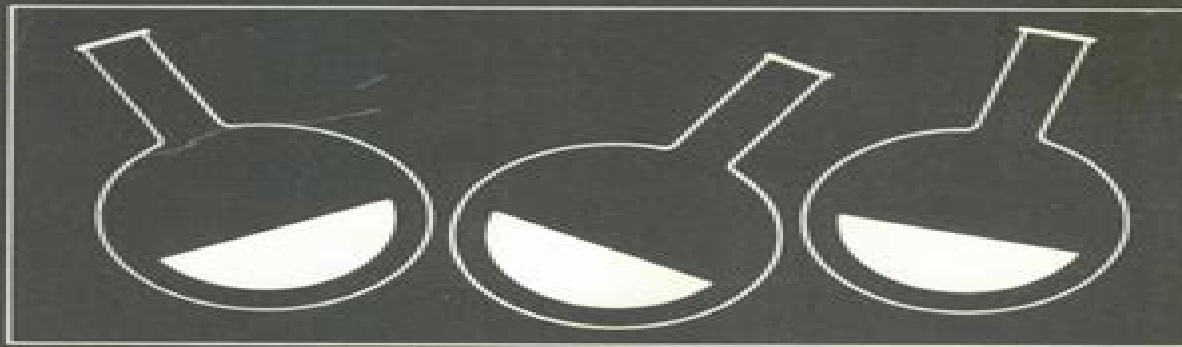


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Robert E. Treybal

THIRD EDITION



International Student Edition

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Principles and Modern Applications of Mass Transfer Operations Jaime

Benitez, 2011-09-20 A problem solving approach that helps students master new material and put their knowledge into practice The Second Edition of the acclaimed Principles and Modern Applications of Mass Transfer Operations continues to provide a thorough accessible text that gives students the support and the tools they need to quickly move from theory to application This latest edition has been thoroughly revised and updated with new discussions of such developing topics as membrane separations ion exchange multistage batch distillation and chromatography and other adsorptive processes Moreover the Second Edition now covers mass transfer phenomena in biological systems making the text appropriate for students in biochemical engineering as well as chemical engineering Complementing the author's clear discussions are several features that help students quickly master new material and put their knowledge into practice including Twenty five to thirty problems at the end of each chapter that enable students to use their newfound knowledge to solve problems Examples and problems that help students become proficient working with Mathcad Figures and diagrams that illustrate and clarify complex concepts and processes References facilitating further in depth research into particular topics Ten appendices filled with helpful data and reference materials Ideal for a first course in mass transfer operations this text has proven to be invaluable to students in chemical and environmental engineering as well as researchers and university faculty

Mass Transfer Operations for the Practicing Engineer Louis Theodore, Francesco Ricci, 2011-12-06 An invaluable guide for problem solving in mass transfer operations This book takes a highly pragmatic approach to providing the principles and applications of mass transfer operations by offering a valuable easily accessible guide to solving engineering problems Both traditional and novel mass transfer processes receive treatment As with all of the books in this series emphasis is placed on an example based approach to illustrating key engineering concepts The book is divided into two major parts It starts with the principles underlying engineering problems showing readers how to apply general engineering principles to the topic of mass transfer operations It then goes on to provide step by step guidance for traditional mass transfer operations including distillation absorption and stripping and adsorption plus novel mass transfer processes Essential topics for professional engineering exams are also covered Geared towards chemical environmental civil and

mechanical engineers working on real world industrial applications Mass Transfer Operations for the Practicing Engineer features Numerous sample problems and solutions with real world applications Clear precise explanations on how to carry out the basic calculations associated with mass transfer operations Coverage of topics from the ground up for readers without prior knowledge of the subject Overview of topics relevant to the ABET Accreditation Board for Engineering and Technology for those taking the Professional Engineering PE exams Appendix containing relevant mass transfer operation charts and tables

Mass Transfer Operations-I D.C. Sikdar, 2022-11-11 Mass Transfer is the net movement of mass of a chemical species from the region of higher concentration to a region of lower concentration It occurs in many industrial and non industrial processes Mass transfer is used by different scientific communities for different processes and mechanisms Mass Transfer Operation is one of the core courses at the undergraduate level of Chemical Engineering curriculum The chapters are organized in a way that enables the students to acquire an in depth understanding of the subject The emphasis is given to the basic concepts of mass transfer operating molecular diffusion inter phase mass transfer humidification operations drying evaporation crystallization adsorption novel separations and Mass transfer analogy all coming under the realm of mass transfer operations Apart from the numerous illustrations the book includes review questions exercises and aptitude test in chemical engineering which bridge the gap between theory and practical implementation All numerical problems are solved in a systematic manner to reinforce the understanding of the concepts This book demonstrates how to solve the industry related problems in chemical Engineering practice This book is primarily intended as a textbook for the undergraduate students of Chemical Engineering It will also be useful for other allied branches such as Mechanical Engineering Petroleum Engineering Polymer Science and Engineering Bio technology as well as Diploma in Chemical Engineering

Principles and Applications of Mass Transfer Jaime Benitez, 2022-12-13 Principles and Applications of Mass Transfer Core textbook teaching mass transfer fundamentals and applications for the design of separation processes in chemical biochemical and environmental engineering Principles and Applications of Mass Transfer teaches the subject of mass transfer fundamentals and their applications to the design of separation processes with enough depth of coverage to guarantee that students using the book will at the end of the course be able to specify preliminary designs of the most common separation process equipment Reflecting the growth of biochemical applications in the field of chemical engineering the fourth edition expands biochemical coverage including transient diffusion environmental applications electrophoresis and bioseparations Also new to the fourth edition is the integration of Python programs which complement the Mathcad programs of the previous edition On the accompanying instructor s website the online appendices contain a downloadable library of Python and Mathcad programs for the example problems in each chapter A complete solution manual for all end of chapter problems both in Mathcad and Python is also provided Some of the topics covered in Principles and Applications of Mass Transfer include Molecular mass transfer covering concentrations velocities and fluxes the Maxwell Stefan relations

and Fick's first law for binary mixtures The diffusion coefficient covering diffusion coefficients for binary ideal gas systems dilute liquids and concentrated liquids Convective mass transfer covering mass transfer coefficients dimensional analysis boundary layer theory and mass and heat transfer analogies Interphase mass transfer covering diffusion between phases material balances and equilibrium stage operations Gas dispersed gas liquid operations covering sparged vessels tray towers diameter and gas pressure drop and weeping and entrainment Principles and Applications of Mass Transfer is an essential textbook for undergraduate chemical biochemical mechanical and environmental engineering students taking a core course on Separation Processes or Mass Transfer Operations along with mechanical engineers and mechanical engineering students starting to get involved in combined heat and mass transfer applications *Mass-transfer Operations* Robert Ewald Treybal, 1967

Mass Transfer A. P. SINHA, PARAMESWAR DE, 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 **Unit**

Operations Handbook John J. McKetta Jr, 2018-12-12 Emphasizes the design control and functioning of various unit operations offering shortcut methods of calculation along with computer and nomographic solution techniques Provides practical sections on conversion to and from SI units and cost indexes for quick updating of all cost information This book is designed for mechanical chemical process design project and materials engineers and continuing education courses in these disciplines *Separation Processes* Pradeep Kumar Mishra, Manoj Kumar Mondal, Pradeep Srivastava, 2009 Contributed articles presented at an International Conference on Separation Processes organized by Institute of Chemical Engineering Technology Institute of Technology Banaras Hindu University in 2009

Off-Gas Purification Annika Graftschafter, Susanne Lux, Matthäus Siebenhofer, 2023-06-06 When doing in the off gas purification business you will pretty soon register that you do not act in an isolated box You have to make yourself familiar with the interplay of your emission problem and the environment and you have to apply a broad view of the subject We can hardly make a forecast on your first steps in this business except that we want you to succeed Therefore we want to offer engineers and graduate students the

basic tools for discussing air pollution problems and for deducing strategies for process and equipment design in off gas purification covering the whole span from the basics to dedusting absorption adsorption and redox processes The didactic concept of the work is to attract students with a learning by doing strategy We discuss the problems the solver strategies and the solvers The problem solver proposals address a multitude of pollution control technologies The work is a compact off gas purification guide for practitioners and students by presenting basics as well as numerous applications with many examples and problems with solutions

Safety and Health in Confined Spaces Neil McManus, 2018-12-18 Safety and Health in Confined Spaces goes beyond all other resources currently available International in scope the 15 chapters and 10 appendices cover every facet of this important subject A significant addition to the literature this book provides a confined space focus to other health and safety concepts Confined spaces differ from other workspaces because their boundary surfaces amplify the consequences of hazardous conditions The relationship between the individual the boundary surface and the hazardous condition is the critical factor in the onset outcome and severity of accidents in these workspaces The author uses information about causative and other factors from analysis of fatal accidents to develop a hazard assessment and hazard management system He provides a detailed disciplined protocol covering 36 hazardous conditions that addresses all segments of work the undisturbed space entry preparation work activity and emergency preparedness and response and illustrates how to use it Safety and Health in Confined Spaces gives you the tools you need for preventing and responding to accidents

Engineering Economics and Economic Design for Process Engineers Thane Brown, 2016-04-19 Engineers often find themselves tasked with the difficult challenge of developing a design that is both technically and economically feasible A sharply focused how to book Engineering Economics and Economic Design for Process Engineers provides the tools and methods to resolve design and economic issues It helps you integrate technical a

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Renewable Resources for Biorefineries Carol Lin,Rafael Luque,2014 An ideal book for upper level undergraduate and postgraduate students taking modules on Renewable resources green chemistry sustainable development environmental science agricultural science and environmental technology **Handbook of Food Preservation** M. Shafiur Rahman,1999-01-21 With over 2900 references tables and drawings this book covers a wide variety of conventional and potential food preservation techniques Emphasizing practical cost effective and safe strategies the book facilitates the selection of the best food ingredients and preservation techniques It covers postharvest handling explains conventional preservation methods details the use of natural antimicrobials antioxidants edible coating nitrites food packaging and HACCP in food safety Highlighting the effects of preservation methods on the functional and sensory properties of foods the book also features the exact mode or mechanisms involved in each preservation method Transport Mechanisms in Membrane Separation Processes J.G.A. Bitter,2012-12-06 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 quantitatively 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

Extraction Optimization in Food Engineering Constantina Tzia, George Liadakis, 2003-07-21 The only comprehensive source on extraction process optimization this book details the installation construction development modeling control and economics of conventional and specialized extraction systems in the food processing industry It supplies case studies for illustration of specific extraction systems in commercial food production *Encyclopedia of Agricultural, Food, and Biological Engineering* Dennis R. Heldman, Carmen I. Moraru, 2010-10-21 Examining the role of engineering in delivery of quality consumer products this expansive resource covers the development and design of procedures equipment and systems utilized in the production and conversion of raw materials into food and nonfood consumer goods With nearly 2000 photographs figures tables and equations including 128 color figures the book emphasizes and illustrates the various engineering processes associated with the production of materials with agricultural origin With contributions from more than 350 experts and featuring more than 200 entries and 3600 references this is the largest and most comprehensive guide on raw production technology

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