



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : Vijay M
Roll Number : 126122010
Programme of Study : Ph.D.
Thesis Title: *Studies Towards the Synthesis of 1,4-Thiazines, 1,4-Thiomorpholines and Imidazolidines*
Name of Thesis Supervisor(s) : Prof. T. Punniyamurthy
Thesis Submitted to the Department/ Center : Chemistry
Date of completion of Thesis Viva-Voce Exam : 03.06.2020
Key words for description of Thesis Work : Aziridine, domino reaction, tandem reaction, photocatalysis

SHORT ABSTRACT

Aziridine, a nitrogen containing three membered heterocyclic ring and more reactive due to ring strain. Owing to this, it made as versatile building blocks and well explored in heterocycle synthesis. This thesis consists of five chapters which explored the aziridine towards synthesis of various heterocycles with more than heteroatom. Chapter-I covers, classifications, literature survey on recent development about aziridines for the synthesis of various nitrogenous heterocycles. Following, the literature gaps and objectives of the thesis are highlighted. In chapter-II, describes Bi-catalyzed domino C-N/C-S bond formation in the synthesis of 1,4-thiazines and 1,4-thiomorpholines. This reaction is general and series of aziridines both cyclic and acyclic substrates reacts with good yield. Chapter-III describes, the synthesis, photophysical and electrochemical studies of Indazoloquinolines (IQ). The redox potential of the synthesized IQ is experimentally found using cyclic voltammetry and the experimental values are further compared using the DFT and TD-DFT calculations. It suggests that IQs have ability to act as photoredox catalyst. Chapter-IV deals tandem ring opening and oxidative C(sp³)-H amination of aziridines with cyclic secondary amines to access the fused imidazolidines. This transformation occurs under visible light using IQ as organophotoredox catalyst. This protocol features wide substrate scope, functional group tolerance, exclusively single diastereomers and atom economy. Further kinetic isotopic studies and mechanism of the reaction has been verified by DFT and TD-DFT studies. Chapter-V illustrate the outlook and summary of the thesis are outlined.