



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Utility of Sterically Strained Brønsted Salts as Organocatalysts for C-C, C-O, O-Si Bond Formations and Metal-Free Si-H Activation

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SHORT ABSTRACT

The contents of this thesis have been divided into five chapters based on the results of experimental and computation works performed during the complete course of the research period. The introductory chapter of the thesis presents an overview of the reactivity of sterically strained bulky bases like 2,4,6-tri-*tert*-butyl pyridine and their utility in various organic reactions. The second chapter shows the synthesis of Phenylallyl Ferrier-*C*-glycosides utilizing the sterically strained interactions of triflate anion with water molecule in activating allylsilanes by generating silyl cation. Third Chapter showcased the synthetically interesting S_N2-type glycosylation of perbenzylated glycosyl trichloroacetimidates using tetrafluoroborate salt of sterically strained tri-*tert*-butylpyridine. Along with the spectroscopical evidence, theoretical calculations were performed in support of the proposed S_N2 type glycosylation. The fourth chapter presents a metal free procedure for the activation of Si-H by using sterically strained TTBP-BArF salt. The thus generated silyl cation was trapped using alcohol. This method is proven efficient for various chemical transformations including synthesis of 1-deoxy glycals, reduction of indoles, ketones and alkyne. Plausible mechanisms were proposed based on several control experiments performed and literature support. The final chapter is a short study on the influence of rigid protecting groups like acetonide, electronic effects of different protecting groups of mannosyl donor aiming for beta mannosides. Apart from chapter I, the rest of the chapters comprise few subsections, including an introduction, detailed literature reports, the origin of the work, present work, experimental section, references, spectral data of selected compounds (¹H, ¹³C, ¹⁹F and ²⁹Si NMR) and XRD data. In addition to these, chapter III includes computations at the DFT level.