

# Skelland Diffusional Mass Transfer

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## **The Art of Modeling in Science and Engineering with Mathematica** - Diran Basmadjian 2019-07-17

Modeling is practiced in engineering and all physical sciences. Many specialized texts exist - written at a high level - that cover this subject. However, students and even professionals often experience difficulties in setting up and solving even the simplest of models. This can be attributed to three difficulties: the proper choice of model, the absence of precise solutions, and the necessity to make suitable simplifying assumptions and approximations. Overcoming these difficulties is the focus of The Art of Modeling in Science and Engineering. The text is designed for advanced undergraduate and graduate students and practicing professionals in the sciences and engineering with an interest in Modeling based on Mass, Energy and Momentum or Force Balances. The book covers a wide range of physical processes and phenomena drawn from chemical, mechanical, civil, environmental sciences and bio-sciences. A separate section is devoted to "real World" industrial problems. The author explains how to choose the simplest model, obtain an appropriate solution to the problem and make simplifying assumptions/approximations.

## **Fundamental Mass Transfer Concepts in Engineering Applications**

- Ismail Tosun 2019-06-03

Fundamental Mass Transfer Concepts in Engineering Applications

provides the basic principles of mass transfer to upper undergraduate and graduate students from different disciplines. This book outlines foundational material and equips students with sufficient mathematical skills to tackle various engineering problems with confidence. It covers mass transfer in both binary and multicomponent systems and integrates the use of Mathcad® for solving problems. This textbook is an ideal resource for a one-semester course. Key Features The concepts are explained with the utmost clarity in simple and elegant language Presents theory followed by a variety of practical, fully-worked example problems Includes a summary of the mathematics necessary for mass transfer calculations in an appendix Provides ancillary Mathcad® subroutines Includes end-of-chapter problems and a solutions manual for adopting instructors

## **Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering** - Ashok Kumar Verma 2014-10-17

The use of simulation plays a vital part in developing an integrated approach to process design. By helping save time and money before the actual trial of a concept, this practice can assist with troubleshooting, design, control, revamping, and more. Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering explores effective modeling and simulation approaches for solving equations. Using a systematic treatment of model development and simulation

studies for chemical, biochemical, and environmental processes, this book explains the simplification of a complicated process at various levels with the help of a "model sketch." It introduces several types of models, examines how they are developed, and provides examples from a wide range of applications. This includes the simple models based on simple laws such as Fick's law, models that consist of generalized equations such as equations of motion, discrete-event models and stochastic models (which consider at least one variable as a discrete variable), and models based on population balance. Divided into 11 chapters, this book: Presents a systematic approach of model development in view of the simulation need Includes modeling techniques to model hydrodynamics, mass and heat transfer, and reactors for single as well as multi-phase systems Provides stochastic and population balance models Covers the application and development of artificial neural network models and hybrid ANN models Highlights gradients based techniques as well as statistical techniques for model validation and sensitivity analysis Contains examples on development of analytical, stochastic, numerical, and ANN-based models and simulation studies using them Illustrates modeling concepts with a wide spectrum of classical as well as recent research papers Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering includes recent trends in modeling and simulation, e.g. artificial neural network (ANN)-based models, and hybrid models. It contains a chapter on flowsheeting and batch processes using commercial/open source software for simulation.

Multicomponent Diffusion - E. L. Cussler 2013-10-22

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.

**Mass Transfer** - A. P. SINHA 2012-05-09

This book introduces the fundamental principles of the mass transfer phenomenon and its diverse applications in process industry. It covers the full spectrum of techniques for chemical separations and extraction. Beginning with molecular diffusion in gases, liquids and solids within a single phase, the mechanism of inter-phase mass transfer is explained with the help of several theories. The separation operations are explained comprehensively in two distinct ways—stage-wise contact and continuous differential contact. The primary design requirements of gas-liquid equipment are discussed. The book provides a detailed discussion on all individual gas-liquid, liquid-liquid, solid-gas, and solid-liquid separation processes. The students are also exposed to the underlying principles of the membrane-based separation processes. The book is replete with real applications of separation processes and equipment. Problems are worked out in each chapter. Besides, problems with answers, short questions, multiple choice questions with answers are given at the end of each chapter. The text is intended for a course on mass transfer, transport and separation processes prescribed for the undergraduate and postgraduate students of chemical engineering.

Two-Phase Flow Heat Exchangers - Sadik Kakaç 2012-12-06

Two-phase flow heat exchangers are vital components of systems for power generation, chemical processing, and thermal environment control. The art and science of the design of such heat exchangers have advanced considerably in recent years. This is due to better understanding of the fundamentals of two-phase flow and heat transfer in simple geometries, greater appreciation of these processes in complex geometries, and enhanced predictive capability through use of complex computer codes. The subject is clearly of great fundamental and

practical importance. The NATO ASI on Thermal-Hydraulic Fundamentals and Design of Two-Phase Flow Heat Exchangers was held in Povoa de Varzim (near Porto), Portugal, July 6-17, 1987. Participating in the organization of the ASI were the Department of Mechanical Engineering and the Clean Energy Research Institute, University of Miami; Universidade do Porto; and the Department of Mechanical Engineering, Aeronautical Engineering, and Mechanics, Rensselaer Polytechnic Institute. The ASI was arranged primarily as a high-level teaching activity by experts representing both academic and industrial viewpoints. The program included the presentation of invited lectures, a limited number of related technical papers and discussion sessions.

**Advances in Heat Transfer** - 1982-06-24

Advances in Heat Transfer

*Convective Heat and Mass Transfer* - S. Mostafa Ghiaasiaan 2018-06-12

*Convective Heat and Mass Transfer*, Second Edition, is ideal for the graduate level study of convection heat and mass transfer, with coverage of well-established theory and practice as well as trending topics, such as nanoscale heat transfer and CFD. It is appropriate for both Mechanical and Chemical Engineering courses/modules.

*Heat Transfer Principles and Applications* - Charles H. Forsberg 2020-03

*Heat Transfer Principles and Applications* is a welcome change from more encyclopedic volumes exploring heat transfer. This shorter text fully explains the fundamentals of heat transfer, including heat conduction, convection, radiation and heat exchangers. The fundamentals are then applied to a variety of engineering examples, including topics of special and current interest like solar collectors, cooling of electronic equipment, and energy conservation in buildings. The text covers both analytical and numerical solutions to heat transfer problems and makes considerable use of Excel and MATLAB(R) in the solutions. Each chapter has several example problems and a large, but not overwhelming, number of end-of-chapter problems.

**PRINCIPLES OF MASS TRANSFER** - KAL RENGANATHAN SHARMA 2007-01-21

This book addresses the specific needs of undergraduate chemical

engineering students for the two courses in Mass Transfer I and Mass Transfer II. It is also suitable for a course in Downstream Processing for biotechnology students. This self-contained textbook is designed to provide single-volume coverage of the full spectrum of techniques for chemical separations. The operations covered include vapour distillation, fluid adsorption, gas absorption, liquid extraction, solid leaching, gas humidification, solid drying, foam separation, solution crystallization, metal alloying, reverse osmosis, molecular sieves, electro dialysis, and ion exchange. The text also discusses emerging applications such as drug delivery, gel electrophoresis, bleaching, membrane separations, polymer devolatilization, solution crystallization, and gas chromatography.

Equipment selection is discussed for different operations. A table of industrial applications for each and every mass transfer unit operation is provided. The worked examples illustrate problems from chemical process and biotechnology industries. Review questions encourage critical thinking, and end-of-chapter problems emphasize grasping of the fundamentals as well as illustrate applications of theory to a wide variety of scenarios. **KEY FEATURES** • Includes several case studies ranging from manufacture of vitamin C, prilling tower to granulate urea to vanaspati discoloration and wilting of the lettuce. • Introduces generalized Fick's law of diffusion. • Discusses hollow fibre mass exchangers. • Introduces new concepts such as cosolvent factor, Z step procedure for multistage cross-current extraction.

*Transport Modeling for Environmental Engineers and Scientists* - Mark M. Clark 2011-09-20

*Transport Modeling for Environmental Engineers and Scientists*, Second Edition, builds on integrated transport courses in chemical engineering curricula, demonstrating the underlying unity of mass and momentum transport processes. It describes how these processes underlie the mechanics common to both pollutant transport and pollution control processes.

*Transport Phenomena and Drying of Solids and Particulate Materials* - J.M.P.Q. Delgado 2014-06-20

The purpose of this book, *Transport Phenomena and Drying of Solids and*

Particulate Materials, is to provide a collection of recent contributions in the field of heat and mass transfer, transport phenomena, drying and wetting of solids and particulate materials. The main benefit of the book is that it discusses some of the most important topics related to the heat and mass transfer in solids and particulate materials. It includes a set of new developments in the field of basic and applied research work on the physical and chemical aspects of heat and mass transfer phenomena, drying and wetting processes, namely, innovations and trends in drying science and technology, drying mechanism and theory, equipment, advanced modelling, complex simulation and experimentation. At the same time, these topics will be going to the encounter of a variety of scientific and engineering disciplines. The book is divided in several chapters that intend to be a resume of the current state of knowledge for benefit of professional colleagues.

Chemical Processing Handbook - John J. McKetta Jr 1993-04-30

Written by more than 40 world renowned authorities in the field, this reference presents information on plant design, significant chemical reactions, and processing operations in industrial use - offering shortcut calculation methods wherever possible.

Mass Transfer Operations - Alapati Suryanarayana 2002

In A Simple And Systematic Manner, This Book Presents An Exhaustive Account Of Various Mass Transfer Operations Involved In Chemical Engineering. Emphasising The Basic Concepts And Techniques, The Book Discusses In Detail Material And Energy Balances, Distillation, Absorption And Stripping And Extraction. The Book Also Explains The Relevant Aspects Of Equipment Design. Recent Developments Like Permeation, Ion Exchange And Froth Flootation Have Also Been Discussed. A Large Number Of Digital Computer Programs Are Included To Illustrate Computer-Aided Techniques. Several Solved Examples And Practice Problems Are Presented In Each Chapter To Illustrate The Theory. With All These Features, This Is An Ideal Text For Undergraduate Chemical Engineering Students. Practising Engineers And Students Of Pharmacy And Metallurgy Would Also Find The Book A Useful Reference Source.

Fundamentals of Momentum, Heat, and Mass Transfer - James Welty 2014-09-09

Fundamentals of Momentum, Heat and Mass Transfer, Revised, 6th Edition provides a unified treatment of momentum transfer (fluid mechanics), heat transfer and mass transfer. The new edition has been updated to include more modern examples, problems, and illustrations with real world applications. The treatment of the three areas of transport phenomena is done sequentially. The subjects of momentum, heat, and mass transfer are introduced, in that order, and appropriate analysis tools are developed.

Diffusional Mass Transfer - A. H. P. Skelland 1974

Desalination Research - United States. Congress. House. Committee on Science, Space, and Technology. Subcommittee on Science 1992

Basic Equations of Mass Transport Through a Membrane Layer - Endre Nagy 2018-11-05

Basic Equations of Mass Transport Through a Membrane Layer, Second Edition, has been fully updated to deliver the latest research in the field. This volume covers the essentials of compound separation, product removal, concentration, and production in the chemical, biochemical, pharmaceutical, and food industries. It outlines the various membrane processes and their applications, offering a detailed mathematical description of mass transport and defining basic mass transport and concentration distribution expressions. Additionally, this book discusses the process parameters and application of the expressions developed for a variety of industrial applications. Comprehensive explanations of convective/diffusive mass transport are provided, both with and without polarization layers, that help predict and process performance and facilitate improvements to operation conditions and efficiency. Basic Equations of Mass Transport Through a Membrane Layer is an ideal resource for engineers and technologists in the chemical, biochemical, and pharmaceutical industries, as well as researchers, professors, and students in these areas at both an undergraduate and graduate level.

Cites and analyzes mass transport equations developed for different membrane processes. Examines the effect of biochemical/chemical reactions in the presence of convective and diffusive flows in plane and cylindrical spaces. Defines the mass transfer rate for first- and zero-order reactions and analytical approaches are given for other-order reactions in closed mathematical forms. Analyzes the simultaneous convective and diffusive transports with same or different directions.

Modeling in Transport Phenomena - Ismail Tosun 2007-07-17

Modeling in Transport Phenomena, Second Edition presents and clearly explains with example problems the basic concepts and their applications to fluid flow, heat transfer, mass transfer, chemical reaction engineering and thermodynamics. A balanced approach is presented between analysis and synthesis, students will understand how to use the solution in engineering analysis. Systematic derivations of the equations and the physical significance of each term are given in detail, for students to easily understand and follow up the material. There is a strong incentive in science and engineering to understand why a phenomenon behaves the way it does. For this purpose, a complicated real-life problem is transformed into a mathematically tractable problem while preserving the essential features of it. Such a process, known as mathematical modeling, requires understanding of the basic concepts. This book teaches students these basic concepts and shows the similarities between them. Answers to all problems are provided allowing students to check their solutions. Emphasis is on how to get the model equation representing a physical phenomenon and not on exploiting various numerical techniques to solve mathematical equations. A balanced approach is presented between analysis and synthesis, students will understand how to use the solution in engineering analysis. Systematic derivations of the equations as well as the physical significance of each term are given in detail Many more problems and examples are given than in the first edition - answers provided

*Boiling Heat Transfer* - R.T. Lahey, Jr. 2013-10-22

This volume covers the modern developments in boiling heat transfer and two-phase flow, and is intended to provide industrial, government

and academic researchers with state-of-the-art research findings in the area of multiphase flow and heat transfer technology. Special attention is given to technology transfer, indicating how recent significant results may be used for practical applications. The chapters give detailed technical material that will be useful to engineers and scientists who work in the field of multiphase flow and heat transfer. The authors of all chapters are members of the CMR at Rensselaer, a research centre specializing in the state-of-the-art in multiphase science.

*Novel Postharvest Treatments of Fresh Produce* - Sunil Pareek 2017-11-22

Consumption of fresh fruits and vegetables has increased dramatically in the last several decades. This increased consumption has put a greater burden on the fresh produce industry to provide fresher product quality, combined with a high level of food safety. Therefore, postharvest handling, storage and shipment of horticultural crops, including fruit and vegetable products has increased in importance. Novel Postharvest Treatments of Fresh Produce focuses mainly on the application of novel treatments for fruits and vegetables shipping and handling life. A greater emphasis is placed on effects of postharvest treatments on senescence and ripening, bioactive molecule contents and food safety. The work presented within this book explores a wide range of topics pertaining to novel postharvest treatments for fresh and fresh-cut fruits and vegetables including applications of various active agents, green postharvest treatments, physical treatments and combinations of the aforementioned.

**Heat and Mass Transfer** - Anthony Mills 2018-05-04

This complete reference book covers topics in heat and mass transfer, containing extensive information in the form of interesting and realistic examples, problems, charts, tables, illustrations, and more. Heat and Mass Transfer emphasizes practical processes and provides the resources necessary for performing accurate and efficient calculations. This excellent reference comes with a complete set of fully integrated software available for download at [crcpress.com](http://crcpress.com), consisting of 21 computer programs that facilitate calculations, using procedures

developed in the text. Easy-to-follow instructions for software implementation make this a valuable tool for effective problem-solving.

**Encyclopedia of Chemical Processing and Design** - John J. McKetta Jr 1993-11-12

"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. "

**Treatise on Controlled Drug Delivery** - Agis F. Kydonieus 2017-10-02

An introductory but detailed treatise which includes some 1,000 references and solved examples and end-of-chapter problems, making it useful to both students and practitioners. The pharmacokinetics, pharmacodynamics, and biological and biopharmaceutical parameters pertinent to each route of administration

**Solvent Extraction in Biotechnology** - Karl Schügerl 2013-03-09

Solvent Extraction in Biotechnology deals with the recovery and purification of primary and secondary metabolites by solvent extraction. In the first part the reaction engineering principles: definitions, thermodynamic fundamentals, and system models, the kinetics of mass transfer between two phases without and with chemical reaction as well as extraction equipment, which are important for downstream processing in biotechnology, are considered in detail. The special part of the book describes the recovery of low-molecular metabolites: alcohols, acids and antibiotics with organic solvents, carrier-modifier-solvent systems, supercritical gases as well as with liquid membrane techniques. Several practical examples are given for the recovery of different metabolites as well as for the calculation of the extraction processes necessary for equipment design. Besides solvent extraction, novel separation techniques with liquid membrane, microemulsion and reversed micelles are also presented. This book will introduce the biochemical engineer and process engineer to the recovery of products from complex cultivation broths by modern techniques of solvent extraction and help them with process design.

**Comprehensive Treatise of Electrochemistry** - Peter Horsman 2013-12-11

It is now time for a comprehensive treatise to look at the whole field of electrochemistry. The present treatise was conceived in 1974, and the earliest invitations to authors for contributions were made in 1975. The completion of the early volumes has been delayed by various factors. There has been no attempt to make each article emphasize the most recent situation at the expense of an overall statement of the modern view. This treatise is not a collection of articles from Recent Advances in Electrochemistry or Modern Aspects of Electrochemistry. It is an attempt at making a mature statement about the present position in the vast area of what is best looked at as a new interdisciplinary field. Texas A & M University John O'M. Bockris University of Ottawa Brian E. Conway Case Western Reserve University Ernest B. Yeager Texas A & M University Ralph E. White Preface to Volume 8 The past three decades have seen the rapid evolution of the transport aspects of electrochemical engineering into a formal part of electrochemistry as well as chemical engineering. With minor exceptions, however, this subject has not been systematically covered in any treatise or recent electrochemical text. The editors believe that the treatment in this volume will serve the function.

*Air-Sea Exchange of Gases and Particles* - P.S. Liss 2012-12-06

Proceedings of the NATO Advanced Study Institute, Durham, New Hampshire, U.S.A., July 19-30, 1982

**Reaction Detection in Liquid Chromatography** - Ira S. Krull

2017-10-19

The first book to focus entirely on reactions for analyte detection and characterization, Reaction Detection in Liquid Chromatography depicts off- and on-line, pre- and postcolumn approaches that have been successfully used for many classes of compounds, both organic and inorganic, in high performance liquid chromatography. The book gives special attention to methods and instrumentation associated with postcolumn reaction detection, discussing theory, background, principles, and equations ... and also highlights major areas of reaction chemistry, such as immobilized (or solution) enzymatic reactions, homogeneous solution chemistry, photochemical derivatization, paired ion reagents, solid

phase and solid supported reagents, and reactions for inorganic species. In addition, Reaction Detection in liquid Chromatography details the efficiencies of the various reactions surveyed ... forecasts how the utility of each reaction is likely to be enhanced by new research ... and gives data that will allow the reader to reproduce reaction-detection approaches for new analytes and samples. Reaction Detection in Liquid Chromatography is essential reading for analytical, bioanalytical, quality control, and research and development chemists. It also comprises a fine reference for analysts involved in development and applications of liquid chromatography for specific qualitative and quantitative analyte identification; and in-house, professional seminars.

*Mass Transfer with Chemical Reaction in Multiphase Systems* - E. Alper  
2013-11-11

The phenomenon of "mass transfer with chemical reaction" takes place whenever one phase is brought into contact with one or more other phases not in chemical equilibrium with it. This phenomenon has industrial, biological and physiological importance. In chemical process engineering, it is encountered in both separation processes and reaction engineering. In some cases, a chemical reaction may deliberately be employed for speeding up the rate of mass transfer and/or for increasing the capacity of the solvent; in other cases the multiphase reaction system is a part of the process with the specific aim of product formation. Finally, in some cases, for instance "distillation with chemical reaction", both objectives are involved. Although the subject is clearly a chemical engineering undertaking, it requires often a good understanding of other subjects, such as chemistry and fluid mechanics etc., leading to publications in diversified areas. On the other hand, the subject has always been a major field and one of the most fruitful for chemical engineers.

[Applied Mechanics Reviews](#) - 1975

**Diffusion** - E. L. Cussler 1997-02-28

Clear and complete description of diffusion in fluids, for undergraduate students in chemical engineering.

**Intelligent and Active Packaging for Fruits and Vegetables** -

Charles L. Wilson, Ph.D. 2007-07-18

Recent nationwide recalls of spinach due to E. coli contamination and peanut butter due to Salmonella, make the emerging development of "active" and "intelligent" packaging crucial for consumer safety and quality assurance. Now that it is possible to make packaging that can detect and inform consumers of contamination, as well as prevent or reduce the growth of human foodborne pathogens, the food packaging and safety industry needs a comprehensive overview of the state-of-the-science and future directions of this widely important field. Drawing on the research of a diverse group of scientists and pioneers in the field, Intelligent and Active Packaging for Fruits and Vegetables explores the new technology and applications used to bring fresh, safe, nutritious produce to the consumer. It explains Modified Atmosphere Packaging (MAP) and its use in packaging fruits and vegetables, as well as, fish and meat. It includes variations and advances on MAP such as high vapor-permeable films, and demonstrates modeling techniques to assist in the prediction and selection of packaging type. The book contains a chapter on the trends, opportunities, and challenges of RFID temperature monitoring in food packaging. It also considers the interaction between container and food product, as well as the use of non-toxic insect repellent plastics. There is a chapter on the regulatory implications of the use of nanotechnology in food packaging. Finally, the book discusses consumer perception, the specific needs of developing countries, and current implementation in Europe. Explaining the very latest in packaging technology and opening areas for future research, Intelligent and Active Packaging for Fruits and Vegetables provides an excellent knowledge base from which to revolutionize the delivery of safe and nutritious food.

**Mass Transfer** - Koichi Asano 2007-09-24

This didactic approach to the principles and modeling of mass transfer as it is needed in modern industrial processes is unique in combining a step-by-step introduction to all important fundamentals with the most recent applications. Based upon the renowned author's successful new modeling

method as used for the O-18 process, the exemplary exercises included in the text are fact-proven, taken directly from existing chemical plants. Fascinating reading for chemists, graduate students, chemical and process engineers, as well as thermodynamics physicists.

**Nonequilibrium Thermodynamics** - Yasar Demirel 2007-10-10

Natural phenomena consist of simultaneously occurring transport processes and chemical reactions. These processes may interact with each other and lead to instabilities, fluctuations, and evolutionary systems. This book explores the unifying role of thermodynamics in natural phenomena. Nonequilibrium Thermodynamics, Second Edition analyzes the transport processes of energy, mass, and momentum transfer processes, as well as chemical reactions. It considers various processes occurring simultaneously, and provides students with more realistic analysis and modeling by accounting possible interactions between them. This second edition updates and expands on the first edition by focusing on the balance equations of mass, momentum, energy, and entropy together with the Gibbs equation for coupled processes of physical, chemical, and biological systems. Every chapter contains examples and practical problems to be solved. This book will be effective in senior and graduate education in chemical, mechanical, systems, biomedical, tissue, biological, and biological systems engineering, as well as physical, biophysical, biological, chemical, and biochemical sciences. Will help readers in understanding and modelling some of the coupled and complex systems, such as coupled transport and chemical reaction cycles in biological systems Presents a unified approach for interacting processes - combines analysis of transport and rate processes Introduces the theory of nonequilibrium thermodynamics and its use in simultaneously occurring transport processes and chemical reactions of physical, chemical, and biological systems A useful text for students taking advanced thermodynamics courses

**Food Engineering in a Computer Climate** - W. Hamm 1992-07-01

Based on papers presented at a conference on food engineering, this book addresses the whole food production process, from receiving the raw materials through to packaging and distribution. Major themes are

the opportunities/limitations afforded by the application of modern computer technology.

*Handbook of Separation Process Technology* - Ronald W. Rousseau 1987-05-13

Surveys the selection, design, and operation of most of the industrially important separation processes. Discusses the underlying principles on which the processes are based, and provides illustrative examples of the use of the processes in a modern context. Features thorough treatment of newer separation processes based on membranes, adsorption, chromatography, ion exchange, and chemical complexation. Includes a review of historically important separation processes such as distillation, absorption, extraction, leaching, and crystallization and considers these techniques in light of recent developments affecting them.

*6th International Symposium on High-Temperature Metallurgical Processing* - Tao Jiang 2016-12-23

The analysis, development, and/or operation of high temperature processes that involve the production of ferrous and nonferrous metals, alloys, and refractory and ceramic materials are covered in the book. The innovative methods for achieving impurity segregation and removal, by-product recovery, waste minimization, and/or energy efficiency are also involved. Eight themes are presented: 1: High Efficiency New Metallurgical Process and Technology 2: Fundamental Research of Metallurgical Process 3: Alloys and Materials Preparation 4: Direct Reduction and Smelting Reduction 5: Coking, New Energy and Environment 6: Utilization of Solid Slag/Wastes and Complex Ores 7: Characterization of High Temperature Metallurgical Process

**Fundamentals of Heat and Mass Transfer** - Theodore L. Bergman 2020-07-08

With Wiley's Enhanced E-Text, you get all the benefits of a downloadable, reflowable eBook with added resources to make your study time more effective. Fundamentals of Heat and Mass Transfer 8th Edition has been the gold standard of heat transfer pedagogy for many decades, with a commitment to continuous improvement by four authors' with more than 150 years of combined experience in heat transfer

education, research and practice. Applying the rigorous and systematic problem-solving methodology that this text pioneered an abundance of examples and problems reveal the richness and beauty of the discipline. This edition makes heat and mass transfer more approachable by giving additional emphasis to fundamental concepts, while highlighting the relevance of two of today's most critical issues: energy and the environment.

*Handbook of Heat and Mass Transfer: Mass transfer and reactor design* - Nicholas P. Cheremisinoff 1986

*Science and Practice of Liquid-liquid Extraction: Phase equilibria, mass transfer and interfacial phenomena, extractor hydrodynamics, selection, and design* - John D. Thornton 1992

This work presents an up-to-date account of some of the fundamental aspects of liquid-liquid extraction technology together with an account of extraction processes in a number of important industries. The work is divided into two parts. Volume 1 is concerned with the thermodynamics of phase equilibria; mass transfer in liquid-liquid systems, including the complicating role of interfacial turbulence; behavior of liquid-liquid dispersions; and the selection and design of countercurrent contactors for particular applications. Volume 2 gives an account of the process chemistry and associated extraction operations in a number of industries of current interest. New extraction techniques have been developed in recent years for specific applications and these are illustrated with reference to the hydrometallurgical, nuclear, pharmaceutical and food industries.