

# Treybal Mass Transfer Operations 3rd Ed

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Theodore N. Anantharaman R.E. Treybal Diran Basmadjian Robert E. Treybal Jaime Benitez Robert Ewald Treybal DUTTA, BINAY  
K. Cecil Coutinho R.E. Treybal R. B. Keey Jaime Benitez Erden Alpay KAL RENGANATHAN SHARMA K A Gavhane  
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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 floatation 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

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 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

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

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 textbook is targetted to undergraduate students in chemical engineering chemical technology and biochemical engineering for courses in mass transfer separation processes transport processes and unit operations the principles of mass transfer both diffusional and convective have been comprehensively discussed the application of these principles to separation processes is explained the more common separation processes used in the chemical industries are individually described in separate chapters the book also provides a good understanding of the construction the operating principles and the selection criteria of separation equipment recent developments in equipment have been included as far as possible the procedure of equipment design and sizing has been illustrated by simple examples an overview of different applications and aspects of membrane separation has also been provided humidification and water cooling necessary in every process industry is also described finally elementary principles of unsteady state diffusion and mass transfer accompanied by a chemical reaction are covered salient

features a balanced coverage of theoretical principles and applications important recent developments in mass transfer equipment and practice are included a large number of solved problems of varying levels of complexities showing the applications of the theory are included many end chapter exercises chapter wise multiple choice questions an instructors manual for the teachers

mass transfer involves the net movement of mass from one location to another due to a driving force such as a difference in concentration gradient it finds extensive application in chemical engineering due to its application in crude oil refining petrochemical separation and extraction processes in general the random motion of molecules causes a net transfer of mass from an area of high concentration to an area of low concentration for separation processes thermodynamics determines the extent of separation while mass transfer determines the rate at which the separation will occur

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

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

distillation liquid liquid extraction adsorption and ion exchange leaching crystallisation drying appendix i

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