New Approach to the Block Synthesis of Alginate Fragments: The Molecular Geometry and Stereo Selectivity of the Mannuronyl Donors

Kutsenok, Ekaterina

The goal of this work is a development of efficient approach to the chemical synthesis of low-molecular-weight fragments of alginate-like bacterial polysaccharides. These fragments are promising basis for vaccine and diagnosticum design as well as for fundamental immunological investigations. The key problem in chemical synthesis of alginate structures is stereo- and regioselective formation of ß-(1?4)-bond between D-mannuronic acid units. This both aspects were considered in this project. First, the new way for differentiation of O-4 in D-mannose residue using bulky silyl group was successfully applied for preparation of series of mannuronyl donors selectively protected at fourth position. All this glycosyl donors bearing different groups at O-4 were studied in model glycosylation. The correlation between NMR-spectral characteristic of parent donor and stereochemical result of further glycosylation was observed. Low-temperature NMR technique allow us to fix conformation equillibrium between two chairs in donor and suggest theoretical model for explanation of observed correlation. This dependence will be applied in total synthesis of alginate oligosaccharides to make it easily available for design of anti-bacterial treating.

Awards Won:
Second Award of $2,000