Statistical Thermodynamics Of Polymer Solutions

Polymerization
Molecular Thermodynamics of Fluid-Phase Equilibria
Selected Works of Paul J. Flory Volume I
Statistical Thermodynamics Of Surfaces, Interfaces, And Membranes
Polymer Blends Volume 1
Statistical Thermodynamics of Polymer Solutions and Precipitation Chromatography
Thermodynamics of Fluids Under Flow
Principles of Polymer Chemistry
Thermodynamics of Polymer Blends, Volume I
Polymer solution properties
Handbook of Polymer Solution Thermodynamics
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Excluded Volume Effects in Polymer Solutions
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Molecular Thermodynamics of Fluid-phase Equilibria
Physical Chemistry of Polymer Solutions
Modern Methods of Polymer Characterization
Statistical Physics of Macromolecules
Polymer Solution Properties
Makromolekulare Chemie
Theory of Liquids and Other Disordered Media
Polymer Physics
Part A. Statistical Thermodynamics of Poly(dimethylsiloxane) Solutions
The Thermodynamics of Polymer Solutions Using the Methods of Statistical Mechanics
An Introduction to Statistical Thermodynamics
Controlling the Morphology of Polymers
Modern Theory of Polymer Solutions
Textbook of Polymer Science
Polymer Solution Properties; Part 1: Statistics and Thermodynamics (Volumes 1 and 2).
Polymer Blends

FRANKLIN RAMOS

Polymerization Courier Corporation
Thermodynamics is an indispensable tool for developing a large and growing fraction of new polymers and polymer blends. These two volumes show the researcher how thermodynamics can be used to rank polymer pairs in order of immiscibility, including the search for suitable chemical structure of compatibilizers. Because of the great current commercial interest in this most dynamic sector of the polymer industry, there is high interest in studying their physical and mechanical properties, their structures, and the processes of their formation and manufacture. These Books are dedicated to Analysis of the Thermodynamics of Polymer Blends. Thermodynamic behavior of blends determines the compatibility of the components, their morphological features, rheological behavior, and microphase structures. As a result, the most important physical and mechanical characteristics of blends can be identified. The information in these two volumes will be useful to all those involved in polymer research, development, analysis and advanced process engineering.
Molecular Thermodynamics of Fluid-Phase Equilibria Amer Inst of Physics
The classic guide to mixtures, completely updated with new models, theories, examples, and data. Efficient separation operations and many other chemical processes depend upon a thorough understanding of the properties of gaseous and liquid mixtures. Molecular Thermodynamics of Fluid-Phase Equilibria, Third Edition is a systematic, practical guide to interpreting, correlating, and predicting thermodynamic properties used in mixture-related phase-equilibrium calculations. Completely updated, this edition reflects the growing maturity of techniques grounded in applied statistical thermodynamics and molecular simulation, while relying on classical thermodynamics, molecular physics, and physical chemistry wherever these fields offer superior solutions. Detailed new coverage includes: Techniques for improving separation processes and making them more environmentally friendly. Theoretical concepts enabling the description and interpretation of solution properties. New models, notably the lattice-fluid and statistical associated-fluid theories. Polymer solutions, including gas-polymer equilibria, polymer blends, membranes, and gels. Electrolyte solutions, including semi-empirical models for solutions containing salts or volatile electrolytes. Coverage also includes: fundamentals of classical thermodynamics of phase equilibria; thermodynamic properties from volumetric data; intermolecular forces; fugacities in gas and liquid mixtures; solubilities of gases and solids in liquids; high-pressure phase equilibria; virial coefficients for quantum gases; and much more. Throughout, Molecular Thermodynamics of Fluid-Phase Equilibria strikes a perfect balance between empirical techniques and theory, and is replete with useful examples and experimental data. More than ever, it is the essential resource for engineers, chemists, and other professionals working with mixtures and related processes.
Selected Works of Paul J. Flory Volume I John Wiley & Sons
Längst ein Klassiker: Kein anderes deutschsprachiges Werk über Makromoleküle erscheint bereits in der sechsten Auflage! Mit Band 2 liegt nun eine zeitgemäße Behandlung der phsikalischen Eigenschaften von Makromolekülen vor. Er schildert in seinem ersten Teil die Struktur isolierter Moleküle

und die zur Strukturaufklärung verwendeten Verfahren, bevor dann Mikro- und Makrokonformationen von Makromolekülen beschrieben werden. Der zweite Teil befasst sich mit der physikalischen Struktur von Molekülverbänden in amorphen Zustaänden, Schmelzen und konzentrierten Lösungen, im kristallinen Zustand, in Mesophasen sowie in und an Grenzflächen, bevor im dritten Teil Makromoleküle in Lösungen diskutiert werden. Teil vier ist dann den Schmelzen und ihren Eigenschaften gewidmet, Teil fünf behandelt die mechanischen Eigenschaften polymerer Festkörper wie Elastizität, Viskoelastizität und Bruchverhalten. Auch in diesem Band stehen eine nicht zu elementare Darstellung des Stoffes und die integrierende Behandlung von Chemie, Physik, Biologie und Technologie im Vordergrund, die von einem breiten Leserkreis geschätzt werden.

Statistical Thermodynamics Of Surfaces, Interfaces, And Membranes Springer Science & Business Media

This textbook introduces chemistry and chemical engineering students to molecular descriptions of thermodynamics, chemical systems, and biomolecules. Equips students with the ability to apply the method to their own systems, as today's research is microscopic and molecular and articles are written in that language Provides ample illustrations and tables to describe rather difficult concepts Makes use of plots (charts) to help students understand the mathematics necessary for the contents Includes practice problems and answers

Polymer Blends Volume 1 John Wiley & Sons

The Statistical Thermodynamics of Polymer Solutions at Finite ConcentrationsStatistical Thermodynamics of Polymer Solutions and Precipitation ChromatographyPhysical Chemistry of Polymer SolutionsElsevier

Statistical Thermodynamics of Polymer Solutions and Precipitation Chromatography Springer

Polymer Blends, Volume 1 highlights the importance of polymer blends as a major new branch of macromolecular science. Topics range from polymer-polymer compatibility and the statistical thermodynamics of polymer blends to the phase separation behavior of polymer-polymer mixtures, transport phenomena in polymer blends, and mechanical properties of multiphase polymer blends. The optical behavior, solid state transition behavior, and rheology of polymer blends are also discussed. This book is organized into 10 chapters and begins with an overview of polymer blends, with emphasis on terminology and the effect of molecular weight on the thermodynamics of polymer blends as well as phase equilibria and transitions. The discussion then turns to the miscibility of homopolymers and copolymers, in bulk and in solution, from the experimental and theoretical viewpoints. The chapters that follow explore the statistical thermodynamics of polymer blends, paying particular attention to the Flory and lattice fluid theories, along with the phase relationship in polymer mixtures. The interfacial energy, structure, and adhesion between polymers in relation to the properties of polymer blends are considered. The final chapter examines the phenomena of low molecular weight penetrant transport. Currently accepted models for unsteady-state and steady-state permeation of polymeric materials are presented. A discussion of unsteady-state absorption and desorption behavior observed in a variety of polymer blends complements the treatment of permeation behavior. This book is intended to provide academic and industrial research scientists and technologists with a broad background in current principles and practice concerning mixed polymer systems.

Thermodynamics of Fluids Under Flow Routledge

This text presents an introduction to the field of statistical physics of macromolecules, from the basic concepts to modern achievements. Applications in various fields of polymer physical chemistry and molecular biophysics are also covered, as are: the fundamentals of statistical theory of polymer solutions and melts; classical, sealing and renormalization group approaches; the main ideas of statistical theories of polymer liquid crystals, polymer networks and polyelectrolytes; dynamic viscoelastic behavior of polymer systems; models of house, Zimm and reptation concepts; and specific features of main biopolymers - DNA and proteins. This English edition also includes sections describing the most important recent advances such as: statistical theory of DNA gel-electrophoresis, polymers at interfaces, and dynamics of concentrated solutions of rigid polymers.

Principles of Polymer Chemistry John Wiley & Sons

"A large number of exercises of a broad range of difficulty make this book even more useful...a good addition to the literature on thermodynamics at the undergraduate level." — Philosophical Magazine Although written on an introductory level, this wide-ranging text provides extensive coverage of topics of current interest in equilibrium statistical mechanics. Indeed, certain traditional topics are given somewhat condensed treatment to allow room for a survey of more recent advances. The book is divided into four major sections. Part I deals with the principles of quantum statistical mechanics and includes discussions of energy levels, states and eigenfunctions, degeneracy and other topics. Part II examines systems composed of independent molecules or of other independent subsystems. Topics range from ideal monatomic gas and monatomic crystals to polyatomic gas and configuration of polymer molecules and rubber elasticity. An examination of systems of interacting molecules comprises the nine chapters in Part III, reviewing such subjects as lattice statistics, imperfect gases and dilute liquid solutions. Part IV covers quantum statistics and includes sections on Fermi-Dirac and Bose-Einstein statistics, photon gas and free-volume theories of quantum liquids. Each chapter includes problems varying in difficulty — ranging from simple numerical exercises to small-scale "research" propositions. In addition, supplementary reading lists for each chapter invite students to pursue the subject at a more advanced level. Readers are assumed to have studied thermodynamics, calculus, elementary differential equations and elementary quantum mechanics. Because of the flexibility of the chapter arrangements, this book especially lends itself to use in a one-or two-semester graduate course in chemistry, a one-semester senior or graduate course in physics or an introductory course in statistical mechanics.

Thermodynamics of Polymer Blends, Volume I Pearson Education

A molecular view on the fundamental issues in polymer physics is provided with an aim at students in chemistry, chemical engineering, condensed matter physics and material science courses. An updated translation by the author, a renowned Chinese chemist, it has been proven to be an effective source of learning for many years. Up-to-date developments are reflected throughout the work in this concise presentation of the topic. The author aims at presenting the subject in an efficient manner, which makes this particularly suitable for teaching polymer physics in settings where time is limited, without having to sacrifice the extensive scope that this topic demands.

Polymer solution properties New Age International

Presents the methods used for characterization of polymers. In addition to theory and basic principles, the instrumentation and apparatus necessary for methods used to study the kinetic and thermodynamic interactions of a polymer with its environment are covered in detail. Some of the methods examined include polymer separations and characterization by size exclusion and high performance chromatography, inverse gas chromatography, osmometry, viscometry, ultracentrifugation, light scattering and spectroscopy.

Handbook of Polymer Solution Thermodynamics Courier Corporation

This book is mainly concerned with building a narrow but secure ladder which polymer chemists or engineers can climb from the primary level to an advanced level without great difficulty (but by no means easily, either). This book describes some fundamentally important topics, carefully chosen, covering subjects from thermodynamics to molecular weight and its distribution effects. For help in self-education the book adopts a "Questions and Answers" format. The mathematical derivation of each equation is shown in detail. For further reading, some original references are also given. Numerous physical properties of polymer solutions are known to be significantly different from those of low molecular weight solutions. The most probable explanation of this obvious discrepancy is the large molar volume ratio of solute to solvent together with the large number of consecutive segments that constitute each single molecule of the polymer chains present as solute. Thorough understanding of the physical chemistry of polymer solutions requires some prior mathematical background in its students. In the original literature, detailed mathematical derivations of the equations are universally omitted for the sake of space-saving and simplicity. In textbooks of polymer science only extremely rough schemes of the theories and then the final equations are shown. As a consequence, the student cannot learn, unaided, the details of the theory in which he or she is interested from the existing textbooks; however, without a full understanding of the theory, one cannot analyze actual experimental data to obtain more basic and realistic physical quantities. In particular, if one intends to apply the theories in industry, accurate understanding and ability to modify the theory are essential.

Statistical Thermodynamics BoD – Books on Demand

This book comprises the contributions of several authors in the area of polymer characterization by atomic force microscopy of the polymer network structure formed in Ferroelectric Liquid Crystals Cells; polymerization by microwave irradiation method of starch/acrylic acid/acrylamide; polymerization of olefins; emulsion polymerization; ring opening polymerization; cationic polymerization of vinyl monomers ; block and graft copolymerization by controlled/living polymerization; fabrication of doped microstructures by two-photon polymerization; rheology of biomaterials; plant cell wall polymers; polyADP-Ribosylation in postfertilization and genome reprogramming . We hope that this book will help inspire readers to pursue study and research in this field.

Statistical Thermodynamics Cornell University Press

97774-4 The classic guide to mixtures, completely updated with new models, theories, examples, and data. Efficient separation operations and many other chemical processes depend upon a thorough understanding of the properties of gaseous and liquid mixtures. Molecular Thermodynamics of Fluid-Phase Equilibria, Third Edition is a systematic, practical guide to interpreting, correlating, and predicting thermodynamic properties used in mixture-related phase-equilibrium calculations. Completely updated, this edition reflects the growing maturity of techniques grounded in applied statistical thermodynamics and molecular simulation, while relying on classical thermodynamics, molecular physics, and physical chemistry wherever these fields offer superior solutions. Detailed new coverage includes: Techniques for improving separation processes and making them more environmentally friendly. Theoretical concepts enabling the description and interpretation of solution properties. New models, notably the lattice-fluid and statistical associated-fluid theories. Polymer solutions, including gas-polymer equilibria, polymer blends, membranes, and gels. Electrolyte solutions, including semi-empirical models for solutions containing salts or volatile electrolytes. Coverage also includes: fundamentals of classical thermodynamics of phase equilibria; thermodynamic properties from volumetric data; intermolecular forces; fugacities in gas and liquid mixtures; solubilities of gases and solids in liquids; high-pressure phase equilibria; virial coefficients for quantum gases; and much more. Throughout, Molecular Thermodynamics ofFluid-Phase Equilibria strikes a perfect balance between empirical techniques and theory, and is replete with useful examples and experimental data. More than ever, it is the essential resource for engineers, chemists, and oth

Thermodynamics Elsevier

Polymers in Solution was written for scientists and engineers who have serious research interests in newer methods for characterization of polymer solutions, but who are not seasoned experts in the theoretical and experimental aspects of polymer science. In particular, it is assumed that the reader is not familiar with the development of theoretical notions in conformational statistics and the dynamics of chainlike molecules; how these two seemingly diverse theoretical topics are related; and the role played by polymer-solvent interactions. Chapter 1 thus presents background material that introduces most of the essential concepts, including some of the mathematical apparatus most commonly used in these areas of theory. This introduction is followed by five chapters that are more closely related to particular experimental techniques. These chapters introduce further theoretical notions as needed. Three of the chapters present con siderable detail on the experimental methods, while two other chapters deal more with the interpretation of experimental results in terms of current theories. Although neutron scattering has become an almost standard technique for the study of conformational properties of macromolecules in the solid state, there has been less emphasis on its application for characterization of polymer molecules in solution. Chapter 4 covers this growing area of application.

Polymers in Solution John Wiley & Sons

Created for engineers and students working with pure polymers and polymer solutions, this handbook provides up-to-date, easy to use methods to obtain specific volumes and phase equilibrium data. A comprehensive database for the phase equilibria of a wide range of polymer-solvent systems, and PVT behavior of pure polymers are given, as are accurate predictive techniques using group contributions and readily available pure component data. Two computer programs on diskettes are included. POLYPROG implements procedures given for prediction and correlation for specific volume of pure polymer liquids and calculation of vapor-liquid equilibria (VLE) of polymer solutions. POLYDATA provides an easy method of accessing the data contained in the many databases in the book. Both disks require a computer with a math coprocessor. This handbook is a valuable resource in the design and operation of many polymer processes, such as polymerization, devolatilization, drying, extrusion, and heat exchange. Special Details: Hardcover with Disks. Special offer: Purchase this book along with X-131, Handbook of Diffusion and Thermal Properties of Polymers and Polymer

Solutions and receive a 20 percent discount off the list or member price.
Handbook of Poylmer-Liquid Interaction Parameters and Solubility Parameters Springer Science & Business Media
Understanding the structural and thermodynamic properties of surfaces, interfaces, and membranes is important for both fundamental and practical reasons. Important applications include coatings, dispersants, encapsulating agents, and biological materials. Soft materials, important in the development of new materials and the basis of many biological systems, cannot be designed using trial and error methods due to the multiplicity of components and parameters. While these systems can sometimes be analyzed in terms of microscopic mixtures, it is often conceptually simpler to regard them as dispersions and to focus on the properties of the internal interfaces found in these systems. The basic physics centers on the properties of quasi-two-dimensional systems embedded in the three-dimensional world, thus exhibiting phenomena that do not exist in bulk materials. This approach is the basis behind the theoretical presentation of Statistical Thermodynamics of Surfaces, Interfaces, and Membranes. The approach adapted allows one to treat the rich diversity of phenomena investigated in the field of soft matter physics (including both colloid/interface science as well as the materials and macromolecular aspects of biological physics) such as interfacial tension, the roughening transition, wetting, interactions between surfaces, membrane elasticity, and self-assembly. Presented as a set of lecture notes, this book is aimed at physicists, physical chemists, biological physicists, chemical engineers, and materials scientists who are interested in the statistical mechanics that underlie the macroscopic, thermodynamic properties of surfaces, interfaces, and membranes. This paperback edition contains all the material published in the original hard-cover edition as well as additional clarifications and explanations.
Excluded Volume Effects in Polymer Solutions John Wiley & Sons
Comprehensive coverage of topics in the theory of classical liquids Widely regarded as the standard text in its field, Theory of Simple Liquids gives an advanced but self-contained account of liquid state theory within the unifying framework provided by classical statistical mechanics. The structure of this revised and updated Fourth Edition is similar to that of the previous one but there are significant shifts in emphasis and much new material has been added. Major changes and Key Features in content include: Expansion of existing sections on simulation methods, liquid-vapour coexistence, the hierarchical reference theory of criticality, and the dynamics of super-cooled liquids. New sections on binary fluid mixtures, surface tension, wetting, the asymptotic decay of pair correlations, fluids in porous media, the thermodynamics of glasses, and fluid flow at solid surfaces. An entirely new chapter on applications to 'soft matter' of a combination of liquid state theory and coarse graining strategies, with sections on polymer solutions and polymer melts, colloidal dispersions, colloid-polymer mixtures, lyotropic liquid crystals, colloidal dynamics, and on clustering and gelation. Expansion of existing sections on simulation methods, liquid-vapour coexistence, the hierarchian reference of criticality, and the dynamics of super-cooled liquids. New sections on binary fluid mixtures, surface tension, wetting, the asymptotic decay of pair correlations, fluids in porous media, the thermodynamics of glasses, and fluid flow at solid surfaces. An entirely new chapter on applications to 'soft matter' of a combination of liquid state theory and coarse graining strategies, with sections on polymer solutions and polymer melts, colloidal dispersions, colloid-polymer mixtures, lyotropic liquid crystals, colloidal dynamics, and on clustering and gelation.
Polymer Physics Springer Science & Business Media
Dieses Lehrbuch der makromolekularen Chemie ist aus einer fruchtbaren Zusammenarbeit der Abteilungen Technische Chemie der Universitlit Greifswald und Physikalische Chemie der Universitlit Osnabriick im Zeitraum November 1991 bis Mai 1993 enstanden. Das Kapitel 5.5 Verarbeitung von MakromolekUlen ist von R. Heering, Universitlit Greifswald, das Kapitel7.5 Alterung und Alterungsschutz von Makromolekulen von S. JovanoviC, Universitiit Belgrad, und das Kapitel 8 Wiederverwertung von Kunststoffen von U. Guhr, A. Lappe, D. Vesper und B. Willenberg, EWvK, Wiesbaden verfaBt worden. Wir danken den Kollegen fur ihre ausgezeichneten Beitriige. Die Kapitel 3, 6 und 7.1 -7.4 wurden von K. Gehrke, die Kapitel 2, 4.1 -4.2 und 5.1 - 5.3 von E. Nordmeier, das Kapitel 5.4 von M.D. Lechner und das Kapitel 4.3 von M.D. Lechner und E. Nordmeier verfaBt. Vorrangiges Ziel des vorliegenden Werks war die Bereitstellung eines bislang nicht verfugbaren echten Lehrbuchs der Physik und Chemie der Makromolekiile fur Studenten, Chemiker und Physiker. Hierbei wurde allergroBter Wert darauf gelegt, daB die Phanomene, Theorien und experimentellen Methoden der makromolekularen Chemie von Grund auf dargestellt werden. Der vorgesehene Umfang des Lehrbuchs lieS allerdings keinen grundlegenden Exkurs uber die allgemein verwendeten physikalisch-chemischen Methoden wie UV /VIS-, IR- und NMR-Spektroskopie zu; hierzu wird auf die giingigen Lehrbucher der physikalischen Chemie vetwiesen. Bei diesen Methoden werden lediglich die Anwendungen in der makromolekularen Chemie beschrieben.
An Introduction to Statistical Thermodynamics Prentice Hall
This Is An Introductory Book Which Explains The Foundations Of The Subject And Its Application. It Is Intended Primarily For Graduate Students But May Provide Useful Information And Reading To Science And Engineering Students At All Levels. It Assumes That Readers Have Knowledge Of Basic Thermodynamics And Quantum Mechanics. With This, The Theory Has Been Developed In A Simple, Logical And Understandable Way. Some Applications Of Statistical Thermodynamics Have Been Described In Detail With Illustrative Solved Examples.There Are Two Basic Approaches In Statistical Mechanics; One Based On The Study Of Independent Particles In An Isolated System And The Other Based On The Concept Of Ensembles. In This Book Attempt Has Been Made To Take Advantage Of Both Approaches. While The Fundamental Concepts Have Been Developed By First Approach, Concept Of Ensembles Have Been Included To Bring Out The Importance Of This Concept In The Application Of Statistical Thermodynamics To Chemical Systems Where Interparticle Interactions Become Important.Part I Of The Book Deals With The Background Concepts, Fundamentals In Mathematics, Classical Mechanics, Quantum Mechanics And Thermodynamics Which Are Essential For Statistical Mechanics. Part Ii Covers Formalism Of Statistical Mechanism And Its Relation To Thermodynamics As Well As The Statistical Mechanics Of Ensembles, Quantum Statistics And Fluctuations. Part Iii Includes Chapters On The Applications Of The Formalism To Real Laboratory Chemical Systems. In This Part Additions Such As Imperfect Gases, Equilibrium Isotope And Kinetic Isotope Effects And Reactions At The Surfaces Have Been Made, In This Edition. Part Iv Is Also An Addition Which Covers Quantum Systems Such As Ideal Fermi Gas (Free Electrons In Metals), Photon Gas And Ideal Bose Gas (Helium Gas).
Makromoleküle CRC Press
Now available for the first time, this valuable reference presents polymer solubility parameters and various polymer-liquid interaction parameters in an easy-to-use form. It critically evaluates and comprehensively compiles data from original sources. It presents these quantities polymer-by-polymer, alphabetically by polymer common chemical name, fully cross-referenced by systematic chemical names, alternative names and trade names. This one-of-a-kind handbook summarizes the relationship between the various quantities and their methods of determination. This resource is an absolute must for all who are interested in the chemical industry, specifically polymer chemistry, chemical engineering, applied chemistry, and physical chemistry.

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