Topics in chemical engineering Volume 7

# MODELLING, SIMULATION AND OPTIMIZATION OF INDUSTRIAL FIXED BED CATALYTIC REACTORS

S.S.E.H. Elnashaie and S.S. Elshishini



S.S.E.H. Elnashaie

Modelling, Simulation and Optimization of Industrial Fixed Bed Catalytic Reactors S.S.E.H. Elnashaie, 2022-01-26 In the last two decades impressive advances have been made toward the understanding and quantitative description of the kinetics Despite these advances however the use of mathematical modelling of gas solid catalytic reactors in industry is still limited By consolidating progress in the understanding of catalytic processes this book applies these fundamental advances to the development of models for design simulation and optimization of industrial reactors Paying particular attention to the verification of the developed models against industrial data these models are used to optimize the performance of many practical reactor cases Using a systems approach for the development of the different components and the resulting overall models the book is easy to read and gives an insight into the behaviour of these complex industrial systems In addition the practical relevance of bifurcation instability and chaos to industrial reactors is briefly discussed Modelling, Simulation and Optimization of Industrial Fixed Bed Catalytic Reactors S.S.E.H. Elnashaie, 2022-01-26 In the last two decades impressive advances have been made toward the understanding and quantitative description of the kinetics Despite these advances however the use of mathematical modelling of gas solid catalytic reactors in industry is still limited By consolidating progress in the understanding of catalytic processes this book applies these fundamental advances to the development of models for design simulation and optimization of industrial reactors Paying particular attention to the verification of the developed models against industrial data these models are used to optimize the performance of many practical reactor cases Using a systems approach for the development of the different components and the resulting overall models the book is easy to read and gives an insight into the behaviour of these complex industrial systems In addition the practical relevance of bifurcation instability and chaos to industrial reactors is briefly discussed Biofuels and Bioenergy Baskar Gurunathan, G Venkatesh, 2024-11-27 Biofuels and Bioenergy Biorefinery and Circular Bioeconomy Approaches covers the latest developments in biorefinery approaches for the production of biofuels like bioethanol biobutanol and biooil from lignocellulosic biomass catalytic conversion of biooil into biofuels biodiesel from non edible vegetable oils and biodiesel from microbial and macroalgal lipids The book also covers biorefinery approaches for a circular bioeconomy and technoeconomic analysis of biofuels production This book provides comprehensive information on biorefinery approaches for biofuels production for academicians researchers scientist and practicing engineers This valuable reference also includes recent advancements in the utilization of biomass for bioenergy production and discusses the role of artificial intelligence to improvise process modelling and development Delivers a reference book for biofuels production Features technological advancements in converting waste to energy Covers industrial processes and problems Explains biorefinery approaches and circular bioeconomy for biofuels and bioenergy production Addresses the role of artificial intelligence in process development for biofuels and bioenergy Applied Chemistry and Chemical Engineering, Volume 4 A. K.

Haghi, Lionello Pogliani, Eduardo A. Castro, Devrim Balköse, Omari V. Mukbaniani, Chin Hua Chia, 2017-12-22 Applied Chemistry and Chemical Engineering Volume 4 Experimental Techniques and Methodical Developments provides a detailed vet easy to follow treatment of various techniques useful for characterizing the structure and properties of engineering materials This timely volume provides an overview of new methods and presents experimental research in applied chemistry using modern approaches Each chapter describes the principle of the respective method as well as the detailed procedures of experiments with examples of actual applications and then goes on to demonstrate the advantage and disadvantages of each physical technique Thus readers will be able to apply the concepts as described in the book to their own experiments The book is broken into several subsections Polymer Chemistry and Technology Computational Approaches Clinical Chemistry and Bioinformatics Special Topics This volume presents research and reviews and information on implementing and sustaining interdisciplinary studies in science technology engineering and mathematics Complexity and Complex Thermo-Economic Systems Stanislaw Sieniutycz, 2019-11-24 Complexity and Complex Thermoeconomic Systems describes the properties of complexity and complex thermo economic systems as the consequence of formulations definitions tools solutions and results consistent with the best performance of a system Applying to complex systems contemporary advanced techniques such as static optimization optimal control and neural networks this book treats the systems theory as a science of general laws for functional integrities It also provides a platform for the discussion of various definitions of complexity complex hierarchical structures self organization examples special references and historical issues This book is a valuable reference for scientists engineers and graduated students in chemical mechanical and environmental engineering as well as those in physics ecology and biology helping them better understand the complex thermodynamic systems and enhance their technical skills in research Provides a lucid presentation of the dynamical properties of thermoeconomic systems Includes original graphical material that illustrates the properties of complex systems Written by a first class expert in the field of advanced methods in thermodynamics **Composition Modulation of Catalytic Reactors** P L Silverton, 1998-11-26 Composition modulation is a method of operating a catalytic reactor to improve catalyst activity or selectivity and has been under study for more than 25 years In the last few years several commercial applications have been realized and more will certainly appear A large international research literature now exists This book examines this literature and attempts to organize and analyze it with the intent of identifying the magnitude of improvements possible why modulation is effective and what questions remain unanswered Topics include hydrogenation oxidation reduction and polymerization reactions for NOX Handbook of Membrane Reactors Angelo Basile, 2013-02-08 Membrane reactors are SOX NH3 and hydrocarbons increasingly replacing conventional separation process and conversion technologies across a wide range of applications Exploiting advanced membrane materials they offer enhanced efficiency are very adaptable and have great economic potential There has therefore been increasing interest in membrane reactors from both the scientific and industrial

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