# Summary and Conclusions

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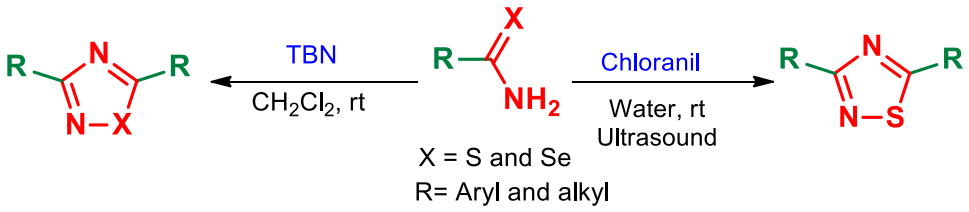
The thesis entitled, "Green Approaches for the Synthesis of Some Biologically Relevant Heterocyclic Compounds," embodies the environmental friendly methods for synthesis of biologically important heterocyclic compounds containing nitrogen, oxygen and sulphur atoms. Characterization of the synthesized compounds have been performed by different analytical instrumental methods *viz.* $^{1}H$ & $^{13}C$ NMR, FT-IR spectroscopy, Mass spectrometry and elemental analysis The content of the thesis has been divided into five chapters.

**Chapter 1** provides a general introduction and literature review of synthesis and application of some main class of nitrogen, oxygen and sulphur containing heterocyclic compounds.

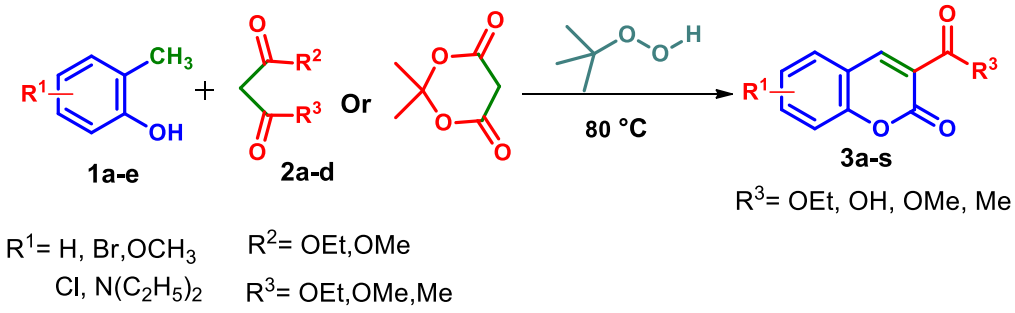
**Chapter 2** deals with the detailed syntheses of 1,2,4-thiadiazole and 1,2,4-selenadiazole by two different methods. The synthesis were successfully achieved by *tert*-butyl nitrite induced radical dimerization of primary thioamides and selenoamides at room temperature and chloranil mediated ultrasound induced dimerization of primary thioamides under metal and catalyst free condition. The developed methods are simple, efficient and provide good to excellent yield in short span of time. (**Scheme A**).




**Scheme A**

The reactions were carried out without any catalyst which complies with the requirements for green and sustainable chemistry.

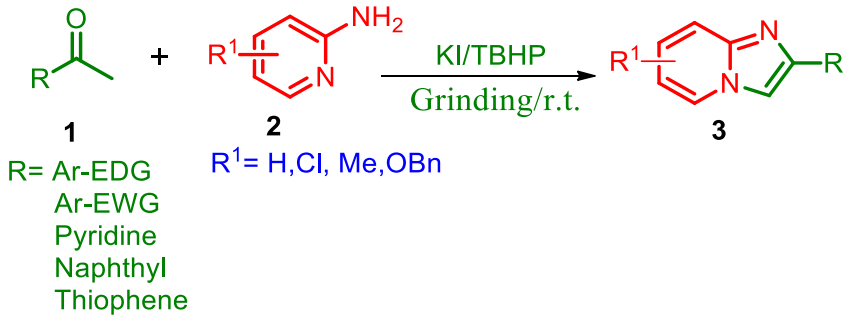
**Chapter 3** describes the synthesis of 3-functionalized coumarins from *o*-cresols and active methylene compounds under metal and catalyst-free condition using *tert*-butyl hydrogen peroxide (**Scheme B**). Herein we have developed a facile, efficient and scalable protocol to successfully achieve the 3-functionalized coumarins. This methodology involves initial functionalization of *o*-cresol by TBHP.




**Scheme B**

Formation of C–O bond, followed by treatment of the *o*-cresol with active methylene in presence of TBHP under solvent-free codition to give desired products in good to excellent yield. The fascinating features of the protocol are as follows: functionalization of *o*-cresol, milder reaction conditions, catalyst free, broad substrate scope and good functional group tolrance.

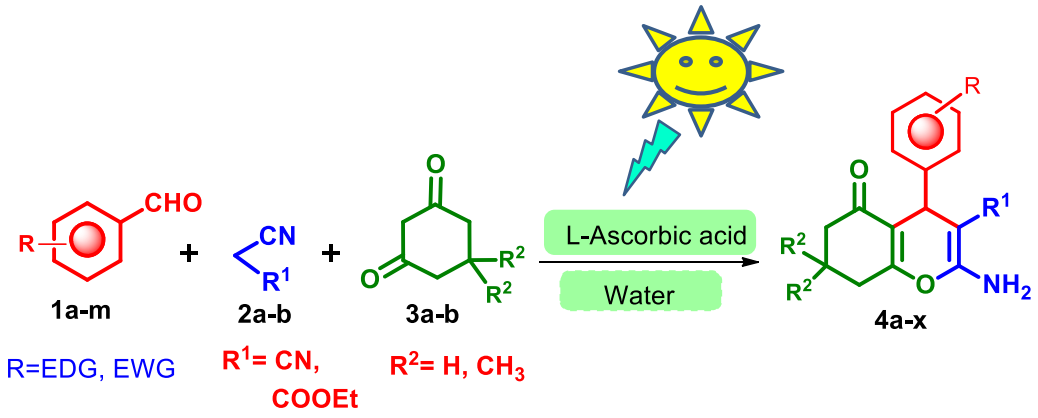
**Chapter 4** is concerned with the development of novel, facile, efficient and scalable route for the synthesis of imidazo[1,2-a]pyridines. These imidazo[1,2-a]pyridines were successfully synthesized by easily available starting material aryl methyl ketone with 2-aminopyridine using KI/TBHP under grinding at room temperature (**Scheme C**).




**Scheme C**

We have developed first metal, acid, base and solvent-free synthesis of imidazo[1,2-a]pyridines under environment friendly condition.

**Chapter 5** describes a solar energy mediated environmentally benign, simple and efficient method for one pot multicomponent synthesis of tetrahydrobenzo[b]pyran using L-ascorbic acid as an organocatalyst in aqueous medium and the isolated yields were up to 91-97% (**Scheme D**).




**Scheme D**

Herein, we have developed a rapid and facile method to achieve the tetrahydrobenzo[b]pyran starting from the Knoevenagel condensation of aromatic aldehyde with active methylene compound followed by Michel addition with 1,3-diketone. The methodology shows extensive functional group tolerance and good to excellent yield in short span of time. The noteworthy feature of the present methodology includes isolation of analytically pure products by simple crystallization method without using cumbersome column chromatographic method.