Foreword

Organic synthesis has seen tremendous growth in last six to seven decades. The world population has been increasing continuously and so have been the demands of chemicals/products so as to make the lives of all individuals' comfortable, disease free and to meet the demands of the emerging technologies. This required the multiplication of chemical industries to meet the increasing demands for chemicals for products of everyday life. However, the methodologies/technologies used for the production of many organic compounds/materials did not change for a very long time resulting into increasing air, water and soil pollution. The chemical industries were perceived to produce lot of waste and harm the environment. Over the years, the industry and wider public became aware of the negative effects of some the practices being followed in chemical industry and the need to protect the environment.This led chemists in last two three decades to focus on development of new synthetic methodologies which are sustainable. This required development of energy efficient techniques, techniques to eliminate or minimize the production of waste, catalytic vs. stoichiometric reactions, application of recyclable catalysts and use of renewable resources. One of the big contributors of chemical waste have been the use of solvents for reactions and separation of products.Therefore the chemists were forced to think of recyclable and environmentally benign solvents and/or methodologies to minimize the application of solvents in industrial processes.

Heterocycles are the most diverse family of organic compounds and find application in pharmaceutical industry, agrochemicals, sensors and are present in many vitamins, natural products and biomolecules. The pharmaceutical industry is one the most important industries due to ever increasing demands of existing drugs and also in the pursuit for newer drugs in order to the life expectancy. Nevertheless, it is also reported to be the most polluting industry due to its highest E factor (wastage per kg of product).

In this context, the present book (Volume 4), which is a part of the book series entitled 'Green Bioactive Heterocycles', focuses mainly on solvent-free synthesis of structurally diverse heterocyclic compounds having biological significance. As mentioned above, the solvent plays an important role in organic transformations and separation of products. The application of different organic solvents is widespread in chemical syntheses and majority of these solvents are not environment friendly due to their volatile nature and adverse effects. Water is undoubtedly the safest solvent but the poor miscibility of the majority of organic reactants in water is another problem besides the stability of reagents and catalysts in aqueous medium. Therefore, solvent-free approaches have gained tremendous attention from chemists in both academia and industry in recent decades in order the processes environmentally benign.

This volume (Volume 4) consists of 13 chapters written by experts from different countries due to their experience in the related areas. Basak and Ghosh summarized have summarized the recent approaches related to the microwave-assisted synthesis of various bioactive heterocycles under solvent-free conditions in first chapter. Chap-

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ter 2 has reported the synthesis of microwave-assisted benzazoles under solvent-free conditions written by Prof. Chakraborti and his group. In chapter 3, Prof. Davor Margetić has reported the applicability of Ball-milling assisted synthesis of various bioactive heterocycles under solvent-free conditions. Chapters 4 and 5 are related to the recent advances on the synthesis of *N*-heterocycles under conventional solvent-free grinding conditions. Ranu et al. have discussed the solvent-free and green synthesis of some *N*-heterocyclic scaffolds having pharmaceutical importance in chapter 6. Chapter 7 deals with the solvent-free synthesis of structurally diverse bioactive xanthene derivatives under conventional heating conditions. In chapter 8, Prof. Das and his coworkers have summarized the synthesis of structurally diverse quinazolines and quinazolinones under solvent-free conditions. Farooq et al., in chapter 9, have summarized the recent advances in the synthesis of various bioactive heterocyclescontaining nitrogen and oxygen under solvent-free conditions. Similarly, chapter 10 deals with the synthesis of bioactive nitrogen as well as sulfur containing heterocycles under solvent-free conditions. Catalytic role of ionic liquids for the synthesis of various bioactive heterocycles under solvent-free conditions is discussed in chapters 10 and 11. In the last chapter, Prof. Maiti and his group have discussed the applications of silica-supported acids as reusable catalysts under solvent-free conditions for the synthesis of various bioactive heterocycles.

Therefore, I am sure that this new book titled 'Solvent-free synthesis: Bioactive Heterocycles' will be of immense interest for researchers working in academia, and specialists involved in the development of industrial processes. Beside chemists, chemical engineers, Ph. D. students and other students will also make use of the valuable subject matter compiled in this book.

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