

Fundamentals Of Industrial Catalytic Processes

Hardcover

Introduction to Catalysis and Industrial Catalytic Processes Fundamentals of Industrial Catalytic Processes Industrial Catalytic Processes for Fine and Specialty Chemicals Fundamentals of Industrial Catalytic Processes Fundamentals of Industrial Catalytic Processes Industrial Catalysis Industrial catalytic processes Industrial Catalysis Metal-catalysis in Industrial Organic Processes Fundamentals of Industrial Catalytic Processes Catalysis Industrial Catalysis New Industrial Catalytic Processes Industrial Catalysis Introduction to Catalysis and Industrial Catalytic Processes Proceedings of the ACS Symposium on New Industrial Catalytic Processes The Development of Catalysis Heterogeneous Catalysis and its Industrial Applications Catalysis Looks to the Future Industrial Catalysts Significance Robert J. Farrauto C. H. Bartholomew Sunil S Joshi Calvin H. Bartholomew Robert J. Farrauto Jens Hagen Wolfgang F. Hölderich Ruud I. Wijngaarden Gian Paolo Chiusoli Robert J. Farrauto J.A. Moulijn Mark Anthony Benvenuto American Chemical Society James D. Burrington Robert J. Farrauto John N. Armor Adriano Zecchina Martin Schmal National Research Council Aiden Feynman

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Calvin H. Bartholomew Robert J. Farrauto Jens Hagen Wolfgang F. Hölderich Ruud I. Wijngaarden Gian Paolo Chiusoli Robert J. Farrauto J.A. Moulijn Mark Anthony Benvenuto American Chemical Society James D. Burrington Robert J. Farrauto John N. Armor Adriano Zecchina Martin Schmal National Research Council Aiden Feynman

introduces major catalytic processes including products from the petroleum chemical environmental and alternative energy industries provides an easy to read description of the fundamentals of catalysis and some of the major catalytic industrial processes used today offers a rationale for process designs based on kinetics and thermodynamics alternative energy topics include the hydrogen economy fuels cells bio catalytic enzymes production of ethanol fuel from corn and biodiesel from vegetable oils problem sets of included with answers available to faculty who use the book review in less than 300 pages it serves as an excellent introduction to these subjects whether for advanced students or those seeking to learn more about these subjects on their own time particularly useful are the succinct summaries throughout the book excellent detail in the table of contents a detailed index key references at the end of each chapter and challenging classroom questions globalcatalysis.com may 2016

catalysis is central to the chemical industry as it is directly or involved in the production of almost all useful chemical products in this book the authors present the definitive account of industrial catalytic processes throughout fundamentals of industrial catalytic processes the information is illustrated with many case studies and problems this book is valuable to anyone wanting a clear account of industrial catalytic processes but is particularly useful to industrial and academic chemists and engineers and graduate working on catalysis this book also covers fundamentals of catalytic processes including chemistry catalyst preparation properties and reaction engineering addresses heterogeneous catalytic processes employed by industry provides detailed data on existing catalysts and catalytic reactions process design and chemical engineering covers catalysts used in fuel cells

industrial catalytic processes for fine and specialty chemicals provides a comprehensive methodology and state of the art toolbox for industrial catalysis the book begins by introducing the reader to the interesting challenging and important field of catalysis and catalytic processes the fundamentals of catalysis and catalytic processes are fully

covered before delving into the important industrial applications of catalysis and catalytic processes with an emphasis on green and sustainable technologies several case studies illustrate new and sustainable ways of designing catalysts and catalytic processes the intended audience of the book includes researchers in academia and industry as well as chemical engineers process development chemists and technologists working in chemical industries and industrial research laboratories discusses the fundamentals of catalytic processes catalyst preparation and characterization and reaction engineering outlines the homogeneous catalytic processes as they apply to specialty chemicals introduces industrial catalysis and catalytic processes for fine chemicals includes a number of case studies to demonstrate the various processes and methods for designing green catalysts

now in its 3rd edition industrial catalysis offers all relevant information on catalytic processes in industry including many recent examples perfectly suited for self study it is the ideal companion for scientists who want to get into the field or refresh existing knowledge the updated edition covers the full range of industrial aspects from catalyst development and testing to process examples and catalyst recycling the book is characterized by its practical relevance expressed by a selection of over 40 examples of catalytic processes in industry in addition new chapters on catalytic processes with renewable materials and polymerization catalysis have been included existing chapters have been carefully revised and supported by new subchapters for example on metathesis reactions refinery processes petrochemistry and new reactor concepts i found the book accessible readable and interesting both as a refresher and as an introduction to new topics and a convenient first reference on current industrial catalytic practice and processes excerpt from a book review for the second edition by p c h mitchell applied organometallic chemistry 2007

this is a book for developers of catalysts and for practitioners working in the field of design operation and optimization of chemical reactors in which heterogeneous catalysis is performed it is designed to give a better understanding of the phenomena which can influence catalyst performance since two disciplines chemistry and chemical engineering meet in catalyst research and development this book covers the chemical point of view for engineers and the engineering point of view for chemists it starts with an introduction

explaining selectivity activity and effectiveness providing the fundamentals for the newcomer catalyst preparation and catalyst testing are also described a method is introduced that can be used to calculate the effectiveness of catalyst pellets as a function of shape size pore size type of kinetics and diffusion and temperature and pressure conditions optimization of catalysts and troubleshooting are also covered this is a book without any rivals because of its practical relevance

catalysis underpins most modern industrial organic processes it has become an essential tool in creating a greener chemical industry by replacing more traditional stoichiometric reactions which have high energy consumption and high waste production with mild processes which increasingly resemble nature's enzymes metal catalysis in industrial organic processes considers the major areas of the field and discusses the logic of using catalysis in industrial processes the book provides information on oxidation hydrogenation carbonylation C-C bond formation metathesis and polymerization processes as well as on the mechanisms involved in addition two appendices offer a concise treatment of homogeneous and heterogeneous catalysis numerous exercises referring to problems of catalytic processes and research perspectives complete the book this definitive reference source written by practising experts in the field provides detailed and up to date information on key aspects of metal catalysis

catalysis is a multidisciplinary activity which is reflected in this book the editors have chosen a novel combination of basic disciplines homogeneous catalysis by metal complexes is treated jointly with heterogeneous catalysis with metallic and non metallic solids the main theme of the book is the molecular approach to industrial catalysis in the introductory section chapter 1 presents a brief survey of the history of industrial heterogeneous and homogeneous catalysis subsequently a selection of current industrial catalytic processes is described chapter 2 a broad spectrum of important catalytic applications is presented including the basic chemistry some engineering aspects feedstock sources and product utilisation in chapter 3 kinetic principles are treated the section on fundamental catalysis begins with a description of the bonding in complexes and to surfaces chapter 4 the elementary steps on complexes and surfaces are described the chapter on heterogeneous catalysis 5 deals with the mechanistic aspects

of three groups of important reactions syn gas conversion hydrogenation and oxidation the main principles of metal and metal oxide catalysis are presented likewise the chapter on homogeneous catalysis 6 concentrates on three reactions representing examples from three areas carbonylation polymerization and asymmetric catalysis identification by in situ techniques has been included many constraints to the industrial use of a catalyst have a macroscopic origin in applied catalysis it is shown how catalytic reaction engineering deals with such macroscopic considerations in heterogeneous as well as homogeneous catalysis chapter 7 the transport and kinetic phenomena in both model reactors and industrial reactors are outlined the section on catalyst preparation chapters 8 and 9 is concerned with the preparation of catalyst supports zeolites and supported catalysts with an emphasis on general principles and mechanistic aspects for the supported catalysts the relation between the preparative method and the surface chemistry of the support is highlighted the molecular approach is maintained throughout the first chapter 10 in the section on catalyst characterization summarizes the most common spectroscopic techniques used for the characterisation of heterogeneous catalysts such as xps auger exafs etc temperature programmed techniques which have found widespread application in heterogeneous catalysis both in catalyst characterization and simulation of pretreatment procedures are discussed in chapter 11 a discussion of texture measurement theory and application concludes this section 12 the final chapter 13 gives an outline of current trends in catalysis two points of view are adopted the first one focusses on developments in process engineering most often these have their origin in demands by society for better processes the second point of view draws attention to the autonomous developments in catalysis which is becoming one of the frontier sciences of physics and chemistry in this book emphasis is on those reactions catalyzed by heterogeneous and homogeneous catalysts of industrial relevance the integrative treatment of the subject matter involves many disciplines consequently the writing of the book has been a multi author task the editors have carefully planned and harmonized the contents of the chapters

industrial catalysis provides an excellent introduction to catalytic principles and processes addressing the applications of inorganic organic and biocatalysts in industrial chemistry each chapter is focussed on one catalytic process and discusses its life cycle from

source materials catalyst synthesis the catalytic process lifetime and recovery the book also includes a comprehensive overview on industrial processes employing catalysis

industrial catalysis chemistry and mechanism is an essential textbook for upper level undergraduate and graduate students with an interest in the underlying concepts of catalysis industrial organic chemistry and the mechanism of catalysis for undergraduates it provides an introduction to the basic catalytic principles and industrial processes graduate students will find that the book gives an in depth understanding of the mechanism of catalytic surface intermediates and the practice of modern catalysis research for the post graduate and industrial chemist involved in catalysis research it is a valuable reference text as a compendium of mechanisms by which major industrial catalytic processes operate this unique book fills the gap between basic organic chemistry and fundamental chemical principles of catalysis and is a must read for students and researchers in the field

introduces major catalytic processes including products from the petroleum chemical environmental and alternative energy industries provides an easy to read description of the fundamentals of catalysis and some of the major catalytic industrial processes used today offers a rationale for process designs based on kinetics and thermodynamics alternative energy topics include the hydrogen economy fuels cells bio catalytic enzymes production of ethanol fuel from corn and biodiesel from vegetable oils problem sets of included with answers available to faculty who use the book review in less than 300 pages it serves as an excellent introduction to these subjects whether for advanced students or those seeking to learn more about these subjects on their own time particularly useful are the succinct summaries throughout the book excellent detail in the table of contents a detailed index key references at the end of each chapter and challenging classroom questions globalcatalysis.com may 2016

this book gradually brings the reader through illustrations of the most crucial discoveries into the modern world of chemical catalysis readers and experts will better understand the enormous influence that catalysis has given to the development of modern societies highlights the field's onset up to its modern days covering the life and achievements of luminaries of the catalytic era appeals to general audience in interpretation and analysis

but preserves the precision and clarity of a scientific approach fills the gap in publications that cover the history of specific catalytic processes

this book aims to introduce the basic concepts involved in industrial catalytic processes it is profusely illustrated with experimental results with the main objective of guiding how to select a suitable catalyst for specific processes the book is divided in two parts in the first part the basic concepts are addressed regarding the existing theories activity patterns and adsorption desorption phenomena in the second part the key experimental methods for the physicochemical characterization of catalysts are presented as well as the currently used catalyst pre and post treatments the last chapter describes some important in situ characterization techniques e g xps and tem and surface model patterns related to surface modifications occurring during the reaction thoroughly illustrated with microscopy images spectroscopy data and schematics of reaction mechanisms the book provides a powerful learning tool for students in undergraduate and graduate level courses on the field of catalysis exercises and resolved problems are provided as well as experimental procedures to support laboratory classes furthermore the content is presented in a carefully chosen sequence reflecting the 30 year teaching experience of the author the author professor martin schmal sees the present book as a way of conveying basic knowledge needed for the development of more efficient catalysts i e nanostructured materials and novel industrial chemical processes in the fields of environmental chemistry fine chemistry hydrotreating of heavy oils hydrogen production and biomass processing

the impact of catalysis on the nation s economy is evidenced by the fact that catalytic technologies generate u s sales in excess of 400 billion per year and a net positive balance of trade of 16 billion annually this book outlines recent accomplishments in the science and technology of catalysis and summarizes important likely challenges and opportunities on the near horizon it also presents recommendations for investment of financial and human resources by industry academe national laboratories and relevant federal agencies if the nation is to maintain continuing leadership in this field© one that is critical to the chemical and petroleum processing industries essential for energy efficient means for environmental protection and vital for the production of a broad range of pharmaceuticals

industrial catalysts significance explores the vital role of catalysts in modern industry focusing on their fundamental principles applications and ongoing development catalysts accelerate chemical reactions enabling the efficient production of everything from fertilizers to plastics one intriguing fact is that the haber bosch process utilizing an iron catalyst revolutionized fertilizer production and averted potential famine the book argues that catalysts are indispensable for sustainable industrial development crucial for tackling resource scarcity energy efficiency and environmental protection the book begins with basic catalysis concepts before examining applications in fertilizer production and petrochemical processes it then progresses to the latest advancements in catalyst research such as novel materials and computational modeling a unique aspect is its bridge between fundamental research and industrial applications providing a comprehensive understanding of real world catalyst performance case studies and experimental data support the book s claims making it a valuable resource for scientists engineers and students alike emphasizing the need for sustainable and environmentally friendly catalytic processes

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Introduction

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