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The remarkable development of
organic thin film transistors

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(OTFTs) has led to their emerging use in active matrix flat-panel displays, radio frequency identification cards, and sensors. Exploring one class of OTFTs, Organic Field-Effect Transistors provides a comprehensive,

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multidisciplinary survey of the present theory, charge transport studies, synthetic methodology, materials characterization, and current applications of organic field-effect transistors (OFETs).

Covering various aspects of

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OFETs, the book begins with a theoretical description of charge transport in organic semiconductors at the molecular level. It then discusses the current understanding of charge transport in single-crystal

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Electrocatalysis in organic devices, small molecules and oligomers, conjugated polymer devices, and charge injection issues in organic transistors.

After describing the design rationales and synthetic methodologies used for organic

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semiconductors and dielectric materials, the book provides an overview of a variety of characterization techniques used to probe interfacial ordering, microstructure, molecular packing, and orientation crucial

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to device performance. It also describes the different processing techniques for molecules deposited by vacuum and solution, followed by current technological examples that employ OTFTs in their operation.

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Featuring respected contributors from around the world, this thorough, up-to-date volume presents both the theory behind OFETs and the latest applications of this promising technology.

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Safety in the process industries is critical for those who work with chemicals and hazardous substances or processes. The field of loss prevention is, and continues to be, of supreme importance to countless

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companies, municipalities and governments around the world, and Lees' is a detailed reference to defending against hazards.

Recognized as the standard work for chemical and process engineering safety professionals,

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it provides the most complete collection of information on the theory, practice, design elements, equipment, regulations and laws covering the field of process safety. An entire library of alternative books (and cross-

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referencing systems) would be

needed to replace or improve

upon it, but everything of

importance to safety

professionals, engineers and

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loss prevention, compiling theory, practice, standards, legislation, case studies and lessons learned in one resource as opposed to multiple sources This work examines all aspects of organic conductors, detailing

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Electrocatalysis: recent theoretical concepts and current laboratory methods of synthesis, measurement, control and analysis. It describes advances in molecular-scale engineering, including switching and memory systems, Schottky

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Electronics and electroluminescent diodes, field-effect transistors, and photovoltaic devices and solar cells.

The field of organic and printed electronics is well established in terms of academic, scientific,

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Electrocatalysis and technological research but is still an emerging one in terms of mass industrial applications such as OLED displays and lighting and organic photovoltaics. This book provides a comprehensive introduction to organic and

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printed electronics, their

fundamental aspects, core

technologies, and applications,

and it is the first book of its kind

specifically designed to address

students in their final

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graduate studies, as well as

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engineers interested in

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Radically enhance your progress in organic synthesis Radical chemistry has undergone a renaissance in recent years. These two volumes will make the key developments accessible to a broad range of organic chemists. They cover both the generation of radicals

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and their use. The editors, Prof. Louis Fensterbank and Dr. Cyril Ollivier, are experts in radical chemistry and its application to organic synthesis. Find all about the generation and use of radicals The two-volume set describes the fundamentals of radical chemistry

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and its application in organic synthesis.

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generation of a variety of organic

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"single-electron transfer" "hydrogen-

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atom transfer" radical functionalization and cross-coupling processes. By understanding the fundamental reactivities of radicals, they can be harnessed for atom-efficient and green reactions.

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overview about the fundamentals and applications of supported ionic liquids in modern organic synthesis. It introduces the concept and synthesis of SILP materials and presents important applications in the field of catalysis (e.g. hydroformylation, hydrogenation,

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Electrochemistry (including electrocatalytic coupling reactions, fine chemical synthesis) as well as energy technology and gas separation. Written by pioneers in the field, this book is an invaluable reference book for organic chemists in academia or industry.

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applications of homogeneous catalysis, hydroformylation is the process whereby alkenes react with carbon monoxide and hydrogen at high temperatures in the presence of a transition metal catalyst to yield aldehydes. The resulting products are

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valuable intermediates in the synthesis of alcohols, esters, amines, and olefins, used in pharmaceutical chemistry and the manufacture of fragrances. This reaction was discovered around 70 years ago, and nowadays some ten million metric tons of aldehydes are

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produced each year. This up-to-date reference is unique in its comprehensive coverage from fundamentals to applications, summarizing the latest advances and developments in hydroformylation reactions. The two authors are at the

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forefront of catalysis research, and unite their expertise in synthetic and applied catalysis, as well as theoretical and analytical chemistry. As such, they provide a detailed account of the catalytic systems employed, catalyst stability and recovery, mechanistic

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investigations, substrate scope, and technical implementation. Chapters on multiphase hydroformylation procedures, tandem hydroformylations and other industrially applied reactions using syngas and carbon monoxide are also included. A must-have reference

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not only for synthetic chemists working in academic and industrial research, but also for theoreticians and analytical chemists.

This textbook is an accessible overview of the broad field of organic electrochemistry, covering the

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fundamentals and applications of contemporary organic electrochemistry. The book begins with an introduction to the fundamental aspects of electrode electron transfer and methods for the electrochemical measurement of organic molecules. It

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Electrochemistry then goes on to discuss organic electrosynthesis of molecules and macromolecules, including detailed experimental information for the electrochemical synthesis of organic compounds and conducting polymers. Later chapters highlight new

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methodology for organic electrochemical synthesis, for example electrolysis in ionic liquids, the application to organic electronic devices such as solar cells and LEDs, and examples of commercialized organic electrode processes.

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Appendices present useful supplementary information including experimental examples of organic electrosynthesis, and tables of physical data (redox potentials of various organic solvents and organic compounds and physical properties of

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various organic solvents).

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Prospects and Opportunities

A Guide to Determining and

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Evaluating Process Greenness

Metal–organic frameworks (MOFs) are porous crystalline polymers constructed by metal sites and organic building blocks. Since the discovery of MOFs in the 1990s, they have received tremendous research attention for various applications due

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to their high surface area, controllable morphology, tunable chemical properties, and multifunctionalities, including MOFs as precursors and self-sacrificing templates for synthesizing metal oxides, heteroatom-doped carbons, metal-atoms encapsulated carbons,

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and others. Thus, awareness and knowledge about MOFs and their derived nanomaterials with conceptual understanding are essential for the advanced material community. This breakthrough new volume aims to explore down-to-earth applications in fields such as

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Electrochromic MOFs for biomedical, environmental, energy, and electronics. This book provides an overview of the structural and fundamental properties, synthesis strategies, and versatile applications of MOFs and their derived nanomaterials. It gives an updated and comprehensive account of the

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research in the field of MOFs and their derived nanomaterials. Whether as a reference for industry professionals and nanotechnologists or for use in the classroom for graduate and postgraduate students, faculty members, and research and development specialists working in

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Electronics for the systematic nano-engineering of soft matter materials, this is an invaluable resource for those involved in the development of modern telecommunication, computing, and sensing technologies depending on electro-optic technology. It is also an indispensable

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work of reference for academic researchers and graduate students in the fields of chemistry, physics, electrical engineering, materials science and engineering, and chemical engineering.

In the past 30 years, organic conjugated molecules have received

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a lot of attention in research because of their unique combination of active properties typical of semiconductors and the technological appeal typical of plastic materials. Among the different applications proposed for organic materials, organic lasers are quickly approaching the performance

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required in real devices, while research on novel active materials is still ongoing. The book covers the basic aspects of the measurement techniques of optical gain and amplified spontaneous emission (ASE) in organic films as well as the photophysics of organic materials

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that can be understood using ASE measurements. It reviews the recent advances in the development of new active materials for organic lasers as well as the actual state of the art of scattering-assisted random lasers and of strongly coupled organic microcavities, both promising

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interesting developments in the near future. Finally, it gives a detailed review of the state of the art of the organic lasers actually closest to real applications, namely external cavity lasers and distributed feedback lasers. The book is unique that it covers basic aspects, technological aspects, and

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Electrochemical systems, which are still a subject of basic science research.

Here is the first reference book to document and summarize the available information in six known areas of reactive separation:

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reaction/extraction;

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reaction/absorption;
reaction/adsorption;
reaction/membrane; and
reaction/crystallization. The book's
structure places emphasis primarily
on applications, but fundamental
principles and technical
considerations in industry are also

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recognized for each technology. The individual reactive separation processes are illustrated using numerous documented research and development studies which describe their reactive applications. The book offers guidance in problem solving and will serve to generate further

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inventive and novel ideas for industrial application. The simple and clear descriptions combined with illustrated examples will help those inexperienced with the subject to comprehend the technical information.

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the generation of a variety of organic radicals. You will find critically reviewed, reliable and ready-to-use information on the use of radicals in: "single-electron transfer" "hydrogen-atom transfer" radical functionalization and cross-coupling processes. By understanding the fundamental reactivities of radicals, they

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can be harnessed for atom-efficient and green reactions.

Despite the development of innovative new analytical techniques for biological trace element research, today's trace element investigators face formidable obstacles to obtaining reliable data. This complete reference identifies and assesses

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control, including such critical factors as sampling and sample preparation, specimen preservation and storage, and ashing, is examined. The book also looks at sample preparation methods unique to various instruments and speciation chemistry issues, and examines the link between chemical analysis and specimen

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banking. A previously unrecognized source of error, presampling factors, is also discussed.

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Study Institute on Heat Pump

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Interest in structured catalysts

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information on all aspects of
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reactors, including: materials,
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Electrocatalysis
examines how monolithic catalysts are used to clean exhaust gas from gasoline engines, treat industrial off-gases, burn fuels in commercial settings, and synthesize chemicals in two-

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and three-phase processes. It discusses configurations, microstructure, physical properties, and manufacture of ceramic and metallic monoliths before directing its focus to arranged catalysts

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and structured packings in terms of mass transfer. The book then explores catalytically active membranes and filters, featuring metallic membranes, permeation mechanisms, preparation and

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modeling, commercial membranes, and the latest applications, such as zeolitic membranes. Finally, several chapters present techniques for incorporating catalytic species into the structured

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controlling catalyst

nanoporosity. This book

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functionalization of membrane
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toxins targeting these crucial structures, the book addresses a topic of major importance in the field of medicine, particularly biosensor design, diagnostic tool development, vaccine

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organic molecules and biomaterials fabricated by wet processes and also highlights applications in nanotechnology The categories of films covered include monomolecular films

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(monolayers) both on a water surface and on a solid plate,

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(transferred multilayer films on a solid plate from a water

surface), layer-by-layer films

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relevant to their own horticultural experiences. Written by a team of highly motivated and experienced horticultural tutors, the text supports the newly restructured RHS

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topics in boxes and
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qualifications at these

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development, and applications of this method for conducting organic reactions has expanded exponentially. PTC has brought vast new dimensions and options to

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chemists and chemical engineers. From its use in less than ten commercial processes in 1975, PTC use has increased so that in the early 1990s it is involved in more than 600

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industrial applications to manufacture products valued at between 10 and 20 billion U.S. dollars. PTC is widely used for simple organic reactions, steps in synthesis of

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pharmaceuticals,
agricultural chemicals,
perfumes, flavorants, and
dyes; for specialty
polymerization reactions,
polymer modifications, and
monomer synthesis; for

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pollution and environmental control processes; for analysis of trace organic and inorganic compounds; and for many other applications. Often, PTC

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has shown to us that a newcomer to PTC can easily be frustrated and confused by the large amount of information available in the literature and in patents. The purpose of

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this book, therefore, was to bring this information together in a logical and user-friendly way, without sacrificing matters of scholarly and fundamental importance.

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This text discusses the synthesis, characterization, and application of metal-organic frameworks (MOFs) for the purpose of adsorbing gases. It

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provides details on the fundamentals of thermodynamics, mass transfer, and diffusion that are commonly required when evaluating MOF materials for gas

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separation and storage applications and includes a discussion of molecular simulation tools needed to examine gas adsorption in MOFs. Additionally, the work presents techniques

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that can be used to characterize MOFs after gas adsorption has occurred and provides guidance on the water stability of these materials. Lastly,

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applications of MOFs are considered with a discussion of how to measure the gas storage capacity of MOFs, a discussion of how to screen MOFs to for

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filtration applications,
and a discussion of the
use of MOFs to perform
industrial separations,
such as olefin/paraffin
separations. Throughout
the work, fundamental

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information, such as a discussion on the calculation of MOF surface area and description of adsorption phenomena in packed-beds, is balanced with a discussion of the

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that shows students how organic chemistry applies to their everyday lives.

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chemical concepts, a greater emphasis on biologically-related chemistry (including new problems) helps them grasp the enormous importance of organic chemistry in

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understanding the reactions that occur in living organisms, and new End of Chapter problems keyed to OWL allow them to work text-specific problems online. Lastly, ,

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for this edition, John
McMurry reevaluated and
revised his writing at the
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Electrocatalysis in chemical processes has become a ubiquitous reality. This very timely introductory text covers new materials, processes and industry sectors: nanotechnology, microreactors, membrane separations, hybrid processes,

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clean technologies, energy savings and safe production of energy, renewables and biotechnology.

Some completely new processes for the solid-liquid systems are also discussed in detail, thus creating new opportunities of sustainable

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development not only in industrial practice.

This unique book covers fundamentals of organolithium compounds and gives a comprehensive overview of the latest synthetic advances and

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developments in the field. Part I covers computational and spectroscopic aspects as well as structure-reactivity relationships of organolithiums, whereas Part II deals with new lithium-based synthetic methodologies as well as

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novel synthetic applications of
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A useful resource for newcomers
and active researchers involved in
organic synthesis, whether working
in academia or industry!

Everyone is becoming more

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environmentally conscious and therefore, chemical processes are being developed with their environmental burden in mind. This also means that more traditional chemical methods are being replaced with new innovations and

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this includes new solvents.

Solvents are everywhere, but how necessary are they? They are used in most areas including synthetic chemistry, analytical chemistry, pharmaceutical production and processing, the food and flavour

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Electrocatalysis in the pharmaceutical industry and the materials and coatings sectors. However, the principles of green chemistry guide us to use less of them, or to use safer, more environmentally friendly solvents if they are essential.

Therefore, we should always ask

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ourselves, do we really need a solvent? Green chemistry, as a relatively new sub-discipline, is a rapidly growing field of research. Alternative solvents - including supercritical fluids and room temperature ionic liquids - form a

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significant portion of research in green chemistry. This is in part due to the hazards of many conventional solvents (e.g. toxicity and flammability) and the significant contribution that solvents make to the waste generated in many

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chemical processes. Solvents are important in analytical chemistry, product purification, extraction and separation technologies, and also in the modification of materials.

Therefore, in order to make chemistry more sustainable in

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these fields, a knowledge of alternative, greener solvents is important. This book, which is part of a green chemistry series, uses examples that tie in with the 12 principles of green chemistry e.g. atom efficient reactions in benign

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solvents and processing of renewable chemicals/materials in green solvents. Readers get an overview of the many different kinds of solvents, written in such a way to make the book appropriate to newcomers to the field and

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prepare them for the 'green choices' available. The book also removes some of the mystique associated with 'alternative solvent' choices and includes information on solvents in different fields of chemistry such as analytical and

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materials chemistry in addition to catalysis and synthesis. The latest research developments, not covered elsewhere, are included such as switchable solvents and biosolvents. Also, some important areas that are often overlooked are

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described such as naturally sourced solvents (including ethanol and ethyl lactate) and liquid polymers (including poly(ethyleneglycol) and poly(dimethylsiloxane)). As well as these additional alternative solvents

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being included, the book takes a more general approach to solvents, not just focusing on the use of solvents in synthetic chemistry. Applications of solvents in areas such as analysis are overviewed in addition to the more widely

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recognised uses of alternative solvents in organic synthesis.

Unfortunately, as the book shows, there is no universal green solvent and readers must ascertain their best options based on prior chemistry, cost, environmental

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benefits and other factors. It is important to try and minimize the number of solvent changes in a chemical process and therefore, the importance of solvents in product purification, extraction and separation technologies are

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highlighted. The book is aimed at newcomers to the field whether research students beginning investigations towards their thesis or industrial researchers curious to find out if an alternative solvent would be suitable in their work.

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This book helps readers move from fundamental organic chemistry principles to a deeper understanding of reaction mechanisms. It directly relates sophisticated mechanistic theories to synthetic and biological

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Electrochemistry is a practical, student-friendly textbook. Presents material in a student-friendly way by beginning each chapter with a brief review of basic organic chemistry, followed by in-depth discussion of certain mechanisms

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organic mechanisms Presents material in a student-friendly way by beginning each chapter with a brief review of basic organic chemistry, followed by in-depth discussion of certain mechanisms Includes end-of-chapter questions

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Sustainable Process Engineering

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This contribution to SpringerBriefs in Green Chemistry outlines and discusses the four major green chemistry metrics (atom economy, reaction mass efficiency, E factor and process mass intensity), at a

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Electrochemistry is a subject at a level that is comprehensible by upper-level undergraduates. Such students have previously received fundamental training in organic chemistry basics, and are ideally positioned to learn about green chemistry principles, of which metrics is one foundational pillar. Following this, other green metrics in common use are

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discussed, along with applications that allow important calculations to be easily undertaken. Finally, an introduction to metrics in the context of life cycle analyses is presented. It should be noted that no other available publication teaches green chemistry metrics in detail with an emphasis on educating undergraduates,

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whilst simultaneously providing a contemporary industrial flavour to the material.

The book presents the latest developments in narrow fabrics and smart materials from research institutions, machinery building companies and producers of such products, presented during the International Week of

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Narrow and Smart Textiles in Spring 2018
in Mönchengladbach, Germany. It also demonstrates different applications of braided and woven fabrics. Braided and woven narrow products are produced using completely different techniques, but have a lot of similarities in their applications – they are used as belts, ropes and tubes in

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areas ranging from medical textiles, cables, technical and home applications to large-scale transport belts and long tubes for transporting oil from the bottom of the ocean.

This book provides a detailed introduction to organic radical polymers and open-shell macromolecules. Functional

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macromolecules have led to marked increases in a wide range of technologies, and one of the fastest growing of these fields is that of organic electronic materials and devices. To date, synthetic and organic electronic device efforts have focused almost exclusively on closed-shell polymers despite the promise of open-shell

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This text represents the first comprehensive review of the design, synthesis, characterization, and device applications of open-shell polymers. In particular, it will summarize the impressive synthetic and device performance efforts that have been achieved with respect to

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Electrocatalysis in energy storage, energy conversion, magnetic, and spintronic applications. By combining comprehensive reviews with a wealth of informative figures, the text provides the reader with a complete “molecules-to-modules” understanding of the state of the art in open-shell macromolecules. Moreover, the

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monograph highlights future directions for open-shell polymers in order to allow the reader to be part of the community that continues to build the field. In this way, the reader will gain a rapid understanding of the field and will have a clear pathway to utilize these materials in next-generation applications.

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The American edition of our monograph is not a mere translation of the Czech edition, which appeared some five years ago. We have had to respect the fact that even such a short period has sufficed for progress in this field, and that the field of application of methods of organic analysis has widened. We have therefore revised a

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number of chapters in Part 1, the general part of the monograph-mainly those devoted to chromatographic methods, which have been extended and complemented by methods of thin-layer chromatography and electrophoresis. The chapters on the theory of color reactions and on analytical literature have also been

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extended; the chapter on spectral methods has been extended by including the use of proton magnetic resonance in organic analysis, and the list of references has been enlarged by adding books of importance for organic analysis. In Part 2, the part dealing specifically with various elements and chemical groups, we have extended the

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chapters on solubility and on acids and bases. The methods for the detection and identification of given classes of compounds have also been supplemented by references to recent papers.

Hydroformylation

Green Chemistry Metrics

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Applications in Organic Synthesis 1

Lees' Loss Prevention in the Process

Industries

Biomimetic Lipid Membranes:

Fundamentals, Applications, and

Commercialization

From Fundamentals to Applications

This book contains the texts of

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*the lectures which were given at
the Nato Advanced Study
Institute on Advanced Heat
Pumps which was held at
Espinho, Portugal in September
1980. A previous NATO
Advanced Study Institute on the*

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topic of heat pumps had been held in 1975. The significance of heat pumps with respect to energy conservation was the main topic of this Institute. In 1980 it was felt that considerable research had to be done in order

to be able to produce more energy efficient, less costly and more widely applicable heat pumps. This requires a good understanding of the functioning of the types of heat pumps available. The simultaneous

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coverage of the basic funda

mentals of heat pumps of

different drive in one lecture

series therefore was the goal of

the 1980 Advanced Study

Institute. Only a few lectures

were devoted to heat pump

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*applications. The lectures on
heat pump applications were
intended to give only a short
overview. They were
supplemented by lectures on the
latest developments on vapour
compression as well as sorption*

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Since its original appearance in 1977, Advanced Organic Chemistry has found wide use as a text providing broad coverage of the structure, reactivity and synthesis of organic compounds.

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The Fourth Edition provides updated material but continues the essential elements of the previous edition. The material in Part A is organized on the basis of fundamental structural topics such as structure,

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stereochemistry, conformation

and aromaticity and basic

mechanistic types, including

nucleophilic substitution, addition

reactions, carbonyl chemistry,

aromatic substitution and free

radical reactions. The material in

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Part B is organized on the basis of reaction type with emphasis on reactions of importance in laboratory synthesis. As in the earlier editions, the text contains extensive references to both the primary and review literature and

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provides examples of data and reactions that illustrate and document the generalizations. While the text assumes completion of an introductory course in organic chemistry, it reviews the fundamental

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concepts for each topic that is discussed. The Fourth Edition updates certain topics that have advanced rapidly in the decade since the Third Edition was published, including computational chemistry,

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structural manifestations of aromaticity, enantioselective reactions and lanthanide catalysis. The two parts stand alone, although there is considerable cross-referencing. Part A emphasizes quantitative

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and qualitative description of structural effects on reactivity and mechanism. Part B emphasizes the most general and useful synthetic reactions. The focus is on the core of organic chemistry, but the information provided

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forms the foundation for future study and research in medicinal and pharmaceutical chemistry, biological chemistry and physical properties of organic compounds. The New Revised 5th Edition will be available shortly. For details,

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*Before the Subcommittee on Air
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2

Reactive Separation Processes
Phase-Transfer Catalysis