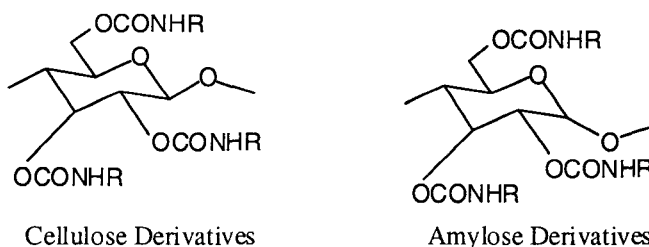


HPLC Resolution of Enantiomers Using Polysaccharide Derivatives as Chiral Stationary Phases

Yoshio Okamoto

*Department of Applied Chemistry, Graduate School of Engineering, Nagoya University,
Chikusa-ku, Nagoya, 464-8603, Japan*

In the past two decades, separations of enantiomers (optical isomers) by high-performance liquid chromatography (HPLC) have remarkably advanced [1]. Among many commercially available chiral stationary phases (CSPs) for HPLC, polysaccharide-based CSPs are the most popular ones, which can cover the resolution of a wide range of the chiral compounds [2,3,4]. Here, I will explain mainly the HPLC separation of enantiomers using these CSPs.



Polysaccharides, such as cellulose and amylose, are the most abundant polymers on the earth and can be readily derivatized to esters and carbamates through the reaction with acid chlorides and isocyanates, respectively. So far, we prepared nearly a hundred carbamate derivatives, particularly phenylcarbamates (R=substituted phenyl), and examined their resolving power as CSPs for HPLC. Their chiral recognition abilities depend very much on the substituents introduced on the phenyl group, and 3,5-dimethylphenylcarbamates of both cellulose and amylose exhibit particularly high chiral recognition to many compounds. With these two CSPs, the resolution of more than 500 racemates have been examined and nearly 80% of them have been resolved. The chiral recognition mechanism on several CSPs has also been well explained on the basis of the NMR data.

Other carbamate derivatives including benzylcarbamate derivatives and cycloalkylcarbamates also exhibit high chiral recognition [5]. On these derivatives, the chiral recognition abilities are very sensitive to the structure of the derivatives. For instance, benzylcarbamates of cellulose and amylose show very low recognition, but both α -methylbenzylcarbamates exhibited much higher recognition.

These polysaccharide-based CSPs have been prepared by coating the derivatives on silica gel, which does not allow to use the solvents that dissolve or swell the derivatives. To improve this defect, immobilization of the derivatives on silica gel without losing the abilities has been extensively examined [6].

References

- [1] N. M. Maier, P. Franco, W. Lindner, *J. Chromatogr. A*, **2001**, *906*, 3. [2] Y. Okamoto, E. Yashima, *Angew. Chem. Int. Ed.*, **1998**, *37*, 1021. [3] E. Yashima, C. Yamamoto, Y. Okamoto, *Synlett*, **1998**, 344. [4] E. Yashima, *J. Chromatogr. A*, **2001**, *906*, 105. [5] T. Kubota, C. Yamamoto, Y. Okamoto, *J. Am. Chem. Soc.*, **2000**, *122*, 4056. [6] T. Kubota, T. Kusano, C. Yamamoto, E. Yashima, Y. Okamoto, *Chem. Lett.*, **2001**, 724.