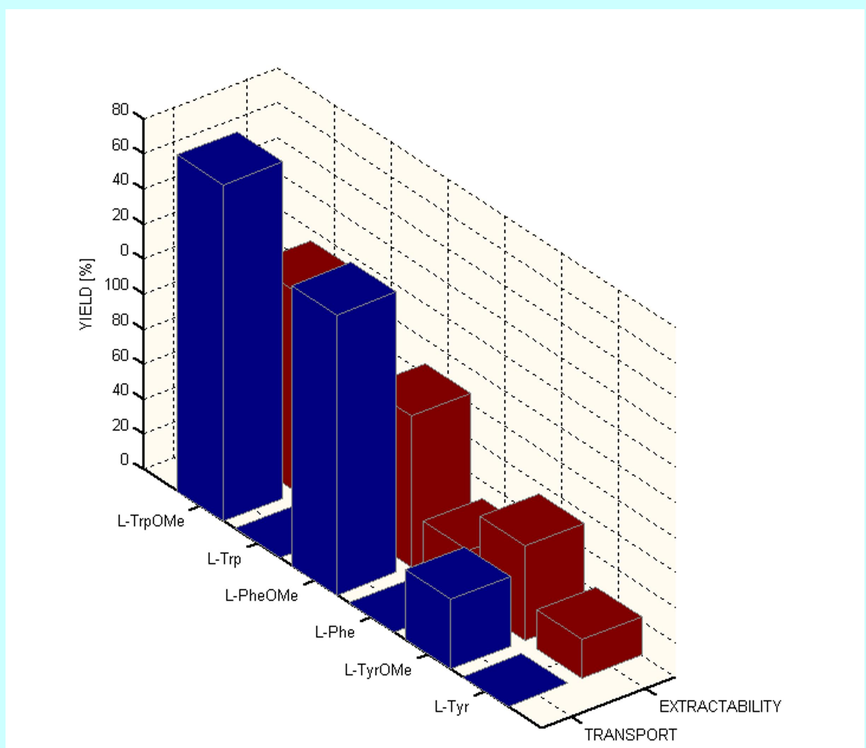

Figure 3. *Experimental data of the extractability of some aromatic native amino acids and methylesters from aqueous phase into chloroform phase and the transport through chloroform liquid membrane by modified β-cyclodextrin.*

Conclusions

The experimental results suggest that native aromatic amino acids and methylesters are effectively extracted and transported through liquid membrane by modified β-cyclodextrin with different yields. The extractability and the rate of the transport of amino acids are controlled by factors like the structure of both the ligand and amino acid native or methylester, the nature of solvent, and the stirring time of phases. The influence of the composition and the structure of the compounds upon the partition processes occurring in triphasic systems were studied.

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