

Nucleic Acids In Chemistry And Biology Rsc

The Nucleic Acids, Chemistry and Biology, Vol II. Modified Nucleic Acids Basic Principles in Nucleic Acid Chemistry Molecular Diagnostics Prebiotic Chemistry and Chemical Evolution of Nucleic Acids The Biophysical Chemistry of Nucleic Acids & Proteins Principles of Nucleic Acid Structure Photochemistry and Photobiology of Nucleic Acids Quadruplex Nucleic Acids As Targets For Medicinal Chemistry Organophosphorus Chemistry Organic Chemistry of Nucleic Acids Principles of Nucleic Acid Structure Advances in Nucleic Acid Therapeutics Chemical Biology of Nucleic Acids Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives Chemistry and Biology of Artificial Nucleic Acids 21st Symposium on Nucleic Acids Chemistry The Chemical Biology of Nucleic Acids Nucleic Acid Structure Physical Chemistry of Nucleic Acids Nucleic Acids in Chemistry and Biology Electrochemistry of Nucleic Acids and Proteins Nucleic Acid-metal Ion Interactions Mass Spectrometry of Nucleosides and Nucleic Acids Chemistry of Protein Conjugation and Cross-Linking Chemistry of Nucleic Acids Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids Dynamics of Proteins and Nucleic Acids Medicinal Chemistry of Nucleic Acids Nucleic Acids Nucleic Acids in Chemistry and Biology Nucleic Acids, Proteins and Carbohydrates Nucleic Acids Methods for Studying Nucleic Acid/Drug Interactions Tenth Symposium on Nucleic Acids Chemistry Purines, Pyrimidines and Nucleotides and the Chemistry of Nucleic Acids Advanced Organic Chemistry of Nucleic Acids Functional Nucleic Acids for Analytical Applications Essentials of Nucleic Acid Analysis Medicinal Chemistry of Nucleic Acids

The Nucleic Acids, Chemistry and Biology, Vol II.

Purines, Pyrimidines and Nucleotides and the Chemistry of Nucleic Acids is a five-chapter text that presents a simple introduction to the basic chemistry of purines and pyrimidines and their derivatives. The opening chapters describe the general properties, reactions, and synthesis of purines and pyrimidines. The next chapter deals with the structure, synthesis, mechanism, and stereochemistry of nucleosides and their analogues. These topics are followed by a discussion on the reactions and biosynthesis of nucleotides. The final chapter focuses on the structure and biosynthesis of DNA, RNA, and other nucleic acids. This book is of value to organic chemists and biochemists, as well as researchers in the allied fields.

Modified Nucleic Acids

Since the discovery of the DNA double helix in 1953, nucleic acids have formed the central theme of much of contemporary molecular science. Nowhere is this more apparent than in the increasing efforts to determine the DNA sequence of the human genome and the development of new diagnostics of genetic disease. Recent sophistication of nucleic acids synthesis has been key to the establishment of the biotechnology industry and our improving knowledge of nucleic acid structures

and interactions is noticeably influencing the design of novel drugs. This second and completely revised edition draws on the expertise of the same international group of authors to set the basics of the nucleic acids in the context of the expanding horizons set by modern structural biology, RNA enzymology, drug discovery and biotechnology.

Basic Principles in Nucleic Acid Chemistry

DNA (sometimes referred to as the molecule of life), is the most interesting and most important of all molecules. *Electrochemistry of Nucleic Acids and Proteins: Towards Electrochemical Sensors for Genomics and Proteomics* is devoted to the electrochemistry of DNA and RNA and to the development of sensors for detecting DNA damage and DNA hybridization. Volume 1, in the brand new series *Perspectives in Bioanalysis*, looks at the electroanalytical chemistry of nucleic acids and proteins, development of electrochemical sensors and their application in biomedicine and in the new fields of genomics and proteomics. The authors have expertly formatted the information for a wide variety of readers, including new developments that will inspire students and young scientists to create new tools for science and medicine in the 21st century. * Covers highly sophisticated methods of electrochemical analysis of nucleic acids and proteins * Summarises the present state of electrochemical analysis of nucleic acids and proteins * Includes future trends in the electrochemical analysis in genomics and proteomics

Molecular Diagnostics

Since most therapeutic efforts have been predominantly focused on pharmaceuticals that target proteins, there is an unmet need to develop drugs that intercept cellular pathways that critically involve nucleic acids. Progress in the discovery of nucleic acid binding drugs naturally relies on the availability of analytical methods that assess the efficacy and nature of interactions between nucleic acids and their putative ligands. This progress can benefit tremendously from new methods that probe nucleic acid/ligand interactions both rapidly and quantitatively. A variety of novel methods for these studies have emerged in recent years, and *Methods for Studying DNA/Drug Interactions* highlights new and non-conventional methods for exploring nucleic acid/ligand interactions. Designed to present drug-developing companies with a survey of possible future techniques, the book compares their drawbacks and advantages with respect to commonly used tools. Perhaps more importantly, this book was written to inspire young scientists to continue to advance these methods into fruition, especially in light of current capabilities for assay miniaturization and enhanced sensitivity using microfluidics and nanomaterials.

Prebiotic Chemistry and Chemical Evolution of Nucleic Acids

The structure, function and reactions of nucleic acids are central to molecular biology and are crucial for the understanding of complex biological processes involved. Revised and updated Nucleic Acids in Chemistry and Biology 3rd Edition discusses in detail, both the chemistry and biology of nucleic acids and brings RNA into parity with DNA. Written by leading experts, with extensive teaching experience, this new edition provides some updated and expanded coverage of nucleic acid chemistry, reactions and interactions with proteins and drugs. A brief history of the discovery of nucleic acids is followed by a molecularly based introduction to the structure and biological roles of DNA and RNA. Key chapters are devoted to the chemical synthesis of nucleosides and nucleotides, oligonucleotides and their analogues and to analytical techniques applied to nucleic acids. The text is supported by an extensive list of references, making it a definitive reference source. This authoritative book presents topics in an integrated manner and readable style. It is ideal for graduate and undergraduates students of chemistry and biochemistry, as well as new researchers to the field.

The Biophysical Chemistry of Nucleic Acids & Proteins

Complete, up-to-date coverage of the broad area of nucleic acid chemistry and biology Assembling contributions from a collection of authors with expertise in all areas of nucleic acids, medicinal chemistry, and therapeutic applications, Medicinal Chemistry of Nucleic Acids presents a thorough overview of nucleic acid chemistry—a rapidly evolving and highly challenging discipline directly responsible for the development of antiviral and antitumor drugs. This reliable resource delves into a multitude of subject areas involving the study of nucleic acids—such as the new advances in genome sequencing, and the processes for creating RNA interference (RNAi) based drugs—to assist pharmaceutical researchers in removing roadblocks that hinder their ability to predict drug efficacy. Offering the latest cutting-edge science in this growing field, Medicinal Chemistry of Nucleic Acids includes: In-depth coverage of the development and application of modified nucleosides and nucleotides in medicinal chemistry A close look at a large range of current topics on nucleic acid chemistry and biology Essential information on the use of nucleic acid drugs to treat diseases like cancer A thorough exploration of siRNA for RNAi and the regulation of microRNA, non-coding RNA (ncRNA), a newly developing and exciting research area Thorough in its approach and promising in its message, Medicinal Chemistry of Nucleic Acids probes the new domains of pharmaceutical research—and exposes readers to a wealth of new drug discovery opportunities emerging in the dynamic field of nucleic acid chemistry.

Principles of Nucleic Acid Structure

The realisation that human, animal, viral and bacterial genomes all contain over-representation of higher-order quadruplex structures in regulatory and other pharmacologically-useful regions, has led to a large number of studies aimed at exploiting this findings for therapeutic and diagnostic purposes. Quadruplex-binding small molecules are starting to be

evaluated in human clinical trials. Provides the authority and expertise of leading contributors from an international board of authors Presents the latest release in the Annual Reports in Medicinal Chemistry series

Photochemistry and Photobiology of Nucleic Acids

An indispensable handbook of the highest standard for those working in the fields of food analysis and forensic applications.

Quadruplex Nucleic Acids As Targets For Medicinal Chemistry

New textbooks at all levels of chemistry appear with great regularity. Some fields like basic biochemistry, organic reaction mechanisms, and chemical thermodynamics are well represented by many excellent texts, and new or revised editions are published sufficiently often to keep up with progress in research. However, some areas of chemistry, especially many of those taught at the graduate level, suffer from a real lack of up-to-date textbooks. The most serious needs occur in fields that are rapidly changing. Textbooks in these subjects usually have to be written by scientists actually involved in the research which is advancing the field. It is not often easy to persuade such individuals to set time aside to help spread the knowledge they have accumulated. Our goal, in this series, is to pinpoint areas of chemistry where recent progress has outpaced what is covered in any available textbooks, and then seek out and persuade experts in these fields to produce relatively concise but instructive introductions to their fields. These should serve the needs of one semester or one quarter graduate courses in chemistry and biochemistry. In some cases the availability of texts in active research areas should help stimulate the creation of new courses. CHARLES R. CANTOR New York Preface This monograph is based on a review on polynucleotide structures written for a book series in 1976.

Organophosphorus Chemistry

The study of nucleic acids is one of the most rapidly developing fields in modern science. The exceptionally important role of the nucleic acids as a key to the understanding of the nature of life is reflected in the enormous number of published works on the subject, including many outstanding monographs and surveys. The pathways of synthesis and metabolism of nucleic acids and the many and varied biological functions of these biopolymers are examined with the utmost detail in the literature. Nearly as much attention has been paid to the macromolecular chemistry of the nucleic acids: elucidation of the size and shape of their molecules, the study of the physicochemical properties of their solutions, and the appropriate methods to be used in such research. The surveys of the chemistry of nucleic acids which have been published so far deal almost entirely with their synthesis and, in particular, with the synthetic chemistry of monomers (nucleosides and nucleotides) ; less attention has been paid to the synthesis of polynucleotides. There is yet another highly important aspect

of the chemistry of nucleic acids which is still in the formative stage, the study of the reactivity of nucleic acid macromolecules and their components. This can make an important contribution to the determination of the structure of these remarkable biopolymers and to the correct understanding of their biological functions.

Organic Chemistry of Nucleic Acids

Sequencing, cloning, transcription - these are but a few key techniques behind the current breathtaking advances in molecular biology and biochemistry. As these methods continuously diversify, biochemists need a sound chemical understanding to keep the pace. Chemists beginning working in the molecular biology lab need an introduction to this field from their point of view. This book serves both: it describes most of the known chemical reactions of nucleosides, nucleotides, and nucleic acids in sufficient detail to provide the desired background, and additionally, the fundamental relations between sequence, structure and functionality of nucleic acids are presented. The first edition of this book, which was published in Russian, has immediately become a recognized standard reference. This second, thoroughly revised and updated edition, now published in English, is likely to achieve a similar position in the international scientific community.

Principles of Nucleic Acid Structure

Advances in Nucleic Acid Therapeutics

This annual review of the literature presents a comprehensive and critical survey of the vast field of study involving organophosphorus compounds, from phosphines and related P-C bonded compounds to phosphorus acids, phosphine chalcogenides and nucleotides. The Editors have added to the content with a timely chapter on the recent developments in green synthetic approaches in organophosphorus chemistry to reflect current interests in the area. With an emphasis on interdisciplinary content, this book is aimed at the worldwide organic chemistry and engineering research communities.

Chemical Biology of Nucleic Acids

Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives

NucleicAcids presents an up-to-date and comprehensive account of the structures and physical chemistry properties of nucleic acids, with special emphasis on biological function. With a targeted audience of 1) molecular biologists, 2) physical

biochemists, and 3) physical chemists, the book has been carefully organized to reach three different audiences while requiring only introductory physical chemistry and molecular biology as prerequisites. Nucleic Acids will serve as a textbook in physical biochemistry and biophysical chemistry classes, as well as a supplemental text in courses on nucleic acid biochemistry or molecular biology, and as a personal reference for students and researchers in these fields. Key Features Organized according to a systematic consideration of techniques used in the study of nucleic acid structure and properties. Key topics--such as protein-DNA and protein-drug complexes, conformational transitions, characterization of nucleic acids by gel and solution techniques, and behavior of supercoiled DNA--are covered in great detail as veritable mini-monographs. Heavily illustrated with diagrams, graphs, and molecular structures, including nearly 2 dozen color figures. Includes numerous figures, tables and an extensive bibliography to facilitate use as a reference volume.

Chemistry and Biology of Artificial Nucleic Acids

Provides a perspective on nucleic acid-metal ion interactions with an emphasis on experimental biophysical studies which will prove indispensable to biophysicists and molecular biologists.

21st Symposium on Nucleic Acids Chemistry

The sequencing of the human genome and subsequent elucidation of the molecular pathways that are important in the pathology of disease have provided unprecedented opportunities for the development of new therapeutics. Nucleic acid-based drugs have emerged in recent years to yield extremely promising candidates for drug therapy to a wide range of diseases. *Advances in Nucleic Acid Therapeutics* is a comprehensive review of the latest advances in the field, covering the background of the development of nucleic acids for therapeutic purposes to the array of drug development approaches currently being pursued using antisense, RNAi, aptamer, immune modulatory and other synthetic oligonucleotides. Nucleic acid therapeutics is a field that has been continually innovating to meet the challenges of drug discovery and development; bringing contributions together from leaders at the forefront of progress, this book depicts the many approaches currently being pursued in both academia and industry. A go-to volume for medicinal chemists, *Advances in Nucleic Acid Therapeutics* provides a broad overview of techniques of contemporary interest in drug discovery.

The Chemical Biology of Nucleic Acids

With extensive coverage of synthesis techniques and applications, this text describes chemical biology techniques which have gained significant impetus during the last five years. It focuses on the methods for obtaining modified and native nucleic acids, and their biological applications. Topics covered include: chemical synthesis of modified RNA expansion of the

genetic alphabet in nucleic acids by creating new base pairs chemical biology of DNA replication: probing DNA polymerase selectivity mechanisms with modified nucleotides nucleic-acid-templated chemistry chemical biology of peptide nucleic acids (PNA) the interactions of small molecules with DNA and RNA the architectural modules of folded RNAs genesis and biological applications of locked nucleic acid (LNA) small non-coding RNA in bacteria microRNA-guided gene silencing nucleic acids based therapies innate immune recognition of nucleic acid light-responsive nucleic acids for the spatiotemporal control of biological processes DNA methylation frameworks for programming RNA devices RNA as a catalyst: The Diels-Alderase-Ribozyme evolving an understanding of RNA function by in vitro approaches the chemical biology of aptamers: synthesis and applications nucleic acids as detection tools bacterial riboswitch discovery and analysis The Chemical Biology of Nucleic Acids is an essential compendium of the synthesis of nucleic acids and their biological applications for bioorganic chemists, chemical biologists, medicinal chemists, cell biologists, and molecular biologists.

Nucleic Acid Structure

Nature has long used nucleic acid aptamers and enzymes for regulatory activities, such as the recently discovered “riboswitches” involved in gene expression. The existence of a large array of natural and artificial functional nucleic acids has generated tremendous enthusiasm and new opportunities for molecular scientists from diverse disciplines to devise new concepts and real applications that take advantage of those nucleic acids for sensing and other analytical applications. This book provides a timely and comprehensive overview of recent advances in the field, from leading experts in biology, chemistry, and engineering. A variety of topics are covered, from fundamentals of functional nucleic acids, to their applications as sensors, to nanotechnologies; as well as integration of functional nucleic acids into practical analytical systems.

Physical Chemistry of Nucleic Acids

This is the first book to provide a comprehensive overview of the field of artificial nucleic acids. Covering a tremendous amount of literature on the chemistry, biology, and structure of artificial nucleic acids, it will constitute an invaluable source of information for the specialist and for young researchers interested in starting a career in this fascinating field of research alike. This book combines the contributions of many of the major players in this research field, and covers the synthesis of sugar-, base- and backbone-modified nucleic acids, their structural characteristics studied by X-ray crystallography, and NMR in solution as well as their chemical and biological properties.

Nucleic Acids in Chemistry and Biology

Photochemistry and Photobiology of Nucleic Acids, Volume I: Chemistry covers the historical developments in the study of photobiology and photochemistry of nucleic acid components. This volume is divided into 12 chapters that deal with the isolation and characterization of ultraviolet photoproducts of pyrimidines. After briefly covering the concepts of photochemistry of nucleic acids, this volume goes on describing the UV-induced physical and chemical alterations in nucleic acid components, such as pyrimidines, purines, their nucleosides and nucleotides, and related compounds. Significant chapters are devoted to mass and nuclear magnetic resonance spectrometry and crystal and molecular structure determinations by X-ray diffraction. Together with the pertinent examples, a short discussion on the theory and techniques is also presented in each chapter. This volume also includes a chapter on radiation chemistry to examine the close relationship between the chemical effects of UV-light and X- or gamma-radiation. This volume is of value to researchers who are active in the study of photochemistry and photobiology in nucleic acids as well as to advanced undergraduate and graduate students interested in this field.

Electrochemistry of Nucleic Acids and Proteins

The origin of life is one of the biggest unsolved scientific questions. This book deals with the formation and first steps of the chemical evolution of nucleic acids, including the chemical roots behind the origin of their components from the simplest sources in a geochemical context. Chemical evolution encompasses the chemical processes and interactions conducive to self-assembly and supramolecular organization, leading to an increase of complexity and the emergence of life. The book starts with a personal account of the pioneering work of Stanley Miller and Jeffrey Bada on the Chemistry of Origins of Life and how the development of organic chemistry beginning in the 19th century led to the emergence of the field of prebiotic chemistry, situated at the frontier between organic, geo- and biochemistry. It then continues reviewing in tutorial manner current central topics regarding the organization of nucleic acids: the origin of nucleobases and nucleosides, their phosphorylation and polymerization and ultimately, their self-assembly and supramolecular organization at the inception of life.

Nucleic Acid-metal Ion Interactions

Complete, up-to-date coverage of the broad area of nucleic acid chemistry and biology Assembling contributions from a collection of authors with expertise in all areas of nucleic acids, medicinal chemistry, and therapeutic applications, Medicinal Chemistry of Nucleic Acids presents a thorough overview of nucleic acid chemistry—a rapidly evolving and highly challenging discipline directly responsible for the development of antiviral and antitumor drugs. This reliable resource delves into a multitude of subject areas involving the study of nucleic acids—such as the new advances in genome sequencing, and the processes for creating RNA interference (RNAi) based drugs—to assist pharmaceutical researchers in

removing roadblocks that hinder their ability to predict drug efficacy. Offering the latest cutting-edge science in this growing field, *Medicinal Chemistry of Nucleic Acids* includes: In-depth coverage of the development and application of modified nucleosides and nucleotides in medicinal chemistry A close look at a large range of current topics on nucleic acid chemistry and biology Essential information on the use of nucleic acid drugs to treat diseases like cancer A thorough exploration of siRNA for RNAi and the regulation of microRNA, non-coding RNA (ncRNA), a newly developing and exciting research area Thorough in its approach and promising in its message, *Medicinal Chemistry of Nucleic Acids* probes the new domains of pharmaceutical research—and exposes readers to a wealth of new drug discovery opportunities emerging in the dynamic field of nucleic acid chemistry.

Mass Spectrometry of Nucleosides and Nucleic Acids

Assembling the work of an international panel of researchers, *Mass Spectrometry of Nucleosides and Nucleic Acids* summarizes and reviews the latest developments in the field and provides a window on the next generation of analysis. Beginning with an overview of recent developments, the book highlights the most popular ionization methods and illustrates the diversity of strategies employed in the characterization and sequencing of DNA and RNA oligomers, nucleosides, nucleotides, and adducts. It describes studies performed on deoxyinosine and its analogues and provides an introduction to tandem mass spectrometry (MS/MS). Next, the contributors examine mass spectrometric application in the study of cyclic nucleotides in biochemical signal transduction. They analyze urinary modified nucleosides and explore DNA adducts. They discuss isotope labeling of DNA-mass spectrometry (ILD-MS) and examine various uses of electrospray ionization mass spectrometry (ESI-MS). The book reviews recent progress in the direct MS characterization of noncovalent nucleic acid-protein complexes, explores the interaction and ionization of guanidine-derived compounds with highly acidic biomolecules, and examines quantitative identification of nucleic acids via signature digestion products detected using mass spectrometry. The book describes a direct-infusion ESI-MS approach that can serve as a screening technique for the presence of modified nucleosides from small RNAs. Lastly, it discusses the LC-MS/MS method for the in vitro replication studies on damage-containing DNA substrates, and concludes with an examination of the influence of metal ions on the structure and reactivity of nucleic acids. The exciting developments in mass spectrometry technology have fueled incredible advances in our understanding of nucleic acids and their complexes. The contributions presented in this volume capture the range of these advances, helping to inspire new findings and avenues of research.

Chemistry of Protein Conjugation and Cross-Linking

This edited book, "Nucleic Acids - From Basic Aspects to Laboratory Tools", contains a series of chapters that highlight the development and status of the various aspects of the nucleic acids related to DNA chemistry and biology and the molecular

application of these small DNA molecules and related synthetic analogues within biological systems. Furthermore, it is hoped that the information in the present book will be of value to those directly engaged in the handling and use of nucleic acids, and that this book will continue to meet the expectations and needs of all who are interested in the different fascinating aspects of molecular biology.

Chemistry of Nucleic Acids

Teaching a course on nucleic acid structure is a hazardous undertaking, especially if one has no continuous teaching obligations. I still have done it on several occasions in various French universities, when colleagues, suffering from administrative overwork and excessive teaching obligations, had asked me to do so. This was generally done with a pile of notes and a dozen slides, and I always regretted that no small, concise, specialized book on nucleic acid structure for students at the senior or beginning graduate level existed. Every year, the lecture notes became more and more voluminous, with some key reprints intermingled. Everything changed when, in the spring of 1973, I received an invitation to teach such a course, under the UNESCO-OAS-Molecular Biology Program at the Universidad de Chile in Santiago during October 1973. I had accepted rather enthusiastically, but soon discovered that it would be necessary to produce a photocopied syllabus for the students. This was the first premanuscript of this book. For nonscientific reasons, the course was first canceled and then postponed until December 1973. Nearly a year later, the course, in slightly amended form, was presented at the Lomonosov-State University in Moscow.

Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids

Chemical cross-linking reagents have attained great practical use in industry as well as in basic research, and an understanding of their fundamental principles of reaction is paramount to their applications. With broad coverage of the development and application of these reagents, *Chemistry of Protein Conjugation and Cross-Linking* discusses the mechanism of reaction and allows you to put the theory into practice. The book offers an explanation of the underlying mechanism of chemical modification, surveys all the bifunctional reagents used in bioconjugation and cross-linking, and provides a review of practical applications of these reagents in various areas of biochemistry, molecular biology, biotechnology, nucleic acid chemistry, immunochemistry, and diagnostic and biomedical disciplines. It contains numerous examples and illustrations, plus step-by-step explanations to reaction procedures. It is an excellent introduction and a comprehensive reference about chemical modification.

Dynamics of Proteins and Nucleic Acids

Medicinal Chemistry of Nucleic Acids

A review of innovative tools for creative nucleic acid chemists that open the door to novel probes and therapeutic agents. Nucleic acids continue to gain importance as novel diagnostic and therapeutic agents. With contributions from noted scientists and scholars, *Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives* is a practical reference that includes a wide range of approaches for the synthesis of designer nucleic acids and their derivatives. The book covers enzymatic (including chemo-enzymatic) methods, with a focus on the synthesis and incorporation of modified nucleosides. The authors also offer a review of innovative approaches for the non-enzymatic chemical synthesis of nucleic acids and their analogs and derivatives, highlighting especially challenging species. The book offers a concise review of the methods that prepare novel and heavily modified polynucleotides in sufficient amount and purity for most clinical and research applications. This important book:

- Presents a timely and topical guide to the synthesis of designer nucleic acids and their derivatives
- Addresses the growing market for nucleotide-derived pharmaceuticals used as anti-infectives and chemotherapeutic agents, as well as fungicides and other agrochemicals.
- Covers novel methods and the most recent trends in the field
- Contains contributions from an international panel of noted scientists

Written for biochemists, medicinal chemists, natural products chemists, organic chemists, and biotechnologists, *Enzymatic and Chemical Synthesis of Nucleic Acid Derivatives* is a practice-oriented guide that reviews innovative methods for the enzymatic as well as non-enzymatic synthesis of nucleic acid species.

Nucleic Acids

This book spans diverse aspects of modified nucleic acids, from chemical synthesis and spectroscopy to in vivo applications, and highlights studies on chemical modifications of the backbone and nucleobases. Topics discussed include fluorescent pyrimidine and purine analogs, enzymatic approaches to the preparation of modified nucleic acids, emission and electron paramagnetic resonance (EPR) spectroscopy for studying nucleic acid structure and dynamics, non-covalent binding of low- and high-MW ligands to nucleic acids and the design of unnatural base pairs. This unique book addresses new developments and is designed for graduate level and professional research purposes.

Nucleic Acids in Chemistry and Biology

Nucleic Acids, Proteins and Carbohydrates

This volume contains 29 engrossing chapters contributed by worldwide, leading research groups in the field of chemical

biology. Topics include pre-biology; the establishment of the genetic code; isomerization of RNA; damage of nucleobases in RNA; the dynamic structure of nucleic acids and their analogs in DNA replication, extra- and intra-cellular transport; molecular crowding by the use of ionic liquids; new technologies enabling the modification of gene expression via editing of therapeutic genes; the use of riboswitches; the modification of mRNA cap regions; new approaches to detect appropriately modified RNAs with EPR spectroscopy and the use of parallel and high-throughput techniques for the analysis of the structure and new functions of nucleic acids. This volume discusses how chemistry can add new frontiers to the field of nucleic acids in molecular medicine, biotechnology and nanotechnology and is not only an invaluable source of information to chemists, biochemists and life scientists but will also stimulate future research.

Nucleic Acids

Methods for Studying Nucleic Acid/Drug Interactions

DNA, RNA and proteins are undoubtedly the most important biological molecules. Being large macromolecules, their physical, chemical and biological properties can differ from those of the monomers from which they are made. This book describes their structures, origins and other key issues.

Tenth Symposium on Nucleic Acids Chemistry

Notable practitioners describe how laboratory medicine is practiced today and illuminate how it will function tomorrow as the revolutionary advances afforded by molecular diagnostics become increasingly central to effective analysis. Proceeding from a discussion of elementary nucleic acid technology to a review of the more advanced techniques, the distinguished contributors lay the groundwork for a comprehensive understanding of their applications throughout clinical medicine. The result is a detailed description of those molecular technologies currently used in diagnostic laboratories, as well as those that seem particularly promising. Detailed discussions of specific clinical applications include those for cancer, hematological malignancies, cardiovascular disease, and neuromuscular, endocrine, and infectious diseases.

Purines, Pyrimidines and Nucleotides and the Chemistry of Nucleic Acids

Life in all its forms is based on nucleic acids which store and transfer genetic information. The book addresses the main aspects of synthesis, hydrolytic stability, solution equilibria of nucleosides and nucleotides as well as base modifications of nucleic acids. The author further describes their structural analogues used as therapeutic drugs, such as antivirals and

anticancer agents, and prodrug strategies of nucleotides.

Advanced Organic Chemistry of Nucleic Acids

This book is a self-contained introduction to the theory of atomic motion in proteins and nucleic acids. An understanding of such motion is essential because it plays a crucially important role in biological activity. The authors, both of whom are well known for their work in this field, describe in detail the major theoretical methods that are likely to be useful in the computer-aided design of drugs, enzymes and other molecules. A variety of theoretical and experimental studies is described and these are critically analyzed to provide a comprehensive picture of dynamic aspects of biomolecular structure and function. The book will be of interest to graduate students and research workers in structural biochemistry (X-ray diffraction and NMR), theoretical chemistry (liquids and polymers), biophysics, enzymology, molecular biology, pharmaceutical chemistry, genetic engineering and biotechnology.

Functional Nucleic Acids for Analytical Applications

This unique and practical resource provides the most complete and concise summary of underlying principles and approaches to studying nucleic acid structure, including discussion of x-ray crystallography, NMR, molecular modelling, and databases. Its focus is on a survey of structures especially important for biomedical research and pharmacological applications. To aid novices, Principles of Nucleic Acid Structure includes an introduction to technical lingo used to describe nucleic acid structure and conformations (roll, slide, twist, buckle, etc.). This completely updated edition features expanded coverage of the latest advances relevant to recognition of DNA and RNA by small molecules and proteins. In particular, the reader will find extensive new discussions on: RNA folding, ribosome structure and antibiotic interactions, DNA quadruplexes, DNA and RNA protein complexes, and short interfering RNA (siRNA). This handy guide ends with a complete list of resources, including relevant online databases and software. Completely updated with expanded discussion of topics such as RNA folding, ribosome structure and antibiotic interactions, DNA quadruplexes, DNA and RNA protein complexes, and short interfering RNA (siRNA) Includes a complete list of resources, including relevant online databases and software Defines technical lingo for novices

Essentials of Nucleic Acid Analysis

Methodicum Chemicum, Volume 11: Natural Compounds, Part 1: Nucleic acids, Proteins and Carbohydrates is devoted to the methods of structural determinations and syntheses of natural products. This text contains four chapters that include a short discussion of the principles of well-proved analytic procedures. It primarily describes the chemistry and biochemistry

of nucleic acids, proteins, carbohydrates, and lipids. Other general topics covered include the components, chemical synthesis, sequences, primary structure, and classification of these macromolecules. This book is of value to chemists and scientists who work in associated areas, including medicine.

Medicinal Chemistry of Nucleic Acids

Newcomers to the field of biopharmaceuticals require an understanding of the basic principles and underlying methodology involved in developing protein- and nucleic acid-based therapies for genetic and acquired diseases. *Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids* introduces the principles of polymer science and chemistry, as well as the basic biology required for understanding how biomaterials can be used as drug-delivery vehicles. No book to date combines a discussion of high-tech biomaterials-based delivery of protein and nucleic acid drugs with the pharmaceutical or biocompatibility aspects. Featuring contributions from leading experts from around the world, this text discusses physiochemical parameters used for design, development, and evaluation of biotechnological dosage forms for delivery of proteins, peptides, oligonucleotides, and genes. The authors also present biological barriers to extravasation and cellular uptake of proteins and nucleic acids. Combining an introduction to biomaterial delivery with the latest developments in the field, this is a valuable reference for both the novice student and the practicing scientist on delivery of biomaterials, on biomedical polymers, and on polymer therapeutics. Understanding these core fundamentals is critical to moving on to more advanced study.

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