

Principles Of Polymerization Solution Manual

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. 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from renewable resources New section on X-ray methods and dielectric relaxation All chapters have been updated and out-of-date material removed. 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. 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 a7776bc6b9

It will also prove invaluable for industry professionals as a fundamental polymer processing analysis and synthesis reference. Replete with problem sets and a solutions manual for instructors, this textbook is recommended for undergraduate and graduate students in chemical engineering and polymer and materials engineering and science. Readers are provided with the complete panorama of polymer processing, starting with fundamental concepts through the latest current industry practices and future directions. Readers familiar with the First Edition will discover a host of new material, including: * Blend and alloy microstructuring * Twin screw-based melting and chaotic mixing mechanisms * Reactive processing * Devolatilization--theory, mechanisms, and industrial practice * Compounding--theory and industrial practice * The increasingly

important role of computational fluid mechanics * A systematic approach to machine configuration design The Second Edition expands on the unique approach that distinguishes it from comparative texts. Rather than focus on specific processing methods, the authors assert that polymers have a similar experience in any processing machine and that these experiences can be described by a set of elementary processing steps that prepare the polymer for any of the shaping methods. Thoroughly revised edition of the classic text on polymer processing The Second Edition brings the classic text on polymer processing thoroughly up to date with the latest fundamental developments in polymer processing, while retaining the critically acclaimed approach of the First Edition. All the chapters have been revised and updated, and four new chapters have been added to introduce the latest developments. On the other hand, the authors do emphasize the unique features of particular polymer processing methods and machines, including the particular elementary step and shaping mechanisms and geometrical solutions a7776bc6b9

Provides meaningful, easy-to-do laboratory activities that will help students in understanding the basic principles of polymer synthesis, structure and functions. It is intended to enable the students prepare a variety of common polymers to investigate their properties as well as to discover their uses and applications. * Thermal characterization of polymers through DSC and TGA techniques. * Purification procedures of monomers and solvents. * Structural characterization with XRD. The book will be useful to professionals in the production as well as R&D units of polymer industries. This book is intended to be used as an laboratory manual at the graduate and postgraduate levels in Materials Science as well as any polymer chemistry course. * Identification of polymers with FT-IR, ¹H-NMR, ¹³C-NMR and UV-visible spectroscopy. * Detailed spectral, thermal and morphological characterization of polymers. * Different kinds of polymerizations reactions as well as their kinetic aspects. * 26 experiments and general analytical techniques to characterize common polymers. The book, divided in 4 main chapters, deals with different kinds of polymerization reactions as well as their kinetic aspects a7776bc6b9

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
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The author also explores the design of new plants and simulation of existing plants where conventional chemicals and material mixtures with measurable compositions are used. The author describes the basic methodologies for computer aided design and offers a description of the basic steps of process simulation in Aspen Plus and Aspen Hysys. A comprehensive and example oriented text for the study of chemical process design and simulation Chemical Process Design and Simulation is an accessible guide that offers information on the most important principles of chemical engineering design and includes illustrative examples of their application that uses simulation software. The final section covers plant design and simulation of processes using nonconventional components. This important resource: Includes information on the application of both the Aspen Plus and Aspen Hysys software that enables a comparison of the two software systems Combines the basic theoretical principles of chemical process and design with real-world examples Covers both processes with conventional organic chemicals and processes with more complex materials such as solids, oil blends, polymers and electrolytes Presents examples that are solved using a new version of Aspen software, ASPEN One 9 Written for students and academics in the field of process design, Chemical Process Design and Simulation is a practical and accessible guide to the chemical process design and simulation using proven software. In addition, to aid in comprehension, solutions to examples of real problems are included. A comprehensive and practical resource, the text uses both Aspen Plus and Aspen Hysys simulation software. The text reviews the design and simulation of individual simple unit operations that includes a mathematical model of each unit operation such as reactors, separators, and heat exchangers a7776bc6b9

The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties. The book is organized similarly to other texts in transport phenomena. The text leads the reader through the development and solution of relevant differential equations by applying familiar principles of conservation to numerous situations and by including many worked examples in each chapter. This text provides a teachable and readable approach to transport phenomena by providing numerous examples and applications. Generous portions of the text, numerous examples, and many problems apply transport phenomena to materials processing. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer a7776bc6b9

Explores fully the principles of macromolecular chemistry, methods for determining molecular weight and configuration of molecules, the structure of macromolecules, and their separations. This book includes end of chapter problems and references, and also: Enables users to improve basic knowledge of biophysical chemistry and physical polymer chemistry. The basic knowledge of both biophysical and physical polymer chemistry is covered, along with important terms, basic structural properties and relationships. Integrating coverage of polymers and biological macromolecules into a single text, Physical Chemistry of Macromolecules is carefully structured to provide a clear and consistent resource for beginners and professionals alike a7776bc6b9

Researchers seeking information that bridges the knowledge gap between the scientific principles and industrial applications of polymer crosslinking and grafting will find coverage on the basic science, the methodologies, and a focus on the specific techniques used in a variety of industrial applications such as automotive, laminates, paints, adhesives, and cable. Polymer modification using grafting and crosslinking are key ways to achieve this in an economical way and without the need for developing new materials. Often widely disparate and in a number of references, practical information on polymer grafting and crosslinking is now available in one volume. Descriptions of analytical tools that can be used to evaluate the results are also included. Coverage also includes potential biomedical applications. Rapid advances in technology require materials with improved property profiles a7776bc6b9

This laboratory manual covers important techniques for polymer synthesis and characterization, and provides newcomers with a comprehensive introduction to the basic principles of highlighted techniques. The reader will benefit from the clear writing style and straightforward approach to fairly complex ideas. Combines the extensive industrial and teaching experience of the authors Introduces the user to the concept of \"Good Manufacturing Practice\" Presents experiments that are representative of a wide variety of polymerization and characterization methods Includes numerous references for more advanced students, technicians, and researcher. The book also provides references that the more advanced reader can use to obtain in-depth explanations of techniques. Polymer Synthesis and Characterization will serve as a useful resource for industrial technicians and researchers in polymer chemistry and physics, material science, and analytical chemistry a7776bc6b9

This revised edition: Integrates concepts from physics, biology, materials science, chemical engineering, and statistics as needed. More details about atom-transfer radical polymerization and reversible addition/fragmentation chain-transfer polymerization have been added to Chapter 4 (\"Controlled Polymerization\"). It

emphasizes the logical progression of concepts and provide mathematical tools as needed as well as fully derived problems for advanced calculations. 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. More examples of relevant synthetic chemistry have been introduced into Chapter 2 ("Step-Growth Polymers"). The worked examples and figures have been augmented. 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. New examples and problems are also featured throughout. The number of homework problems has been greatly increased, to over 350 in all. 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. Chapter 8 (still called "Light Scattering by Polymer Solutions") has been supplemented with an extensive introduction to small-angle neutron scattering. Chapter 7 (renamed "Thermodynamics of Polymer Mixtures") now features a separate section on thermodynamics of polymer blends. The much-anticipated Third Edition expands and reorganizes material to better develop polymer chemistry concepts and update the remaining chapters a7776bc6b9

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. 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. 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. Emphasizing polymerization kinetics, the author uses a unique question-and-answer approach when developing theory or introducing new concepts. 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. The first four chapters introduce polymer science, focusing on physical and molecular properties, solution behavior, and molecular weights. With such a wide diversity of properties and applications, is it any wonder that industry and academia have such a fascination with polymers. 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 a7776bc6b9

Polymers have an important role in manufacturing and their engineering properties form an important part of any course in engineering. Major changes for this second edition include an introductory chapter on the environmental impact of polymers, emphasizing the important issues, and substantially revised sections on fracture testing for toughened polymers, yield, processing, heat transfer, and polymer forming. The opening chapters explain why plastics and rubbers have such distinctive properties and how these are affected by temperature, strain rate, and other factors. The book then explores how these properties can be exploited within these property constraints to produce functional components. This revised and updated second edition develops the principles of polymer engineering from the underlying materials science, and is aimed at undergraduate and postgraduate students in engineering and materials science a7776bc6b9

This text is designed for chemical and biochemical engineering students (senior undergraduate year, plus appropriate for capstone design courses where taken, plus graduates) and lecturers/tutors, and professionals in industry (chemical process, biochemical, pharmaceutical, petrochemical sectors). It contains new discussions of conceptual plant design, flowsheet development, and revamp design; extended coverage of capital cost estimation, process costing, and economics; and new chapters on equipment selection, reactor design, and solids handling processes. New discussion of conceptual plant design, flowsheet development and revamp design Significantly increased coverage of capital cost estimation, process costing and economics New chapters on equipment selection, reactor design and solids handling processes New sections on fermentation, adsorption, membrane separations, ion exchange and chromatography Increased coverage of batch processing, food, pharmaceutical and biological processes All equipment chapters in Part II revised and updated with current information Updated throughout for latest US codes and standards, including API, ASME and ISA design codes and ANSI standards Additional worked examples and homework problems The most complete and up to date coverage of equipment selection 108 realistic commercial design projects from diverse industries A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data and Excel spreadsheet calculations plus over 150 Patent References, for downloading from the companion website Extensive instructor resources: 1170 lecture slides plus fully worked solutions manual available to adopting instructors. The broad themes of Part I are flowsheet development, economic analysis, safety and environmental impact and optimization. Revised throughout, this edition has

been specifically developed for the U. New to this edition: Revised organization into Part I: Process Design, and Part II: Plant Design. Chemical Engineering Design, Second Edition, deals with the application of chemical engineering principles to the design of chemical processes and equipment. market. Part II contains chapters on equipment design and selection that can be used as supplements to a lecture course or as essential references for students or practicing engineers working on design projects. S. Extensive instructor resources, including 1170 lecture slides and a fully worked solutions manual are available to adopting instructors. A rigorous pedagogy assists learning, with detailed worked examples, end of chapter exercises, plus supporting data, and Excel spreadsheet calculations, plus over 150 Patent References for downloading from the companion website. It provides the latest US codes and standards, including API, ASME and ISA design codes and ANSI standards a7776bc6b9

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. This is the first complete book of polymer terminology ever published a7776bc6b9

It is also useful to polymer scientists wanting to know more about materials applications. It will be an invaluable aid to lecturers and as a tool for self-teaching. It is an integrated, complete, and stimulating introduction to polymer engineering suitable for a core course in mechanical or production engineering. This is a manual of complete solutions to all the problems in the text, written by the authors of the main text. Principles of Polymer Engineering 2nd edition (OUP, 1997) is a text for students in their third year a7776bc6b9

Audience: A valuable resource for scientists and engineers, academic and industrial, who are involved in the manufacture or application of polymeric dispersions. The book discusses the kinetics and mechanisms of polymerization in dispersed media, examines the processes controlling particle morphology, presents both off-line and on-line methods for the characterization of polymer colloids, considers reactor engineering and control, and covers a wide variety of applications, such as latex paint formulations, encapsulation of inorganic particles, reactive latexes, adhesives, paper coating, and biomedical and pharmaceutical applications. A comprehensive and up to date survey of the science and technology of polymeric dispersions a7776bc6b9

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. 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. Thus, interrelationships among molecular structure, morphology, and mechanical behavior of polymers continue to provide much of the value of the book. 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. An Updated Edition of the Classic Text Polymers constitute the basis for the plastics, rubber, adhesives, fiber, and coating industries. 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 a7776bc6b9

Any student with a working knowledge of calculus, physics and chemistry should be able to read this book. Polymer Physics provides an introduction to the field for upper level undergraduates and first year graduate students. The essential tools of the polymer physical chemist or engineer are derived in this book without skipping any steps a7776bc6b9

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. This introductory text is intended as the basis for a two or three semester course in synthetic macromolecules. Serves as both a textbook and an introduction for scientists in the field Problems accompany each chapter a7776bc6b9

Principles of Polymerization, Fourth Edition presents the classic text on polymer synthesis, fully updated to reflect today's state of the art. Yet the language throughout remains straightforward and geared towards the student. 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. A thorough discussion at the elementary level prefaces each topic, with a more advanced treatment following. 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. 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. 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. 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 a7776bc6b9

It has thus been possible to show the interrelationship of the different aspects of the subject in a coherent framework. Introduction to Polymers, Second Edition discusses the synthesis, characterization, structure, and mechanical properties of polymers in a single text, giving approximately equal emphasis to each of these major topics. The book has been written to be self-contained, with most equations fully derived and critically discussed. Problems have been supplied at the end of each chapter so that students can test their understanding and practice the manipulation of data. It is supported by a large number of diagrams and micrographs and is fully referenced for more advanced reading a7776bc6b9

Introduction; Polymer Synthesis; Polymerization of styrene; Preparation of polystyrene by a free radical polymerization process; Preparation of polystyrene by an emulsion polymerization process; Preparation of polystyrene by an anionic polymerization method; Preparation of polystyrene by a cationic polymerization process; Polymerization of acrylic esters; Bulk polymerization of methyl methacrylate: a test tube demonstration; Suspension polymerization of methyl methacrylate; Redox emulsion polymerization of ethyl acrylate; Polyamides; Preparation of poly (hexamethylenesecbacamide) (nylon 6-100 by an interfacial polymerization technique; Polyesters; Preparation of poly(1,4-butylene isophthalate); Epoxy resins; Preparation of a cured epoxy resin by the room temperature reaction of bisphenol A diglycidyl ether with polyamines; Polymerization of vinyl acetate; Seeded emulsion terpolymerization of vinyl acetate, Butyl acrylate, and vinyl neodecanoate with gradual monomer and initiator additions; Preparation of

poly(vinyl alcohol) by the alcoholysis of poly(vinyl acetate); Polymer characterization; Nuclear magnetic resonance; Infrared spectroscopy; Thermogravimetric analysis; Differential scanning calorimetry; Dilute solution viscosity of polymers; Gel permeation chromatography; Light scattering; End group analysis; X-ray diffraction; Optical microscopy; Dynamic mechanical analysis a7776bc6b9

New edition brings classic text up to date with the latest science, techniques, and applications With its balanced presentation of polymer chemistry, physics, and engineering applications, the Third Edition of this classic text continues to instill readers with a solid understanding of the core concepts underlying polymeric materials. Following a brief introduction, *Fundamental Principles of Polymeric Materials* is divided into four parts: Part 1: Polymer Fundamentals Part 2: Polymer Synthesis Part 3: Polymer Properties Part 4: Polymer Processing and Performance Thoroughly Updated and Revised Readers familiar with the previous edition of this text will find that the organization and style have been updated with new material to help them grasp key concepts and discover the latest science, techniques, and applications. For example, there are new introductory sections on organic functional groups focusing on the structures found in condensation polymerizations. The text also features new techniques for polymer analysis, processing, and microencapsulation as well as emerging techniques such as atom transfer radical polymerization. At the end of each chapter are problems—including many that are new to this edition—to test the reader's grasp of core concepts as they advance through the text. It begins with molecular-level considerations and then progressively builds the reader's knowledge with discussions of bulk properties, mechanical behavior, and processing methods. There are also references leading to the primary literature for further investigation of individual topics. A classic in its field, this text enables students in chemistry, chemical engineering, materials science, and mechanical engineering to fully grasp and apply the fundamentals of polymeric materials, preparing them for more advanced coursework. Both students and instructors have praised the text for its clear explanations and logical organization a7776bc6b9

Revised and updated throughout, *Hansen Solubility Parameters: A User's Handbook*, Second Edition features the three Hansen solubility parameters for over 1200 chemicals and correlations for over 400 materials including p. Hansen solubility parameters (HSPs) are used to predict molecular affinities, solubility, and solubility-related phenomena a7776bc6b9

Kinetic expressions incorporate the possibility of a variable-volume reaction mass, and feature new examples to illustrate the effects of variable volume. New sections on

scaleup calculations for the laminar flow of non-Newtonian fluids; liquid-crystal polymers; and group-transfer polymerization, including a quantitative treatment of Ziegler-Natta polymerization with worked-out examples. All kinetic expressions are written in terms of conversions (rather than monomer concentration) for greater generality and ease of application. Expanded discussion of extended-chain crystals and their commercial developments; phase behavior in polymer-solvent systems; and three-dimensional stress and strain introduction to the Flory-Huggins theory; the "modified Cross" model; and Tobolsky's "Procedure X" for extracting discrete relaxation times and moduli from data

The manual provides complete solutions to all of the problems in the main text, helping professors and students alike to increase the efficiency and effectiveness of instruction. This manual is the companion guide for Principles of Polymer Engineering, a text whose case studies and examples met with widespread approval from polymer science educators

Highlighting dynamic developments in polymer synthesis, this book focuses on the chemical techniques to synthesize and characterize biomedically relevant polymers and macromolecules. • Aids researchers developing polymers and materials for biomedical applications • Describes biopolymers from a synthetic perspective, which other similar books do not do • Covers areas that include: cationically-charged macromolecules, pseudo-peptides, polydrugs and prodrugs, controlled radical polymerization, self-assembly, polycondensates, and polymers for surface modification

Books in Print

The book is divided into three main sections: po. 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. Your search for the perfect polymers textbook ends here - with Polymer Science and Technology

With over 250 geometrical model diagrams, Polymer Solutions is a necessary reference for students and for scientists pursuing a broader understanding of polymers. Polymer Solutions: An Introduction to Physical Properties offers a fresh, inclusive approach to teaching the fundamentals of physical polymer science. Students, instructors, and professionals in polymer chemistry, analytical chemistry, organic chemistry, engineering, materials, and textiles will find Iwao Teraoka's text at once accessible and highly detailed in its treatment of the properties of polymers in the solution phase. The

author's incorporation of recent advances in the instrumentation of size-exclusion chromatography, the method by which polymers are analyzed, renders the text particularly topical. Teraoka's purpose in writing Polymer Solutions is twofold: to familiarize the advanced undergraduate and beginning graduate student with basic concepts, theories, models, and experimental techniques for polymer solutions; and to provide a reference for researchers working in the area of polymer solutions as well as those in charge of chromatographic characterization of polymers. Subjects discussed include: Real, ideal, Gaussian, semirigid, and branched polymer chains Polymer solutions and thermodynamics Static light scattering of a polymer solution Dynamic light scattering and diffusion of polymers Dynamics of dilute and semidilute polymer solutions Study questions at the end of each chapter not only provide students with the opportunity to test their understanding, but also introduce topics relevant to polymer solutions not included in the main text a7776bc6b9

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