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AIDAN CHARLES

Bioseparations John Wiley & Sons

The biology, biotechnology, chemistry, pharmacy and chemical engineering students at various university and engineering institutions are required to take the Biochemical Engineering course either as an elective or compulsory subject. This book is written keeping in mind the need for a text book on afore subject for students from both engineering and biology backgrounds. The main feature of this book is that it contains the solved problems, which help the students to understand the subject better. The book is divided into three sections: Enzyme mediated bioprocess, whole cell mediated bioprocess and the engineering principle in bioprocess. Dr. Rajiv Dutta is Professor in Biotechnology and Director, Amity Institute of Biotechnology, Lucknow. He earned his M. Tech. in Biotechnology and Engineering from the Department of Chemical Engineering, IIT, Kharagpur and Ph.D. in Bioelectronics from BITS, Pilani. He has taught Biochemical Engineering and Biophysics to B.E., M.E. and M.Sc. level student carried out advanced research in the area of Ion channels at the

Department of Botany at Oklahoma State University, Stillwater and Department of Biological Sciences at Purdue University, West Lafayette, IN. He also holds the position of Nanion Technologies Adjunct Research Professor at Research Triangle Institute, RTP, NC. He had received various awards including JCI Outstanding Young Person of India and ISBEM Dr. Ramesh Gulrajani Memorial Award 2006 for outstanding research in electro physiology. **Microbial Biomass Process Technologies and Management** John Wiley & Sons
 An affordable, easily accessible desk reference on biomanufacturing, focused on downstream recovery and purification Advances in the fundamental knowledge surrounding biotechnology, novel materials, and advanced engineering approaches continue to be translated into bioprocesses that bring new products to market at a significantly faster pace than most other industries. Industrial scale biotechnology and new manufacturing methods are revolutionizing medicine, environmental monitoring and remediation, consumer products, food production, agriculture, and forestry, and continue to be a major area of research. The downstream stage in industrial biotechnology refers to recovery, isolation, and purification of the microbial products from cell debris, processing medium and contaminating biomolecules from the upstream process into a

finished product such as biopharmaceuticals and vaccines. Downstream process design has the greatest impact on overall biomanufacturing cost because not only does the biochemistry of different products (e.g., peptides, proteins, hormones, antibiotics, and complex antigens) dictate different methods for the isolation and purification of these products, but contaminating byproducts can also reduce overall process yield, and may have serious consequences on clinical safety and efficacy. Therefore downstream separation scientists and engineers are continually seeking to eliminate, or combine, unit operations to minimize the number of process steps in order to maximize product recovery at a specified concentration and purity. Based on Wiley's Encyclopedia of Industrial Biotechnology: Bioprocess, Bioseparation, and Cell Technology, this volume features fifty articles that provide information on down- stream recovery of cells and protein capture; process development and facility design; equipment; PAT in downstream processes; downstream cGMP operations; and regulatory compliance. It covers: Cell wall disruption and lysis Cell recovery by centrifugation and filtration Large-scale protein chromatography Scale down of biopharmaceutical purification operations Lipopolysaccharide removal Porous media in biotechnology Equipment used in industrial protein purification Affinity chromatography Antibody

purification, monoclonal and polyclonal Protein aggregation, precipitation and crystallization Freeze-drying of biopharmaceuticals Biopharmaceutical facility design and validation Pharmaceutical bioburden testing Regulatory requirements Ideal for graduate and advanced undergraduate courses on biomanufacturing, biochemical engineering, biopharmaceutical facility design, biochemistry, industrial microbiology, gene expression technology, and cell culture technology, Downstream Industrial Biotechnology is also a highly recommended resource for industry professionals and libraries.

Bioprocess Engineering Bioseparations Downstream Processing for Biotechnology

The biopharmaceutical industry has become an increasingly important player in the global economy, and the success of these products depends on the development and implementation of cost-effective, robust and scalable production processes. Bioseparations—also called downstream processing—can be a key source of competitive advantage to biopharmaceutical developers. Process Scale Bioseparations for the Biopharmaceutical Industry brings together scientific principles, empirical approaches, and practical considerations for designing industrial downstream bioprocesses for various classes of biomolecules. Using clear language along with numerous case studies, examples, tables, flow charts, and schematics, the book presents perspectives from experienced professionals involved in purification processes and industrial downstream unit operations. The authors provide useful experimental design strategies and guidelines for developing application-specific process scale bioseparations. Chapter topics include harvest by centrifugation and filtration, expanded bed chromatography, protein refolding, modes of preparative chromatography, methodologies for resin screening, membrane chromatography, protein crystallization, viral filtration, ultrafiltration/diafiltration, implementing post-approval downstream process changes for an antibody product, and future trends. Ideal for both new and experienced scientists in the biopharmaceutical industry and students, Process Scale Bioseparations for the Biopharmaceutical Industry is a comprehensive resource for all topics relevant to industrial process development.

Rules of Thumb in Engineering Practice Oxford University Press, USA

Publisher Description

Distillation: Operation and Applications CRC Press

With contributions by numerous experts

Bioseparation John Wiley & Sons

Still the Most Complete, Up-To-Date, and Reliable Reference in the Field Drying is a highly energy-intensive operation and is encountered in nearly all industrial sectors. With rising energy costs and consumer demands for higher quality dried products, it is increasingly important to be aware of the latest developments in industrial drying technology

Bioseparations Science and Engineering World Scientific

This book covers the fundamentals of protein inactivation during bioseparation and the effect on protein processing. Bioseparation of Proteins is unique because it provides a background of the bioseparation processes, and it is the first book available to emphasize the influence of the different bioseparation processes on protein inactivation. Bioseparation of Proteins covers the extent, mechanisms of, and control of protein inactivation during these processes along with the subsequent and essential validation of these processes. The book focuses on the avoidance of protein (biological product) inactivation at each step in a bioprocess. It compares protein inactivation exhibited during the different bioseparation processes by different workers and provides a valuable framework for workers in different areas interested in bioseparations. Topics include separation and detection methods; estimates of protein inactivation and an analysis of this problem for different separation processes; strategies for avoiding inactivation; the molecular basis of surface activity and protein adsorption, process monitoring, and product validation techniques; and the economics of various bioseparation processes and quality control procedures. Key Features * Protein inactivation and other aspects of biological stability are critical to an effective bioseparation process; This book is a detailed and critical review of the available literature in an area that is essential to the effectiveness, validation, and economics of bioseparation processes for drugs and other biological products; Conveniently assembled under one cover, the survey of the literature and resulting perspective will greatly assist engineers and chemists in designing and improving their own processes; Key features of the text include: * detailed data on biological stability under various bioseparation conditions * extensive case studies from the literature on separation processes, validation, and economics * simplified analysis of protein refolding and inactivation mechanisms * consideration of adsorption theories and the effect of heterogeneity *

coverage of both classical and novel bioseparation techniques, including chromatographic procedures

Purification of Fermentation Products CRC Press

Ultrafiltration is a pressure-driven, membrane-based separation process, which is used for a broad variety of applications, ranging from the processing of biological macromolecules to wastewater treatment. It has significant advantages over competing separation technologies. Food and biotechnological applications account for nearly 40% of the current total usage of ultrafiltration membranes. Protein bioseparation is an important component of this application segment. Ultrafiltration is used for protein concentration, desalting, clarification and fractionation (i.e. protein-protein separation). Concentration, desalting and clarification are technologically less demanding and have been in use in the bioprocess industry for some time. Protein fractionation, on the other hand, is a challenging proposition and is definitely a more recent development. This book focuses primarily on protein fractionation. Contents: Protein Bioseparation: An Overview Ultrafiltration: An Overview Membranes Membrane Module and Operation Membrane Fouling Permeate Flux in Ultrafiltration Protein Transmission Through Ultrafiltration Membranes Selectivity of Protein Fractionation in Ultrafiltration Protein Concentration Diafiltration of Protein Solutions Protein Clarification Protein Fractionation New Developments Readership: Graduate students, academics and researchers in biotechnology, biochemistry, food sciences, bioengineering/biomedical engineering and chemical engineering.

Theory, Applications and New Developments CRC Press

Expanded bed adsorption chromatography is a novel processing technique for the purification of biomolecules, combining clarification, concentration and initial purification in one step. By such an integration it is possible to reduce the number of steps in the purification process, to shorten the processing time and to improve the yields. The technology is new, and interesting developments have taken place concerning the adsorbents, the processing technology and potential applications. Both small-scale laboratory processes and larger industrial processes are being developed. Expanded bed chromatography is one of the most exciting new developments in downstream processing in recent years. The technology will be a standard procedure when new biotechnological processes are being developed.

Continuous Processing in Pharmaceutical Manufacturing Springer Science & Business Media

One of Nature's most important talents is evolutionary development of systems capable of molecular recognition: distinguishing one molecule from another. Molecular recognition is the basis for most biological processes, such as ligand-receptor binding, substrate-enzyme reactions and translation and transcription of the genetic code and is therefore

Molecular Imprinting of Polymers Springer Science & Business Media

Food Processing: Principles and Applications second edition is the fully revised new edition of this best-selling food technology title. Advances in food processing continue to take place as food scientists and food engineers adapt to the challenges imposed by emerging pathogens, environmental concerns, shelf life, quality and safety, as well as the dietary needs and demands of humans. In addition to covering food processing principles that have long been essential to food quality and safety, this edition of Food Processing: Principles and Applications, unlike the former edition, covers microbial/enzyme inactivation kinetics, alternative food processing technologies as well as environmental and sustainability issues currently facing the food processing industry. The book is divided into two sections, the first focusing on principles of food processing and handling, and the second on processing technologies and applications. As a hands-on guide to the essential processing principles and their applications, covering the theoretical and applied aspects of food processing in one accessible volume, this book is a valuable tool for food industry professionals across all manufacturing sectors, and serves as a relevant primary or supplemental text for students of food science.

Marine Biotechnology I Cambridge University Press

Offers a concise introduction to the separation and purification of biochemicals. Bridges two scientific cultures, providing an introduction to bioseparations for scientists with no background in engineering and for engineers with little grounding in biology. The authors supplement the ideas by simple worked examples, making the techniques of bioseparations easy to learn. Discusses removal of insolubles, product isolation, purification and polishing.

Principles, Phenomena and Processes Wiley-Interscience

The emergence and refinement of techniques in molecular biology has changed our perceptions of medicine, agriculture and environmental management. Scientific breakthroughs in gene

expression, protein engineering and cell fusion are being translated by a strengthening biotechnology industry into revolutionary new products and services. Many a student has been enticed by the promise of biotechnology and the excitement of being near the cutting edge of scientific advancement. However, graduates trained in molecular biology and cell manipulation soon realise that these techniques are only part of the picture. Reaping the full benefits of biotechnology requires manufacturing capability involving the large-scale processing of biological material. Increasingly, biotechnologists are being employed by companies to work in co-operation with chemical engineers to achieve pragmatic commercial goals. For many years aspects of biochemistry and molecular genetics have been included in chemical engineering curricula, yet there has been little attempt until recently to teach aspects of engineering applicable to process design to biotechnologists. This textbook is the first to present the principles of bioprocess engineering in a way that is accessible to biological scientists. Other texts on bioprocess engineering currently available assume that the reader already has engineering training. On the other hand, chemical engineering textbooks do not consider examples from bioprocessing, and are written almost exclusively with the petroleum and chemical industries in mind. This publication explains process analysis from an engineering point of view, but refers exclusively to the treatment of biological systems. Over 170 problems and worked examples encompass a wide range of applications, including recombinant cells, plant and animal cell cultures, immobilised catalysts as well as traditional fermentation systems. * * First book to present the principles of bioprocess engineering in a way that is accessible to biological scientists * Explains process analysis from an engineering point of view, but uses worked examples relating to biological systems * Comprehensive, single-authored * 170 problems and worked examples encompass a wide range of applications, involving recombinant plant and animal cell cultures, immobilized catalysts, and traditional fermentation systems * 13 chapters, organized according to engineering sub-disciplines, are grouped in four sections - Introduction, Material and Energy Balances, Physical Processes, and Reactions and Reactors * Each chapter includes a set of problems and exercises for the student, key references, and a list of suggestions for further reading * Includes useful appendices, detailing conversion factors, physical and chemical property data, steam tables, mathematical rules, and a list of symbols used * Suitable for course adoption - follows closely curricula used on most bioprocessing and process biotechnology courses at senior undergraduate and graduate levels.

Protein Purification Process Engineering Washington, D.C. : American Chemical Society

An immense treasure trove containing hundreds of equipment symptoms, arranged so as to allow swift identification and elimination of the causes. These rules of thumb are the result of preserving and structuring the immense knowledge of experienced engineers collected and compiled by the author - an experienced engineer himself - into an invaluable book that helps younger engineers find their way from symptoms to causes. This sourcebook is unrivalled in its depth and breadth of coverage, listing five important aspects for each piece of equipment: * area of application * sizing guidelines * capital cost including difficult-to-find installation factors * principles of good practice, and * good approaches to troubleshooting. Extensive cross-referencing takes into account that some items of equipment are used for many different purposes, and covers not only the most familiar types, but special care has been taken to also include less common ones. Consistent terminology and SI units are used throughout the book, while a detailed index quickly and reliably directs readers, thus aiding engineers in their everyday work at chemical plants: from keywords to solutions in a matter of minutes.

Basic Concepts World Scientific Publishing Company

Edited by three of the world's leading pharmaceutical scientists, this is the first book on this important and hot topic, containing much previously unpublished information. As such, it covers all aspects of green chemistry in the pharmaceutical industry, from simple molecules to complex proteins, and from drug discovery to the fate of pharmaceuticals in the environment. Furthermore, this ready reference contains several convincing case studies from industry, such as Taxol, Pregabalin and Crestor, illustrating how this multidisciplinary approach has yielded efficient and environmentally-friendly processes. Finally, a section on technology and tools highlights the advantages of green chemistry.

Food Processing CRC Press

Distillation: Operation and Applications—winner of the 2015 PROSE Award in Chemistry & Physics from the Association of American Publishers—is a single source of authoritative information on all aspects of the theory and practice of modern distillation, suitable for advanced students and

professionals working in a laboratory, industrial plants, or a managerial capacity. It addresses the most important and current research on industrial distillation, including all steps in process design (feasibility study, modeling, and experimental validation), together with operation and control aspects. This volume features an extra focus on distillation applications. Winner of the 2015 PROSE Award in Chemistry & Physics from the Association of American Publishers Practical information on the newest development written by recognized experts Coverage of a huge range of laboratory and industrial distillation approaches Extensive references for each chapter facilitates further study

Unfolding/Folding and Validations CRC Press

This book brings together environmental scientists and engineers to discuss the development of new approaches and methodologies which utilize microalgae for biological wastewater treatment. The researchers report their recent findings on microalgal removal of nutrients, heavy metals and other organic pollutants from sewage and industrial effluents. The technologies discussed here include biosorption and bioaccumulation of heavy metals, cell immobilization of algae, and mathematical modelling of metal uptake by cells. This book is unique in that it takes a practical approach to the subject matter and is a useful reference both in and outside of the laboratory.

Applications to Large-scale Processes Springer

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

BIOSPERATIONS Springer Science & Business Media

Edited to avoid duplication and favor comprehensiveness, 20 contributors detail the recovery, separation, and purification operations of bioprocess technology. Individual chapters in this classic yet still highly relevant work emphasize concepts that are becoming more and more important when applied to the large scale versions of techniques that are considered well established. Aside from fully discussing processes, Separation Processes in Biotechnology includes sections on concentration separation and operation, purification operations, and product release and recovery. It also discusses plant operation and equipment and delves into economic considerations

Principles of Bioseparations Engineering Springer

"The series Advances in Biochemical Engineering/Biotechnology presents critical reviews of the present and future trends in polymer and biopolymer science including chemistry, physical chemistry, physics and material science. It is addressed to all scientists at universities and in industry who wish to keep abreast of advances in the topics covered."--Title page verso.

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