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BOOK REVIEW

Glycoscience. Chemistry and Chemical Biology

(Fraser-Reid, B. O., Tatsuta, K., Thiem, J., Cote, G. L., Flitsch, S., Ito, Y., Kondo, H., Nishimura, S.-I., and Yu, B. (eds.) 2nd Edn., Springer-Verlag, Berlin-Heidelberg-New York, 2008, $1599, 2874 p.)

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Carbohydrates play highly diverse and crucial roles in a myriad of organisms and important systems in biology, physiology, medicine, bioengineering, and technology. Only in recent years have the tools been developed to partially understand the highly complex functions and the chemistry behind them. While many facts in the biological role of carbohydrate remain undiscovered, this book has been contributed to by a large number of the world's leading researchers in the field and thus constitutes the very latest information on glycoscience.

This book is excellent and one of the biggest of Springer's reference works in glycobiology. The second edition of this book was completely revised and updated. The book includes around 3000 pages, 12,000 chemical reactions, and more than 9000 references. The book consists of 12 major chapters that are subdivided into separate topics.

Chapter 1 gives general data related to structure, conformation, properties, occurrence, and preparation of carbohydrates.

Chapter 2 deals with general synthetic methods for various types of carbohydrates. There are descriptions of reactions of oxygen atoms – reactions of oxidation, reduction, and deoxygenation. Special parts of this chapter consider reactions replacing non-anomeric oxygen atoms by heteroatoms (e.g. halogen, nitrogen, sulfur, phosphorus, etc.) and also reactions of synthesis of anomeric and non-anomeric anhydrosugars and anhydronucleosides. C–C/C=C bond formation and degradation and rearrangement reactions also are included in this chapter.

Chapter 3 highlights chemical glycosylation reactions: glycosyltrichloro-acetimidates, O-, S-, and C-glycosylation, and other glycosylation reactions.

Chapter 4 consists of data related to monosaccharide characterization: occurrence, properties, and synthesis.

Chapter 5 is devoted to oligosaccharides and includes characterization, synthesis, oligosaccharides in food and agriculture, and enzymatic glycosylation by glycohydrolases and glycosynthases.

Chapter 6 highlights complex polysaccharides including starch, cellulose, gums, and bacterial cell wall components.

Chapters 7 and 8 characterize glycolipids and glycoproteins, respectively.

Chapter 9 deals with glycomimetics and describes azaglycomimetics, carbasugars, sulfur-containing glycomimetics, C-glycosyl analogs of oligosaccharides, and oligosaccharide mimetics.

Chapter 10 deals with key technologies and tools for functional glycobiology.

In chapter 11, there is discussion on biosynthesis and degradation of various types of carbohydrates including mono-, oligo-, and polysaccharides.

Chapter 12 deals with glycomedicine. This branch of glycobiology is now an important part of efforts of many biotechnology companies that are using natural and synthetic carbohydrates and their derivatives for developing very active drugs, including antitumor and antimicrobial glycoconjugates, vaccines, and other effective drugs.

In conclusion, the book provides up-to-date information on carbohydrates – their chemistry and chemical biology – in the form of a completely comprehensive survey. The texts are illustrated by more than 2500 figures, 159 tables, and numerous chemical structures and reaction schemes. The book is an essential resource for scientists from various fields and disciplines: chemists, biochemists, pharmacists, and medical researchers in pharmaceutical and chemical industry; researchers and engineers in food technology and agribusiness; researchers in organic, medicinal, and molecular medicine.

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