

Integration Propane Dehydrogenation Pdh

Technology Economics: Propylene Via Propane Dehydrogenation Intratec Solutions

This book offers a comprehensive coverage of process simulation and flowsheeting, useful for undergraduate students of Chemical Engineering and Process Engineering as theoretical and practical support in Process Design, Process Simulation, Process Engineering, Plant Design, and Process Control courses. The main concepts related to process simulation and application tools are presented and discussed in the framework of typical problems found in engineering design. The topics presented in the chapters are organized in an inductive way, starting from the more simplistic simulations up to some complex problems.

Elaborating on recent and future developments in the field of membrane engineering, Volume 2 is devoted to the main advances in gaseous phase membrane reactors and separators. The book covers innovative membranes and new processes, and includes new chapters on cost analysis and life cycle assessment. Together with Volume 1, these books form an innovative reference work on membrane engineering and technology in the field of gas separation and

gaseous phase membrane reactors.

On January 1988, the ascertained and economically accessible reserves of Natural Gas (NG) amounted to over 144,000 billion cubic meters worldwide, corresponding to 124 billion tons of oil equivalents (comparable with the liquid oil reserves, which are estimated to be 138 billion TOE). It is hypothesized that the volume of NG reserve will continue to grow at the same rate of the last decade. Forecasts on production indicate a potential increase from about 2,000 billion cubic meters in 1990 to not more than 3,300 billion cubic meters in 2010, even in a high economic development scenario. NG consumption represents only one half of oil: 1.9 billion TOE/y as compared to 3.5 of oil. Consequently, in the future gas will exceed oil as a carbon atom source. In the future the potential for getting energetic vectors or petrochemicals from NG will continue to grow. The topics covered in Natural Gas Conversion V reflect the large global R&D effort to look for new and economic ways of NG exploitation. These range from the direct conversion of methane and light paraffins to the indirect conversion through synthesis gas to fuels and chemicals. Particularly underlined and visible are the technologies already commercially viable. These proceedings prove that mature and technologically feasible processes for natural gas conversion are already available and that new and improved catalytic approaches are currently

developing, the validity and feasibility of which will soon be documented. This is an exciting area of modern catalysis, which will certainly open novel and rewarding perspectives for the chemical, energy and petrochemical industries. Catalyst Deactivation 1997 focused on 9 key topical areas: carbon deposition and coke formation, chemicals, environmental catalysis, modeling, petroleum processing, poisoning, syngas conversion, techniques, and thermal degradation. All of these areas were well represented at the meeting; moreover, several review articles were presented that provide perspectives on new research and development thrusts. The proceedings of the meeting are organized with six review and award articles at the front of the volume followed by topical articles a keynote, 5-6 oral, and 2-3 poster papers. A list of authors is provided at the end of the book. It should be emphasized that all of the papers were ranked and reviewed by members of the Scientific Committee.

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With the recent advent of nanotechnology, research and development in the area of nanostructured materials has gained unprecedented prominence. Novel

materials with potentially exciting new applications are being discovered at a much higher rate than ever before. Innovative tools to fabricate, manipulate, characterize and evaluate such materials are being developed and expanded. To keep pace with this extremely rapid growth, it is necessary to take a breath from time to time, to critically assess the current knowledge and provide thoughts for future developments. This book represents one of these moments, as a number of prominent scientists in nanostructured materials join forces to provide insightful reviews of their areas of expertise, thus offering an overall picture of the state-of-the-art of the field. Nanostructured materials designate an increasing number of materials with designed shapes, surfaces, structures, pore systems, etc. Nanostructured materials with modified surfaces include those whose surfaces have been altered via such techniques as grafting and tethering of organic or organometallic species, or through various deposition procedures including electro, electroless and vapor deposition, or simple adsorption. These materials find important applications in catalysis, separation and environmental remediation. Materials with patterned surfaces, which are essential for the optoelectronics industry, constitute another important class of surface-modified nanostructured materials. Other materials are considered nanostructured because of their composition and internal organization.

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Authored by a top-level team of both academic and industrial researchers in the field, this is an up-to-date review of mesoporous zeolites. The leading experts cover novel preparation methods that allow for a purpose-oriented fine-tuning of zeolite properties, as well as the related materials, discussing the specific characterization methods and the applications in close relation to each individual preparation approach. The result is a self-contained treatment of the different classes of mesoporous zeolites. With its academic insights and practical relevance this is a comprehensive handbook for researchers in the field and related areas, as well as for developers from the chemical industry.

A complete guide to petrochemicals production processes—fully revised to cover the latest advances Get all the information you need on petrochemical processes for major organic chemicals inside this industry-standard one-stop reference. Prepared by leading petrochemical licensing firms, Handbook of Petrochemicals Production Processes, Second Edition clearly explains the powerful techniques used to create the most economically important chemicals in the world. The book offers cutting-edge production methods along with detailed product properties. You will discover how to effectively evaluate licensable processes for new production through the comparison of technologies, environmental factors, and economics. Coverage includes:

- General process descriptions, feed definitions, product yields, and simplified flow diagrams
- Process chemistries and thermodynamics
- Commercial process perspectives, including plant locations and long-term plans
- Process details, with flow diagrams and mass and energy balances for major process variations
- Feeds and details on unique and key equipment
- Brand-new details on gas to petrochemical conversion, biomass to petrochemical conversion, and bisphenol A (BPA)

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This book covers the application of methods and tools for energy optimization and process design. It focuses the application of these methods on petrochemical process units such as the aromatics process unit. The book provides practical methods and tools to industrial practitioners with the focus on improving industrial energy efficiency, reducing capital investment, and optimizing yields via better design, operation, and optimization. Broken down into six parts the book covers a range of topics including: Aromatics Process Description; Process Design Considerations; Petrochemical Separation Design; Process Integration; Process system optimization; Types of revamps; Equipment assessment; Common operating issues; and Troubleshooting case analysis to name a few.

The growing exploitation of shale gas in the United States raised the propane availability, reducing its prices. This, coupled with growing demand for propylene, made of the propane dehydrogenation (PDH) a promising alternative for on-purpose propylene production. The technical aspects of a PDH process similar to the Lummus CATOFIN technology are reviewed. The analysis also includes estimates for both the capital investment and the operating costs of typical plants on the US Gulf Coast and in China. This study follows the same pattern as all Technology Economics studies developed by Intratec. About Technology Economics Technology Economics studies are advisory services ordered by leading chemical companies, which are disclosed to public after an agreed upon period of time. All Technology Economics studies are based on the same rigorous methodology and well-defined structure, encompassing: Process flow diagrams and material balances Raw material and utility consumptions Major equipment sizing Inside and outside battery limits capital costs Detailed fixed and variable manufacturing expenses

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Presents state-of-the-art information concerning the syntheses of valuable functionalized organic compounds from alkanes, with a focus on simple, mild, and green catalytic processes

Alkane Functionalization offers a comprehensive review of the state-of-the-art of catalytic functionalization of alkanes under mild and green conditions. Written by a team of leading experts on the topic, the book examines the latest research developments in the synthesis of valuable functionalized organic compounds from alkanes. The authors describe the various modes of interaction of alkanes with metal centres and examine the oxidative alkane functionalization upon C-O bond formation. They address the many types of mechanisms, discuss typical catalytic systems and highlight the strategies inspired by biological catalytic systems. The book also describes alkane functionalization upon C-heteroatom bond formation as well as oxidative and non-oxidative approaches. In addition, the book explores non-transition metal catalysts and metal-free catalytic systems and presents selected types of functionalization of sp^3 C-H bonds pertaining to substrates other than alkanes. This important resource: Presents a guide to the most recent advances concerning the syntheses of valuable functionalized organic compounds from alkanes Contains information from leading experts on the topic Offers information on the catalytic functionalization of alkanes that allows for improved simplicity and sustainability compared to current multi-stage industrial processes Explores the challenges inherent with the application of alkanes as starting materials for syntheses of added value functionalized organic compounds Written for academic researchers and industrial scientists working in the fields of coordination chemistry, organometallic chemistry, catalysis, organic synthesis and green chemistry, Alkane Functionalization is an important resource for accessing the most up-to-date information available in the field of

catalytic functionalization of alkanes.

Current Trends and Future Developments in (Bio-) Membranes: Recent Advances in Metallic Membranes presents recent developments in metallic membranes used in membrane reactors to save energy. It also offers a comprehensive review of the present state-of-the-art on the fabrication and design of metallic membranes and membrane reactors, considering various applications. This book focuses on the structure, preparation, characterization and applications of metallic membranes and membrane reactors, as well as transport mechanisms and simulation aspects. As recent research has focused on the development of metallic membranes and their applications, this book is an ideal reference on different production procedures and their use. Reviews metallic membranes research and applications Outlines the mechanisms of metallic membrane based processes Includes structure, preparation, characterization and properties of metallic membranes Highlights various applications of metallic membranes in energy production

Palladium (Pd)-based membranes have received a great deal of attention from both academia and industry thanks to their ability to selectively separate hydrogen from gas streams. The integration of such membranes with appropriate catalysts in membrane reactors allows for hydrogen production with CO₂ capture that can be applied in smaller bioenergy or combined heat and power (CHP) plants, as well as in large-scale power plants. Pd-based membranes are therefore regarded as a Key Enabling Technology (KET) to facilitate the transition towards a knowledge-based, low-carbon, and resource-efficient economy. This Special Issue of the journal Membranes on “Pd-based Membranes: Overview and Perspectives” contains nine peer-reviewed articles. Topics include manufacturing techniques, understanding of material

phenomena, module and reactor design, novel applications, and demonstration efforts and industrial exploitation.

This report presents a cost analysis of Polymer Grade (PG) Propylene production from propane using a dehydrogenation process. The process examined is similar to Uhde STAR process. In this process, Propylene is produced through two dehydrogenation steps: a steam reforming step followed by oxyreaction. This report examines one-time costs associated with the construction of a United States-based plant and the continuing costs associated with the daily operation of such a plant. More specifically, it discusses:

- * Capital Investment, broken down by:
 - Total fixed capital required, divided in production unit (ISBL); infrastructure (OSBL) and contingency
 - Alternative perspective on the total fixed capital, divided in direct costs, indirect costs and contingency
 - Working capital and costs incurred during industrial plant commissioning and start-up
- * Production cost, broken down by:
 - Manufacturing variable costs (raw materials, utilities)
 - Manufacturing fixed costs (maintenance costs, operating charges, plant overhead, local taxes and insurance)
 - Depreciation and corporate overhead costs
- * Raw materials consumption, products generation and labor requirements
- * Process block flow diagram and description of industrial site installations (production unit and infrastructure)

This report was developed based essentially

on the following reference(s): US Patent 7678956, issued to Uhde in 2010

Keywords: PG Propylene, Steam Active Reforming, Thyssenkrupp, Propene, PDH, On-Purpose Propylene Production

Uniquely focussed on the engineering aspects of membrane reactors Provides tools for analysis with specific regard to sustainability Applications include water treatment, wastewater recycling, desalination, biorefineries, agro-food production Membrane reactors can bring energy saving, reduced environmental impact and lower operating costs

The rise of shale gas and the consequent reduction in propane prices added to the interest about Propane Dehydrogenation (PDH) processes - one of on-purpose propylene production technologies. This publication reviews the technical aspects of a PDH technology similar to the Uhde STAR process(r), which employs an oxydehydrogenation step. The analysis also includes estimates for both the capital investment and the operating costs of typical plants on the US Gulf Coast and in China. This study follows the same pattern as all Technology Economics studies developed by Intratec. About Technology Economics Technology Economics studies are advisory services ordered by leading chemical companies, which are disclosed to public after an agreed upon period of time. All Technology Economics studies are based on the same

rigorous methodology and well-defined structure, encompassing: Process flow diagrams and material balances Raw material and utility consumptions Major equipment sizing Inside and outside battery limits capital costs Detailed fixed and variable manufacturing expenses

Through innovative design, creation, processing, use, and disposal of substances, the chemical industry plays a major role in advancing applications to support sustainability in a way that will allow humanity to meet current environmental, economic, and societal needs without compromising the progress and success of future generations. Based on a workshop held in February 2005 that brought together a broad cross section of disciplines and organizations in the chemical industry, this report identifies a set of overarching Grand Challenges for Sustainability research in chemistry and chemical engineering to assist the chemical industry in defining a sustainability agenda. These Grand Challenges include life cycle analysis, renewable chemical feedstocks, and education, among others.

Chemicals -- and the process used to produce them -- are a billion dollar business. Written by experts from major international petrochemical licensing firms, this innovative handbook details the latest and most powerful chemical processes used to create the most economically important chemicals in the

world.

Describes how to conduct kinetic experiments with heterogeneous catalysts, analyze and model the results, and characterize the catalysts Detailed analysis of mass transfer in liquid phase reactions involving porous catalysts. Important to the fine chemicals and pharmaceutical industries so it has appeal to many researchers in both industry and academia (chemical engineering and chemistry departments)

This report presents a cost analysis of Polymer Grade (PG) Propylene production from propane using a dehydrogenation process. The process examined is similar to CB&I Lummus CATOFIN process. In this process, the dehydrogenation reaction is carried out in a fixed-bed reactor. This report was developed based essentially on the following reference(s): (1) US Patent 20120014846, issued to Lummus Technology in 2012 (2) US Patent 8101541, issued to Sud-Chemie in 2012 Keywords: PG Propylene, Clariant, Sud-Chemie, Propene, PDH, On-Purpose Propylene Production

Membrane Reactors for Hydrogen Production Processes deals with technological and economic aspects of hydrogen selective membranes application in hydrogen production chemical processes. Membrane Reactors for Hydrogen Production Processes starts with an overview of membrane integration in the chemical reaction environment,

formulating the thermodynamics and kinetics of membrane reactors and assessing the performance of different process architectures. Then, the state of the art of hydrogen selective membranes, membrane manufacturing processes and the mathematical modeling of membrane reactors are discussed. A review of the most useful applications from an industrial point of view is given. These applications include: natural gas steam reforming, autothermal reforming, water gas shift reaction, decomposition of hydrogen sulphide, and alkanes dehydrogenation. The final part is dedicated to the description of a pilot plant where the novel configuration was implemented at a semi-industrial scale. Plant engineers, researchers and postgraduate students will find Membrane Reactors for Hydrogen Production Processes a comprehensive guide to the state of the art of membrane reactor technology.

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.

This book describes new theories and applications of artificial neural networks, with a special focus on answering questions in neuroscience, biology and biophysics and cognitive research. It covers a wide range of methods and technologies, including deep neural networks, large scale neural models, brain computer interface, signal processing methods, as well as models of perception, studies on emotion recognition, self-organization and many more. The book includes both selected and invited papers presented at the XXII International Conference on Neuroinformatics, held on October 12-16, 2020, Moscow, Russia.

Biochemistry for Materials Science: Catalysis, Complexes and Proteins unlocks recent developments in the field of biochemistry through a series of case studies, enabling materials scientists to harness these advances for innovation in their own field, from the design of bio-inspired materials, to the use of new classes of catalyst. The book is

broken up into six independent parts that include an introduction to seven recent discoveries, a discussion of the fundamental knowledge and techniques of biochemistry, a look at a number of biochemical materials, and an exploration of the areas of life science, organic chemistry and inorganic-related materials. The book concludes with a discussion of cosmochemistry. Presents recent developments in biochemistry that can be harnessed for innovation in materials science Utilizes case studies to illustrate the application of various biochemistry concepts Provides readers with the fundamental knowledge of basic chemistry relating to life-forming materials, catalysis, etc.

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.

In the last decade, the attention paid to the environmental protection has generated a considerable interest towards the development of new energy carriers and green energy production methods. Hydrogen as an energy carrier becomes a potential important source of energy due to its neutral environmental impact. However, its production, transformation and purification, presents a challenge in the so called hydrogen economy. Current Trends and Future Developments on (Bio-) Membranes gives a comprehensive review on the present state of the art of the hydrogen production and purification using new and alternative technologies stressing green

processes and environment protection. The book covers green processes, renewable feedstocks utilization and membrane reactor technology for hydrogen production in line with new process intensification strategy. The book is divided in four sections, ie fundamentals of hydrogen generation, its impact on environmental issue, new applications involving hydrogen and its storage and distribution. The main scope of this book is to offer a new horizon on hydrogen generation and utilization. It stresses the role of new technologies for hydrogen generation, including the “micro-reactors technology for portable applications , their combination with high temperature fuel cells, the role of gas-separation for both hydrogen purification and CO₂ sequestration, the exploitation of renewable sources (biogas, bioethanol and other renewables feedstocks) in reforming processes useful to generate hydrogen, membrane and membrane reactor technology as well as membrane bio-reactors etc. Presents process intensification and commercialization of new and alternative hydrogen generation technologies Relates new hydrogen production methods to their environmental impact Outlines the fundamentals of hydrogen generation Includes new developed technologies for hydrogen transport and storage Leveraging Synergies Between Refining and Petrochemical Processes provides a detailed description of the interfaces and connections between crude oil refining and petrochemicals. It offers a view of global and regional markets and economic opportunities for synergies between these sectors. Features: Shows a global and

regional market outlook for crude oil refining and petrochemical sectors Explores economic and market opportunities for taking advantage of the synergies between both sectors Analyzes the technical challenges and opportunities that come with these synergies Gives an outlook and prediction of what companies will be able to achieve in the mid-term future Provides introductory and explanatory material as well as in-depth insight into future technology and market developments This book serves as a reference for professionals in chemical engineering, oil and gas engineering, and industrial chemistry. It aims to help engineers and industry professionals understand the challenges and the potential benefits of developing expansion or optimization projects that may bridge the gap between refining and petrochemicals.

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 separate petrochemical building blocks—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. Thanks to their outstanding hydrogen selectivity, palladium membranes have attracted extensive R&D interest. They are a potential breakthrough technology

for hydrogen production and also have promising applications in the areas of thermochemical biorefining. This book summarises key research in palladium membrane technologies, with particular focus on the scale-up challenges. After an introductory chapter, Part one reviews the fabrication of palladium membranes. Part two then focuses on palladium membrane module and reactor design. The final part of the book reviews the operation of palladium membranes for synthesis gas/hydrogen production, carbon capture and other applications. Review of manufacture and design issues for palladium membranes Discussion of the applications of palladium membrane technology, including solar steam reforming, IGCC plants, NGCC plants, CHP plants and hydrogen production Examples of the technology in operation

This book is essential reading for scientists and students interested in both organic and inorganic chemical technology. The authors cover the production of chemical reagents as well as trends from adjacent fields including biotechnology and process simulation. Chemical Technologies and Processes is of interest to chemical engineers, materials scientists, as well as chemists in both academia and industry.

Sustainable Design through Process Integration: Fundamentals and Applications to Industrial Pollution Prevention, Resource Conservation, and Profitability

Enhancement, Second Edition, is an important textbook that provides authoritative, comprehensive, and easy-to-follow coverage of the fundamental concepts and practical techniques on the use of process integration to maximize the efficiency and sustainability of industrial processes. The book is ideal for adoption in process design and sustainability courses. It is also a valuable guidebook to process, chemical, and environmental engineers who need to improve the design, operation, performance, and sustainability of industrial plants. The book covers pressing and high growth topics, including benchmarking process performance, identifying root causes of problems and opportunities for improvement, designing integrated solutions, enhancing profitability, conserving natural resources, and preventing pollution. Written by one of the world's foremost authorities in integrated process design and sustainability, the new edition contains new chapters and updated materials on various aspects of process integration and sustainable design. The new edition is also packed with numerous new examples and industrial applications. Allows the reader to methodically develop rigorous targets that benchmark the performance of industrial processes then develop cost-effective implementations Contains state-of-the-art process integration and improvement approaches and techniques including graphical, algebraic, and mathematical methods Covers topics and

applications that include profitability enhancement, mass and energy conservation, synthesis of innovative processes, retrofitting of existing systems, design and assessment of water, energy, and water-energy-nexus systems, and reconciliation of various sustainability objectives

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