Synthesis of Robust Oligosaccharides for Applications in Biotechnology and Biomedical Research

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Abstract

Researchers from California State University, Sacramento have developed a method of that makes it very easy to link together two sugars that are either the same or different using a minimum of steps, no protecting group chemistry, efficient and green reaction conditions, and results in good to excellent product yields.

Full Description

We have developed a unique method to synthesize carbohydrate-based glycomimetic compounds using efficient green chemistry methodologies. This includes: no protecting group chemistry, use of water as a solvent in most reactions, use of a single common commercially available starting material to create multiple building blocks for glycomimetic assembly, use of microwave-mediated reactions to speed up reactions, and the use of water-based purification strategies. The molecules derived from the building blocks can be used to synthesize oligomers of a desired chain length for a variety of biotechnology/biomedical applications. The resultant oligomers are also expected to be stable under a variety of different pH environments, as well as in the presence of common degradative enzymes such as amidases and glycosidases. This chemistry can be used on any sugar that has a minimum of one oxidizable carbon to create stable homo- or hetero-oligosaccharides of one's choosing for a variety of applications. Our method can also be utilized in other applications for the synthesis of robust polymers for use in biotechnology/biomedical applications.

This invention solves a major issue in carbohydrate chemistry, where multiple additional protection/deprotection steps must be employed to provide regioselectivity to the resultant products if a specific glycosidic linkage orientation (alpha- or beta-) is desired. This leads to longer synthetic pathways and lower overall yields. Additionally, unlike other fields of macromolecules like peptides/proteins, or oligo-/polynucleotides, carbohydrate chemistry has not mastered the ability to automate the synthesis of important oligo-/polysaccharides. As we now know, carbohydrates are incredibly important in understanding a variety of biological attributes, including, but not limited to healthy vs. diseased states, or self vs. non-self. This invention can help us move closer to these achievements and move our understanding of biologically relevant oligo-/polysaccharides forward.

Applications

- Method can be used for the synthesis of robust polymers for use in biotechnology/biomedical applications

Features/Benefits

- Uses efficient green chemistry methodologies
- Higher yields
- Uses in biotechnology and biomedical applications

Patent Status

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Sialic Acid
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