

Principles Of Polymerization Odian Solution

How can a scientist or engineer synthesize and utilize polymers to solve our daily problems? This introductory text, aimed at the advanced undergraduate or graduate student, provides future scientists and engineers with the fundamental knowledge of polymer design and synthesis to achieve specific properties required in everyday applications. In the first five chapters, this book discusses the properties and characterization of polymers, since designing a polymer initially requires us to understand the effects of chemical structure on physical and chemical characteristics. Six further chapters discuss the principles of polymerization reactions including step, radical chain, ionic chain, chain copolymerization, coordination and ring opening. Finally, material is also included on how commonly known polymers are synthesized in a laboratory and a factory. This book is suitable for a one semester course in polymer chemistry and does not demand prior knowledge of polymer science.

Providing a range of information on polymers and polymerization techniques, this text covers the gamut of polymer science from synthesis, structure and properties to function and applications. It analyzes speciality polymers, including acrylics, fluoropolymers, polysilanes, polyphosphazenes, and inorganic and conducting polymers. The book examines the stereochemistry of polymerization and the stereoregularity of polymers.

Large numbers of chemical engineers work with polymerization reactions and the problems and the challenges particular to the production of polymers. These problems have no counterparts in small-molecule reactions, and thus usually are neglected in standard reactor courses. This book provides a clearly written, comprehensive textbook on polymerization reactor engineering, appropriate for senior-level undergraduate and 1st- and 2nd-year graduate students. It focuses on polymer structure and structure-property relationships conditions that can play a role in dictating structure.

Maintaining a balance between depth and breadth, the Sixth Edition of Principles of Polymer Systems continues to present an integrated approach to polymer science and engineering. A classic text in the field, the new edition offers a comprehensive exploration of polymers at a level geared toward upper-level undergraduates and beginning graduate stu

This second edition Encyclopedia supplies nearly 350 gold standard articles on the methods, practices, products, and standards influencing the chemical industries. It offers expertly written articles on technologies at the forefront of the field to maximize and enhance the research and production phases of current and emerging chemical manufacturing practices and techniques. This collecting of information is of vital interest to chemical, polymer, electrical, mechanical, and civil engineers, as well as chemists and chemical researchers. A complete reconceptualization of the classic reference series the Encyclopedia of Chemical Processing and Design, whose first volume published in 1976, this resource offers extensive A-Z treatment of the subject in five simultaneously published volumes, with comprehensive indexing of all five volumes in the back matter of each tome. It includes material on the design of key unit operations involved with chemical processes; the design, unit operation, and integration of reactors and separation systems; process system peripherals such as pumps, valves, and controllers; analytical techniques and equipment; and pilot plant design and scale-up criteria. This reference contains well-researched sections on automation, equipment, design and simulation, reliability and maintenance, separations technologies, and energy and environmental issues. Authoritative contributions cover chemical processing equipment, engineered systems, and laboratory apparatus currently utilized in the field. It also presents expert overviews on key engineering science topics in property predictions, measurements and analysis, novel materials and devices, and emerging chemical fields. ALSO AVAILABLE ONLINE This Taylor & Francis encyclopedia is also available through online subscription, offering a variety of extra benefits for both researchers, students, and librarians, including: Citation tracking and alerts Active reference linking Saved searches and marked lists HTML and PDF format options Contact Taylor and Francis for more information or to inquire about subscription options and print/online combination packages. US: (Tel) 1.888.318.2367; (E-mail) e-reference@taylorandfrancis.com International: (Tel) +44 (0) 20 7017 6062; (E-mail) online.sales@tandf.co.uk

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.

Describes the physical and organic chemistry of the reactions by which polymer molecules are synthesized. Begins by introducing the characteristics which distinguish polymers from their much smaller sized homologs. Proceeds to a detailed study of three types of polymerization reactions: step, chain and ring-opening. Reactions are characterized as to their kinetic and thermodynamic features, their scope and utility for synthesis of different types of polymer structures, and the process conditions which are used to carry them out. Assumes a background in organic and physical chemistry and can serve as either a self-teaching guide to polymers for the beginner or as a handy reference for the experienced polymer chemist. Each chapter includes a selection of problems to aid learning and a solutions manual is available on request.

This is the first complete book of polymer terminology ever published. It contains more than 7,500 polymeric material terms. Supplementary electronic material brings important relationships to life, and audio supplements include pronunciation of each term.

Principles of Polymerization John Wiley & Sons

This book has been designed to appeal to both chemists working in, and new to, the area of polymer synthesis. It contains detailed instructions for the preparation of a wide-range of polymers by a wide variety of different techniques,

and describes how this synthetic methodology can be applied to the development of new materials. It includes details of well-established techniques, e.g. chain-growth or step-growth processes together with more up-to-date examples using methods such as atom-transfer radical polymerisation. Less-well known procedures are also included, e.g. electrochemical synthesis of conducting polymers and the preparation of liquid crystalline elastomers with highly ordered structures. Other topics covered include general polymerisation methodology, controlled/'living' polymerisation methods, the formation of cyclic oligomers during step-growth polymerisation, the synthesis of conducting polymers based on heterocyclic compounds, dendrimers, the preparation of imprinted polymers and liquid crystalline polymers. The main bulk of the text is preceded by an introductory chapter detailing some of the techniques available to the scientist for the characterisation of polymers, both in terms of their chemical composition and in terms of their properties as materials. The book is intended not only for the specialist in polymer chemistry, but also for the organic chemist with little experience who requires a practical introduction to the field.

Principles of Polymer Science and Technology in Cosmetics and Personal Care

Maintaining a balance between depth and breadth, the Sixth Edition of Principles of Polymer Systems continues to present an integrated approach to polymer science and engineering. A classic text in the field, the new edition offers a comprehensive exploration of polymers at a level geared toward upper-level undergraduates and beginning graduate students. Revisions to the sixth edition include: A more detailed discussion of crystallization kinetics, strain-induced crystallization, block copolymers, liquid crystal polymers, and gels New, powerful radical polymerization methods Additional polymerization process flow sheets and discussion of the polymerization of polystyrene and poly(vinyl chloride) New discussions on the elongational viscosity of polymers and coarse-grained bead-spring molecular and tube models Updated information on models and experimental results of rubber elasticity Expanded sections on fracture of glassy and semicrystalline polymers New sections on fracture of elastomers, diffusion in polymers, and membrane formation New coverage of polymers from renewable resources New section on X-ray methods and dielectric relaxation All chapters have been updated and out-of-date material removed. The text contains more theoretical background for some of the fundamental concepts pertaining to polymer structure and behavior, while also providing an up-to-date discussion of the latest developments in polymerization systems. Example problems in the text help students through step-by-step solutions and nearly 300 end-of-chapter problems, many new to this edition, reinforce the concepts presented. Supplying nearly 350 expertly-written articles on technologies that can maximize and enhance the research and production phases of current and emerging chemical manufacturing practices and techniques, this second edition provides gold standard articles on the methods, practices, products, and standards recently influencing the chemical industries. New material includes: design of key unit operations involved with chemical processes; design, unit operation, and integration of reactors and separation systems; process system peripherals such as pumps, valves, and controllers; analytical techniques and equipment; current industry practices; and pilot plant design and scale-up criteria. Offers new strategies to optimize polymer reactions With contributions from leading macromolecular scientists and engineers, this book provides a practical guide to polymerization monitoring. It enables laboratory researchers to optimize polymer reactions by providing them with a better understanding of the underlying reaction kinetics and mechanisms. Moreover, it opens the door to improved industrial-scale reactions, including enhanced product quality and reduced harmful emissions. Monitoring Polymerization Reactions begins with a review of the basic elements of polymer reactions and their kinetics, including an overview of stimuli-responsive polymers. Next, it explains why certain polymer and reaction characteristics need to be monitored. The book then explores a variety of practical topics, including: Principles and applications of important polymer characterization tools, such as light scattering, gel permeation chromatography, calorimetry, rheology, and spectroscopy Automatic continuous online monitoring of polymerization (ACOMP) reactions, a flexible platform that enables characterization tools to be employed simultaneously during reactions in order to obtain a complete record of multiple reaction features Modeling of polymerization reactions and numerical approaches Applications that optimize the manufacture of industrially important polymers Throughout the book, the authors provide step-by-step strategies for implementation. In addition, ample use of case studies helps readers understand the benefits of various monitoring strategies and approaches, enabling them to choose the best one to match their needs. As new stimuli-responsive and "intelligent" polymers continue to be developed, the ability to monitor reactions will become increasingly important. With this book as their guide, polymer scientists and engineers can take full advantage of the latest monitoring strategies to optimize reactions in both the lab and the manufacturing plant.

The new edition of a classic text and reference The large chains of molecules known as polymers are currently used in everything from "wash and wear" clothing to rubber tires to protective enamels and paints. Yet the practical applications of polymers are only increasing; innovations in polymer chemistry constantly bring both improved and entirely new uses for polymers onto the technological playing field. Principles of Polymerization, Fourth Edition presents the classic text on polymer synthesis, fully updated to reflect today's state of the art. New and expanded coverage in the Fourth Edition includes: * Metallocene and post-metallocene polymerization catalysts * Living polymerizations (radical, cationic, anionic) * Dendrimer, hyperbranched, brush, and other polymer architectures and assemblies * Graft and block copolymers * High-temperature polymers * Inorganic and organometallic polymers * Conducting polymers * Ring-opening polymerization * In vivo and in vitro polymerization Appropriate for both novice and advanced students as well as professionals, this comprehensive yet accessible resource enables the reader to achieve an advanced, up-to-date understanding of polymer synthesis. Different methods of polymerization, reaction parameters for synthesis, molecular weight, branching and crosslinking, and the chemical and physical structure of polymers all receive ample coverage. A thorough discussion at the elementary level prefaces each topic, with a more advanced treatment following. Yet the language throughout remains straightforward and geared towards the student. Extensively updated, Principles of Polymerization, Fourth

Edition provides an excellent textbook for today's students of polymer chemistry, chemical engineering, and materials science, as well as a current reference for the researcher or other practitioner working in these areas.

Extensively revised and updated to keep abreast of recent advances, *Polymers: Chemistry and Physics of Modern Materials*, Third Edition continues to provide a broad-based, high-information text at an introductory, reader-friendly level that illustrates the multidisciplinary nature of polymer science. Adding or amending roughly 50% of the material, *General, Organic and Biochemistry* is praised for the way it gives students the tools they need to develop a working understanding of chemical principles—rather than just asking them to memorize facts. The new edition brings forward the same clear explanations, quality problem-solving support, helpful pedagogy, and applications coverage, adding new features and content to make the text even more accessible, effective, and relevant to its student audience. In order to motivate and thoroughly prepare students, particular attention is paid to relating the chemistry concepts to the human body, health, nutrition, and other important areas important to the student audience. Available in three versions: • *General, Organic, and Biochemistry*, Second Edition, 0-7167-4375-2—A hardback text of 26 chapters. • *Organic and Biochemistry*, Second Edition, 0-7167-7072-5—A paperback text containing all organic and biochemistry chapters, plus two general chemistry chapters not included in the GOB version. • *An Introduction to General Chemistry*, 0-7167-7073-3—A paperback text containing all 10 general chemistry chapters.

Extensively updated, *Principles of Polymerization*, Fourth Edition provides an excellent textbook for today's students of polymer chemistry, chemical engineering, and materials science, as well as a current reference for the researcher or other practitioner working in these areas.

An Updated Edition of the Classic Text *Polymers* constitute the basis for the plastics, rubber, adhesives, fiber, and coating industries. The Fourth Edition of *Introduction to Physical Polymer Science* acknowledges the industrial success of polymers and the advancements made in the field while continuing to deliver the comprehensive introduction to polymer science that made its predecessors classic texts. The Fourth Edition continues its coverage of amorphous and crystalline materials, glass transitions, rubber elasticity, and mechanical behavior, and offers updated discussions of polymer blends, composites, and interfaces, as well as such basics as molecular weight determination. Thus, interrelationships among molecular structure, morphology, and mechanical behavior of polymers continue to provide much of the value of the book. Newly introduced topics include: * Nanocomposites, including carbon nanotubes and exfoliated montmorillonite clays * The structure, motions, and functions of DNA and proteins, as well as the interfaces of polymeric biomaterials with living organisms * The glass transition behavior of nano-thin plastic films In addition, new sections have been included on fire retardancy, friction and wear, optical tweezers, and more.

Introduction to Physical Polymer Science, Fourth Edition provides both an essential introduction to the field as well as an entry point to the latest research and developments in polymer science and engineering, making it an indispensable text for chemistry, chemical engineering, materials science and engineering, and polymer science and engineering students and professionals.

Exploring the characterization, thermodynamics and structural, mechanical, thermal and transport behavior of polymers as melts, solutions and solids, this text covers essential concepts and breakthroughs in reactor design and polymer production and processing. It contains modern theories, end-of-chapter problems and real-world examples for a clear understanding of polymer function and development. *Fundamentals of Polymer Engineering*, Second Edition provides a thorough grounding in the fundamentals of polymer science for more advanced study in the field of polymers. Topics include reaction engineering of step-growth polymerization, emulsion polymerization, and polymer diffusion.

This and its companion Volumes 4 and 5 document the proceedings of the 5th International Symposium on Surfactants in Solution held in Bordeaux, France, July 9-13, 1984. This symposium was the continuation of the series of symposia initiated in 1976 in Albany, New York under the title "Micellization, Solubilization and Microemulsions". The next two symposia were labelled "Solution Chemistry of Surfactants" and "Solution Behavior of Surfactants: Theoretical and Applied Aspects" held in Knoxville, TN in 1978 and Potsdam, N. Y. in 1980, respectively. In 1982 at the time of the 4th Symposium in this series, it became amply evident that there was a definite need to have more a generic title to describe these biennial events, and after much deliberation it was decided that an appropriate title would be "Surfactants in Solution" as both the aggregation and adsorption aspects of surfactants were addressed. So the 4th Symposium was held in Lund, Sweden, under this new rubric, and it was decided to continue these symposia in the future under this appellation. Naturally, the Bordeaux Symposium was dubbed as the 5th International Symposium on Surfactants in Solution, and our logo became SIS which is very apropos and appealing. It was in Bordeaux that the decision was made to hold the 6th SIS Symposium in New Delhi and it is scheduled for August 18-22, 1986 in the capital of India.

This book explores functional polymers containing aromatic azo chromophores in side-chain, main-chain and other parts of their structures, known as azo polymers and which share common photoresponsive properties. It focuses on the molecular architecture of azo polymers, the synthetic methods and their most important functions, such as photoinduced birefringence and dichroism, surface-relief-grating (SRG) formation, and light-driven deformation of liquid crystal elastomers. It combines a general survey of the subject and in-depth discussions of each topic, including numerous illustrations, figures, and photographs. Offering a balance between an introduction to the core concepts and a snapshot of hot and emerging topics, it is of interest to graduate students and researchers working in this and related fields. Xiaogong Wang is a Professor at the Department of Chemical Engineering, Tsinghua University, China.

Since their first industrial use polymers have gained a tremendous success. The two volumes of "Polymers - Opportunities and Risks" elaborate on both their potentials and on the impact on the environment arising from their production and applications. Volume 11 "Polymers - Opportunities and Risks I: General and Environmental Aspects" is dedicated to the basics of the engineering of polymers – always with a view to possible environmental implications. Topics include: materials, processing, designing, surfaces, the utilization phase, recycling, and depositing. Volume 12 "Polymers - Opportunities and Risks II: Sustainability, Product Design and Processing" highlights raw materials and renewable polymers, sustainability, additives for manufacture and processing, melt modification, biodegradation, adhesive technologies, and solar applications. All contributions were written by leading experts with substantial practical experience in their fields. They are an invaluable source of information not only for scientists, but also for environmental managers and decision makers.

Covers the fundamentals of supramolecular chemistry; supramolecular advancements and methods in the areas of chemistry, biochemistry, biology, environmental and materials science and engineering, physics, computer science, and applied mathematics.

Self-healing is a well-known phenomenon in nature: a broken bone merges after some time and if skin is damaged, the wound will stop bleeding and heals again. This concept can be mimicked in order to create polymeric materials with the ability to regenerate after they have suffered degradation or wear. Already realized applications are used in aerospace engineering, and current research in this fascinating field shows how different self-healing mechanisms proven successful by nature can be adapted to produce even more versatile materials. The book combines the knowledge of an international panel of experts in the field and provides the reader with chemical and physical concepts for self-healing polymers, including aspects of biomimetic processes of healing in nature. It shows how to design self-healing polymers and explains the dynamics in these systems. Different self-healing concepts such as encapsulated systems and supramolecular systems are detailed. Chapters on analysis and friction detection in self-healing polymers and on applications round off the book.

Polymer chemistry and technology form one of the major areas of molecular and materials science. This field impinges on nearly every aspect of modern life, from electronics technology, to medicine, to the wide range of fibers, films, elastomers, and structural materials on which everyone depends. Although most of these polymers are organic materials, attention is being focused increasingly toward polymers that contain inorganic elements as well as organic components. The goal of *Inorganic Polymers* is to provide a broad overview of inorganic polymers in a way that will be useful to both the uninitiated and those already working in this field. There are numerous reasons for being interested in inorganic polymers. One is the simple need to know how structure affects the properties of a polymer, particularly outside the well-plowed area of organic materials. Another is the bridge that inorganic polymers provide between polymer science and ceramics. More and more chemistry is being used in the preparation of ceramics of carefully controlled structure, and inorganic polymers are increasingly important precursor materials in such approaches. This new edition begins with a brief introductory chapter. That is followed with a discussion of the characteristics and characterization of polymers, with examples taken from the field. Other chapters in the book detail the synthesis, reaction chemistry, molecular structure, and uses of polyphosphazenes, polysiloxanes, and polysilanes. The coverage in the second edition has been updated and expanded significantly to cover advances and interesting trends since the first edition appeared. Three new chapters have been added, focusing on ferrocene-based polymers, other phosphorous-containing polymers, and boron-containing polymers; inorganic-organic hybrid composites; and preceramic inorganic polymers.

"Principles of Polymer Science introduces several basic and advanced aspects of polymers for the undergraduate and graduate students in chemistry, chemical engineering and materials science. The second and thoroughly revised edition includes the technical aspects of synthesis, characterization, behaviour and technology in a straightforward and lucid manner. Separate chapters on natural, inorganic and specialty polymers would attract readers from interdisciplinary courses."--BOOK JACKET.

This is a laboratory text for the mainstream organic chemistry course taught at both two and four year schools, featuring both microscale experiments and options for scaling up appropriate experiments for use in the macroscale lab. It provides complete coverage of organic laboratory experiments and techniques with a strong emphasis on modern laboratory instrumentation, a sharp focus on safety in the lab, excellent pre- and post-lab exercises, and multi-step experiments. Notable enhancements to this new edition include inquiry-driven experimentation, validation of the purification process, and the implementation of greener processes (including microwave use) to perform traditional experimentation.

With such a wide diversity of properties and applications, is it any wonder that industry and academia have such a fascination with polymers? A solid introduction to such an enormous and important field is critical to the modern polymer scientist-to-be, but most of the available books do not stress practical problem solving or include recent advances. Serving as the polymer book for the new millennium, *Introduction to Polymer Science and Chemistry: A Problem Solving Approach* unites the fundamentals of polymer science and polymer chemistry in a seamless presentation. Emphasizing polymerization kinetics, the author uses a unique question-and-answer approach when developing theory or introducing new concepts. The first four chapters introduce polymer science, focusing on physical and molecular properties, solution behavior, and molecular weights. The remainder of the book explores polymer chemistry, devoting individual, self-contained chapters to the main types of polymerization reactions: condensation; free radical; ionic; coordination; and ring-opening. It introduces recent advances such as supramolecular polymerization, hyperbranching, photoemulsion polymerization, the grafting-from polymerization process, polymer brushes, living/controlled radical polymerization, and immobilized metallocene catalysts. With numerical problems accompanying the discussion at every step along with numerous end-of-chapter exercises, *Introduction to Chemical Polymer Science: A Problem Solving Approach* is an ideal introductory text and self-study vehicle for mastering the principles and methodologies of modern polymer science and chemistry.

This work examines the science and technology used in the manufacture of acrylic fibre for both mass-produced commodity products and premium products. It elucidates the chemistry and fibre production techniques of speciality acrylics such as flame-retardant, water-reversible bicomponent, producer dyed and others. Capacity figures for developing countries are published here.; This work is intended for: polymer, fibre and textile scientists, chemists and engineers; physical and dye chemists; textile company managers; and upper-level undergraduate and graduate students in these disciplines.

A well-rounded and articulate examination of polymer properties at the molecular level, *Polymer Chemistry* focuses on fundamental principles based on underlying chemical structures, polymer synthesis, characterization, and properties. It emphasizes the logical progression of concepts and provide mathematical tools as needed as well as fully derived problems for advanced calculations. The much-anticipated Third Edition expands and reorganizes material to better

develop polymer chemistry concepts and update the remaining chapters. New examples and problems are also featured throughout. This revised edition: Integrates concepts from physics, biology, materials science, chemical engineering, and statistics as needed. Contains mathematical tools and step-by-step derivations for example problems. Incorporates new theories and experiments using the latest tools and instrumentation and topics that appear prominently in current polymer science journals. Polymer Chemistry, Third Edition offers a logical presentation of topics that can be scaled to meet the needs of introductory as well as more advanced courses in chemistry, materials science, polymer science, and chemical engineering.

Tissue or organ transplantation are among the few options available for patients with excessive skin loss, heart or liver failure, and many common ailments, and the demand for replacement tissue greatly exceeds the supply, even before one considers the serious constraints of immunological tissue type matching to avoid immune rejection. Tissue engineering promises to help sidestep constraints on availability and overcome the scientific challenges, with huge medical benefits. This book lays out the principles of tissue engineering. It will be a useful reference work for those associated with this field and as a textbook for specialized courses in the subject. It is a companion volume to Saltzman's OUP book on drug delivery.

This Third Edition of the classic, best-selling polymer science textbook surveys theory and practice of all major phases of polymer science, engineering, and technology, including polymerization, solution theory, fractionation and molecular-weight measurement, solid-state properties, structure-property relationships, and the preparation, fabrication and properties of commercially-important plastics, fibers, and elastomers.

The first English edition of this book was published in 2014. This book was originally intended for undergraduate and graduate students and had one major objective: teach the basic concepts of kinetics and reactor design. The main reason behind the book is the fact that students frequently have great difficulty to explain the basic phenomena that occur in practice. Therefore, basic concepts with examples and many exercises are presented in each topic, instead of specific projects of the industry. The main objective was to provoke students to observe kinetic phenomena and to think about them. Indeed, reactors cannot be designed and operated without knowledge of kinetics. Additionally, the empirical nature of kinetic studies is recognized in the present edition of the book. For this reason, analyses related to how experimental errors affect kinetic studies are performed and illustrated with actual data. Particularly, analytical and numerical solutions are derived to represent the uncertainties of reactant conversions in distinct scenarios and are used to analyze the quality of the obtained parameter estimates. Consequently, new topics that focus on the development of analytical and numerical procedures for more accurate description of experimental errors in reaction systems and of estimates of kinetic parameters have been included in this version of the book. Finally, kinetics requires knowledge that must be complemented and tested in the laboratory. Therefore, practical examples of reactions performed in bench and semi-pilot scales are discussed in the final chapter. This edition of the book has been organized in two parts. In the first part, a thorough discussion regarding reaction kinetics is presented. In the second part, basic equations are derived and used to represent the performances of batch and continuous ideal reactors, isothermal and non-isothermal reaction systems and homogeneous and heterogeneous reactor vessels, as illustrated with several examples and exercises. This textbook will be of great value to undergraduate and graduate students in chemical engineering as well as to graduate students in and researchers of kinetics and catalysis.

Exploring the chemistry of synthesis, mechanisms of polymerization, reaction engineering of step-growth and chain-growth polymerization, polymer characterization, thermodynamics and structural, mechanical, thermal and transport behavior of polymers as melts, solutions and solids, Fundamentals of Polymer Engineering, Third Edition covers essential concepts and breakthroughs in reactor design and polymer production and processing. It contains modern theories and real-world examples for a clear understanding of polymer function and development. This fully updated edition addresses new materials, applications, processing techniques, and interpretations of data in the field of polymer science. It discusses the conversion of biomass and coal to plastics and fuels, the use of porous polymers and membranes for water purification, and the use of polymeric membranes in fuel cells. Recent developments are brought to light in detail, and there are new sections on the improvement of barrier properties of polymers, constitutive equations for polymer melts, additive manufacturing and polymer recycling. This textbook is aimed at senior undergraduate students and first year graduate students in polymer engineering and science courses, as well as professional engineers, scientists, and chemists. Examples and problems are included at the end of each chapter for concept reinforcement. Principles of Polymer Chemistry, Second Edition was written for advanced undergraduate and graduate students in polymer chemistry, along with practicing chemists who need a reference guide. Many important events have taken place since the First Edition was published in 1995, and they are updated here. For example, sections have been included on controlled/living free radical polymerization, and sections on metathesis type polymerization and metallocene catalysts were expanded. The book was also expanded to include discussions of thermodynamics of elasticity, thermodynamics of polymeric solutions, and rheology and viscoelasticity. A chapter on degradation of polymers was also added.

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