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An Introduction to the principles of physical chemistry from the standpoint of modern atomistics and thermodynamics Pearson Education

Chemical Thermodynamics: Principles and Applications presents a thorough development of the principles of thermodynamics--an old science to which the authors include the most modern applications, along with those of importance in developing the science and those of historical interest. The text is written in an informal but rigorous style, including anecdotes about some of the great thermodynamicists (with some of whom the authors have had a personal relationship), and focuses on "real" systems in the discussion and figures, in contrast to the generic examples that are often used in other textbooks. The book provides a basic review of thermodynamic principles, equations, and applications of broad interest. It covers the development of thermodynamics as one of the pre-eminent examples of an exact science. A discussion of the standard state that emphasizes its significance and usefulness is also included, as well as a more rigorous and indepth treatment of thermodynamics and discussions of a wider variety of applications than are found in more broadly based physical chemistry undergraduate textbooks. Combined with its companion book, Chemical Thermodynamics: Advanced Applications, the practicing scientist will have a complete reference set detailing chemical thermodynamics. Outlines the development of the principles of thermodynamics, including the most modern applications along with those of importance in developing the science and those of historical interest Provides a basic review of thermodynamic principles, equations, and applications of broad interest Treats thermodynamics as one of the preeminent examples of an exact science Provides a more rigorous and indepth treatment of thermodynamics and discussion of a wider variety of applications than are found in more broadly based physical chemistry undergraduate textbooks Includes examples in the text and exercises and problems at the end of each chapter to assist the student in learning the subject Provides a complete set of references to all sources of data and to supplementary reading sources

A Textbook of Physical Chemistry - Application of Thermodynamics | Volume 3, 5th Edition CRC Press
Modern Thermodynamics: From Heat Engines to Dissipative Structures, Second Edition presents a comprehensive introduction to 20th century thermodynamics that can be applied to both equilibrium and non-equilibrium systems, unifying what was traditionally divided into ' thermodynamics ' and ' kinetics ' into one theory of irreversible processes. This comprehensive text, suitable for introductory as well as advanced courses on thermodynamics, has been widely used by chemists, physicists, engineers and geologists. Fully revised and expanded, this new edition includes the following updates and features: Includes a completely new chapter on Principles of Statistical Thermodynamics. Presents new material on solar and wind energy flows and energy flows of interest to engineering. Covers new material on self-organization in non-equilibrium systems and the thermodynamics of small systems. Highlights a wide range of applications relevant to students across physical sciences and engineering courses. Introduces students to computational methods using updated Mathematica codes. Includes problem sets to help the reader understand and apply the principles introduced throughout the text. Solutions to exercises and supplementary lecture material provided online at <http://sites.google.com/site/modernthermodynamics/>. Modern Thermodynamics: From Heat Engines to Dissipative Structures, Second Edition is an essential resource for undergraduate and graduate students taking a course in thermodynamics.

Problems And Solutions On Thermodynamics And Statistical Mechanics (Second Edition) World Scientific Publishing Company

"an impressive text that addresses a glaring gap in the teaching of physical chemistry, being specifically focused on biologically-relevant systems along with a practical focus.... the ample problems and tutorials throughout are much appreciated." –Tobin R. Sosnick, Professor and Chair of Biochemistry and Molecular Biology, University of Chicago "Presents both the concepts and equations associated with statistical thermodynamics in a unique way that is at visual, intuitive, and rigorous. This approach will greatly benefit students at all levels." –Vijay S. Pande, Henry Dreyfus Professor of Chemistry, Stanford University "a masterful tour de force.... Barrick's rigor and scholarship come through in every chapter." –Rohit V. Pappu, Edwin H. Murty Professor of Engineering, Washington University in St. Louis This book provides a comprehensive, contemporary introduction to developing a quantitative understanding of how biological macromolecules behave using classical and statistical thermodynamics. The author focuses on practical skills needed to apply the underlying equations in real life examples. The text develops mechanistic models, showing how they connect to thermodynamic observables, presenting simulations of thermodynamic behavior, and analyzing experimental data. The reader is presented with plenty of exercises and problems to facilitate hands-on learning through mathematical simulation. Douglas

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Applied Mineralogical Thermodynamics John Wiley & Sons

Outstanding text focuses on physical technique of thermodynamics, typical problems, and significance and use of thermodynamic potential. Mathematical apparatus, first law of thermodynamics, second law and entropy, more. 1965 edition.

Chemical Thermodynamics: Advanced Applications Walter de Gruyter GmbH & Co KG

Volume 3 is the third book of the 7-volume series on Physical Chemistry written by Dr. K L Kapoor. This book is useful for 2nd and 3rd Semester students of B.Sc Chemistry (Hons and Gen). Updated fifth edition on Applications of Thermodynamics includes thoroughly updated chapter on electrochemical cells which has been written in accordance with the IUPAC recommendations. In addition to this, a brief discussion on the stability of ions of an element in different states of oxidation has been added in terms of Latimer and Frost diagrams. New illustrations on calculation of mean activity coefficient for an electrolyte have been added. Salient Features: 1. Coverage and structuring as per the latest UGC syllabus. 2. Strict adherence to the usage of SI units in all solved and unsolved problems. 3. Following the IUPAC recommendations, arrows have been changed to “equal to” sign and emf to “potential”. 4. Numerical exercises have been categorized topicwise to enable the students solve them.

Thermodynamics of Polymer Solutions CRC Press

Equilibrium Thermodynamics gives a comprehensive but concise course in the fundamentals of classical thermodynamics. Although the subject is essentially classical in nature, illustrative material is drawn widely from modern physics and free use is made of microscopic ideas to illuminate it. The overriding objective in writing the book was to achieve a clear exposition: to give an account of the subject that is both stimulating and easy to learn from. Classical thermodynamics has such wide application that it can be taught in many ways. The terms of reference for Equilibrium Thermodynamics are primarily those of the undergraduate physicist; but it is also suitable for courses in chemistry, engineering, materials science etc. The subject is usually taught in the first or second year of an undergraduate course, but the book takes the student to degree standard (and beyond). Prerequisites are elementary or school-level thermal physics.

Basic Chemical Thermodynamics (Fifth Edition) World Scientific

Advanced Thermodynamics Engineering, Second Edition is designed for readers who need to understand and apply the engineering physics of thermodynamic concepts. It employs a self-teaching format that reinforces presentation of critical concepts, mathematical relationships, and equations with concrete physical examples and explanations of applications—to help readers apply principles to their own real-world problems. Less

Mathematical/Theoretical Derivations—More Focus on Practical Application

Because both students and professionals must grasp theory almost immediately

in this ever-changing electronic era, this book—now completely in decimal outline format—uses a phenomenological approach to problems, making advanced concepts easier to understand. After a decade teaching advanced thermodynamics, the authors infuse their own style and tailor content based on their observations as professional engineers, as well as feedback from their students. Condensing more esoteric material to focus on practical uses for this continuously evolving area of science, this book is filled with revised problems and extensive tables on thermodynamic properties and other useful information. The authors include an abundance of examples, figures, and illustrations to clarify presented ideas, and additional material and software tools are available for download. The result is a powerful, practical instructional tool that gives readers a strong conceptual foundation on which to build a solid, functional understanding of thermodynamics engineering.

John Wiley & Sons

There are essentially two theories of solutions that can be considered exact: the McMillan–Mayer theory and Fluctuation Solution Theory (FST). The first is mostly limited to solutes at low concentrations, while FST has no such issue. It is an exact theory that can be applied to any stable solution regardless of the number of components and their concentrations, and the types of molecules and their sizes. Fluctuation Theory of Solutions: Applications in Chemistry, Chemical Engineering, and Biophysics outlines the general concepts and theoretical basis of FST and provides a range of applications described by experts in chemistry, chemical engineering, and biophysics. The book, which begins with a historical perspective and an introductory chapter, includes a basic derivation for more casual readers. It is then devoted to providing new and very recent applications of FST. The first application chapters focus on simple model, binary, and ternary systems, using FST to explain their thermodynamic properties and the concept of preferential solvation. Later chapters illustrate the use of FST to develop more accurate potential functions for simulation, describe new approaches to elucidate microheterogeneities in solutions, and present an overview of solvation in new and model systems, including those under critical conditions. Expert contributors also discuss the use of FST to model solute solubility in a variety of systems. The final chapters present a series of biological applications that illustrate the use of FST to study cosolvent effects on proteins and their implications for protein folding. With the application of FST to study biological systems now well established, and given the continuing developments in computer hardware and software increasing the range of potential applications, FST provides a rigorous and useful approach for understanding a wide array of solution properties. This book outlines those approaches, and their advantages, across a range of disciplines, elucidating this robust, practical theory.

Theory and Applications Oxford University Press

This textbook addresses the key questions in both classical thermodynamics and statistical thermodynamics: Why are the thermodynamic properties of a nano-sized system different from those of a macroscopic system of the same substance? Why and how is entropy defined in thermodynamics, and how is the entropy change calculated when dissipative heat is involved? What is an ensemble and why is its theory so successful? Translated from a highly successful Chinese book, this expanded English edition contains many updated sections and several new ones. They include the introduction of the grand canonical ensemble, the grand partition function and its application to ideal quantum gases, a discussion of the mean field theory of the Ising model and the phenomenon of

ferromagnetism, as well as a more detailed discussion of ideal quantum gases near $T = 0$, for both Fermi and Bose gases.

Thermodynamics in Materials Science, Second Edition Springer Science & Business Media

This textbook covers chemical thermodynamics in materials science from basic to advanced level, especially for iron and steel making processes. To improve a process by applying knowledge of thermodynamics or to assess the calculation results of thermodynamic software, an accurate and systematic understanding of thermodynamics is required. For that purpose, books from which one can learn thermodynamics from the basic to the advanced level are needed, but such books are rarely published. This book bridges the gap between the basics, which are treated in general thermodynamic books, and their application, which are only partially dealt with in most specialized books on a specific field. This textbook can be used to teach the basics of chemical thermodynamics and its applications to beginners.

The basic part of the book is written to help learners acquire robust applied skills in an easy-to-understand manner, with in-depth explanations and schematic diagrams included. The same book can be used by advanced learners as well. Those higher-level readers such as post-graduate students and researchers may refer to the basic part of the book to get down to the basic concepts of chemical thermodynamics or to confirm the basic concepts.

Abundant pages are also devoted to applications designed to present more advanced applied skills grounded in a deep understanding of the basics. The book contains some 50 examples and their solutions so that readers can learn through self-study.

A Textbook of Physical Chemistry John Wiley & Sons

Problems in Metallurgical Thermodynamics and Kinetics provides an illustration of the calculations encountered in the study of metallurgical thermodynamics and kinetics, focusing on theoretical concepts and practical applications. The chapters of this book provide comprehensive account of the theories, including basic and applied numerical examples with solutions. Unsolved numerical examples drawn from a wide range of metallurgical processes are also provided at the end of each chapter. The topics discussed include the three laws of thermodynamics; Clausius-Clapeyron equation; fugacity, activity, and equilibrium constant; thermodynamics of electrochemical cells; and kinetics. This book is beneficial to undergraduate and postgraduate students in universities, polytechnics, and technical colleges.

Methods of Thermodynamics Elsevier

During the past 20 years, the field of mechanical engineering has undergone enormous changes. These changes have been driven by many factors, including: the development of computer technology worldwide competition in industry improvements in the flow of information satellite communication real time monitoring increased energy efficiency robotics automatic control increased sensitivity to environmental impacts of human activities advances in design and manufacturing methods These developments have put more stress on mechanical engineering education, making it increasingly difficult to cover all the topics that a professional engineer will need in his or her career. As a result of these developments, there has been a growing need for a handbook that can serve the professional community by providing relevant background and current information in the field of mechanical engineering. The CRC Handbook of Mechanical Engineering serves the needs of the professional engineer as a resource of information into the next century.

Chemical Thermodynamics in Materials Science Springer Science & Business Media

This widely acclaimed text, now in its fifth edition and translated into many languages, continues to present a clear, simple and concise introduction to chemical thermodynamics.

An examination of equilibrium in the everyday world of mechanical objects provides the starting point for an accessible account of the factors that determine equilibrium in chemical systems. This straightforward approach leads students to a thorough understanding of the basic principles of thermodynamics, which are then applied to a wide range of physico-chemical systems. The book also discusses the problems of non-ideal solutions and the concept of activity, and provides an introduction to the molecular basis of thermodynamics. Over five editions, the views of teachers of the subject and their students have been incorporated. The result is a little more rigour in specifying the dimensions within logarithmic expressions, the addition of more worked examples and the inclusion of a simple treatment of the molecular basis of thermodynamics. Students on courses in thermodynamics will continue to find this popular book an excellent introductory text./a

Equilibrium Thermodynamics Springer Science & Business Media

Thermodynamics is a self-contained analysis of physical and chemical processes, based on classical thermodynamic principles. Emphasis is placed on the fundamental principles, with a combination of theory and practice, and demonstrating their application to a variety of disciplines. Included in this work are new approaches to irreversible processes, electromagnetic effects, adsorption phenomena, self-assembly, the origin of phase diagrams, critical phenomena, and Carathéodory's treatment of the second law. This book will appeal to graduate students and professional chemists and physicists who wish to acquire a more sophisticated overview of thermodynamics and related subject matter.

- Easy-to-understand style appeals to both chemists and physicists
- Discusses treatment of electromagnetic phenomena and adsorption of surface gases surfaces
- Extensively revised to cater for advanced courses in thermodynamics

Thermodynamics of Rock-Forming Crystalline Solutions CRC Press

This textbook provides a thorough and comprehensive introduction to stoichiometry and thermodynamics with special emphasis on applications to metallurgical processes. The author's approach is to introduce students early on to the fundamentals of the physical chemistry and thermodynamics of metallurgical processes and then gradually expand the treatment into progressively more advanced areas. Topics covered include the laws of thermodynamics, material and energy balances, gasification and combustion of fuels, the iron blast furnace, direct reduction reactors, nonferrous smelters, fluidized-bed roasters, the theory of solutions, chemical equilibrium, electrochemistry. Also included are over 150 worked examples and 450 exercises, many with solutions. The examples and exercises range from straightforward tests of theory to complex analyses of real processes. Every chapter is provided with a full and up-to-date set of references.

Second Edition McGraw-Hill Education

This is the second edition of the book "Thermodynamics of Fluids under Flow," which was published in 2000 and has now been corrected, expanded and updated. This is a companion book to our other title Extended irreversible thermodynamics (D. Jou, J. Casas-Vázquez and G. Lebon, Springer, 4th edition 2010), and of the textbook Understanding non-equilibrium thermodynamics (G. Lebon, D. Jou and J. Casas-Vázquez, Springer, 2008). The present book is more specialized than its counterpart, as it focuses its attention on the non-equilibrium thermodynamics of flowing fluids, incorporating non-trivial thermodynamic contributions of the flow, going beyond local equilibrium theories, i.e., including the effects of internal variables and of external forcing due to the flow. Whereas the book's first edition was much more focused on polymer solutions, with brief glimpses into ideal and real gases, the present edition covers a much wider variety of systems, such as: diluted and concentrated polymer

solutions, polymer blends, laminar and turbulent superfluids, phonon hydrodynamics and heat transport in nanosystems, nuclear collisions, far-from-equilibrium ideal gases, and molecular solutions. It also deals with a variety of situations, emphasizing the non-equilibrium flow contribution: temperature and entropy in flowing ideal gases, shear-induced effects on phase transitions in real gases and on polymer solutions, stress-induced migration and its application to flow chromatography, Taylor dispersion, anomalous diffusion in flowing systems, the influence of the flow on chemical reactions, and polymer degradation. The new edition is not only broader in scope, but more educational in character, and with more emphasis on applications, in keeping with our times. It provides many examples of how a deeper theoretical understanding may bring new and more efficient applications, forging links between theoretical progress and practical aims. This updated version expands on the trusted content of its predecessor, making it more interesting and useful for a larger audience.

Principles and Applications CRC Press

This volume is a compilation of carefully selected questions at the PhD qualifying exam level, including many actual questions from Columbia University, University of Chicago, MIT, State University of New York at Buffalo, Princeton University, University of Wisconsin and the University of California at Berkeley over a twenty-year period. Topics covered in this book include the laws of thermodynamics, phase changes, Maxwell-Boltzmann statistics and kinetic theory of gases. This latest edition has been updated with more problems and solutions and the original problems have also been modernized, excluding outdated questions and emphasizing those that rely on calculations. The problems range from fundamental to advanced in a wide range of topics on thermodynamics and statistical physics, easily enhancing the student's knowledge through workable exercises. Simple-to-solve problems play a useful role as a first check of the student's level of knowledge whereas difficult problems will challenge the student's capacity on finding the solutions. *Stoichiometry and Thermodynamics of Metallurgical Processes* Elsevier

This book is an excellent companion to *Chemical Thermodynamics: Principles and Applications*. Together they make a complete reference set for the practicing scientist. This volume extends the range of topics and applications to ones that are not usually covered in a beginning thermodynamics text. In a sense, the book covers a "middle ground" between the basic principles developed in a beginning thermodynamics textbook, and the very specialized applications that are a part of an ongoing research project. As such, it could prove invaluable to the practicing scientist who needs to apply thermodynamic relationships to aid in the understanding of the chemical process under consideration. The writing style in this volume remains informal, but more technical than in *Principles and Applications*. It starts with Chapter 11, which summarizes the thermodynamic relationships developed in this earlier volume. For those who want or need more detail, references are given to the sections in *Principles and Applications* where one could go to learn more about the development, limitations, and conditions where these equations apply. This is the only place where *Advanced Applications* ties back to the previous volume. Chapter 11 can serve as a review of the fundamental thermodynamic equations that are

necessary for the more sophisticated applications described in the remainder of this book. This may be all that is necessary for the practicing scientist who has been away from the field for some time and needs some review. The remainder of this book applies thermodynamics to the description of a variety of problems. The topics covered are those that are probably of the most fundamental and broadest interest. Throughout the book, examples of "real" systems are used as much as possible. This is in contrast to many books where "generic" examples are used almost exclusively. A complete set of references to all sources of data and to supplementary reading sources is included. Problems are given at the end of each chapter. This makes the book ideally suited for use as a textbook in an advanced topics course in chemical thermodynamics. An excellent review of thermodynamic principles and mathematical relationships along with references to the relevant sections in *Principles and Applications* where these equations are developed. Applications of thermodynamics in a wide variety of chemical processes, including phase equilibria, chemical equilibrium, properties of mixtures, and surface chemistry. Case-study approach to demonstrate the application of thermodynamics to biochemical, geochemical, and industrial processes. Applications at the "cutting edge" of thermodynamics. Examples and problems to assist in learning. Includes a complete set of references to all literature sources.

Thermodynamics in Bioenergetics CRC Press

This book considers molecular structural information, statistical methods and thermodynamic measurements, and the ways in which the relative role of each differs from another. By putting together selected papers in a single publication, the book highlights the cohesive aspects of certain advances through time and development, and can aid historical studies. Several papers from journals not widely circulated can also be found in this selection of papers.

Biomolecular Thermodynamics CUP Archive

The laws of thermodynamics have wide ranging practical applications in all branches of engineering. This invaluable textbook covers all the subject matter in a typical undergraduate course in engineering thermodynamics, and uses carefully chosen worked examples and problems to expose students to diverse applications of thermodynamics. This new edition has been revised and updated to include two new chapters on thermodynamic property relations, and the statistical interpretation of entropy. Problems with numerical answers are included at the end of each chapter. As a guide, instructors can use the examples and problems in tutorials, quizzes and examinations. Request Inspection Copy