Science And Practice Of Liquid Liquid Extraction Volume 1

#Liquid-liquid extraction #Solvent extraction principles #Chemical engineering separation #Mass transfer operations #LLE practical guide

Explore the fundamental science and practice of liquid-liquid extraction with this comprehensive first volume. Delve into the core principles, mass transfer operations, and solvent extraction techniques essential for chemical engineering separation processes. Ideal for researchers, students, and professionals seeking a detailed understanding of LLE applications.

Science and Practice of Liquid-liquid Extraction: Process chemistry and extraction operations in the hydrometallurgical, nuclear, pharmaceutical, and food industries

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.

Science and Practice of Liquid-liquid Extraction: Phase equilibria, mass transfer and interfacial phenomena, extractor hydrodynamics, selection, and design

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Recent Advances in Liquid-Liquid Extraction

Recent Advances in Liquid-liquid Extraction focuses on the applications of liquid extraction. The selection first discusses solvent extraction. Concerns include organic and inorganic separations, mass transfer process, solvent extraction economics, and coalescence in liquid-liquid systems. The book focuses on the chemistry of solvent extraction. Extraction by acidic organophosphorus compounds; extraction by phosphorus-bonded oxygen-donor solvents; extraction by high-molecular weight amines; and synergistic extraction are elaborated. The book also focuses on industrial organic processes; industrial contacting equipment; response characteristics and control of extraction processes; and calculation of contactors with longitudinal mixing. The selection presents the study of longitudinal mixing in liquid-liquid contactors. Rotating disc contactors, packed columns, vibrating plate extractors, and Oldshue-Rushton columns are described. The text also discusses heat transfer by direct liquid-liquid contact and the coalescence of liquid droplets and liquid dispersion. The selection is a vital source of data for readers interested in liquid extraction.

Liquid-Phase Extraction

Liquid Phase Extraction thoroughly presents both existing and new techniques in liquid phase extraction. It not only provides all information laboratory scientists need for choosing and utilizing suitable sample preparation procedures for any kind of sample, but also showcases the contemporary uses of sample preparation techniques in the most important industrial and academic project environments, including countercurrent chromatography, pressurized-liquid extraction, single-drop Microextraction, and more. Written by recognized experts in their respective fields, it serves as a one-stop reference for those who need to know which technique to choose for liquid phase extraction. Used in conjunction with a similar release, Solid Phase Extraction, it allows users to master this crucial aspect of sample preparation. Defines the current state-of-the-art in extraction techniques and the methods and procedures for implementing them in laboratory practice Includes extensive referencing that facilitates the identification of key information Aimed at both entry-level scientists and those who want to explore new techniques and methods

Science and Practice of Liquid-liquid Extraction: Process chemistry and extraction operations in the hydrometallurgical, nuclear, pharmaceutical, and food industries

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Liquid Extraction

A complete and up-to-date presentation of the fundamental theoretical principles and many applications of solvent extraction, this enhanced Solvent Extraction Principles and Practice, Second Edition includes new coverage of the recent developments in solvent extraction processes, the use of solvent extraction in analytical applications and waste recovery, and computational chemistry methods for modeling the solvent extraction of metal ions. Offering sound scientific and technical descriptions in a format accessible to students and expedient for researchers and engineers, this edition also features a new chapter on ionic strength corrections and contains more than 850 up-to-date literature citations.

Solvent Extraction Principles and Practice, Revised and Expanded

In recent years the use of liquid—liquid extraction equipment has attracted widespread interest from all major chemical engineering, petroleum and pharmaceutical companies as well as university-based scientists and engineers. Liquid—Liquid Extraction Equipment presents : a critical analysis of all available information, including practical recommendations new ideas on performance enhancement and equipment selection an up-to-date review of research results on equipment performance illustrations of

present understanding using well-known equipment a concise survey of past, present and forthcoming procedures The combination of the historical aspects of the subject, with extensive references and illustrations, make this a unique information source. All researchers, in industry and academia, using this type of equipment will find Liquid—Liquid Extraction Equipment an authoritative reference work and a solid basis for future research projects.

Liquid-Liquid Extraction Equipment

A fresh new treatment written by industry insiders, this work gives readers a remarkably clear view into the world of chemical separation. The authors review distillation, extraction, adsorption, crystallization, and the use of membranes – providing historical perspective, explaining key features, and offering insights from personal experience. The book is for engineers and chemists with current or future responsibility for chemical separation on a commercial scale – in its design, operation, or improvement – or for anyone wanting to learn more about chemical separation from an industrial point of view. The result is a compelling survey of popular technologies and the profession, one that brings the art and craft of chemical separation to life. Ever wonder how popular separation technologies came about, how a particular process functions, or how mass transfer units differ from theoretical stages? Or perhaps you want some pointers on how to begin solving a separation problem. You will find clear explanations and valuable insights into these and other aspects of industrial practice in this refreshing new survey.

Industrial Chemical Separation

Offers in-depth coverage of the latest advances in new and traditional separation technologies as they are used in a variety of ways to produce value-added products. Examines both fundamental and applied aspects of separation techniques.

Bioseparation Processes in Food

Explore and review novel techniques for intensifying transport and reaction in liquid-liquid and related systems with this essential toolkit. Topics include discussion of the principles of process intensification, the nexus between process intensification and sustainable engineering, and the fundamentals of liquid-liquid contacting, from an expert with over forty-five years' experience in the field. Providing promising directions for investment and for new research in process intensification, in addition to a unique review of the fundamentals of the topic, this book is the perfect guide for senior undergraduate students, graduate students, developers, and research staff in chemical engineering and biochemical engineering.

Intensification of Liquid–Liquid Processes

Liquid-Liquid Systems

Liquid-liquid Extraction

Over the last decade, the biggest advances in physical chemistry have come from thinking smaller. The leading edge in research pushes closer to the atomic frontier with every passing year. Collecting the latest developments in the science and engineering of finely dispersed particles and related systems, Finely Dispersed Particles: Micro-, Nano-, and Atto-Engineering explores heat, mass, momentum and electron transfer phenomena of well-characterized interfaces at the milli-, micro-, nano-, and atto-scales. An interdisciplinary team of leading experts from around the world discuss recent concepts in the physics and chemistry of various well-studied interfaces of rigid and deformable particles in homo- and hetero-aggregate dispersed systems, including emulsions, dispersoids, foams, fluosols, polymer membranes, and biocolloids. The contributors clearly elucidate the hydrodynamic, electrodynamic, and thermodynamic instabilities that occur at interfaces, as well as the rheological properties of interfacial layers responsible for droplets, particles, and droplet-particle-film structures in finely dispersed systems. The book examines structure and dynamics from various angles, such as relativistic and non-relativistic theories, molecular orbital methods, and transient state theories. With a comprehensive survey of our current understanding, Finely Dispersed Particles: Micro-, Nano-, and Atto-Engineering provides a solid platform for further exploration and discovery at increasingly smaller scales.

Solvent Extraction Principles and Practice, Revised and Expanded

This is the first book dedicated to the entire field of integrated chemical processes, covering process design, analysis, operation and control of these processes. Both the editors and authors are internationally recognized experts from different fields in industry and academia, and their contributions describe all aspects of intelligent integrations of chemical reactions and physical unit operations such as heat exchange, separational operations and mechanical unit operations. As a unique feature, the book also introduces new concepts for treating different integration concepts on a generalized basis. Of great value to a broad audience of researchers and engineers from industry and academia.

Liquid-liquid Systems

This book offers both a practical as well a theoretical approach to Solvent Microextraction (SME) and will help analytical chemists to evaluate SME for a given sample preparation. Introductory chapters overview a comparison of SME with other sample preparation methods, a summary of the technical aspects, and a detailed theoretical treatment of SME. The book then describes the practical aspects of the technique, with detailed “how to” chapters devoted to the preparation and analysis of atmospheric, solid and liquid environmental, clinical and industrial samples. This text will serve as both a handy laboratory desk-reference and an indispensible instructional tool.

Finely Dispersed Particles

Presenting breakthrough research pertinent to scientists in a wide range of disciplines-from medicine and biotechnology to cosmetics and pharmacy-this Second Edition provides practical approaches to complex formulation problems encountered in the development of particulate delivery systems at the micro- and nano-size level. Completely revised and e

Integrated Chemical Processes

Extraction '84 presents the proceedings of the Symposium on Liquid-Liquid Extraction Science, held in Dounreay, Scotland, on November 27-29, 1984. This book discusses the principle involved in liquid-liquid extraction. Organized into 22 chapters, this compilation of papers begins with an overview of the performances of pulsed columns, including decontamination factors and recovery yields. This text then discusses the alternative ways of managing neptunium in the Purex process and reviews the main coordination and redox characteristics of neptunium in nitric medium. Other chapters consider the.

Solvent Microextraction

Covers all aspects of solvent extraction from fundamental principles to industrial and research applications. International authorities describe the most current equipment, plant design, processes, and engineering practice in applying solvent extraction. Extensively cross-referenced.

Solvent Extraction

This highly detailed reference represents an elaborate development of the theory of processing oil and natural gas and its application in the field -- indispensable for graduate engineering students and professionals alike. The renowned expert author, a professor at Moscow State University, has ample experience in both lecturing and publishing, albeit in the Russian language. This book is thus the first to provide a translation compiling his extensive knowledge, much of which remained unpublished due to security restrictions in the former Soviet Union. Based upon and compiled from Professor Sinaiski's university lectures, the first chapters treat the technical facilities for preparing and processing natural hydrocarbon substances. The following systematic approach go on to explain the behaviors of fluids, gases and droplets separately for solutions, suspensions and emulsions, as well as for gas-liquid mixtures. The resulting work is of interest both for senior students as well as for engineers working in this field.

Microencapsulation

Sustained developments in various branches of science and technology have resulted in considerable improvements in food processing methods. These new processing technologies have in turn contributed to enhancement of the quality and acceptability of foods. The aim of this book is to assemble, for handy reference, new developments pertaining to selected food processing technologies. Food processing methods covered include: NMR imaging, on-line NMR, on-line sensors, ultrason-

ics, synchrotron radiation to study fast events, membrane processing, bioseparation, high pressure processing, aseptic processing, irradiation, freezing, extrusion and extraction technologies. The book, adequately referenced and illustrated with numerous figures and tables, is a valuable reference for scientists, engineers, and technologists in industries and government laboratories involved in food processing, food research and/or development, and also for faculty, advanced undergraduate, graduate and postgraduate students from the Food Science, Food Engineering, and Agricultural Engineering departments.

Extraction '84

Biotechnology is one of the major technologies of the twenty-first century. Its wide-ranging, multi-disciplinary activities include recombinant DNA techniques, cloning and the application of microbiology to the production of goods from bread to antibiotics. In this new edition of the textbook Basic Biotechnology, biology and bioprocessing topics are uniquely combined to provide a complete overview of biotechnology. The fundamental principles that underpin all biotechnology are explained and a full range of examples are discussed to show how these principles are applied; from starting substrate to final product. A distinctive feature of this text are the discussions of the public perception of biotechnology and the business of biotechnology, which set the science in a broader context. This comprehensive textbook is essential reading for all students of biotechnology and applied microbiology, and for researchers in biotechnology industries.

Liquid-liquid Equilibrium and Extraction

The main challenge in modern solvent extraction separation is that most techniques are mainly empirical, specific and particular for narrow fields of practice and require a large degree of experimentation. This concise and modern book provides a complete overview of both solvent extraction separation techniques and the novel and unified competitive complexation/solvation theory. This novel and unified technique presented in the book provides a key for a preliminary quantitative prediction of suitable extraction systems without experimentation, thus saving researchers time and resources. Analyzes and compares both classical and new competitive models and techniques Offers a novel and unified competitive complexation / solvation theory that permits researchers to standardize some parameters, which decreases the need for experimentation at R&D Presents examples of applications in multiple disciplines such as chemical, biochemical, radiochemical, pharmaceutical and analytical separation Written by an outstanding scientist who is prolific in the field of separation science

Handbook of Solvent Extraction

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

Separation of Multiphase, Multicomponent Systems

Students entering the food processing stream need to acquire knowledge of concepts and analytical skills together with the knowledge of their applications. Food Engineering: Principles and Practices explains the different unit operations in food processing with an emphasis on the principles of food engineering as well as the different types of equipment used for the purpose. An approach in which propounding concepts and theory is immediately followed by numerical examples makes this book unique among food engineering textbooks. The examples, which are thoroughly explicated, have been taken, in general, from different competitive examinations and have been selected with practical applications for a better appreciation and understanding by the students. In the case of equipment, the constructional and operational features are discussed along with the specialty features of these types of equipment for better understanding their applications. Key Features: Merges a presentation of food engineering fundamentals with a discussion of unit operations and food processing equipment; Reviews concepts comprehensively with suitable illustrations and problems; Provides an adequate number of examples with different levels of difficulty to give ample practice to students; Explains equipment units in three broad subheadings: construction and operation, salient features, and applications This book is written as a textbook for students of food processing and food technology. Therefore, the book is meant for undergraduate and graduate students pursuing food processing and food technology courses. It also serves as a reference book for shop floor professionals and food processing consultants.

Food Processing

Extraction '84 presents the proceedings of the Symposium on Liquid–Liquid Extraction Science, held in Dounreay, Scotland, on November 27–29, 1984. This book discusses the principle involved in liquid–liquid extraction. Organized into 22 chapters, this compilation of papers begins with an overview of the performances of pulsed columns, including decontamination factors and recovery yields. This text then discusses the alternative ways of managing neptunium in the Purex process and reviews the main coordination and redox characteristics of neptunium in nitric medium. Other chapters consider the mass transfer measurements made in a pulsed plate liquid–liquid extraction column. This book discusses as well the extraction of uranium from wet process phosphoric acid. The final chapter deals with full-scale pulse column tests, which have been performed with uranium and simulated fission products to evaluate. This book is a valuable resource for chemical engineers, chemists, chemical physicists, and research workers.

Liquid-liquid Extraction

The growth in the world’s nuclear industry, motivated by peaking world oil supplies, concerns about the greenhouse effect, and domestic needs for energy independence, has resulted in a heightened focus on the need for next-generation nuclear fuel-cycle technologies. Ion Exchange and Solvent Extraction: A Series of Advances, Volume 19 provides a comprehensive look at the state of the science underlying solvent extraction in its role as the most powerful separation technique for the reprocessing of commercial spent nuclear fuel. Capturing the current technology and scientific progress as it exists today and looking ahead to potential developments, the book examines the overall state of solvent extraction in reprocessing, new molecules for increased selectivity and performance, methods for predicting extractant properties, and actinide-lanthanide group separation. The contributors also explore the simultaneous extraction of radionuclides by mixing extractants, the cause and nature of third-phase formation, the effects of radiation on the solvent and its performance, analytical techniques for measuring process concentrations, new centrifugal contactors for more efficient processing, and new chemistry using novel media. The long-term vision of many professionals in the field entails a proliferation-free nuclear energy economy in which little or no waste is stored or released into the environment and all potential energy values in spent nuclear fuel are recycled. This text opens a window on that possibility, offering insight from world leaders on the cutting edge of nuclear research.

Basic Biotechnology

Get Cutting-Edge Coverage of All Chemical Engineering Topics— from Fundamentals to the Latest Computer Applications First published in 1934, Perry's Chemical Engineers' Handbook has equipped generations of engineers and chemists with an expert source of chemical engineering information and data. Now updated to reflect the latest technology and processes of the new millennium, the Eighth Edition of this classic guide provides unsurpassed coverage of every aspect of chemical engineering-from

fundamental principles to chemical processes and equipment to new computer applications. Filled with over 700 detailed illustrations, the Eighth Edition of Perry's Chemcial Engineering Handbook features: Comprehensive tables and charts for unit conversion A greatly expanded section on physical and chemical data New to this edition: the latest advances in distillation, liquid-liquid extraction, reactor modeling, biological processes, biochemical and membrane separation processes, and chemical plant safety practices with accident case histories Inside This Updated Chemical Engineering Guide - Conversion Factors and Mathematical Symbols • Physical and Chemical Data • Mathematics • Thermodynamics • Heat and Mass Transfer • Fluid and Particle Dynamics Reaction Kinetics • Process Control • Process Economics • Transport and Storage of Fluids • Heat Transfer Equipment • Psychrometry, Evaporative Cooling, and Solids Drying • Distillation • Gas Absorption and Gas-Liquid System Design • Liquid-Liquid Extraction Operations and Equipment • Adsorption and Ion Exchange • Gas-Solid Operations and Equipment • Liquid-Solid Operations and Equipment • Solid-Solid Operations and Equipment • Size Reduction and Size Enlargement • Handling of Bulk Solids and Packaging of Solids and Liquids • Alternative Separation Processes • And Many Other Topics!

Solvent Extraction

Supercritical Fluid Extraction is a technique in which CO2 is used under extremely high pressure to separate solution (e.g., removing caffeine from coffee). Separations is basic to all process industries and supercritical fluid extraction is a specific type which is receiving a high level of attention. The book will combine basic fundamentals with industrial applications. The second edition has been expanded and updated and includes new chapters on chromatography and food processing. "...this is an excellent book which is both instructive and amusing to read. Its true value is neatly summarised in one of the closing sentences: 'We have supplied you with the guidelines and criteria which you can now apply when considering supercritical fluids for your own needs." - Chemistry in Britain, February 1995

Mass Transfer and Separation Processes

As the global population grows and many developing countries modernize, the importance of water supply and wastewater treatment becomes a much greater factor in the welfare of nations. Clearly, in today’s world the competition for water resources coupled with the unfortunate commingling of wastewater discharges with freshwater supplies creates additional pressure on treatment systems. Recently, researchers focus on wastewater treatment by difference methods with minimal cost and maximum efficiency. This volume of the Wastewater Engineering: Advanced Wastewater Treatment Systems is a selection of topics related to physical-chemical and biological processes with an emphasis on their industrial applications. It gives an overview of various aspects in wastewater treatments methods including topics such as biological, bioremediation, electrochemical, membrane and physical-chemical applications. Experts in the area of environmental sciences from diverse institutions worldwide have contributed to this book, which should prove to be useful to students, teachers, and researchers in the disciplines of wastewater engineering, chemical engineering, environmental engineering, and biotechnology. We gratefully acknowledge the cooperation and support of all the contributing authors.

Food Engineering

A number of important advances are changing the landscape in the field of solvent extraction! This volume of Ion Exchange and Solvent Extraction captures transformational changes in both the chemistry and engineering side of solvent extraction, deepening our understanding of the structure and dynamics of liquid-liquid systems from the molecular- to nano- to meso- to bulk-scale. Riddles that have perplexed researchers for over half a century are finally unraveling, and the insights gained are creating entirely new directions in the field. An international assembly of expert authors provide critical reviews of these recent landscape-changing advances in solvent extraction. Their reviews cover microfluidics techniques for measuring kinetics, the streamlining of process applications, and new approaches to the design of liquid-liquid contacting equipment. New tools are emerging for understanding the structure and dynamics of the liquid-liquid interface, and molecular-dynamics methods reveal interactions in the solvent phase with increasingly High fidelity. Highly selective extractants can now be designed, aided by insights from supramolecular chemistry, and task-specific ionic liquids provide a complexity new type of organic phase with unexpected properties. Ion Exchange and Solvent Extraction: Volume 23, Changing the Landscape in Solvent Extraction provides a comprehensive overview of the new developments across the field. Book jacket.

Extraction '84

The separation operations between two fluid phases are predominantly based on the mass transfer between individual phases across a phase interphase. The investigation of the actual transport across the interphase was the topic of a research programme, result in this work -the most profund publication on the topic. Here, scientists working in different subject areas (physics, physical chemistry, technical chemistry, chemocal engineering and thermodynamics) present their results in this exciting field.

Ion Exchange and Solvent Extraction

Includes no. 53a: British wartime books for young people.

Liquid-liquid Extraction

It is generally recognized that the commercial success of biotechnology products is highly dependent on the successful development and application of high-powered separation and purification methods. In this practical and authoritative handbook, the separation of proteins, nucleic acids, and oligonucleotides from biological matrices is covered from analytical to process scales. Also included in a chapter on the separation of monoclonal antibodies, which have found numerous uses as therapeutic and diagnostic agents. Analytical techniques include an interesting montage of chromatographic methods, capillary electrophoresis, isoelectric focusing, and mass spectrometry. Among separation and purification methods, liquid-liquid distribution, displacement chromatography, expanded bed adsorption, membrane chromatography, and simulated moving bed chromatography are covered at length. Regulatory and economic considerations are addressed, as are plant and process equipment and engineering process control. A chapter on future developments highlights the application of DNA chip arrays as well as evolving methodologies for a large number of drugs that are under development for treatment of cancer, AIDS, rheumatoid arthritis, and Alzheimer's disease. Handbook of Bioseparations serves as an essential reference and guidebook for separation scientists working in the pharmaceutical and biotechnology industries, academia, and government laboratories. Key Features * Covers bioseparations of proteins, nucleic acids, and monoclonal antibodies * Encompasses both analytical and process-scale methods * Elucidates the importance of engineering process control * Details selection of plant and process equipment * Addresses economic considerations * Discusses future developments

Liquid-Liquid Extraction and Other Liquid-Liquid Operations and Equipment

Supercritical Fluid Extraction