Abstract

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Title: *"Development of methodologies for the synthesis of biologically important heterocyclic scaffolds"* submitted by **Subhendu Pramanik**

The thesis entitled "Development of methodologies for the synthesis of biologically important heterocyclic scaffolds" is divided into three chapters, each chapter consists of further two parts (part I and II). Part I of each chapter deals with a general survey of the importance and part II deals with the detailed methodology developed. The reaction methodologies described in the thesis are described briefly below.

The chapter one deals with an atom economic direct synthesis of carbazoles having aryl and keto-aryl groups. The synthesis of the said compounds has been achieved through Pd(II)-catalyzed cascade reactions between 1-(indol-2-yl)but-3-yn-1-ols and aldehydes. The reaction proceeds through alkyne-carbonyl metathesis, an uncommon pathway using palladium catalyst, and constitutes a fast intermolecular assembly through four carbon-carbon bond formations in one-pot. A reasonable reaction mechanism supported by control experiments has also been proposed to explain the product formation.

The chapter two describes a facile and straightforward syntheses of 6*H*-dibenzo[*c,h*]chromenes and 5,6-dihydrobenzo[*c*]phenanthridines which have been achieved via Pd(II)-catalyzed domino reactions of acetylenic substrates through intramolecular *trans*-oxo/amino palladation onto the triple bond followed by nucleophilic addition of the generated carbon−palladium bond to a tethered aldehyde. The scope of this reaction was further extended through one step conversion of some of those products into 6*H*-dibenzo[*c,h*]chromen-6-ones and benzo[*c*]phenanthridines which are prevalent as core structures of many natural products and medicinally active compounds. A concise formal total synthesis of *Arnottin I* could be achieved easily through utilization of this methodology.

The chapter three deals with an efficient palladium(II)-catalyzed cascade reaction of ene-yne substrates carrying aldehyde group is described. It involves successive hetero- and benz-annulations in one pot via *trans*-oxo/amino palladation onto alkyne followed by 1,2-addition to aldehyde, providing a convenient synthesis of naphtho[1,2-*b*]furans.The reaction constitutes a fast intramolecular assembly through several carbon-carbon and carbon-hetero atom bond formations taking place in one pot. The reactions are operationally simple, compatible with a range of functional groups and atom economical in nature. A plausible reaction mechanism has also been described providing rational for product formation.

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