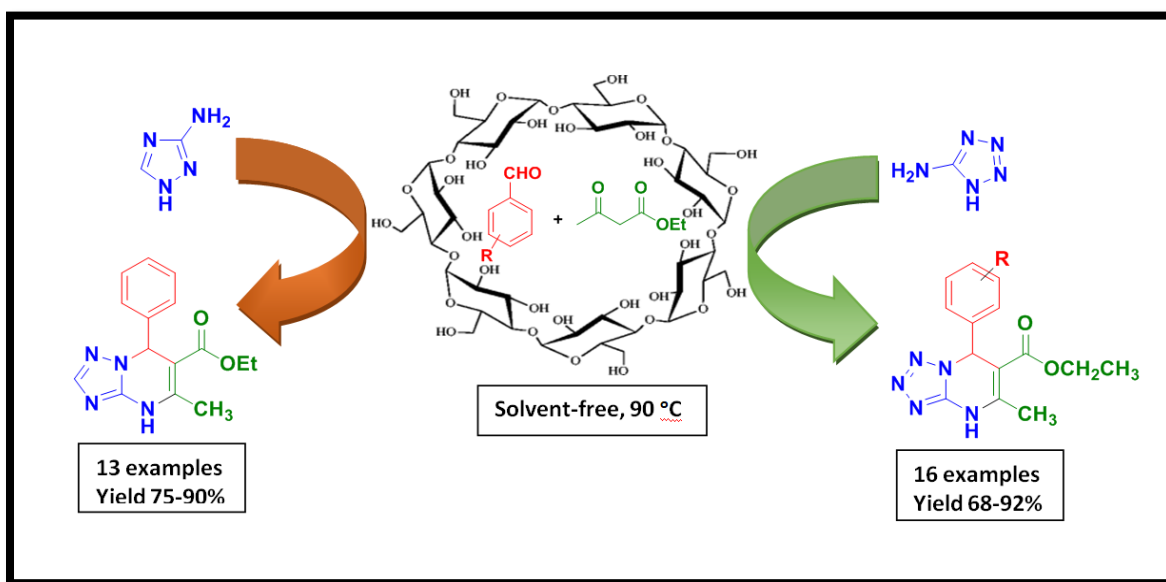


ABSTRACT

The thesis entitled “**INNOVATIVE APPROACHES TOWARDS THE SYNTHESIS OF HETEROCYCLIC COMPOUNDS**” comprises five chapters and a brief of their contents are as follows:

Chapter I comprises a brief review on the approaches towards the synthesis of heterocyclic compounds. Heterocyclic compounds have been extensively used in designing of various pharmaceutically significant compounds. Apart from this, they are considered to be powerful starting materials for construction of naturally occurring biologically active compounds.

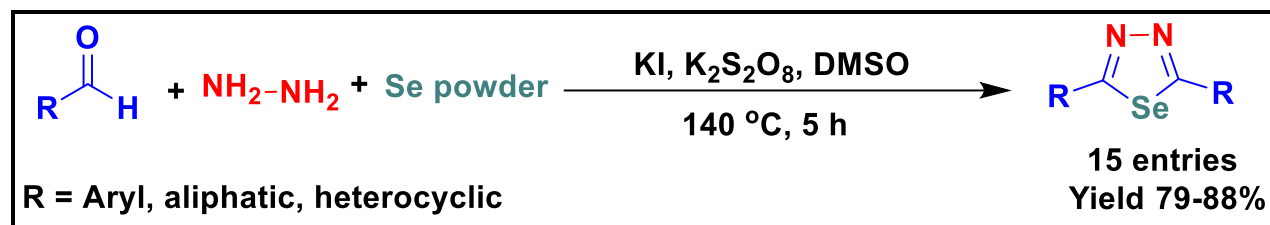
Chapter II is divided into two sections, **Section A** deals with the tandem annulations for synthesis of tetrazolo[1,2-*a*]pyrimidine and **Section B** deals with preparation of [1,2,4]triazolo[1,5-*a*]pyrimidine. In these two sections, β -Cyclodextrin, an robust organo catalyst has been explored for the straightforward and facile synthesis of tetrazolo[1,2-*a*]pyrimidine and [1,2,4]triazolo[1,5-*a*]pyrimidine derivatives through one-pot three-component tandem annulations reaction under solvent-free condition using aldehyde, active methylene compound and 5-aminotetrazole and 3-amino-1,2,4 triazole respectively. This greener chemical procedure has advantages such as shorter reaction time, absence of toxic and hazardous catalyst, chemicals and solvent, highly functional group tolerance, easy work up procedure and product separation.



In **Chapter III**, Humic acid, a high molecular weight, environment friendly biopolymer has been investigated as a catalyst for a straight forward and versatile one-pot three-component reaction through famous Kabachnik-Fields reaction for the diversity-oriented convergent synthesis of diethyl(phenyl(phenylamino)methyl)phosphonate by using aldehydes, amines and diethyl phosphate under solvent-free reaction condition. The developed reaction protocol has successfully removed the use of hazardous solvent, toxic reagent, metal catalyst and harsh reaction condition for the synthesis of this important class of compound. The eco-benign reaction condition, low catalyst loading, easy reaction set-up, good yield and broad range of functional group tolerance are the key advantages of the reported protocol. Furthermore, the solvent-free reaction protocol using humic acid, as a green, non-toxic, easily available, biodegradable and easily recycled polymeric catalyst convincingly enhances the superiority of this newly developed protocol over the conventional one.



Chapter IV describes an efficient catalytic system consisting of KI and K₂S₂O₈ for one-pot pseudo three-component cascade reaction in the preparation of diverse array of 1,3,4-selenadiazoles derivatives from easily accessible precursors aldehydes, hydrazine and elemental selenium. Here, KI is used as the surrogate of iodine and K₂S₂O₈ as oxidant. The key advantages of this protocol include easy reaction set up, operational simplicity, high functional group tolerance and utilization of low toxic chemicals. Further, a radical quenching reaction was also performed to confirm the mechanistic pathway.



Chapter V describes eucalyptol, a bio-degradable greener solvent, non-toxic and easily accessible organocatalyst mediated straightforward and environmentally benign approach towards the preparation of diverse array of functionalized bis-coumarins by the reaction of a vast

range of aldehydes with 4-hydroxycoumarin without any additional solvent. This protocol proceeds without any hazardous solvents, toxic metal catalysts and harsh reaction conditions. In addition, low catalyst loading, good yield and excellent functional group tolerance are the key advantages of these protocols.

