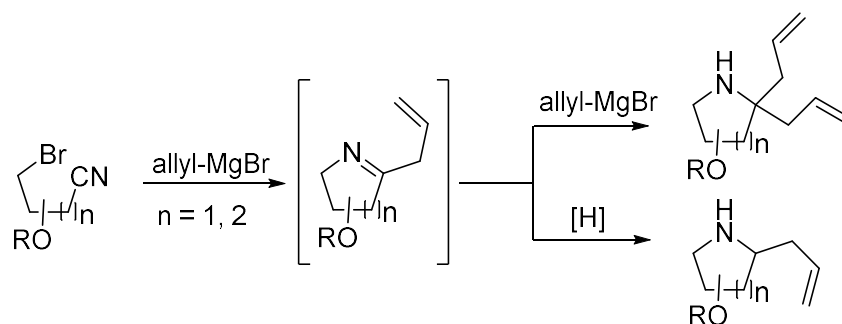


Addition of Allylmagnesium Bromide to Bromonitriles as a Key Step in the Synthesis of Iminosugars

Author: Michał Malik, M. Eng.

Supervisor: Prof. Sławomir Jarosz

The main purpose of this dissertation was to study the feasibility of the addition of allylmagnesium bromide to ω -bromonitriles as a tool for the synthesis of polyhydroxylated derivatives of piperidine and pyrrolidine, compounds that can be regarded as iminosugars. The subject of the thesis belongs to a relatively unexplored field, having a very limited number of literature precedents.



First, the polyhydroxylated ω -bromonitriles were obtained from sugar-derived oximes by treatment with $\text{Ph}_3\text{P/CBr}_4$. Then, the title reaction was studied. It has been established, that the addition of allylmagnesium bromide should be carried out in toluene, in the presence of an excess of $\text{Zn}(\text{BH}_4)_2$. This way, the 2-allylsubstituted products are obtained. The stereochemical course of this transformation has been proposed. Alternatively, 2,2-diallylsubstituted derivatives can be obtained by treatment of an ω -bromonitrile with an excess of allylmagnesium bromide in THF/DMPU.

In the next part of the thesis, the obtained iminosugars have been transformed into bicyclic iminosugars. For example, (-)-castanospermine has been synthesized from D-xylose in eleven steps. One of them involved palladium-catalyzed allylic C-H oxidation with the use of a carbamate protecting group as an internal nucleophile.

Several other bicyclic iminosugars have been also synthesized (including one *spiro* compound). During these syntheses, one-pot RCM/*syn*-dihydroxylation with the reuse of a ruthenium catalyst has been employed for the formation of the second ring.