

Construction of C–C, C–N and C–O Bonds on sp^2 / sp^3 Carbon via Radical Pathway

A dissertation submitted in partial fulfillment for the degree of
Doctor of Philosophy

Submitted by

Bilal Ahmad Mir
Roll No. 146122034



Department of Chemistry
Indian Institute of Technology Guwahati
Guwahati-781039, Assam, India
February, 2020

Abstract

The contents of this thesis have been divided into five chapters based on the results of experimental works performed during the complete course of the research period. The introductory chapter of the thesis presents an overview of the construction of C-C, and C-X (C-N, C-O) bonds via the intermediacy of radicals. All the other chapters emphasize on C-C, C-N and C-O bond formations on sp^2 / sp^3 carbon via a radical pathway involving oxidizing agents. These bond formations (C-C, C-N and C-O) have been achieved via metal-free or metal-catalyzed radical addition and radical substitution. Chapter II describes the copper-catalyzed differential peroxidation of the terminal and internal alkenes using tertiary butyl hydroperoxide. Chapter III demonstrates *tert*-butyl nitrite mediated differential functionalizations of internal alkenes as paths to furoxans and nitroalkenes. Chapter IV illustrates the *tert*-butyl nitrite mediated nitro-nitratation of internal alkenes. Chapter V deals with iron (III)-catalyzed peroxide-mediated C-3 functionalizations of flavones. Each of these chapters comprises of seven subsections which include introduction, literature reports, present work, experimental section, references, spectral data and some selected spectra.