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Transfer Handbook of Heat and Mass Transfer PRINCIPLES OF MASS
TRANSFER Mass Transfer Fundamentals of Mass Transfer Thomas Kilgore
Sherwood T. L. Bergman N. Anantharaman Louis Theodore Jaime Benitez
Koichi Asano Diran Basmadjian Ross Taylor Hironori Nakajima Mohamed
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RENGANATHAN SHARMA Anthony L. Hines Ben Nnolim
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previous editions published under title absorption and extraction

fundamentals of heat and mass transfer 7th edition is the gold standard of
heat transfer pedagogy for more than 30 years with a commitment to

continuous improvement by four authors having more than 150 years of combined experience in heat transfer education research and practice using a rigorous and systematic problem solving methodology pioneered by this text it is abundantly filled with examples and problems that reveal the richness and beauty of the discipline this edition maintains its foundation in the four central learning objectives for students and also makes heat and mass transfer more approachable with an additional emphasis on the fundamental concepts as well as highlighting the relevance of those ideas with exciting applications to the most critical issues of today and the coming decades energy and the environment an updated version of interactive heat transfer iht software makes it even easier to efficiently and accurately solve problems

mass transfer operations are of great importance in a process industry as it has a direct impact on the cost of the final product a chemical process engineer therefore should have sound knowledge of the basics of mass transfer and its applications this book is designed to equip the reader with sufficient knowledge of mass transfer operations and face the challenges ahead the objective of this textbook is to teach a budding chemical engineer the principles involved in analyzing a process and apply the desired mass transfer operation to separate the components involved it deals with operations involving diffusion interphase mass transfer humidification drying crystallization absorption distillation extraction leaching and adsorption the principles and equipment used for different mass transfer operations have been lucidly explained designed for a two semester course this text is primarily intended for the undergraduate students of chemical pharmaceutical petrochemical engineering as well as biotechnology and industrial biotechnology it will also be useful to plant engineers and design professionals key features 1 explains the theoretical concepts with full derivation of equations 2 illustrates the application of theory through worked out numerical examples 3 provides exercise problems with answers at the end of each chapter for practice

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

a staple in any chemical engineering curriculum new edition has a stronger emphasis on membrane separations chromatography and other adsorptive processes ion exchange discusses many developing topics in more depth in mass transfer operations especially in the biological engineering area covers in more detail phase equilibrium since distillation calculations are completely dependent on this principle integrates computational software and problems using mathcad features 25 30 problems per chapter

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

in recent years the subject of mass transfer has been treated as a minor player in the larger field of transport phenomena and taken a back seat to its more mature brother heat transfer yet mass transfer is sufficiently mature as a discipline and sufficiently distinct from other transport processes to merit a separate treatment particularly one that does not overwhelm readers with an abundance of high level mathematics mass transfer principles and applications takes an integrated approach that uses a wealth of real world examples organizes the material according to mode of operation and highlights the importance of modeling the author begins by introducing diffusion rates fick s law film theory and mass transfer coefficients then develops these concepts in complementary stages the

treatment of phase equilibria covers topics generally not addressed in thermodynamics courses and these concepts are then used to analyze compartmental models and staged processes as well as continuous contact operations the final chapter offers a concise survey of simultaneous mass and heat transfer throughout the book discussions transition smoothly between theory and practice and clearly reflect the author's many years of engineering experience and the breadth of mass transfer applications mass transfer principles and applications is a unique and accessible treatment of this relatively complicated topic that will fill a significant gap as both a textbook and professional reference

addresses the use of rigorous multicomponent mass transfer models for the simulation and design of process equipment deals with the basic equations of diffusion in multicomponent systems describes various models and estimations of rates of mass and energy transfer covers applications of multicomponent mass transfer models to process design includes appendices providing necessary mathematical background contains a large number of numerical examples worked out in detail

our knowledge of mass transfer processes has been extended and applied to various fields of science and engineering including industrial processes in recent years since mass transfer is primordial phenomenon it plays a key role in the scientific researches and fields of mechanical energy environmental materials bio and chemical engineering in this book energetic authors especially provide advances in scientific findings and technologies and develop new theoretical models concerning mass transfer for sustainable energy and environment this book brings valuable references for research engineers working in the variety of mass transfer sciences and related fields since the constitutive topics cover the advances in broad research areas the topics will be mutually stimulus and informative not only to research engineers but also to university professors and students

this book covers a number of developing topics in mass transfer processes in multiphase systems for a variety of applications the book effectively blends theoretical numerical modeling and experimental aspects of mass transfer in multiphase systems that are usually encountered in many research areas such as chemical reactor environmental and petroleum engineering from biological and chemical reactors to paper and wood industry and all the way to thin film the 31 chapters of this book serve as an important reference for any researcher or engineer working in the field of mass transfer and related topics

mass transfer along with separation processes is an area that is often quite challenging to master as most volumes currently available complicate the learning by teaching mass transfer linked with heat transfer rather than focusing on more relevant techniques with this thoroughly updated second edition mass transfer and separation processes pr

mass transfer describes the net movement of mass from one location usually meaning stream phase fraction or component to another mass transfer happens in many processes such as absorption evaporation adsorption drying precipitation membrane filtration and distillation mass transfer is used by different scientific disciplines for different processes and mechanisms the phrase is commonly used in engineering for physical processes that involve diffusive and convective transport of chemical species within physical systems the theory of mass transfer allows for the computation of mass flux in a system and the distribution of the mass of different species over time and space in such a system also when chemical reactions are present the purpose of such computations is to understand and possibly design or control such a system some usual phenomenon of mass transfer processes are the evaporation of water from a pond to the atmosphere the purification of blood in the kidneys and liver and the distillation of alcohol in industrial processes mass transfer operations include separation of chemical components in distillation columns mass transfer is frequently attached to additional transport processes such as in industrial cooling towers these towers combine heat transfer to mass transfer by sanctioning hot water to flow in dealings with hotter air and evaporate as it grips heat from the air this book entitled mass transfer in chemical engineering processes compromises several approaches in solving mass transfer problems for different practical chemical engineering applications the book should be of great importance to its readers with interesting ideas and inspirations or direct solutions of their particular problems

this book introduces a number of selected advanced topics in mass transfer phenomenon and covers its theoretical numerical modeling and experimental aspects the 26 chapters of this book are divided into five parts the first is devoted to the study of some problems of mass transfer in microchannels turbulence waves and plasma while chapters regarding mass transfer with hydro magnetohydro and electro dynamics are collected in the second part the third part deals with mass transfer in food such as rice cheese fruits and vegetables and the fourth focuses on mass transfer in some large scale applications such as geomorphologic studies the last part introduces several issues of combined heat and mass transfer

phenomena the book can be considered as a rich reference for researchers and engineers working in the field of mass transfer and its related topics

this book provides a solid foundation in the principles of heat and mass transfer and shows how to solve problems by applying modern methods the basic theory is developed systematically exploring in detail the solution methods to all important problems the revised second edition incorporates state of the art findings on heat and mass transfer correlations the book will be useful not only to upper and graduate level students but also to practicing scientists and engineers many worked out examples and numerous exercises with their solutions will facilitate learning and understanding and an appendix includes data on key properties of important substances

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 electrodialysis 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 discolouration 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

a thorough introduction to the fundamentals and applications of microscopic and macroscopic mass transfer

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