ABSTRACT

The thesis titled "**Stereoselective Synthesis of 2-Amino-*C*-, *N*-, *O*- and *S*-glucosides**" presents the work carried out on the synthesis of 2-amino-imidazolium glycosides, novel 2-amino-*C*-glucosyl amino acid methyl esters, and 2-amino-*O*- and *S*-glucosides from a single starting material tri-*O*-benzyl-D-glucal.

Chapter 1 describes the stereoselective synthesis of 2-amino-imidazolium glycosides as precursors for novel chiral *N*-heterocyclic carbenes. Tri-*O*-benzyl-D-glucal was first transformed into 1,2-dideoxy-2-iodo-1-*N*-(*p*-toluenesulfonamido)-D-glucose according to a procedure previously developed in our laboratory. Subsequent reflux of this intermediate with a series of *N*-substituted imidazoles in acetonitrile enabled the efficient synthesis of 2-amino-imidazolium glycosides in excellent yields. Although the scope of application of these carbohydrate-derived optically active chiral *N*HC precursors remains limited, the present study primarily focuses on their rational design and synthesis.

Chapter 2 describes a straightforward and stereoselective synthesis for the preparation of 2-amino-β-*C*-glucosyl amino acid methyl esters in excellent yields. Beginning with tri-*O*-benzyl-D-glucal, the desired products were obtained in four sequential steps involving the formation of iodo-sulfonamide, 2-amino-β-glucosyl diethyl malonate, and 2-amino-β-glucosyl acetic acid. This methodology enables the efficient and highly stereoselective construction of the *C*-glycosidic bond, providing convenient access to *C*-linked glycoamino acid building blocks.

Chapter 3 describes a one-step, stereoselective synthesis of 2-amino-*O*- and *S*-glucosides from iodo-sulfonamide, which was prepared from tri-*O*-benzyl-D-glucal. The target compounds were obtained in good yields with β-stereoselectivity. The transformation proceeds efficiently at 25 °C using inexpensive and readily available reagents, with DMF as the solvent and sodium hydroxide as the base. Furthermore, the protocol is operationally simple, exhibits broad substrate compatibility with a variety of phenol and thiol derivatives, is readily scalable to gram quantities, and consistently affords the desired products in good yields.