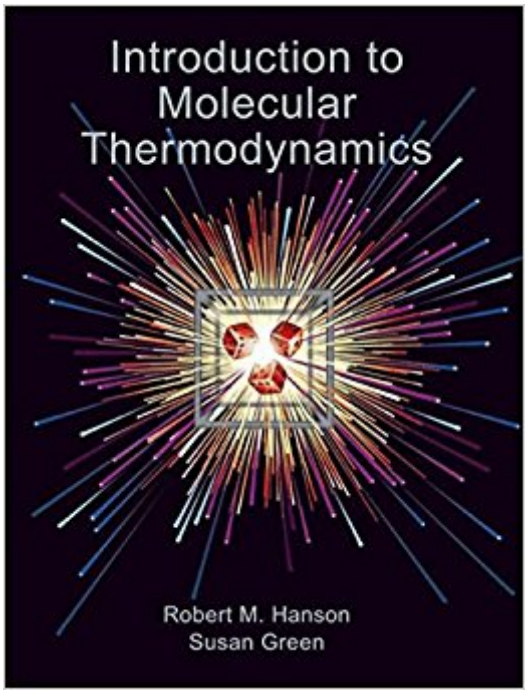
Introduction To Molecular Thermodynamics



Synopsis

This book takes readers on an adventure into the inner workings of the molecular world, following a logical step-by-step progression of ideas and examples from the field.It helps readers understand the world around them in molecular terms. It features helpful pedagogy, including chapter ending-summaries, problems and brain teasers, with answers provided at the end of the book. It is filled with real-world examples ranging from casinos to lasers to endangered coral reefs.Starting with just a few basic principles of probability and the distribution of energy, the book takes students on an adventure into the inner workings of the molecular world like no other, from probability to Gibbs energy and beyond, following a logical step-by-step progression of ideas.

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Customer Reviews

ROBERT HANSON is a Professor of Chemistry at St. Olaf College, in Northfield, Minnesota, USA, where he has been teaching since 1986. Trained as an organic chemist with Gilbert Stork at Columbia University, he shares a patent with 2001 Nobel Prize winner K.Barry Sharpless for the asymmetric epoxidation of allylic alcohols. His interest in thermodynamics goes back to early training at the California Institute of Technology, from which he got a B.S. degree in 1979. He spends his occasional moments of free time playing the violin in a community orchestra, piloting gliders and designing new Sudoku strategies. SUSAN GREEN has had the privilege of being both a student and a professor at St. Olaf College in Northfield, Minnesota, USA where she was first introduced to the idea of teaching thermodynamics to first-year students. She trained as a physical chemist at the University of Minnesota studying the vibrational and electronic structure of small

metal oxides as well as trying her hand at analytical chemistry. When she in not chasing after her two children with the help of her husband Hans, she can be found with a book.

Here at St. Olaf (I’m a student here and I know Dr. Hanson) we chemistry majors use this book in the freshman spring course, and after that we only take one semester of physical chemistry. This is in part due to the fact, I think, that this book is a very solid intro to p-chem. It’s certainly thorough. Dr. Hanson’s writing style is engaging and eloquent, almost prose-like sometimes. This was actually a problem for me sometimes; it was difficult to go fishing through the text to find the info I wanted. But for a subject that is notoriously math and derivation-based, Dr. Hanson makes the content accessible, even for freshman with only one semester of calculus behind them.However, as a caveat, there are MANY numerical errors, especially in the practice problem answers at the back of the book. Students, if you’re working through problems and one of the book answers doesn’t make sense, you aren’t crazy. It’s probably a typo! The second printing, which has a slightly glossy cover (first printing has a matte surface) is slightly better with fewer errors.

Teaching and learning thermodynamics has never been easier than usign this book.Keep in mind that probability and statistical mechanics are not the usual choice as a teaching estrategy for undergraduate courses dealing thermodynamics. Thermal machinery, abstract definitions and mid-level differential equations are the option often.But the problem with the usual choice is that concepts like internal energy, entropy and equilibroium does not come naturally as consecuence of the VERY nature of the system.And this book shos that probability is the sole rule - The nature of energy distribution and system total particle quantity determines the whole thermodynamic picture.IN A FEW WORDS: If the usual way of the thermodynamics you knew or are knowing does not make the perfect sense It would be for you, TRY this approach: The very nature of the system and some not-so-painful-probablity background EXPLAINS IT ALL.Ã Â¿Do you want to finally understand what U, S, G, or H (internal energy, entropy, Gibbs or even Helmholtz energies are?Ã Â¿Do you want to understand the underlying natural concepts behind termodynamics?READ THIS BOOK.P. D.: Initially, you don’t even need to be a quantum mechanics pro.

The consensus is when many of my colleagues (most of whom have advanced degrees in Chemistry and Chemical Engineering) read this book is "WOW!, why didn’t I learn thermodynamics this way?". That will perhaps be your reaction when you have studied thermodynamics using other introductory textbooks and thought to yourself at the end of the course "I really don’t understand

thermodynamics!"This book is perhaps the most accessible thermodynamics text that also contains advanced ideas stemming from statistical thermodynamics. The entire basis of this book is built upon the statistical notation of probability and distribution which the first 2 chapters teaches us very clearly, before moving on to Boltzmans' Distribution and the various Laws of Thermodynamics. Every chapter is nicely written with clear examples and practice at the end of each chapters that do not deviate too much from the given examples but the section of "Brain teasers" allows the students to think about the applications beyond what they have currently learned (a nice touch from the authors). I would highly recommend this book to any chemistry undergrads who are serious about becoming a chemist or even to a 1st or 2nd year grad student who need a refresher course in chemical thermodynamics or as a self study guide.

Hanson and Green used their experience, insight, and obvious love of teaching to craft a very engaging and understandable book on a rigorous subject. They explain the foundational ideas beautifully, using simple diagrams and clear, step-by-step calculations. They even take care to explain some tricky mathematical details as they proceed through the many examples, so they don't lose the rusty reader. They don't skip steps! They don't assume you remember or understand everything from previous chapters, and they always seem to anticipate those places where the reader might need a little more help, gradually titrating the level of detail and difficulty. The footnotes are great. The examples are well chosen chemical reactions that have numerous practical applications to understanding everyday phenomena: dew, frost, relative humidity, melting, boiling, evaporation, refrigeration, scuba diving, reef formation, atmospheric changes, etc. The authors have taken their wealth of experience and knowledge, and translated it into a thoughtfully organized, enjoyable, and useful book. As a person who enjoys learning, I am always looking for authors like Hanson and Green, who are willing and able to explain complicated things in a clear and compassionate way, without sacrificing the integrity or accuracy of the material. Well done!

I am in love with this book. It is very easy to read and presents the material clearly. At the end of Chapter 12, Hanson ties everything back to the beginning beautifully. It was a climactic moment that felt like the ending of an epic adventure. This book showed me the astounding beauty of Thermodynamics and the world of Chemistry, and I plan to re-read it many times.

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