



# Some analytical applications of 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 also in analytical chemistry. There are studies dedicated to the 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 the molecular recognition, a study on the solvent extraction and transport through liquid membrane of some aromatic amino acids native and derivatives by means of heptakis (2,3,6-tri-O-acetyl)- $\beta$ -cyclodextrin is presented.

## Experimental

The extractability was calculated as the ratio  $E[\%] = (A_0 - A)/A_0 \times 100$ , 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)- $\beta$ -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).

## Results

The extraction abilities of heptakis (2,3,6-tri-O-acetyl)- $\beta$ -cyclodextrin upon some aromatic amino acids have been investigated. The values of extractability of amino acids native 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)- $\beta$ -cyclodextrin proves to be an efficient extractant for the amino acids.

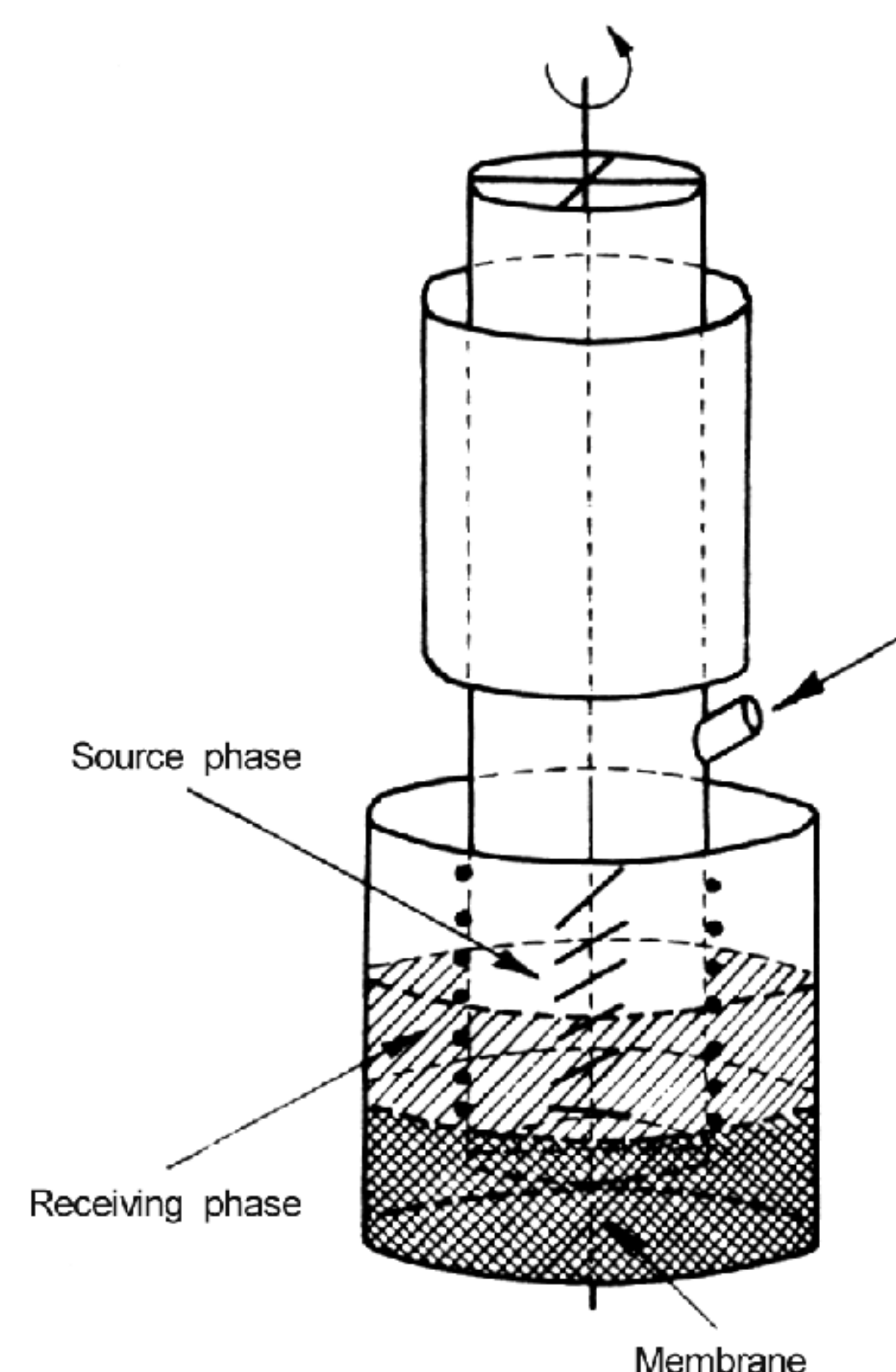


Figure 2. The device employed in separation of some amino acids through chloroform liquid membrane.

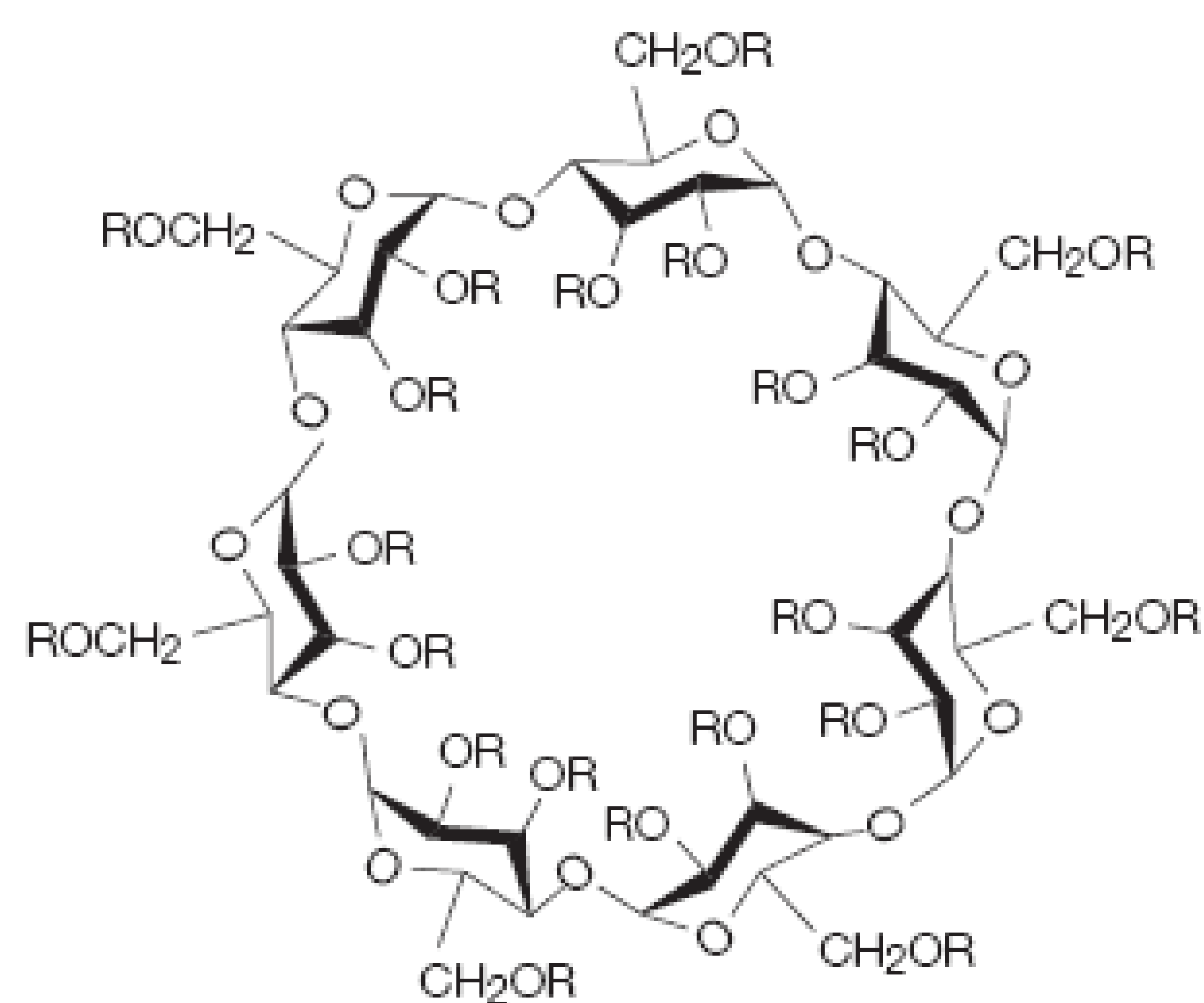


Figure 1. The chemical structure of modified  $\beta$ -cyclodextrin

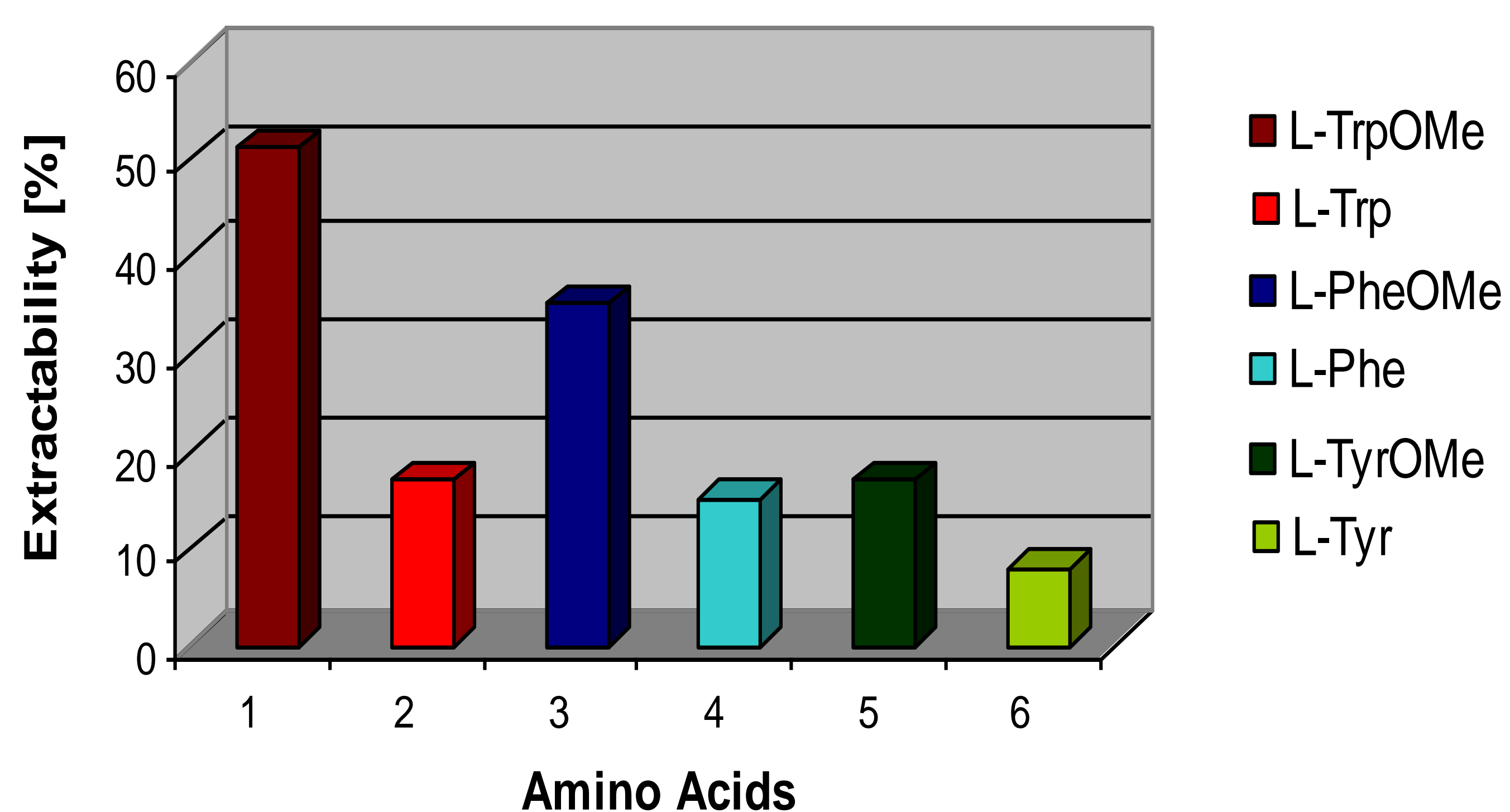


Figure 3. Experimental data of the extractability of some amino acids native and methylesters from aqueous phase into chloroform phase by modified  $\beta$ -cyclodextrin.

## Conclusions

The experimental results suggest that the amino acids native and methylesters were effectively extracted and transported through liquid membrane by modified  $\beta$ -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 have been studied.

## References

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