

Author: Norbert Gajda  
Supervisor: prof. Sławomir Jarosz

## Summary of the Ph.D. Thesis

The objective of this Ph.D. dissertation was the elaboration of the methodology of the synthesis of dimeric macrocyclic derivatives based on 1',2,3.3',4,4'-hexa-*O*-benzyl- and/or 1',2,3.3',4,4'-hexa-*O*-methyl-sucrose.

The review of the literature is composed of two parts. First one is focused on the physicochemical properties of sucrose and on the synthesis of useful derivatives of this disaccharide: silyl and trityl ethers, esters, and acetals. Known methods of the preparation of 1',2,3.3',4,4'-hexa-*O*-benzyl- and 1',2,3.3',4,4'-hexa-*O*-methyl-sucrose are briefly described. In the second part, previous reports on the synthesis of macrocycles with sucrose scaffold are reviewed. This material covers the preparation of compounds containing one sucrose molecule in which macrocyclic ring is built via a connection of the 6 and 6' positions as well as dimeric derivatives containing two sucrose units. Complexing properties of such receptors are also discussed.

The results of own research on dimeric macrocyclic compounds based on 1',2,3.3',4,4'-hexa-*O*-benzyl- and 1',2,3.3',4,4'-hexa-*O*-methyl-sucrose are collected in a separate part. These results propose several new methods for the preparation of 1',2,3.3',4,4'-hexa-*O*-benzylsucrose and useful strategies of the connection of two sucrose molecules via their terminal C6. This includes the S<sub>N</sub>2 reaction with simple aliphatic compounds containing oxygen, nitrogen, or sulfur atoms, metathesis reactions with Grubbs catalyst I and II generation, reductive amination, and reaction with oxalyl chloride. The usefulness of the Wittig-Horner type reaction in the preparation of the target with two sucrose units is demonstrated.

Experimental part provides all synthetic procedures and full analytical data of the new derivatives of 1',2,3.3',4,4'-hexa-*O*-benzylsucrose and 1',2,3.3',4,4'-hexa-*O*-methylsucrose.