INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Development of New Organocatalytic Methods towards the Synthesis of 2-Deoxy and 2,6-Dideoxy Glycosides

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SHORT ABSTRACT

The contents of the thesis entitled "**Development of New Organocatalytic Methods towards the Synthesis of 2-Deoxy and 2,6-Dideoxy Glycosides**" have been divided into five chapters based on the experimental works, results, and calculations during the complete course of the research period. The first chapter of the thesis is the literature review of deoxy glycosides. The second chapter contains the dehydrative glycosylation of 2-deoxy hemiacetals via iminium ion catalysis. The third chapter describes the open-close strategy towards ribo-lactol to form biologically relevant 2-deoxy riboglycosides using pyrrolidinium salts. Chapter four reveals us that protonated sterically hindered TTBPy salts act as a single hydrogen bond donor to activate glycals towards stereoselective glycosylation. The fifth chapter contains the cooperative catalysis of DMAP salts and Schreiner's thiourea towards dehydrative glycosylation of 2-deoxy and 2,6-dideoxy glycosides.

In conclusion, 2-deoxy hemiacetals as glycosyl donors gave us stereoselective glycosides through the formation of oxocarbenium ion via iminium catalysis. This dehydrative glycosylation also has the potential to convert native and readily available deoxy sugars into the corresponding glycosides with high yields. Afterward, the open-close strategy of protected ribose hemiacetal successfully gave us biologically relevant 2-deoxy riboglycosides. Surprisingly, the

formation of furan derivative implied us a clear idea about the mechanism. We found that protonated TTBPy can act as a single hydrogen bond donor to activate the alcohol, thereby driving the glycosylation of glycals in a stereoselective fashion. It is interesting to see that TBDPS protected glycals gave stereoselective products in high yields. The usage of bulky and the superarmed TBDPS along with the sterically congested TTBPy salts allowed to achieve high α-selectivities in the construction of the glycosidic bonds. The effect of the counterions on the structure and reactivity of the cationinc TTBPy has also been thoroughly investigated, and the difference in reactivity was showcased in the glycosylation reactions towards the synthesis of 2-deoxy glycosides as well as the Ferrier glycosyl products. Finally, the use of Schreiner's thiourea in combination with DMAP salts allowed us to perform the dehydrative glycosylation under ambient conditions. Overall, we have developed three different methods for the synthesis of 2-deoxy and 2,6-dideoxy glycosides each following a unique mechanism, and the utility of these methods towards the synthesis of other classes of glycosides will be investigated.