

Sivasankar Engineering Chemistry

This systematically organized and well-balanced book compresses within the covers of a single volume the theoretical principles and techniques involved in bio-separations, also called downstream processing. These techniques are derived from a range of subjects, for example, physical chemistry, analytical chemistry, bio-chemistry, biological science and chemical engineering. Organized in its 15 chapters, the text covers in the first few chapters topics related to chemical engineering unit operations such as filtration, centrifugation, adsorption, extraction and membrane separation as applied to bioseparations. The use of chromatography as practiced at laboratory as well as industrial scale operation and related techniques such as gel filtration, affinity and pseudoaffinity chromatography, ion-exchange chromatography, electrophoresis and related methods have been discussed. The important applications of these techniques have also been highlighted.

Issues in Chemical Engineering and other Chemistry Specialties: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Chemical Engineering. The editors have built Issues in Chemical Engineering and other Chemistry Specialties: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Chemical Engineering in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Chemical Engineering and other Chemistry Specialties: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

This book discusses the problems and feasible remediation of fluoride contamination in groundwater. The book investigates applications of various carbons derived from bio-mass and bio-polymers. It also inquires into surface modified carbons that use inorganic ions to help remove excess fluoride ions in drinking water and wastewater effluents. The compliance of kinetic and isotherm models with fluoride sorption is covered, and the suggested mechanisms of defluoridation by surface modified carbon materials is described.

The book provides insight into the working of clays and clay minerals in speeding up a variety of organic reactions. Clay minerals are known to have a large propensity for taking up organic molecules and can catalyse numerous organic reactions due to fine particle size, extensive surface area, layer structure, and peculiar charge characteristics. They can be used as heterogeneous catalysts and catalyst carriers of organic reactions because they are non-corrosive, easy to separate from the reaction mixture, and reusable. Clays and clay minerals have an advantage over other solid acids as they are abundant, inexpensive, and non-polluting.

Instrumental Methods of Analysis is a textbook designed to introduce various analytical and chemical methods, their underlying principles and applications to the undergraduate engineering students of biotechnology and chemical engineering. This book would also be of interest to students who pursue their B. Sc / M. Sc degree programs in biotechnology and chemistry.

This book provides a comprehensive review of the antioxidant value of widely consumed fruits. Each chapter covers the botanical description, nutritional & health properties of these popular fruits. Fruits are one of the most important indicators of dietary quality and offer protective effects against several chronic diseases such as cardiovascular diseases, obesity, and various types of cancer. In order to effectively promote fruit consumption, it is necessary to know and understand the components of fruits. In addition to underscoring the importance of fruit consumption's effects on human diet, the book addresses the characterization of the chemical compounds that are responsible for the antioxidant properties of various fruits. Given its scope, the book will be of interest to graduate and post-graduate students, research scholars, academics, pomologists and agricultural scientists alike. Those working in various fruit processing industries and other horticultural departments will also find the comprehensive information relevant to their work.

Engineering Chemistry includes comprehensive, lucid and accurate presentations of the subject matter, which is easy to understand and stimulates the interest of students. It provides the in-depth information required to understand the principles and practice of applied chemistry, and presents coherent and adequate coverage of various topics. The fundamentals have been explained with the help of illustrations, diagrams and tables to facilitate better understanding. A balance between theoretical and applied aspects have been maintained in this book. The solved examples in the chapter and exercises at the end of each chapter help in strengthening the theoretical concepts.

This proceedings volume brings together selected peer-reviewed papers presented at the 2014 International Conference on Frontier of Energy and Environment Engineering. Topics covered include energy efficiency and energy management, energy exploration and exploitation, power generation technologies, water pollution and protection, air pollution and
Some chapters in the book deal with the basic principles of chemistry while others are focused on its applied aspects, providing the correct interphase between the principles of chemistry and engineering. KEY FEATURES * Chapters cover both basic principles of chemistry as also its applied aspects. * Written in easy self-explanatory language and in depth at the same time. * Review questions provided at the end of each chapter. * A separate section 'Laboratory Manual' in Engineering Chemistry comprising 12 experiments is appended at the end of the book.

In the present scenario, green technologies are playing significant role in changing the course of nation's economic growth towards sustainability and providing an alternative socio-economic model that will enable present and future generations to live in a clean and healthy environment, in harmony with nature. Green technology, which is also known as clean technology, refers to the development and extension of processes, practices, and applications that improve or replace the existing technologies facilitating society to meet their own needs while substantially decreasing the impact of human on the planet, and reducing environmental risks and ecological scarcities. The concepts of Green Technologies, if endorsed and pervaded into the lives of all societies, will facilitate the aim of the Millennium Development Goals of keeping the environment intact and improve it for the civilization to survive. Green Technologies and Environmental Sustainability is focused on the goals of green technologies which are becoming increasingly important for ensuring sustainability. This book provides different perspectives of green technology in sectors like energy, agriculture, waste management and economics and contains recent advancements made towards sustainable development in the field of bioenergy, nanotechnology, green chemistry, bioremediation, degraded land reclamation. This book is written for a large and broad readership, including researchers, scientists, academicians and readers from diverse backgrounds

across various fields such as nanotechnology, chemistry, agriculture, environmental science, water engineering, waste management and energy. It could also serve as a reference book for graduates and post-graduate students, faculties, environmentalist and industrial personnel who are working in the area of green technologies.

Advanced Textile Engineering Materials is written to educate readers about the use of advanced materials in various textile applications. In the first part, the book addresses recent advances in chemical finishing, and also highlights environmental issues in textile sectors. In the second part, the book provides a compilation of innovative fabrication strategies frequently adopted for the mechanical finishing of textiles. The key topics are • Smart textiles • Functional modifications • Protective textiles • Conductive textiles • Coated/laminated textiles • Antimicrobial textiles • Environmental aspects in textiles • Textile materials in composites • 3-D woven preforms for composite reinforcement • Evolution of soft body armor

Any good text book, particularly that in the fast changing fields such as engineering & technology, is not only expected to cater to the current curricular requirements of various institutions but also should provide a glimpse towards the latest developments in the concerned subject and the relevant disciplines. It should guide the periodic review and updating of the curriculum.

The book provides comprehensive coverage of the processing and preservation aspects of food science that include chemical, microbiological and technological processes on the one hand, and assessment of food quality and safety, new and modified foods by fermentation, food-borne diseases and food spoilage on the other. The preservation operations involving the use of high and low temperatures and radiation have also been discussed in detail. Intended as a textbook for undergraduate students of science and engineering, this study would also be of great help to postgraduate students offering courses in food science, and to professionals as well as academicians.

Research on nanotechnology has mainly focused on the aspects of synthesis of nanomaterials that have unique chemical, thermal, and mechanical properties applicable to a wide range of applications. A variety of properties and phenomena have been investigated, and many of the studies have been directed toward understanding the properties and applications of nanomaterials. Nanomaterials have properties that are useful for enhancing surface-to-volume ratio, reactivity, strength, and durability. Due to their enhanced chemical and mechanical properties, the nanomaterials play promising roles in enhancing the desulfurization.

Nanocomposites for the Desulfurization of Fuels is an essential reference source that discusses the synthesis, properties, and technological developments of nanomaterials and their applications in petroleum. Featuring research on topics such as hybrid materials, catalytic properties, and environmental concerns, this book is ideally designed for chemical engineers, scientists, researchers, academicians, and students in fields that include chemistry, petroleum, materials science, physics, and engineering. This volume opens by providing a comprehensive overview of the use and regulation of metals in our society, metal properties, and available testing methodologies. Common and uncommon metal allergens and sources of exposure are then reviewed in depth, detailing allergic responses and paying special consideration to select patient populations. In the general population, the prevalence of metal allergy is high. Environmental sources of metal exposure include jewelry, clothing, electronic devices, coins, leather, diet, and occupational exposure. Metal allergy may result in allergic contact dermatitis and systemic contact dermatitis, as well as several less common manifestations. Further, metal allergy has been associated with device failure and/or dermatitis following implantation of medical devices and dental implants. As metals are ubiquitous, this book will be indispensable for a wide range of clinicians and investigators. This handy reference will meet the needs of all health professionals and investigators who are interested in metal allergy and its diagnosis and management.

Achieving environmental sustainability with rapid industrialization is currently a major global challenge. Industries are the key economic drivers, but are also the main polluters as untreated/partially treated effluents from industry are usually discharged into the aquatic environment or dumped. Industrial effluents often contain highly toxic and hazardous pollutants, which cause ecological damage and present health hazards to living beings. As such, there is a pressing need to find ecofriendly solutions to deal with industrial waste, and to develop sustainable methods for treating/detoxifying waste before it's released into the environment. As a low cost and eco-friendly clean technology, bioremediation can offer a sustainable alternative to conventional remediation technologies for the treatment and management of industrial wastes. This book (Volume II) describes the role of biological agents in the degradation and detoxification of organic and inorganic pollutants in industrial wastes, and presents recent bioremediation approaches for waste treatment and management, such as constructed wetlands, electro-bioremediation and nano-bioremediation, as well as microbial fuel cells. It appeals to students, researchers, scientists, industry professionals and experts in the field of microbiology, biotechnology, environmental sciences, eco-toxicology, environmental remediation and waste management and other relevant areas who are interested in biodegradation and bioremediation of industrial wastes for environmental safety.

The edited volume presents the progress of first and second generation biofuel production technology in selected countries. Possibility of producing alternative fuels containing biocomponents and selected research methods of biofuels exploitation characteristics (also aviation fuels) was characterized. The book shows also some aspects of the environmental impact of the production and biofuels using, and describes perspectives of biofuel production technology development. It provides the review of biorefinery processes with a particular focus on pretreatment methods of selected primary and secondary raw materials. The discussion includes also a possibility of sustainable development of presented advanced biorefinery processes.

Agroecosystem is an ideal dynamic functional system with a set of chemical and biological interaction taking place in plant surface either below or above the ground levels. These levels of interaction activities fundamentally with microorganism-plant-soil systems are extended upto the level of entire agricultural economy. Greatly simplified, the agroecosystems control the various range of energy flux, resources exchange, organic and inorganic nutrient budgets and population dynamics. The main aim of this edited volume is to provide a broad spectrum of agroecosystems structure, function and maintenance involved in microbial research. This book consists of 20 full length research articles focusing on the emerging problems in the field and the positive findings are identified on key areas of research such as biodiversity, ecosystem service, environmental cleaning in agroecology, etc. These articles are arranged progressively linking themselves thematically with photographs, figures and tables. Focused field articles are included which prove a valuable contribution to the field of agroecosystem management by microbial facilitations. The editor hopes that these articles would prompt the budding scholars to further their research which in turn would certainly help the agriculturists. This book deals with bioprocess engineering, which encompasses the design and development of equipment and processes for the manufacturing of products such as food, pharmaceuticals, chemicals, polymers and paper from biological materials. It also deals with studying various biotechnological processes used in industries for large scale production of biological products, for the

optimization of yield. This work also incorporates significant treatment on biocatalysts and their applications in food industry, bioplastics production, conversion of agro waste and the importance of biotechnology in bioprocessing. This is coupled with pertinent information related to environmental contaminants.

Ultrasonic irradiation and the associated sonochemical and sonophysical effects are complementary techniques for driving more efficient chemical reactions and yields. Sonochemistry—the chemical effects and applications of ultrasonic waves—and sustainable (green) chemistry both aim to use less hazardous chemicals and solvents, reduce energy consumption, and increase product selectivity. A comprehensive collection of knowledge, Handbook on Applications of Ultrasound covers the most relevant aspects linked to and linking green chemistry practices to environmental sustainability through the uses and applications of ultrasound-mediated and ultrasound-assisted biological, biochemical, chemical, and physical processes. Chapters are presented in the areas of: Medical applications Drug and gene delivery Nanotechnology Food technology Synthetic applications and organic chemistry Anaerobic digestion Environmental contaminants degradation Polymer chemistry Industrial syntheses and processes Reactor design Electrochemical systems Combined ultrasound?microwave technologies While the concepts of sonochemistry have been known for more than 80 years, in-depth understanding of this phenomenon continues to evolve. Through a review of the current status of chemical and physical science and engineering in developing more environmentally friendly and less toxic synthetic processes, this book highlights many existing applications and the enormous potential of ultrasound technology to upgrade present industrial, agricultural, and environmental processes.

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Nanomaterials: Application in Biofuels and Bioenergy Production Systems looks at how biofuels and bioenergy can be part of the "sustainable" solution to the world's energy problems. By addressing bioenergy products compared to their fossil energy counterparts, covering research and development in biofuels applied with nanomaterials this book analyzes the future trends and how biofuels and bioenergy can contribute to its optimization. Starting from fundamentals up to synthesis, characterization and applications of nanomaterials in biofuels and bioenergy production systems, the chapters include the procedures needed for introducing nanomaterials in these specific sectors along with the benefits derived from their applications. Including the hazards and environmental effects of nanomaterials in bioenergy applications, sustainability issues and a techno-economic analysis of the topic, this book provides researchers in bioscience, energy & environment and bioengineering with an up to date look at the full life cycle assessment of nanomaterials in bioenergy. Provides a one stop solution manual for applications of nanomaterials in bioenergy and biofuels Includes biofuel applications with compatible global application case studies Addresses the demand for environmental and techno-economic analysis of nanomaterials applications

This book is a printed edition of the Special Issue "Structural Health Monitoring (SHM) of Civil Structures" that was published in Applied Sciences

Analysis of Chemical Residues in Agriculture presents a focused, yet comprehensive guide on how to identify, evaluate and analyze the wide range of chemicals that impact our food production system. The book presents a variety of analytical technologies and methods in order to help professionals, researchers, and graduate and undergraduate students understand chemical residues in agriculture and apply them to applications for the detection and quantification of chemical residues – both organic and inorganic – in several agricultural matrices, including crops, fruits, meat, food, feed, soil and water. Agriculture remains one of the most strategic sectors for the global economy and well-being. However, it is seen as a source of environmental and health concerns mainly due to the high amount of pesticides and fertilizers used in production systems around the world; moreover, a thorough understanding of the topic is necessary when we consider livestock production systems also apply large amounts of veterinary drugs to treat illness and promote increases in productivity. Identifies the main scientific and technological approaches of analytical chemistry dedicated to agricultural and related matrices to solve real problems and for R&D purposes Provides a description of the analytical technologies and methodologies used to reduce the negative impact of several agrochemicals on the environment and health Explores cutting-edge analytical technologies to detect residues in agricultural and related matrices

The Metaphysics of Good and Evil is the first, full-length contemporary defence, from the perspective of analytic philosophy, of the Scholastic theory of good and evil – the theory of Aristotle, Augustine, Aquinas, and most medieval and Thomistic philosophers. Goodness is analysed as obedience to nature. Evil is analysed as the privation of goodness. Goodness, surprisingly, is found in the non-living world, but in the living world it takes on a special character. The book analyses various kinds of goodness, showing how they fit into the Scholastic theory. The privation theory of evil is given its most comprehensive contemporary defence, including an account of truthmakers for truths of privation and an analysis of how causation by privation should be understood. In the end, all evil is deviance – a departure from the goodness prescribed by a thing's essential nature. Key Features: Offers a comprehensive defence of a venerable metaphysical theory, conducted using the concepts and methods of analytic philosophy. Revives a much neglected approach to the question of good and evil in their most general nature. Shows how Aristotelian-Thomistic theory has more than historical relevance to a fundamental philosophical issue, but can be applied in a way that is both defensible and yet accessible to the modern philosopher. Provides what, for the Scholastic philosopher, is arguably the only solid metaphysical foundation for a separate treatment of the origins of morality.

Copper(I) Complexes of Phosphines, Functionalized Phosphines and Phosphorus Heterocycles is a comprehensive guide to one of the most widely used and extensively studied metals: copper. The numerous practical applications of copper compounds are discussed, including homogeneous and heterogeneous catalysis and their use as fungicides, pesticides, pigments for paints, resins and glasses, and in high-temperature superconductors. The remarkable structural flexibility of simple copper(I) complexes, such as cuprous halides is covered, including numerous structural motifs that, when combined with different ligand systems, exhibit linear, trigonal planar or tetrahedral geometries. This work is an essential reference for inorganic and coordination chemists, as well as researchers working on catalysis, anticancer reagents, luminescence, fluorescence and photophysical aspects. Discusses the properties of copper and similarities to noble metals, such as their corrosion resistance, high thermal and electrical conductivity and rich coordination chemistry Includes the copper(I) coordination chemistry of tertiary phosphines, bisphosphines and phosphines containing other donor atoms and their potential application in catalysis, biosystems and photochemical areas Features a discussion of the rich photochemistry exhibited by some mixed-ligand copper(I) complexes (phosphines with heteroaromatic ligands) which can exhibit coprophilic interactions, photoluminescence and thermochromic properties

The use of synthetic chemical dyes in various industrial processes, including paper and pulp manufacturing, plastics, dyeing of cloth, leather treatment and printing, has increased considerably over the last few years, resulting in the release of dye-containing industrial effluents into the soil and aquatic ecosystems. The textile industry generates high-polluting wastewaters and their treatment is a very serious problem due to high total dissolved solids (TDS), presence of toxic heavy metals, and the non-biodegradable nature of the dyestuffs in the effluent. The chapters in this book provide an overview of the problem and its solution from different angles. These problems and solutions are presented in a genuinely holistic way by world-renowned researchers. Discussed are various promising techniques to remove dyes, including the use of nanotechnology, ultrasound, microwave, catalysts, biosorption, enzymatic treatments, advanced oxidation processes, etc., all of which are "green." Green Chemistry for Dyes Removal from Wastewater comprehensively discusses: Different types of dyes, their working and

methodologies and various physical, chemical and biological treatment methods employed. Application of advanced oxidation processes (AOPs) in dye removal whereby highly reactive hydroxyl radicals are generated chemically, photochemically and/or by radiolytic/sonolytic means. The potential of ultrasound as an AOP is discussed as well. Nanotechnology in the treatment of dye removal types of adsorbents for removal of toxic pollutants from aquatic systems. Photocatalytic oxidation process for dye degradation under both UV and visible light, application of solar light and solar photoreactor in dye degradation.

Processes that meet the objectives of green chemistry and chemical engineering minimize waste and energy use, and eliminate toxic by-products. Given the ubiquitous nature of products from chemical processes in our lives, green chemistry and chemical engineering are vital components of any sustainable future. Gathering together ten peer-reviewed articles from the Encyclopedia of Sustainability Science and Technology, Innovations in Green Chemistry and Green Engineering provides a comprehensive introduction to the state-of-the-art in this key area of sustainability research. Worldwide experts present the latest developments on topics ranging from organic batteries and green catalytic transformations to green nanoscience and nanotoxicology. An essential, one-stop reference for professionals in research and industry, this book also fills the need for an authoritative course text in environmental and green chemistry and chemical engineering at the upper-division undergraduate and graduate levels.

Applications of Nuclear and Radioisotope Technology: For Peace and Sustainable Development presents the latest technology and research on nuclear energy with a practical focus on a variety of applications. Author Dr. Khalid Al-Nabhani provides a thorough and well-rounded view of the status of nuclear power generation in order to promote its benefits towards a sustainable, clean and secure future. This book offers innovative theoretical, analytical, methodological and technological approaches, encourages a positive societal and political uptake. This book enhances awareness of peaceful nuclear applications across a broad spectrum of industries, including power generation, agriculture, and medicine. It presents successful examples and lessons learned across many countries that are working towards their sustainability goals in cooperation with the IAEA and AAEA, to benefit researchers, professionals and decision-makers implementing and developing their own nuclear strategies for the future.

Presents theoretical and scientific knowledge which is supported with real examples and successful experiences. Provides prevailing perceptions of nuclear safety and security concerns by presenting the most advanced safety and security systems. Applies technologies to a variety of applications to guide the reader to make informed decisions to help meet sustainability goals.

Handbook of Biofuels looks at the many new developments in various types of bioenergy, along with the significant constraints in their production and/or applications. Beyond introducing current approaches and possible future directions of research, this title covers sources and processing of raw materials to downstream processing, constraints involved and research approaches to address and overcome these needs. Different combinations of products from the biorefinery are included, along with the material to answer questions surrounding the optimum process conditions for conversion of different feedstocks to bioenergy, the basis for choosing conversion technology, and what bioenergy products make economic sense. With chapters on the techno-economic analysis of biofuel production and concepts and step-by-step approaches in bioenergy processing, the objective of this book is to present a comprehensive and all-encompassing reference about bioenergy to students, teachers, researchers and professionals. Reviews all existing and emerging technologies surrounding the production of advanced biofuels, including biodiesel and bioethanol. Includes biofuel applications with compatible global application case studies. Offers new pathways for converting biomass.

This book introduces in detail the physical and chemical phenomena and processes during petroleum production. It covers the properties of reservoir rocks and fluids, the related methods of determining these properties, the phase behavior of hydrocarbon mixtures, the microscopic mechanism of fluids flowing through reservoir rocks, and the primary theories and methods of enhancing oil recovery. It also involves the up-to-date progress in these areas. It can be used as a reference by researchers and engineers in petroleum engineering and a textbook for students majoring in the area related with petroleum exploitation.

Catalysis will be of interest to anyone working in academia and industry that needs an up-to-date critical analysis and summary of catalysis research and applications.

Mechanics of Structures and Materials: Advancements and Challenges is a collection of peer-reviewed papers presented at the 24th Australasian Conference on the Mechanics of Structures and Materials (ACMSM24, Curtin University, Perth, Western Australia, 6-9 December 2016). The contributions from academics, researchers and practising engineers from Australasian, Asia-Pacific region and around the world, cover a wide range of topics, including: • Structural mechanics • Computational mechanics • Reinforced and prestressed concrete structures • Steel structures • Composite structures • Civil engineering materials • Fire engineering • Coastal and offshore structures • Dynamic analysis of structures • Structural health monitoring and damage identification • Structural reliability analysis and design • Structural optimization • Fracture and damage mechanics • Soil mechanics and foundation engineering • Pavement materials and technology • Shock and impact loading • Earthquake loading • Traffic and other man-made loadings • Wave and wind loading • Thermal effects • Design codes. **Mechanics of Structures and Materials: Advancements and Challenges** will be of interest to academics and professionals involved in Structural Engineering and Materials Science.

Biomass Valorization Explore the potential of biomass-based chemicals with this comprehensive new reference from leading voices in the field. With the depletion of fossil raw materials a readily ascertainable inevitability, the exploitation of biomass-based renewable derivatives becomes ever more practical and realistic. In **Biomass Valorization: Sustainable Methods for the Production of Chemicals**, accomplished researchers and authors Davide Ravelli and Chiara Samori deliver a thorough compilation of state-of-the-art techniques and most advanced strategies used to convert biomass into useful building blocks and commodity chemicals. Each chapter in this collection of insightful papers begins by detailing the core components of the described technology, along with a fulsome description of its advantages and limitations, before moving on to a discussion of recent advancements in the field. The discussions are grouped by the processed biomass, such as terrestrial biomass, aquatic biomass, and biomass-deriving waste. Readers will also benefit from the inclusion of: A thorough introduction to the role of biomass in the production of chemicals. An exploration of biomass processing via acid, base and metal catalysis, as well as biocatalysis. A practical discussion of biomass processing via pyrolysis and thermochemical-biological hybrid processes. A concise treatment of biomass processing assisted by ultrasound and via electrochemical, photochemical and mechanochemical means. Perfect for chemical engineers, catalytic chemists, biotechnologists, and polymer chemists, **Biomass Valorization: Sustainable Methods for the Production of Chemicals** will also earn a place in the libraries of environmental chemists and professionals working with organometallics and natural products chemists.