PREFACE

Carbonyl compounds and phenols are extremely important classes of organic compounds from various points of views including their biological and industrial importance. The studies of these classes of compounds are too broad and have wider scope. However, the scope of the thesis is very limited. A literature survey has revealed that a number of biologically active compounds have been synthesized starting from pyrazole-4-carbaldehydes. Various biological activities associated with them include antimicrobial, anti-inflammatory (COX-2 inhibitor and ulcerogenic activity), antitubercular, antitumor, antiangiogenesis, anti-parasitic, and antiviral activity. In view of these observations, the research studies embodied in this thesis focus on the reactions of pyrazole-4-carbaldehydes and their derivatives such as o-hydroxychalcone type compounds, which contain phenolic group in their structure.

The thesis has been divided in three sections (I-III) and there are total six chapters (1-6). Each section consists of two chapters.

Section I consists of chapters 1 and 2. The first chapter presents a general introduction to carbonyl compounds and their reactivity pattern, etc., which is followed by a brief review on the chemical transformations involving pyrazole-4-carbaldehydes as a substrate. The second chapter deals with the synthesis and hypervalent iodine oxidation of some new bis α,β-unsaturated ketones namely 2,5-bis((1-phenyl-3-aryl-1H-pyrazol-4-yl)methylene) cyclopentanones and 2,6-bis((1-phenyl-3-aryl-1H-pyrazol-4-yl)methylene)cyclohexanones. Antimicrobial activity of new 2,6-bis((1-phenyl-3-aryl-1H-pyrazol-4-yl)methylene) cyclohexanones is also discussed in this chapter.

Section II consists of chapters 3 and 4. This section focuses on the reactions of o-hydroxychalcone of pyrazole analogues, which contain phenolic group. Chapter 3 briefly summarizes important hypervalent iodine mediated oxidation of phenolic compounds with emphasis on o-hydroxychalcones. The chapter 4 discusses the results of experimental studies related to hypervalent iodine oxidation of o-hydroxychalcone of pyrazole analogues. This chapter is further divided into two parts 4.2.1 and 4.2.2, which covers iodine(III) mediated oxidative cleavage of o-hydroxychalcones of pyrazole analogues and synthesis of
cis-3-hydroxycromanones analogues of pyrazole, respectively. The results on the biological screening of the newly synthesized compounds are also discussed in this chapter.

**Section III** also consists of two chapters (5 and 6), which cover the studies on the hypervalent iodine oxidation of pyrazol-4-carbaldehyde derivatives. **Chapter 5** describes the synthesis of 2-((3-aryl)-1-phenyl-1H-pyrazol-4-yl)methylene)-1-(pyridin-2-yl)hydrazines and their oxidative cyclization to fused 3-(3-aryl-1-phenyl-1H-pyrazol-4-yl)-[1,2,4]triazolo[4,3-a] pyridines using iodobenzene diacetate (IBD). All the synthesized compounds were screened for their antimicrobial activity. The results on the antimicrobial study of the newly synthesized compounds are also discussed in this chapter. **Chapter 6** describes the synthesis of diethyl 1,4-dihydro-2,6-dimethyl-4-(3-aryl-1-phenyl-4-pyrazolyl)pyridine-3,5-dicarboxylates and their aromatization to corresponding diethyl 2,6-dimethyl-4-(3-aryl-1-phenyl-4-pyrazolyl)pyridine-3,5-dicarboxylates using HTIB ([hydroxy/tosyloxy]iodo] benzene, Koser’s reagent) as the oxidizing agent.