Modern Drying Technology Energy Savings

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Drying Technology in Food Processing - Seid Mahdi Jafari 2023-05-25
Drying Technology in Food Processing, in the Unit Operations and Processing Equipment in the Food Industry series, explains the processing operations and equipment necessary for drying of different food products. These processes and unit operations are very important in terms of qualitative properties and energy usage.

Divided into four sections, "Drying basics", "Different dryers in the food industry", "Application of drying in the food industry", and "Design, control, and efficiency of dryers", all chapters emphasize experimental, theoretical, computational and/or applications of food engineering principles and the relevant processing equipment. Written by experts in the field of food engineering, in a simple and dynamic way, this book targets industrial engineers working in the field of food processing and within food factories to make them more familiar with drying unit operations. Thoroughly explores novel applications of drying unit operations in food industries Strives to help improve the quality and safety of food products with drying technology Reviews alternatives for drying operations

Furniture Manufacturing - Jegatheswaran Ratnasingam 2022-02-17

div="" This volume covers all aspects of furniture manufacturing from a production engineering perspective. It takes a step-by-step pedagogical approach, dwelling on details which must be understood at every process, as the furniture makes its way through the factory shop floor. The content highlights the global industry, and discusses furniture design and manufacturing systems. The chapters also discuss every stage of the manufacturing process until the finished product is packaged. There is also emphasis on strength design of furniture, furniture testing, environmental compliance, and automation. The contents also discuss the optimization of furniture manufacturing through a mathematical approach and highlights the current global trends impacting the furniture manufacturing industry, especially the circular economy and Industry 4.0. This volume will a useful

resource to those in academia and industry.
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Handbook of Industrial Drying, Fourth Edition - Arun S. Mujumdar 2014-07-11
By far the most commonly encountered and energy-intensive unit operation in almost all industrial sectors, industrial drying continues to attract the interest of scientists, researchers, and engineers. The Handbook of Industrial Drying, Fourth Edition not only delivers a comprehensive treatment of the current state of the art, but also serves as a consultative reference for streamlining industrial drying operations. New to the Fourth Edition: Computational fluid dynamic simulation Solar, impingement, and pulse combustion drying Drying of fruits, vegetables, sugar, biomass, and coal Physicochemical aspects of sludge drying Life-cycle assessment of drying systems Covering commonly encountered dryers as well as innovative dryers with future potential, the Handbook of Industrial Drying, Fourth Edition not only details the latest developments in the field, but also explains how improvements in dryer design and operation can increase energy efficiency and cost-effectiveness.

Sustainable Energy Solutions in Agriculture - Jochen Bundschuh 2014-03-07
Sustainability in agriculture and associated primary industries, which are both energy-intensive, is crucial for the development of any country. Increasing scarcity and resulting high fossil fuel prices combined with the need to significantly reduce greenhouse gas emissions, make the improvement of energy efficient farming and increased use of renewable energy essential. This book provides a technological and scientific endeavor to assist society and farming communities in different regions and scales to improve

their productivity and sustainability. To fulfill future needs of a modern sustainable agriculture, this book addresses highly actual topics providing innovative, effective and more sustainable solutions for agriculture by using sustainable, environmentally friendly, renewable energy sources and modern energy efficient, cost-improved technologies. The book highlights new areas of research, and further R&D needs. It helps to improve food security for the rapidly growing world population and to reduce carbon dioxide emissions from fossil fuel use in agriculture, which presently contributes 22% of the global carbon dioxide emissions. This book provides a source of information, stimuli and incentives for what and how new and energy efficient technologies can be applied as effective tools and solutions in agricultural production to satisfy the continually increasing demand for food and fibre in an economically sustainable way, while contributing to global climate change mitigation. It will be useful and inspiring to decision makers working in different authorities, professionals, agricultural engineers, researchers, and students concerned with agriculture and related primay industries, sustainable energy development and climate change mitigation projects.

Modern Drying Technology - Evangelos Tsotsas

Pinch Analysis for Energy and Carbon Footprint Reduction - Ian C. Kemp 2020-08-08

Pinch Analysis for Energy and Carbon Footprint Reduction is the only dedicated pinch analysis and process integration guide, covering a breadth of material from foundational knowledge to in-depth processes. Readers are introduced to the

main concepts of pinch analysis, the calculation of energy targets for a given process, the pinch temperature, and the golden rules of pinch-based design to meet energy targets. More advanced topics include the extraction of stream data necessary for a pinch analysis, the design of heat exchanger networks, hot and cold utility systems, combined heat and power (CHP), refrigeration, batch- and time-dependent situations, and optimization of system operating conditions, including distillation, evaporation, and solids drying. This new edition offers tips and techniques for practical applications, supported by several detailed case studies. Examples stem from a wide range of industries, including buildings and other non-process situations. This reference is a must-have guide for chemical process engineers, food and biochemical engineers, plant engineers, and professionals concerned with energy optimization, including building designers. Covers practical analysis of both new and existing processes Teaches readers to extract the stream data necessary for a pinch analysis and describes the targeting process in depth; includes a downloadable spreadsheet to calculate energy targets Demonstrates how to achieve the targets by heat recovery, utility system design, and process change Updated to include carbon footprint, water and hydrogen pinch, developments in industrial applications and software, site data reconciliation, additional case studies, and answers to selected exercises

Drying Atlas - Werner Muhlbauer 2020-02-21

Drying Atlas: Drying Kinetics and Quality of Agricultural Products provides, in a condensed and systematic way, specific insights on the drying-relevant properties and coefficients of over 40 agricultural

products. It also presents information about the production methods that influence the drying process, the quality of the dried product, the official quality standards of the products, and the design principles and operating characteristics of drying systems that are widely used in the postharvest processing and food industry. Available books on drying technology mainly focus on drying theory and simulation of drying processes. This book offers systematic information on the impact of other important parameters, such as relative humidity, air flow rate, mechanical, thermal and chemical pre-treatment, and drying mode for specific products. It is a unique and valuable reference for scientists and engineers who want to focus on industrial drying applications and dryers, as well as graduate and post-graduate students in postharvest technology and drying. Explores the production methods that influence the drying process and quality of the dried product Outlines the official quality standards of the products, the design principles, and the operating characteristics of drying systems that are used in postharvest processing Features 41 chapters that are (each for an agricultural product) presented in a condensed and systematic way

Flame Spray Drying - Mariia Sobulska 2021-09-22

Drying processes are among the most energy-consuming operations in industry. Flame spray drying (FSD) is a novel approach to reduce the energy supply needed for the spray drying process. Flame Spray Drying: Equipment, Mechanism, and Perspectives describes FSD technology and current developments in flame techniques and evaluates potential industrial implementation. Details advantages of FSD in terms of energy consumption and

reduced drying time Promotes applications of biofuels for the drying process Analyzes the FSD method from CFD modelling to product quality Evaluates potential safety and product degradation risks Provides examples of potential applications of the FSD technique in drying of different materials This book describes an important new technique that is useful to chemical and process engineering researchers, professionals, and students working with drying technologies.

Drying of Biomass, Biosolids, and Coal - Shusheng Pang 2019-03-14

Drying of Biomass, Biosolids, and Coal: For Efficient Energy Supply and Environmental Benefits provides insight into advanced technologies and knowledge of the drying of biomass, biosolids, and coal in terms of improved efficiency, economics, and environmental impact. It comprehensively covers all the important aspects of drying for a variety of biomass, biosolids and coal resources. This book covers the drying of biomass, bio-solids and coal while also providing integration of the drying process with the energy system. Important issues in the commercial drying operations are tackled, including energy and exergy efficiencies, environmental impact, and potential safety concerns. It also assesses the performance of energy production plants in integration with biomass/coal drying to provide information for plant optimization. It offers in-depth analysis and data for process understanding and design, and analyzes the drying process's effect on economics and the environment. This book is aimed at drying professionals and researchers, chemical engineers, industrial engineers, and manufacturing engineers. It will also be of use to anyone who is interested in the utilization of biomass, organic solid wastes, algae and low-rank

coals for energy.

Modern Drying Technology, Volume 2 - Evangelos Tsotsas 2009-02-09

This five-volume handbook provides a comprehensive overview of all important aspects of modern drying technology, including only cutting-edge results. Volume 2 comprises experimental methods used in various industries and in research in order to design and control drying processes, measure moisture and moisture distributions, characterize particulate material and the internal micro-structure of dried products, and investigate the behavior of particle systems in drying equipment. Key topics include acoustic levitation, near-infrared spectral imaging, magnetic resonance imaging, X-ray tomography, and positron emission tracking.

Drying, Roasting, and Calcining of Minerals - Thomas Battle 2016-12-01

The papers in this volume give the reader focused information on the important extractive metallurgy unit operations of drying, roasting, and calcining

CRC Handbook of Thermal Engineering - Raj P. Chhabra 2017-11-08

The CRC Handbook of Thermal Engineering, Second Edition, is a fully updated version of this respected reference work, with chapters written by leading experts. Its first part covers basic concepts, equations and principles of thermodynamics, heat transfer, and fluid dynamics. Following that is detailed coverage of major application areas, such as bioengineering, energy-efficient building systems, traditional and renewable energy sources, food processing, and aerospace heat transfer topics. The latest numerical and computational tools, microscale and nanoscale engineering, and new complex-structured materials are also presented.

Designed for easy reference, this new edition is a must-have volume for engineers and researchers around the globe.

Real Prospects for Energy Efficiency in the United States - National Research Council 2010-06-10

America's economy and lifestyles have been shaped by the low prices and availability of energy. In the last decade, however, the prices of oil, natural gas, and coal have increased dramatically, leaving consumers and the industrial and service sectors looking for ways to reduce energy use. To achieve greater energy efficiency, we need technology, more informed consumers and producers, and investments in more energy-efficient industrial processes, businesses, residences, and transportation. As part of the America's Energy Future project, Real Prospects for Energy Efficiency in the United States examines the potential for reducing energy demand through improving efficiency by using existing technologies, technologies developed but not yet utilized widely, and prospective technologies. The book evaluates technologies based on their estimated times to initial commercial deployment, and provides an analysis of costs, barriers, and research needs. This quantitative characterization of technologies will guide policy makers toward planning the future of energy use in America. This book will also have much to offer to industry leaders, investors, environmentalists, and others looking for a practical diagnosis of energy efficiency possibilities.

Innovative Food Processing Technologies - 2020-08-18

Food process engineering, a branch of both food science and chemical engineering, has evolved over the years since its inception and still is a rapidly changing discipline. While traditionally the main objective of

food process engineering was preservation and stabilization, the focus today has shifted to enhance health aspects, flavour and taste, nutrition, sustainable production, food security and also to ensure more diversity for the increasing demand of consumers. The food industry is becoming increasingly competitive and dynamic, and strives to develop high quality, freshly prepared food products. To achieve this objective, food manufacturers are today presented with a growing array of new technologies that have the potential to improve, or replace, conventional processing technologies, to deliver higher quality and better consumer targeted food products, which meet many, if not all, of the demands of the modern consumer. These new, or innovative, technologies are in various stages of development, including some still at the R&D stage, and others that have been commercialised as alternatives to conventional processing technologies. Food process engineering comprises a series of unit operations traditionally applied in the food industry. One major component of these operations relates to the application of heat, directly or indirectly, to provide foods free from pathogenic microorganisms, but also to enhance or intensify other processes, such as extraction, separation or modification of components. The last three decades have also witnessed the advent and adaptation of several operations, processes, and techniques aimed at producing high quality foods, with minimum alteration of sensory and nutritive properties. Some of these innovative technologies have significantly reduced the thermal component in food processing, offering alternative nonthermal methods. Food Processing Technologies: A Comprehensive Review covers the latest advances in innovative and nonthermal

processing, such as high pressure, pulsed electric fields, radiofrequency, high intensity pulsed light, ultrasound, irradiation and new hurdle technology. Each section will have an introductory article covering the basic principles and applications of each technology, and in-depth articles covering the currently available equipment (and/or the current state of development), food quality and safety, application to various sectors, food laws and regulations, consumer acceptance, advancements and future scope. It will also contain case studies and examples to illustrate state-of-the-art applications. Each section will serve as an excellent reference to food industry professionals involved in the processing of a wide range of food categories, e.g., meat, seafood, beverage, dairy, eggs, fruits and vegetable products, spices, herbs among others.

Drying Atlas - H C Werner Muhlbauer 2019-11-15

Drying Atlas: Drying Kinetics and Quality of Agricultural Products features foundational overview information for food production as an introduction to this important process. The book provides, in a condensed and systematic way, specific insights to the drying-relevant properties and coefficients of over 40 agricultural products. It also presents information about production methods influencing the drying process and the quality of the dried product, the official quality standards of the products, the design principles and operating characteristics of drying systems that are widely used in postharvest processing and food industry. Available books on drying technology mainly focus on drying theory and simulation of drying processes. Drying Atlas: Drying Kinetics and Quality of Agricultural Products offers systematic information about the impact of other

important parameters such as relative humidity, air flow rate, mechanical, thermal and chemical pre-treatment, and drying mode for specific products. This book is a unique and valuable reference for those scientists and engineers focused on industrial drying applications and dryers, as well as graduate and post-graduate students in postharvest technology and drying. Explores production methods influencing the drying process and the quality of the dried product Outlines the official quality standards of the products, the design principles, and operating characteristics of drying systems that are used in postharvest processing Features 41 chapters (each for an agricultural product) presented in a condensed and systematic way

Hearing to Review Food Aid and Agriculture Trade Programs Operated by the U.S. Department of Agriculture ..., Serial No. 110-21, May 10, 2007, 110-1 Hearing, * - 2009

Nutritional Value of Amaranth - Viduranga Yashasvi Waisundara 2020-03-18 Pseudocereals, belonging to the genus Amaranthus, have been cultivated for their grains for 8,000 years or more. The grain was a staple food of the Aztecs and was also considered an integral part of Aztec religious ceremonies. The book primarily focuses on the nutrient properties of amaranth and expresses its viewpoint in considering this crop as a remedy for many nutrient deficiencies and curbing food insecurity. The functional properties of the grain are immense and it is clear that the crop would be a valuable agricultural product around the world.

Advanced Drying Technologies for Foods - Arun S Mujumdar 2019-06-19 The goal of all drying research and

development is to develop cost-effective innovative processes that yield high-quality dried products with less energy consumption and reduced environmental impact. With the literature on drying widely scattered, Advanced Drying Technologies for Foods compiles under one cover concise, authoritative, up-to-date assessments of modern drying technologies applied to foods. This book assembles a number of internationally recognized experts to provide critical reviews of advanced drying technologies, their merits and limitations, application areas and research opportunities for further development. Features: Provides critical reviews of advanced drying technologies Discusses the merits and limitations of a variety of food drying technologies Explains drying kinetics, energy consumption and quality of food products Reviews the principles and recent applications of superheated steam drying The first four chapters deal with recent developments in field-assisted drying technologies. These include drying techniques with the utilization of electromagnetic fields to deliver energy required for drying, for example, microwave drying, radio frequency drying, electrohydrodynamic drying, and infrared radiation drying. The remainder of this book covers a wide assortment of recently developed technologies, which include pulse drying, swell drying, impinging stream drying, and selected advances in spray drying. The final chapter includes some innovative technologies which are gaining ground and are covered in depth in a number of review articles and handbooks, and hence covered briefly in the interest completeness. This book is a valuable reference work for researchers in academia as well as industry and will encourage further research and

development and innovations in food drying technologies.

Modern Drying Technology, Volume 3 - Evangelos Tsotsas 2011-08-29

This five-volume series provides a comprehensive overview of all important aspects of modern drying technology, concentrating on the transfer of cutting-edge research results to industrial use. Volume 3 discusses how desired properties of foods, biomaterials, active pharmaceutical ingredients, and fragile aerogels can be preserved during drying, and how spray drying and spray fluidized bed processes can be used for particle formation and formulation. Methods for monitoring product quality, such as process analytical technology, and modeling tools, such as Monte Carlo simulations, discrete particle modeling and neural networks, are presented with real examples from industry and academia.

Energy Efficiency in Industry - Markus Blesl 2022-01-01

This book quantifies the potential for greater energy efficiency in industry on the basis of technology- and sector-related analyses. Starting from the methodological fundamentals, the first part discusses the electricity- and heat-based basic technologies and cross-sectional processes on the basis of numerous application examples. In addition to classic topics such as lighting and heat recovery, the study also covers processes that have received less attention to date, such as drying and painting. The second part is devoted to energy-intensive industries, in particular metal production and processing, the manufacture of the non-metallic materials cement and glass, and the chemical, paper, plastics and food industries. Both parts are concluded by placing them in a larger energy and economic context. The findings

are condensed into checklists at many points and summarized in the overall view at the end to form generally applicable recommendations. This book is a translation of the original German 2nd edition Energieeffizienz in der Industrie by Markus Blesl and Alois Kessler, published by Springer-Verlag GmbH Germany, part of Springer Nature in 2017. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will read stylistically differently from a conventional translation. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors.

Advanced Agro-Engineering Technologies for Rural Business Development - Kharchenko, Valeriy 2019-03-22

Developing countries need access to the technological advancements of the modern world in order to apply these advancements to their small-scale operations. Applying newly discovered information concerning efficient energy to remote corners of the world will ensure small-scale businesses can conduct successful production and sale of agricultural products. Advanced Agro-Engineering Technologies for Rural Business Development is an essential reference source that examines technological methods and technical means that ensure the organization of production of various products and adapts them for application in small-scale production. Additionally, it seeks to organize an efficient production process in the face of energy resource scarcity and emphasizes the need to rationally use them. This book is ideally designed for students, managers, experts, and small businesses.

Food Engineering Handbook - Theodoros Varzakas 2014-11-24

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. A complement to Food Engineering Handbook: Food Engineering Fundamentals, this text: Discusses size reduction, mixing, emulsion, and encapsulation Provides case studies of solid–liquid and supercritical fluid extraction Explores fermentation, enzymes, fluidized-bed drying, and more Presenting cutting-edge information on new and emerging food engineering processes, Food Engineering Handbook: Food Process Engineering is an essential reference on the modeling, quality, safety, and technologies associated with food processing operations today.

Handbook of Biomass Valorization for Industrial Applications - Shahid Ul-Islam 2022-01-05

HANDBOOK of BIOMASS VALORIZATION for INDUSTRIAL APPLICATIONS The handbook provides a comprehensive view of cutting-edge research on biomass valorization, from advanced fabrication methodologies through useful derived materials, to current and potential application sectors. Industrial sectors, such as food, textiles, petrochemicals and pharmaceuticals, generate massive amounts of waste each year, the disposal of which has become a major issue worldwide. As a result, implementing a circular economy that employs sustainable practices in waste management is critical for any

industry. Moreover, fossil fuels, which are the primary sources of fuel in the transportation sector, are also being rapidly depleted at an alarming rate. Therefore, to combat these global issues without increasing our carbon footprint, we must look for renewable resources to produce chemicals and biomaterials. In that context, agricultural waste materials are gaining popularity as cost-effective and abundantly available alternatives to fossil resources for the production of a variety of value-added products, including renewable fuels, fuel components, and fuel additives. Handbook of Biomass Valorization for Industrial Applications investigates current and emerging feedstocks, as well as provides in-depth technical information on advanced catalytic processes and technologies that enable the development of all possible alternative energy sources. The 22 chapters of this book comprehensively cover the valorization of agricultural wastes and their various uses in value-added applications like energy, biofuels, fertilizers, and wastewater treatment. Audience The book is intended for a very broad audience working in the fields of materials sciences, chemical engineering, nanotechnology, energy, environment, chemistry, etc. This book will be an invaluable reference source for the libraries in universities and industrial institutions, government and independent institutes, individual research groups, and scientists working in the field of valorization of biomass.

Modern Drying Technology, Volume 5 - Evangelos Tsotsas 2014-01-10

This five-volume series provides a comprehensive overview of all important aspects of modern drying technology, concentrating on the transfer of cutting-edge research results to industrial use. Volume 5 is dedicated to process

intensification by hybrid processes that combine convective or contact heat transfer with microwaves, ultrasound or radiation. Process intensification by more efficient choice, distribution, and flow of the drying medium - such as impinging jet drying, pulse combustion drying, superheated steam drying, drying in specially designed spouted beds - are thoroughly discussed. Moreover, methods that favorably affect the process by changing the structure of the drying product, e.g. foaming, electroporation, are treated. Emphasis is placed on drying, including freeze-drying, of sensitive materials such as foods, biomaterials and pharmaceuticals. Released Volumes of Modern Drying Technology: * Volume 1: Computational Tools at Different Scales ISBN 978-3-527-31556-7 * Volume 2: Experimental Techniques ISBN 978-3-527-31557-4 * Volume 3: Product Quality and Formulation ISBN 978-3-527-31558-1 * Volume 4: Energy Savings ISBN 978-3-527-31559-8 * Set (Volume 1-5) ISBN 978-3-527-31554-3

Novel and Alternative Methods in Food Processing - N. Veena 2023-08-04

This new volume explores emerging and advanced techniques in the food processing sector. Novel food processing methods such as ultrasound processing, microwave heating, advanced drying methods, and nonthermal technologies are discussed in detail. The volume also covers the application of irradiation and encapsulation methods, microbial valorizing, and other novel food processing and preservation methods. Mathematical modeling concepts and case studies are also included to illustrate applications of modeling techniques in food processing. The volume promotes the understanding of the thermodynamics of food polymers, structural design principles, structural

hierarchy, and the steps involved in food structuring and structure measurement techniques.

Drying and Energy Technologies - J.M.P.Q. Delgado 2015-07-11

This book provides a comprehensive overview of essential topics related to conventional and advanced drying and energy technologies, especially motivated by increased industry and academic interest. The main topics discussed are: theory and applications of drying, emerging topics in drying technology, innovations and trends in drying, thermo-hydro-chemical-mechanical behaviors of porous materials in drying, and drying equipment and energy. Since the topics covered are inter-and multi-disciplinary, the book offers an excellent source of information for engineers, energy specialists, scientists, researchers, graduate students, and leaders of industrial companies. This book is divided into several chapters focusing on the engineering, science and technology applied in essential industrial processes used for raw materials and products.

Essentials and Applications of Food Engineering - C. Anandharamakrishnan 2019-03-15

Essentials & Applications of Food Engineering provides a comprehensive understanding of food engineering operations and their practical and industrial utility. It presents pertinent case studies, solved numerical problems, and multiple choice questions in each chapter and serves as a ready reference for classroom teaching and exam preparations. The first part of this textbook contains the introductory topics on units and dimensions, material balance, energy balance, and fluid flow. The second part deals with the theory and applications of heat and mass transfer, psychrometry, and reaction kinetics. The

subsequent chapters of the book present the heat and mass transfer operations such as evaporation, drying, refrigeration, freezing, mixing, and separation. The final section focuses on the thermal, non-thermal, and nanotechnology-based novel food processing techniques, 3D food printing, active and intelligent food packaging, and fundamentals of CFD modeling. Features Features 28 case studies to provide a substantial understanding of the practical and industrial applications of various food engineering operations Includes 178 solved numerical problems and 285 multiple choice questions Highlights the application of mass balance in food product traceability and the importance of viscosity measurement in a variety of food products Provides updated information on novel food processing techniques such as cold plasma, 3D food printing, nanospray drying, electrospraying, and electrospinning The textbook is designed for undergraduate and graduate students pursuing Food Technology and Food Process Engineering courses. This book would also be of interest to course instructors and food industry professionals.

Hearing to Review Food Aid and Agriculture Trade Programs Operated by the U.S. Department of Agriculture and the U.S. Agency for International Development - United States. Congress. House. Committee on Agriculture. Subcommittee on Specialty Crops, Rural Development, and Foreign Agriculture 2009

Modern Drying Technology, Volume 4 - Evangelos Tsotsas 2011-12-15

This five-volume series provides a comprehensive overview of all important aspects of modern drying technology, concentrating on the transfer of cutting-

edge research results to industrial use. Volume 4 deals with the reduction of energy demand in various drying processes and areas, highlighting the following topics: Energy analysis of dryers, efficient solid-liquid separation techniques, osmotic dehydration, heat pump assisted drying, zeolite usage, solar drying, drying and heat treatment for solid wood and other biomass sources, and sludge thermal processing.

Intermittent and Nonstationary Drying Technologies - Azharul Karim 2017-09-18

The first comprehensive book on intermittent drying, Intermittent and Nonstationary Drying Technologies: Principles and Applications demonstrates the benefits of this process and covers key issues, including technologies, effect of operating parameters, mathematical modelling, energy-efficiency, and product quality. It discusses such topics as periodic drying, conventional and intermittent food drying processes and food quality, relationship among intermittency of drying, microstructural changes, and food quality, microwave assisted pulsed fluidized and spouted bed drying, and cellular level water distribution. Aimed at food engineers, chemical product engineers, pharmaceutical engineers and technologists, plant design engineers, and researchers and students in these areas, this useful reference helps readers:

Food Engineering Handbook, Two Volume Set - Theodoros Varzakas 2014-12-12

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 rheology, 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.

Solar Drying Technology - Om Prakash 2017-08-29

This book offers a comprehensive reference guide to the latest developments and advances in solar drying technology, covering the concept, design, testing, modeling, and economics of solar drying technologies, as well as their impact on the environment. The respective chapters are based on the latest studies conducted by reputed international researchers in the fields of solar energy and solar drying. Offering a perfect blend of research and

practice explained in a simple manner, the book represents a valuable resource for researchers, students, professionals, and policymakers working in the field of solar drying and related agricultural applications.

Modern Energy Economy in Beet Sugar Factories - K. Urbaniec 2013-10-22

This book is devoted to the problems of identifying the potential for, designing and implementing, energy-saving measures in beet sugar factories. As the sugar industries in various countries differ considerably with respect to the economic conditions for factory operation and the level of technological development, the problem range is very broad. It may include the elimination of faulty or unreliable auxiliary equipment, or the introduction of simple improvements in vapour distribution schemes, in factories operated in countries where the need for efficient energy utilization has not really been very urgent until now. On the other hand, there are sugar factories in some other countries where considerable achievements have been made in energy saving but where further progress may still be possible if more advanced engineering problems are solved. The author takes an interdisciplinary approach to its subject aimed at demonstrating how the energy demand of a sugar factory can be affected by the interactions between a number of factors, namely: layout and parameters of the energy conversion and distribution processes; layout and parameters of the sugar manufacturing process and by-processes; characteristics of the equipment and control systems; completeness and accuracy of the energy monitoring systems. The book consists essentially of three parts. In Chapters 1 to 3, some theoretical background is given and engineering principles for creating efficient energy

conversion and utilization subsystems in sugar factories are reviewed. The second part - Chapters 4 to 7 - discusses recent developments in these areas and their importance to energy conversion and utilization in sugar factories. The presentation is illustrated with suitable practically-oriented examples based mostly on the author's experience gained from nine years working with an engineering company specializing in the design, erection and modernization of sugar factories, as well as five years of consulting and research for the sugar industry. Short examples are presented in Chapters 1, 2, 3 and 7, while in the third part of the book (Chapters 8 and 9) summaries are given of real-life design analyses of energy subsystems of sugar factories, characterized by different levels of sophistication of the energy economy. The book thus provides a systematic review which will be helpful to managers and technologists in sugar factories where the problem may arise of choosing the most appropriate set of measures that best fit the factory's unique needs. It can also be used in university-level courses on the energy economy of sugar factories, and will be of interest to design engineers and specialists engaged in research in the area.

Regulating Safety of Traditional and Ethnic Foods - V. Prakash 2015-11-25

Regulating Safety of Traditional and Ethnic Foods, a compilation from a team of experts in food safety, nutrition, and regulatory affairs, examines a variety of traditional foods from around the world, their risks and benefits, and how regulatory steps may assist in establishing safe parameters for these foods without reducing their cultural or nutritive value. Many traditional foods provide excellent nutrition from sustainable resources, with some containing

nutraceutical properties that make them not only a source of cultural and traditional value, but also valuable options for addressing the growing need for food resources. This book discusses these ideas and concepts in a comprehensive and scientific manner. Addresses the need for balance in safety regulation and retaining traditional food options Includes case studies from around the world to provide practical insight and guidance Presents suggestions for developing appropriate global safety standards

Modern Drying Technology, Volume 4 - Evangelos Tsotsas 2011-12-19

This five-volume series provides a comprehensive overview of all important aspects of modern drying technology, concentrating on the transfer of cutting-edge research results to industrial use. Volume 4 deals with the reduction of energy demand in various drying processes and areas, highlighting the following topics: Energy analysis of dryers, efficient solid-liquid separation techniques, osmotic dehydration, heat pump assisted drying, zeolite usage, solar drying, drying and heat treatment for solid wood and other biomass sources, and sludge thermal processing.

Energy Technology 2012 - Maria D. Salazar-Villalpando 2012-05-09

Proceedings of symposia sponsored by the Energy Committee of the Extraction and Processing Division and the Light Metals Division of TMS (The Minerals, Metals & Materials Society) Held during the TMS 2012 Annual Meeting & Exhibition Orlando, Florida, USA, March 11-15,2012

Modern Drying Technology, Volume 1 - Evangelos Tsotsas 2011-02-10

This five-volume handbook provides a comprehensive overview of all important aspects of modern drying technology, including only advanced results. In this first

volume diverse model types for the drying of products and the design of drying processes (short-cut methods, homogenized, pore network, and continuous thermo-mechanical approaches) are treated, along with computational fluid dynamics, population balances, and process systems simulation tools. Emphasis is put on scale transitions.

Thermal Energy Storage - Ibrahim Dincer 2011-06-24

The ability of thermal energy storage (TES) systems to facilitate energy savings, renewable energy use and reduce environmental impact has led to a recent resurgence in their interest. The second edition of this book offers up-to-date coverage of recent energy efficient and sustainable technological methods and solutions, covering analysis, design and performance improvement as well as life-cycle costing and assessment. As well as having significantly revised the book for use as a graduate text, the authors address real-life technical and operational problems, enabling the reader to gain an understanding of the fundamental principles and practical applications of thermal energy storage technology. Beginning with a general summary of thermodynamics, fluid mechanics and heat transfer, this book goes on to discuss practical applications with chapters that include TES systems, environmental impact, energy savings, energy and exergy analyses, numerical modeling and simulation, case studies and new techniques and performance assessment methods.

Modern Drying Technology, 5 Volume Set - Evangelos Tsotsas 2014-04-14

These five-volume series provide a comprehensive overview of all important aspects of drying technology like

computational tools at different scales (Volume 1), modern experimental and analytical techniques (Volume 2), product quality and formulation (Volume 3), energy savings (Volume 4) and process intensification (Volume 5) Based on high-level cutting-edge results contributed by internationally recognized experts in the various treated fields, this book series will help engineers achieve greater efficiency for an unavoidable, yet vital process Located at the intersection of the two main approaches in modern chemical engineering, product engineering and process systems engineering, the series brings theory into practice in order to improve the quality of high-value dried products, save energy, and cut the costs of drying processes Available in print as 5 Volume Set or as individual volumes. Buy the Set and SAVE 30%! Also available online. For further information, visit wileyonlinelibrary.com Individual volumes: Volume 1 - Modern Drying Technology, Computational Tools at Different Scales Diverse model types for the drying of products and the design of drying processes (short-cut methods, homogenized, pore network, and continuous thermo-mechanical approaches) are treated, along with computational fluid dynamics, population balances, and process systems simulation tools. Emphasis is put on scale transitions. Volume 2 - Modern Drying Technology: Experimental Techniques Comprises experimental methods used in various industries and in research in order to design and control drying processes, measure moisture and moisture distributions, characterize particulate material and the internal micro-structure of dried products, and investigate the behavior of particle systems in drying equipment. Key topics include acoustic

levitation, near-infrared spectral imaging, magnetic resonance imaging, X-ray tomography, and positron emission tracking. Volume 3 - Modern Drying Technology: Product Quality and Formulation Discusses how desired properties of foods, biomaterials, active pharmaceutical ingredients, and fragile aerogels can be preserved during drying, and how spray drying and spray fluidized bed processes can be used for particle formation and formulation. Methods for monitoring product quality, such as process analytical technology, and modeling tools, such as Monte Carlo simulations, discrete particle modeling and neural networks, are presented with real examples from industry and academia. Volume 4 - Modern Drying Technology: Energy Savings Deals with the reduction of energy demand in various drying processes and areas, highlighting the following topics: Energy analysis of dryers, efficient solid-liquid separation techniques, osmotic dehydration, heat pump assisted drying, zeolite usage, solar drying, drying and heat treatment for solid wood and other biomass sources, and sludge thermal processing. Volume 5 - Process Intensification Dedicated to process intensification by more efficient distribution and flow of the drying medium, foaming, controlled freezing, and the application of superheated steam, infrared radiation, microwaves, power ultrasound and pulsed electric fields. Process efficiency is treated in conjunction with the quality of sensitive products, such as foods, for a variety of hybrid and combined drying processes.

Advanced Drying Technologies for Foods - Arun S Mujumdar 2019-06-19

The goal of all drying research and development is to develop cost-effective innovative processes that yield high-quality

dried products with less energy consumption and reduced environmental impact. With the literature on drying widely scattered, Advanced Drying Technologies for Foods compiles under one cover concise, authoritative, up-to-date assessments of modern drying technologies applied to foods. This book assembles a number of internationally recognized experts to provide critical reviews of advanced drying technologies, their merits and limitations, application areas and research opportunities for further development. Features: Provides critical reviews of advanced drying technologies Discusses the merits and limitations of a variety of food drying technologies Explains drying kinetics, energy consumption and quality of food products Reviews the principles and recent applications of superheated steam drying The first four chapters deal with recent developments in field-assisted drying technologies. These include drying techniques with the utilization of electromagnetic fields to deliver energy required for drying, for example, microwave drying, radio frequency drying, electrohydrodynamic drying, and infrared radiation drying. The remainder of this book covers a wide assortment of recently developed technologies, which include pulse drying, swell drying, impinging stream drying, and selected advances in spray drying. The final chapter includes some innovative technologies which are gaining ground and are covered in depth in a number of review articles and handbooks, and hence covered briefly in the interest completeness. This book is a valuable reference work for researchers in academia as well as industry and will encourage further research and development and innovations in food drying technologies.