

Modeling of Processes and Reactors for Upgrading of Heavy Petroleum



Jorge Ancheyta



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Modeling Of Processes And Reactors For Upgrading Of Heavy Petroleum Chemical Industries

Wen-Ching Yang



Modeling Of Processes And Reactors For Upgrading Of Heavy Petroleum Chemical Industries:

Modeling of Processes and Reactors for Upgrading of Heavy Petroleum Jorge Ancheyta, 2013-01-29 The worldwide petroleum industry is facing a dilemma the production level of heavy petroleum is higher than that of light petroleum Heavy crude oils possess high amounts of impurities sulfur nitrogen metals and asphaltenes as well as a high yield of residue with consequent low production of valuable distillates gasoline and diesel These Mathematical Modeling of Complex Reaction Systems in the Oil and Gas Industry Jorge Ancheyta, Andrey Zagoruiko, Andrey Elyshev, 2024-07-25 Master the fundamentals of reaction systems modeling for the age of decarbonization Reactor design is one of the most important parts of the oil and gas industry with reactor processes and the accompanying technologies constantly evolving to meet industry needs A crucial component of effective reactor design is modelling complex reaction systems which can help predict commercial performance shape safety procedures and more At a time when decarbonization and clean energy transition are among the fundamental global technological challenges it has never been more important for engineers to grasp the cutting edge of reaction system modelling Mathematical Modeling of Complex Reaction Systems in the Oil and Gas Industry provides a systematic introduction to this timely subject Each chapter provides a step by step description of the kinetic and reactor models for a particular kind of process and its accompanying systems Backed by voluminous experimental data and incorporating extensive simulation results the book constitutes an indispensable contribution to the global search for clean energy solutions Mathematical Modeling of Complex Reaction Systems in the Oil and Gas Industry readers will also find All the required tools for developing new reactor models for different reaction scales Detailed discussion of topics including hydrocracking of heavy oils catalyst deactivation oxidative regeneration of catalysts and many more Extensive treatment of both steady state and dynamic simulations Mathematical Modeling of Complex Reaction Systems in the Oil and Gas Industry is ideal for chemical and process engineers computational chemists and modelers catalysis researchers and any other researchers or professionals in petrochemical engineering and the oil and gas industry **Handbook of Petrochemical Processes** James G. Speight, 2019-06-13 The petrochemical industry is a scientific and engineering field that encompasses the production of a wide range of chemicals and polymers The purpose of this book is not only to provide a follow on to form the later chapters of the highly successful Chemistry and Technology of Petroleum 5th Edition but also provides a simplified approach to a very diverse chemical subject dealing with the chemistry and technology of various petroleum and petrochemical process Following from the introductory chapters this book provides the readers with a valuable source of information containing insights into petrochemical reactions and products process technology and polymer synthesis Provides readers with a valuable source of information containing insights into petrochemical reactions and products process technology and polymer synthesis Introduces the reader to the various petrochemical intermediates are generally produced by chemical conversion of primary petrochemicals to form more complicated derivative products The reactions and processes

involved in transforming petroleum based hydrocarbons into the chemicals that form the basis of the multi billion dollar petrochemical industry are reviewed and described The book includes information on new process developments for the production of raw materials and intermediates for petrochemicals Includes a description of the origin of the raw materials for the petrochemicals industry including an overview of the coal chemicals industry **Chemical Reaction Engineering and Reactor Technology, Second Edition** Tapio O. Salmi,Jyri-Pekka Mikkola,Johan P. Wärnå,2019-07-11 The role of the chemical reactor is crucial for the industrial conversion of raw materials into products and numerous factors must be considered when selecting an appropriate and efficient chemical reactor Chemical Reaction Engineering and Reactor Technology defines the qualitative aspects that affect the selection of an industrial chemical reactor and couples various reactor models to case specific kinetic expressions for chemical processes Thoroughly revised and updated this much anticipated Second Edition addresses the rapid academic and industrial development of chemical reaction engineering Offering a systematic development of the chemical reaction engineering concept this volume explores essential stoichiometric kinetic and thermodynamic terms needed in the analysis of chemical reactors homogeneous and heterogeneous reactors reactor optimization aspects residence time distributions and non ideal flow conditions in industrial reactors solutions of algebraic and ordinary differential equation systems gas and liquid phase diffusion coefficients and gas film coefficients correlations for gas liquid systems solubilities of gases in liquids guidelines for laboratory reactors and the estimation of kinetic parameters The authors pay special attention to the exact formulations and derivations of mass energy balances and their numerical solutions Richly illustrated and containing exercises and solutions covering a number of processes from oil refining to the development of specialty and fine chemicals the text provides a clear understanding of chemical reactor analysis and design **Modeling and Simulation of Catalytic Reactors for Petroleum Refining** Jorge Ancheyta,2011-04-20 Modeling and Simulation of Catalytic Reactors for Petroleum Refining deals with fundamental descriptions of the main conversion processes employed in the petroleum refining industry catalytic hydrotreating catalytic reforming and fluid catalytic cracking Common approaches for modeling of catalytic reactors for steady state and dynamic simulations are also described and analyzed Aspects such as thermodynamics reaction kinetics process variables process scheme and reactor design are discussed in detail from both research and commercial points of view Results of simulation with the developed models are compared with those determined at pilot plant scale as well as commercial practice Kinetics data used in the reactor model are either taken from the literature or obtained under controlled experiments at the laboratory *Synthetics, Mineral Oils, and Bio-Based Lubricants* Leslie R. Rudnick,2020-01-29 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

Deactivation of Heavy Oil Hydroprocessing Catalysts Jorge Ancheyta, 2016-07-25 Written by a scientist and researcher with more than 25 years of experience in the field this serves as a complete guide to catalyst activity loss during the hydroprocessing of heavy oils Explores the physical and chemical properties of heavy oils and hydroprocessing catalysts the mechanisms of catalyst deactivation catalyst characterization by a variety of techniques and reaction conditions laboratory and commercial information for model validations and more Demonstrates how to develop correlations and models for a variety of reaction scales with step by step descriptions and detailed experimental data Contains important implications for increasing operational efficiencies within the petroleum industry An essential reference for professionals and researchers working in the refining industry as well as students taking courses on chemical reaction engineering

Process Chemistry of Petroleum Macromolecules Irwin A. Wiehe, 2008-06-20 Although there is a shortage of light petroleum there is plenty of heavy petroleum rich in macromolecules available creating an increasing interest for processes that can convert heavy oils to light oils Process Chemistry of Petroleum Macromolecules provides the scientific basis for such processes presenting methods to determine improvement potential Topics include characterization thermal kinetics phase behavior and separation Revealing that the science of petroleum macromolecules is simpler and more exciting than imagined it also discusses macromolecules that self associate liquid crystalline phases reactions triggered by phase separation and both dispersed and dissolved solutes

Fossil Energy Update ,1977 **21st European Symposium on Computer Aided Process Engineering** ,2011-06-10 The European Symposium on Computer Aided Process Engineering ESCAPE series presents the latest innovations and achievements of leading professionals from the industrial and academic communities The ESCAPE series serves as a forum for engineers scientists researchers managers and students to present and discuss progress being made in the area of computer aided process engineering CAPE European industries large

and small are bringing innovations into our lives whether in the form of new technologies to address environmental problems new products to make our homes more comfortable and energy efficient or new therapies to improve the health and well being of European citizens Moreover the European Industry needs to undertake research and technological initiatives in response to humanity s Grand Challenges described in the declaration of Lund namely Global Warming Tightening Supplies of Energy Water and Food Ageing Societies Public Health Pandemics and Security Thus the Technical Theme of ESCAPE 21 will be Process Systems Approaches for Addressing Grand Challenges in Energy Environment Health Bioprocessing Nanotechnologies Oil Shales and Tar Sands United States. Department of Energy,1977 **Advances in Clean**

Hydrocarbon Fuel Processing M. Rashid Khan,2011-09-23 Conventional coal oil and gas resources used worldwide for power production and transportation are limited and unsustainable Research and development into clean alternative hydrocarbon fuels is therefore aimed at improving fuel security through exploring new feedstock conversion techniques improving production efficiency and reducing environmental impacts Advances in clean hydrocarbon fuel processing provides a comprehensive and systematic reference on the range of alternative conversion processes and technologies Following introductory overviews of the feedstocks environmental issues and life cycle assessment for alternative hydrocarbon fuel processing sections go on to review solid liquid and gaseous fuel conversion Solid fuel coverage includes reviews of liquefaction gasification pyrolysis and biomass catalysis Liquid fuel coverage includes reviews of sulfur removal partial oxidation and hydroconversion Gaseous fuel coverage includes reviews of Fischer Tropsch synthesis methanol and dimethyl ether production water gas shift technology and natural gas hydrate conversion The final section examines environmental degradation issues in fuel processing plants as well as automation advanced process control and process modelling techniques for plant optimisationWritten by an international team of expert contributors Advances in clean hydrocarbon fuel processing provides a valuable reference for fuel processing engineers industrial petrochemists and energy professionals as well as for researchers and academics in this field A comprehensive reference on the range of alternative conversion processes and technologies Provides an overview of the feedstocks environmental issues and life cycle assessments for alternative hydrocarbon fuel processing including a review of the key issues in solid liquid and gaseous fuel conversion Examines automation advanced process control and process modelling techniques for plant optimisation

Multiphase Catalytic Reactors Zeynep Ilse Önsan,Ahmet Kerim Avci,2016-07-05 Provides a holistic approach to multiphase catalytic reactors from their modeling and design to their applications in industrial manufacturing of chemicals Covers theoretical aspects and examples of fixed bed fluidized bed trickle bed slurry monolith and microchannel reactors Includes chapters covering experimental techniques and practical guidelines for lab scale testing of multiphase reactors Includes mathematical content focused on design equations and empirical relationships characterizing different multiphase reactor types together with an assortment of computational tools Involves detailed coverage of multiphase reactor

applications such as Fischer Tropsch synthesis fuel processing for fuel cells hydrotreating of oil fractions and biofuels processing

Chemical Reaction Engineering and Reactor Technology Tapio O. Salmi, Jyri-Pekka Mikkola, Johan P. Warna, 2011-07-01 The role of the chemical reactor is crucial for the industrial conversion of raw materials into products and numerous factors must be considered when selecting an appropriate and efficient chemical reactor Chemical Reaction Engineering and Reactor Technology defines the qualitative aspects that affect the selection of an industrial chemical reactor and couples various reactor models to case specific kinetic expressions for chemical processes Offering a systematic development of the chemical reaction engineering concept this volume explores Essential stoichiometric kinetic and thermodynamic terms needed in the analysis of chemical reactors Homogeneous and heterogeneous reactors Residence time distributions and non ideal flow conditions in industrial reactors Solutions of algebraic and ordinary differential equation systems Gas and liquid phase diffusion coefficients and gas film coefficients Correlations for gas liquid systems Solubilities of gases in liquids Guidelines for laboratory reactors and the estimation of kinetic parameters The authors pay special attention to the exact formulations and derivations of mass energy balances and their numerical solutions Richly illustrated and containing exercises and solutions covering a number of processes from oil refining to the development of specialty and fine chemicals the text provides a clear understanding of chemical reactor analysis and design

Fusion Energy Update, 1982-04

Handbook of Fluidization and Fluid-Particle Systems Wen-Ching Yang, 2003-03-19 This reference details particle characterization dynamics manufacturing handling and processing for the employment of multiphase reactors as well as procedures in reactor scale up and design for applications in the chemical mineral petroleum power cement and pharmaceuticals industries The authors discuss flow through fixed beds elutriation and entrainment gas distributor and plenum design in fluidized beds effect of internal tubes and baffles general approaches to reactor design applications for gasifiers and combustors dilute phase pneumatic conveying and applications for chemical production and processing This is a valuable guide for chemists and engineers to use in their day to day work

Catalytic Reactors Basudeb Saha, 2015-12-18 Catalytic Reactors presents several key aspects of reactor design in Chemical and Process Engineering Starting with the fundamental science across a broad interdisciplinary field this graduate level textbook offers a concise overview on reactor and process design for students scientists and practitioners new to the field This book aims to collate into a comprehensive and well informed work of leading researchers from north America western Europe and south east Asia The editor and international experts discuss state of the art applications of multifunctional reactors biocatalytic membrane reactors micro flow reactors industrial catalytic reactors micro trickle bed reactors and multiphase catalytic reactors The use of catalytic reactor technology is essential for the economic viability of the chemical manufacturing industry The importance of Chemical and Process Engineering and efficient design of reactors are another focus of the book Especially the combination of advantages from both catalysis and chemical reaction technology for optimization and intensification as essential factors in

the future development of reactors and processes are discussed Furthermore options that can drastically influence reaction processes e g choice of catalysts alternative reaction pathways mass and heat transfer effects flow regimes and inherent design of catalytic reactors are reviewed in detail Focuses on the state of the art applications of catalytic reactors and optimization in the design and operation of industrial catalytic reactors Insights into transfer of knowledge from laboratory science to industry For students and researchers in Chemical and Mechanical Engineering Chemistry Industrial Catalysis and practising Engineers *Batch Processes* Ekaterini Korovessi, Andreas A. Linninger, 2005-09-26 Reduced time to market lower production costs and improved flexibility are critical success factors for batch processes Their ability to handle variations in feedstock and product specifications has made them key to the operation of multipurpose facilities and therefore quite popular in the specialty chemical pharmaceutical agricultural and Chemical Engineering Progress ,2007 Energy Research Abstracts ,1990

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