

## Blended Processing Mathematics In Chemical Kinetics

Covers the current state of theoretical and experimental studies of oligomeric mixed systems from the physico-chemical standpoint and provides a technologist with the means for the quantitative approach to preparing liquid oligomeric compositions and choosing proper operating conditions for their processing into materials and articles. Recommendations are given on the practical use of found physico-patterns as well as the physico-chemical analysis of the effect of the composition ingredients on the final properties.

This new book focuses on important research related to the mathematical modelling of engineering and environmental processes, manufacturing, and industrial systems. It includes heat transfer, fluid mechanics, CFD, and transport phenomena; solid mechanics and mechanics of metals; electromagnets and MHD; reliability modelling and system optimisation; finite volume, finite element, and boundary element procedures; decision sciences in an industrial and manufacturing context; civil engineering systems and structures; mineral and energy resources; relevant software engineering issues associated with CAD and CAE; and materials and metallurgical engineering.

The field of Chemical Engineering and its link to computer science is in constant evolution and new engineers have a variety of tools at their disposal to tackle their everyday problems.

Introduction to Software for Chemical Engineers, Second Edition provides a quick guide to the use of various computer packages for chemical engineering applications. It covers a range of software applications from Excel and general mathematical packages such as MATLAB and MathCAD to process simulators, CHEMCAD and ASPEN, equation-based modeling languages, gProms, optimization software such as GAMS and AIMS, and specialized software like CFD or DEM codes. The different packages are introduced and applied to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, process and equipment design and control. This new edition offers a wider view of packages including open source software such as R, Python and Julia. It also includes complete examples in ASPEN Plus, adds ANSYS Fluent to CFD codes, Lingo to the optimization packages, and discusses Engineering Equation Solver. It offers a global idea of the capabilities of the software used in the chemical engineering field and provides examples for solving real-world problems. Written by leading experts, this book is a must-have reference for chemical engineers looking to grow in their careers through the use of new and improving computer software. Its user-friendly approach to simulation and optimization as well as its example-based presentation of the software, makes it a perfect teaching tool for both undergraduate and master levels.

With their broad range of properties, polymer blends are widely used in adhesion, colloidal stability, the design of composite and biocompatible materials, and other areas. As the science and technology of polymer blends advances, an increasing number of polymer blend systems and applications continue to be developed. Functional Polymer Blends: Syn

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.

Mathematical Methods in Chemical and Biological Engineering describes basic to moderately advanced mathematical techniques useful for shaping the model-based analysis of chemical and biological engineering systems. Covering an ideal balance of basic mathematical

principles and applications to physico-chemical problems, this book presents examples drawn from recent scientific and technical literature on chemical engineering, biological and biomedical engineering, food processing, and a variety of diffusional problems to demonstrate the real-world value of the mathematical methods. Emphasis is placed on the background and physical understanding of the problems to prepare students for future challenging and innovative applications.

Scientists have attributed more than 40 percent of the failures in new drug development to poor biopharmaceutical properties, particularly water insolubility. Issues surrounding water insolubility can postpone, or completely derail, important new drug development. Even much-needed reformulation of currently marketed products can be significantly affected by these challenges. Water Insolubility is the Primary Culprit in over 40% of New Drug Development Failures The most comprehensive resource on the topic, this second edition of Water Insoluble Drug Formulation brings together a distinguished team of experts to provide the scientific background and step-by-step guidance needed to deal with solubility issues in drug development. Twenty-three chapters systematically describe solubility properties and their impact on formulation, from theory to industrial practice. With detailed discussion on how these properties contribute to solubilization and dissolution, the text also features six brand new chapters on water-insoluble drugs, exploring regulatory aspects, pharmacokinetic behavior, early phase formulation strategies, lipid based systems for oral delivery, modified release of insoluble drugs, and scalable manufacturing aspects. The book includes more than 15 water-insoluble drug delivery systems or technologies, illustrated with case studies featuring oral and parenteral applications. Highlighting the most current information and data available, this seminal volume reflects the significant progress that has been made in nearly all aspects of this field.

Coal Production and Processing Technology provides uniquely comprehensive coverage of the latest coal technologies used in everything from mining to greenhouse gas mitigation. Featuring contributions from experts in industry and academia, this book: Discusses coal geology, characterization, beneficiation, combustion, coking, gasification, and liquef Due in part to an absence of universally accepted standardization methods, nutraceuticals and functional foods face regulatory ignorance, marketing incompetence and ethical impunity. Even though many researchers believe that there is a connection between nutraceuticals and functional foods and reduced health care expenses as well as disease prevent Optimization is of critical importance in engineering. Engineers constantly strive for the best possible solutions, the most economical use of limited resources, and the greatest efficiency. As system complexity increases, these goals mandate the use of state-of-the-art optimization techniques. In recent years, the theory and methodology of optimization have seen revolutionary improvements. Moreover, the exponential growth in computational power, along with the availability of multicore computing with virtually unlimited memory and storage capacity, has fundamentally changed what engineers can do to optimize their designs. This is a two-way process: engineers benefit from developments in optimization methodology, and challenging new classes of optimization problems arise from novel engineering applications. Advances and Trends in Optimization with Engineering Applications reviews 10 major areas of optimization and related engineering applications, providing a broad summary of state-of-the-art optimization techniques most important to engineering practice. Each part provides a clear overview of a specific area and discusses a range of real-world problems. The book provides a solid foundation for engineers and mathematical optimizers alike who want to understand the importance of optimization methods to engineering and the capabilities of these methods. Problem solving is central to the teaching and learning of chemistry at secondary, tertiary and post-tertiary levels of education, opening to students and professional chemists alike a whole new world for analysing data, looking for patterns and making deductions. As an important

higher-order thinking skill, problem solving also constitutes a major research field in science education. Relevant education research is an ongoing process, with recent developments occurring not only in the area of quantitative/computational problems, but also in qualitative problem solving. The following situations are considered, some general, others with a focus on specific areas of chemistry: quantitative problems, qualitative reasoning, metacognition and resource activation, deconstructing the problem-solving process, an overview of the working memory hypothesis, reasoning with the electron-pushing formalism, scaffolding organic synthesis skills, spectroscopy for structural characterization in organic chemistry, enzyme kinetics, problem solving in the academic chemistry laboratory, chemistry problem-solving in context, team-based/active learning, technology for molecular representations, IR spectra simulation, and computational quantum chemistry tools. The book concludes with methodological and epistemological issues in problem solving research and other perspectives in problem solving in chemistry.

Processing of polymer nanocomposites usually requires special attention since the resultant structure—micro- and nano-level, is directly influenced by among other factors, polymer/nano-additive chemistry and the processing strategy. This book consolidates knowledge, from fundamental to product development, on polymer nanocomposites processing with special emphasis on the processing-structure-property-performance relationships in a wide range of polymer nanocomposites. Furthermore, this book focuses on emerging processing technologies such as electrospinning, which has very exciting applications ranging from medical to filtration. Additionally, the important role played by the nanoparticles in polymer blends structures has been illustrated in the current book, with special focus on fundamental aspects and properties of nanoparticles migration and interface crossing in immiscible polymer blend nanocomposites. This book focuses heavily on the processing technologies and strategies and extensively addresses the processing-structure-property-performance relationships in a wide range of polymer nanocomposites, such as commodity polymers (chapter 1), engineering polymers (chapter 2), elastomers (chapter 3), thermosets (chapter 4), biopolymers (chapter 5), polymer blends (chapter 6), and electrospun polymer (chapter 7). The important role played by nanoparticles in polymer blends structures in particular is illustrated. The book is useful to undergraduate and postgraduate students (polymer engineering, materials science & engineering, chemical & process engineering), as well as research & development personnel, engineers, and material scientists.

While "plastics" was a one-word joke in the 1967 movie *The Graduate*, plastics and other polymers have never been a laughing matter at the University of Akron, with its world-renowned College of Polymer Science and Polymer Engineering. *Chains of Opportunity: The University of Akron and the Emergence of the Polymer Age, 1909-2007* tells the story of the university's rise to prominence in the field, beginning with the world's first academic course in rubber chemistry almost a century ago. *Chains of Opportunity* explores the university's pioneering contributions to rubber chemistry, polymer science, and polymer engineering. It traces the school's interaction with Akron rubber giants such as Goodyear and Firestone, recounts its administration of the federal government's synthetic rubber program during World War II, and describes its role in the development and professionalization of the academic discipline in polymers. The University of Akron has been an essential force in establishing the polymer age that has become a pervasive part of our material lives, in everything from toys to biotechnology.

This reference text introduces latest mathematical modeling techniques and analysis for renewable energy systems. It comprehensively covers important topics including study of combustion characteristics of laser ignited gasoline-air mixture, hierarchical demand

response controller, mathematical modeling of an EOQ for a multi-item inventory system, and integration and modeling of small-scale pumped storage with micro optimization model (HOMER). Aimed at graduate students and academic researchers in the fields of electrical engineering, environmental engineering, mechanical engineering, and civil engineering, this text: Discusses applied mathematical modeling techniques in renewable energy. Covers effective storage and generation of power through renewable energy generation sources. Provides real life applications and problems based on renewable energy. Covers new ways of applying mathematical techniques for applications in diverse areas of science and engineering.

Written in four parts, this book provides a dedicated and in-depth reference for blending within the pharmaceutical manufacturing industry. It links the science of blending with regulatory requirements associated with pharmaceutical manufacture. The contributors are a combination of leading academic and industrial experts, who provide an informed and industrially relevant perspective of the topic. This is an essential book for the pharmaceutical manufacturing industry, and related academic researchers in pharmaceutical science and chemical and mechanical engineering.

Biomass can be used to produce renewable electricity, thermal energy, transportation fuels (biofuels), and high-value functional chemicals. As an energy source, biomass can be used either directly via combustion to produce heat or indirectly after it is converted to one of many forms of bioenergy and biofuel via thermochemical or biochemical pathways. The conversion of biomass can be achieved using various advanced methods, which are broadly classified into thermochemical conversion, biochemical conversion, electrochemical conversion, and so on. Advanced development technologies and processes are able to convert biomass into alternative energy sources in solid (e.g., charcoal, biochar, and RDF), liquid (biodiesel, algae biofuel, bioethanol, and pyrolysis and liquefaction bio-oils), and gaseous (e.g., biogas, syngas, and biohydrogen) forms. Because of the merits of biomass energy for environmental sustainability, biofuel and bioenergy technologies play a crucial role in renewable energy development and the replacement of chemicals by highly functional biomass. This book provides a comprehensive overview and in-depth technical research addressing recent progress in biomass conversion processes. It also covers studies on advanced techniques and methods for bioenergy and biofuel production.

Process Systems Engineering brings together the international community of researchers and engineers interested in computing-based methods in process engineering. This conference highlights the contributions of the PSE community towards the sustainability of modern society and is based on the 13th International Symposium on Process Systems Engineering PSE 2018 event held San Diego, CA, July 1-5 2018. The book contains contributions from academia and industry, establishing the core products of PSE, defining the new and changing scope of our results, and future challenges. Plenary and keynote lectures discuss real-world challenges (globalization, energy, environment and health) and contribute to discussions on the widening scope of PSE versus the consolidation of the core topics of PSE. Highlights how the Process Systems Engineering community contributes to the sustainability of modern society Establishes the core products of Process Systems Engineering Defines the future challenges of Process Systems Engineering Mathematical Modelling of Gas-Phase Complex Reaction Systems: Pyrolysis and

Combustion, Volume 45, gives an overview of the different steps involved in the development and application of detailed kinetic mechanisms, mainly relating to pyrolysis and combustion processes. The book is divided into two parts that cover the chemistry and kinetic models and then the numerical and statistical methods. It offers a comprehensive coverage of the theory and tools needed, along with the steps necessary for practical and industrial applications. Details thermochemical properties and "ab initio" calculations of elementary reaction rates Details kinetic mechanisms of pyrolysis and combustion processes Explains experimental data for improving reaction models and for kinetic mechanisms assessment Describes surrogate fuels and molecular reconstruction of hydrocarbon liquid mixtures Describes pollutant formation in combustion systems Solves and validates the kinetic mechanisms using numerical and statistical methods Outlines optimal design of industrial burners and optimization and dynamic control of pyrolysis furnaces Outlines large eddy simulation of turbulent reacting flows

This book consists of a collection of articles describing the emerging and integrated area of Energy, Natural Resources and Environmental Economics. A majority of the authors are researchers doing applied work in economics, finance, and management science and are based in the Nordic countries. These countries have a long tradition of managing natural resources. Many of the applications are therefore founded on such examples. The book contents are based on a workshop that took place during May 15–16, 2008 in Bergen, Norway. The aim of the workshop was to create a meeting place for researchers who are active in the area of Energy, Natural Resource, and Environmental Economics, and at the same time celebrate Professor Kurt Jorns' 60th birthday. The book is divided into four parts. The first part considers petroleum and natural gas applications, taking up topics ranging from the management of incomes and reserves to market modeling and value chain optimization. The second and most extensive part studies applications from electricity markets, including analyses of market prices, risk management, various optimization problems, electricity market design, and regulation. The third part describes different applications in logistics and management of natural resources. Finally, the fourth part covers more general problems and methods arising within the area.

textbook. Basic description is attempted, and the bibliography has been specifically chosen to guide the reader toward a fuller treatment of his specialized interests. No fully satisfactory term has yet emerged to describe the processing of minerals, which is also called "ore dressing", "mineral dressing", "mineral engineering" and, in the University of London degree course "mineral technology". The dressing of ores was an excellent description of the older processes which aimed to break down rock to appropriate sizes, grade it, and separate the heavy fraction from the light one in each grade or size by gravity methods. The work done in the mill today goes far beyond these simple operations, and requires some knowledge of physical chemistry, particularly the branches which deal with the physics and chemistry of surfaces and of the interphase between solid particle and the surrounding liquid. At the same time, the engineer must not become so absorbed in the study of fundamental and applied technology as a physico-chemical science that he overlooks the mechanical, economic, and humanistic aspects of his work. He is an engineer, a chemist, a physicist, and an administrator and, as such, should have a sound scientific and cultural education.

Technically, his work is to extract the valuable minerals from the ore sent to his mill; economically, it is to balance all the financial costs and returns in such a way as to ensure the maximum profit from the operation.

A guide to the important chemical engineering concepts for the development of new drugs, revised second edition The revised and updated second edition of Chemical Engineering in the Pharmaceutical Industry offers a guide to the experimental and computational methods related to drug product design and development. The second edition has been greatly expanded and covers a range of topics related to formulation design and process development of drug products. The authors review basic analytics for quantitation of drug product quality attributes, such as potency, purity, content uniformity, and dissolution, that are addressed with consideration of the applied statistics, process analytical technology, and process control. The 2nd Edition is divided into two separate books: 1) Active Pharmaceutical Ingredients (API's) and 2) Drug Product Design, Development and Modeling. The contributors explore technology transfer and scale-up of batch processes that are exemplified experimentally and computationally. Written for engineers working in the field, the book examines in-silico process modeling tools that streamline experimental screening approaches. In addition, the authors discuss the emerging field of continuous drug product manufacturing. This revised second edition: Contains 21 new or revised chapters, including chapters on quality by design, computational approaches for drug product modeling, process design with PAT and process control, engineering challenges and solutions Covers chemistry and engineering activities related to dosage form design, and process development, and scale-up Offers analytical methods and applied statistics that highlight drug product quality attributes as design features Presents updated and new example calculations and associated solutions Includes contributions from leading experts in the field Written for pharmaceutical engineers, chemical engineers, undergraduate and graduation students, and professionals in the field of pharmaceutical sciences and manufacturing, Chemical Engineering in the Pharmaceutical Industry, Second Edition contains information designed to be of use from the engineer's perspective and spans information from solid to semi-solid to lyophilized drug products.

"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. "

Developing Solid Oral Dosage Forms: Pharmaceutical Theory and Practice, Second Edition illustrates how to develop high-quality, safe, and effective pharmaceutical products by discussing the latest techniques, tools, and scientific advances in preformulation investigation, formulation, process design, characterization, scale-up, and production operations. This book covers the essential principles of physical pharmacy, biopharmaceutics, and industrial pharmacy, and their application to the research and development process of oral dosage forms. Chapters have been added, combined, deleted, and completely revised as necessary to produce a comprehensive, well-organized, valuable reference for industry professionals and academics engaged in all aspects of the development process. New and important topics include spray drying, amorphous solid dispersion using hot-melt extrusion, modeling and simulation, bioequivalence of complex modified-released dosage forms, biowaivers, and much

more. Written and edited by an international team of leading experts with experience and knowledge across industry, academia, and regulatory settings Includes new chapters covering the pharmaceutical applications of surface phenomenon, predictive biopharmaceutics and pharmacokinetics, the development of formulations for drug discovery support, and much more Presents new case studies throughout, and a section completely devoted to regulatory aspects, including global product regulation and international perspectives

Issues in Food Production, Processing, and Preparation: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Food Production, Processing, and Preparation. The editors have built Issues in Food Production, Processing, and Preparation: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Food Production, Processing, and Preparation in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Food Production, Processing, and Preparation: 2011 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/>.

This book captures the path of digital transformation that the cement enterprises are adopting progressively to elevate themselves to 'Industry 4.0' level. Digital innovations-based Internet of Things (IoT) and Artificial Intelligence (AI) are pertinent technologies for the cement enterprises as the manufacturing processes operate at very large scales with multiple inputs, outputs, and variables, resulting in the essentiality of big data management. Featuring contributions from cement industries worldwide, it covers various aspects of cement manufacturing from IoT, machine learning and data analytics perspective. It further discusses implementation of digital solutions in cement process and plants through case studies. Features: Present an up-to-date, consolidated view on modern cement manufacturing technology, applying new systems. Provides narration of complexity and variables in modern cement plants and processes. Discusses evolution of automation and computerization for the manufacturing processes. Covers application of ERP techniques to cement enterprises. Includes data-driven approaches for energy, environment, and quality management. This book aims at researchers and industry professionals involved in cement manufacturing, cement machinery and system suppliers, chemical engineering, process engineering, industrial engineering, and chemistry.

Processing of fine particles has presented numerous challenges to scientists and engineers for many years. Considerable progress has already been made in meeting these challenges across various fields of applications around the world. Research on every aspect of fine particle processing has gained momentum in recent years, resulting in the development of new processes, improved products, and better understanding of the science and engineering fundamentals of fine particles. This symposium addressed the recent progress in fine particles processing, particularly in the production of minerals for chemicals, pigments and metal production, ceramic materials, and fossil fuels. This book represents the edited proceedings of the International Symposium on Advances in Fine Particles Processing, where selected peer-reviewed papers describe current practices, review the state of the art and report original fundamental and applied research on fine particle production, sizing, characterization of the

interface, fluid flow, and interparticle colloidal interactions, leading to dispersion, flocculation and flotation. Processing of fine particles by multi-chemical, physical and biological phenomena has also been addressed. Accordingly, the book consists of seven parts, with each part addressing a specific topic. Part One deals with production of fine particles by comminution methods where different milling practices, mathematic modeling and physical chemical control methods are reported. Part Two covers particle flow properties in various fluids. Part Three addresses surface and colloidal phenomena in fine particle processing, while Part Four continues this topic but with emphasis on clay minerals.

27th European Symposium on Computer Aided Process Engineering, Volume 40 contains the papers presented at the 27th European Society of Computer-Aided Process Engineering (ESCAPE) event held in Barcelona, October 1-5, 2017. It is a valuable resource for chemical engineers, chemical process engineers, researchers in industry and academia, students, and consultants for chemical industries. Presents findings and discussions from the 27th European Society of Computer-Aided Process Engineering (ESCAPE) event

This book provides an in depth and unparalleled presentation of the compositions of virtually all polymer blends.

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