Production Of Olefin And Aromatic Hydrocarbons By

Energy recovery from waste resources holds a significant role in the sustainable waste management hierarchy to support the concept of circular economies and to mitigate the challenges of waste originated problems of sanitation, environment, and public health. Today, waste disposal to landfills is the most widely used methodology, particularly in developing countries, because of limited budgets and lack of efficient infrastructure and facilities to maintain efficient and practical global standards. As a consequence, the dump-sites or non-sanitary landfills have become the significant sources of greenhouse gases emissions, soil and water contamination, unpleasant odors, leachate, and disease spreading vectors, flies, and rodents. However, waste can be utilized to produce a range of potential products such as energy, fuels and value-added products under waste biorefineries. A holistic and quantitative view, such as waste biorefinery, on waste management must be linked to the actual country, taking into account its socio-economic situation, local waste sources, and composition, as well as the available markets for the recovered energy and products. Therefore, it is critical to understand that solutions cannot be just copied from one region to the others. In fact, all waste handling, transportation, and treatment can represent a burden to the cities' environment and macro and micro economics, except for the benefits obtained from recovered materials and energy. Equally significant is a clear and quantitative understanding of the industrial, and public potential of utilizing recovered materials and energy in the markets as these can be reached without exacerbating the environmental issues using excessive transport. The book explores new advancements and discoveries on the development of emerging waste-to-energy technologies, practical implementation, and lessons learned from sustainable wastemanagement practices under waste biorefinery concept, which will accelerate the growth of circular economies in the world. The articles presented in this book have been written by expert researchers and academics working in institutions at different countries across the world including Germany, Greece, Japan, South Korea, China, Saudi Arabia, Pakistan, Indonesia, Malaysia, Iran, and India. The research articles have been arranged into three main subject categories; 1) Resource recovery from waste, 2) Waste to energy technologies and 3) Waste biorefineries. This book will serve as an important resource for research students, academics, industry, policy makers, and government agencies working in the field of integrated waste management, energy and resource recovery, waste to energy technologies, waste biorefineries etc. The editorial team of this book is very grateful to all the authors for their excellent contributions and making the book successful.

This book presents a collection of studies on state-of-art techniques for converting biomass to chemical products by means of pyrolysis, which are widely applicable to the valorization of biomass. In addition to discussing the fundamentals and mechanisms for producing bio-oils, chemicals, gases and biochar using pyrolysis, it outlines key reaction parameters and reactor configurations for various types of biomass. Written by leading experts and providing a broad range of perspectives on cutting-edge applications, the book is a comprehensive reference guide for academic researchers and industrial engineers in the fields of natural renewable materials, biorefinery of lignocellulose, biofuels, and environmental engineering, and a valuable resource for university students in the fields of chemical engineering, material science and environmental engineering.

"Written by engineers for engineers (with over 150 International Editorial Advisory Board members),this highly lauded resource provides up-to-the-minute information on the chemical processes, methods, practices, products, and standards in the chemical, and related, industries. "

This work details the technical, environmental and business aspects of current methanol production processes and presents recent developments concerning the use of methanol in transportation fuel and in agriculture. It is written by internationally renowned methanol experts from academia and industry.

First published in 1983, this book provides a detailed look at the OPEC nations' changing roles in the world oil market as they expanded their participation in "downstream" activities such as the hydrocarbon industries formerly controlled by the major oil companies. The authors begin with a detailed survey of world oil resources and an overview of the production capabilities and polices of major oil exporters. They then examine the contemporary refinery overcapacity crisis in the developed world, outline the refinery construction plans of the OPEC nations and the refinery scrapping problems in the industrialised world, and employ simulation tools to estimate the future output mix of refineries in key OPEC nations. A discussion of the comparative economics of refineries in the Gulf and in Europe in also included. Turning to the tanker industry, the authors project future oil export patterns and tanker demand in light of changing import/export need and OPEC's participation in oil and refined products transport. Subsequent chapters describe OPEC's ventures into petrochemical manufacturing and natural gas processing. The book concludes with a chapter on the future of OPEC, examining its changing power structure, the influence of non-OPEC oil production, possible future oil-pricing policies, and the opportunities and constraints that OPEC nations will meet as they expand their operations in the downstream oil industry. This book will be of interest to students of economics and Middle East and international politics.

Modern Petrochemical Technology A text that explores the essence of petrochemicals and petrochemical technology Modern Petrochemical Technology: Methods, Manufacturing and Applications is a comprehensive resource that provides an overview of the uses for common petrochemical building blocks, a review of the marketplaces, and offers a survey of the technology used to make the key petrochemical building blocks. The book contains both critical information the technologies used to produce petrochemicals, how the various petrochemicals are applied in industry, and provides illustrative examples and problems designed to reinforce the learning about the basic science, engineering, and use of petrochemicals. The book explores three seprate petrochemical building block—olefin complexes, aromatic complexes and synthesis gas complexes—and examines the "interconnected" nature of these building blocks. The authors also include information on the olefins productions using steam cracking, paraffin

dehydrogenation, and methanol to olefins technologies and describes various methods, commercial processes to produce aromatics such as benzene, toluene and xylene, and much more. This important book: Offers a guide to the critical information on petrochemical producing technologies Includes material on various petrochemicals from the industrial point-of-view Explores the separation processes, membrane technology, absorption technology, liquid-liquid extraction, and more Contains material from a team of noted experts Provides a survey of examples of commercialization applications of petrochemicals Written for chemical engineers, chemists in industry, membrane scientists, and process engineers, Modern Petrochemical Technology provides an overview of markets and uses for common petrochemical building blocks as well as includes a survey of the technology used to make the key petrochemical building blocks.

For many years, the subject matter encompassed by the title of this book was largely limited to those who were interested in the two most economically important organic materials found buried in the Earth, namely, coal and petroleum. The point of view of any discussions which might occur, either in scientific meetings or in books that have been written, was, therefore, dominated largely by these interests. A great change has occurred in the last decade. This change had as its prime mover our growing knowledge of the molecular architecture of biological systems which, in turn, gave rise to a more legitimate asking of the question: "How did life come to be on the surface of the Earth?" A second motivation arose when the possibilities for the exploration of planets other than the Earth-the moon, Mars, and other parts of the solar system-became a reality. Thus the question of the possible existence of life elsewhere than on Earth conceivably could be answered.

To meet changing market demands that have stringent emission standards and to ensure proper performance in refinery units, evaluation of novel catalyst designs and results from material characterization and testing of catalysts are of crucial importance for refiners as well as for catalyst manufacturers. This book highlights recent developments in the application of refinery catalysts in selected units such as fluid catalytic cracking (FCC), hydrogen production for hydroprocessing units, hydrotreating, hydrocracking, and sustainable processing of biomass into biofuels.

This is an easily-accessible two-volume encyclopedia summarizing all the articles in the main volumes Kirk-Othmer Encyclopedia of Chemical Technology, Fifth Edition organized alphabetically. Written by prominent scholars from industry, academia, and research institutions, the Encyclopedia presents a wide scope of articles on chemical substances, properties, manufacturing, and uses; on industrial processes, unit operations in chemical engineering; and on fundamentals and scientific subjects related to the field.

A decade ago, the U.S. chemical industry was in decline. Of the more than 40 chemical manufacturing plants being built worldwide in the mid-2000s with more than $1 billion in capitalization, none were under construction in the United States. Today, as a result of abundant domestic supplies of affordable natural gas and natural gas liquids resulting from the dramatic rise in shale gas production, the U.S. chemical industry has gone from the world's highest-cost producer in 2005 to among the lowest-cost producers today. The low cost and increased supply of natural gas and natural gas liquids provides an opportunity to discover and develop new catalysts and processes to enable the direct conversion of natural gas and natural gas liquids into value-added chemicals with a lower carbon footprint. The economic implications of developing advanced technologies to utilize and process natural gas and natural gas liquids for chemical production could be significant, as commodity, intermediate, and fine chemicals represent a higher-economic-value use of shale gas compared with its use as a fuel. To better understand the opportunities for catalysis research in an era of shifting feedstocks for chemical production and to identify the gaps in the current research portfolio, the National Academies of Sciences, Engineering, and Medicine conducted an interactive, multidisciplinary workshop in March 2016. The goal of this workshop was to identify advances in catalysis that can enable the United States to fully realize the potential of the shale gas revolution for the U.S. chemical industry and, as a result, to help target the efforts of U.S. researchers and funding agencies on those areas of science and technology development that are most critical to achieving these advances. This publication summarizes the presentations and discussions from the workshop.

The conversion of natural gas to light olefins, having dimethyl ether (DME) as a key intermediate, is a promising route for olefin manufacturing. Syngas can be used to produce DME. DME, can, in turn, be used as a feedstock to produce light olefins catalytically (dimethyl ether to olefin, or DTO process). Thus, selecting a proper catalyst and suitable operating conditions is the key for the implementation of the DTO conversion process. The aim of the present research is to investigate HZSM-5 as a potential selective catalyst for light olefin production from DME. The detailed objectives of this PhD dissertation include: a) catalyst preparation, b) characterization, c) testing under reaction conditions, and d) kinetic modeling. The catalyst characterization addresses the influence of the SiO2/Al2O3 ratio (30, 80, and 280) on HZSM-5 physicochemical properties. The reactivity runs, on the hand, are intended to achieve the maximum catalyst performance and light olefin selectivity by varying the SiO2/Al2O3 ratio in the HZSM-5 catalyst. The kinetic study involves a reaction scheme and the development of a model suitable to describe the reaction network. X-ray diffraction (XRD) and N2 isotherms show that SiO2/Al2O3 has no noticeable influence on HZSM-5 morphology or porosity characteristics. On the other hand, TPD (temperature programmed desorption) and FTIR (Fourier transform infrared spectroscopy) data along with the NH3-desorption kinetics all display weak and strong acid sites on HZSM-5 with both their ratio and total acidity being reduced by increasing the SiO2/Al2O3 ratio. The NH3-desorption kinetics show that the activation energies augmented with the raise of the SiO2/Al2O3 ratio. DME conversion and coke for mation both rose with HZSM-5 acidity along with the reactor temperature. In the case of ZSM5-280, coke was limited and this led to negligible catalyst deactivation and higher light olefins selectivity. Furthermore, when the DME conversion on ZSM5-280 was increased, C5 olefins, paraffins, and aromatics selectivities were consistently augmented and this happened at the expense of light olefins (C4-). A DTO reaction network was developed having methoxy species as the key methylating species. In this respect, it is proposed

that ethylene is formed through DME dehydration. Following this, light olefins experience methylation up to octene. In addition, hexene is partially dehydrogenated to benzene, with benzene experiencing further methyl group insertion forming heavier aromatics. The DTO kinetic study shows that the pre-exponential constant for methylating olefins and aromatics was decreased consistently with the carbon number increase of the methylated species. On the other hand, the activation energy for methylating light olefins was found to be slightly higher when compared to that for the heavy olefins. Aromatic methylation reactions displayed higher activation energy as the number of methyl groups in the aromatic ring increased. Thus, the present research demonstrates that HZSM-5 with SiO2/Al2O3 =280 can be used as a potential catalyst for the dimethyl ether (DME) transformation into light olefins (DTO). Furthermore, it is also proven that a proposed reaction scheme and kinetic model can be established using rigorous statistical methods for parameter estimation.

Mono-Olefins: Chemistry and Technology is a translation from the German and deals with the study of olefins from low ethylene to hexenes and olefins from the high hexenes to eicosenes. The book describes the gaseous or low-boiling olefins and the higher, normally liquid olefins (which have only a minor role in applications in the chemical industry). The olefins are considered important as they are added in the distillation of off-gases in refineries. Although the liquid olefins are used sparingly, these are needed to manufacture lubricants, synthetic detergents, and the higher aliphatic alcohols. The book then explains the three processes used to separate olefin containing mixtures of gases into fractions by the C-number or to convert olefins in the pure state: distillation, absorption, and adsorption. The author then describes the processes in manufacturing carburetor fuel from petroleum and natural gases. Petroleum oil is a mixture of paraffinic, naphthenic, and aromatic hydrocarbons and has no olefins. The text describes the complete process of refining petroleum into different products such as gasoline, kerosene, lubricants, and spotting benzenes. Then the book explains the polymerization of olefins to produce carburetor fuels either by the thermal method or catalytic method. The text notes some research made into double-bond isomerization in mono-olefins and their possible applications. This book is beneficial to industrial chemists, researchers, technical designers, and engineers whose works are related with oil refinery and fossil fuels.

Focusing on real applications of nanocomposites and nanotechnologies for sustainable development, this book shows how nanocomposites can help to solve energy and environmental problems, including a broad overview of energy-related applications and a unique selection of environmental topics. Clearly structured, the first part covers such energy-related applications as lithium ion batteries, solar cells, catalysis, thermoelectric waste heat harvesting and water splitting, while the second part provides unique perspectives on environmental fields, including nuclear waste management and carbon dioxide capture and storage. The result is a successful combination of fundamentals for newcomers to the field and the latest results for experienced scientists, engineers, and industry researchers.

In response to the global increase in the use of biofuels as substitute transportation fuels, advanced chemical, biochemical and thermochemical biofuels production routes are fast being developed. Research and development in this field is aimed at improving the quality and environmental impact of biofuels production, as well as the overall efficiency and output of biofuels production plants. The range of biofuels has also increased to supplement bioethanol and biodiesel production, with market developments leading to the increased production and utilisation of such biofuels as biosyngas, biohydrogen and biobutanol, among others. Handbook of biofuels production provides a comprehensive and systematic reference on the range of biomass conversion processes and technology. Part one reviews the key issues in the biofuels production chain, including feedstocks, sustainability assessment and policy development. Part two reviews chemical and biochemical conversion and in turn Part three reviews thermal and thermo-chemical conversion, with both sections detailing the wide range of processes and technologies applicable to the production of first, second and third generation biofuels. Finally, Part four reviews developments in the integration of biofuels production, including biorefineries and by-product valorisation, as well as the utilisation of biofuels in diesel engines. With its distinguished international team of contributors, Handbook of biofuels production is a standard reference for biofuels production engineers, industrial chemists and biochemists, plant scientists, academics and researchers in this area. A comprehensive and systematic reference on the range of biomass conversion processes and technologies Addresses the key issues in the biofuels production chain, including feedstocks, sustainability assessment and policy development Reviews chemical and bio-chemical conversion techniques as well as thermal and thermo-chemical conversion, detailing the range of processes and technologies applicable to biofuels production

Offers state-of-the-art information on all the major synthetic fluids, describing established products as well as highly promising experimental fluids with commercial potential. This second edition contains chapters on polyinternalolefins, polymer esters, refrigeration lubes, polyphenyl ethers, highly refined mineral oils, automotive gear oils and industrial gear oils. The book also assesses automotive, industrial, aerospace, environmental, and commercial trends in Europe, Asia, South America, and the US.

Offering practical treatment strategies for CO2 emission generated from various energy-related sources, CO2 Capture, Utilization, and Sequestration Strategies emphasizes carbon capture, utilization, and sequestration (CCUS) with special focus on methods for each component of the strategy. While other books mostly focus on CCS strategy for CO2, this book details the technologies available for utilization of CO2, showing how it can be a valuable renewable source for chemicals, materials, fuels, and power instead of a waste material damaging the environment. Highlights current and potential future commercially viable CCUS strategies Discusses applications for direct and the more complex indirect utilization of CO2 streams Examines viability of the mineral carbonation process and biological treatments to convert CO2 into useful biochemicals, biomaterials, and biofuels Explores heterogeneous catalysis for thermal and electrochemical conversion and solar energy-based thermal, photo-thermal, and photocatalytic conversion of CO2 Presents the rapidly growing concept of plasma-activated catalysis for CO2 conversion CO2 Capture, Utilization, and Sequestration Strategies is a valuable reference for researchers in academia, industry, and government organizations seeking a guide to effective CCUS processes, technologies, and applications.

Highlighting the major economic and industrial changes in the lubrication industry since the first edition, Synthetics, Mineral Oils, and Bio-Based Lubricants: Chemistry and Technology, Third Edition highlights

the major economic and industrial changes in the lubrication industry and outlines the state of the art in each major lubricant application area. Chapters cover the use of lubricant fluids, growth or decline of market areas and applications, potential new applications, production capacities, and regulatory issues, including biodegradability, toxicity, and food production equipment lubrication. The highly-anticipated third edition features new and updated chapters including those on automatic and continuously variable transmission fluids, fluids for food-grade applications, oil-soluble polyalkylene glycols, functional bio-based lubricant base stocks, farnesene-derived polyolefins, estolides, bio-based lubricants from soybean oil, and trends in construction equipment lubrication. Features include: Contains an index of terms, acronyms, and analytical testing methods. Presents the latest conventions for describing upgraded mineral oil base fluids. Considers all the major lubrication areas: engine oils, industrial lubricants, food-grade applications, greases, and space-age applications Includes individual chapters on lubricant applications—such as environmentally friendly, disk drive, and magnetizable fluids—for major market areas around the globe. In a single, unique volume, Synthetics, Mineral Oils, and Bio-Based Lubricants: Chemistry and Technology, Third Edition offers property and performance information of fluids, theoretical and practical background to their current applications, and strong indicators for global market trends that will influence the industry for years to come.

Shale Oil and Gas Production Processes delivers the basics on current production technologies and the processing and refining of shale oil. Starting with the potential of formations and then proceeding to production and completion, this foundational resource also dives into the chemical and physical nature of the precursor of oil shale, kerogen, to help users understand and optimize its properties in shale. Rounding out with reporting, in situ retorting, refining and environmental aspects, this book gives engineers and managers a strong starting point on how to manage the challenges and processes necessary for the further development of these complex resources. Helps readers grasp current research on production from shale formations, including properties and composition Fill in the gaps between research and practical application, including discussions of existing literature Includes a glossary to help readers fully understand key concepts

Aromatic Hydrocarbons—Advances in Research and Treatment: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Benzene. The editors have built Aromatic Hydrocarbons—Advances in Research and Treatment: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Benzene in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Aromatic Hydrocarbons—Advances in Research and Treatment: 2013 Edition has been produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Separation processesâ€"or processes that use physical, chemical, or electrical forces to isolate or concentrate selected constituents of a mixtureâ€"are essential to the chemical, petroleum refining, and materials processing industries. In this volume, an expert panel reviews the separation process needs of seven industries and identifies technologies that hold promise for meeting these needs, as well as key technologies that could enable separations. In addition, the book recommends criteria for the selection of separations research projects for the Department of Energy's Office of Industrial Technology.

A GUIDE TO THE DESIGN, OPERATION, CONTROL, TROUBLESHOOTING, OPTIMIZATION AS WELL AS THE RECENT ADVANCES IN THE FIELD OF PETROCHEMICAL PROCESSES Efficient Petrochemical Processes: Technology, Design and Operation is a guide to the tools and methods for energy optimization and process design. Written by a panel of experts on the topic, the book highlights the application of these methods on petrochemical technology such as the aromatics process unit. The authors describe practical approaches and tools that focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields through better design, operation, and optimization. The text is divided into sections that cover the range of essential topics: petrochemical technology description; process design considerations; reaction and separation design; process integration; process system optimization; types of revamps; equipment assessment; common operating issues; and troubleshooting case analysis. This important book: Provides the basic knowledge related to fundamentals, design, and operation for petrochemical processes Applies process integration techniques and optimization techniques that improve process design and operations in the petrochemical process Provides practical methods and tools for industrial practitioners Puts the focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields Contains information on the most recent advances in the field. Written for managers, engineers, and operators working in process industries as well as university students, Efficient Petrochemical Processes: Technology, Design and Operation explains the most recent advances in the field of petrochemical processes and discusses in detail catalytic and adsorbent materials, reaction and separation mechanisms.

In Chemistry of Petrochemical Processes, readers find a handy and valuable source of information containing insights into petrochemical reactions and products, process technology, and polymer synthesis. The book reviews and describes the reactions and processes involved in transforming petroleum-based hydrocarbons into the chemicals that form the basis of the multi-billion dollar petrochemical industry. In addition, the book includes information on new process developments for the production of raw materials and intermediates for petrochemicals that have surfaced since the book's first edition. Provides a quick understanding of the chemical reactions associated with oil and gas processing Contains insights into petrochemical reactions and products, process technology, and polymer synthesis

This handbook provides a comprehensive but concise reference resource for the vast field of petroleum technology. Built on the successful book "Practical Advances in Petroleum Processing" published in 2006, it has been extensively revised and expanded to include upstream technologies. The book is divided into four parts: The first part on petroleum characterization offers an in-depth review of the chemical composition and physical properties of petroleum, which determine the possible uses and the quality of the products. The second part provides a brief overview of petroleum geology and upstream practices. The third part exhaustively discusses established and emerging refining technologies from a practical perspective, while the final part describes the production of various refining products, including fuels and lubricants, as well as petrochemicals, such as olefins and polymers. It also covers process automation and real-time refinery-wide process optimization. Two key chapters provide an integrated view of petroleum technology, including environmental and safety issues.Written by international experts from academia, industry and research institutions, including integrated oil companies, catalyst suppliers, licensors, and consultants, it is an invaluable resource for researchers and graduate students as well as practitioners and professionals.

Pyrolysis gasoline (PyGas) is a by-product of high temperature naphtha cracking during ethylene and propylene production. It is a high octane number mixture which contains aromatics, olefins and paraffins ranging from C5s to C12s. PyGas has high potential for use as a gasoline blending mixture and/or as a source of aromatics. Currently, PyGas is

generally used as a gasoline blending mixture due to its high octane number, but global production of PyGas is very high and further increases are anticipated in the future due to higher demands for ethylene and propylene. However, current strict fuel regulations for aromatic content make PyGas utilisation as a blending mixture more difficult, therefore a useful avenue for PyGas consumption is desired. Catalytic hydrogenation of PyGas is an important industrial and academic research area for the stabilisation, upgrading and utilisation of PyGas. Limited work has been performed on the hydrogenation of PyGas and an incomplete picture of the process has been obtained. The composition of PyGas is very complex and therefore most of the studies have been carried out with single compounds or a mixture of a few model compounds for simplicity and generality. However, the single model compound cannot be representive of the entire PyGas hydrogenation process. Furthermore, the behaviour of these compounds is generally different in mixtures than as individual compounds. Hence, the hydrogenation of a PyGas, which contained styrene, toluene, 1-octene, cyclopentene, heptane, decane and 1,3-pentadiene/1-pentene, was investigated over alumina supported nickel and palladium catalysts. This is a comprehensive model for the broader groups of hydrocarbons present in PyGas. The aim of the work was to investigate the effect of reaction parameters such as reaction temperature, total reaction pressure, hydrogen partial pressure and WHSV of PyGas on the hydrogenation of PyGas. Different strategies were proposed for PyGas consumption to obtain; (i) a high octane number gasoline blend, (ii) an aromatic source mixture and (iii) hydrogenation of surplus aromatics present in PyGas. These desired products were achieved during PyGas hydrogenation over both the nickel and palladium catalysts by using different reaction conditions. However, the palladium catalyst was found to be preferable for the selective hydrogenation of reactive species such as styrene, diolefins and for the isomerisation of olefins, without the hydrogenation of aromatics during PyGas hydrogenation at mild reaction temperatures. However, surplus aromatics hydrogenation can be achieved over the palladium catalyst with an increase in reaction temperature. Conversely, a greater amount of aromatics saturation was observed during PyGas hydrogenation over the nickel catalyst. Therefore the nickel catalyst was found to be preferable when aromatic ring saturation is desired during PyGas hydrogenation. The selective hydrogenation of PyGas without aromatics saturation was achieved over a nickel catalyst when using a low hydrogen partial pressure. The kinetics of PyGas hydrogenation were also investigated for a better understanding of the process. The apparent orders for hydrogenation /isomerisation of the PyGas components were investigated by using an empirical rate equation. During PyGas hydrogenation, first order (1.1 to 1.6) kinetics were observed for the hydrogenation of olefins to their respective paraffins over both the nickel and palladium catalysts with an increase in hydrogen partial pressure, which became zero or negative order kinetics when sufficient amounts of hydrogen were available on the surface of the catalyst. Negative order kinetics were observed for olefin isomerisation to internal olefin with an increase in hydrogen partial pressure. Meanwhile the hydrogenation of styrene to ethylbenzene followed zero order kinetics with respect to hydrogen over both catalysts due to the strong adsorption of styrene onto the catalyst. Third order kinetics were observed for aromatics hydrogenation over both catalysts. On the other hand, the hydrogenation of olefins to paraffins followed zero to negative order (0 to -0.7) kinetics, whilst positive order (1.6 to 3.6) kinetics were observed for isomerisation of olefins to internal olefins with respect to PyGas. Moreover, positive order (0.7 to 1.0) kinetics were observed for styrene hydrogenation to ethylbenzene with respect to PyGas. The hydrogenation of aromatics followed negative orders kinetics with respect to PyGas over both catalysts due to competitive hydrogenation of the olefinic and aromatic components. Coke deposition is believed to be the main reason for catalyst deactivation during the PyGas hydrogenation reaction. The amount and nature of the coke deposited was investigated by in-situ temperature programmed oxidation (TPO). The increase in reaction temperature not only increased the amount of coke deposition but also produced more condensed hydrogen deficient type coke. Conversely, the carbon laydown decreased with an increase in hydrogen partial pressure. Larger amounts of coke deposition took place over the nickel catalyst when compared to the coke deposited over the palladium catalyst under identical reaction conditions. Moreover, a soft type coke (with lower C/H ratio) was deposited over the palladium catalyst, while a comparatively hard type coke (with higher C/H ratio) was deposited over the nickel catalyst. Both the nickel and palladium catalysts used during PyGas hydrogenation were effectively regenerated by in-situ TPO with no significant loss to their catalytic properties.

Chemistry of Petrochemical ProcessesElsevier

Written by an author with over 38 years of experience in the chemical and petrochemical process industry, this handbook will present an analysis of the process steps used to produce industrial hydrocarbons from various raw materials. It is the first book to offer a thorough analysis of external factors effecting production such as: cost, availability and environmental legislation. An A-Z list of raw materials and their properties are presented along with a commentary regarding their cost and availability. Specific processing operations described in the book include: distillation, thermal cracking and coking, catalytic methods, hydroprocesses, thermal and catalytic reforming, isomerization, alkylation processes, polymerization processes, solvent processes, water removal, fractionation and acid gas removal. Flow diagrams and descriptions of more than 250 leading-edge process technologies An analysis of chemical reactions and process steps that are required to produce chemicals from various raw materials Properties, availability and environmental impact of various raw materials used in hydrocarbon processing

Catalytic Naphtha Reforming, Second Edition presents modern, crystal-clear explanations of every aspect of this critical process for generating high-octane reformate products for gasoline blending and production of benzene, toluene, and xylene (BTX) aromatics. The book details the chemistry of naphtha reforming, the preparation and characterization Written by more than 40 world renowned authorities in the field, this reference presents information on plant design, significant chemical reactions, and processing operations in industrial use - offering shortcut calculation methods wherever possible.

Supported by some of the largest petrochemical and petroleum companies in the world, this unique handbook provides the secrets to the latest in licensed petrochemical technology for some of the most economically important chemicals used throughout the world Process chemistry and thermodynamics are covered for each major processing unit as applicable.

""Covers the chemistry, process chemistry, technology, engineering, and economics of methane conversion, including its environmental impact and commercial exploitation. Begins with methane's availability and increasing importance as an environmentally acceptable natural resource alternative and feedstock.

Petroleum refining involves refining crude petroleum as well as producing raw materials for the petrochemical industry. This book covers current refinery processes and process-types that are likely to come on-stream during the next three to five decades. The book includes (1) comparisons of conventional feedstocks with heavy oil, tar sand bitumen, and bio-feedstocks; (2) properties and refinability of the various feedstocks; (3) thermal processes versus hydroprocesses; and (4) the influence of refining on the environment.

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)

The Production of Olefin-Containing and Fuel Gases reviews the production processes of gasification of distillate and residual liquid fuels employed in France, Germany, UK, USA, and Russia. The monograph first offers information on the methods of chemical treatment of gases and products from the pyrolysis of crude oil and raw materials for the process of gasification. Discussions focus on the production of raw materials for oil-chemical synthesis and production of oil-chemical products. The text then ponders on the theoretical presentation of high temperature pyrolysis of hydrocarbons and pyrolysis of hydrocarbon stock and resins. Topics include thermodynamic representation and mechanism of high temperature pyrolysis of hydrocarbons; methods for the calculation of the composition of a gas at equilibrium conditions; and dynamics of the change in composition of the reaction products in the gasification process. The publication takes a look at contemporary installations for the gasification of liquid fuels, including the process of autothermic pyrolysis of hydrocarbons with air or steam-air blast and the processes of autothermic pyrolysis of crude petroleum in the presence of a catalyst. The monograph is a dependable reference for chemical engineering students and plant engineers.