

Enzymes in Nonaqueous Solvents

Methods and Protocols

Edited by

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HUMANA PRESS

Enzymes In Nonaqueous Solvents Methods And Protocols Methods In Biotechnology 15

José-Luis Barredo



Enzymes In Nonaqueous Solvents Methods And Protocols Methods In Biotechnology 15:

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

Enzymes in Nonaqueous Solvents Evgeny N. Vulfson, Peter J. Halling, Herbert L. Holland, 2001 In *Enzymes in Nonaqueous Solvents Methods and Protocols* leading chemists biochemists biotechnologists and process engineers summarize for the first time a wide range of methods for executing enzymatic transformations under nonaqueous conditions Each method includes detailed step by step instructions for its successful completion a list of materials and ancillary notes that explain the scientific basis of the procedure as well as troubleshooting Also provided are a generic description of key reactions advice on biocatalyst preparation discussion of reaction conditions and instructions on bioreactor design Comprehensive and state of the art *Enzymes in Nonaqueous Solvents Methods and Protocols* offers today's synthetic chemists biochemists and process engineers all the essential information needed to carry out enzymatic reactions in nonaqueous media as well as to successfully scale up to production quantities

Pesticide Protocols José L. Martínez Vidal, 2007-10-26 A comprehensive collection of robust methods for the detection of pesticide compounds or their metabolites useful in food environmental and biological monitoring and in studies of exposure via food water air and the skin or lungs The readily reproducible methods range from gas and liquid chromatography coupled to mass spectrometry detection and other classic detectors to capillary electrophoresis and immunochemical or radioimmunoassay methods The authors have focused on extraction and cleanup procedures in order to develop and optimize more fully automated and miniaturized methods including solid phase extraction solid phase microextraction microwave assisted extraction and on line tandem liquid chromatography LC LC trace enrichment among others The protocols offer step by step laboratory instructions an introduction outlining the principles behind the technique lists of the necessary equipment and reagents and tips on

troubleshooting and avoiding known pitfalls *Microbial Processes and Products* José-Luis Barredo, 2008-02-05 The development of biotechnology over the last 20 years and particularly the use of recombinant DNA techniques has rapidly expanded the opportunities for human benefits from living resources Efforts to reduce pollution prevent environmental damage combat microbial infection improve food production and so on can each involve fermentation or the environmental release of microorganisms Many products of fermentation technology such as alcoholic beverages bread antibiotics amino acids vitamins enzymes and others have been influenced by the progress of recombinant DNA techniques The development of new products or the more efficient manufacturing of those already being produced often involve the use of microorganisms as cell factories for many productions and biotransformations *Microbial Processes and Products* is intended to provide practical experimental laboratory procedures for a wide range of processes and products mediated by microorganisms Although not an exhaustive treatise it provides a detailed step by step description of the most recent developments in such applied biotechnological processes The detailed protocols we provide are cross referenced in the Notes section contain critical details lists of problems and their troubleshooting as well as safety recommendations that may not normally appear in journal articles and can be particularly useful for those unfamiliar with specific techniques **Microbial Enzymes and**

Biotransformations Jose Luis Barredo, 2008-02-05 Leading experts in enzyme manipulation describe in detail their cutting edge techniques for the screening evolution production immobilization and application of enzymes These readily reproducible methods can be used to improve enzyme function by directed evolution to covalently immobilize enzymes to microencapsulate enzymes and cells and to manufacture enzymes for human health nutrition and environmental protection Overview chapters on microorganisms as a source of metabolic and enzymatic diversity and on the fast moving field of enzyme biosensors are presented *Microbial Enzymes and Biotransformations* offers laboratory and industrial scientists a wealth of proven enzymatic protocols that show clearly how to go from laboratory results to successful industrial applications

Enzymes in Food and Beverage Processing Muthusamy Chandrasekaran, 2015-10-23 Biotechnology particularly eco friendly enzyme technologies has immense potential for the augmentation of diverse food products utilizing vast biodiversity resolving environmental problems owing to waste disposal from food and beverage industries In addition to introducing the basic concepts and fundamental principles of enzymes *Enzymes in Food* **Natural Products Isolation** Satya D. Sarker, 2008-02-05 The term natural products spans an extremely large and diverse range of chemical compounds derived and isolated from biological sources Our interest in natural products can be traced back thousands of years for their usefulness to humankind and this continues to the present day Compounds and extracts derived from the biosphere have found uses in medicine agriculture cosmetics and food in ancient and modern societies around the world Therefore the ability to access natural products understand their usefulness and derive applications has been a major driving force in the field of natural product research The first edition of *Natural Products Isolation* provided readers for the first time with some

practical guidance in the process of extraction and isolation of natural products and was the result of Richard Cannell's unique vision and tireless efforts. Unfortunately, Richard Cannell died in 1999 soon after completing the first edition. We are indebted to him and hope this new edition pays adequate tribute to his excellent work. The first edition laid down the ground rules and established the techniques available at the time. Since its publication in 1998, there have been significant developments in some areas in natural product isolation. To capture these developments, publication of a second edition is long overdue and we believe it brings the work up to date while still covering many basic techniques known to save time and effort and capable of results equivalent to those from more recent and expensive techniques. **Environmental**

Microbiology John F. T. Spencer, Alicia L. Ragout de Spencer, 2008-02-05. The methods included in *Environmental Microbiology Methods and Protocols* can be placed in the categories: Communities and Biofilms, Fermented Milks, Recovery and Determination of Nucleic Acids, and the review section containing chapters on the endophytic bacterium *Bacillus mojavensis*, the engineering of bacteria to enhance their ability to carry out bioremediation of aromatic compounds using the hemoglobin gene from a strain of *Vitreoscilla* 23 spp, and the use of chemical shift reagents and Na NMR to study sodium gradients in microorganisms, all of which should be of interest to investigators in these fields. The subjects treated within the different categories also cover a wide range with methods ranging from those for the study of marine organisms through those for the investigation of microorganisms occurring in ground waters including subsurface ground waters to other types of environmental waters to as varied subjects as the biodiversity of yeasts found in northwest Argentina. The range of topics described in the Fermented Milks section is smaller but significant for investigators in areas concerned with milk as an item of foods for infants, small children, and even adults. *Biosensors and Molecular Imprinting* Bo Mattiasson, Gizem Ertürk, 2018-07-06. This book is a printed edition of the Special Issue *Biosensors and Molecular Imprinting* that was published in *Sensors*.

Encyclopedia of Chemical Processing Sunggyu Lee, 2006. Collecting information of vital interest to chemical, polymer, mechanical, electrical, and civil engineers as well as chemists and chemical researchers, this *Encyclopedia* supplies nearly 350 articles on current design, engineering, science, and manufacturing practices, offering expertly written articles on technologies at the forefront of the field to maximize and enhance the research and production phases of current and emerging chemical manufacturing practices and techniques. *Solvents and Solvent Effects in Organic Chemistry*

Christian Reichardt, Thomas Welton, 2011-08-04. Now in its 4th edition, this book remains the ultimate reference for all questions regarding solvents and solvent effects in organic chemistry. Retaining its proven concept, there is no other book which covers the subject in so much depth; the handbook is completely updated and contains 15% more content, including new chapters on Solvents and Green chemistry, Classification of Solvents by their Environmental Impact, and Ionic Liquids. An essential part of every organic chemist's library. **Biobased Surfactants** Douglas G. Hayes, Daniel K. Solaiman, Richard D.

Ashby, 2019-04-30. *Biobased Surfactants: Synthesis, Properties, and Applications*, Second Edition, covers biosurfactant synthesis

and applications and demonstrates how to reduce manufacturing and purification costs impurities and by products Fully updated this book covers surfactants in biomedical applications detergents personal care food pharmaceuticals cosmetics and nanotechnology It reflects on the latest developments in biobased surfactant science and provides case scenarios to guide readers in efficient and effective biobased surfactant application along with strategies for research into new applications This book is written from a biorefinery based perspective by an international team of experts and acts as a key text for researchers and practitioners involved in the synthesis utilization and development of biobased surfactants Describes new and emerging biobased surfactants and their synthesis and development Showcases an interdisciplinary approach to the topic featuring applications to chemistry biotechnology biomedicine and other areas Presents the entire lifecycle of biobased surfactants in detail

Enzymes and Their Biotechnological Applications Pabulo H. Rampelotto, 2018-10-02 This book is a printed edition of the Special Issue Enzymes and Their Biotechnological Applications that was published in Biomolecules

Biocatalysis Gonzalo de Gonzalo, Pablo Domínguez de María, 2017-11-02 Implementing biocatalytic strategies in an industrial setting at a commercial scale is a challenging task necessitating a balance between industrial need against economic viability With invited contributions from small and large scale 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 key aspects to economically succeed With its focus on industry related issues this book will be a useful tool for future research by both practitioners and academics

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

Encyclopedia of Catalysis István T. Horváth, 2003 Catalysis the speeding up of a chemical reaction by a substance which itself does not react is vital not only to the chemical process industry but also to life itself The

six volume Encyclopedia of Catalysis is the definitive A to Z reference work covering the most significant aspects of homogenous heterogeneous asymmetric biomimetic and biological catalysis Available both on line and in print the state of the art Encyclopedia encompasses the principles of catalysis the scope of catalytic reactions the preparation characterization and use of catalysts including catalytic technology the modeling of catalytic processes and related reaction engineering techniques The logical organization of this seminal work renders the text easily accessible to both process personnel and those involved in basic and applied research and development For more information regarding the online edition please visit Wiley InterScience at www.mrw.interscience.wiley.com/enccat

Introduction to Green Chemistry John Andraos, Albert S. Matlack, 2022-03-09 Interest in green chemistry and clean processes has grown so much in recent years that topics such as fluororous biphasic catalysis metal organic frameworks and process intensification which were barely mentioned in the First Edition have become major areas of research In addition government funding has ramped up the development of fuel cells and biofuels This reflects the evolving focus from pollution remediation to pollution prevention Copiously illustrated with more than 800 figures the Third Edition provides an update from the frontiers of the field It features supplementary exercises at the end of each chapter relevant to the chemical examples introduced in each chapter Particular attention is paid to a new concluding chapter on the use of green metrics as an objective tool to demonstrate proof of synthesis plan efficiency and to identify where further improvements can be made through fully worked examples relevant to the chemical industry

NEW AND EXPANDED RESEARCH TOPICS Metal organic frameworks Metrics Solid acids for alkylation of isobutene by butanes Carbon molecular sieves Mixed micro and mesoporous solids Organocatalysis Process intensification and gas phase enzymatic reactions Hydrogen storage for fuel cells Reactive distillation Catalysts in action on an atomic scale

UPDATED AND EXPANDED CURRENT EVENTS TOPICS Industry resistance to inherently safer chemistry Nuclear power Removal of mercury from vaccines Removal of mercury and lead from primary explosives Biofuels Uses for surplus glycerol New hard materials to reduce wear Electronic waste Smart growth The book covers traditional green chemistry topics including catalysis benign solvents and alternative feedstocks It also discusses relevant but less frequently covered topics with chapters such as Chemistry of Long Wear and Population and the Environment This coverage highlights the importance of chemistry to everyday life and demonstrates the benefits the expanded exploitation of green chemistry can have for society

Methods in Non-Aqueous Enzymology Munishwar N. Gupta, 2013-12-01 Extending the range of enzymatic catalysis by using non aqueous media has now developed into a powerful approach in biochemistry and biotechnology One peculiar feature which distinguishes it from the conventional enzymology carried out in aqueous buffers is that the awareness of different parameters that control and influence the behaviour of enzymes in such environments has emerged rather slowly Science is about being able to repeat what somebody else has done Absence of knowledge about such well defined parameters factors has sometimes made some workers rather cautious and diffident about using this approach in their

laboratories But for this non aqueous enzymology would be more widely practised It is these thoughts that made me feel that the availability of some well defined protocols for various applications involving enzymes in non aqueous environments would further catalyze the growth of this area Hence this book in which each chapter has some protocols in a specific area The protocols are preceded by brief background material The early chapters which are of general importance concern control of water activity and stabilization via immobilization Some subsequent chapters provide the protocols for transformations involving lipids and carbohydrates peptide synthesis and preparation of chiral compounds The disproportionate focus on lipases is not a coincidence this class of enzymes has been used more often than others in non aqueous enzymology

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

Novel Surfactants Krister Holmberg, 2003-07-03 Extensively revised and expanded this timely reference discusses the synthesis properties and potential applications of popular and emerging surfactant compounds and systems This reference reflects current research trends in green surfactants the production of surfactants using biotechnological methods and surfactants based on natural building

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