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M6GKNI - KARLEE WILLIAMSON

Extensive experimentation and high failure rates are a well-recognised downside to the drug discovery process, with the resultant high levels of inefficiency and waste producing a negative environmental impact. Sustainable and Green Approaches in Medicinal Chemistry reveals how medicinal and green chemistry can work together to directly address this issue. After providing essential context to the growth of green chemistry in relation to drug discovery in Part 1, the book goes on to identify a broad range of practical methods and synthesis techniques in Part 2. Part 3 reveals how medicinal chemistry techniques can be used to improve efficiency, mitigate failure and increase the environmental benignity of the entire drug discovery process, whilst Parts 4 and 5 discuss natural products and microwave-induced chemistry. Finally, the role of computers in drug discovery is explored in Part 6. Identifies novel and cost effective green medicinal chemistry approaches for improved efficiency and sustainability Reflects on techniques for a broad range of compounds and materials Highlights sustainable and green chemistry pathways for molecular synthesis

Organocatalyzed Reactions I and II presents a timely summary of organocatalysed reactions including: a) Enantioselective C-C bond formation processes e.g. Michael-addition, Mannich-reaction, Hydrocyanation (Strecker-reaction), aldol reaction, allylation, cycloadditions, aza-Diels-Alder reactions, benzoin condensation, Stetter reaction, conjugative Umpolung, asymmetric Friedel-Crafts reactions; b) Asymmetric enantioselective reduction processes e.g. Reductive amination of aldehydes or ketones, asymmetric transfer hydrogenation; c) Asymmetric enantioselective oxidation processes; d) Asymmetric epoxidation, Bayer-Villiger oxidation; e) Enantioselective a-functionalization; f) A-alkylation of ketones, a-halogenation and a-oxidation of carbonyl compounds.

In this book, the author focuses on exploring new organocatalytic transformations under operationally simple and environmentally friendly reaction conditions. Two new types of catalytic reactions promoted by N-heterocyclic carbenes (NHCs) are described. The oxa- and azacycle-forming reactions of sulfonylalkynols and sulfonylalkynamides are broadly considered to be a new type of activation mode in NHC chemistry, wherein the bond formation with internal O- and N-nucleophiles occurs at the γ-position of the propargyl sulfones with 1,2-sulfonyl migration. The resulting oxa- and azacycles are core structures in many biologically significant compounds and medicinally important agents. In addition, the book develops the chiral NHC-catalyzed kinetic resolution of α-hydroxy carboxylic acid derivatives based on chiral recognition of the substrate–cocatalyst complex. In this carboxylate cocatalyst-assisted chiral acylation, the reaction rate acceleration and selectivity enhancement are interpreted in terms of the reversible complexation of the substrate and carboxylate cocatalyst, which is verified by control experiments and measured using analytical methods. The findings described here reveal a promising new aspect of not only NHC catalysis but also identifying novel catalysis systems.

This unique and long-awaited handbook on this important topic in the hot field of stereoselective organic synthesis covers several types of nucleophiles. Top international authors deal with modern forms of achieving stereoselective conjugate additions based on the use of chiral auxiliaries or asymmetric catalysis, such as P-N ligands, organocatalysis, domino reactions, Lewis acid and base catalysis. There is also a discussion of the employment of enantioselective conjugate addition transformations in total synthesis of important molecules. With its reliable and previously unpublished experimental procedures, this is a true source of high quality information.

Providing critical analysis of the topics, this book is essential reading for anyone wanting to keep up to date with the literature on photochemistry and its applications.

A best seller since 1966, Purification of Laboratory Chemicals keeps engineers, scientists, chemists, biochemists and students up to date with the purification of the chemical reagents with which they work, the processes for their purification, and guides readers on critical safety and hazards for the safe handling of chemicals and processes. The Seventh Edition is fully updated and provides expanded coverage of the latest commercially available chemical products and processing techniques, safety and hazards: over 200 pages of coverage of new commercially available chemicals since the previous edition. The only comprehensive chemical purification reference, a market leader since 1966, Amarego delivers essential information for research and industrial chemists, pharmacists and engineers: '... (it) will be the most commonly used reference book in any chemical or biochemical laboratory' (MDPI Journal) An essential lab practice and proceedures manual. Improves efficiency, results and safety by providing critical information for day-to-day lab and processing work. Improved, clear organization and new indexing delivers accurate, reliable information on processes and techniques of purification along with detailed physical properties The Sixth Edition has been reorganised and is fully indexed by CAS Registry Numbers; compounds are now grouped to make navigation easier; literature references for all substances and techniques have been added; ambiguous alternate names and cross references removed; new chemical products and processing techniques are covered; hazards and safety remain central to the book

This book introduces multi-catalyst systems by describing their mechanism and advantages in asymmetric catalysis. • Helps organic chemists perform more efficient catalysis with step-by-step methods • Overviews new concepts and progress for greener and economic catalytic reactions • Covers topics of interest in asymmetric catalysis including bifunctional catalysis, cooperative catalysis, multimetallic catalysis, and novel tandem reactions • Has applications for pharmaceuticals, agrochemicals, materials, and flavour and fragrance

Authored by one of the leading experts in the field, this is the only comprehensive overview of chiral organophosphorus compounds, from asymmetric synthesis to catalysis and pharmacological applications. As such, this unique reference covers the chemical background as well as spectroscopical analysis of phosphorus compounds, and thoroughly describes all the various synthetic strategies for these substances. Metal-, organo- and biocatalyzed reactions for the introduction of phosphorus are explained as are asymmetric oxidation and reduction methods for the preparation of all possible oxidation states of phosphorus. The text also includes industrial applications for these compounds. Of particular interest to chemists working in the field of asymmetric synthesis, as well as to the pharmaceutical industry due to the increasing number of phosphorous-containing drugs.

Sets forth an important group of environmentally friendlyorganic reactions With contributions from leading international experts in organicsynthesis, this book presents all the most important methodologiesfor stereoselective organocatalysis, fully examining both theactivation mode as well as the type of bond formed. Clearexplanations guide researchers through all the most importantmethods used to form key chemical bonds, including carbon--carbon(C–C), carbon-nitrogen (C–N), and carbon-halogen(C–X) bonds. Moreover, readers will discover how the use ofnon-metallic catalysts facilitates a broad range of importantreactions that are environmentally friendly and fully meet thestandards of green chemistry. Stereoselective Organocatalysis begins with an historicaloverview and a review of activation modes in asymmetricorganocatalysis. The next group of chapters is organized by bond-type, making it easy to find bonds according to their applications.The first of these chapters takes a detailed look at the manyroutes to C–C bond formation. Next, the book covers: Organocatalytic C–N bond formation C–O bond formation C–X bond formation C–S, C–Se, and C–B bond formation Enantioselective organocatalytic reductions Cascade reactions forming both C–C bonds andC–heteroatom bonds The final chapter is devoted to the use of organocatalysis forthe synthesis of natural products. All the chapters in the book areextensively referenced, serving as a gateway to the growing body oforiginal research reports and reviews in the field. Based on the most recent findings and practices in organicsynthesis, Stereoselective Organocatalysis equips syntheticchemists with a group of organocatalytic reactions that will helpthem design green reactions and overcome many challenges in organicsynthesis.

The book consists of a brief introduction, a foreward provided by professor Danishefsky of Columbia University, and about 14 - 16 chapters, each written by one or two eminent scholars/authors describing their recent research in the area of either domino reactions or intramolecular rearrangements in carbohydrate chemistry. Three or four chapters will be reviews. The domino (cascade, tandem) reactions are always intramolecular. They are usually very fast, clean and offer highly complex structures in a one pot process. Intramolecular rearrangements offer very similar advantages and often lead to highly complex products as well. Although many recently isolated carbohydrates fulfill various sophisticated functions, their structures are often very complex. The editors cover the broadest scope of novel methodologies possible. All the synthetic and application aspects of domino/cascade reactions are explored in this book. A second theme that will be covered is intramolecular rearrangement, which is also fast, stereoselective, and often constitutes one or more steps of domino / cascade process. Selected examples of intramolecular rearrangements are presented. Together, both processes offer an elegant and convenient approach to the synthesis of many complex molecules, which are normally difficult to synthesize via alternative routes. It appears that domino and intramolecular rearrangements are ideally suited to synthesize certain specific modified monosaccharides. What is particularly important is that both processes are intermolecular and almost always yield products with very well-defined stereochemistry. This high definition is absolutely crucial when synthesizing advanced, modified mono and oligosaccharides. The choice of contributors reflects an emphasis on both therapeutic and pharmacological aspects of carbohydrate chemistry.

Organocatalysis is considered today one of the three pillars in asymmetric catalysis, along with biocatalysis and organometallic catalysis. The possibility to combine organocatalysis with radical chemistry, photocatalysis and enabling technologies opened new avenues in organic synthesis.

Corinna Reisinger has developed a new organocatalytic asymmetric epoxidation of cyclic and acyclic α,β-unsaturated ketones. In this thesis, Corinna documents her methodology, using primary amine salts as catalysts, and hydrogen peroxide as an inexpensive and environmentally benign oxidant. She describes the unprecedented and powerful catalytic asymmetric hydroperoxidation of α,β-enones, a process which produces optically active five-membered cyclic peroxyhemiketals in a single operation. She also proves the versatility and synthetic value of the cyclic peroxyhemiketals by converting them into highly enantioenriched acyclic and cyclic aldol products. Currently, these cyclic aldol products are inaccessible by any other synthetic means. Furthermore, cyclic peroxyhemiketals are precursors to optically active 1,2-dioxolanes which are of biological relevance. This work is a breakthrough in the field of asymmetric epoxidation chemistry and outlines the most efficient method in the literature for generating highly enantioselective cyclic epoxyketones known to date.

This first comprehensive overview of this important synthetic reaction covers the whole spectrum of this modern and rapidly developing field. Clearly structured, the book presents all the known synthetic approaches for the construction of aromatic compounds bearing benzylic stereocenters with a defined configuration. With its representative synthetic procedures, organocatalysis and industrial applications it combines a theoretical basis with practical examples, resulting in valuable advice for beginners and experts alike. The ultimate source for every synthetic chemist in academia and industry.

Praise for the previous editions "An excellent text . . . will no doubt provide the benchmark for comparative works for many years." —Journal of the American Chemical Society "An excellent state-of-the-art compilation of catalytic asymmetric chemistry . . . should be included in any chemistry refer-

ence collection." —Choice "This is a tremendous resource and an excellent read. I recommend immediate purchase." —Perkin Transactions Since this important work was first published in 1993, the field of catalytic asymmetric synthesis has grown explosively, spawning effective new methods for obtaining enantiomerically pure compounds on a large scale and stimulating new applications in diverse fields—from medicine to materials science. Catalytic Asymmetric Synthesis, Third Edition addresses these rapid changes through contributions from highly recognized world leaders in the field. This seminal text presents detailed accounts of the most important catalytic asymmetric reactions known today, and discusses recent advances and essential information on the initial development of certain processes. An excellent working resource for academic researchers and industrial chemists alike, the Third Edition features: Six entirely new chapters focusing on novel approaches to catalytic asymmetric synthesis including non-conventional media/conditions, organocatalysis, chiral Lewis and Bronsted acids, CH activation, carbon-heteroatom bond-forming reactions, and enzyme-catalyzed asymmetric synthesis A new section focusing on the important new reaction, asymmetric metathesis, in carbon-carbon bond-forming reactions Updated chapters on hydrogenation, carbon-carbon bond-forming reactions, hydrosilylations, carbonylations, oxidations, amplifications and autocatalysis, and polymerization reactions Retaining the best of its predecessors but now thoroughly up to date, Catalytic Asymmetric Synthesis, Third Edition serves as an excellent desktop reference and text for researchers and students from the upper-level undergraduates through experienced professionals in industry or academia.

The first handbook to focus on the asymmetric synthesis of different types of three-membered rings. The outstanding and experienced authors have an excellent international reputation and cover cyclopropanes, epoxides and aziridines as well as chiral oxaziridines in equal measure. To this end, they describe in detail different synthetic approaches starting with chiral substrates as well as the application of chiral metal- or organocatalysts. Furthermore, methods for the kinetic resolution of initially racemic products are treated alongside recent advances and novel developments in established techniques for the synthesis of three-membered rings. With its structured composition this is of high interest to scientists in methodological and natural product synthesis as well as those in industrial and pharmaceutical chemistry.

The shift towards being as environmentally-friendly as possible has resulted in the need for this important volume on homogeneous catalysis. Edited by the father and pioneer of Green Chemistry, Professor Paul Anastas, and by the renowned chemist, Professor Robert Crabtree, this volume covers many different aspects, from industrial applications to atom economy. It explains the fundamentals and makes use of everyday examples to elucidate this vitally important field. An essential collection for anyone wishing to gain an understanding of the world of green chemistry, as well as for chemists, environmental agencies and chemical engineers.

Asymmetric catalysis represents still one of the major challenges in modern organic chemistry. Besides the well-established asymmetric metal-complex-catalysed syntheses and biocatalysis, the use of "pure" organic catalysts turned out to be an additional efficient tool for the synthesis of chiral building blocks. In this handbook, the experienced authors from academia and industry provide the first overview of the important use of such metal-free organic catalysts in organic chemistry. With its comprehensive description of numerous reaction types, e.g., nucleophilic substitution and addition reactions as well as cycloadditions and redox reactions, this book targets organic chemists working in industry and academia, and deserves a place in every laboratory.

This book covers advances in the methods of catalytic asymmetric synthesis and their applications. Coverage moves from new materials and technologies to homogeneous metal-free catalysts and homogeneous metal catalysts. The applications of several methodologies for the synthesis of biologically active molecules are discussed. Part I addresses recent advances in new materials and technologies such as supported catalysts, supports, self-supported catalysts, chiral ionic liquids, supercritical fluids, flow reactors and microwaves related to asymmetric catalysis. Part II covers advances and milestones in organocatalytic, enzymatic and metal-based mediated asymmetric synthesis, including applications for the synthesis of biologically active molecules. Written by leading international experts, this book consists of 16 chapters with 2000 References and illustrations of 560 schemes and figures.

Chiral molecules are needed for the production of many pharmaceuticals and materials, and catalytic asymmetric synthesis provides a method for the preparation of such chiral products. For the synthesis of complex molecules, such as natural products and biologically active compounds, more than one catalytic reaction may be necessary and tandem catalysis refers to the combination of catalytic reactions into one synthesis. By combing catalysts it enables a more efficient, economical and selective one pot approach for complex molecule synthesis which could not be achieved through single specific catalytic systems. The challenge is finding the right catalyst which is compatible with other catalysts but also tolerates reagents, solvent and intermediates generated during the course of the reaction. Enantioselective Multicatalysed Tandem Reactions provides an overview of recent developments in the area. The first part of the book covers asymmetric tandem reactions catalysed by multiple catalysts from the same discipline (organocatalysts, two metal and multienzyme-catalysed reactions). The second part looks at tandem reactions catalysed by multiple catalysts from different disciplines including reactions catalysed by a combination of metals and organocatalysts, reactions catalysed by a combination of metals and enzymes, and finally reactions catalysed by a combination of organocatalysts and enzymes. The book will appeal to researchers and professionals in academic and industrial laboratories interested in catalysis, biocatalysis and organic synthesis of chiral compounds.

Structured in three parts this manual recollects efficient organocatalytic transformations around clear principles that meet actual standard in asymmetric synthesis. Chapters were written by acknowledged leaders of the organocatalysis field, and are presented in a concise way. Volume 1: Privileged Catalysts gives insight to readers to the continuously increasing variety of catalysts, and the relatively complex interactions that make organocatalytic reactions selective. An appendix recollects catalyst structures with the adequate cross-references. Volume 2: Activations covers the fundamental activation types (non-covalent and covalent activations) and helps understanding the importance of physical parameters, and in particular, the role of water, that influences reactivity and selectivity. Volume 3: Reactions and Applications highlights transformations by reaction types. The final part of this volume is dedicated to application in multistep synthesis and industrial applications. Considering the ever increasing interest in the organocatalysis field, the book aims addressing to a large audience: to academic, and, industrial researchers, students and teachers who are interested in synthetic organic chemistry at advanced level. This book provides non-specialists with an introduction to the topic as well as serving as a valuable source for newcomers and researchers searching for an up-to-date and comprehensive overview of this promising area of synthetic organic chemistry.

This book reviews chiral polymer synthesis and its application to asymmetric catalysis. It features the design and use of polymer-immobilized catalysts and methods for their design and synthesis. Chapters cover peptide-catalyzed and enantioselective synthesis, optically-active polymers, and continuous flow processes. It collects recent advances in an important field of polymer and organic chemistry, with leading researchers explaining applications in academic and industry R & D.

This reference book originates from the interdisciplinary research cooperation between academia and industry. In three distinct parts, latest results from basic research on stable enzymes are explained and brought into context with possible industrial applications. Downstream processing technology as well as biocatalytic and biotechnological production processes from global players display the enormous potential of biocatalysts. Application of "extreme" reaction conditions (i.e. unconventional, such as high temperature, pressure, and pH value) - biocatalysts are normally used within a well defined process window - leads to novel synthetic effects. Both novel enzyme systems and the synthetic routes in which they can be applied are made accessible to the reader. In addition, the complementary innovative process technology under unconventional conditions is highlighted by latest examples from biotech industry.

In this reference leaders at the forefront of research provide an insight into one of the hottest topics in organic synthesis, focusing on the most important enantioselective reactions. Clearly structured, each entry begins with a concise introduction, including a mechanistic discussion of the reaction, followed by preparative guidelines for newcomers, such as carefully selected working procedures with critical notes for bench chemists, rules of thumb and tips and tricks.

This book provides the reader with an illustrative overview concerning successful and widely used applications of organocatalysis in the field of natural product synthesis. The main focus will be on organocatalytic key-steps for each (multi-step) synthesis described, whereas other often particularly innovative transformations will be omitted, as this would be beyond the scope of this volume.

The selective formation of bondings between molecules is one of the major challenges in organic chemistry, and the so-called aldol reaction is one of the most important for this purpose. These reactions are a highly useful tool for developing such novel substances as natural products and pharmaceuticals. Likes its highly successful and much appreciated predecessor, "Modern Aldol Reactions", this ready reference provides a systematic overview of methodologies for installing a required configuration during an aldol addition step, but shifts the focus so as to cover the latest developments. As such, it presents a set of brand new tools, including vinylogous Mukaiyama-aldol reactions and substrate-controlled aldol reactions, as well as asymmetric induction in aldol additions. Furthermore, new developments in existing stereoselective aldol additions are described, such as the deployment of supersilyl groups or organocatalyzed aldol additions. All of these methodologies are presented in the context of their deployment in the total synthesis of natural products.

Written by some of the most talented young chemists in Europe, this text covers most of the groundbreaking issues in chemistry. It provides an account of the latest research results in European chemistry based on a selection of leading young scientists participating in the 2008 European Young Chemists Award competition. The contributions range from self-organization to new catalytic synthetic methodologies to organocatalysis. In addition, the authors provide a current overview of their field of research and a preview of future directions. For organic, catalytic, natural products and biochemists.

Organocatalysis are an important tool for greener catalytic processes due to the lack of precious metals used. This book explores different organocatalysts and their use in synthesis. Topics covered include zwitterionic imidazolium salt catalysts, asymmetric catalysts in aqueous media, beaker yeast catalysis, organocatalysts for Aldol and Michael reactions, amino acid-based organocatalysts, and Brönsted acidic surfactant organocatalysts.

An integrated view of chiral drugs—from concept and synthesisto pharmaceutical properties Chirality greatly influences a drug's biological and pharmacological properties. In an effort to achieve more predictable results from chiral drugs, the Food and Drug Administration now requires that these medicines be as pure as possible, which places great demands on drug synthesis, purification, analysis, and testing. To assist researchers in acquiring the essential knowledge to meet these rigid guidelines, Chiral Drugs focuses on three vital chiral technologies—asymmetric synthesis, biocatalytic process, and chiral resolution—to offer details on the basic concepts, key developments, and recent trends in chiral drug discovery, along with: The history of chiral drugs development and industrial applications of chiral technologies A section listing twenty-five approved or advanced-trial chiral drugs that lists each drug name, chemical name and properties, a representative synthetic pathway, pharmacological characterizations, and references An interdisciplinary approach combining synthetic organic chemistry, medicinal chemistry, and pharmacology Nearly two-thirds of the drugs on today's market are chiral drugs. Reducing and eliminating their negative characteristics is an ongoing and serious challenge for the pharmaceutical industry. With its well-balanced approach to covering each important aspect of chirality, Chiral Drugs champions important strategies for tipping the medical scale in a positive direction for the production of more effective—and safer—drugs.

This book provides an excellent overview on state-of-the-art of modern organocatalysis. It presents the contributions from leading experts, with backgrounds in academia and industry, to an Ernst Schering Research Foundation Symposium held in April 2007. It will be of interest to those who want a general overview of the topic, but also to those who want to learn more about the state-of-the-art, current trends and perspectives in this highly dynamic field of research.

Annotation Kerstin Etzenbach-Effers, Albrecht Berkessel: Non-Covalent Organocatalysis Based on Hydrogen Bonding: Elucidation of Reaction Paths by Computational Methods.- Petri M. Pihko, Inkeri Majander, and Anniina Erkkilä: Enamine Catalysis.- Jennifer L. Moore, Tomislav Rovis: Lewis Base Catalysts 6: Carbene Catalysts.- Amal Ting, Jennifer M. Goss, Nolan T. McDougal, and Scott E. Schaus: Brønsted Base Catalysts.- O. Andrea Wong, Yian Shi: Chiral Ketone and Iminium Catalysts for Olefin Epoxidation.- Alan C. Spivey, Stellios Arseniyadis: Amine, Alcohol and Phosphine Catalysts for Acyl Transfer Reactions.- John B. Brazier, Nicholas C.O. Tomkinson: Lewis Base Catalysts 2 Secondary and Primary Amine Catalysts for Iminium Catalysis.- Oksana Sereda, Sobia Tabassum, and René Wilhelm: Lewis Acid Organocatalysts.- Daniela Kampen, Corinna M. Reisinger, and Benjamin List: Chiral Bronsted Acids for C Organocatalysis.

In this exciting 2 volume set, the approach and methodology of bio-inspired synthesis of complex natural products is laid out, backed by abundant practical examples from the authors' own work as well as from the published literature. Volume 1 describes the biomimetic synthesis of alkaloids. Volume 2 covers terpenes, polyketides, and polyphenols. A discussion of the current challenges and frontiers in biomimetic synthesis concludes this comprehensive handbook. Key features: Biomimetic Strategies have become an every-day tool not only for chemists but also for biologists. The synthetic applications are overwhelming, making this comprehensive 2 volume work a must-have for everyone working in the field. Unifying both synthetic and biosynthetic aspects, this book covers everything from organocatalysis and natural product synthesis to synthetic biology and even green chemistry.
Focussing on catalysis without metals or other endangered elements, this book is an important reference for researchers working in catalysis and green chemistry.

This first handbook to focus solely on the application of N-heterocyclic carbenes in synthesis covers metathesis, organocatalysis, oxidation and asymmetric reactions, along with experimental procedures. Written by leading international experts this is a valuable and practical source for every organic chemist.
An updated overview of the rapidly developing field of green techniques for organic synthesis and medicinal chemistry Green chemistry remains a high priority in modern organic synthesis and pharmaceutical R&D, with important environmental and economic implications. This book presents comprehensive coverage of green chemistry techniques for organic and medicinal chemistry applications, summarizing the available new technologies, analyzing each technique’s features and green chemistry characteristics, and providing examples to demonstrate applications for green organic synthesis and medicinal chemistry. The extensively revised edition of Green Techniques for Organic Synthesis and Medicinal Chemistry includes 7 entirely new chapters on topics including green chemistry and innovation, green chemistry metrics, green chemistry and biological drugs, and the business case for green chemistry in the generic pharmaceutical industry. It is divided into 4 parts. The first part introduces readers to the concepts of green chemistry and green engineering, global environmental regulations, green analytical chemistry, green solvents, and green chemistry metrics. The other three sections cover green catalysis, green synthetic techniques, and green techniques and strategies in the pharmaceutical industry. Includes more than 30% new and updated material—plus seven brand new chapters Edited by highly regarded experts in the field (Berkeley Cue is one of the fathers of Green Chemistry in Pharma) with backgrounds in academia and industry Brings together a team of international authors from academia, industry, government agencies, and consultancies (including John Warner, one of the founders of the field of Green Chemistry) Green Techniques for Organic Synthesis and Medicinal Chemistry, Second Edition is an essential resource on green chemistry technologies for academic researchers, R&D professionals, and students working in organic chemistry and medicinal chemistry.
Catalysis plays a vital role in chemical, petroleum, agriculture, polymer, electronics, pharmaceutical, and other industries. Over 90 percent of chemicals originate from catalytic processes. Toughening economic and environmental constraints have proven to be a challenge for meeting the demand of novel efficient and sustainable regio- and stereoselective catalyst systems. Environmentally Sustainable Catalytic Asymmetric Oxidations provides a comprehensive overview of existing ecologically friendly catalyst systems for various asymmetric oxidation processes. Topics include: A survey of existing transition metal-based catalyst systems for asymmetric epoxidations (AEs) with O2 and H2O2 Asymmetric sulfoxidations with H2O2 on chiral metal complexes An overview of various transition metal-catalyzed oxidative transformations with H2O2 or O2 used as the terminal oxidant Organocatalytic asymmetric oxidations Catalytic processes of stereospecific oxidations of C-H functional groups The role that oxoiron(V) intermediates play in chemo- and stereoselective oxidations catalyzed by non-heme iron complexes The book concludes with a discussion of the opportunities and problems associated with the industrial application of stereoselective processes of catalytic oxidation with H2O2 and O2. It also provides examples of processes with industrial potential. Some of the catalysts presented in this book may serve as promising alternatives for existing catalysts—progressively replacing them in manufacturing processes and ultimately making the chemical industry greener and cleaner.
Organocatalysis has recently attracted enormous attention as green and sustainable catalysis. It was realized as a fundamental field providing wide families of catalysts for important organic transformations. It will certainly develop in the future. Given the diversity of accessible transformations, metal-catalyzed reactions have become major tools in organic synthesis that will undoubtedly continue to have an important impact in the future. Alternatively, over the last years, a metal-free approach such as organocatalysis has reached a level of faithfulness, allowing researchers to discover new catalytic systems based on engagement of new or early-prepared organic molecules as organocatalysts. Organocatalysis meets green chemistry principles, especially the reduction of toxicity and chemical accidents, the biodegradability, and the use of benign and friendlier reaction media and conditions.

This book covers the latest developments in asymmetric domino reactions, focussing on those published in the last 6 years. These fascinating reactions have rapidly become one of the most current fields in organic chemistry, since they allow reaching easily high molecular complexity in an economically favourable way with advantages of savings in solvent, time, energy, and costs. Unsurprisingly, the high levels of efficiency and enantioselectivity generally reached in these reactions have been exploited for the production of a wide number of complex chiral molecules with dense stereochemistry and functionality, which are motifs present in biologically active compounds and natural products. The book is divided into three principal sections, dealing successively with asymmetric domino reactions based on the use of chiral auxiliaries, asymmetric domino reactions based on the use of chiral metal catalysts, and asymmetric domino reactions based on the use of chiral organocatalysts, covering the literature since the beginning of 2006.
Considering the challenge of sustainability facing our society in the coming decades, catalysis is without any doubt a research area of major importance. In this regard, asymmetric organocatalysis, now considered a pillar of green chemistry, deserves particular attention. The first chapter of this volume examines the topic of asymmetric organocatalysis in light of radical chemistry. Recent important progress in this field has been attained by promoting the formation and harnessing the high reactivity of open-shell intermediates. Merging organocatalysis with radical chemistry has been the key to solving some longstanding bottlenecks, and has also significantly contributed to reinforcing the key role of organocatalysis in asymmetric catalysis. This chapter presents the most significant developments in this area, with a particular focus on asymmetric SOMO- and photoredox-organocatalyzed transformations. Chapter 2 focuses on quaternary ammonium salts (R4N+X-), especially chiral derivatives, and their behavior as unique catalysts in organocatalysis. Forming chiral ion-pairs capable of promoting asymmetric reactions, they also operate as unique “transporters involved in phase transfer catalytic processes between liquid–liquid or liquid–solid systems. Furthermore, they offer unique opportunities when forming cooperative ion-paired entities R4N+X-, allowing a synergistic implication of the counter-ion X- either as Brønsted bases or Lewis bases. Specific design of such chiral catalysts in modern chemistry and better insight into their mode of activation facilitates efficient and unprecedented chemical transformations. This chapter provides an overview of the use of chiral quaternary ammonium salts in organocatalysis, emphasizing both general mechanistic aspects and the scope of this approach. Presents the most significant developments with a particular focus on asymmetric SOMO- and photoredox-organocatalyzed transformations Givies a larger overview of chiral ammonium salts in organocatalysis rather than a specific review dedicated to specialists in this area Affords a historical evolution of this field of research
The aim of this book is to cover the very recent developments in asymmetric organocatalysis, focussing on those published since the beginning of 2008. The last decade has witnessed an explosive growth in the field of asymmetric organocatalysis with an impressive amount of new catalysts, novel methodologies, and applications in numerous reaction types, such as nucleophilic substitutions, addition reactions, as well as cycloadditions, oxidations, reductions, kinetic resolutions, and miscellaneous reactions. This very diverse and intensely developing field is too wide to cover in a single review. The timeliness of the book together with the expected impact is excellent, since nowadays asymmetric organocatalysis is arguably the most intensively developed field in organic chemistry. The book is designed to meet the demands of a postgraduate textbook,containing case studies and Q&A sections, as well as a practical book filled with facts and data useful as a working tool for the practitioner. The book is divided into ten sections, dealing successively with nucleophilic additions to electron-deficient C=C double bonds, nucleophilic additions to C=O double bonds, nucleophilic additions to C=N double bonds, nucleophilic additions to unsaturated nitrogen, nucleophilic substitutions at aliphatic carbon, cycloaddition reactions, oxidations, reductions, kinetic resolutions and desymmetrisations, and miscellaneous reactions.