INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The contents of the thesis have been organized into five chapters based on the experimental works, observations and literature survey. **Chapter I** comprises an introductory discussion about the importance and synthetic methodologies of Polyheteroaromatic compounds (PHAs). The domino and multicomponent reactions are particularly superior to other multi-step syntheses of PHAs due to their remarkable, efficiency and selectivity, involving at least two consecutive reactions within a single step generating lesser number of by-products without the need for isolating intermediates or introducing new reagents. This thesis documents the synthesis of tricyclic, tetracyclic and hexacyclic heteroaromatics through the strategic application of the Domino and Multicomponent reactions. **Chapter II** describes the preparation of 2-(7,8,9,10-tetrahydrobenzo[*c*]phenanthridin-6-yl)phenol derivatives as a precursor from the multicomponent reaction of 1-naphthylamine, salicylaldehyde and cyclohexanones. Then, the synthesis of benzo[*c*]chromeno[4,3,2-*gh*]phenanthridine derivatives is accomplished using the precursor in a one-step cascade reaction. This includes a consecutive series of reactions such as the formation of *o*-quinone methide intermediate, 6pe ring closure reaction, hydroxylation, and H_2O elimination reactions for the aromatization. **Chapter III** illustrates the synthesis of 7-bromobenzo[*c*]chromeno[4,3,2-*gh*]phenanthridine from the tandem reaction of the same phenolic precursors with a regioselective instalment of the bromo group. This methodology showcases the involvement of radical catalyzed di-bromination, pyran ring formation by intramolecular substitution, and aromatization reactions in a step employing NBS/AIBN. **Chapter IV** delves into the synthesis of 6-aryl-8,9-dihydro-benzo[*c*]phenanthridine-10(7H)-ones by using solvent-dependent multicomponent reaction of 1-naphthylamine, salicylaldehyde and cyclohexanones. This methodology flaunts imine formation, adding imine and cyclohexanone, cyclization followed by regioselective benzylic oxygenation using DMSO as a solvent-cum-reactant. Finally, 6-aryl benzo[*c*]phenanthridin-10-ol derivatives are obtained from the ketone precursor. **Chapter V** consists of the pseudo-multicomponent reaction of aryl amine (mainly 1-naphthylamine, 2-naphthylamine, 2-aminoanthracene), aryl aldehyde and solvent-cum-reactant dimethyl sulfoxide (DMSO). Herein, DMSO is used as a -CH=C-CH_3 synthon. The thesis also demonstrates the brief AIE study of a 7-bromobenzo[*c*]chromeno[4,3,2-*gh*]phenanthridine compound and fluoride sensing study of few 6-(2-hydroxyaryl)-8,9-dihydro-benzo[*c*]phenanthridine-10(7H)-one derivative.