Abstract

This master thesis deals with preparation of cyclodextrin (CD) derivatives that are suitable for bonding on solid surfaces such as dopamine polymer and gold.

The nucleophilic attack of 6^{I}-*O*-*p*-toluenesulfonyl-β-CD (6-tosyl-β-CD) by dithiols created derivatives with substituents bound to CD skeleton by one of the sulphur atom while keeping a free terminal sulphanyl group. Despite initial problems caused by oxidation of the thiols to disulfides, CDs were modified by alkyl or oligoethylene glycol spacers prepared in 60 – 88% yields.

The same reaction was used for preparation of derivatives of β-CD with amino group at the end of the tether that was linked to CD by nitrogen atom. For these purposes were used corresponding diamines and reactions proceeded smoothly reaching up to 92% isolated yield.

Next, also the chemoselectivity of the reaction with an ambident spacer bearing both amino and sulphanyl functional group was studied and by 2D NMR experiments was proved that substituent was bound to CD through sulphur atom. It was demonstrated on the case of preparation of CD derivative with dimethylene linker that was prepared in 84% yield.

A complete set of yet other CD-oligoethylene glycol derivatives with spacers linked to CD skeleton through the sulphur atom and terminated by amino group was prepared by Staudinger reduction of the corresponding azide. These derivatives were again formed by reaction of 6-tosyl-β-CD and tether terminated by sulphanyl and azide group in high yields ranging from 76 to 89%.

Preparation of the last set of derivatives with substituents joined to CD skeleton in this case by nitrogen atom and with terminal SH group was complicated by the low nucleophilicity of nitrogen compared to sulphur and the tendency of thiols to oxidize into disulfides. Although the formation of desired products was proved, the preparation and the isolation of these substances in sufficient purity were not successful.

For all of the above mentioned derivatives suitable oligoethylene glycol starting materials were prepared by standard chemical transformations.