Foaming with Supercritical Fluids

Exploring the range and utility of high-pressure solvent systems across a variety of different chemical applications, this book brings together recent advances in supercritical technology and other pressurised-solvent systems. It provides an in-depth overview of the latest advances and developments and discusses the limitations and drawbacks that need to be addressed. Wherever possible, the greenness and economic viability of the different solvent systems is highlighted. This book is ideal for researchers and industrialists working in environmental science, green chemistry and biorefineries.

Supercritical Fluids Technology in Lipase Catalyzed Processes
Organometallic compounds are utilized as reagents in the preparation and processing of advanced nanostructured materials, as catalysts in the production of a wide variety of specialty chemicals and polymers, and as drugs. Supercritical fluid science and technology has a wide variety of applications ranging from extraction of pharmaceutically active compounds to the synthesis of advanced materials. The combination of organometallic chemistry and supercritical fluids has significant potential. This book covers the fundamental aspects and related applications in this rapidly growing area. Covers the preparation of nanostructured composite materials using supercritical fluids Focuses on the intersection of organometallic chemistry and supercritical fluids Addresses the behavior of organometallic compounds in supercritical fluid environments

Fractionation of Polymeric Materials Using Novel Supercritical Fluid Technology

Enhanced concern for the quality and safety of food products, increased preference for natural products, and stricter regulations on the residual level of solvents, all contribute to the growing use of supercritical fluid technology as a primary alternative for the extraction, fractionation, and isolation of active ingredients. As a solvent-free p

Introduction to Supercritical Fluids

Globalization and industrialization involve a number of reactions, products, extractions, and separations that require the use of organic solvents. These solvents are responsible for a number of ecological concerns, including atmospheric and land toxicity. Conventional organic solvents are regarded as volatile organic compounds; some are even limited due to their potential for ozone layer depletion. While supercritical liquids exhibit physical properties that could make them ideal substitutes for these volatile compounds, there is particular interest in the use of carbon dioxide as a solvent of crude material. In particular, carbon dioxide has apparent ‘green’ properties, like its noncombustible nature, the fact that it is generally nonpoisonous, and its relative inertness. Thus, the use of supercritical carbon dioxide can provide practical improvements to the sustainability of industrial products and processes. This book provides in-depth literature in the area of industrial green processes, focusing on the separation, purification, and extraction of compounds utilizing supercritical carbon dioxide as a green solvent.

Supercritical Fluid Science and Technology

New directions in supercritical fluids science and technology, fluorescence spectroscopy studies of intermolecular interactions in supercritical fluids, solvation structure in supercritical fluid mixtures based on molecular distribution functions, gibbs-ensemble Monte Carlo simulations of phase equilibria in supercritical fluid mixtures, spectroscopic determination of solvent strength and structure in supercritical fluid mixtures, partition coefficients of polyethylene glycols in supercritical carbon dioxide, experimental measurement of supercritical fluid-liquid phase equilibrium, vapor-liquid equilibria of fatty acid esters in supercritical fluids, four-phase equilibrium of two ternary organic systems with carbon dioxide,
direct viscosity enhancement of carbon dioxide, inverse emulsion polymerization of acrylamide, interaction of polymers with near-critical carbon dioxide, fundamental kinetics of methanol oxidation in supercritical fluids, thermodynamic analysis of corrosion of iron alloys in supercritical water, electrochemical measurements of corrosion of iron alloys in supercritical water, phase and reaction equilibria considerations in the evaluation and operation of supercritical fluid reaction processes, kinetic model for supercritical delignification of wood, gas antisolvent recrystallization solids formation after the expansion of supercritical mixtures, food, pharmaceutical, and environmental applications, design of commercial plant.

Supercritical Fluid Extraction of Nutraceuticals and Bioactive Compounds

Although supercritical fluid (SCF) technology is now widely used in extraction and purification processes (in the petrochemical, food and pharmaceuticals industries), this book is the first to address the new application of cleaning. The objective is to provide a roadmap for readers who want to know whether SCF technology can meet their own processing and cleaning needs. It is particularly helpful to those striving to balance the requirements for a clean product and a clean environment. The interdisciplinary subject matter will appeal to scientists and engineers in all specialties ranging from materials and polymer sciences to chemistry and physics. It is also useful to those developing new processes for other applications, and references given at the end of each chapter provide links to the wider body of SCF literature. The book is organized with topics progressing from the fundamental nature of the supercritical state, through process conditions and materials interactions, to economic considerations. Practical examples are included to show how the technology has been successfully applied. The first four chapters consider principles governing SCF processing, detailing issues such as solubility, design for cleanability, and the dynamics of particle removal. The next three chapters discuss surfactants and microemulsions, SCF interaction with polymers, and the use of supercritical carbon dioxide (CO2) as a cleaning solvent. The closing chapters focus on more practical considerations such as scaleup, equipment costs, and financial analysis.

Supercritical and Other High-pressure Solvent Systems

This text provides an introduction to supercritical fluids with easy-to-use Excel spreadsheets suitable for both specialized-discipline (chemistry or chemical engineering student) and mixed-discipline (engineering/economic student) classes. Each chapter contains worked examples, tip boxes and end-of-the-chapter problems and projects. Part I covers web-based chemical information resources, applications and simplified theory presented in a way that allows students of all disciplines to delve into the properties of supercritical fluids and to design energy, extraction and materials formation systems for real-world processes that use supercritical water or supercritical carbon dioxide. Part II takes a practical approach and addresses the thermodynamic framework, equations of state, fluid phase equilibria, heat and mass transfer, chemical equilibria and reaction kinetics of supercritical fluids. Spreadsheets are arranged as Visual Basic for Applications (VBA) functions and macros that are completely...
Supercritical Fluid Technology (1991)

For 'better solutions' - this practical guide describes how to take advantage of supercritical fluids in chemical synthesis. Well-established in extractions and materials processing, supercritical fluids are becoming increasingly popular as media for modern chemical syntheses. Historically, the application of compressed gases has been restricted mainly to the production of bulk chemicals. In the last decade, however, research has turned to exploiting the unique properties of supercritical fluids for the synthesis of fine chemicals and specialized materials. Now that the necessary equipment is more readily available, the use of supercritical fluids should become more widespread in both laboratory and industrial scale syntheses. More than merely a concise introduction to the properties of supercritical fluids, here leading experts give a thorough, up-to-date account of chemistry in these alternative media. In-depth scientific commentary, detailed reaction protocols, descriptions of necessary equipment, and an outline of spectroscopic techniques add to the value of this handbook aimed at innovative synthetic chemists.

Supercritical Fluids

The environmental and climate program demands technological solutions in the chemical industry that incorporate prevention of pollution. Major advances are needed to reduce the use of organic solvents, such as methanol, toluene, xylene, methyl ethyl ketone, and dichloromethane, which account for 27 percent of total toxics release inventory chemical.

Particle Formation with Supercritical Fluids

Supercritical fluids have been utilized for numerous scientific advancements and industrial innovations. As the concern for environmental sustainability grows, these fluids have been increasingly used for energy efficiency purposes. Advanced Applications of Supercritical Fluids in Energy Systems is a pivotal reference source for the latest academic material on the integration of supercritical fluids into contemporary energy-related applications. Highlighting innovative discussions on topics such as renewable energy, fluid dynamics, and heat and mass transfer, this book is ideally designed for researchers, academics, professionals, graduate students, and practitioners interested in the latest trends in energy conversion.

Advanced Supercritical Fluids Technologies

Supercritical fluid carbon dioxide (sc-CO2) possesses both gas-like and liquid-like
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Properties. It is capable of depositing nanoparticles in small structures and poorly wettable substrates. Deposition and array formation of metal and metal sulphide nanoparticles on various substrates using sc-CO2 as a medium has been a subject of considerable interest for researchers in nanomaterials area in recent years. This handbook begins by exploring nanoparticle deposition using supercritical fluid carbon dioxide. Further topics in this handbook include separation of oils using supercritical carbon dioxide; the application of an integrated supercritical extraction and impregnation process for incorporation of thyme extracts into different carriers; supercritical fluid extraction application on dairy products and by-products; and supercritical fluid technology applications in pharmaceutical drug formulations.

Handbook of Research on Advancements in Supercritical Fluids Applications for Sustainable Energy Systems

This title analyzes the chemical reactions, structures and fundamental properties of supercritical fluid systems for the production of new compounds, nanomaterials, fibers, and films. It complies contemporary research and technological advances for increased selectivity and reduced waste in chemical, industrial, pharmaceutical, and biomedical applications. Topics include fluid dynamics, catalysis, hydrothermal synthesis, surfactants, conducting polymers, crystal growth, and other aspects and applications of supercritical fluids.

Introduction to Supercritical Fluids

The technology of application of fluids in the supercritical state is a viable option and a high quality scientific method for obtaining materials, insulation, and extractions among other situations in which it may be applied yielding a high quality material. Due to its wide range of application, it has been extensively used to investigate different raw materials focusing on obtaining high quality products and applicability in various industrial segments. Its use has been mentioned in several studies as a high-quality and efficient technology for obtaining high-value added products. This book discusses the technology used in supercritical fluid extraction, as well as its applications and limitations.

Handbook of Food Analysis Instruments

Interconnecting the fundamentals of supercritical fluid (SCF) technologies, their current and anticipated utility in drug delivery, and process engineering advances from related methodological domains and pharmaceutical applications, this volume unlocks the potential of supercritical fluids to further the development of improved pharmaceutical products—from drug powders for respiratory delivery to drug delivery systems for controlled release.

Handbook on Supercritical Fluids

This title analyzes the chemical reactions, structures and fundamental properties of supercritical fluid systems for the production of new compounds, nanomaterials, fibers, and films. It complies contemporary research and
technological advances for increased selectivity and reduced waste in chemical, industrial, pharmaceutical, and biomedical applications. Topics include fluid dynamics, catalysis, hydrothermal synthesis, surfactants, conducting polymers, crystal growth, and other aspects and applications of supercritical fluids.

Supercritical Fluid Chromatography

Analytical chemists in the pharmaceutical industry are always looking for more-efficient techniques to meet the analytical challenges of today’s pharmaceutical industry. One technique that has made steady advances in pharmaceutical analysis is supercritical fluid chromatography (SFC). SFC is meeting the chromatography needs of the industry by providing efficient and selective testing capabilities on the analytical and preparative scale. The supercritical fluid mobile phase, consisting mainly of CO₂, facilitates cost reduction costs and helps the industry in meeting green chemistry standards. This book provides a comprehensive overview of the use of SFC in pharmaceutical analysis. Supercritical Fluid Chromatography reviews the use of SFC in drug-discovery applications and describes its application in drug development. When a drug is developed and brought to market, it is tested many times for impurities and degradants, enantiomeric purity, and analytical and preparative isolations—it is tested during discovery and development and for under-regulated and unregulated methodologies. The book describes the use of SFC for each of these applications and discusses more in-depth topics, such as the use of SFC in mass spectrometric and polarographic detection. The book also sheds light on the role of SFC in drug development from natural products and the advancement of SFC with new technologies and its use in pilot-scale operations as a chromatographic technique.

Supercritical Fluid Nanotechnology

Supercritical fluids are neither gas nor liquid, but can be compressed gradually from low to high density and they are therefore interesting and important as tunable solvents and reaction media in the chemical process industry. By adjusting the density the properties of these fluids can be customised and manipulated for a given process - physical or chemical transformation. Separation and processing using supercritical solvents such as CO₂ are currently on-line commercially in the food, essential oils and polymer industries. Many agencies and industries are considering the use of supercritical water for waste remediation. Supercritical fluid chromatography represents another, major analytical application. Significant advances have recently been made in materials processing, ranging from particle formation to the creation of porous materials. The chapters in this book provide tutorial accounts of topical areas centred around: (1) phase equilibria, thermodynamics and equations of state; (2) critical behaviour, crossover effects; (3) transport and interfacial properties; (4) molecular modelling, computer simulation; (5) reactions, spectroscopy; (6) phase separation kinetics; (7) extractions; (8) applications to polymers, pharmaceuticals, natural materials and chromatography; (9) process scale-up.
The Application of Green Solvents in Separation Processes features a logical progression of a wide range of topics and methods, beginning with an overview of green solvents, covering everything from water and organic solvents, to ionic liquids, switchable solvents, eutectic mixtures, supercritical fluids, gas-expanded solvents, and more. In addition, the book outlines green extraction techniques, such as green membrane extraction, ultrasound-assisted extraction, and surfactant-mediated extraction techniques. Green sampling and sample preparation techniques are then explored, followed by green analytical separations, including green gas and liquid capillary chromatography, counter current chromatography, supercritical fluid chromatography, capillary electrophoresis, and other electrical separations. Applications of green chemistry techniques that are relevant for a broad range of scientific and technological areas are covered, including the benefits and challenges associated with their application. Provides insights into recent advances in greener extraction and separation processes. Goes an understanding of alternatives to harmful solvents commonly used in extraction and separation processes, as well as advanced techniques for such processes. Written by a multidisciplinary group of internationally recognized scientists.

Practical Supercritical Fluid Chromatography and Extraction

This title analyzes the chemical reactions, structures and fundamental properties of supercritical fluid systems for the production of new compounds, nanomaterials, fibers, and films. It complies with contemporary research and technological advances for increased selectivity and reduced waste in chemical, industrial, pharmaceutical, and biomedical applications. Topics include fluid dynamics, catalysis, hydrothermal synthesis, surfactants, conducting polymers, crystal growth, and other aspects and applications of supercritical fluids.

Supercritical Carbon Dioxide

Explore the Pros and Cons of Food Analysis Instruments

With contributions from leading scientists, many of whom actually developed or refined each technique or

Chemical Synthesis Using Supercritical Fluids

Thermodynamics of supercritical fluids with respect to lipid-containing systems; Solubility measurement of lipid constituents in supercritical fluids; Supercritical fluid extraction of oilseeds/lipids in natural products; Supercritical fractionation of lipids; Oilseed solubility and extraction modeling; Modeling of the supercritical fluid extraction rate of oilseeds; Design and economic analysis of supercritical fluid extraction processes; Supercritical fluid extraction and fractionation of fish oils; Supercritical fluid extraction of egg lipids; Supercritical fluid extraction of Cocoa and Cocoa products; Supercritical CO2 extraction of meat products and edible animal fats for cholesterol reduction; Supercritical fluid extraction of algae; Effect of supercritical fluids on residual meals and protein functionality; Treatment of food materials with supercritical carbon dioxide; Enzymatic
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synthesis in supercritical fluids; Basic principles and the role of supercritical fluid chromatography in lipid analysis; Supercritical fluid chromatography for the analysis of oleochemicals; Supercritical fluid chromatography of trace components in oils and fats; Analytical supercritical fluid extraction for oil and lipid analysis.

The Application of Green Solvents in Separation Processes

This book addresses graduate students and researchers wishing to better understand the liquid and supercritical fluid states of matter, presenting a single cohesive treatment of the liquid and supercritical fluid states using the gas-like and solid-like approaches. Bringing this information together into one comprehensive text, this book outlines how our understanding of the liquid and supercritical fluid states is applied and explores the use of supercritical fluids in daily life and in research, for example in power generation, and their existence in planetary interiors. Presents a single coherent treatment of the key knowledge about the liquid and supercritical fluid states Provides comprehensive survey of key fluid properties from the latest experiments and applies our theoretical knowledge to understand the behaviour of these real fluids Explores the consequences of recent advances in the field on our understanding in industry, nature, and in interdisciplinary research, including planetary science.

Supercritical Fluid Technology for Energy and Environmental Applications

"This book deals with energy conversion and fluid dynamics categories. It discusses supercritical fluids, from the perspective of a new set of fluid manipulation and operations in a wide range of energy related systems/applications"--

Supercritical Fluid Technology in Oil and Lipid Chemistry

Recently, supercritical fluids have emerged as more sustainable alternatives for the organic solvents often used in polymer processes. This is the first book emphasizing the potential of supercritical carbon dioxide for polymer processes from an engineering point of view. It develops a state-of-the-art overview on polymer fundamentals, polymerization reactions and polymer processing in supercritical carbon dioxide. The book covers topics in a multidisciplinary approach starting from polymer chemistry and thermodynamics, going through monitoring, polymerization processes and ending with polymer shaping and post-processing. The authors are internationally recognized experts from different fields in polymer reaction engineering in supercritical fluids. The book was initiated by the Working Party on Polymer Reaction Engineering of the European Federation of Chemical Engineering and further renowned international experts.

Supercritical Fluid Technology in Materials Science and Engineering

The technology of application of fluids in the supercritical state is a viable option.
and a high quality scientific method for obtaining materials, insulation, and extractions among other situations in which it may be applied yielding a high quality material. Due to its wide range of application, it has been extensively used to investigate different raw materials focusing on obtaining high quality products and applicability in various industrial segments. Its use has been mentioned in several studies as a high-quality and efficient technology for obtaining high-value added products. This book discusses the technology used in supercritical fluid extraction, as well as its applications and limitations.

Advanced Applications of Supercritical Fluids in Energy Systems

Supercritical Fluid Technology for Energy and Environmental Applications covers the fundamental principles involved in the preparation and characterization of supercritical fluids (SCFs) used in the energy production and other environmental applications. Energy production from diversified resources — including renewable materials — using clean processes can be accomplished using technologies like SCFs. This book is focused on critical issues scientists and engineers face in applying SCFs to energy production and environmental protection, the innovative solutions they have found, and the challenges they need to overcome. The book also covers the basics of sub- and supercritical fluids, like the thermodynamics of phase and chemical equilibria, mathematical modeling, and process calculations.

A supercritical fluid is any substance at a temperature and pressure above its critical point where distinct liquid and gas phases do not exist. At this state the compound demonstrates unique properties, which can be "fine-tuned," making them suitable as organic solvents in a range of industrial and laboratory processes. This volume enables readers to select the most appropriate medium for a specific situation. It helps instructors prepare course material for graduate and postgraduate courses in the area of chemistry, chemical engineering, and environmental engineering. And it helps professional engineers learn supercritical fluid-based technologies and use them in solving the increasingly challenging environmental issues. Relates theory, chemical characteristics, and properties of the particular supercritical fluid to its various applications Covers the fundamentals of supercritical fluids, like thermodynamics of phase and chemical equilibria, mathematical modeling, and process calculations Includes the most recent applications of supercritical fluids, including energy generation, materials synthesis, and environmental protection

Supercritical Fluid Technology in Materials Science and Engineering

Enzymes are currently used in various industries, most commonly in food, detergents, and pharmaceuticals production. Lipases are hydrolytic enzymes that demonstrate great potential as an alternative to conventional catalysts in a number of industrial applications. A complete understanding of enzymes, and their proteins structure and environmental behavior, can greatly aid in the further development of industrial applications. Supercritical Fluids Technology in Lipase Catalyzed Processes provides basic information about enzymes, their sources, reaction kinetics, and main industrial applications. The book focuses in lipases. their main sources, structure, and features, with an emphasis on their specificity and interfacial activity, and presents proven techniques for isolating,
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extracting, and purifying. Comprised of six compact chapters, this comprehensive guide introduces: Immobilization techniques and immobilized lipases that allow repeated use (which is essential from an economic point of view) Different bioreactor configurations using immobilized lipases The latest information on the available technologies in lipolytic reactions The advantages of nonaqueous media in biochemical synthesis over aqueous and solvent-free systems Material on the use of lipases in nonaqueous media to overcome the drawbacks usually encountered with the use of conventional chemical catalysts The use of supercritical fluids (SCFs) as a green alternative reaction medium Factors affecting the physical properties of lipases in this medium and, hence, their activity and stability A case study using supercritical carbon dioxide (SC-CO₂) for biodiesel production Novel, cutting-edge technology, using immobilized enzymes to reduce the overall production cost Supercritical Fluids Technology in Lipase Catalized Processes outlines the main industrial applications of common enzymes and discusses relevant challenges and innovations emerging in the field.

Supercritical Fluids and Organometallic Compounds

Particle formation with supercritical fluids is a promising alternative to conventional precipitation processes as it allows the reduction of particle size and control of morphology and particle size distribution without degradation or contamination of the product. The book comprehensively examines the current status of research and development and provides perspectives and insights on promising future directions. The introduction to high pressure and high temperature phase equilibria and nucleation phenomena provides the basic principles of the underlying physical and chemical phenomena, allowing the reader an understanding of the relationship between process conditions and particle characteristics. Bridging the gap between theory and application, the book imparts the scientific and engineering fundamentals for innovative particle formation processes. The interdisciplinary "modus operandi" will encourage cooperation between scientists and researchers from different but complementary disciplines. Focuses on the general principles of particle formation in supercritical fluids Considers high pressure and high temperature phase equilibria, fluid dynamics and nucleation theory Discusses the underlying physical and chemical phenomena needed to understand the different applications, pointing out the relationship between process conditions and product properties

Fundamentals and Applications of Supercritical Carbon Dioxide (SCO2) Based Power Cycles

Fundamentals and Applications of Supercritical Carbon Dioxide (SCO2) Based Power Cycles aims to provide engineers and researchers with an authoritative overview of research and technology in this area. Part One introduces the technology and reviews the properties of SCO2 relevant to power cycles. Other sections of the book address components for SCO2 power cycles, such as turbomachinery expanders, compressors, recuperators, and design challenges, such as the need for high-temperature materials. Chapters on key applications, including waste heat, nuclear power, fossil energy, geothermal and concentrated
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Solar power are also included. The final section addresses major international research programs. Readers will learn about the attractive features of SC02 power cycles, which include a lower capital cost potential than the traditional cycle, and the compounding performance benefits from a more efficient thermodynamic cycle on balance of plant requirements, fuel use, and emissions. Represents the first book to focus exclusively on SC02 power cycles. Contains detailed coverage of cycle fundamentals, key components, and design challenges. Addresses the wide range of applications of SC02 power cycles, from more efficient electricity generation, to ship propulsion.

Supercritical Fluids

The potential of supercritical fluid methods is presented in a comprehensive way. On the basis of a careful discussion of physical and chemical principles, the application of this method in process technology is demonstrated.

Advanced Nanotechnology and Application of Supercritical Fluids

Supercritical Fluids as Solvents and Reaction Media

This text provides an introduction to supercritical fluids with easy-to-use Excel spreadsheets suitable for both specialized-discipline (chemistry or chemical engineering student) and mixed-discipline (engineering/economic student) classes. Each chapter contains worked examples, tip boxes and end-of-the-chapter problems and projects. Part I covers web-based chemical information resources, applications and simplified theory presented in a way that allows students of all disciplines to delve into the properties of supercritical fluids and to design energy, extraction and materials formation systems for real-world processes that use supercritical water or supercritical carbon dioxide. Part II takes a practical approach and addresses the thermodynamic framework, equations of state, fluid phase equilibria, heat and mass transfer, chemical equilibria and reaction kinetics of supercritical fluids. Spreadsheets are arranged as Visual Basic for Applications (VBA) functions and macros that are completely (source code) accessible for students who have interest in developing their own programs. Programming is not required to solve problems or to complete projects in the text. Property worksheets/spreadsheets that are easy to use in learning environments. Worked examples with Excel VBA Worksheet functions allow users to design their own processes. Fluid phase equilibria and chemical equilibria worksheets allow users to change conditions, study new solutes, co-solvents, chemical systems or reactions.

Supercritical Fluids

Hydrothermal and Supercritical Water Processes presents an overview on the properties and applications of water at elevated temperatures and pressures. It combines fundamentals with production process aspects. Water is an extraordinary substance. At elevated temperatures (and pressures) its properties change dramatically due to the modifications of the molecular structure of bulk water that varies from a stable three-dimensional network, formed by hydrogen
bonds at low and moderate temperatures, to an assembly of separated polar water molecules at high and supercritical temperatures. With varying pressure and temperature, water is turned from a solvent for ionic species to a solvent for polar and non-polar substances. This variability and an enhanced reactivity of water have led to many practical applications and to even more research activities, related to such areas as energy transfer, extraction of functional molecules, unique chemical reactions, biomass conversion and fuel materials processing, destruction of dangerous compounds and recycling of useful ones, growth of monolithic crystals, and preparation of metallic nanoparticles. This book provides an introduction into the wide range of activities that are possible in aqueous mixtures. It is organized to facilitate understanding of the main features, outlines the main applications, and gives access to further information.

Supercritical Fluid Technology for Drug Product Development

Using SuperCritical Fluids (SCFs) in various processes is not new, because Mother Nature has been processing minerals in aqueous solutions at critical and supercritical pressures for billions of years. Somewhere in the 20th century, SCFs started to be used in various industries as working fluids, coolants, chemical agents, etc. Written by an international team of experts and complete with the latest research, development, and design, Advanced Supercritical Fluids Technologies is a unique technical book, completely dedicated to modern and advanced applications of supercritical fluids in various industries. Advanced Supercritical Fluids Technologies provides engineers and specialists in various industries dealing with SCFs as well as researchers, scientists, and students of the corresponding departments with a comprehensive overview of the current status, latest trends and developments of these technologies. Dr. Igor Pioro is a professor at the University of Ontario Institute of Technology, Canada, and the Founding Editor of the ASME Journal of Nuclear Engineering and Radiation Science.

Supercritical Fluid Extraction

An exploration of fundamental as well as practical aspects of supercritical fluid chromatography and extraction. It addresses topics such as: packed columns in SFC; detection in SFC; supercritical fluid chromatography/mass spectroscopy; and evaporative light scattering detection in SFC.

Solubility in Supercritical Carbon Dioxide

Supercritical fluids behave either like a gas or a liquid, depending on the values of thermodynamic properties. This tuning of properties, and other advantageous properties of supercritical fluids led to innovative technologies. More than 100 plants of production size are now in operation worldwide in the areas of process and production technology, environmental applications, and particle engineering. New processes are under research and development in various fields. This book provides an overview of the research activities in the field of Supercritical Fluids.
Read Free Supercritical Fluid Technology In Materials Science And Engineering Syntheses Properties And Applications in Germany. It is based on the research program "Supercritical fluids as solvents and reaction media" on the initiative of the "GVC-Fachausschuß Hochdruckverfahrenstechnik" (i.e. the German working party on High Pressure Chemical Engineering of the Society of Chemical Engineers). This research program provided an immensely valuable platform for exchange of knowledge and experience. More than 50 young researchers were involved contributing with their expertise, their new ideas, and the motivation of youth. The results of this innovative research are described in this book. - This book provides an overview of the research activities in the field of Supercritical Fluids in Germany - Contains results of projects within the research program on "Supercritical fluids as solvents and reaction media" on the initiative of the German working party on High Pressure Chemical Engineering of the Society of Chemical Engineers. - More than 50 young researchers were involved in contributing with their expertise, their new ideas, and the motivation of youth.

The Liquid and Supercritical Fluid States of Matter

Foaming with Supercritical Fluids, Volume Nine provides a comprehensive description of the use of supercritical fluids as blowing agents in polymer foaming. To this aim, the fundamental issues on which the proper design and control of this process are rooted are discussed in detail, with specific attention devoted to the theoretical and experimental aspects of sorption thermodynamics of a blowing agent within a polymer, the effect of the absorbed blowing agent on the thermal, interfacial and rheological properties of the expanding matter, and the phase separation of the gaseous phase, and of the related bubble nucleation and growth phenomena. Several foaming technologies based on the use of supercritical blowing agents are then described, addressing the main issues in the light of the underlying chemical-physical phenomena. Offers strong fundamentals on polymer properties important on foaming Outlines the use of supercritical fluids for foaming Covers theoretical points-of-view, including foam formation of the polymer/gas solution to the setting of the final foam Discusses the several processing technologies and applications

Supercritical Fluid Extraction

A supercritical fluid is any substance at a temperature and pressure above its critical point. It can diffuse through solids like a gas, and dissolve materials like a liquid. Additionally, close to the critical point, small changes in pressure or temperature result in large changes in density, allowing many properties to be "tuned". Supercritical fluids are suitable as a substitute for organic solvents in a range of industrial and laboratory processes. Carbon dioxide and water are the most commonly used supercritical fluids, being used for decaffeination and power generation respectively. In general terms, supercritical fluids have properties between those of a gas and a liquid. This new and important book gathers the latest research from around the globe in this field of study with a focus on such topics as: the modification and preparation of membrane in supercritical carbon dioxide, supercritical fluid technology applied to the manufacture of prebiotic carbohydrates, the pre-treatment of herbaceous matrix in a process of supercritical fluid extraction, fundamental properties and chemical reactions of supercritical methanol and others.
Supercritical Fluid Cleaning

Supercritical fluid extraction is an environmentally safe and cost-effective alternative to traditional organic solvents. Carbon dioxide is widely used as the solvent of choice for applications such as caffeine and nicotine extraction due to its mild critical temperature, nontoxicity, nonflammability, and low cost. Introducing the most complete collection of supercritical CO2 solubility data currently available, Solubility in Supercritical Carbon Dioxide features experimental data on more than 780 solutes in consistent units and an easily accessible format. This book reflects the authors’ painstaking efforts to compile solubility data for an extensive variety of compounds including liquids, solids, polymers, foods, drugs, nutraceuticals, pesticides, dyes, and metal complexes. Each of the more than 1200 tables is arranged in alphabetical order by compound, includes a graphical plot of its data, and features the following information: Compound name, molecular formula, and molecular weight Temperature and pressure given in Kelvin and bar, respectively Name and amount of cosolvent, if applicable Molar or mass solubility, when applicable Molar or mass-fraction solubility Synonyms for the compound, where available Reference source for the data Density data for CO2 appears in one appendix, while a complete list of solutes by molecular formula appears in the other. Clear, consistent, and carefully organized, Solubility in Supercritical Carbon Dioxide is the most convenient quick-lookup guide for reliable data.

Hydrothermal and Supercritical Water Processes

In this volume, we have collected a series of reviews that cover both experimental and theoretical work geared toward the more exact requirements of current SFE applications. While we have artificially divided the volume into experimental and theoretical sections, natural overlaps will be apparent. Many of the papers on experimental and theoretical sections, natural overlaps will be apparent. Many of the papers on experimental technique contain discussions on equation of state correlations. Indeed, a good deal of the experimental work is intimately tied to a mathematical description of fluid mixtures. The theoretical section presents reviews that cover the modern theory of critical phenomena, methods to correlate near critical experimental results and approaches to understanding the behavior of near critical fluids from microscopic theory. It is hoped that the scope of these reviews will provide the reader with the basis to further develop our understanding of the behavior of supercritical fluids.