CHAPTER - 6

Summary and Concussions

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Summary and conclusion

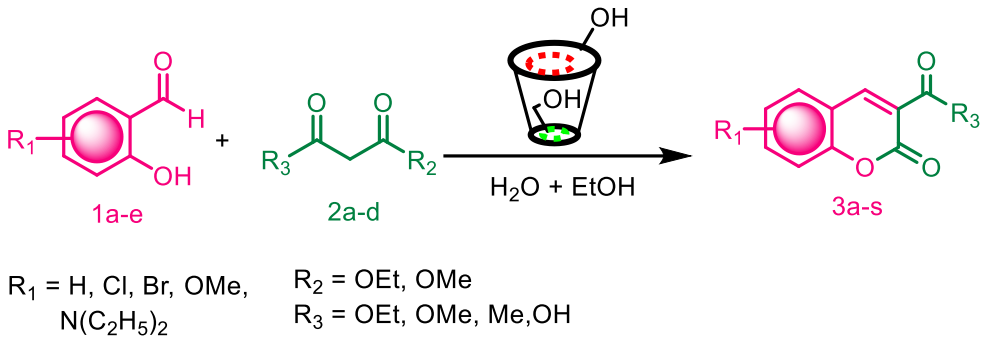
6.1 Summary and conclusion

The thesis entitled, "Green and Benign Strategies for the Efficient synthesis of Heterocyclic Compounds," embodies the environment friendly methods for synthesis of biologically important heterocyclic compounds containing nitrogen, oxygen and sulphur atoms. The synthesised compounds were characterized using a variety of analytical approaches, including **^{1}H** and **^{13}C NMR**, FT-IR spectroscopy, mass spectrometry, and elemental analysis. The thesis contains five chapters.

Chapter 1 Provides a brief introduction and literature review on synthesizing and applying some of the most common classes of nitrogen, oxygen, and sulphur containing heterocyclic compounds. The following four chapters describe the studies and conclusions (**Chapters 2 to Chapter 5)**. Each chapter, which is complete in itself, consists of an introduction, results and discussion, control experiment, plausible mechanism, experimental section including methods and analytical data, and references.

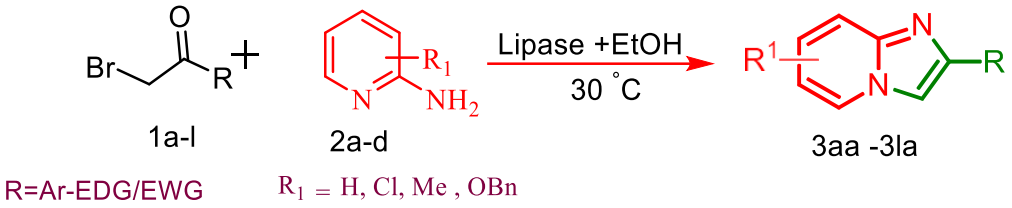
Chapter 2 In this chapter, we have discussed a new synthetic method for the preparation of coumarin derivatives from *o*-cresols and active methylene compounds under metal and catalyst-free condition using beta-cyclodextrin as a green catalyst with the equimolar ratio of ethanol: water **(1:1)** reaction medium (**Scheme 6.1**) with significant advantages of high

scalability, high yields, shorter reaction time, relatively low temperature, cost-effectiveness, and ease of isolation of products without hazardous solvents and by-products. A wide substrate scope of derivatives has been reported in good to excellent yields.

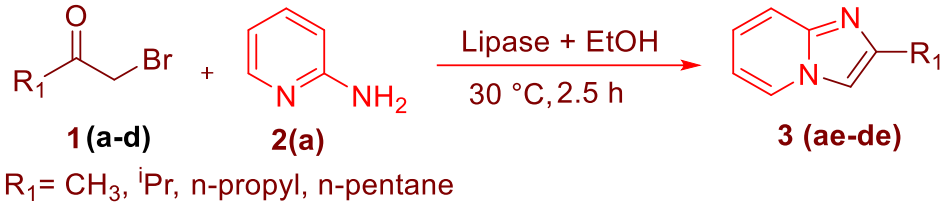


Scheme 6.1 Synthesis of 3- functionalized coumarin derivatives 3a-s

Chapter 3 is concerned with the development of novel, facile, efficient and scalable route for the synthesis of imidazo[1,2-a] pyridines. These imidazo[1,2-a] pyridines were successfully synthesized by easily available starting material 2-halocarbonyl compounds with 2-aminopyridines is catalyze by lipase and ethanol as reaction medium with stirring at 30 °C **(Scheme 6.2-6.3)**. This reaction avoids toxic catalysts and volatile organic solvents. The merits of this protocol are high atom economy, operational simplicity, mild reaction conditions, easy workup and purification process, and good yields of desired products in short reaction times. After studying the antimicrobial and antifungal activities of desired products

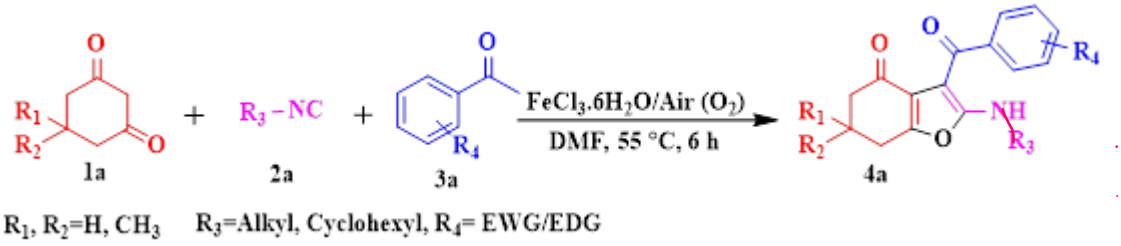


Scheme 6.2 Synthesis of imidazo[1,2-a] pyridines for aryl series 3aa-la



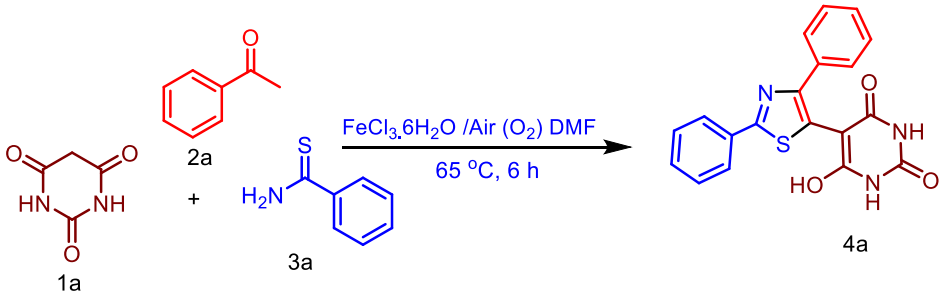
Scheme 6.3 Synthesis of imidazo[1,2-a] pyridines for alkyl series 3ae-de

Chapter 4 In this chapter we have designed an improved, assisted synthesis of clean and efficient one-pot synthesis of 6,7-dihydrobenzofuran-4(5H)-ones. To investigate the feasibility of our envisioned protocol, we commenced our analysis with dimedone 1a(1.0mmol), acetophenone 2a (1.0 mmol) and tertiary butyl isocyanide 3a (1.0 mmol) using iron salt as a catalyst in the presence air and DMF as promoting medium. (**Scheme 6.4**). Herein we have developed a facile, efficient and scalable protocol to successfully achieve the 6,7-dihydrobenzofuran-4(5H)-ones. The main advantage of the present methods such as broad substrate scope, good functional group tolerance and iron salt is use as catalyst which are economically favorable and less toxic as compare other metal salt.



Scheme 6.4 Synthesis of 6,7-dihydrobenzofuran-4(5H)-one's derivative.

Chapter 5 Describes a completely eco-friendly and straightforward protocol for the biologically important synthesis of trisubstituted thiazole derivatives by the reaction of easily available starting materials barbituric acid, acetophenone and aryl thioamides in the presence $FeCl_3.6H_2O$ and O_2(Air) in DMF solvent **(Scheme 6.5)**. This is the one pot reaction synthetic condition is operational simplicity, offering a modified and expedient methodology for the construction of synthetically useful thiazole derivatives in good to excellent yields. Additionally, this protocol highlights environmentally benign reaction conditions, short reaction times, operational simplicity, easy workup and purification procedure.



Scheme 6.5 Synthesis of trisubstituted thiazole derivatives