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Biochemical engineering is one of the pillars of our basic technological knowledge, with applications in the food, pharmaceutical, biotechnological and water-treatment industries.

However, the understanding of the basic thermodynamics of processes that involve cells or other forms of life is still incomplete, and is under investigation in intensive research efforts.

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Thermodynamics is central to the practice of chemical engineering, yet students sometimes feel that the discipline is too abstract while they are studying the subject. By providing an applied and modern approach, Stanley Sandler's *Chemical, Biochemical, and Engineering Thermodynamics, Fourth Edition* helps students see the value and relevance of studying thermodynamics to all areas of chemical engineering, and gives them the depth of coverage they need to develop a solid understanding of the ...

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thermodynamics can best be

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are needed in many areas,
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Thermodynamics is a branch of physics that deals with heat, work, and temperature, and their relation to energy, radiation, and physical properties of matter. The behavior of these quantities is governed by the four laws of thermodynamics which convey a quantitative description using measurable macroscopic physical quantities, but may be explained in terms of microscopic constituents by statistical mechanics.

Thermodynamics applies to a wide variety of topics in science and engineering, especial

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Description. Reviews (0) In this newly revised 5th Edition of Chemical and Engineering Thermodynamics (PDF), Sandler presents a modern, applied approach to chemical thermodynamics and provides sufficient detail to develop a solid understanding of the key principles in the field. The ebook confronts current information on safety and environmental issues and how chemical engineering principles apply in biochemical engineering, biotechnology, polymers, and solid-state-processing.

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Aug 30, 2020 chemical

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This book covers the fundamentals of the rapidly growing field of biothermodynamics, showing how thermodynamics can best be applied to applications and processes in biochemical engineering. It describes the

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rigorous application of thermodynamics in biochemical engineering to rationalize bioprocess development and obviate a substantial fraction of this need for tedious experimental work. As such, this book will appeal to a diverse group of readers, ranging from students and professors in biochemical engineering, to scientists and engineers, for whom it will be a valuable reference.

A revised edition of the well-received thermodynamics text, this work retains the thorough coverage and excellent organization that made the first edition so popular. Now incorporates industrially relevant microcomputer programs, with

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readable style, it will serve as an introduction to the study of energy transformation in the life sciences and particularly as an accessible means for biology, biochemistry and bioengineering undergraduate students to acquaint themselves with the physical dimension of their subject. The emphasis throughout the text is on understanding basic concepts and developing problem-solving skills. The mathematical difficulty increases gradually by chapter, but no calculus is required. Topics covered include energy and its transformation, the First Law of Thermodynamics, Gibbs free energy, statistical thermodynamics, binding equilibria and reaction kinetics. Each chapter comprises numerous illustrative

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examples taken from different areas of biochemistry, as well as a broad range of exercises and references for further study.

Thermodynamic Approaches in Engineering Systems responds to the need for a synthesizing volume that throws light upon the extensive field of thermodynamics from a chemical engineering perspective that applies basic ideas and key results from the field to chemical engineering problems. This book outlines and interprets the most valuable achievements in applied non-equilibrium thermodynamics obtained within the recent fifty years. It synthesizes nontrivial achievements of thermodynamics in important branches of chemical

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Readers will gain an update on what has been achieved, what new research problems could be stated, and what kind of further studies should be developed within specialized research. Presents clearly structured chapters beginning with an introduction, elaboration of the process, and results summarized in a conclusion

Written by a first-class expert in the field of advanced methods in thermodynamics Provides a synthesis of recent thermodynamic developments in practical systems Presents very elaborate literature discussions from the past fifty years

Building up gradually from first principles, this unique introduction

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to modern thermodynamics integrates classical, statistical and molecular approaches and is especially designed to support students studying chemical and biochemical engineering. In addition to covering traditional problems in engineering thermodynamics in the context of biology and materials chemistry, students are also introduced to the thermodynamics of DNA, proteins, polymers and surfaces. It includes over 80 detailed worked examples, covering a broad range of scenarios such as fuel cell efficiency, DNA/protein binding, semiconductor manufacturing and polymer foaming, emphasizing the practical real-world applications of thermodynamic principles; more than 300 carefully tailored

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homework problems, designed to stretch and extend students' understanding of key topics, accompanied by an online solution manual for instructors; and all the necessary mathematical background, plus resources summarizing commonly used symbols, useful equations of state, microscopic balances for open systems, and links to useful online tools and datasets.

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Mathematica(r) to practically resolve thermodynamic issues.

Topics covered include: *

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Because Mathematica(r) allows the

intermingling of text and

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Process integration has been one of the most active research fields in Biochemical Engineering over the last decade and it will continue to be so if bioprocessing is to become more rational, efficient and productive. This volume outlines what has been achieved in recent years. Written by experts who have made important contributions to the European Science, Foundation Program on Process Integration in Biochemical Engineering, the volume focuses on the progress made and the major opportunities, and in addition on the limitations and the challenges in bioprocess integration that lie ahead. The concept of bioprocess integration

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is treated at various levels, including integration at the molecular, biological, bioreactor and plant levels, but also accounting for the integration of separation and mass transfer operations and biology, fluid dynamics and physiology, as well as basic science and process technology.

Thermodynamics of Biochemical Reactions emphasizes the fundamental equations of thermodynamics and the application of these equations to systems of biochemical reactions. This emphasis leads to new thermodynamic potentials that provide criteria for spontaneous

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