Abstract

For more than century, heterocycles have constituted one of the largest areas of research in organic chemistry. The majority of pharmaceutical products that mimic natural products with biological activity are often derived from heterocyclic structures. The present research work is concerned with the design and synthesis of structurally diverse heterocycles with fused biodynamic heterosystems by green chemical protocols through multicomponent approach. The multicomponent domino reactions offer remarkable advantages from the environmental point of view including operational simplicity, facile automation and minimized waste generation because of reduction in number of extraction and purification stages. Multicomponent reactions combined with molecular diversity and eco-compatibility are considered cornerstones of combinatorial chemistry and diversity oriented synthesis and have played a critical role in the development of modern synthetic methodologies for pharmaceutical and drug discovery research. In view of the promising biological activities of the structurally diverse heterocycles with fused heterocyclic systems, we have designed green chemical multicomponent heterocyclic protocol with the aim of developing new structural motifs of structural complexity with promising bioactivity.

An efficient one-pot synthesis of structurally diverse 3,4-dihydropyrimidin-2(1H)-thiones derivatives by p-TSA promoted three component reaction of ethyl acetoacetate with thiourea/phenylthiourea and aryl aldehydes is described in chapter 2. The present protocol provides excellent yields of structurally complex, biologically relevant dihydropyrimidin-2(1H)-thiones in a single operation.

An environmentally benign, efficient and convenient protocol is described in chapter 3 for the synthesis of structurally diverse dihydropyridine fused hetrocycles; 2,3-quinolinedicarboxylate,chromeno[4,3-b]pyridine-2,3-dicarboxylate, pyrido[2,3-d]pyrimidine-6,7-dicarboxylate, pyrano[4,3-b]pyridine-2,3-dicarboxylate incorporating medicinally privileged fused heterosystems by Iron(III)chloride-catalyzed four-component domino reaction of aromatic aldehydes, acetylenedicarboxylate and arylamines with cyclic 1,3- dicarbonyl compound in an ethanol medium. The selective formation of the very different pyridine fused heterocyclic derivatives depends on the structure of cyclic 1, 3-dicarbonyl compound.

A concise and efficient Iron(III)-catalyzed protocols for the synthesis of functionalized dihydrobenzo[4,5-*d*]imidazo[1,2-*a*]pyrimidines and 5H-benzo[4,5-d]thiazolo[2,3-b]pyrimidine-4-carboxalic acid derivatives is described in chapter 4 and 5 respectively by one-pot domino reaction of 2-aminobenzimidazole/ 2-aminobenzothiazole with substituted aromatic aldehyde and pyruvic acid in ethanol. This methodology provides a convenient, atom-economical and eco-friendly approach for the synthesis of biologically important benzimidazopyrimidines /benzothiazolopyrimidines from easily available substrates under mild reaction conditions.

Keywords: Multicomponent Domino reactions (MDRs), DHPMs, p_TSA, Thiones, Benzothiazolopyrimidine, One-pot, Benzimidazolopyrimidine, Iron-catalyzed, 2,3-quinolinedicarboxylate, Pyrido-[2,3-d]-pyrimidine, Pyrano[4,3-b] Pyridine, Chromeno[4,3-b]pyridine.