

Fermentation And Biochemical Engineering Handbook Principles Process Design And Equipment

Completely revised, updated, and enlarged, this second edition now contains a subchapter on biorecognition assays, plus a chapter on bioprocess control added by the new co-author Jun-ichi Horichi, who is one of the leading experts in the field. The central theme of the textbook remains the application of chemical engineering principles to biological processes in general, demonstrating how a chemical engineer would address and solve problems. To create a logical and clear structure, the book is divided into three parts. The first deals with the basic concepts and principles of chemical engineering and can be read by those students with no prior knowledge of chemical engineering. The second part focuses on process aspects, such as heat and mass transfer, bioreactors, and separation methods. Finally, the third section describes practical aspects, including medical device production, downstream operations, and fermenter engineering. More than 40 exemplary solved exercises facilitate understanding of the complex engineering background, while self-study is supported by the inclusion of over 80 exercises at the end of each chapter, which are supplemented by the corresponding solutions. An excellent, comprehensive introduction to the principles of biochemical engineering.

Industrialization of Indigenous Fermented Foods, Second Edition presents the most recent innovations in the processing of a wide range of indigenous fermented foods ranging from soy sauce to African maize. It serves as the only comprehensive review of indigenous fermented food manufacture from ancient production methods to industrialized processing technologies for clear understanding of the impact of fermented food products on the nutritional needs of communities around the world. Provides authoritative studies from more than 24 internationally recognized professionals on various processing and control technologies, biochemical and microbiological information, and manufacturing and production procedures form the United States, Indonesia, and Western Europe. About the Author Keith H. Steinkraus is a Professor Emeritus of Microbiology and Food Science at Cornwall University in Geneva and Ithaca, New York, USA. He is the author or editor of numerous professional publications including the Handbook of Indigenous Fermented Foods. He is a Fellow of the International Academy of Food Science and Technology, the Institute of Food Technologists, the American Academy of Microbiology, and the American Association for the Advancement of Science.

The definitive guide for the general chemical analysis of non-petroleum based organic products such as paints, dyes, oils, fats, and waxes. * Chemical tables, formulas, and equations * Covers all of the chemical processes which utilize organic chemicals * Physical properties for the most common organic chemicals Contents: Safety Considerations in Process Industries * Industrial Pollution Prevention and Waste Management * Edible Oils, Fats, and Waxes * Soaps and Detergents * Sugar and Other Sweeteners * Paints, Pigments, and Industrial Coatings * Dye stuffs, Finishing and Dyeing of Textiles * Industrial Fermentation * Pharmaceutical Industry * Agrochemicals * Chemical Explosives * Petroleum Processing and Petrochemicals * Polymers and Plastics

With a foreword written by Professor Ludwig Narziss—"one of the world's most notable brewing scientists"—the Handbook of Brewing, Third Edition, as it has for two previous editions, provides the essential information for those who are involved or interested in the brewing industry. The book simultaneously introduces the basics—such as the biochemistry and microbiology of brewing processes—and also deals with the necessities associated with a brewery, which are steadily increasing due to legislation, energy priorities, environmental issues, and the pressures to reduce costs. Written by an international team of experts recognized for their contributions to brewing science and technology, it also explains how massive improvements in computer power and automation have modernized the brewhouse, while developments in biotechnology have steadily improved brewing efficiency, beer quality, and shelf life.

Handbook of Food and Beverage Fermentation Technology
Fermentation and Biochemical Engineering Handbook

Theory and Design of Fermentation Processes
Food Process Engineering
Citric Acid Biotechnology

Of major economic, environmental and social importance, industrial microbiology involves the utilization of microorganisms in the reproduction of a wide range of products, including enzymes, foods, beverages, chemical feedstocks, fuels and pharmaceuticals, and clean technologies employed for waste treatment and pollution control. Aimed at undergraduates studying the applied aspects of biology, particularly those on biotechnology and microbiology courses and students of food science and biochemical engineering, this text provides a wide-ranging introduction to the field of industrial microbiology. The content is divided into three sections: key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products investigation of a wide range of established and novel industrial fermentation processes and products Written by experienced lecturers with industrial backgrounds, Industrial Microbiology provides the reader with groundwork in both the fundamental principles of microbial biology and the various traditional and novel applications of microorganisms to industrial processes, many of which have been made possible or enhanced by recent developments in genetic engineering technology. A wide-ranging introduction to the field of industrial microbiology Based on years of teaching experience by experienced lecturers with industrial backgrounds Explains the underlying microbiology as well as the industrial application. Content is divided into three sections: 1. key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products 2. industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products 3. investigation of a wide range of established and novel industrial fermentation processes and products

A complete reference for fermentation engineers engaged in commercial chemical and pharmaceutical production, Fermentation and Biochemical Engineering Handbook emphasizes the operation, development and design of manufacturing processes that use fermentation, separation and purification techniques. Contributing authors from companies such as Merck, Eli Lilly, Amgen and Bristol-Myers Squibb highlight the practical aspects of the processes—data collection, scale-up parameters, equipment selection, troubleshooting, and more. They also provide relevant perspectives for the different industry sectors utilizing fermentation techniques, including chemical, pharmaceutical, food, and biofuels. New material in the third edition covers topics relevant to modern recombinant cell fermentation, mammalian cell culture and biorefinery, along with developments in instrumentation such as optical-based dissolved oxygen probes, capacitance-based culture viability probes, and in situ real-time fermentation monitoring with wireless technology. It addresses topical environmental considerations, including the use of new (bio)technologies to treat and utilize waste streams and produce renewable energy from wastewaters. Options for bioremediation are also explained. Fully updated to cover the latest advances in recombinant cell fermentation, mammalian cell culture and biorefinery, along with developments in instrumentation Industrial contributors from leading global companies, including Merck, Eli Lilly, Amgen, and Bristol-Myers Squibb Covers synthetic processes for both small and large molecules

Substantially revising and updating the information from the widely-used previous editions, this book offers a valuable overview of current chemical processes, products, and practices. No other source offers as much data on the chemistry, engineering, economics, and infrastructure of the industry. In addition to thoroughly revised material on chemical economics, safety, statistical control methods, and waste management, chapters on industrial cell culture and industrial fermentation expand the treatment of biochemical engineering. Sectors covered include: plastics, rubber, adhesives, textiles, pharmaceuticals, soap, coal, dyes, chlor-alkali, pigments, chemical explosives, petrochemicals, natural and industrial gas, sulfur, phosphorus, food, and sweeteners. Comprehensive and easy to use, the tenth edition of Riegel's Handbook of Industrial Chemistry is an essential working tool for chemical and process engineers, chemists, plant and safety managers, and regulatory agency personnel.

Biochemical Engineering and Biotechnology, 2nd Edition, outlines the principles of biochemical processes and explains their use in the manufacturing of every day products. The author uses a direct approach that should be very useful for students in food the concepts and practical applications. This book is unique in having many solved problems, case studies, examples and demonstrations of detailed experiments, with simple design equations and required calculations. Covers major concepts of biochemical engineering and biotechnology, including applications in bioprocesses, fermentation technologies, enzymatic processes, and membrane separations, amongst others Accessible to chemical engineering students who need to both learn, and apply, biological knowledge in engineering principals Includes solved problems, examples, and demonstrations of detailed experiments with simple design equations and all required calculations Offers many graphs that present actual experimental data, figures, and tables, along with explanations

Fermented Beverage Production

Principles, Processes and Products

FERMENTATION AND BIOCHEMICAL ENGINEERING HANDBOOK

Fermentation Processes: Emerging and Conventional Technologies

An Introduction

Clostridia is one of the largest bacterial genera with an enormous potential for biochemical and medical applications. Despite growing scientific, medical, and industrial interest, information on basic methods, biochemical fundamentals, clinical practice, industrial applications, and novel developments remains scattered in a variety of research ar Biotechnological Engineering Fundamentals, 2e, combines contemporary engineering science with relevant biological concepts in a comprehensive introduction to biochemical engineering. The biological background provided enables students to comprehend the major problems in biochemical engineering and formulate effective solutions.

This work covers citric acid fermentation methods including recent advances and approaches. The book looks at all aspects of the fermentation process and should be of interest to those working in biotechnology, microbiology and biochemistry.

This second edition has been thoroughly updated to include recent advances and developments in the field of fermentation technology, focusing on industrial applications. The book now covers new aspects such as recombinant DNA techniques in the improvement of industrial micro-organisms, as well as including comprehensive information on fermentation media, sterilization procedures, inocula, and fermenter design. Chapters on effluent treatment and fermentation economics are also incorporated. The text is supported by plenty of clear, informative diagrams. This book is of great interest to final year and post-graduate students of applied biology, biotechnology, microbiology, biochemical and chemical engineering.

Handbook of Indigenous Foods Involving Alkaline Fermentation

Chemical Engineering Education and Main Products

Handbook of Downstream Processing

Vinegars of the World

A Laboratory Manual

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 realize 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 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.

Biochemical engineering mostly deals with the most complicated life systems as compared with chemical engineering. A fermenter is the heart of biochemical processes. It is essential to operate a system properly. A description of enzymatic reaction kinetics is followed by cell growth kinetics to determine several kinetic parameters. Operations and analyses of several biochemical processes are included to determine their special. The book also covers the determination of several operational parameters, such as volumetric mass transfer coefficient, mixing time, death rate constant, chemical oxygen demand, and heat of combustion. This book provides a novel description of the experimental protocol to find out several operational parameters of biochemical processes. A comprehensive collection of numerous experiments based on fundamentals, it focuses on the determination of not only the characteristics of raw materials but also other essential parameters required for the operation of biochemical processes. It also emphasizes the applicability of the analysis to various processes. Equipped with illustrative diagrams, neat flowcharts, and exhaustive tables, the book is ideal for young researchers, teachers, and scientists working towards developing a solid understanding of the experimental aspects of biochemical engineering.

Vinegars of the World: A Laboratory Manual This book covers the enri- ment of our diet, and resulting from the desired or controlled oxidation of ethanol containing (liquid) substrates. The traditional use and integration of vinegars in numerous cultures can be traced back to ancient times. In fact, the cultural heritage of virtually every civilization includes one or more vinegars made by the souring action (of micro-organisms) following alcoholic fermentation. It has been doc- mented that the Egyptians, Sumerians and Babylonians had experience and tech- cal knowledge in making vinegar from barley and any kind of fruit. Vinegar was very popular both in ancient Greece and Rome, where it was used in food prepa- tions and as remedy against a great number of diseases. In Asia, the first records about vinegar date back to the Zhou Dynasty (1027-221 BC) and probably China's ancient rice wines may have originally been derived from fruit, for which (maltd) rice was substituted later. The historical and geographical success of vinegars is mainly due to the low technology required for their production, and to the fact that several kinds of raw materials rich in sugars may easily be processed to give vinegar. In addition, vi- gars are well-known and accepted as safe and stable commodities that can be c- samed as beverages, health drinks or added to food as preservatives or as flavo- ing agents.

The last two decades have seen a phenomenal growth of the field of genetic or biochemical engineering and have witnessed the development and ultimately marketing of a variety of products-typically through the manipulation and growth of different types of microorganisms, followed by the recovery and purification of the associated products. The engineers and biotechnologists who are involved in the full-scale process design of such facilities must be familiar with the variety of unit operations and equipment and the applicable regulatory requirements. This book describes current commercial practice and will be useful to those engineers working in this field in the design, construction and operation of pharmaceutical and biotechnology plants. It will be of help to the chemical or pharmaceutical engineer who is developing a plant design and who faces issues such as: Should the process be batch or continuous? How should the optimum process design be developed? Should one employ a new revolutionary separation which could be potentially difficult to validate or use accepted technology which involves less risk? Should the process be run with ingredients formulated from water for injection, deionized water, or even filtered tap water? Should any of the separations be run in cold rooms or in glycol jacketed lines to minimize microbial growth where sterilization is not possible? Should the process equipment and lines be designed to be sterilized in-place, cleaned-in-place, or should every piece be broken down, cleaned and autoclaved after every turn?

Principles, Process Design, and Equipment

Riegel's Handbook of Industrial Chemistry

Fermentation Microbiology and Biotechnology

Handbook on Clostridia

Biochemical Engineering Fundamentals

Current Developments in Biotechnology and Bioengineering: Current Advances in Solid-State Fermentation provides knowledge and information on solid-state fermentation involving the basics of microbiology, biochemistry, molecular biology, genetics and principles of genetic engineering, metabolic engineering and biochemical engineering. This volume of the series is on Solid-State Fermentation (SSF), which would cover the basic and applied aspects of SSF processes, including engineering aspects such as design of bioreactors in SSF. The book offers a pool of knowledge on biochemical and microbiological aspects as well as chemical and biological engineering aspects of SSF

to provide an integrated knowledge and version to the readers. Provides state-of-the-art information on basic and fundamental principles of solid-state fermentation Includes key features for the education and understanding of biotechnology education and R&D, in particular on SSF Lists fermentation methods for the production of a wide variety of enzymes and metabolites Provides examples of the various industrial applications of enzymes in solid state fermentation

Handbook of Indigenous Foods Involving Alkaline Fermentation details the basic approaches of alkaline fermentation, provides a brief history, and offers an overview of the subject. Devoted exclusively to alkaline-fermented foods (AFFs), this text includes contributions from experts from around the globe. It discusses the diversity of indigenous fermented foods involving an alkaline reaction, as well as the taxonomy, ecology, physiology, and genetics of predominant microorganisms occurring in AFFs. Presented in nine chapters, the book explains how microorganisms or enzymes transform raw ingredients into AFFs. It discusses the safety aspects of AFFs, and considers the challenges associated with the technological aspects in modernizing AFFs. It stresses the significance of the microbiological and biochemical processes in the fermentations, as well as the factors that influence the development of the characteristic microbiota, and the biochemical and organoleptic changes induced by them. It also proposes solutions, discusses the value of AFFs and related dominant microorganisms, and assesses the future of AFFs. The authors highlight commonly known foods and beverages of plant and animal origin. They provide insight into the manufacture, chemical and microbiological composition, processing, and compositional and functional modifications taking place as a result of microbial and enzyme effects. The text examines safety, legislation, traditional and industrialized processes, as well as new product development, and opportunities for developing commodities from Africa, Asia, Europe, Latin America, and the Middle East. In addition, it also assesses the value of food processing by-products, biotechnology, and engineering of solid-state processes, modern chemical and biological analytical approaches to safety, and health and consumer perception. Focuses on how fermentation of food remains an important aspect of food processing Describes how fermentation of food contributes to its preservation Details how to ferment foods Involves enzymatic modifications of food components such as sugars, fats, and proteins Handbook of Indigenous Foods Involving Alkaline Fermentation offers insight into the microbiology and chemistry of the fermentation process. This book serves graduate students and researchers of food science and technology, nutrition and dietetics, food microbiology, and related areas.

Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. Revised throughout, this edition has been specifically developed for the U.S. market. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards. It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data, and Excel spreadsheet calculations, plus over 150 Patent References for downloading from the companion website. Extensive instructor resources: including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical systems). New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for students or practicing engineers working on design projects. New discussion of conceptual plant design, flowsheet development, and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of both processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data and Excel spreadsheet calculations plus over 150 Patent References, for downloading from the companion website Extensive instructor resources: 1170 lecture slides plus fully worked solutions manual available to adopting instructors

Food Engineering Handbook: Food Process Engineering addresses the basic and applied principles of food engineering methods used in food processing operations around the world. Combining theory with a practical, hands-on approach, this book examines the thermophysical properties and modeling of selected processes such as chilling, freezing, and dehydration

Fermentation and Biochemical Engineering Handbook, 2nd Ed.
Handbook of Brewing
Fermentation Biotechnology
Biochemical Engineering

Industrial Microbiology

Far more than a simple update and revision, the Handbook of Food Spoilage Yeasts, Second Edition extends and restructures its scope and content to include important advances in the knowledge of microbial ecology, molecular biology, metabolic activity, and strategy for the prohibition and elimination of food borne yeasts. The author incorporates new insights in taxonomy and phylogeny, detection and identification, and the physiological and genetic background of yeast stress responses, and introduces novel and improved processing, packaging, and storage technologies. Including 30 new tables, 40 new figures, 20 percent more species, and more than 2000 references, this second edition provides an unparalleled overview of spoilage yeasts, delivering comprehensive coverage of the biodiversity and ecology of yeasts in a wide variety food types and environments. Beginning with photographic examples of morphological and phenotypic characteristics, the book considers changes in taxonomy and outlines ecological factors with new sections on biofilms and interactions. It examines the yeast lifecycle, emphasizing kinetics and predictive modeling as well as stress responses; describes the regulation of metabolic activities; and looks at traditional and alternative methods for the inhibition and inactivation of yeasts. The book introduces molecular techniques for identification, enumeration, and detection and points to future developments in these areas. An entirely new chapter explores novel industrial applications of yeasts in food fermentation and biotechnology. Providing a practical guide to understanding the ecological factors governing the activities of food borne yeasts, Handbook of Food Spoilage Yeasts, Second Edition lays the foundation for improved processing technologies and more effective preservation and fermentation of food and beverage products.

The aim of this book is to present in a single volume an up-to-date account of the chemistry and chemical engineering which underlie the major areas of the chemical process industry. This most recent edition includes several new chapters which comprise important threads in the industry's total fabric. These new chapters cover waste minimization, safety considerations in chemical plant design and operation, emergency response planning, and statistical applications in quality control and experimental planning. Together with the chapters on chemical industry economics and wastewater treatment – they provide a unifying base on which the reader can most effectively apply the information provided in the chapters which describe the various areas of the chemical process industries. The ninth edition of this established reference work contains the contributions of some fifty experts from industry, government, and academe. I have been humbled by the breadth and depth of their knowledge and expertise and by the willingness and enthusiasm with which they shared their knowledge and insights. They have, without exception, been unstinting in their efforts to make their respective chapters as complete and informative as possible within the space available. Errors of omission, duplication, and shortcomings in organization are mine. Grateful acknowledgment is made to the editors of technical journals and publishing houses for permission to reproduce illustrations and other materials and to the many industrial concerns which contributed drawings and photographs. Comments and criticisms by readers will be welcome.

Handbook of Chemical Technology and Pollution Control integrates industrial chemistry with pollution control and environmental chemistry. This unified approach provides practicing professionals and consultants with a concise yet authoritative handbook covering the Key Features, relative importance, and environmental impact of currently operating chemical processes. It also meets the critical needs of students training for industrial careers. Handbook of Chemical Technology and Pollution Control considers community, municipal, power generation, industrial, and transportation components of environmental impact.

The book covers the major inorganic and organic commodity chemicals; aluminum, iron and steel, and copper production; pulp and paper; fermentation; petroleum production and refining. It also includes key topics and process details for major petrochemicals and large-scale consumer and engineering polymers. This single, convenient volume describes aspects of recycling at the industrial and post-consumer levels, and emphasizes a quantitative approach as used in the author's well-known lifecycle work with disposable and reusable cups. 0-12-350811-8Key Features * Covers historical background and new developments in a single, authoritative handbook * Presents integrated treatment of chemical technology with emission control chemistry * Includes tables throughout that give current and trend data * Considers community, municipal, power generation, and transportation components of environmental impact * Provides many references to further reading * Contains review questions that offer working experience with the information and concepts

Chemical Engineering and Chemical Process Technology is a theme component of Encyclopaedia of Chemical Sciences, Engineering and Technology Resources in the global Encyclopaedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty encyclopedias. Chemical engineering is a branch of engineering, dealing with processes in which materials undergo changes in their physical or chemical state. These changes may concern size, energy content, composition and/or other application properties. Chemical engineering deals with many processes belonging to chemical industry or related industries (petrochemical, metallurgical, food, pharmaceutical, fine chemicals, coatings and colors, renewable raw materials, biotechnological, etc.), and finds application in manufacturing of such products as acids, alkalis, salts, fuels, fertilizers, crop protection agents, ceramics, glass, paper, colors, dyestuffs, plastics, cosmetics, vitamins and many others. It also plays significant role in environmental protection, biotechnology, nanotechnology, energy production and sustainable economical development. The Theme on Chemical Engineering and Chemical Process Technology deals, in five volumes and covers several topics such as:

Fundamentals of Chemical Engineering; Unit Operations – Fluids; Unit Operations – Solids; Chemical Reaction Engineering; Process Development, Modeling, Optimization and Control; Process Management; The Future of Chemical Engineering; Chemical Engineering Education; Main Products, which are then expanded into multiple subtopics, each as a chapter. These five volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

Current Advances in Solid-State Fermentation

Handbook of Food Spoilage Yeasts, Second Edition

Chemical Engineering and Chemical Process Technology - Volume V

Current Developments in Biotechnology and Bioengineering

Organic Chemistry

Surveys the state-of-the-art in industrial fermentation monitoring and control. The main aim of the report is to encourage industry to take up methodologies suggested by research. It draws its conclusions from a one-year study into issues such as: improving data analysis procedures and monitoring techniques; applying estimation methods to enhance on-line information; easing the task of establishing effective closed-loop control systems; utilizing artificial intelligence techniques to improve process fault detection and diagnosis and provide general operator assistance; using optimization approaches where possible to enhance bioprocess profitability from improved laboratory scale to large-scale production.

Of major economic, environmental and social importance, industrial microbiology involves the utilization of microorganisms in the production of a wide range of products, including enzymes, foods, beverages, chemical feedstocks, fuels and pharmaceuticals, and clean technologies employed for waste treatment and pollution control. Aimed at undergraduates studying the applied aspects of biology, particularly those on biotechnology and microbiology courses and students of food science and biochemical engineering, this text provides a wide-ranging introduction to the field of industrial microbiology. The content is divided into three sections: key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products investigation of a wide range of established and novel industrial fermentation processes and products Written by experienced lecturers with industrial backgrounds, Industrial Microbiology provides the reader with groundwork in both the fundamental principles of microbial biology and the various traditional and novel applications of microorganisms to industrial processes, many of which have been made possible or enhanced by recent developments in genetic engineering technology. A wide-ranging introduction to the field of industrial microbiology Based on years of teaching experience by experienced lecturers with industrial backgrounds Explains the underlying microbiology as well as the industrial application. Content is divided into three sections: 1. key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products 2. industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products 3. investigation of a wide range of established and novel industrial fermentation processes and products

Food Engineering Handbook, Two-Volume Set provides a stimulating and up-to-date review of food engineering phenomena. It also addresses the basic and applied principles of food engineering methods used in food processing operations around the world. Combining theory with a practical, hands-on approach, this set examines the thermophysical properties and modeling of selected processes such as chilling, freezing, and dehydration, and covers the key aspects of food engineering, from mass and heat transfer to steam and boilers, heat exchangers, diffusion, and absorption. Comprised of Food Engineering Handbook: Food Engineering Fundamentals and Food Engineering Handbook: Food Process Engineering, this comprehensive resource: Explains the interactions between different food constituents that might lead to changes in food properties Describes the characterization of the heating behavior of foods, their heat transfer, heat exchangers, and the equipment used in each food engineering method Discusses chilling, fluid flow, evaporation, distillation, size reduction, mixing, emulsion, and encapsulation Provides case studies of solid – liquid and supercritical fluid extraction and food behaviors Explores fermentation, enzymes, fluidized-bed drying, and more Presenting cutting-edge information on new and emerging food engineering processes, Food Engineering Handbook, Two-Volume Set offers a complete reference on the fundamental concepts, modeling, quality, safety, and technologies associated with food engineering and processing operations today.

Explores the use of conventional and novel technologies to enhance fermentation processes Fermentation Processes reviews the application of both conventional and emerging technologies for enhancing fermentation conditions, examining the principles and mechanisms of fermentation processes, the microorganisms used in bioprocesses, their implementation in industrial fermentation, and more. Designed for scientists and industry professionals alike, this authoritative and up-to-date volume describes how non-conventional technologies can be used to increase accessibly and bioavailability of substrates by microorganisms during fermentation, which in turn promotes microbial growth and can improve processes and productivity across the agri-food, nutraceutical, pharmaceutical, and beverage industries. The text begins by covering the conventional fermentation process, discussing cell division and growth kinetics, current technologies and developments in industrial fermentation processes, the parameters and modes of fermentation, various culture media, and the impact of culture conditions on fermentation processes. Subsequent chapters provide in-depth examination of the use of emerging technologies—such as pulsed electric fields, ultrasound, high-hydrostatic pressure, and microwave irradiation—for biomass fractionation and microbial stimulation. This authoritative resource: Explores emerging technologies that shorten fermentation time, accelerate substrate consumption, and increase microbial biomass Describes enhancing fermentation at conventional conditions by changing oxygenation, agitation, temperature, and other medium conditions Highlights the advantages of new technologies, such as reduced energy consumption and increased efficiency Discusses the integration and implementation of conventional and emerging technologies to meet consumer and industry demands Offers perspectives on the future direction of fermentation technologies and applications Fermentation Processes: Emerging and Conventional Technologies is ideal for microbiologists and bioprocess technologists in need of an up-to-date overview of the subject, and for instructors and students in courses such as bioprocess technology, microbiology, new product development, fermentation, food processing, biotechnology, and bioprocess engineering.

A Textbook for Engineers, Chemists and Biologists

Biochemical Engineering and Biotechnology

Monitoring and Control of Fermenters

Principles of Fermentation Technology

Bioprocess Engineering Principles

This invaluable guide addresses the Why, What, and How of enterprise cloud adoption, leveraging a clear framework and proven best practices from Microsoft's own experience. * Great book. What 's particularly impressive is the outline of steps Microsoft itself is taking in its move to the cloud. Do as I do is always more powerful than do as I say. " —Al Ries, Coauthor, War in the Boardroom * This book takes on enterprise cloud adoption to a level I ' ve not seen before—made even more elegant with its structured framework and crisp approach. " —Anthony D. Christie, CMO, Level 3 Communications, Former CTO/CIO, Global Crossing " A practical and timely guide that covers the entire journey to the cloud from an enterprise perspective, including business, technology, and organizational impact. " —Bart Luitjen, CIO Corporate Functions & Corporate Technology, Phillips " The cloud powers business solutions for building tomorrow ' s enterprise and this book offers a simple, well-structured, and high-level process map for cloud adoption. " —Kris Gopalakrishnan, Executive Co-Chairman, Infosys Limited Cloud computing is full of tremendous opportunity, but is also riddled with hype and confusion. Business and technology leaders know the cloud is essential, but lack clarity and experience. To the Cloud cuts through the noise and addresses the Why, What, and How of enterprise cloud adoption. The book lays out a four-step framework leveraging the experience and best practices of Microsoft's own IT group. It provides end-to-end business and technology guidance, including how to analyze application portfolios to identify good cloud candidates, choose the right cloud models, consider architecture and security, and understand how shifting operations to the cloud affects budgeting and staffing. The book is applicable to all cloud platforms and providers, and debunks myths in its clear and concise style (e.g., real clouds are more than just web hosting, virtualization, or the Internet itself rebranded). It takes a balanced approach, addressing concerns and hybrid adoption scenarios alike. Leveraging the authors' proven expertise working for Microsoft's CIO on cloud migration and with cloud platform development teams, the book is supported by clear frameworks, graphics, tables, summaries, and checklists to provide a true practitioner ' s guide to the cloud. In this book, you will learn how to 10x explore cloud computing to understand its promise and challenges Envision how cloud computing can transform your organization with the necessary resources and skills Execute the design, development, and operation of cloud workloads To the Cloud is an essential guide for IT professionals seeking to lower total cost of ownership, improve the return on IT investment of existing services, or help the business bring new products to market more quickly.

This book covers the kinetics and design of fermentation processes, defined in the broader sense as any industrial processes that use living microorganisms or cells, both under aerobic and anaerobic conditions. It starts with a concise introduction to microbes and their metabolism, followed by rate equations, stoichiometry, derivation and use of mass balances for the design processes. It covers oxygen transfer and mass balances, heat transfer and design and scale-up/ scale-down of fermentation processes. It further includes industrially relevant process examples, over 100 solved examples, questions and problems, and solutions of differential equations and systems of equations in Excel. Features Uses chemical engineering principles for the study of fermentation processes Provides detailed coverage of stoichiometry and kinetics of fermentation processes Discusses pertinent oxygen transfer theory and its applications Concisely covers microorganism biochemistry and metabolism Includes solved examples and problems with solutions This book is designed as a textbook for undergraduate students in chemical engineering; however, it is also suitable for postgraduate students and for process engineers interested in these topics.

This is a well-rounded handbook of fermentation and biochemical engineering presenting techniques for the commercial production of chemicals and pharmaceuticals via fermentation. Emphasis is given to unit operations fermentation, separation, purification, and recovery. Principles, process design, and equipment are detailed. Environment aspects are covered. The practical aspects of development, design, and operation are stressed. Theory is included to provide the necessary insight for a particular operation. Problems addressed are the collection of pilot data, choice of scale-up parameters, selection of the right piece of equipment, pinpointing of likely trouble spots, and methods of troubleshooting. The text, written from a practical and operating viewpoint, will assist development, design, engineering and production personnel in the fermentation industry. Contributors were selected based on their industrial background and orientation. The book is illustrated with numerous figures, photographs and schematic diagrams.

Over the past decade, new applications of genetic engineering in the fermentation of food products have received a great deal of coverage in scientific literature. While many books focus solely on recent developments, this reference book highlights these developments and provides detailed background and manufacturing information.Co-Edited by Fiedl To the Cloud: Cloud Powering an Enterprise

Industrialization of Indigenous Fermented Foods, Revised and Expanded

Principles, Process Design and Equipment

Food Engineering Handbook, Two Volume Set

Principles, Practice and Economics of Plant and Process Design

Fermented Beverage Production, Second Edition is an essential resource for any company producing or selling fermented alcoholic beverages. In addition it would be of value to anyone who needs a contemporary introduction to the science and technology of alcoholic beverages. This authoritative volume provides an up-to-date, practical overview of fermented beverage production, focusing on concepts and processes pertinent to all fermented alcoholic beverages, as well as those specific to a variety of individual beverages. The second edition features three new chapters on sparkling wines, runs, and Latin American beverages such as tequila, as well as thorough updating of information on new technologies and current scientific references.

Fermentation Microbiology and Biotechnology, Third Edition explores and illustrates the diverse array of metabolic pathways employed for the production of primary and secondary metabolites as well as biopharmaceuticals. This updated and expanded edition addresses the whole spectrum of fermentation biotechnology, from fermentation kinetics and dynam Chemical Engineering Design

Fermentation and Biochemical Engineering Handbook - Principles, Process Design, and Equipment

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