

R K Bansal Heterocyclic Chemistry

Green Synthetic Approaches for Biologically Relevant Heterocycles, Second Edition, Volume One: Advanced Synthetic Techniques reviews this significant group of organic compounds within the context of sustainable methods and processes, expanding on the first edition with fully updated coverage and a whole range of new chapters. Volume One explores advanced synthetic techniques, with each chapter presenting in-depth coverage of various green protocols for the synthesis of a wide variety of bioactive heterocycles that are classified on the basis of ring-size and/or the presence of heteroatoms. Techniques covered range from high pressure cycloaddition reactions and microwave irradiation to sustainable one-pot domino reactions. This updated edition is an essential resource on sustainable approaches for academic researchers, R&D professionals, and students working across medicinal, organic, natural product and green chemistry. Provides fully updated coverage of the field of greener heterocycle synthesis Includes new chapters on varied multicomponent reactions, alongside both traditional and novel approaches Presents information in an accessible style with an emphasis on sustainability

T. L.S. Kishbaugh: Metalation of Pyrrole.- K.-S. Yeung: Furans and Benzofurans.- P. E. Alford: Lithiation-Based and Magnesation-Based Strategies for the Functionalization of Imidazole: 2001–2010.- L. Fu: Metalation of Oxazoles and Benzoxazoles.- S. Roy • S. Roy • G. W. Gribble: Metalation of Pyrazoles and Indazoles.- J. C. Badenock: Metalation Reactions of Isoxazoles and Benzisoxazoles.- Y.-J. Wu: Thiazoles and Benzothiazoles.- C. F. Nutaitis: Isothiazoles and Benzisothiazoles.- E. R. Biehl: Recent Advances in the Synthesis of Thiophenes and Benzothiophenes.- J. M. Lopchuk: Mesoionics.- J. M. Lopchuk: Azoles with 3-4 Heteroatoms.

The next article includes the description of the rich chemistry of phosphinines, including azaphosphinines. The sixth article deals with synthetic approaches to different types of 1-heterophosphacyclanes, including four-, five-, and six-membered P-heterocycles. The next two articles cover the chemistry of phosphorus containing mac- cycles. The phosphorus containing calixarenes have attracted much attention in recent years due to their various functions such as metal cations binding, catalysis, molecular recognition, and bioactivity. Likewise, other phosphorus-containing macrocycles, cryptands, and dendrimers find various uses in analytical chemistry and biochemistry. We hope to include the following articles in the second volume on phosphorous heterocycles: Diazaphospholes Selected phosphorous heterocycles containing a stereogenic phosphorus Heterophenes carrying phosphorus functional groups as key structures The synthesis and chemistry of the phospholane ring system Synthesis and bioactivity of 2,5-dihydro-1,2-oxaphosphole-2-oxide derivatives Recent developments in the chemistry of N-heterocyclic phosphines. I would be failing in my duty if I do not express my sincere thanks to the people at Springer, particularly Ms. Birgit Kollmar-Thoni and Ms. Ingrid Samide, for coordinating the project with great dedication.

Advances in Heterocyclic Chemistry is the definitive series in the field - one of great importance to organic chemists, polymer chemists, and many biological scientists. Because biology and organic chemistry increasingly intersect, the associated nomenclature also is being used more frequently in explanations. Written by established authorities in the field from around the world, this comprehensive review combines descriptive synthetic chemistry and mechanistic insight to yield an understanding of how chemistry drives the preparation and useful properties of heterocyclic compounds.

This expanded second edition provides a concise overview of the main principles and reactions of heterocyclic chemistry for undergraduate students studying chemistry and related courses. Using a successful and student-friendly "at a glance" approach, this book helps the student grasp the essence of heterocyclic chemistry, ensuring that they can confidently use

that knowledge when required. The chapters are thoroughly revised and updated with references to books and reviews; extra examples and student exercises with answers online; and color diagrams that emphasize exactly what is happening in the reaction chemistry depicted.

Established in 1960, *Advances in Heterocyclic Chemistry* is the definitive serial in the area—one of great importance to organic chemists, polymer chemists, and many biological scientists. Written by established authorities in the field, the comprehensive reviews combine descriptive chemistry and mechanistic insight and yield an understanding of how the chemistry drives the properties.

Explanation of the structure-property relationship of a given molecule is generally simple because the characteristics of the atomic groups and chemical bonds and the effects emerging from their interaction have long been known, both from theoretical studies and numerous experimental results. In contrast, it is often difficult to analyze, estimate, and account for the structure-properties relationship in supramolecules. The characteristics of supramolecules are governed both by the nature of the constituent molecules and by their configuration while the characteristics of the constituent molecules are usually evident as mentioned above; their configurations are difficult to control, predict, and accurately estimate because of insufficient knowledge regarding the intermolecular forces. Moreover, since most of the intermolecular forces constructing supramolecules are weak, the supramolecular structure may vary depending on various factors, such as modification of the molecular structure, auxiliaries, and experimental conditions. Thus, in order to obtain supramolecules with the desired structures and properties, theoretical investigations on the intermolecular forces and accumulation of experimental studies on the relationship between the supramolecular structure and properties are both important.

This book covers nearly all topics in Organic Chemistry taught up to the B.Sc. level. Topics like resonance, H-bond, hybridization, IUPAC nomenclature, acid-base theory of organic compounds, stereochemistry, structure reactivity relationship and spectroscopy have been introduced early in the book. Subsequent chapters deal with synthetic polymers, aliphatic and aromatic hydrocarbons, alcohols and phenols, ethers, aldehydes, carboxylic acids and their derivatives, amines, carbohydrates, organometallics and terpenes. These topics have been discussed in-depth and in a comprehensive manner. A great deal of attention has been focussed on chemical reactions and their mechanisms. The scope and limitations of the reactions have been stated. Certain topics of general interest namely C.N.G., L.P.G., simple drugs, DNA finger printing, PUFA, trans fatty acids, soaps and detergents, pesticides, industrial alcohols, coal tar, octane number, chromatography, and artificial sweeteners have been highlighted at appropriate places. Also included are approximately 900 in-text and end-of-the-chapter problems, and a set of Multiple Choice Questions (MCQ) at the end of each chapter. A glossary of important terms is also included. This book has been designed as a comprehensive textbook for students up to B.Sc. level. In addition, the book will be immensely useful for those preparing for competitive examinations like I.I.T., AIEEE, medical entrance and others.

Contents: S. Sasaki: Heterophenes Carrying Phosphorus Functional Groups as Key Structures.- D.D. Enchev: Synthesis and Biological Activity of 2,5-Dihydro-1,2-Oxaphosphole-2-Oxide Derivatives.- D. Gudat: Recent Developments in the Chemistry of N -Heterocyclic Phosphines.- J. Drabowicz ? D. Krasowska ? A. ?opusi?ski ?T.S.A. Heugebaert ? C.V. Stevens: Selected Five-Membered Phosphorus Heterocycles Containing a Stereogenic Phosphorus.- G. Keglevich:

1-(2,4,6-Trialkylphenyl)-1 H -Phospholes with a Flattened P-Pyramid: Synthesis and Reactivity.- N. Gupta: Recent Advances in the Chemistry of Diazaphospholes

Progress in Heterocyclic Chemistry (PHC) is an annual review series commissioned by the International Society of Heterocyclic Chemistry (ISHC). The volumes in the series contain both highlights of the previous year's literature on heterocyclic chemistry and articles on new developing topics of interest to heterocyclic chemists. The highlight chapters in Volume 8 are all written by leading researchers in their field and these chapters constitute a systematic survey of the important original material reported in the literature on heterocyclic chemistry in 1995. The volume also contains an article on Geminal Diazides of Heterocycles and an article on Radical Methodologies for the synthesis of heterocyclic compounds. As with previous volumes in the series, Volume 8 will enable academic and industrial chemists, and advanced students to keep abreast of developments in heterocyclic chemistry in an effortless way.

Organophosphorus chemistry is an important discipline within organic chemistry. Phosphorus compounds, such as phosphines, trialkyl phosphites, phosphine oxides (chalcogenides), phosphonates, phosphinates and $>P(O)H$ species, etc., may be important starting materials or intermediates in syntheses. Let us mention the Wittig reaction and the related transformations, the Arbuzov- and the Pudovik reactions, the Kabachnik–Fields condensation, the Hirao reaction, the Mitsunobu reaction, etc. Other reactions, e.g., homogeneous catalytic transformations or C-C coupling reactions involve P-ligands in transition metal (Pt, Pd, etc.) complex catalysts. The synthesis of chiral organophosphorus compounds means a continuous challenge. Methods have been elaborated for the resolution of tertiary phosphine oxides and for stereoselective organophosphorus transformations. P-heterocyclic compounds, including aromatic and bridged derivatives, P-functionalized macrocycles, dendrimers and low coordinated P-fragments, are also of interest. An important segment of organophosphorus chemistry is the pool of biologically-active compounds that are searched and used as drugs, or as plant-protecting agents. The natural analogue of P-compounds may also be mentioned. Many new phosphine oxides, phosphinates, phosphonates and phosphoric esters have been described, which may find application on a broad scale. Phase transfer catalysis, ionic liquids and detergents also have connections to phosphorus chemistry. Green chemical aspects of organophosphorus chemistry (e.g., microwave-assisted syntheses, solvent-free accomplishments, optimizations, and atom-efficient syntheses) represent a dynamically developing field. Last, but not least, theoretical approaches and computational chemistry are also a strong sub-discipline within organophosphorus chemistry.

I. Ojima • E. S. Zuniga • J. D. Seitz: Advances in the Use of Enantiopure β -Lactams for the Synthesis of Biologically Active Compounds of Medicinal Interests.- I. Fernández • Miguel A. Sierra: β -Lactams from Fischer Carbene Complexes: Scope, Limitations, and Reaction Mechanism.- Bablee Mandal • Basudeb Basu: Synthesis of β -Lactams Through Alkyne–Nitrene Cycloadditions.- T. T. Tidwell: Preparation of Bis- β -Lactams by Ketene–Imine Cycloadditions.- Edward Turos: The Chemistry and Biology of N-Thiolated β -Lactams.- Indrani Banik • Bimal K. Banik: Synthesis of β -Lactams and Their Chemical Manipulations Via Microwave-Induced Reactions.

B. R. Buckley and H. Heaney: Mechanistic Investigations of Copper(I)- Catalyzed Alkyne–Azide Cycloaddition Reactions.- J. D. Crowley and D. A. McMorran: “Click-

Triazole” Coordination Chemistry: Exploiting 1,4-Disubstituted-1,2,3-Triazoles as Ligands.- S. Lee and A. H. Flood: Binding Anions in Rigid and Reconfigurable Triazole Receptors.- M. Watkinson: Click Triazoles as Chemosensors.- H.-F. Chow, C.-M. Lo and Y. Chen: Triazole-Based Polymer Gels.- T. Zheng, S. H. Rouhanifard, A. S. Jalloh, P. Wu: Click Triazoles for Bioconjugation.- S. Mignani, Y. Zhou, T. Lecourt and L. Micouin: Recent Developments in the Synthesis 1,4,5-Trisubstituted Triazoles. Géraldine Masson, Luc Neuville ? Carine Bughin ? Aude Fayol ? Jieping Zhu Multicomponent Syntheses of Macrocycles Thomas J.J. Müller Palladium-Copper Catalyzed Alkyne Activation as an Entry to Multicomponent Syntheses of Heterocycles Rachel Scheffelaar ? Eelco Ruijter ? Romano V.A. Orru Multicomponent Reaction Design Strategies: Towards Scaffold and Stereochemical Diversity Nicola Kielland ? Rodolfo Lavilla Recent Developments in Reissert-Type Multicomponent Reactions Jitender B. Bariwal ? Jalpa C. Trivedi ? Erik V. Van der Eycken Microwave Irradiation and Multicomponent Reactions Irini Akritopoulou-Zanze ? Stevan W. Djuric Applications of MCR-Derived Heterocycles in Drug Discovery

Heterocyclic chemistry is of prime importance as a sub-discipline of Organic Chemistry, as millions of heterocyclic compounds are known with more being synthesized regularly Introduces students to heterocyclic chemistry and synthesis with practical examples of applied methodology Emphasizes natural product and pharmaceutical applications Provides graduate students and researchers in the pharmaceutical and related sciences with a background in the field Includes problem sets with several chapters

Contents: L. Banfi ? A. Basso ? R. Riva: Synthesis of Heterocycles Through Classical Ugi and Passerini Reactions Followed by Secondary Transformations Involving One or Two Additional Functional Groups.- V.A. Chebanov ? K. A. Gura ? S.M. Desenko: Aminoazoles as Key Reagents in Multicomponent Heterocyclizations.- Y. Huang ? K. Khoury ? A. Dömling: Piperazine Scaffolds by Multicomponent 3 Reactions: The Piperazine Space 4 in MCR Chemistry 5 Deep MCR Piperazine Space.- N. Elders ? E. Ruijter ? V.G. Nenajdenko ? R.V.A. Orru: ?-Acidic Isocyanides in Multicomponent Chemistry.- A. Cukalovic ? J.-C.M.R. Monbaliu ? C.V. Stevens: Microreactor Technology as an Efficient Tool for Multicomponent Reactions.- L.A. Wessjohann ? C.R.B. Rhoden ? D.G. Rivera ? O. Eichler Vercillo: Cyclic Peptidomimetics and Pseudopeptides from Multicomponent Reactions.- M. del Mar Sanchez Duque ? C. Allais ? N. Isambert ? T. Constantieux ? J. Rodriguez: β -Diketo Building Blocks for MCRs-Based Syntheses of Heterocycles

Enables researchers to fully realize the potential to discover new pharmaceuticals among heterocyclic compounds Integrating heterocyclic chemistry and drug discovery, this innovative text enables readers to understand how and why these two fields go hand in hand in the effective practice of medicinal chemistry. Contributions from international leaders in the field review more than 100 years of findings, explaining their relevance to contemporary drug discovery practice. Moreover, these authors have provided plenty of practical guidance and tips based on their own academic and industrial laboratory

experience, helping readers avoid common pitfalls. Heterocyclic Chemistry in Drug Discovery is ideal for readers who want to fully realize the almost limitless potential to discover new and effective pharmaceuticals among heterocyclic compounds, the largest and most varied family of organic compounds. The book features: Several case studies illustrating the role and application of 3, 4, 5, and 6+ heterocyclic ring systems in drug discovery Step-by-step descriptions of synthetic methods and practical techniques Examination of the physical properties for each heterocycle, including NMR data and quantum calculations Detailed explanations of the complexity and intricacies of reactivity and stability for each class of heterocycles Heterocyclic Chemistry in Drug Discovery is recommended as a textbook for organic and medicinal chemistry courses, particularly those emphasizing heterocyclic chemistry. The text also serves as a guide for medicinal and process chemists in the pharmaceutical industry, offering them new insights and new paths to explore for effective drug discovery. Specialist Periodical Reports provide systematic and detailed review coverage of progress in the major areas of chemical research. Written by experts in their specialist fields the series creates a unique service for the active research chemist, supplying regular critical in-depth accounts of progress in particular areas of chemistry. For over 90 years The Royal Society of chemistry and its predecessor, the Chemical Society, have been publishing reports charting developments in chemistry, which originally took the form of Annual Reports. However, by 1967 the whole spectrum of chemistry could no longer be contained within one volume and the series Specialist Periodical Reports was born. The Annual Reports themselves still existed but were divided into two, and subsequently three, volumes covering Inorganic, Organic, and Physical Chemistry. For more general coverage of the highlights in chemistry they remain a 'must'. Since that time the SPR series has altered according to the fluctuating degree of activity in various fields of chemistry. Some titles have remained unchanged, while others have altered their emphasis along with their titles; some have been combined under a new name whereas others have had to be discontinued. The current list of Specialist Periodical Reports can be seen on the inside flap of this volume.

The chemistry of heterocycles is an important branch of organic chemistry. This is due to the fact that a large number of natural products, e. g. hormones, antibiotics, vitamins, etc. are composed of heterocyclic structures. Often, these compounds show beneficial properties and are therefore applied as pharmaceuticals to treat diseases or as insecticides, herbicides or fungicides in crop protection. This volume presents important agrochemicals. Each of the 21 chapters covers in a concise manner one class of heterocycles, clearly structured as follows: * Structural formulas of most important examples (market products) * Short background of history or discovery * Typical syntheses of important examples * Mode of action * Characteristic biological activity * Structure-activity relationship * Additional chemistry information (e.g. further transformations,

alternative syntheses, metabolic pathways, etc.) * References A valuable one-stop reference source for researchers in academia and industry as well as for graduate students with career aspirations in the agrochemical chemistry.

This book explores topics in Heterocyclic chemistry, including Perfluoroheteroaromatic Chemistry; Monofluorinated Heterocycles; Synthesis of beta-Halofurans; Halogenated Heterocycles as Pharmaceuticals; Green Methods in Halogenation of Heterocycles and more.

Organic Chemistry is primarily intended for the third year students pursuing B.Sc Chemistry (Honours) at the University of Calcutta and other major universities across eastern India. It offers 'learning by practice' approach and provides an up-to-date and comprehensive account of the subject matter.

Brett M. Rambo ? Eric S. Silver ? Christopher W. Bielawski ? Jonathan L. Sessler Covalent Polymers Containing Discrete Heterocyclic Anion Receptors Philip A. Gale ? Chang-Hee Lee Calix[n]pyrroles as Anion and Ion-Pair Complexants Wim Dehaen Calix[n]phyrins: Synthesis and Anion Recognition Hiromitsu Maeda Acyclic Oligopyrrolic Anion Receptors Jeffery T. Davis Anion Binding and Transport by Prodigiosin and Its Analogs Hemraj Juwarker ? Jae-min Suk ? Kyu-Sung Jeong Indoles and Related Heterocycles Pavel Anzenbacher Jr. Pyrrole-Based Anion Sensors, Part I: Colorimetric Sensors Pavel Anzenbacher Jr. Pyrrole-Based Anion Sensors, Part II: Fluorescence, Luminescence, and Electrochemical Sensors Ermitas Alcalde ? Immaculada Dinarès ? Neus Mesquida Imidazolium-Based Receptors Nathan L. Kilah ? Paul D. Beer Pyridine and Pyridinium-Based Anion Receptors Kevin P. McDonald ? Yuran Hua ? Amar H. Flood 1,2,3-Triazoles and the Expanding Utility of Charge Neutral CHIIIAnion Interactions

This product is not available separately, it is only sold as part of a set. There are 750 products in the set and these are all sold as one entity.

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Contents: B. Alcaide ? P. Almendros: Novel Aspects on the Preparation of Spirocyclic and Fused Unusual ?-Lactams.- S.S. Bari ? A. Bhalla: Spirocyclic ?-Lactams: Synthesis and Biological Evaluation of Novel Heterocycles.- L. Troisi ? C. Granito ? E. Pindinelli: Novel and Recent Synthesis and Applications of ?-Lactams.- C. Palomo ? M. Oiarbide: ?-Lactams Ring Opening: A Useful Entry to Amino Acids and Relevant Nitrogen-Containing Compounds.- B. Mandal ? P. Ghosh ? B. Basu: Recent Approaches Towards Solid Phase Synthesis of ?-Lactams.- A.Arrieta ? B. Lecea ? F.P. Cossio: Computational Studies on the Synthesis of ?-Lactams Via [2+2] Thermal Cycloadditions.- B. K. Banik ? I. Banik ? F. F. Becker: Novel Anticancer ?-Lactams

Today, our world increasingly is conceived of as being molecular. An ever widening range of phenomena are described logically in terms of molecular properties and molecular interactions. The majority of known molecules are heterocyclic and heterocycles dominate the fields of biochemistry, medicinal chemistry, dyestuffs, photographic science and are of increasing importance in many others, including polymers, adhesives, and molecular engineering. Thus, the importance of heterocyclic chemistry continues to increase and this three volume work by Drs. R. R. Gupta, Mahendra Kumar and Vandana Gupta is a welcome addition to the available guides on the subject. Its scope places it in a useful niche between the single-volume texts and monographs of heterocyclic chemistry and the multivolume treatises. The authors have retained the well tried classical approach but have succeeded in placing their own individual spin on their arrangement. They have put together a well selected range from among the most important of the vast array of facts available. This factual material is ordered in a clear and logical fashion over the three volumes. The present work should be of great value to students-

and practitioners of heterocyclic chemistry at all levels from the advanced undergraduate upwards. It will be of particular assistance in presenting a clear and modern view of the subject to those who use heterocycles in a variety of other fields and we wish it well.

Richard J. Sundberg Electrophilic Substitution Reactions of Indoles Tara L.S. Kishbaugh Reactions of Indole with Nucleophiles Erin Pelkey Metalation of Indole Jie Jack Li ? Gordon W. Gribble Metal-Catalyzed Cross-Coupling Reactions for Indoles Jeanese C. Badenock Radical Reactions of Indole Fariborz Firooznia ? Robert F. Kester ? Steven J. Berthel [2+2], [3+2] and [2+2+2] Cycloaddition Reactions of Indole Derivatives Robert F. Kester ? Steven J. Berthel ? Fariborz Firooznia [4+2] Cycloaddition Reactions of Indole Derivatives Jonathon S. Russel Oxindoles and Spirocyclic Variations: Strategies for C3 Functionalization Liangfeng Fu Advances in the Total Syntheses of Complex Indole Natural Products

Organophosphorus Chemistry provides a comprehensive and critical review of the recent literature. Coverage includes phosphines and their chalcogenides, phosphonium salts, low coordination number phosphorus compounds, penta- and hexa- coordinated compounds, quinquivalent phosphorus acids, nucleotides and nucleic acids, ylides and related compounds, phosphazenes and the application of physical methods in the study of organophosphorus compounds. This is the 40th in a series of volumes which first appeared in 1970 under the editorship of Stuart Trippett and which covered the literature of organophosphorus chemistry published in the period from January 1968 to June 1969, citing some 1370 publications. The present volume covers the literature from January 2009 to January 2010, citing more than 2200 publications, continuing our efforts to provide an up to date survey of progress in an area of chemistry that has expanded significantly over the past 40 years.

Advances in Heterocyclic Chemistry, Volume 124, is the definitive series in the field—one of great importance to organic chemists, polymer chemists, and many biological scientists. Updates in this new volume include sections on the Organometallic Complexes of Azines, The Literature of Heterocyclic Chemistry, Part XV, Heterocycles Incorporating a Pentacoordinated, Hypervalent Phosphorus Atom, and Tautomerism and the Structure of Azoles: NMR Spectroscopy, amongst other related topics. Written by established authorities in the field, this comprehensive review combines descriptive synthetic chemistry and mechanistic insight to yield an understanding of how chemistry drives the preparation and useful properties of heterocyclic compounds. Considered the definitive serial in the field of heterocyclic chemistry Serves as the go-to reference for organic chemists, polymer chemists and many biological scientists Provides the latest comprehensive reviews written by established authorities in the field Combines descriptive synthetic chemistry and mechanistic insights to enhance understanding of how chemistry drives the preparation and useful properties of heterocyclic compounds This advanced text-cum-reference book presents a comprehensive account of the syntheses, reactions, properties and applications of all the most significant classes of heterocyclic compounds. This second volume in the series is an essential tool not only for advanced undergraduates and graduates, but also for academic and industrial researchers in organic, medicinal, pharmaceutical, dye and agricultural chemistry. Science of Synthesis provides a critical review of the synthetic methodology developed from the early 1800s to date for the entire field of organic and organometallic chemistry. As the only resource providing full-text descriptions of organic transformations and synthetic methods as well as experimental procedures, Science of Synthesis is therefore a unique chemical information tool. Over 1000 world-renowned experts have chosen the most important molecular transformations for a class of organic compounds and elaborated on their scope and limitations. The systematic, logical and consistent

organization of the synthetic methods for each functional group enables users to quickly find out which methods are useful for a particular synthesis and which are not. Effective and practical experimental procedures can be implemented quickly and easily in the lab.// The content of this e-book was originally published in December 2003.

Covering the fundamentals of heterocyclic reactivity and synthesis, this book teaches the subject in a way that is understandable to graduate students. Recognizing the level at which heterocyclic chemistry is often taught, the authors have included advanced material that make it appropriate for postgraduate courses. The text discusses the chemical reactivity and synthesis of particular heterocyclic systems. Exercises and solutions help students understand and apply the principles. Original references are included throughout, as well as many review references.

This book discusses the structure, synthesis, and reactivity of heterocyclic compounds. It covers nomenclature, conformational aspects, aromatic stabilization and biological activity of heterocyclic compounds. The book also includes discussions of biochemical processes involving destruction of heterocyclic rings. It includes problem sets that help readers to understand and apply the principles of heterocyclic reactivity and synthesis. The inclusion of more advanced material and references make the book a valuable reference text for postgraduate taught courses, postgraduate researchers, and chemists at all levels working with heterocyclic compounds in industry, particularly in the pharmaceutical and agrochemical industries.

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