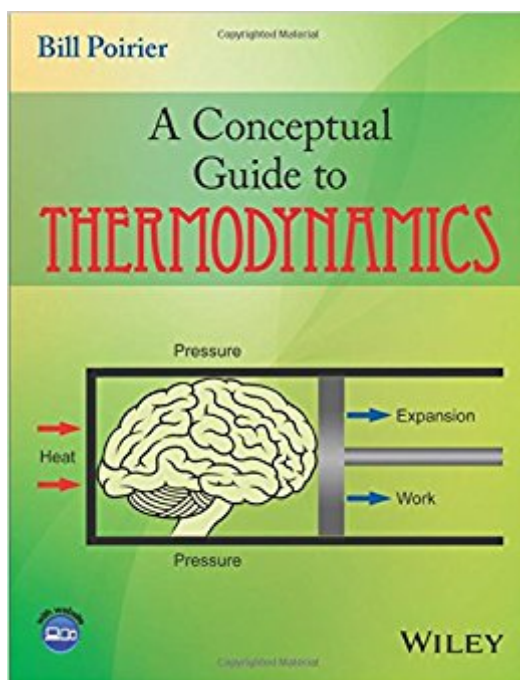


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# A Conceptual Guide To Thermodynamics



## Synopsis

Thermodynamics is the science that describes the behavior of matter at the macroscopic scale, and how this arises from individual molecules. As such, it is a subject of profound practical and fundamental importance to many science and engineering fields. Despite extremely varied applications ranging from nanomotors to cosmology, the core concepts of thermodynamics such as equilibrium and entropy are the same across all disciplines. *A Conceptual Guide to Thermodynamics* serves as a concise, conceptual and practical supplement to the major thermodynamics textbooks used in various fields. Presenting clear explanations of the core concepts, the book aims to improve fundamental understanding of the material, as well as homework and exam performance. Distinctive features include: Terminology and Notation Key: A universal translator that addresses the myriad of conventions, terminologies, and notations found across the major thermodynamics texts. Content Maps: Specific references to each major thermodynamic text by section and page number for each new concept that is introduced. Helpful Hints and Don't Try Its: Numerous useful tips for solving problems, as well as warnings of common student pitfalls. Unique Explanations: Conceptually clear, mathematically fairly simple, yet also sufficiently precise and rigorous. A more extensive set of reference materials, including older and newer editions of the major textbooks, as well as a number of less commonly used titles, is available online at <http://www.conceptualthermo.com>. Undergraduate and graduate students of chemistry, physics, engineering, geosciences and biological sciences will benefit from this book, as will students preparing for graduate school entrance exams and MCATs.

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A Conceptual Guide to Thermodynamics Bill Poirier Department of Chemistry and Biochemistry, Department of Physics, Center for Chemical Biology Texas Tech University, USA

Thermodynamics is the science that describes the behavior of matter at the macroscopic scale, and how this arises from individual molecules. As such, it is a subject of profound practical and fundamental importance to many science and engineering fields. Despite extremely varied applications ranging from nanomotors to cosmology, the core concepts of thermodynamics such as equilibrium and entropy are the same across all disciplines. A Conceptual Guide to Thermodynamics serves as a concise, conceptual and practical supplement to the major thermodynamics textbooks used in various fields. Presenting clear explanations of the core concepts, the book aims to improve fundamental understanding of the material, as well as homework and exam performance. Distinctive features include: Terminology and Notation Key: A universal translator that addresses the myriad of conventions, terminologies, and notations found across the major thermodynamics texts. Content Maps: Specific references to each major thermodynamic text by section and page number for each new concept that is introduced. Helpful Hints and Don't Try Its: Numerous useful tips for solving problems, as well as warnings of common student pitfalls. Unique Explanations: Conceptually clear, mathematically fairly simple, yet also sufficiently precise and rigorous. A more extensive set of reference materials, including older and newer editions of the major textbooks, as well as a number of less commonly used titles, is available online at <http://www.conceptualthermo.com>. Undergraduate and graduate students of chemistry, physics, engineering, geosciences and biological sciences will

benefit from this book, as will students preparing for graduate school entrance exams and MCATs.

a very concise book on Thermodynamics. Good to read and study for college level students.

Poirier is truly a master of explanation, and this guide presents a concise and refreshingly transparent approach to understanding the concepts of thermodynamics. The level and style are absolutely appropriate for undergraduates. At the same time, graduate students and even seasoned instructors will also find this book enlightening (especially for cumulative exams). I particularly like the information theory approach to entropy and the second law. The "Textbook Guide" is another unique feature that will serve to help students from a variety of disciplines. Test-takers will certainly appreciate the sound advice contained in the "Helpful Hint" and "Don't Try It" boxes. The "To Ponder" boxes will further inspire more experienced readers and also deep thinkers. I highly recommend this book to any serious student of physical science or to any student (engineering, pre-med, etc) who just wants to get a better grade on their next thermo exam.

A Conceptual Guide to Thermodynamics is the kind of book I wish I had had when I was learning thermo as an undergrad, and the kind of book I'm glad to have now that I'm teaching. In a nutshell, this book ties concepts together. Thermo, probably more than most disciplines, pulls a lot of information seemingly from the air, expecting you to know without being told what approximations are being used, which equations are appropriate, and how to read the code the different textbook authors are using in their books to write it all down. A Conceptual Guide to Thermodynamics demystifies all of this, teaching you how to think from first-principles, instead of memorizing rules for every situation. You learn WHY certain approximations work in certain situations, you learn how to easily derive the appropriate equations for those situations, and the many tables and charts help decode more than twenty textbooks of information and boil them down to their essentials, providing direction and focus in your studies like a road map does to a cross-country trip. Whether you are a student studying for an exam, or a teacher trying to make a lesson plan, you won't find a resource as complete, yet succinct; brilliant, yet accessible; or comprehensive, yet focused as this book. If that isn't enough here are some bullet point features that I love about this book: Entropy is explained in a way that is way deeper than "chaos." If you don't know what "increasing entropy by 1" actually physically means, this book is for you. The very involved and crucial area of "gas

expansions. It is not only explained in detail in the text, but summarized in a lamination-worthy chart in the back of the book. An extremely detailed notation lexicon (that includes many major textbooks from physics, chemistry, engineering, biology, and even geology) decodes and relates unfamiliar terms to their counterparts in other places. If your professor's notation doesn't match your text's notation, this book is for you. Finally, I just downloaded a free chapter from his companion website (conceptualthermo.com) all about phase transitions. This is the book that doesn't stop giving.

This book, "A Conceptual Guide to Thermodynamics," is an excellent companion to any class where classical thermodynamics is taught. Those more advanced in the field of chemistry and other disciplines can also benefit from this book by reviewing "the big picture." I found the book engaging and there are a few explanations that illuminated some topics I had wondered about since my undergraduate days. One feature that I particularly like is that the book contains heuristics to solve thermodynamics problems that students will find very valuable. The subject of the book is classical thermodynamics. Reference is occasionally made to statistical thermodynamics, but no time is spent developing that field, only using the results of it when helpful to the discussion. This is not a drawback (it's not a textbook), but the reader should be aware that "only" classical thermodynamics is presented. One of the best things about this book is relaxed diction that makes it easy to read. As stated in the book, the point was not to write a textbook going over the nitty-gritty details and deriving all the formulae but rather to be in addition to the thermodynamics part of any physical chemistry textbook (and other classes, too, that teach thermodynamics, as mentioned in the book). The author has gone to great lengths to provide a Rosetta Stone to translate conventions (like the symbols chosen for variables) between common textbooks and this book. I would heartily recommend this book to any students taking a class involving classical thermodynamics. More than that, I recommend it to anyone who wants to know more about the concepts of thermodynamics or needs to tie up loose ends from the traditional approach.

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