

Carbohydrates The Essential Molecules Of Life Second Edition

The finding by Emil Fischer that glucose and fructose on treatment with phenylhydrazine gave the identical osazone led him to the elucidation of stereochemistry of carbohydrates. Since then, progress in the field of carbohydrates has been amazing with the unraveling their basic structure, biosynthesis, immunology, functions, and clinical uses, for pure carbohydrates and for protein-linked carbohydrates (glycoproteins and proteoglycans). The chapters in Carbohydrate Chemistry, Biology and Medical Applications present a logical sequence leading from the chemistry and biochemistry of carbohydrates, followed by their role in various pathological conditions, to carbohydrates as potential therapeutic and diagnostic agents. This book offers a detailed panoramic review of the chemistry and biology of carbohydrates for chemists, biologists and health professionals. Each chapter is authored by contributors expert in the particular area of research. Explains how carbohydrates are important to life Details the chemistry, biology and medical aspects of carbohydrates Interdisciplinary and international team of authors

Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

Diet and Health examines the many complex issues concerning diet and its role in increasing or decreasing the risk of chronic disease. It proposes dietary recommendations for reducing the risk of the major diseases and causes of death today: atherosclerotic cardiovascular diseases (including heart attack and stroke), cancer, high blood pressure, obesity, osteoporosis, diabetes mellitus, liver disease, and dental caries.

Introduction what is organic chemistry all about?; Structural organic chemistry the shapes of molecules functional groups; Organic nomenclature; Alkanes; Stereoisomerism of organic molecules; Bonding in organic molecules atomic-orbital models; More on nomenclature compounds other than hydrocarbons; Nucleophilic substitution and elimination reactions; Separation and purification identification of organic compounds by spectroscopic techniques; Alkenes and alkynes. Ionic and radical addition reactions; Alkenes and alkynes; Oxidation and reduction reactions; Acidity of alkynes.

Results from the National Research Council's (NRC) landmark study Diet and health are readily accessible to nonscientists in this friendly, easy-to-read guide. Readers will find the heart of the book in the first chapter: the Food and Nutrition Board's nine-point dietary plan to reduce the risk of diet-related chronic illness. The nine points are presented as sensible guidelines that are easy to follow on a daily basis, without complicated measuring or calculating--and without sacrificing favorite foods. Eat for Life gives practical recommendations on foods to eat and in a "how-to" section provides tips on shopping (how to read food labels), cooking (how to turn a high-fat dish into a low-fat one), and eating out (how to read a menu with nutrition in mind). The volume explains what protein, fiber, cholesterol, and fats are and what foods contain them, and tells readers how to reduce their risk of chronic disease by modifying the types of food they eat. Each chronic disease is clearly defined, with information provided on its prevalence in the United States. Written for everyone concerned about how they can influence their health by what they eat, Eat for Life offers potentially lifesaving information in an understandable and persuasive way. Alternative Selection, Quality Paperback Book Club

Sugar chains (glycans) are often attached to proteins and lipids and have multiple roles in the organization and function of all organisms. "Essentials of Glycobiology" describes their biogenesis and function and offers a useful gateway to the understanding of glycans.

The American body is in trouble. Unprecedented numbers of us suffer from obesity, heart disease, diabetes, and other debilitating illnesses. The root cause is a once-revolutionary idea that seemed to offer so much promise, but instead has become the cause of a global health crisis: processed foods. Over the past seventy-five years, a number of factors aligned to create a reality in which processed carbohydrates became our main food source. In Fast Carbs, Slow Carbs, bestselling author and former FDA Commissioner David A. Kessler explains how the quest to feed a nation resulted in a population that is increasingly suffering from obesity and chronic disease and offers a solution for changing course. For decades, no one questioned the effects of these processed carbohydrates. The focus was on fertile grassland, ideal for growing vast amounts of wheat and corn; an industrial infrastructure perfect for refining those grains into starch; a food production behemoth that turns refined grains into affordable, appealing, and ever-present food items, from pizza to burritos to bagels; and an efficient distribution network that ensures consumption by Americans nationwide. But during those same decades, our bodies quietly contended with the metabolic chaos caused by consuming rapidly absorbable starch. Slowly but surely, these effects accumulated and became disastrous, leading to the public health crisis in which we find ourselves today. In Fast Carbs, Slow Carbs, Kessler explains how eating refined grains such as wheat, corn, and rice leads to a cascade of hormonal and metabolic issues that make it very easy to gain weight and nearly impossible to lose it. Worse still is how excess weight creates a very real link to diabetes, heart disease, cognitive decline, and a host of cancers. We can no longer afford to dismiss the consequences of eating food that is designed to be rapidly absorbed as sugar in our bodies. Informed by cutting-edge research as well as Dr. Kessler's own personal quest to manage his weight, Fast Carbs, Slow Carbs reveals in illuminating detail how we got to this critical turning point in our health as a nation—and outlines a plan for eliminating heart disease, allowing us to, finally, regain control of our

health.

Nutrient Metabolism defines the molecular fate of nutrients and other dietary compounds in humans, as well as outlining the molecular basis of processes supporting nutrition, such as chemical sensing and appetite control. It focuses on the presentation of nutritional biochemistry; and the reader is given a clear and specific perspective on the events that control utilization of dietary compounds. Slightly over 100 self-contained chapters cover all essential and important nutrients as well as many other dietary compounds with relevance for human health. An essential read for healthcare professionals and researchers in all areas of health and nutrition who want to access the wealth of nutrition knowledge available today in one single source. Key Features * Highly illustrated with relevant chemical structures and metabolic pathways * Foreword by Steven Zeisel, Editor-in-chief of the Journal of Nutritional Biochemistry * First comprehensive work on the subject

Carbohydrates are the most widely distributed naturally-occurring organic compounds on Earth. They make up much of our food, clothing and shelter, and are as vital to national economies as they are to our diet. This book is the first broad treatment of carbohydrate chemistry in many years, and presents the structures, reactions, modifications, and properties of carbohydrates. Woven throughout the text are discussions of biological properties of carbohydrates, their industrial applications, and the history of the field of carbohydrate chemistry. Written for students as well as practicing scientists, this text/reference will be of interest to a wide range of disciplines influenced by carbohydrates: biochemistry, chemistry, food and nutrition, microbiology, pharmacology, and medicine.

With contributions by numerous experts

This book is a comprehensive and concise review on principles, strategies, and crucial advances in glycochemistry. It focuses on synthesis and practical applications and emphasizes state-of-the-art approaches to the assembly and design of sugars. • Provides detailed discussion on specific topics like oligosaccharide assembly and design of sugars, techniques in glycoconjugate preparation, multivalency, and carbohydrate-based drug design • Uses notable examples, like solution-based one-pot methods and automated methods for sugar assembly, to illustrate important concepts and advances in a rapidly emerging field • Discusses practical applications of carbohydrates, like medicine, therapeutics, drug and vaccine development

Hydrogen bonds are weak attractions, with a binding strength less than one-tenth that of a normal covalent bond. However, hydrogen bonds are of extraordinary importance; without them all wooden structures would collapse, cement would crumble, oceans would vaporize, and all living things would disintegrate into random dispersions of inert matter. Hydrogen Bonding in Biological Structures is informative and eminently usable. It is, in a sense, a Rosetta stone that unlocks a wealth of information from the language of crystallography and makes it accessible to all scientists. (From a book review of Kenneth M. Harmon, Science 1992)

Biology has entered an era in which interdisciplinary cooperation is at an all-time high, practical applications follow basic discoveries more quickly than ever before, and new technologies--recombinant DNA, scanning tunneling microscopes, and more--are revolutionizing the way science is conducted. The potential for scientific breakthroughs with significant implications for society has never been greater. Opportunities in Biology reports on the state of the new biology, taking a detailed look at the disciplines of biology; examining the advances made in medicine, agriculture, and other fields; and pointing out promising research opportunities. Authored by an expert panel representing a variety of viewpoints, this volume also offers recommendations on how to meet the infrastructure needs--for funding, effective information systems, and other support--of future biology research. Exploring what has been accomplished and what is on the horizon, Opportunities in Biology is an indispensable resource for students, teachers, and researchers in all subdisciplines of biology as well as for research administrators and those in funding agencies.

Since its inception in 1945, this serial has provided critical and informative articles written by research specialists that integrate industrial, analytical, and technological aspects of biochemistry, organic chemistry, and instrumentation methodology in the study of carbohydrates. The articles provide a definitive interpretation of the current status and future trends in carbohydrate chemistry and biochemistry. Features contributions from leading authorities and industry experts Informs and updates on all the latest developments in the field

A masterful introduction to the cell biology that you need to know! This critically acclaimed textbook offers you a modern and unique approach to the study of cell biology. It emphasizes that cellular structure, function, and dysfunction ultimately result from specific macromolecular interactions. You'll progress from an explanation of the "hardware" of molecules and cells to an understanding of how these structures function in the organism in both healthy and diseased states. The exquisite art program helps you to better visualize molecular structures. Covers essential concepts in a more efficient, reader-friendly manner than most other texts on this subject. Makes cell biology easier to understand by demonstrating how cellular structure, function, and dysfunction result from specific macromolecular interactions. Progresses logically from an explanation of the "hardware" of molecules and cells to an understanding of how these structures function in the organism in both healthy and diseased states. Helps you to visualize molecular structures and functions with over 1500 remarkable full-color illustrations that present physical structures to scale. Explains how molecular and cellular structures evolved in different organisms. Shows how molecular changes lead to the development of diseases through numerous Clinical Examples throughout. Includes STUDENT CONSULT access at no additional charge, enabling you to consult the textbook online, anywhere you go · perform quick searches · add your own notes and bookmarks · follow Integration Links to related bonus content from other STUDENT CONSULT titles—to help you see the connections between diverse disciplines · test your knowledge with multiple-choice review questions · and more! New keystone chapter on the origin and evolution of life on earth probably the best explanation of evolution for cell biologists available! Spectacular new artwork by gifted artist Graham Johnson of the Scripps Research Institute in San Diego. 200 new and 500 revised figures bring his keen insight to Cell Biology illustration and further aid the reader's understanding. New chapters and sections on the most dynamic areas of cell biology - Organelles and membrane traffic by Jennifer Lippincott-Schwartz; RNA processing (including RNAi) by David Tollervey., updates on stem cells and DNA Repair. ,More readable than ever. Improved organization and an accessible new design increase the focus on understanding concepts and mechanisms. New guide to figures featuring specific organisms and specialized cells paired with a list of all of the figures showing these organisms. Permits easy review of cellular and molecular mechanisms. New glossary with one-stop definitions of over 1000 of the most important terms in cell biology.

Sugars, with a scientific term as saccharides, are involved in various aspects in the lives of human beings, including the sense of taste, energy for daily life, etc. Recent development in polysaccharides, as well as the background knowledge in this field, further deepens insight into their roles as healthy supplements. In this book, the principles on

polysaccharides' solubility and structure, methodologies and application of polysaccharides have been reviewed. The chapters in this book include the relationship between structure and solubility of polysaccharide, the experimental and computational researches on polysaccharide solubility and the common polysaccharide, which may further aid scholars and researchers in regard to solubility of polysaccharides, methodologies and modification.

Medical Biochemistry is supported by over forty years of teaching experience, providing coverage of basic biochemical concepts, including the structure and physical and chemical properties of hydrocarbons, lipids, proteins, and nucleotides in a straightforward and easy to comprehend language. The book develops these concepts into the more complex aspects of biochemistry using a systems approach, dedicating chapters to the integral study of biological phenomena, including particular aspects of metabolism in some organs and tissues, and the biochemical bases of endocrinology, immunity, vitamins, hemostasis, and apoptosis. Integrates basic biochemistry principles with molecular biology and molecular physiology Provides translational relevance to basic biochemical concepts through medical and physiological examples Utilizes a systems approach to understanding biological phenomena

Meat holds an important position in human nutrition. Although protein from this source has lower biological value than egg albumin, it is an exclusive source of heme iron and vitamins and minerals. Fat content and fatty acid profile from this source are a constant matter of concern. Though currently meat utilization is linked with an array of maladies, including atherosclerosis, leukemia, and diabetes, meat has a noteworthy role not only for safeguarding proper development and health, but also in human wellbeing. Enormous scientific investigations have proved that consuming meat has had a beneficial role in cranial/dental and gastrointestinal tract morphologic changes, human upright stance, reproductive attributes, extended lifespan, and maybe most prominently, in brain and cognitive development.

This book is an attempt to bring together current knowledge on the role and importance of organic acids in life processes. There are lots of compounds based on the chemical nature of this functional group, which makes this class of molecules to be present in our lives starting with the human body (Krebs cycle - the core of cellular metabolism) to the products we currently use (food, medicines and cosmetics). No overall consensus is sought in this book, and the following chapters are authored by dedicated researchers presenting a diversity of applications and hypotheses concerning organic acids. The five chapters in this book include general information on carboxylic acids and their applications in life sciences (use in organic synthesis, nanotechnology, plant physiology, plant nutrition and soil chemistry).

About the Book: Biomolecules are those molecules that are involved in the maintenance and metabolic processes of all living organisms. This fully revised second edition offers extensive coverage of important biomolecules from organic chemistry point of view. The author discusses carbohydrates, amino acids, peptides, proteins, enzymes, pyrimidines, purines, nucleic acids, lipids, terpenoids and alkaloids. The various topics are described in simple, lucid language and the mechanisms of the reactions are explained wherever required. Ideal for upper level undergraduates, graduates and researchers. Features: The author discusses the basic organic chemistry of the main families of biomolecules. Gives comprehensive information on biogenic substances. Includes a new chapter on alkaloids. It is a one-stop work with complete information about important biomolecules. This second edition will now appeal to upper level undergraduates as well as graduates.

Dietary Guidelines for Americans 2015-2020 provides the government's most up-to-date information on diet and health in order to help all children and their families consume a healthy, nutritionally adequate diet. Previous editions of the Dietary Guidelines focused primarily on individual dietary components of the food pyramid, such as dairy, meats, fruits, and vegetables. However, a growing body of new research has examined the relationship between overall eating patterns, health, and risk of chronic disease, and findings on these relationships are sufficiently well established to support dietary guidance. As a result, eating patterns and their food and nutrient characteristics are a focus of the recommendations in the 2015-2020 Dietary Guidelines. This edition provides guidelines for the seven million Americans who follow vegetarian diets—a number that has tripled in the last ten years. The information in the Dietary Guidelines is used in developing Federal food, nutrition, and health policies, educational materials, and programs. These guidelines are a necessary reference for policymakers and nutrition and health professionals, and a great resource for parents who strive to create a healthy lifestyle for their families. Additional audiences who may use Dietary Guidelines information to develop programs, policies, and communication for the general public include businesses, schools, community groups, media, the food industry, and State and local governments.

Microalgae could play an important role in the achievement of sustainability goals related to the generation of renewable energy and greenhouse gas (GHG) emissions. These photosynthetic microorganisms are able to capture CO₂ and, therefore, can be used to produce biofuels such as ethanol, methane and green diesel. Other factors, such as their high growth rate, ability to use wastewater as a culture medium and the ability to grow on non-arable land makes them a potentially economical source of biofuel production on a large scale. This monograph introduces the reader to the basic and applied science of microalgal biofuel production. Chapters in the volume give information about bioethanol and biogas production from microalgal sources, the fermentation process, optimization of culture parameters and industrial applications of biomass projects. The book is a useful reference for biotechnology and environmental science graduates and professionals interested in biofuel production.

The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research.

This book provides an understanding on a large variety of related topics in fish biology. The further development on molecular and cellular biology and ecology leads to assimilate the newer scientific knowledge in this area. Leading research works from around the world are brought together in this book to produce a valuable source of reference for teachers, researcher, and advanced students of biological science. The first three chapters of this book give a general description of the complex biology of the immune response. Detailed descriptions were also included on understanding of cytokine

regulation in teleost immune system. The second three chapters provide information on the environmental stressors on the responses of freshwater fish across molecular to population level. Then, the following two chapters review two special topics; the roles of the atrium and the ventricle across teleost species and the tracer methodologies on the measurements of carbohydrate metabolism. The last chapter discusses the variables that are involved in the feeding behavior of a predatory freshwater fish species.

This book is on carbohydrates-the essential molecules that give you energy. They are the building blocks of life. This book delivers up-to-date coverage on all aspects of carbohydrate chemistry. The molecules are sometimes sugars, i.e. "sweet," hence the subtitle "The Sweet Molecules of Life." Carbohydrates first gives the "nuts and bolts" of carbohydrate chemistry, enabling the reader to appreciate the subsequent chapters on protecting groups and the reactions of monosaccharides. (The protecting groups do just that-they are put on the molecules as a temporary measure during one or more reactions to stop the wrong bit of the molecule being changed during that reaction.) * Introduces the basic chemistry of carbohydrates * Describes the concepts, protecting groups, and reactions of carbohydrates * Includes all aspects of the synthesis of the glycosidic linkage * Gives an introduction to glycobiology and vaccines * Includes references to carbohydrate literature

Guide to Biochemistry provides a comprehensive account of the essential aspects of biochemistry. This book discusses a variety of topics, including biological molecules, enzymes, amino acids, nucleic acids, and eukaryotic cellular organizations. Organized into 19 chapters, this book begins with an overview of the construction of macromolecules from building-block molecules. This text then discusses the strengths of some weak acids and bases and explains the interaction of acids and bases involving the transfer of a proton from an acid to a base. Other chapters consider the effectiveness of enzymes, which can be appreciated through the comparison of spontaneous chemical reactions and enzyme-catalyzed reactions. This book discusses as well structure and function of lipids. The final chapter deals with the importance and applications of gene cloning in the fundamental biological research, which lies in the preparation of DNA fragments containing a specific gene. This book is a valuable resource for biochemists and students.

Carbohydrates are the most abundant natural products, in line with their role as energy stores and structural building blocks in plants and algae. They are versatile enough to serve as encoders of biological information and, last but not least, they are involved in a variety of molecular recognition processes. Research into carbohydrate and glycoconjugate functions in cell-to-cell communication processes has even created a new and rapidly developing field of study: glycobiology. This Lindhorst's successful book is now available in its second edition. Going from the basic concepts right up to the most recent results, this didactically written book features numerous practical examples of synthetic and analytical methods. The contents have been thoroughly updated, and a new chapter on mass spectroscopy of carbohydrates has been added. With its clear and lucid style, this introduction to carbohydrate chemistry and biochemistry is essential reading for students and postgraduate scientists in chemistry, biochemistry, pharmacy and biomedicine. "a very readable book which presents carbohydrate chemistry and, in later sections, biochemistry as exciting areas to work and study. The author captures a sense of wonder and inspiration from the very elegance of these areas of science and their application in the real worlds of pharmaceutical and medical research." (The Alchemist)

Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand. We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts.

Carbohydrates in Drug Discovery and Development: Synthesis and Applications examines recent and notable developments in the synthesis, biology, therapeutic, and biomedical applications of carbohydrates, which is considered to be a highly promising area of research in the field of medicinal chemistry. Their role in several important biological processes, notably energy storage, transport, modulation of protein function, intercellular adhesion, malignant transformation, signal transduction, viral, and bacterial cell surface recognition formulate the carbohydrate systems to be an exceedingly considerable scaffold for the development of new chemical entities of pharmacological importance. In addition to their easy accessibility, high functionality and chiral pool characteristics are the few additional fascinating structural features of carbohydrates, which further enhance their utilities and thus they have been able to attract chemists and biologists toward harnessing these properties for the past several decades. This book covers an advanced aspect of carbohydrate-based molecular scaffolding, starting with a general introduction followed by a detailed discussion about the impact of diverse carbohydrate-containing molecules of great therapeutic values and their impact on drug discovery and development. The topics covered in this book include the significance of heparin mimetics as the possible tools for the modulation of biology and therapy, chemistry and bioactivities of C-glycosylated compounds, inositols, iminosugars, KDO, sialic acids, glycohybrids, macrocycles, plant oligosaccharides, anti-bacterial and anti-cancer vaccines, antibiotics, and more. • Presents a practical and detailed overview of a wide range of carbohydrate systems including KDO, sialic acids, inositols, iminosugars, etc relevant for drug discovery and development. • Highlights the use of functionalized carbohydrates as synthons for the construction of various systems. • Covers recent developments in the synthesis of various glycohybrid molecules and vaccines. • Highlights the significance of heparin mimetics as tools for the modulation of biology. • Provides an impact of glycan microarrays and carbohydrate– protein interaction.

All essential areas of basic synthetic carbohydrate chemistry are covered and appropriately described. In addition, this book explains the basic reaction mechanisms while taking into account modern concepts such as stereoelectronic principles.

This book provides the "nuts and bolts" background for a successful study of carbohydrates - the essential molecules that not only give you energy, but are an integral part of many biological processes. A question often asked is 'Why do carbohydrate chemistry?' The answer is simple: It is fundamental to a study of biology. Carbohydrates are the building blocks of life and enable biological processes to take place. Therefore the book will provide a taste for the subject of glycobiology. Covering the basics of carbohydrates and then the chemistry and reactions of carbohydrates this book will enable a chemist to gain essential knowledge that will enable them to move smoothly into the worlds of biochemistry, molecular biology and cell biology. * includes perspective from new co-author Spencer Williams, who enhances coverage of the connection between carbohydrates and life * describes the basic chemistry and biology of carbohydrates * reviews the concepts, synthesis, reactions, and biology of carbohydrates In much of biology, the search for understanding the relation between structure and function is now taking place at the macromolecular level. Proteins, nucleic acids, and polysaccharides are macromolecule--polymers formed from families of simpler subunits. Because of their size and complexity, the polymers are capable of both inter- and intramolecular interactions. These interactions confer upon the polymers distinctive three-dimensional shapes. These tertiary configurations, in turn, determine the function of the macromolecule. Computers have become so inextricably involved in empirical

studies of three-dimensional macromolecular structure that mathematical modeling, or theory, and experimental approaches are interrelated aspects of a single enterprise.

This text provides comprehensive coverage of fibers used in food formulations, starting with the understanding of their basic chemical structure and how they are present and organized in the cell wall structure, their physicochemical and functional properties, their impact on the digestive process and their role and preventive action against various chronic diseases including colon cancer. The book focuses on traditional and new fiber rich sources, incorporating an integrated approach in terms of the technological and engineering processes used to obtain and incorporate them in traditional foods, plus their characterization, extraction and modification. The study of processing conditions including the chemical, physical and enzymatic processes of fiber extraction and modification are also covered, including traditional and emerging processing technologies, plus the application of fibers in the development of new products and processes. Science and Technology of Fibers in Food Systems integrates knowledge of fibers from their basic structural and property aspects and the applications of these ingredients to extraction process analysis, modification and feasibility for use at the industry level. The chapters incorporate the physiological aspects related to the consumption of fiber for prevention of serious diseases.

Volume 40 of Carbohydrate Chemistry: Chemical and Biological Approaches demonstrates the importance of the glycosciences for innovation and societal progress. Carbohydrates are molecules with essential roles in biology and also serve as renewable resources for the generation of new chemicals and materials. Honouring Professor Andr Lubineau's memory, this volume resembles a special collection of contributions in the fields of green and low-carbon chemistry, innovative synthetic methodology and design of carbohydrate architectures for medicinal and biological chemistry. Green methodology is illustrated by accounts on the industrial development of water-promoted reactions (C-glycosylation, cycloadditions) and the design of green processes and synthons towards sugar-based surfactants and materials. The especially challenging transformations at the anomeric center are presented in several contributions on glycosylation methodologies using iron or gold catalysis, electrochemical or enzymatic (thio)glycosylation, exo-glycal chemistry and bioengineering of carbohydrate synthases. Then, synthesis and structure of multivalent and supramolecular oligosaccharide architectures are discussed and related to their physical properties and application potential, e.g. for deepening our understanding of biological processes, such as enzymatic pathways or bacterial adhesion, and design of antibacterial, antifungal and innovative anticancer vaccines or drugs.

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