ABSTRACT

The Synthesis of Differentially Protected 2-*N*,*N*-dibenzyl-2-deoxyamino-glucopyranose donors and Evaluation of their Utility in Stereoselective Glycoside Bond Formation

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This thesis examines the biological significance of amino sugars, specifically the *N*-acetyl-2-deoxyamino glucopyranose derivatives. These sugars exist ubiquitously in nature and are components of all *N*-linked glycoproteins, glycolipids, glycosaminoglycans and other naturally occurring oligosaccharides. They play extensive roles in cellular recognition and many other biologically important processes. These glycostructures have gained considerable interest in the development of synthetic strategies for the treatment of diseases. However, their incorporation into biomimetic glycosides is often fraught with difficulties during the glycosylation process. Firstly, the 2-*N*-acetyl glucosamine is highly unreactive as a result of participation of the *N*-acetyl group. Secondly, glycoside chain extension usually requires the 4-OH group of 2-*N*-acetyl glucosamine, however, hydrogen bonding makes this hydroxyl group very unreactive as a glycosyl acceptor. As such, a plethora of groups for the protection of the 2-*N* centre have been previously investigated, each with their own set of advantages and drawbacks. The 2-*N*,*N*-dibenzylamino protection, with suitable functionality on the rest of the

molecule is promising as a protecting group for the 2-deoxyamino glucopyranose molecules. This thesis focuses on the synthesis of such novel 2-*N*,*N*-dibenzylamino compounds functionalized with acetate groups, as well as benzyl and benzylidene groups. The evaluation of the 2-*N*,*N*-dibenzylamino *O*-acetate protected glucopyranosyl donors were extensively investigated utilizing the trichloroacetimidate method. Coupling studies were performed with simple and differentially protected monosaccharide acceptors; various glycosyl promoters; and in different solvents. Both glycosyl donors (α and β) proved to be quite successful in the synthesis of exclusive β-glycosides. This report also discusses the synthesis of the novel 2-*N*,*N*-dibenzylamino *O*-benzyl protected glucopyranose molecules, as well as, the preliminary studies involving the novel 2-*N*,*N*-dibenzylamino *O*-benzylidene protected system. Both protected-2-*N*,*N*-dibenzylamino systems can be used as potential glycosyl donors for the investigation of stereoselective glycosylation.

Keywords: amino sugars; aziridinium ion; dibenzylamino protecting group; glucopyranosyl trichloroacetimidate donor; glycosylation; β-selectivity.