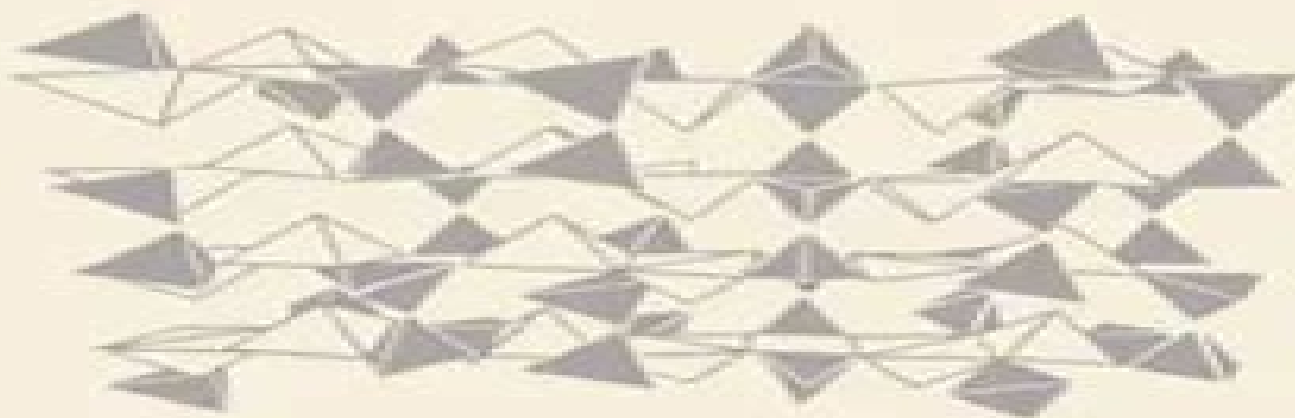


Heterogeneous Hydrocarbon Oxidation



EDITED BY
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Heterogeneous Hydrocarbon Oxidation

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Oyama, American Chemical Society.
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Chemistry, American Chemical Society.
Division of Petroleum
Chemistry, American Chemical Society.
Meeting**

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Heterogeneous Hydrocarbon Oxidation, 1996 *Heterogeneous Hydrocarbon Oxidation* Barbara K. Warren, S. Ted Oyama, American Chemical Society. Division of Colloid and Surface Chemistry, American Chemical Society. Division of Petroleum Chemistry, American Chemical Society. Meeting, 1996 Compares and contrasts complete combustion and partial oxidation Critically reviews the latest theories on oxidation and the factors that determine selectivity Presents the latest advances in alkane oxidation including methane activation Describes novel methods of catalyst preparation and characterization Provides examples of oxidation by nontraditional oxidants like ozone hydrogen peroxide sulfates nitrates and light

Hydrocarbon Chemistry George A. Olah, Arpad Molnar, G. K. Surya Prakash, 2017-08-29 This book provides an unparalleled contemporary assessment of hydrocarbon chemistry presenting basic concepts current research and future applications Comprehensive and updated review and discussion of the field of hydrocarbon chemistry Includes literature coverage since the publication of the previous edition Expands or adds coverage of carboxylation sustainable hydrocarbons extraterrestrial hydrocarbons Addresses a topic of special relevance in contemporary science since hydrocarbons play a role as a possible replacement for coal petroleum oil and natural gas as well as their environmentally safe use Reviews of prior edition literature coverage is comprehensive and ideal for quickly reviewing specific topics of most value to industrial chemists Angewandte Chemie and useful for chemical engineers as well as engineers in the chemical and petrochemical industries Petroleum Science and Technology

Chemistry of Hydrocarbon Combustion David. Hucknall, 2012-12-06 The scientific and economic importance of the high temperature reactions of hydrocarbons in both the presence and absence of oxygen cannot be overemphasized A vast chemical industry exists based on feedstocks produced by the controlled pyrolysis of hydrocarbons while uncontrolled combustion in air is still among the most important sources of heat and mechanical energy The detonation and explosion of hydrocarbon oxidant mixtures can however be a highly dangerous phenomenon which destroys lives and equipment In order that control can be exerted over combustion processes a complete description of hydrocarbon oxidation and pyrolysis is required A major contribution to this is an understanding of the unstable intermediates involved and their reactions The aim of this book is to review our knowledge of the chemistry of hydrocarbon combustion and to consider the data which are available for relevant reactions Chapter 1 describes early studies in which the apparent complexity of the chemistry was established and the type of information required for a better understanding was defined Experimental studies of the overall process which were carried out with the aim of establishing the sequence of stable chemical intermediates and some of the unstable species are described in Chapter 2 The limited nature of the information thus obtained showed that independent studies of individual reactions involving the unstable species were required In Chapter 3 investigations specifically aimed at the determination of the kinetics of elementary reactions are discussed

The Technology of Catalytic Oxidations Philippe Arpentinier, Fabrizio Cavani, Ferruccio Trifirò, 2001 Volume 1

covers the most important technological aspects of the use of molecular oxygen for catalytic oxidation reactions Volume 2 addresses the safety issues associated with the use of oxygen in catalytic oxidation reactions Contents Vol 1 1 Introduction 2 Chemical physical properties of molecular oxygen 3 Oxygen production technologies 4 Chemical fundamentals of oxidation reactions 5 Reactor technologies for multiphase systems 6 Liquid phase oxidations 7 Gas phase selective oxidations 8 Selective oxidation of paraffins References Index Vol 2 9 Introduction to safety problems in the chemical industry 10 Chemical aspects of combustion in the gaseous phase 11 Homogeneous chemical explosions autoignition or spontaneous ignition 12 Deflagration or propagation of flame 13 Conditions governing flame propagation capability 14 Detonation in the gaseous phase 15 Prevention of and protection against explosions References Index

Organometallic Chemistry and Catalysis Didier Astruc, 2007-08-14 This volume covers both basic and advanced aspects of organometallic chemistry of all metals and catalysis In order to present a comprehensive view of the subject it provides broad coverage of organometallic chemistry itself The catalysis section includes the challenging activation and fictionalization of the main classes of hydrocarbons and the industrially crucial heterogeneous catalysis Summaries and exercises are provided at the end of each chapter and the answers to these exercises can be found at the back of the book Beginners in inorganic organic and organometallic chemistry as well as advanced scholars and chemists from academia and industry will find much value in this title

Catalytic Activation and Functionalisation of Light Alkanes E.G. Derouane, Jerzy Haber, Francisco Lemos, Fernando Ramôa Ribeiro, Michel Guisnet, 2013-11-11 Light alkanes tend to be resistant to many forms of activation The horizontal approach of the present book covers homogeneous heterogeneous and biological catalysis thus allowing readers to gain an awareness of progress and ideas in research areas different from their own The book contains both general chapters giving an overview of the subject and specialised contributions that deal with the details and state of the art A specialist report is also included which gives a critical insight into current progress and discusses future prospects and major challenges Audience Newcomers and senior researchers in the field of alkane activation The mixed theoretical and practical approach will be of interest to researchers and industrialists alike

Encyclopedia of Surface and Colloid Science - Arthur T. Hubbard, 2002-07-18 This comprehensive reference collects fundamental theories and recent research from a wide range of fields including biology biochemistry physics applied mathematics and computer materials surface and colloid science providing key references tools and analytical techniques for practical applications in industrial agricultural and forensic processes as well as in the production of natural and synthetic compounds such as foods minerals paints proteins pharmaceuticals polymers and soaps

Activation of Saturated Hydrocarbons by Transition Metal Complexes A.E. Shilov, 1984-06-30

Activation and Catalytic Reactions of Saturated Hydrocarbons in the Presence of Metal Complexes A.E. Shilov, Georgiy B. Shul'pin, 2006-04-11 Chemistry is the science about breaking and forming of bonds between atoms One of the most important processes for organic chemistry is breaking bonds C H as well as C C in various compounds and primarily

in hydrocarbons Among hydrocarbons saturated hydrocarbons alkanes methane ethane propane hexane etc are especially attractive as substrates for chemical transformations This is because on the one hand alkanes are the main constituents of oil and natural gas and consequently are the principal feedstocks for chemical industry On the other hand these substances are known to be the less reactive organic compounds Saturated hydrocarbons may be called the noble gases of organic chemistry and if so the first representative of their family methane may be compared with extremely inert helium As in all comparisons this parallel between noble gases and alkanes is not fully accurate Indeed the transformations of alkanes including methane have been known for a long time These reactions involve the interaction with molecular oxygen from air burning the main source of energy as well as some mutual interconversions of saturated and unsaturated hydrocarbons However all these transformations occur at elevated temperatures higher than 300 500 C and are usually characterized by a lack of selectivity The conversion of alkanes into carbon dioxide and water during burning is an extremely valuable process but not from a chemist viewpoint

Catalytic Ignition of Hydrogen and Hydrogen-Hydrocarbon Blends Over Noble Metals Nickolai M. Rubtsov, Kirill Ya. Troshin, Michail I. Alymov, 2023-06-01 This book examines the issues on noble metal influence on gaseous combustion The book focuses on the new data on combustion processes having practical applications and includes fire safety issues in the use of noble metals in hydrogen recombiners for NPP as well as in catalytically stabilized CS combustion technology including stimulation of combustion of hydrogen blended hydrocarbons synthesis of carbon nanotubes and determination of catalytic ignition limits in noble metal hydrogen hydrocarbon systems to meet the challenges of explosion safety

Advances in Chemical Engineering Guy B. Marin, 2011-09-21 Understanding and modeling the kinetics of chemical reactions is crucial to any research and development effort aimed at process optimization and innovation This volume of Advances in Chemical Engineering provides four complementary points of view It reflects state of the art developments as well as views on the way to proceed by reporting on the efforts of a representative sample of research and development groups A first contribution by W H Green Jr sets the scene The author advocates a paradigm shift in chemical kinetics from postdictive to predictive models The contribution from the Politecnico di Milano reports on the tremendous experience accumulated over the years in the field of steam cracking one of the largest scale production processes of the petrochemical industry The Russian school of chemical kinetics is represented by a chapter on oxidation of alkanes this contribution addresses more philosophical issues The last chapter gives an indication of the state of the art in an industrial environment Provides original reviews Presents leading chemical engineers as authors Reviews state of the art developments

Catalysis by Polymer-Immobilized Metal Complexes Anatoly D. Pomogailo, 2020-08-18 Deals with a new and promising field developed during the last two decades on the boundary between homogeneous and heterogeneous catalysis This book presents general information on catalysis for a wide range of organic reactions e g hydrogenation and oxidation reactions and polymerization transformations Special attention is paid to electro and photochemical stimulation of catalytic processes

in the presence of immobilized metal complexes Other topics covered are the quantitative data on the comparison of catalyses by mobile and immobilized metal complexes main factors affecting the activity of these catalytic systems and methods of optimizing their control and specific problems of catalysis by fixed complexes e g ligand exchange and electron transfer in metal polymer systems macromolecular effects and polyfunctional catalysis

Introduction to Green

Chemistry John Andraos, Albert S. Matlack, 2022-03-10 Interest in green chemistry and clean processes has grown so much in recent years that topics such as fluorous 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

Advances in Catalysis, 1976-07-06 Advances in Catalysis

Turning Points in Solid-state, Materials and Surface State Kenneth D. M. Harris, Peter P. Edwards, Royal Society of Chemistry (Great Britain), 2008 The scientific exploration of solid materials represents one of the most important fascinating and rewarding areas of scientific endeavour in the present day not only from the viewpoint of advancing fundamental understanding but also from the industrial perspective given the immense diversity of applications of solid materials across the full range of commercial sectors Turning Points in Solid State Materials and Surface Science provides a state of the art survey of some of the most important recent developments across the spectrum of solid state materials and surface sciences while at the same time reflecting on key turning points in the evolution of this scientific discipline and projecting into the directions for future research progress The book serves as a timely tribute to the life and work of Professor Sir John Meurig

Thomas FRS who has made monumental contributions to this field of science throughout his distinguished 50 year career in research during which he has initiated developed and exploited many important branches of this field Indeed the depth and breadth of his contributions towards the evolution and advancement of this scientific discipline and his critical role in elevating this field to the important position that it now occupies within modern science are demonstrated recurrently throughout the chapters of this book Individual chapters are contributed by internationally leading experts in their respective fields and the topics covered include solid state chemistry of inorganic and organic materials heterogeneous catalysis surface science and materials science with one section of the book focusing on modern developments in electron microscopy and its contributions to chemistry and materials science The book serves as a modern and up to date monograph in these fields and provides a valuable resource to researchers in academia and industry who require a comprehensive source of information on this important and rapidly developing subject

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Kenneth D M Harris, Peter P Edwards, 2007-11-30 The scientific exploration of solid materials represents one of the most important fascinating and rewarding areas of scientific endeavour in the present day not only from the viewpoint of advancing fundamental understanding but also from the industrial perspective given the immense diversity of applications of solid materials across the full range of commercial sectors Turning Points in Solid State Materials and Surface Science provides a state of the art survey of some of the most important recent developments across the spectrum of solid state materials and surface sciences while at the same time reflecting on key turning points in the evolution of this scientific discipline and projecting into the directions for future research progress The book serves as a timely tribute to the life and work of Professor Sir John Meurig Thomas FRS who has made monumental contributions to this field of science throughout his distinguished 50 year career in research during which he has initiated developed and exploited many important branches of this field Indeed the depth and breadth of his contributions towards the evolution and advancement of this scientific discipline and his critical role in elevating this field to the important position that it now occupies within modern science are demonstrated recurrently throughout the chapters of this book Individual chapters are contributed by internationally leading experts in their respective fields and the topics covered include solid state chemistry of inorganic and organic materials heterogeneous catalysis surface science and materials science with one section of the book focusing on modern developments in electron microscopy and its contributions to chemistry and materials science The book serves as a modern and up to date monograph in these fields and provides a valuable resource to researchers in academia and industry who require a comprehensive source of information on this important and rapidly developing subject

Kinetic Models of

Catalytic Reactions G.S. Yablonskii, V.I. Bykov, V.I. Elokhin, A.N. Gorban, 1991-04-17 This book has been written by a group of mathematicians and chemists whose common interest is in the complex dynamics of catalytic reactions Based on developments in mathematical chemistry a general theory is described that allows the investigation of the relationships

between the kinetic characteristics of complex reactions and their detailed reaction mechanism Furthermore a comprehensive analysis is made of some typical mechanism of catalytic reactions in particular for the oxidation of carbon monoxide on platinum metals In fact the book presents three kinetics a detailed oriented to the elucidation of a detailed reaction mechanism according to its kinetic laws b applied with the aim of obtaining kinetic relationships for the further design of chemical reactors and c mathematical kinetics whose purpose is the analysis of mathematical models for heterogeneous catalytic reactions taking place under steady or unsteady state conditions

Initiation and Flame Propagation in Combustion of Gases and Pyrophoric Metal Nanostructures Nikolai M. Rubtsov, Boris S. Seplyarskii, Michail I. Alymov, 2020-10-01 This book presents new data on combustion processes for practical applications discussing fire safety issues in the development of flame arresters and the use of noble metals in hydrogen recombiners for nuclear power plants It establishes the basic principles of production of metal nanostructures namely nanopowders of metals and compact products made of them with the preservation of the unique properties of nanoproducts

Catalysis In Chemistry And Biology - Proceedings Of The 24th International Solvay Conference On Chemistry Kurt Wuthrich, Robert H Grubbs, Thierry Visart De Bocarme, Anne De Wit, 2018-06-27 The Proceedings of the 24th International Solvay Conference on Chemistry comprise contributed short personal statements and transcripts of in depth discussions on Catalysis in Chemistry and Biology from a by invitation only select group of 48 eminent scientists including four Nobel Laureates from all parts of the world The theme of the conference was presented in six sessions along which the Proceedings are organized The first session on Homogeneous Catalysis chaired by Professor Robert Grubbs is devoted to basic research on catalysis in homogeneous solutions and applications thereof Heterogeneous Catalysis and Characterization of Catalyst Surfaces chaired by Professor Gerhard Ertl includes extensive references to industrial applications of catalysis on solid supports and discussions on the experimental techniques used in this field Catalysis by Microporous Materials chaired by Professor Mark E Davis is devoted to a detailed characterization of this particular class of solid support catalysts with special emphasis on model analysis of the processes catalyzed by these materials Catalysis under Extreme Conditions Studies at High Pressure and High Temperatures Relations with Processes in Nature chaired by Professor Henk N W Lekkerkerker broadens the scope of the two preceding sessions with exciting illustrations The sessions on Catalysis by Protein Enzymes chaired by Prof JoAnne Stubbe and Catalysis by Ribozymes in Molecular Machines chaired by Prof David Lilley present at the same time an exciting extension of and a contrast to the initial four sessions The combination of the six sessions provides an impressive overview giving innovative insights into relationships between catalysis in chemical processes and in biological systems and a unique outlook to anticipated developments in the coming years and the more distant future

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Table of Contents Heterogeneous Hydrocarbon Oxidation

1. Understanding the eBook Heterogeneous Hydrocarbon Oxidation
 - The Rise of Digital Reading Heterogeneous Hydrocarbon Oxidation
 - Advantages of eBooks Over Traditional Books
2. Identifying Heterogeneous Hydrocarbon Oxidation
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Heterogeneous Hydrocarbon Oxidation
 - User-Friendly Interface
4. Exploring eBook Recommendations from Heterogeneous Hydrocarbon Oxidation
 - Personalized Recommendations
 - Heterogeneous Hydrocarbon Oxidation User Reviews and Ratings
 - Heterogeneous Hydrocarbon Oxidation and Bestseller Lists
5. Accessing Heterogeneous Hydrocarbon Oxidation Free and Paid eBooks

- Heterogeneous Hydrocarbon Oxidation Public Domain eBooks
 - Heterogeneous Hydrocarbon Oxidation eBook Subscription Services
 - Heterogeneous Hydrocarbon Oxidation Budget-Friendly Options
6. Navigating Heterogeneous Hydrocarbon Oxidation eBook Formats
 - ePub, PDF, MOBI, and More
 - Heterogeneous Hydrocarbon Oxidation Compatibility with Devices
 - Heterogeneous Hydrocarbon Oxidation Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Heterogeneous Hydrocarbon Oxidation
 - Highlighting and Note-Taking Heterogeneous Hydrocarbon Oxidation
 - Interactive Elements Heterogeneous Hydrocarbon Oxidation
 8. Staying Engaged with Heterogeneous Hydrocarbon Oxidation
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Heterogeneous Hydrocarbon Oxidation
 9. Balancing eBooks and Physical Books Heterogeneous Hydrocarbon Oxidation
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Heterogeneous Hydrocarbon Oxidation
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Heterogeneous Hydrocarbon Oxidation
 - Setting Reading Goals Heterogeneous Hydrocarbon Oxidation
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Heterogeneous Hydrocarbon Oxidation
 - Fact-Checking eBook Content of Heterogeneous Hydrocarbon Oxidation
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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