

Problem Solving In Enzyme Biocatalysis

Biocatalysis Peter Grunwald.2009-03-02 The book covers the fundamentals of the field of biocatalysis that are not treated in such detail (or even not at all) in existing biocatalysis books or biochemistry textbooks. It of course does not substitute existing biochemistry textbooks but will serve a suitable supplement as it discusses biochemical fundamentals in connection with the respective topics. With focus on the interdisciplinary nature of biocatalysis, the book contains many aspects of fundamental organic chemistry and some of inorganic chemistry as well, which should make it interesting not only for biochemistry but also for chemistry students. An important theme being emphasized in the book is that applied biocatalysis is one of the main prerequisites for a sustainable development. The topics covered ranges from basic enzyme chemistry (biosynthesis, structure, properties, interaction forces, kinetics) to a detailed description of catalytic mechanisms. It covers the fundamentals of the different enzyme classes together with their applications in native and in immobilized state or in the form of whole cells in aqueous as well as non-conventional media. Topics such as catalytic antibodies, nucleic acid catalysts, non-ribosomal peptide synthesis, evolutionary methods, and the design of cells are also included.

Biocatalysis Andreas S. Bommarius,Bettina R. Riebel-Bommarius.2004-03-12 The whole range of biocatalysis, from a firm grounding in theoretical concepts to in-depth coverage of practical applications and future perspectives. The book not only covers reactions, products and processes with and from biological catalysts, but also the process of designing and improving such biocatalysts. One unique feature is that the fields of chemistry, biology and bioengineering receive equal attention, thus addressing practitioners and students from all three areas.

Biocatalysts and Enzyme Technology Klaus Buchholz,Volker Kasche,Uwe Theo Bornscheuer.2012-12-21 This second edition of a bestselling textbook offers an instructive and comprehensive overview of our current knowledge of biocatalysis and enzyme technology. The book now contains about 40% more printed content. Three chapters are completely new, while the others have been thoroughly updated, and a section with problems and solutions as well as new case studies have been added. Following an introduction to the history of enzyme applications, the text goes on to cover in depth enzyme mechanisms and kinetics, production, recovery, characterization and design by protein engineering. The authors treat a broad range of applications of soluble and immobilized biocatalysts, including wholecell systems, the use of non-aqueous reaction systems, applications in organic synthesis, bioreactor design and reaction engineering. Methods to estimate the sustainability, important internet resources and their evaluation, and legislation concerning the use of biocatalysts are also covered.

Introduction to Biocatalysis Using Enzymes and Microorganisms S. M. Roberts.1995-01-27 This book gives an introduction to biotransformations, the practice of harnessing biological catalysts for the preparation of useful chemicals.

Enzyme Catalysis in Organic Synthesis, 3 Volume Set Karlheinz Drauz,Harald Gröger,Oliver May.2012-03-26 This comprehensive three-volume set is the standard reference in the field of organic synthesis, catalysis and biocatalysis. Edited by a highly experienced and highly knowledgeable team with a tremendous amount of experience in this field and its applications, this edition retains the successful concept of past editions, while the contents are very much focused on new developments in the field. All the techniques described are directly transferable from the lab to the industrial scale, making for a very application-oriented approach. A must for all chemists and biotechnologists.

Stereoselective Biocatalysis Ramesh N. Patel.2000-01-03 This book offers an explanation of the specific ways that biocatalysis outperforms chemical catalysis by: utilizing ambient temperature and atmospheric pressure to minimize problems of isomerization, racemization, and epimerization; employing microbial cells and enzymes that can be immobilized and reused over many cycles; and overexpressing enzymes for greater economy and efficiency.

Biocatalysis Peter Grunwald.2017-08-04 In this Completely Revised and Extended Edition with a significantly enhanced content, all Chapters have been updated considering relevant literature and recent developments until 2016 together with application oriented examples with a focus on Industrial Biocatalysis. Newly treated topics comprise among others systems metabolic engineering approaches, metagenome screening, new tools for pathway engineering, and de-novo computational design as actual research areas in biocatalysis. Information about different aspects of RNA technologies, and completely new Chapters on 'Fluorescent Proteins' and 'Biocatalysis and Nanotechnology' are also included.

Biocatalysis for Practitioners Gonzalo de Gonzalo,Iván Lavandera.2021-07-19 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.

Biocatalysis Qayyum Husain,Mohammad Fahad Ullah.2019-09-03 This book introduces readers to industrially important enzymes and discusses in detail their structures and functions, as well as their manifold applications. Due to their selective biocatalytic capabilities, enzymes are used in a broad range of industries and processes. The book highlights selected enzymes and their applications in agriculture, food processing and discoloration, as well as their role in biomedicine. In turn, it discusses biochemical engineering strategies such as enzyme immobilization, metabolic engineering, and cross-linkage of enzyme aggregates, and critically weighs their pros and cons. Offering a wealth of information, and stimulating further research by presenting new concepts on enzymatic catalytic functions in basic and applied contexts, the book represents a valuable asset for researchers from academia and industry who are engaged in biochemical engineering, microbiology and biotechnology.

Biocatalysis Ajit Sadana.1991

Enzyme Biocatalysis Andrés Illanes.2009-08-29 This book was written with the purpose of providing a sound basis for the design of enzymatic reactions based on kinetic principles, but also to give an updated vision of the potentials and limitations of biocatalysis, especially with respect to recent applications in processes of organic synthesis. The first five chapters are structured in the form of a textbook, going from the basic principles of enzyme structure and function to reactor design for homogeneous systems with soluble enzymes and heterogeneous systems with immobilized enzymes. The last chapter of the book is divided into six sections that represent illustrative case studies of biocatalytic processes of industrial relevance or potential, written by experts in the respective fields. We sincerely hope that this book will represent an element in the toolbox of graduate students in applied biology and chemical and biochemical engineering and also of undergraduate students with formal training in organic chemistry, biochemistry, thermodynamics and chemical reaction kinetics. Beyond that, the book pretends also to illustrate the potential of biocatalytic processes with case studies in the field of organic synthesis, which we hope will be of interest for the academia and professionals involved in R&D&I. If some of our young readers are encouraged to engage or persevere in their work in biocatalysis this will certainly be our more precious reward.

Organic Synthesis with Enzymes in Non-Aqueous Media Giacomo Carrea,Sergio Riva.2008-04-09 Closing a gap in the literature, this comprehensive book examines and discusses different non-aqueous systems from organic solvents to ionic liquids for synthetic applications, thus opening the door to new successful methods for biocatalytic reactions. It gathers into one handy source the information otherwise widely spread throughout the literature, combining useful background information with a number of synthetic examples, including industrial scale processes for pharmaceutical and fine chemicals. Extremely well structured, the text introduces the fundamentals of non-aqueous enzymology, before going on to new reaction media and synthetic applications using hydrolases and non-hydrolytic enzymes. The one-stop reference for everyone working in this hot field.

Enzymes for Solving Humankind's Problems José J. G. Moura,Isabel Moura,Luisa B. Maia.2020-12-01 This book presents specific key natural and artificial systems that are promising biocatalysts in the areas of health, agriculture, environment and energy. It provides a comprehensive account of

the state of the art of these systems and outlines the significant progress made in the last decade using these systems to develop innovative, sustainable and environmentally friendly solutions. Chapters from expert contributors explore how natural enzymes and artificial systems tackle specific targets such as: climate change, carbon footprint and economy and carbon dioxide utilisation; nitrogen footprint and fixation and nitrous oxide mitigation; hydrogen production, fuel cells and energy from bacteria; biomass transformation and production of added-value compounds, as well as biosensors development. This book provides an important and inspiring account for the designing of new natural and artificial systems with enhanced properties, and it appeals not only to students and researchers working in the fields of energy, health, food and environment, but also to a wider audience of educated readers that are interested in these up-to-date and exciting subjects. Chapter “Carbon Dioxide Utilisation—The Formate Route” is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Modern Biocatalysis Wolf-Dieter Fessner, Thorleif Anthonsen. 2008-12-03 This reference covers the wide and rapidly growing field of biocatalysis. It combines complementary expertise from such areas as microbiology, enzymology, molecular biology structural biology and organic chemistry, thus highlighting the interdisciplinary nature of the subject. With its special focus on progress and new developments towards environmentally beneficial reactions with high levels of selectivity for the production of key compound classes, this book will enlighten both chemists and biologists as to the advances and opportunities existing in enzyme catalysis.

Biotransformations and Bioprocesses Mukesh Doble, Anil Kumar Kruthiventi, Vilas Ganjanan Gaikar. 2004-03-24 From the laboratory to full-scale commercial production, this reference provides a clear and in-depth analysis of bioreactor design and operation and encompasses critical aspects of the biocatalytic manufacturing process. It clarifies principles in reaction and biochemical engineering, synthetic and biotransformation chemistry, and biocell and enzyme kinetics for successful applications of biocatalysis and bioprocess technologies in the food, chiral drug, vitamin, pharmaceutical, and animal feed industries. Studying reactions from small to supramolecules, this reference provides an abundant supply of end-of-chapter problems to sharpen understanding of key concepts presented in the text.

Industrial Use of Enzymes Bernard Wolnak, Marvin Scher. 1990

Industrial Enzyme Applications Andreas Vogel, Oliver May. 2019-07-03 This reference is a must-read: It explains how an effective and economically viable enzymatic process in industry is developed and presents numerous successful examples which underline the efficiency of biocatalysis.

Handbook of Industrial Biocatalysis Ching T. Hou. 2005-06-09 Until now, no comprehensive handbook on industrial biocatalysis has been available. Soliciting chapters on virtually every aspect of biocatalysis from international experts most actively researching the field, the Handbook of Industrial Biocatalysis fills this need. The handbook is divided into three sections based on types of substrates. T

Modern Biocatalysis Gavin Williams, Mélanie Hall. 2018-05-31 The synergy between synthetic biology and biocatalysis is emerging as an important trend for future sustainable processes. This book reviews all modern and novel techniques successfully implemented in biocatalysis, in an effort to provide better performing enzymatic systems and novel biosynthetic routes to (non-)natural products. This includes the use of molecular techniques in protein design and engineering, construction of artificial metabolic pathways, and application of computational methods for enzyme discovery and design. Stress is placed on current 'hot' topics in biocatalysis, where recent advances in research are defining new grounds in enzyme-catalyzed processes. With contributions from leading academics around the world, this book makes a ground-breaking contribution to this progressive field and is essential reading for graduates and researchers investigating (bio)catalysis, enzyme engineering, chemical biology, and synthetic biology.

Industrial Biotransformations Andreas Liese, Karsten Seelbach, Christian Wandrey. 2006-08-21 The completely revised second edition of this user-friendly and application-oriented overview of one-step biotransformations of industrial importance. Based on extensive literature and patent research, this book is unique in arranging each process in a systematic way to allow for easy comparison. All the chapters have been rewritten, with all the processes updated and more than 30 new processes added. Each set of data is accompanied by key literature citations, supported by flow sheets where available, reduced to their significant elements. In addition, an extensive index classified by substrates, products, enzymes, and companies provides direct access to each process, organized according to enzyme class. Biotechnologists, biochemists, microbiologists, process engineers and those working in the chemical and biotechnological industries will find here all the significant parameters characterizing both the biotransformation and the process.

Enzymes in Organic Synthesis Ciba Foundation. 1985

Applied Biocatalysis John Whittall, Peter W. Sutton. 2020-08-21 Provides clear and comprehensive coverage of recently developed applied biocatalysis for synthetic organic chemists with an emphasis to promote green chemistry in pharmaceutical and process chemistry This book aims to make biocatalysis more accessible to both academic and industrial synthetic organic chemists. It focuses on current topics within the applied industrial biocatalysis field and includes short but detailed experimental methods on timely novel biocatalytic transformations using new enzymes or new methodologies using known enzymes. The book also features reactions that are “expanding and making the enzyme toolbox available to chemists”—providing readers with comprehensive methodology and detailed key sourcing information of a wide range of enzymes. Chapters in Applied Biocatalysis: The Chemist’s Enzyme Toolkit are organized by reaction type and feature a short introductory section describing the current state of the art for each example. Much of the book focuses on processes for which the enzymes are readily available so that organic chemists can synthesize appropriate quantities of chemicals with available materials in a standard chemical laboratory. Advanced methods are included to present examples of new enzymes that might encourage collaboration with suppliers or academic groups and that will educate chemists of rapidly expanding future possibilities. Focuses on current topics within the applied industrial biocatalysis field Offers experimental methods on novel biocatalytic transformations using new enzymes or new methodology using known enzymes Covers the hot topics of enzyme and chemoenzymatic cascades and biocatalysis in flow Edited by noted experts from both academia and industry with years of experience in the field of biocatalysis—particularly, the industrial applications of enzymes Written for synthetic organic chemists working in all industries but especially the pharmaceutical industry and for those in academia with an eye for biocatalysis, Applied Biocatalysis: The Chemist’s Enzyme Toolkit will also benefit academic groups in chemistry and related sciences that are using enzymes for synthetic purposes, as well as those working in the area of enzymology and molecular biology.

Removal of Emerging Contaminants Through Microbial Processes Maulin P Shah. 2020-10-14 The abundance of organic pollutants found in wastewater affect urban surface waters. Traditional wastewater management technologies focus on the removal of suspended solids, nutrients and bacteria, however, new pollutants such as synthetic or naturally occurring chemicals are often not monitored in the environment despite having the potential to enter the environment and cause adverse ecological and human health effects. Collectively referred to as emerging contaminants, they are mostly derived from domestic activities and occur in trace concentrations ranging from pico to micrograms per liter. Environmental contaminants are resistant to conventional wastewater treatment processes and most of them remain unaffected, causing contamination of receiving water. This in turn leads to the need for advanced wastewater treatment processes capable of removing environmental contaminants to ensure safe fresh water sources. This book provides an up-to-date overview of the current bioremediation strategies, including their limitations, challenges and their potential application to remove environmental pollutants. It also introduces the latest trends and advances in environmental bioremediation, and presents the state-of-the-art in biological and chemical wastewater treatment processes. As such, it will appeal to researchers and policy-makers, as well as undergraduate and graduate environmental sciences students.

Practical Methods for Biocatalysis and Biotransformations John Whittall, Peter W. Sutton. 2009-12-09 Biocatalysts are increasingly used by chemists engaged in fine chemical synthesis within both industry and academia. Today, there exists a huge choice of high-tech enzymes and whole cell biocatalysts, which add enormously to the repertoire of synthetic possibilities. Practical Methods for Biocatalysis and Biotransformations is a “how-to” guide focussing on commercially available enzymes and strains of microorganisms that are readily obtained from culture collections. The source of starting materials and reagents, hints, tips and safety advice (where appropriate) are given to ensure, as far as possible, that the procedures are reproducible. Comparisons to alternative methodology are given and relevant references to the primary literature are cited. Contents include: Introduction to the application of biocatalysts in the pharma industry introduction to molecular biological techniques for biocatalyst

development Lipase and protease methods including enzyme supports and dynamic kinetic resolutions Nitrile hydrolases and hydratases Alcohol dehydrogenases and co-factor recycling Epoxide hydrolases Amino acid synthesis Whole cell processes Other biocatalysts, including monoamine oxidases, aminotransferases, and lyases Practical Methods for Biocatalysis and Biotransformations is an essential text offering validated biocatalyst methods for researchers and postgraduate students in industry and academia.

Immobilized Biocatalysts Peter Grunwald.2018-11-14 This book is a printed edition of the Special Issue Immobilized Biocatalysts that was published in Catalysts

Enzyme Cascade Design and Modelling Selin Kara, Florian Rudroff.2021-02-24 This book provides a comprehensive overview of the recent developments achieved in the field of chemo/enzymatic cascades with topics spanning from design (in vitro and in vivo) to kinetic- and process modelling as well as process control. Opportunities and challenges of building multi-step chemo/enzymatic reactions are discussed, whereby the latter are critically assessed in each chapter and methods to ease the implementation are explored. Both, multi-enzymatic cascades and chemo-enzymatic cascades are presented with the motivation of combining the strengths of these two worlds (e.g. selectivity, activity and robustness) not neglecting the obstacles and challenges of such endeavour. Furthermore, the use of non-conventional media for catalytic cascade reactions, recent achievements and potential for future developments in a technical environment are addressed.

Problem Solving in Enzyme Biocatalysis Andrés Illanes, Lorena Wilson, Carlos Vera.2013-10-02 Enzyme biocatalysis is a fast-growing area in process biotechnology that has expanded from the traditional fields of foods, detergents, and leather applications to more sophisticated uses in the pharmaceutical and fine-chemicals sectors and environmental management. Conventional applications of industrial enzymes are expected to grow, with major opportunities in the detergent and animal feed sectors, and new uses in biofuel production and human and animal therapy. In order to design more efficient enzyme reactors and evaluate performance properly, sound mathematical expressions must be developed which consider enzyme kinetics, material balances, and eventual mass transfer limitations. With a focus on problem solving, each chapter provides abridged coverage of the subject, followed by a number of solved problems illustrating resolution procedures and the main concepts underlying them, plus supplementary questions and answers. Based on more than 50 years of teaching experience, Problem Solving in Enzyme Biocatalysis is a unique reference for students of chemical and biochemical engineering, as well as biochemists and chemists dealing with bioprocesses. Contains: Enzyme properties and applications; enzyme kinetics; enzyme reactor design and operation 146 worked problems and solutions in enzyme biocatalysis.

Enzymes in Nonaqueous Solvents Evgeny N. Vulfson.2008-02-05 Enzymatic catalysis has gained considerable attention in recent years as an efficient tool in the preparation of natural products, pharmaceuticals, fine chemicals, and food ingredients. The high selectivity and mild reaction conditions associated with enzymatic transformations have made this approach an attractive alternative in the synthesis of complex bioactive compounds, which are often difficult to obtain by standard chemical routes. However, the majority of organic compounds are not very soluble in water, which was traditionally perceived as the only suitable reaction medium for the application of biocatalysts. The realization that most enzymes can function perfectly well under nearly anhydrous conditions and, in addition, display a number of useful properties, e. g. , highly enhanced stability and different selectivity, has dramatically widened the scope of their application to the organic synthesis. Another great attraction of using organic solvents rather than water as a reaction solvent is the ability to perform synthetic transformations with relatively inexpensive hydrolytic enzymes. It is worth reminding the reader that in vivo, the synthetic and hydrolytic pathways are catalyzed by different enzymes. However, elimination of water from the reaction mixture enables the "reversal" of hydrolytic enzymes and thus avoids the use of the expensive cofactors or activated substrates that are required for their synthetic counterparts.

Applied Biocatalysis Adrie J.J. Straathof, Patrick Adlercreutz.2003-09-02 This book describes the essential steps in the development of biocatalytic processes from concept to completion. It is a carefully integrated text which combines the fundamentals of biocatalysis with technological experience and in-depth commercial case studies. The book starts with an introductory look at the characteristics and present applications of biocatalysts, followed by more detailed overviews of these areas.

Enzymes, Biocatalysis and Chemical Biology Stefano Serra.2020-06-18 This book provides recent studies focused on chemical biology and biocatalysis applied to organic synthesis. The articles range from topics such as fungal metabolism and fungi-mediated biotransformations to the exploitation of specific enzymes in biocatalyzed reactions, also including works on the characterization of enzymes and the study of their catalytic activity. Overall, ten studies are presented that provide the reader with relevant, fresh insights on the use of enzymes and on the importance of biocatalysis.

Biocatalyst Immobilization Maria Lujan Ferreira.2022-11-12 Biocatalyst Immobilization: Foundations and Applications provides a comprehensive overview of biocatalytic immobilization processes, as well as methods for study, characterization and application. Early chapters discuss current progress in enzyme immobilization and methods for selecting and pretreating enzymes prior to immobilization, with an emphasis on navigating common challenges and employing enzyme supports and post immobilization treatments to impact enzymatic activity. Process-based chapters instruct on measuring and reporting on enzyme immobilization efficiency, protein final content, quantification of reaction products, and the use of nanomaterials to characterize immobilized enzymes. Later chapters examine recent advances, including novel enzymatic reactors, multi-enzymatic biocatalysts, enzymatic biosensors, whole cell immobilization, the industrial application of immobilized enzymes, and perspectives on future trends. Provides a thorough overview of biocatalyst and enzyme immobilization for research and practical application Presents methods based content that instructs in enzyme immobilization pretreatment, enzyme supports, post immobilization treatments, measuring enzyme immobilization efficiency, quantification of reaction products, and whole cell immobilization Features chapter contributions from international leaders in the field

Enzyme Biocatalysis Andrés Illanes.2008-06-19 This book was written with the purpose of providing a sound basis for the design of enzymatic reactions based on kinetic principles, but also to give an updated vision of the potentials and limitations of biocatalysis, especially with respect to recent applications in processes of organic synthesis. The first five chapters are structured in the form of a textbook, going from the basic principles of enzyme structure and function to reactor design for homogeneous systems with soluble enzymes and heterogeneous systems with immobilized enzymes. The last chapter of the book is divided into six sections that represent illustrative case studies of biocatalytic processes of industrial relevance or potential, written by experts in the respective fields. We sincerely hope that this book will represent an element in the toolbox of graduate students in applied biology and chemical and biochemical engineering and also of undergraduate students with formal training in organic chemistry, biochemistry, thermodynamics and chemical reaction kinetics. Beyond that, the book pretends also to illustrate the potential of biocatalytic processes with case studies in the field of organic synthesis, which we hope will be of interest for the academia and professionals involved in R&D&I. If some of our young readers are encouraged to engage or persevere in their work in biocatalysis this will certainly be our more precious reward.

Biocatalysis Gonzalo de Gonzalo, Pablo Domínguez de María.2017-11-02 Implementing biocatalytic strategies in an industrial setting is a challenging task, especially when commercial scale necessitates a balance between industrial need and economic viability. With invited contributions from a wide range of chemical and pharmaceutical companies, this book bridges the gap between academia and industry. Contributors discuss current processes, types of biocatalysts and improvements, industrial motivation and the key aspects needed for economic success. Focussing on industry related issues, this book will be a useful tool for future research by both practitioners and academics.

Nanomaterials for Biocatalysis Guillermo R. Castro, Ashok Kumar Nadda, Tuan Anh Nguyen, Xianghui Qi, Ghulam Yasin.2021-10-12 Nanomaterials for Biocatalysis explains the fundamental design concepts and emerging applications of nanoscale biocatalysts, such as bioconversions, bioelectronics, biosensors, biocomputing and therapeutic applications. Nano-biocatalysts refers to the incorporation of enzymes into nanomaterials. These enzyme-enhanced nanocarriers have many advantages, including low mass transfer limitation, high enzyme capacity, better stabilization, and the formation of single-enzyme nanoparticles. Smart nanocontainers have been developed for the smart release of their embedded active substances. These smart releases can be obtained by using smart coatings as their outer nanoshells. In addition, these nanocontainers could protect the enzymes from chemical or metabolic alterations on their delivering pathways towards the target. This is an important reference source for materials scientists

and chemical engineers who want to know more about how nanomaterials are being used for biocatalysis applications. Explains the major fabrication techniques and applications of nanobiocatalysts Shows how nanobiocatalysts are used in a variety of environmental and biomedical sectors Assesses the major challenges associated with the widespread manufacture of nanobiocatalysts

Applied Biocatalysis Lutz Hilterhaus, Andreas Liese, Ulrich Kettling, Garabed Antranikian. 2016-07-27 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.

Novel Enzyme and Whole-Cell Biocatalysts Anwar Sunna, Richard Daniellou. 2020-11-04 The concept of a circular economy relies on waste reduction, valorization, and recycling. Global trends for "green" synthesis of chemicals have positioned the field of enzyme technology and biocatalysis (multi-enzymes and whole-cells) as an alternative for the synthesis of more social- and environmentally-responsible bio-based chemicals. Recent advances in synthetic biology, computational tools, and metabolic engineering have supported the discovery of new enzymes and the rational design of whole-cell biocatalysts. In this book, we highlight these current advances in the field of biocatalysis, with special emphasis on novel enzymes and whole-cell biocatalysts for applications in several industrial biotechnological applications.

Enzyme or Whole Cell Immobilization for Efficient Biocatalysis: Focusing on Novel Supporting Platforms and Immobilization Techniques Wen-Yong Lou, Jun Ge, Changzhu Wu, Jesús Fernández Lucas. 2021-04-21

Modification of Polymers Charles E. Carraher, James A. Moore. 2012-12-06 The sheer volume of topics which could have been included under our general title prompted us to make some rather arbitrary decisions about content. Modification by irradiation is not included because the activity in this area is being treated elsewhere. We have chosen to emphasize chemical routes to modification and have striven to present as balanced a representation of current activity as time and page count permit. Industrial applications, both real and potential, are included. Where appropriate, we have encouraged the contributors to include review material to help provide the reader with adequate context. The initial chapter is a review from a historical perspective of polymer modification and contains an extensive bibliography. The remainder of the book is divided into four general areas: Reactions and Preparation of Copolymers Reactions and Preparation of Block and Graft Copolymers Modification Through Condensation Reactions Applications The chemical modification of homopolymers such as polyvinylchloride, polyethylene, poly(chloroalkylene sulfides), polysulfones, poly(chloromethylstyrene), polyisobutylene, polysodium acrylate, polyvinyl alcohol, polyvinyl chloroformate, sulfonated polystyrene; block and graft copolymers such as poly(styrene-block-ethylene-co-butylene block-styrene), poly(1,4-polybutadiene-block ethylene oxide), star chlorine-telechelic polyisobutylene, poly(isobutylene-co-2,3-dimethyl-1,3-butadiene), poly(styrene-co-N-butylmethacrylate); cellulose, dextrans and inulin, is described.

Biocatalysts for Industry Jonathan S. Dordick. 2013-03-09 The application of enzymes or whole cells (fermentatively active or resting; microbial, plant, or animal) to carry out selective transformations of commercial importance is the central theme of industrial biocatalysis. Traditionally, biocatalysis has been in the domain of the life scientist or biochemical engineer. However, recent advances in this field have enabled biocatalytic processes to compete head on with, and in some cases outperform, conventional chemical processing. Chemo-biocatalytic systems are being developed thereby combining the most attractive features of biocatalysts, namely high specificity, with those of chemical catalysts, such as high reactivities and wide substrate specificities. Hence, synthetic chemists and chemical engineers are now beginning to use biocatalysts as highly selective reagents in chemical synthesis and processing. This book is about biocatalysts and their past, present, and potential applications in the food, pharmaceutical, and chemical industries. The concept of the book did not emanate from a meeting. Rather, it is a compilation of selected examples where biocatalysis either has already made a significant impact in the aforementioned industries, or has the potential to make a substantial contribution. I have been fortunate to have assembled contributions from world-class researchers in the field of biocatalysis. Their timely contributions are sincerely appreciated.

Enzymes for Solving Humankind's Problems José J. G. Moura, Isabel Moura, Luisa B. Maia. 2021-12-03 This book presents specific key natural and artificial systems that are promising biocatalysts in the areas of health, agriculture, environment and energy. It provides a comprehensive account of the state of the art of these systems and outlines the significant progress made in the last decade using these systems to develop innovative, sustainable and environmentally friendly solutions. Chapters from expert contributors explore how natural enzymes and artificial systems tackle specific targets such as: climate change, carbon footprint and economy and carbon dioxide utilisation; nitrogen footprint and fixation and nitrous oxide mitigation; hydrogen production, fuel cells and energy from bacteria; biomass transformation and production of added-value compounds, as well as biosensors development. This book provides an important and inspiring account for the designing of new natural and artificial systems with enhanced properties, and it appeals not only to students and researchers working in the fields of energy, health, food and environment, but also to a wider audience of educated readers that are interested in these up-to-date and exciting subjects. Chapter "Carbon Dioxide Utilisation—The Formate Route" is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

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Problem Solving In Enzyme Biocatalysis Introduction

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