Abstract of doctoral dissertation:

"**Selected applications of trityl group**"

Sylwia Górczyńska

Molecules with triphenylmethyl (trityl, Tr, CPh_3) moiety, are widely used in almost every organic chemistry laboratory. Every year, the trityl group's interest is growing due to its physicochemical properties. The topic of my interest is chemistry related to the trityl group, and in my doctoral dissertation, I discuss selected applications of the triphenylmethyl group in organic chemistry.

In general, trityl can be used as a structuring factor (reagent) influencing the enantio- and diastereoselectivity of the reactions, as well as a reporting factor for the stereochemistry of the molecule being formed.

The central part of the doctoral dissertation has been divided into four chapters in which various (selected) uses of the triphenylmethyl group are described. The physicochemical properties of the trityl group, which directly affect its nature and applications, were presented in detail.

1. *In situ* generated triphenylmethyl and triarylmethyl carbanions for the selective opening of oxirane rings.

One of the assumptions was to check whether the oxiranes would undergo opening reactions in a typical way, or whether the steric trityl group would change the reaction mechanism. The trityl group would be both a reagent and a reporter for the chirality of the product. The substrates I used were of different types, and the reactions I described can be called screening.

2. The use of a conformation-labile trityl group as a chromophore probe capable of specifically "reporting" the configuration and/or conformation of the inducer (chiral fragment).

The trityl group attached to the spherical fragment is characterized by C_3 symmetry. However, when connected to a more complex chiral system, information about the chirality is transferred to the trityl group, manifested by adopting a lower symmetry conformation of the trityl. So far, in all compounds tested in the literature, the trityl group was distant from the chiral element (from one to four bonds).

The first goal of this task was an introduction of the trityl group near the stereogenic center. The distance between the inducer to the receptor is shortened, which should be reflected in an undisturbed chirality transfer process. A steric hindrance generated by the adjacent stereogenic center will show the influence of an additional chiral element on the structure, dynamics, and circular dichroism of the system under study. Moreover, the presence of other functional groups containing an electronegative oxygen atom would allow the formation of additional stabilizing interactions in the molecule and indirectly affect the efficiency/mechanism of chirality transfer.

3. The demonstration of the effect of the trityl group on the diastereo- and enantioselectivity of the reaction in which a new stereogenic center is generated with the participation of a chiral auxiliary.

The first aim of this part was a demonstration of the influence of the trityl group on the diastereo- and enantioselectivity of the reaction in which a new stereogenic center is generated with the participation of a chiral auxiliary. The goal is to synthesize chiral molecules that contain an Oppolzer sultam fragment, a trityl group, and a stereogenic center. The second is to develop an efficient and repeatable synthesis of chiral triphenylmethane derivatives, which have a stereogenic center in the immediate proximity of the trityl group. The steric hindrance of the triphenylmethyl group effectively reduces the number of possible chemical reactions enabling the synthesis of this type of molecule.

4. Preparation of derivatives with a trityl group in various catalyzed reactions and comparison of the stereoselectivity of these reactions when trityl-free starting materials are used.

The main goal of this part of the project is to obtain and analyze chiral products containing a trityl group in the structure. In the first part was used a diastereoselective reaction for the preparation of spirocyclic azlactones, catalyzed by the organic catalyst and a palladium(0) compound. The second assumption was to obtain trityl allenes that would be stereoselectively formed in a reaction catalyzed by chiral derivatives of the cyclopentadienyl anion (PCCP), which works as a chiral Brønsted acid.