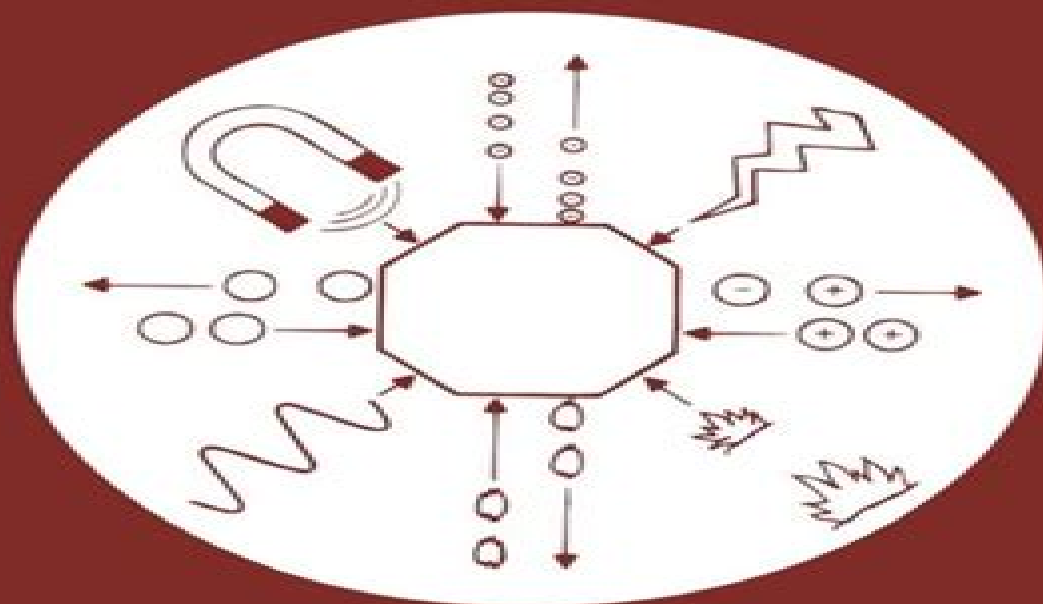


studies in surface science and catalysis



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CATALYSIS: AN INTEGRATED APPROACH
SECOND, REVISED AND ENLARGED EDITION

R.A. van Santen
P.W.N.M. van Leeuwen
J.A. Moulijn
B.A. Averill
(editors)



elsevier

Catalysis An Integrated Approach

J. W. Niemantsverdriet



Catalysis An Integrated Approach:

Catalysis: An Integrated Approach R.A. van Santen, B.A. Averill, J.A. Moulijn, P.W.N.M. van Leeuwen, 2000-09-26 This book concentrates on industrially relevant reactions which are catalyzed by heterogeneous and homogeneous catalysts. Homogeneous catalysis by metal complexes is treated jointly with heterogeneous catalysis using metallic and non-metallic solids. In both areas the high degree of sophistication of spectroscopic techniques and theoretical modelling has led to an enormous increase in our understanding at the molecular level. This holds for the kinetics of the reactions and the reactivities of the catalysts as well as for the syntheses of the catalytic materials. The development of catalysis science since the first edition of this book has necessitated a thorough revision including special chapters on biocatalysis, catalyst characterization and adsorption methods. The multidisciplinary nature of catalysis is reflected in the choice of a novel combination of basic disciplines which will be refreshing and inspiring to readers.

Catalysis J.A. Moulijn, P.W.N.M. van Leeuwen, R.A. van Santen, 1993-09-09 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

Catalysis Ulf Hanefeld, Leon Lefferts, 2018-02-20 Written by an excellent highly experienced and motivated team of lecturers this textbook is based on one of the most successful courses in catalysis and as such is tried and tested by generations of graduate and PhD students i e the Catalysis An Integrated Approach CAIA course organized by NIOK the Dutch Catalysis research school It covers all essential aspects of this important topic including homogeneous heterogeneous and biocatalysis but also kinetics catalyst characterization and preparation reactor design and engineering The perfect source of information for graduate and PhD students in chemistry and chemical engineering as well as for scientists wanting to refresh their knowledge

Catalysis Rutger A. van Santen, 1999 **Catalysis**, 1993 **Catalysis** Jacob A. Moulijn, P. W. N. M. van Leeuwen, R. A. van Santen, 1993 **Catalysis: An Integrated Approach to Homogeneous, Heterogeneous and Industrial Catalysis; Studies in Surface Science and Catalysis**, 1993 Catalysis: An Integrated Approach; Second Revised and Enlarged Edition; Studies in Surface Science and Catalysis, 1999 **Spectroscopy in Catalysis** J. W. Niemantsverdriet, 2007-09-24 Superbly organized and of great pedagogic value Spectroscopy in Catalysis describes the most important modern analytical techniques used to investigate catalytic surfaces These include electron ion and vibrational spectroscopy mass spectrometry temperature programmed techniques diffraction and microscopy With the focus on practical use rather than theory each chapter presents current applications to illustrate the type of information that the technique provides and evaluates its possibilities and limitations allowing selection of the best catalyst and the correct technique to solve a given problem This third edition includes significant new developments and case studies with all the chapters updated by way of recent examples and relevant new literature For students and for everyone who wants a digestible introduction to catalyst characterization From reviews of the previous editions This is a truly valuable book very useful for industrial practitioners who need to be aware of the type of information that can be obtained from modern surface spectroscopies The book has a superb pedagogic value Journal of Catalysis this is an excellent text on spectroscopies in catalysis and I highly recommend it for introductory courses on heterogeneous catalysis or as a general introductory monograph Journal of the American Chemical Society *Contemporary Chemical Approaches for Green and Sustainable*

Drugs Marianna Torok, 2022-08-26 Contemporary Chemical Approaches for Green and Sustainable Drugs provides readers with the knowledge they need to integrate sustainable approaches into their work Sections cover different aspects of green and sustainable drug development from design to disposal including computer aided drug design green resourcing of drugs and drug candidates an overview of the health concerns of pharmaceutical pollution and a survey of potential chemical methods for its reduction Drawing together the knowledge of a global team of experts this book provides an inclusive overview of the chemical tools and approaches available for minimizing the negative environmental impact of current and newly developed drugs This will be a useful guide for all academic and industrial researchers across green and sustainable chemistry medicinal chemistry environmental chemistry and pharmaceutical science Provides an integrative overview of the environmental risks of drugs and drug by products to support chemists in pre emptively addressing these issues Highlights the advantages of computer aided drug design green and sustainable sourcing and novel methods for the production of safer more effective drugs Presents individual chapters written by renowned experts with diverse backgrounds Reflects research in practice through selected case studies and extensive state of the art reference sections to serve as a starting point in the design of any specialized environmentally conscious medicinal chemistry project

Fine Chemicals Manufacture A.

Cybulski, 2001 The sector of fine chemicals including pharmaceuticals agrochemicals dyes and pigments fragrances and flavours intermediates and performance chemicals is growing fast For obvious reasons chemistry is a key to the success in developing new processes for fine chemicals However as a rule chemists formulate results of their work as recipes which usually lack important information for process development Fine Chemicals Manufacture Technology and Engineering is intended to show what is needed to make the recipe more useful for process development purposes and to transform the recipe into an industrial process that will be safe environmentally friendly and profitable The goal of this book is to form a bridge between chemists and specialists of all other branches involved in the scale up of new processes or modification of existing processes with both a minimum effort and risk and maximum profit when commercializing the process New techniques for scale up and optimization of existing processes and improvements in the utilization of process equipment that have been developed in recent years are presented in the book

Science of Synthesis: C-1 Building Blocks in Organic Synthesis Vol. 1

Piet W.N.M. van Leeuwen, 2014-05-14 The two volume set on C 1 Building Blocks in Organic Synthesis critically reviews the state of the art of a wide variety of reactions by which one carbon atom is added to an organic molecule forming a C C bond In spite of the numerous classic reactions of this kind there has been enormous progress in recent years especially for those reactions involving catalytic methods Introduction of substituted methyl groups is a major challenge and only very recently the first catalysts have been discovered that enable the introduction of fluoromethyl groups in aromatics

McGraw-Hill encyclopedia of science & technology McGraw-Hill, 2002 *Comprehensive Organometallic Chemistry*

III D. M. P. Mingos, Robert Crabtree, 2006-12-26 Comprehensive Organometallic Chemistry COMC III Third Edition 13

Volume Set is aimed at the specialist and non specialist alike It covers the major developments in the field in a carefully presented way with extensive cross references COMC III provides a clear and comprehensive overview of developments since 1993 and attempts to predict trends in the field over the next ten years Applications of organometallic chemistry continue to expand and this has been reflected by the significant increase in the number of volumes devoted to applications in COMC III Organic chemists have edited the volumes on organometallic chemistry towards organic synthesis this is now organized by reaction type so as to be readily accessible to the organic community Like its predecessors COMC 1982 and COMC II 1995 this new work is the essential reference text for any chemist or technologist who needs to use or apply organometallic compounds Also available online via ScienceDirect 2006 featuring extensive browsing searching and internal cross referencing between articles in the work plus dynamic linking to journal articles and abstract databases making navigation flexible and easy For more information pricing options and availability visit www.info.sciencedirect.com Presents a comprehensive overview of the major developments in the field since 1993 providing general and significant insights Highlights the expansion of applications in organometallic chemistry with a strong organic synthesis focus Provides a structured first point of entry to the key literature and background material for those planning research teaching and writing about the area

Preparation of Catalysts, 1995 **Aslib Book Guide**, 1994 **Cerium-ferrierite Catalyst Systems for Reduction of NO_x in Lean Burn Engine Exhaust Gas** Germaine Seijger, Germaine Bertine Frédérique Seijger, 2002

Contents of this Doctoral Dissertation include NO_x emission reduction from lean burn engines automotive exhaust gas emissions Reactions of NO_x in the atmosphere Engine market share and sales trends Ferrierite characteristics synthesis and application Characteristics of the group of FER framework structures Screening of silver and cerium exchanged zeolite catalysts for the lean burn reduction of NO_x with propene Hydrocarbon NO_x reduction in lean burn exhaust gas over Ce FER catalysts Approach to the kinetics of NO_x reduction with propene over Ce H Ferrierite In SITU preparation of ferrierite coatings on cordierite honeycomb supports Concluding remarks

Semiconductor Nanoclusters - Physical, Chemical, and Catalytic Aspects P.V. Kamat, D. Meisel, 1997

During the past decade there has been a phenomenal growth in the basic research of semiconductor nanoclusters and other nanomaterials As the field has evolved the emphasis has shifted from basic theoretical description to field utilization of nanostructure based devices The topics of the various chapters presented in this book written by leaders in the field highlight the salient features of nanocrystalline semiconductor materials Features of this book Provides synthetic strategies to generate ultrasmall particles films and wires Describes the characterization methodologies of a large number of nanomaterials from the molecular level to the long range crystallographic ordering Develops theoretical descriptions of present day quantum confinement effects in various materials including metallic particles III V semiconductors and porous silicon Explores the fate of photoinduced charge carriers in these materials and the phenomena of charge transfer across interfaces Covers the utilization of these newly discovered effects in analytical

chemistry organic synthesis environmental remediation and electrochemistry The aim of the book is to present the necessary background material for advanced undergraduate students in the field of physical chemistry and materials science and provide a reference book for the experts in this area **The Catalytic Conversion of CO₂ Into Useful Products** Ian Anthony Fisher, 1998 **High Temperature Gas-solid Reactions in Earth and Planetary Processes** Bruce Fegley, Terry Seward, 2018 Reviews in Mineralogy Geochemistry RiMG volumes contain concise advances in theoretical and or applied mineralogy crystallography petrology and geochemistry

This book delves into Catalysis An Integrated Approach. Catalysis An Integrated Approach is an essential topic that must be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Catalysis An Integrated Approach, encompassing both the fundamentals and more intricate discussions.

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 - Chapter 2: Essential Elements of Catalysis An Integrated Approach
 - Chapter 3: Catalysis An Integrated Approach in Everyday Life
 - Chapter 4: Catalysis An Integrated Approach in Specific Contexts
 - Chapter 5: Conclusion
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3. In chapter 2, this book will delve into the foundational concepts of Catalysis An Integrated Approach. This chapter will elucidate the essential principles that must be understood to grasp Catalysis An Integrated Approach in its entirety.
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5. In chapter 4, this book will scrutinize the relevance of Catalysis An Integrated Approach in specific contexts. This chapter will explore how Catalysis An Integrated Approach is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, the author will draw a conclusion about Catalysis An Integrated Approach. This chapter will summarize the key points that have been discussed throughout the book.

This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Catalysis An Integrated Approach.

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