

Textbook Of Polymer Science By Fw Billmeyer

Filling a gap in the market, this textbook provides a concise, yet thorough introduction to polymer science for advanced engineering students and practitioners, focusing on the chemical, physical and materials science aspects that are most relevant for engineering applications. After covering polymer synthesis and properties, the major section of the book is devoted to polymeric materials, such as thermoplastics and polymer composites, polymer processing such as injection molding and extrusion, and methods for large-scale polymer characterization. The text concludes with an overview of engineering plastics. The emphasis throughout is on application-relevant topics, and the author focuses on real-life, industry-relevant polymeric materials.

Handbook of Polymers, Second Edition, presents normalized, up-to-date polymer data in a consistent and easily referenceable layout. This new edition represents an update of the available data, including new values for many commercially available products, verification of existing data, and removal of older data where it is no longer useful. The book includes data on all major polymeric materials used by the plastics industry and all branches of the chemical industry, as well as specialty polymers used in the electronics, pharmaceutical, medical, and space fields. The entire scope of the data is divided into sections to make data comparison and search easy, including synthesis, physical, mechanical, and rheological properties, chemical resistance, toxicity and environmental impact, and more. The data enables engineers and materials scientists to solve practical problems, be that in applications, research and development, or legislation. The most current grades of materials have been selected to provide readers with information that is characteristic of currently available products. Includes practical data on the most widely used polymers for engineers and materials scientists in design, manufacture, and applications research Presents data on polymer synthesis, properties, chemical resistance, processing, and their related environmental impacts Provides a comprehensive update to the data, including new information and the verification of existing datasets

Macromolecules is an introductory book about macromolecules, specifically about the fundamental aspects of macromolecules, such as their nature, the ways they are formed, and their behavior. This book also focuses on the basics of macromolecules, which includes history, composition, and properties. The topics covered in this book include polymerization kinetics, chemical reactions, and degradation of macromolecules. This book also discusses biological molecules, including naturally occurring materials, synthetic macromolecules, and model compounds. Students majoring in chemistry or other related fields, such as materials engineering, will find this book very useful.

"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.

Brydson's Plastics Materials, Eighth Edition, provides a comprehensive overview of the commercially available plastics materials that bridge the gap between theory and practice. The book enables scientists to understand the commercial implications of their work and provides engineers with essential theory. Since the previous edition, many developments have taken place in plastics materials, such as the growth in the commercial use of sustainable bioplastics, so this book brings the user fully up-to-date with the latest materials, references, units, and figures that have all been thoroughly updated. The book remains the authoritative resource for engineers, suppliers, researchers, materials scientists, and academics in the field of polymers,

including current best practice, processing, and material selection information and health and safety guidance, along with discussions of sustainability and the commercial importance of various plastics and additives, including nanofillers and graphene as property modifiers. With a 50 year history as the principal reference in the field of plastics material, and fully updated by an expert team of polymer scientists and engineers, this book is essential reading for researchers and practitioners in this field. Presents a one-stop-shop for easily accessible information on plastics materials, now updated to include the latest biopolymers, high temperature engineering plastics, thermoplastic elastomers, and more Includes thoroughly revised and reorganised material as contributed by an expert team who make the book relevant to all plastics engineers, materials scientists, and students of polymers Includes the latest guidance on health, safety, and sustainability, including materials safety data sheets, local regulations, and a discussion of recycling issues

This book is written for undergraduate and graduate students in chemical engineering and chemistry. Designed to cover all main aspects of the field, it is written with a progressive logic, defining terms and concepts as they are introduced. The book describes and classifies polymers and copolymers, including detailed coverage of their properties. It also examines the types of chain growth and step growth polymerization and copolymerization reactions. Other main topics include polymer characterization techniques, practical experimental practices, industrial processing techniques, and commercially important polymers such as biopolymers, thermoplastics, and conducting polymers.

This monograph aims to give an overview of recent chemical and technological developments in the area of polymers and co-polymers derived from isobutylene, which have a wide range of (industrial) applications. The scientific basis for presenting the material " application of the acid-base theory with a view to the fundamental steps of isobutylene polymerization " is combined with the application of quantum-chemical calculations of catalysts, linked active centers, separate elementary stages of the process, and critical analysis of some experimental data. In addition, a number of problems, such as the macrokinetic description of isobutylene polymerization, description of the balanced scheme of industrial production of isobutylene polymers, and initiation of isobutylene polymerization with the help of immobilized cationic catalysts are discussed. Special attention is given to ecological aspects of synthesis and application of isobutylene polymers. This book will be of value and interest to researchers in the areas of chemistry and physics of high-molecular compounds, as well as engineers and technologists specialized in the area of olefins and polyolefins.

"The Chemistry of Polymers is a concise, easy-to-read, inexpensive introduction to the subject and fulfils the need for a polymer text written from an applied angle. It covers the basics of polymer chemistry while emphasising the practical applications and is essential for those who wish to acquire a rapid overview of the field. This book covers the basics of polymer synthesis, characterisation, reaction kinetics and materials science, as well as important specialised topics such as polymer degradation, polymers and pollution, and a variety of technological developments. Now in its second edition, the book has been revised and expanded to reflect recent developments in the subject. There are, for example, extensive updates to the "Special topics in polymer chemistry" section, with an additional section on optically active polymers, expanded sections on ionic and co-ordination polymerisations, and copolymerisation, and additional examples of new environmental legislation are outlined wherever appropriate."

Introduction CHEMISTRY Chemical Structure Chain Polymerizations Non-Chain Polymerizations PHYSICAL CHEMISTRY Molecule Size and Shape Solution Thermodynamics Polymer Hydrodynamics PHYSICS Polymer Assemblies Transitions and Relaxations Solid State Properties TECHNOLOGY Auxiliaries Elastomers Fibers Plastics Appendix
Technical and technological development demands the creation of new materials that are stronger, more reliable, and more durable—materials with new properties. This book skillfully

blends and integrates polymer science, plastic technology, and rubber technology to highlight new developments and trends in advanced polyblends. The fundamentals of polymerization, polymer characteristics, rheology and morphology, as well as composition, technology, testing and evaluation of various plastics, rubbers, fibers, adhesives, coatings, and composites are comprehensively presented in this informative volume. The book presents the developments of advanced polyblends and the respective tools to characterize and predict the material properties and behavior. It provides important original and theoretical experimental results that use non-routine methodologies often unfamiliar to many readers. Furthermore chapters on novel applications of more familiar experimental techniques and analyses of composite problems are included, which indicate the need for the new experimental approaches that are presented. This new book:

- Provides an up-to-date and thorough exposition of the present state of the art of polyblends and composites
- Familiarizes the reader with new aspects of the techniques used in the examination of polymers, emphasizing plastic technology and rubber technology
- Describes the types of techniques now available to the polymer chemist and technician and discusses their capabilities, limitations, and applications
- Provides a balance between materials science and the mechanics aspects, basic and applied research, and high-technology and high-volume (low-cost) composite development

Entrepreneurs and professionals engaged in production of as well as research and development in polymers will find the information presented here valuable and informative.

This book skillfully blends and integrates polymer science, plastic technology and rubber technology. The fundamentals of polymerization, polymer characteristics, rheology and morphology, as well as the composition, technology, testing and evaluation of various plastics, rubbers, fibres, adhesives, coatings and composites are comprehensively presented. New to this Edition Extensive discussion of dendritic polymers, dendrimers and useful inorganic polymers Lucid description of the use of power polymers in developing solar photovoltaic devices In-depth coverage of the applications of nanotechnology to polymers Detailed explanation of the use of polymers in waste disposal and recycling The book is highly suitable for all entrepreneurs and professionals engaged in production of as well as research and development in polymers. It will also be found immensely useful by advanced level students of physics, chemistry, materials science, and electronics specializing in polymers, as well as students of electronics, chemical and metallurgical engineering having courses in polymer technology/materials science and technology.

“Highly recommended!” – CHOICE New Edition Offers Improved Framework for Understanding Polymers Written by well-established professors in the field, *Polymer Chemistry, Second Edition* provides a well-rounded and articulate examination of polymer properties at the molecular level. It focuses on fundamental principles based on underlying chemical structures, polymer synthesis, characterization, and properties. Consistent with the previous edition, the authors emphasize the logical progression of concepts, rather than presenting just a catalog of facts. The book covers topics that appear prominently in current polymer science journals. It also provides mathematical tools as needed, and fully derived problems for advanced calculations. This new edition integrates new theories and experiments made possible by advances in instrumentation. It adds new chapters on controlled polymerization and chain conformations while expanding and updating material on topics such as catalysis and synthesis, viscoelasticity, rubber elasticity, glass transition, crystallization, solution properties, thermodynamics, and light scattering. *Polymer Chemistry, Second 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, and chemical engineering. Now in its second edition, this widely used text provides a unique presentation of today's polymer science. It is both comprehensive and readable. The authors are leading educators in this field with extensive background in industrial and academic polymer research. The text

starts with a description of the types of microstructures found in polymer

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.

Very few polymer mechanics problems are solved with only pen and paper today, and virtually all academic research and industrial work relies heavily on finite element simulations and specialized computer software. Introducing and demonstrating the utility of computational tools and simulations, Mechanics of Solid Polymers provides a modern view of how solid polymers behave, how they can be experimentally characterized, and how to predict their behavior in different load environments. Reflecting the significant progress made in the understanding of polymer behaviour over the last two decades, this book will discuss recent developments and compare them to classical theories. The book shows how best to make use of commercially available finite element software to solve polymer mechanics problems, introducing readers to the current state of the art in predicting failure using a combination of experiment and computational techniques. Case studies and example Matlab code are also included. As industry and academia are increasingly reliant on advanced computational mechanics software to implement sophisticated constitutive models – and authoritative information is hard to find in one place - this book provides engineers with what they need to know to make best use of the technology available. Helps professionals deploy the latest experimental polymer testing methods to assess suitability for applications Discusses material models for different polymer types Shows how to best make use of available finite element software to model polymer behaviour, and includes case studies and example code to help engineers and researchers apply it to their work

This is an introductory textbook on polymer science aimed at lecturers/professors, undergraduate and graduate students of polymer science and technology courses as well as engineering (materials, chemical, civil, food, etc.), chemistry, and physics. It is also aimed at engineers and technologists. Each chapter is written starting from simple concepts and progressively getting more complex towards its end, to help the reader decide how deep to go into each topic. Each chapter also presents the solution of many proposed problems, guiding the reader to solve numerically the everyday problems polymer technologists face, by applying theoretical concepts. Additionally, at every chapter's end there is a list of problems for the reader to check his/her understanding of the topics. The book contains a list of more than 10 experiments to perform in the laboratory, linked to some of the concepts discussed in the book. It also serves as a long-term reference with many figures, diagrams, tables, chemical equations containing frequently needed information. It contains as well an appendix with a long list of chemical structures of the main commercially available polymers.

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.

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.

Polymer Science and Innovative Applications: Materials, Techniques, and Future Developments introduces the science of innovative polymers and composites, their analysis via experimental techniques and simulation, and their utilization in a variety of application areas. This approach helps to unlock the potential of new materials for product design and other uses. The book also examines the role that these applications play in the human world, from pollution and health impacts, to their potential to make a positive contribution in areas including environmental remediation, medicine and healthcare, and renewable energy. Advantages, disadvantages, possibilities, and challenges relating to the utilization of polymers in human society are included. Presents the latest advanced applications of polymers and their composites and identifies key areas for future development. Introduces the simulation methods and experimental techniques involved in the modification of polymer properties, supported by clear and detailed images and diagrams. Supports an interdisciplinary approach, enabling readers across different fields to harness the power of new materials for innovative applications.

Introduction to Polymer Chemistry provides undergraduate students with a much-needed, well-rounded presentation of the principles and applications of natural, synthetic, inorganic, and organic polymers. With an emphasis on the environment and green chemistry and materials, this fourth edition continues to provide detailed coverage of natural and synthetic giant molecules, inorganic and organic polymers, elastomers, adhesives, coatings, fibers, plastics, blends, caulks, composites, and ceramics. Building on undergraduate work in foundational courses, the text fulfills the American Chemical Society Committee on Professional Training (ACS CPT) in-depth course requirement.

This high school textbook introduces polymer science basics, properties, and uses. It starts with a broad overview of synthetic and natural polymers and then covers synthesis and preparation, processing methods, and demonstrations and experiments. The history of polymers is discussed alongside the s

Polymer physics is one of the key courses not only in polymer science but also in material science. In his textbook Strobl presents the elements of polymer physics to the necessary extent in a very didactical way. His main focus is on the concepts and major phenomena of polymer physics, not just on mere physical methods. He has written the book in a personal style evaluating the concepts he is dealing with. Every student in polymer and materials science will be happy to have it on his shelf.

This book has been written in a concise manner to include all fundamental aspects of polymer science including recent inventions in polymerisation's and polymers. It covers atom transfer radical polymerisation (ATRP), reversible addition-fragmentation chain transfer (RAFT), nitroxide-mediated polymerisation (NMP), click chemistry as well as stereopolymerisation, ring opening metathesis polymerisation (ROMP), group transfer polymerisation (GTP), plasma polymerisation etc. in addition to the usual polymerisation mechanisms such as radical, ionic and step polymerisations. It also includes new developments of polymer science which are considered as hot topics of functional polymers like smart or intelligent polymers, light emitting polymers, conducting polymers, magnetic polymers, optically active and/or chiral polymers, liquid crystalline polymers, self-healing polymers, polymers for biomedical applications, dendrimers and/or dendritic polymers and polymer nanocomposites etc.

Basics of Polymer Chemistry is of great interest to the chemistry audience. The basic properties of polymers, including diverse fundamental and applied aspects, are presented. This book constitutes a basis for understanding polymerization, and it presents a comprehensive overview of the scientific research of polymers. The chapters presented can be used as a reference for those interested in understanding the sustainable development in polymers.

Basics of Polymer Chemistry provides a balanced coverage of the key developments in this field, and highlights recent and emerging technical achievements. The topics covered present a comprehensive overview of the subject area and are therefore of interest to professors and students. The recent developments in polymerization using catalysts, homo and copolymerization are presented, and it contains current efforts in designing new polymer architectures. Improved property performance attributes of the polymers by controlling their molecular-structural characteristics such as molecular weight distribution, comonomer type content distribution, and branching level are also discussed.

Textbook of polymer science Polymer Science A Textbook for Engineers and Technologists Carl Hanser Verlag GmbH Co KG

Covering a broad range of polymer science topics, Handbook of Polymer Synthesis, Characterization, and Processing provides polymer industry professionals and researchers in polymer science and technology with a single, comprehensive handbook summarizing all aspects involved in the polymer production chain. The handbook focuses on industrially important polymers, analytical techniques, and formulation methods, with chapters covering step-growth, radical, and co-polymerization, crosslinking and grafting, reaction engineering, advanced technology applications, including conjugated, dendritic, and nanomaterial polymers and emulsions, and characterization methods, including spectroscopy, light scattering, and microscopy.

This introductory text is intended as the basis for a two or three semester course in synthetic macromolecules. It can also serve as a self-instruction guide for engineers and scientists without formal training in the subject who find themselves working with polymers. For this reason, the material covered begins with basic concepts and proceeds to current practice, where appropriate. Serves as both a textbook and an introduction for scientists in the field Problems accompany each chapter

This successor to the popular textbook, "Polymer Physics" (Springer, 1999), is the result of a quarter-century of teaching experience as well as critical comments from specialists in the various sub-fields, resulting in better

explanations and more complete coverage of key topics. With a new chapter on polymer synthesis, the perspective has been broadened significantly to encompass polymer science rather than “just” polymer physics. Polysaccharides and proteins are included in essentially all chapters, while polyelectrolytes are new to the second edition. Cheap computing power has greatly expanded the role of simulation and modeling in the past two decades, which is reflected in many of the chapters. Additional problems and carefully prepared graphics aid in understanding. Two principles are key to the textbook’s appeal: 1) Students learn that, independent of the origin of the polymer, synthetic or native, the same general laws apply, and 2) students should benefit from the book without an extensive knowledge of mathematics. Taking the reader from the basics to an advanced level of understanding, the text meets the needs of a wide range of students in chemistry, physics, materials science, biotechnology, and civil engineering, and is suitable for both masters- and doctoral-level students. Praise for the previous edition: ...an excellent book, well written, authoritative, clear and concise, and copiously illustrated with appropriate line drawings, graphs and tables. - Polymer International ...an extremely useful book. It is a pleasure to recommend it to physical chemists and materials scientists, as well as physicists interested in the properties of polymeric materials. - Polymer News This valuable book is ideal for those who wish to get a brief background in polymer science as well as for those who seek a further grounding in the subject. - Colloid Polymer Science The solutions to the exercises are given in the final chapter, making it a well thought-out teaching text. - Polymer Science

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. 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.

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.

'An excellent textbook for an advanced undergraduate or introductory graduate course on polymer chemistry. ...The book is easy to read and understand. The emphasis on commercially important materials makes it a definite choice for a textbook.' -Microchemical Journal 'This excellent, well-written book, suitable for advanced undergraduates and graduate level classes in polymer syntheses, would also be useful as a general resource book....thoroughly referenced, and contain[s] excellent problem sets.' -Choice This outstanding text combines comprehensive discussions of reaction mechanisms of polymer chemistry with detailed descriptions of practical industrial applications. Intended for graduate students and professionals, this text examines topics at the forefront of today's research-including high performance materials, polymeric reagents and catalysts, and ultraviolet light curing of polymeric coatings. Each chapter contains helpful review questions reinforcing key points. The book also features useful appendixes describing two highly applicable computer programs.

Filling a gap in the literature and all set to become the standard in this field, this monograph begins with a look at computational viscoelastic fluid mechanics and studies of turbulent flows of dilute polymer solutions. It then goes on to discuss simulations of nanocomposites, polymerization kinetics, computational approaches for polymers and modeling polyelectrolytes. Further sections deal with tire optimization, irreversible phenomena in polymers, the hydrodynamics of artificial and bacterial flagella as well as modeling and simulation in liquid crystals. The result is invaluable reading for polymer and theoretical chemists, chemists in industry, materials scientists and plastics technologists.

Publisher Description

Macromolecular Engineering: Design, Synthesis and Application of Polymers explores the role of macromolecular engineering in the development of polymer systems with engineered structures that offer the desired combination of properties for advanced applications. This book is organized into sections covering theory and principles, science and technology, architectures and technologies, and applications, with an emphasis on the latest advances in techniques, materials, properties, and end uses – and including recently commercialized, or soon to be commercialized, designed polymer systems. The chapters are contributed by a group of leading figures who are actively researching in the field. This is an invaluable resource for researchers and scientists interested in polymer synthesis and design, across the fields of polymer chemistry, polymer science, plastics engineering, and materials science and engineering. In industry, this book supports engineers, R&D, and scientists working on polymer design for application areas such as biomedical and

healthcare, automotive and aerospace, construction and consumer goods. Presents the theory, principles, architectures, technologies, and latest advances in macromolecular engineering for polymer design and synthesis Explains polymer design for cutting-edge applications areas, including coatings, automotive, industrial, household and medical uses Approaches several novel materials, such as polyisobutylene (PIB), polyamide-based polyurethanes, and aliphatic polyesters

This comprehensive textbook describes the synthesis, characterization and technical and engineering applications of polymers. Offering a broad and balanced introduction to the basic concepts of macromolecular chemistry and to the synthesis and physical chemistry of polymers, it is the ideal text for graduate students and advanced Masters students starting out in polymer science. Building on the basic principles of organic chemistry and thermodynamics, it provides an easily understandable and highly accessible introduction to the topic. Step by step, readers will obtain a detailed and well-founded understanding of this vibrant and increasingly important subject area at the intersection between chemistry, physics, engineering and the life sciences. Following an approach different from many other textbooks in the field, the authors, with their varying backgrounds (both from academia and industry), offer a new perspective. Starting with a clear and didactic introduction, the book discusses basic terms and sizes and shapes of polymers and macromolecules. There then follow chapters dedicated to polymers in solutions, molar mass determination, and polymers in the solid state, incl. (partially) crystalline or amorphous polymers as well as their application as engineering materials. Based on this information, the authors explain the most important polymerization methods and techniques. Often neglected in other textbooks, there are chapters on technical polymers, functional polymers, elastomers and liquid crystalline polymers, as well as polymers and the environment. An overview of current trends serves to generate further interest in present and future developments in the field. This book is the English translation of the successful German textbook "Polymere", which was awarded the Chemical Industry in Germany's 2015 literature Prize ("Literaturpreis des Fonds der Chemischen Industrie") for its innovative, novel approach, and its good accessibility and readability, while at the same time providing comprehensive coverage of the field of polymer science. This is an introductory textbook on polymer science aimed at lecturers/professors, undergraduate and graduate students of polymer science and technology courses as well as engineering (materials, chemical, civil, food, etc.), chemistry, and physics. It is also aimed at engineers and technologists. Each chapter is written starting from simple concepts and progressively getting more complex towards its end, to help the reader decide how deep to go into each topic. Each chapter also presents the solution of many proposed problems, guiding the reader to solve numerically the everyday problems polymer technologists face, by applying theoretical concepts. Additionally, at every

chapter's end there is a list of problems for the reader to check his/her understanding of the topics. The book contains a list of more than 10 experiments to perform in the laboratory, linked to some of the concepts discussed in the book. It also serves as a long-term reference with many figures, diagrams, tables, chemical equations containing frequently needed information. It contains as well an appendix with a long list of chemical structures of the main commercially available polymers.

Your search for the perfect polymers textbook ends here - with Polymer Science and Technology. By incorporating an innovative approach and consolidating in one volume the fundamentals currently covered piecemeal in several books, this efficient text simplifies the learning of polymer science. The book is divided into three main sections: polymer fundamentals; polymer formation and conversion into useful articles; and polymer properties and applications. Polymer Science and Technology emphasizes the basic, qualitative understanding of the concepts rather than rote memorization or detailed mathematical analysis. Since the book focuses on the ultimate property of the finished product, it minimizes laborious descriptions of experimental procedures used for the characterization of polymers. Instead, the author highlights how the various stages involved in the production of the finished product influence its properties. Well-organized, clear-cut, and user-friendly, Polymer Science and Technology is an outstanding textbook for teaching junior and senior level undergraduates and first year graduate students in an introductory course covering the challenging subject of polymers.

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