

Preface

The heterocyclic series “Green Bioactive Heterocycles” consists of 9 volumes till date. Each volume of this series deals with different aspects of bioactive heterocycles. This 9th volume, entitled ‘*Carbohydrates in Chemistry and Biology: Decorated Compounds, Bioconjugation and Catalysis*’, of the above series focuses on various aspects of carbohydrate chemistry and consist of twenty chapters. All the chapters have exhaustively covered the topics and the corresponding literature.

Since long back, the role of carbohydrates in almost all aspects of chemistry and biology is considered an exceedingly promising area of interest which has been further increasing exponentially in recent years. This is a most abundant natural product and is considered an essential biomolecules that have enormous applications in chemistry, biology, medicine, food, agriculture, and functional materials. In addition to their well-known essential role as energy storage, they have notable significance in various pivotal biological events, including modulation of protein function, transport, intercellular adhesion, malignant transformation, signal transduction, viral and bacterial cell surface recognition and many more, which eventually formulate this fascinating scaffold for easy access of diverse range of drug candidates. The other enthralling features of carbohydrates include its readily availability, chiral, and functional nature that all together increases its adoptability in catalysis in chiral synthesis and also functional materials of wider applicability. Toward this end, we once again extend the importance of carbohydrates in drug development and also their synthetic perspectives to a further updated and new perspectives including material science and we are very sure that this book may successfully interconnect their diverse role to the wide range of the readers. This book covers twenty chapters that illustrate an opportunity of carbohydrates in various emerging fields, which is the major objective of present multidisciplinary project. We would like to extend our sincere thanks to all the contributors who are active experts known in the area of glycoscience for their valuable contributions to this project titled ‘*Carbohydrates in Chemistry and Biology: Decorated Compounds, Bioconjugation and Catalysis*’.

An introduction to carbohydrate-designed drug candidates is covered by Prof. P. Chawla and co-workers in Chapter 1, while Pathak *et al.* in Chapter 2 presented the notable role of carbohydrates in drug delivery. Mishra *et al.* in Chapter 3 discussed the impact of carbohydrate-functionalized nanoparticles with special consideration of their notable applications from the laboratory to clinics in comprehensive fashion. Dr. S. Majhi in Chapter 4 presented the total synthesis of some selected carbohydrate-decorated bioactive molecules. Prof. D.K. Maiti and his group in Chapter 5 considered interesting update on synthesis of potent carbohydrate-decorated *O*-heterocycles. Further, the scope of green solvents in the synthesis of diverse range of carbohydrate scaffolds is nicely presented by Prof. B.C. Ranu and his group in Chapter 6. Some interesting features about common coupling reactions explored in glycoscience have been presented by Prof. R. Das and his group in Chapter 7. Prof. B. Basu and co-researchers

in Chapter 8 exemplified the regioselective triazole forming ‘Click Chemistry’ in the development of biologically relevant 1,2,3-triazole-linked glycohybrids and glycoconjugates. Prof. P. Ghosh in Chapter 9 covers the notable applications of carbohydrate containing isothiocyanate scaffold for easy access of structurally diverse heterocycles. Some interesting common synthetic routes leading to biologically relevant carbohydrate analogues by utilizing Ultrasonic as well microwave (*MW*)-assisted condition is well presented in Chapter 10 and Chapter 11, respectively by Prof. S.C. Ameta and co-workers. Furthermore, versatile use of carbohydrates as renewable feed stocks for easy access of bioactive molecules is covered by Dr. K. Pathak and group in Chapter 12. Followed by, a detail overview on application of carbohydrate-based gelators as well ionic liquids for biomass utilization is covered by groups of Dr. A. Abbas and Prof. H.C. Chopra, respectively in Chapter 13 and 14. Prof. A. Ramazani and co-researcher in chapter 15 presented a comprehensive overview on carbohydrate-supported nanostructured biomaterials and their notable application in organic transformations. An interesting update on bioconjugation in carbohydrates is discussed by Dr. T. Farooq and co-researchers in Chapter 16, whereas Prof. P. Ghosh and his co-researchers in Chapter 17 nicely covered the application of carbohydrate polymers in Chapter 17. Dr. S. Gupta in chapter 18 exemplified the use of carbohydrates in the preparation of biofuels. In Chapter 19, Dr. H. Bukhari and his group cover the representative industrial application of biocompatible carbohydrates. At the end, Prof. A. Ramzani and group in Chapter 20 summarized the recent advances in carbohydrates-based metal-organic frameworks.

The topics included in this book included the basic and advanced aspect of carbohydrates. All the chapters are broad and aimed to present advance information about the carbohydrates with their ever increasing application in science and technology. We once again sincerely thank all the esteem contributors and also our special appreciation and gratitude goes to all the learned reviewers who provide very constructive comments and suggestions which greatly help our book interesting to the readers.

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