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Basic Equations of the Mass Transport Through a Membrane Layer Materials Science of Membranes for Gas and Vapor Separation Membrane Technology and Applications The Mathematics of Diffusion *Membrane Handbook* **Transport Mechanisms in Membrane Separation Processes Permeability of Plastic Films and Coatings Science and Technology of Separation Membranes A Diffusion Hydrodynamic Model** Marine Geochemistry **Mass Transport & Reactive Barriers in Packaging** Membrane Processes *Synthetic Membranes and Membrane Separation Processes* Multicomponent Diffusion Synthetic Membranes and Membrane Separation Processes **New-Product Diffusion Models** Simple Brownian Diffusion **Quantum State Diffusion Membrane Separations Technology** Nanofiltration: Principles and Applications **Morphological Models of Random Structures** *Advanced Membrane Technology and Applications* **Comprehensive Membrane Science and Engineering Nonlinear Reaction-Diffusion Systems Models for Innovation Diffusion** *Fractional Diffusion Equations and Anomalous Diffusion Numerical Solution of Time-Dependent Advection-Diffusion-Reaction Equations* **Desalination by Reverse Osmosis Membrane Processing for Dairy Ingredient Separation** Polymeric Gas Separation Membranes Handbook of Food Engineering **Nanotechnology for Water Purification Water Quality Engineering Membranes for Environmental Applications Drug Delivery Separation of Molecules, Macromolecules and Particles Introduction to Desalination Membrane Technology and Applications** Modeling in Membranes and Membrane-Based Processes **Food Properties and Computer-Aided Engineering of Food Processing Systems**

Membrane Separations Technology Apr 10 2021 The field of membrane separation technology is presently in a state of rapid growth and innovation. Many different membrane separation processes have been developed during the past half century and new processes are constantly emerging from academic, industrial, and governmental laboratories. While new membrane separation processes are being conceived with remarkable frequency, existing processes are also being constantly improved in order to enhance their economic competitiveness. Significant improvements are currently being made in many aspects of membrane separation technology: in the development of new membrane materials with higher selectivity and/or permeability, in the fabrication methods for high-flux asymmetric or composite membranes, in membrane module construction and in process design. Membrane separation technology is presently being used in an impressive variety of applications and has generated businesses totalling over one billion U.S. dollars annually. The main objective of this book is to present the principles and applications of a variety of membrane separation processes from the unique perspectives of investigators who have made important contributions to their fields. Another objective is to provide the reader with an authoritative resource on various aspects of this rapidly growing technology. The text can be used by someone who wishes to learn about a general area of application as well as by the knowledgeable person seeking more detailed information.

Water Quality Engineering Jan 27 2020 Explains the fundamental theory and mathematics of water and wastewater treatment processes By carefully explaining both the underlying theory and the underlying mathematics, this text enables readers to fully grasp the fundamentals of physical and chemical treatment processes for water and wastewater. Throughout the book, the authors use detailed examples to illustrate real-world challenges and their solutions, including step-by-step mathematical calculations. Each chapter ends with a set of problems that enable readers to put their knowledge into practice by developing and analyzing complex processes for the removal of soluble and particulate materials in order to ensure the safety of our water supplies. Designed to give readers a deep understanding of how water treatment processes actually work, Water Quality Engineering explores: Application of mass balances in continuous flow systems, enabling readers to understand and predict changes in water quality Processes for removing soluble contaminants from water, including treatment of municipal and industrial wastes Processes for removing particulate materials from water Membrane processes to remove both soluble and particulate materials Following the discussion of mass balances in continuous flow systems in the first part of the book, the authors explain and analyze water treatment processes in subsequent chapters by setting forth the relevant mass balance for the process, reactor geometry, and flow pattern under consideration. With its many examples and problem sets, Water Quality Engineering is recommended as a textbook for graduate courses in physical and chemical treatment processes for water and wastewater. By drawing together the most recent research findings and industry practices, this text is also recommended for professional environmental engineers in search of a contemporary perspective on water and wastewater treatment processes.

A Diffusion Hydrodynamic Model Feb 20 2022 The Diffusion Hydrodynamic Model (DHM), as presented in the 1987 USGS publication, was one of the first computational fluid dynamics computational programs based on the groundwater program MODFLOW, which evolved into the control volume modeling approach. Over the following decades, others developed similar computational programs that either used the methodology and approaches presented in the DHM directly or were its extensions that included additional components and capacities. Our goal is to demonstrate that the DHM, which was developed in an age preceding computer graphics/visualization tools, is as robust as any of the popular models that are currently used. We thank the USGS for their approval and permission to use the content from the earlier USGS report.

New-Product Diffusion Models Jul 13 2021 Product sales, especially for new products, are influenced by many factors. These factors are both internal and external to the selling organization, and are both controllable and uncontrollable. Due to the enormous complexity of such factors, it is not surprising that product failure rates are relatively high. Indeed, new product failure rates have variously been reported as between 40 and 90 percent. Despite this multitude of factors, marketing researchers have not been deterred from developing and designing techniques to predict or explain the levels of new product sales over time. The proliferation of the internet, the necessity or developing a road map to plan the launch and exit times of various generations of a product, and the shortening of product life cycles are challenging firms to investigate market penetration, or innovation diffusion, models. These models not only provide information on new product sales over time but also provide insight on the speed with which a new product is being accepted by various buying groups, such as those identified as innovators, early adopters, early majority, late majority, and laggards. New Product Diffusion Models aims to distill, synthesize, and integrate the best thinking that is currently available on the theory and practice of new product diffusion models. This state-of-the-art assessment includes contributions by individuals who have been at the forefront of developing and applying these models in industry. The book's twelve chapters are written by a combined total of thirty-two experts who together represent twenty-five different universities and other organizations in Australia, Europe, Hong Kong, Israel, and the United States. The book will be useful for researchers and students in marketing and technological forecasting, as well as those in other allied disciplines who study relevant aspects of innovation diffusion. Practitioners in high-tech and consumer durable industries should also gain new insights from New Product Diffusion Models. The book is divided into five parts: I. Overview; II. Strategic, Global, and Digital Environments for Diffusion Analysis; III. Diffusion Models; IV. Estimation and V. Applications and Software. The final section includes a PC-based software program developed by Gary L. Lilien and Arvind Rangaswamy (1998) to implement the Bass diffusion model. A case on high-definition television is included to illustrate the various features of the software. A free, 15-day trial access period for the updated software can be downloaded from http://www.mktgeng.com/diffusionbook. Among the book's many highlights are chapters addressing the implications posed by the internet, globalization, and production policies upon diffusion of new products and technologies in the population.

Membranes for Environmental Applications Dec 26 2019 This book introduces recent developments of membrane technologies applied to gas and water treatments, energy processes and environmental issues. Novel knowledge and mechanisms on membrane fabrication and usage in energy, chemical, and environmental engineering are detailed in 12 book chapters from France, UK, Spain, China, Nigeria, Iran and Pakistan. The information in this book will be useful for engineers, students, and experts in these fields.

Simple Brownian Diffusion Jun 12 2021 Brownian diffusion, the motion of large molecules in a sea of very many much smaller molecules, is topical because it is one of the ways in which biologically important molecules move about inside living cells. This book presents the mathematical physics that underlies the four simplest models of Brownian diffusion.

Comprehensive Membrane Science and Engineering Dec 06 2020 This multivolume work covers all aspects of membrane science and technology - from basic phenomena to the most advanced applications and future perspectives. Modern membrane engineering is critical to the development of process-intensification strategies and to the stimulation of industrial growth. The work presents researchers and industrial managers with an indispensable tool toward achieving these aims. Covers membrane science theory and economics, as well as applications ranging from chemical purification and natural gas enrichment to potable water Includes contributions and case studies from internationally recognized experts and from up-and-coming researchers working in this multi-billion dollar field Takes a unique, multidisciplinary approach that stimulates research in hybrid technologies for current (and future) life-saving applications (artificial organs, drug delivery)

Polymeric Gas Separation Membranes Apr 29 2020 Polymeric Gas Separation Membranes is an outstanding reference devoted to discussing the separation of gases by membranes. An international team of contributors examines the latest findings of membrane science and practical applications and explores the complete spectrum of relevant topics from fundamentals of gas sorption and diffusion in polymers to vapor separation from air. They also compare membrane processes with other separation technologies. This essential book will be valuable to all practitioners and students in membrane science and technology.

Handbook of Food Engineering Mar 29 2020 As the demand for safe, nutritious, convenient foods continues to rise, and the capabilities of molecular biology and nutritional biochemistry continue to expand, the need for up-to-date engineering information becomes ever more critical. The application of innovative engineering concepts enables scientific breakthroughs to be utilized in the manuf

Synthetic Membranes and Membrane Separation Processes Oct 16 2021 Synthetic Membranes and Membrane Separation Processes addresses both fundamental and practical aspects of the subject. Topics discussed in the book cover major industrial membrane separation processes, including reverse osmosis, ultrafiltration, microfiltration, membrane gas and vapor separation, and pervaporation. Membrane materials, membrane preparation, membrane structure, membrane transport, membrane module and separation design, and applications are discussed for each separation process. Many problem-solving examples are included to help readers understand the fundamental concepts of the theory behind the processes. The book will benefit practitioners and students in chemical engineering, environmental engineering, and materials science.

Advanced Membrane Technology and Applications Jan 07 2021 Advanced membranes-from fundamentals and membrane chemistry to manufacturing and applications A hands-on reference for practicing professionals, Advanced Membrane Technology and Applications covers the fundamental principles and theories of separation and purification by membranes, the important membrane processes and systems, and major industrial applications. It goes far beyond the basics to address the formulation and industrial manufacture of membranes and applications. This practical guide: Includes coverage of all the major types of membranes: ultrafiltration; microfiltration; nanofiltration; reverse osmosis (including the recent high-flux and low-pressure membranes and anti-fouling membranes); membranes for gas separations; and membranes for fuel cell uses Addresses six major topics: membranes and applications in water and wastewater; membranes for biotechnology and chemical/biomedical applications; gas separations; membrane contractors and reactors; environmental and energy applications; and membrane materials and characterization Includes discussions of important strategic issues and the future of membrane technology With chapters contributed by leading experts in their specific areas and a practical focus, this is the definitive reference for professionals in industrial manufacturing and separations and research and development; practitioners in the manufacture and applications of membranes; scientists in water treatment, pharmaceutical, food, and fuel cell processing industries; process engineers; and others. It is also an excellent resource for researchers in industry and academia and graduate students taking courses in separations and membranes and related fields.

Permeability of Plastic Films and Coatings Apr 22 2022

The Mathematics of Diffusion Jul 25 2022 Though it incorporates much new material, this new edition preserves the general character of the book in providing a collection of solutions of the equations of diffusion and describing how these solutions may be obtained.

Membrane Processes Nov 17 2021 The fundamental processes of mass transport in membranes are outlined in this book, which also develops the applications of these processes in industry. Local transport phenomena and the behaviour of individual elements, the technical unit and the module are all examined.

Quantum State Diffusion May 11 2021 The first book devoted to quantum state diffusion - suitable for graduate students and researchers.

Synthetic Membranes and Membrane Separation Processes Aug 14 2021 Synthetic Membranes and Membrane Separation Processes addresses both fundamental and practical aspects of the subject. Topics discussed in the book cover major industrial membrane separation processes, including reverse osmosis, ultrafiltration, microfiltration, membrane gas and vapor separation, and pervaporation. Membrane materials, membrane preparation, membrane structure, membrane transport, membrane module and separation design, and applications are discussed for each separation process. Many problem-solving examples are included to help readers understand the fundamental concepts of the theory behind the processes. The book will benefit practitioners and students in chemical engineering, environmental engineering, and materials science.

Marine Geochemistry Jan 19 2022 Marine geochemistry uses chemical elements and their isotopes to study how the ocean works in terms of ocean circulation, chemical composition, biological activity and atmospheric CO2 regulation. This rapidly growing field is at a crossroad for many disciplines (physical, chemical and biological oceanography, geology, climatology, ecology, etc.). It provides important quantitative answers to questions such as: What is the deep ocean mixing rate? How much atmospheric CO2 is pumped by the ocean? How fast are pollutants removed from the ocean? How do ecosystems react to anthropogenic pressure? This text gives a simple introduction to the concepts, the methods and the applications of marine geochemistry with a particular emphasis on isotopic tracers. Overall introducing a very large number of topics (physical oceanography, ocean chemistry, isotopes, gas exchange, modelling, biogeochemical cycles), with a balance of didactic and indepth information, it provides an outline and a complete course in marine geochemistry. Throughout, the book uses a hands-on approach with worked out exercises and problems (with answers provided at the end of the book), to help the students work through the concepts presented. A broad scale approach is take including ocean physics, marine biology, ocean-climate relations, remote sensing, pollutions and ecology, so that the reader acquires a global perspective of the ocean. It also includes new topics arising from ongoing research programs. This textbook is essential reading for students, scholars, researchers and other professionals.

Membrane Technology and Applications Aug 26 2022 Table of Contents Preface Acknowledgments for the first edition Acknowledgments for the second edition 1 Overview of Membrane Science and Technology 1 2 Membrane Transport Theory 15 3 Membranes and Modules 89 4 Concentration Polarization 161 5 Reverse Osmosis 191 6 Ultrafiltration 237 7 Microfiltration 275 8 Gas Separation 301 9 Pervaporation 355 10 Ion Exchange Membrane Processes - Electrodialysis 393 11 Carrier Facilitated Transport 425 12 Medical Applications of Membranes 465 13 Other Membrane Processes 491 Appendix 523 Index 535.

Mass Transport & Reactive Barriers in Packaging Dec 18 2021 This book is a systematic and comprehensive presentation of the theory and practice of polymer barrier films. Starting from a presentation of how gases and liquid solutes permeate films, the book explains the performance limits of polymer barriers under multiple packaging conditions. This information is then used to illustrate how engineers can predict properties and performance for single and multilayer barriers for a wide variety of packaging applications.

Modeling in Membranes and Membrane-Based Processes Jul 21 2019 The book Modeling in Membranes and Membrane-Based Processes is based on the idea of developing a reference which will cover most relevant and "state-of-the-art" approaches in membrane modeling. This book explores almost every major aspect of modeling and the techniques applied in membrane separation studies and applications. This includes first principle-based models, thermodynamics models, computational fluid dynamics simulations, molecular dynamics simulations, and artificial intelligence-based modeling for membrane separation processes. These models have been discussed in light of various applications ranging from desalination to gas separation. In addition, this breakthrough new volume covers the fundamentals of polymer membrane pore formation mechanisms, covering not only a wide range of modeling techniques, but also has various facets of membrane-based applications. Thus, this book can be an excellent source for a holistic perspective on membranes in general, as well as a comprehensive and valuable reference work. Whether a veteran engineer in the field or lab or a student in chemical or process engineering, this latest volume in the "Advances in Membrane Processes" is a must-have, along with the first book in the series, Membrane Processes, also available from Wiley-Scrivener.

Transport Mechanisms in Membrane Separation Processes May 23 2022 The present book contains a comparison of existing theoretical models developed in order to describe membrane separation processes. In general, the permeation equations resulting from these models give inaccurate predictions of the mutual effects of the permeants involved, due to the simplifications adopted in their derivation. It is concluded that an optimum description of transport phenomena in tight (diffusion-type) membranes is achieved with the "solution-diffusion" model. According to this model each component of a fluid mixture to be separated dissolves in the membrane and passes through by diffusion in response to its gradient in the chemical potential. A modified Flory-Huggins equation has been derived to calculate the solubility of the permeants in the membrane material. Contrary to the original Flory-Huggins equation, the modified equation accounts for the large effect on solubility of crystallinity and elastic strain of the polymer chains by swelling. The equilibrium sorption of liquids computed with this equation was found to be in good agreement with experimental results. Also, the sorption of gases in both rubbery and glassy polymers could be described quan titatively with the modified Flory-Huggins equation without any need of the arbitrary Langmuir term, as required in the conventional "dual-mode" sorption model. Furthermore, fewer parameters are required than with the at least identical accuracy.

Basic Equations of the Mass Transport Through a Membrane Layer Oct 28 2022 With a detailed analysis of the mass transport through membrane layers and its effect on different separation processes, this book provides a comprehensive look at the theoretical and practical aspects of membrane transport properties and functions. Basic equations for every membrane are provided to predict the mass transfer rate, the concentration distribution, the convective velocity, the separation efficiency, and the effect of chemical or biochemical reaction taking into account the heterogeneity of the membrane layer to help better understand the mechanisms of the separation processes. The reader will be able to describe membrane separation processes and the membrane reactors as well as choose the most suitable membrane structure for separation and for membrane reactor. Containing detailed discussion of the latest results in transport processes and separation processes, this book is essential for chemistry students and practitioners of chemical engineering and process engineering. Detailed survey of the theoretical and practical aspects of every membrane process with specific equations Practical examples discussed in detail with clear steps Will assist in planning and preparation of more efficient membrane structure separation

Numerical Solution of Time-Dependent Advection-Diffusion-Reaction Equations Aug 02 2020 Unique book on Reaction-Advection-Diffusion problems

Separation of Molecules, Macromolecules and Particles Oct 24 2019 Providing chemical engineering undergraduate and graduate students with a basic understanding of how separation of a mixture of molecules, macromolecules or particles is achieved, this textbook is a comprehensive introduction to the engineering science of separation. • Students learn how to apply their knowledge to determine the separation achieved in a given device or process • Real-world examples are taken from biotechnology, chemical, food, petrochemical, pharmaceutical and pollution control industries • Worked examples, elementary separator designs and chapter-end problems are provided, giving students a practical understanding of separation. The textbook systematically develops different separation processes by considering the forces causing the separation and how this separation is influenced by the patterns of bulk flow in the separation device. Readers will be able to take this knowledge and apply it to their own future studies and research in separation and purification. Online resources include solutions to the exercises and guidance for computer simulations.

Food Properties and Computer-Aided Engineering of Food Processing Systems Jun 19 2019 Food properties, whether they concern the physical, thermodynamic, chemical, nutritional or sensory characteristics of foods, play an important role in food processing. In our quest to gain a mechanistic understanding of changes occurring during food processing, the knowledge of food properties is essential. Quantitative information on the food properties is necessary in the design and operation of food processing equipment. Foods, because of their biological nature and variability, vary in the magnitude of their properties. The variation in properties offer a challenge both in their measurement and use in the food processing applications. Often a high level of precision in measurement of properties is not possible as the measurement method may itself cause changes to the product, resulting in a variation in the obtained values. Recognizing the difficulties in measurement of food properties, and the lack of completeness of such information, several research programs have been in existence during the last two decades. In Europe, a multinational effort has been underway since 1978. The first project supported by COST (European Cooperation in the Field of Scientific and Technical Research), was titled COST 90 "The Effect of Processing on the Physical Properties of Foodstuffs". This and another project COST 90bis have considerably added to our knowledge of measurement methods and data on a number of physical properties. Two publications that summarize the work conducted under 1 2 these projects are Physical Properties of Foods and Physical Properties of Foods .

Materials Science of Membranes for Gas and Vapor Separation Sep 27 2022 Materials Science of Membranes for Gas and Vapor Separation is a one-stop reference for the latest advances in membrane-based separation and technology. Put together by an

international team of contributors and academia, the book focuses on the advances in both theoretical and experimental materials science and engineering, as well as progress in membrane technology. Special attention is given to comparing polymer and inorganic/organic separation and other emerging applications such as sensors. This book aims to give a balanced treatment of the subject area, allowing the reader an excellent overall perspective of new theoretical results that can be applied to advanced materials, as well as the separation of polymers. The contributions will provide a compact source of relevant and timely information and will be of interest to government, industrial and academic polymer chemists, chemical engineers and materials scientists, as well as an ideal introduction to students.

Science and Technology of Separation Membranes Mar 21 2022 Offers a comprehensive overview of membrane science and technology from a single source Written by a renowned author with more than 40 years' experience in membrane science and technology, and polymer science Covers all major current applications of membrane technology in two definitive volumes Includes academic analyses, applications and practical problems for each existing membrane technology Includes novel applications such as membrane reactors, hybrid systems and optical resolution as well as membrane fuel cells

Introduction to Desalination Sep 22 2019 One book dealing with the fundamentals of thermal and membrane desalination systems and discussing their economical as well as environmental aspects. With a growing population, climate change and greater water demand, desalination has increasingly become a part of the solution to regional water scarcity - seawater desalination capacity has roughly doubled in the past ten years. Desalination has also begun to receive more attention in academia, with research focusing on improving energy efficiency and system robustness and lowering capital costs. With this book, an introduction is given to the basics and fundamentals of desalination systems. Both, thermal and membrane desalination systems, are covered and discussed in view of energy, exergy, economic and environmental aspects. In the beginning, Introduction to Desalination: Systems, Processes and Environmental Impacts describes multi effect evaporation, vapor compression and multi-stage flashing. Further chapters deal with common membrane-based separations like reverse osmosis and membrane filtration, forward osmosis, diffusion dialysis and pervaporation as well as thermo-osmosis, electrodialysis and electrodeionization. Subsequently, hybrid systems are discussed, and the economic analysis of such systems and their environmental impact are highlighted. Each chapter contains theoretical and practical examples and concludes with questions and problems for self-study. * Needed: Desalination has become a part of the solution to regional water scarcity and an introductory book in this field is urgently needed. * Balanced Approach: Presents the fundamentals of thermal and membrane desalination systems. * Learning Material: Each chapter includes exercises for self-study and Instructors can find teaching material online. Introduction to Desalination: Systems, Processes and Environmental Impacts is an important resource for master's students in engineering sciences, lecturers in chemical and mechanical engineering, engineers, environmental chemists, as well as process engineers, engineering scientists in industry, and environmental consultants.

Nanotechnology for Water Purification Feb 26 2020 Nanotechnology is a highly inter- and multi- disciplinary application oriented research area. Not only does it find its use in nanomedicine, solar cells, sensor development and so on, but can also be effectively utilized to prevent water pollution. Nanostructured materials such as magnetic nanoparticles, carbon nanotubes, silver-impregnated cyclodextrin nanocomposites, nanostructured iron-zeolites, carbo-iron nanomaterials, photocatalytic titania nanoparticles, nanofiltration membranes and functionalized silica nanoparticles can be employed in water treatment to remove heavy metals, sediments, chemical effluents, charged particles, bacteria and other pathogens. This edited book comprises several review-style chapters written by world experts. The chapters are devoted to each of these nanotechnology based approaches: basic principles, practical applications, recent break-through and limitations associated with it. The last chapter covers the environmental risks of applying engineered nanomaterials for water purification. The wealth of information and insight offered in this book will be appealing to scientists and researchers over a wide range of disciplines.

Membrane Handbook Jun 24 2022 Membrane processes have wide industrial ap This handbook reviews the published litera plications covering many existing and emerging ture, presents an in-depth description of com uses in the chemical, petrochemical, petroleum, mercialized membrane processes, and gives a state-of-the-art review of new membrane pro environmental, water treatment, pharmaceutic al, medical, food, dairy, beverage, paper, tex cess concepts under development. It is intended tile, and electronic industries. The existing ap to be a single source of underlying principles, membranes, membrane modules, process de plications include: (1) dialysis for the purifica tion of human blood (the artificial kidney), (2) sign, applications, and cost estimates. It is also electrodialysis for the desalination of brackish a first attempt to bridge the gap between the water to produce potable water, (3) reverse theory and practice. osmosis for the desalination of seawater, (4) There are several groups which may benefit ultrafiltration for the concentration of large pro from this handbook. It can be used as educa tein molecules from cheese, casein whey, and tional material for industrial personnel engaged milk, and (5) microfiltration for the sterilization in membrane separations. For scientists and of pharmaceutical and medical products, beer, engineers active in research and development in wine, and soft drinks. Since membrane pro synthetic membranes, it will serve as a single cesses generally have low capital investment, as source of reference for the entire field.

Fractional Diffusion Equations and Anomalous Diffusion Sep 03 2020 Presents a unified treatment of anomalous diffusion problems using fractional calculus in a wide range of applications across scientific and technological disciplines.

Morphological Models of Random Structures Feb 08 2021 This book covers methods of Mathematical Morphology to model and simulate random sets and functions (scalar and multivariate). The introduced models concern many physical situations in heterogeneous media, where a probabilistic approach is required, like fracture statistics of materials, scaling up of permeability in porous media, electron microscopy images (including multispectral images), rough surfaces, multi-component composites, biological tissues, textures for image coding and synthesis. The common feature of these random structures is their domain of definition in n dimensions, requiring more general models than standard Stochastic Processes.The main topics of the book cover an introduction to the theory of random sets, random space tessellations, Boolean random sets and functions, space-time random sets and functions (Dead Leaves, Sequential Alternate models, Reaction-Diffusion), prediction of effective properties of random media, and probabilistic fracture theories.

Membrane Processing for Dairy Ingredient Separation May 31 2020 Membrane processing is a filtration technique in which particles are separated from liquids by being forced through a porous material, or membrane. Applied to dairy products, the separation techniques allow valuable compounds, found in milk, to be isolated for use as ingredients in food processing. A comprehensive overview of membrane separation processes, this book explores various applications such as pressure driven processes, electrical field driven processes, and concentration driven processes, for the recovery of various dairy streams and ingredients. The topics covered place emphasis on new applications, including microfiltration, ultrafiltration, reverse osmosis, electrodialysis, and pervaporation. The text also presents in-depth knowledge of the mechanisms of each membrane separation process, as well as membrane types and the equipment used in these processes. Combining their educational backgrounds and substantial industrial experience in dairy ingredients processes, the authors address cutting-edge technologies that have been thoroughly researched and have great potential to be commercialized in the near future. The book will therefore be of interest to dairy industry professionals and will serve as a source of reference material for professors and students in food science and engineering.

Nonlinear Reaction-Diffusion Systems Nov 05 2020 This book presents several fundamental results in solving nonlinear reaction-diffusion equations and systems using symmetry-based methods. Reaction-diffusion systems are fundamental modeling tools for mathematical biology with applications to ecology, population dynamics, pattern formation, morphogenesis, enzymatic reactions and chemotaxis. The book discusses the properties of nonlinear reaction-diffusion systems, which are relevant for biological applications, from the symmetry point of view, providing rigorous definitions and constructive algorithms to search for conditional symmetry (a nontrivial generalization of the well-known Lie symmetry) of nonlinear reaction-diffusion systems. In order to present applications to population dynamics, it focuses mainly on two- and three-component diffusive Lotka-Volterra systems. While it is primarily a valuable guide for researchers working with reaction-diffusion systems and those developing the theoretical aspects of conditional symmetry conception, parts of the book can also be used in master's level mathematical biology courses.

Membrane Technology and Applications Aug 22 2019 "… the best handbook on membrane technology, which is currently on the market... " –Membrane News (on the previous edition) Building on the success of the previous edition, Membrane Technology and Applications Third Edition provides a comprehensive overview of separation membranes, their manufacture and their applications. Beginning with a series of general chapters on membrane preparation, transport theory and concentration polarization, the book then surveys several major areas of membrane application in separate chapters. Written in a readily accessible style, each chapter covers its membrane subject thoroughly, from historical and theoretical backgrounds through to current and potential applications. Topics include reverse osmosis, ultrafiltration, pervaporation, microfiltration, gas separation and coupled and facilitated transport; chapters on electrodialysis and medical applications round out the coverage. NEW TO THE THIRD EDITION New sections on the use of membranes in the chlor-alkali industry, membrane distillation, pressure retarded osmosis and constant flux-variable pressure ultrafiltration Zeolite and ceramic membranes, submerged membrane modules, and fuel cell membranes Substantially enhanced chapters on ultrafiltration, pervaporation and membrane contactors Updates to every chapter to reflect the developments in the field

Drug Delivery Nov 24 2019 Synthetic materials are a tremendous potential resource for treating human disease. For the rational design of many of these biomaterials it is necessary to have an understanding of polymer chemistry and polymer physics. Equally important to those two fields is a quantitative understanding of the principles that govern rates of drug transport, reaction, and disappearance in physiological and pathological situations. This book is a synthesis of these principles, providing a working foundation for those in the field of drug delivery. It covers advanced drug delivery and contemporary biomaterials.

<u>Multicomponent Diffusion</u> Sep 15 2021 Multicomponent Diffusion discusses the multicomponent diffusion of the three phases of matter. The book is comprised of nine chapters that cover studies of multicomponent diffusion and mass transfer with an emphasis on the chemical characteristics responsible for multicomponent diffusion. Chapter 1 provides an introductory discourse about multicomponent diffusion. Chapter 2 discusses binary diffusion, while Chapter 3 covers multicomponent flux equation. The measurement of ternary diffusion and the estimation of ternary diffusion coefficients are also explained in the book. A chapter then covers the interacting systems, and the subsequent chapter talks about membranes without mobile carriers. The text also discusses carrier-containing membranes and the multicomponent mass transfer. The book will be of great use to researchers and professionals whose work requires a good understanding of multicomponent diffusion.

Models for Innovation Diffusion Oct 04 2020 Presents a powerful set of techniques for investigating the temporal diffusion process of any innovation. In addition, this volume outlines several widely used diffusion models and suggests their appropriate applications.

<u>Nanofiltration: Principles and Applications</u> Mar 09 2021 Nanofiltration processes are finding wide applications in several 'wet' industries, such as water/wastewater treatment, water re-use, textile industry, diary industry, food industry and the pulp and paper industries. Despite this, no definitive book exists which covers the principles of the techniques and their potential and actual applications. ' Nanofiltration: Principles and Applications ' is edited by three well-known specialists from Australia, and contains chapters from top international authorities. The result is a comprehensive and up to date account which will be essential reading for membrane designers, manufacturers and end-users worldwide. *Hot industrial topic *Best Australian Editors and international contributors