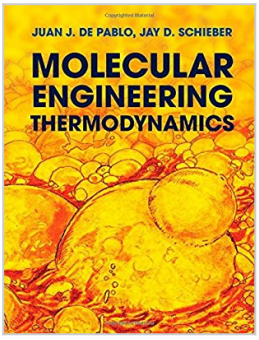

Molecular Engineering Thermodynamics (Cambridge Series in Chemical Engineering)

By Juan J. de Pablo, Jay D. Schieber

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Building up gradually from first principles, this unique introduction 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, emphasising the practical real-world applications of thermodynamic principles; more than 300 carefully tailored 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 summarising commonly used symbols, useful equations of state, microscopic balances for open systems, and links to useful online tools and datasets.

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Editorial Review

Review
"This is a book to use many times. First as a textbook that explains the principles of thermodynamics and statistical mechanics with rigour and clarity. The importance and the contemporary relevance of the subject matter is illustrated in many examples from physics, chemical engineering and biology - and it is to these examples that future readers are likely to return time and again. They illustrate how thermodynamics can be used as a framework to organize and quantify our understanding of an amazing variety of physical phenomena. A textbook to hold on to."
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"[This book] ... is both sensible and innovative. [De Pablo and Schieber] use a postulational approach to present the basic ideas of the subject, which, I believe, is the best way to teach equilibrium thermodynamics, since it is clear and concise. Their book is also important because they show how thermodynamics can be used to attack problems involving chemical reaction equilibria, properties of polymer solutions and blends, and surfaces and interfaces. They also make it clear how thermodynamics may be applied to engineering flow systems (which are not at equilibrium). A chapter on statistical mechanics shows how molecular ideas fit into the subject of thermodynamics."
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About the Author
Juan J. de Pablo is the Liew Family Professor at the Institute for Molecular Engineering, University of Chicago, and a former Director of the Materials Science and Engineering Center on Structured Interfaces, University of Wisconsin, Madison. He has won several teaching awards, been awarded a Presidential Early Career Award in Science and Engineering from the NSF and is a Fellow of the APS and AAAS.

Jay D. Schieber is Professor of Chemical Engineering in the Department of Chemical and Biological Engineering and the Department of Physics, and Director of the Center for Molecular Study of Condensed Soft Matter, at the Illinois Institute of Technology. He has been a visiting professor at universities in both Europe and Asia, holds numerous teaching awards, and was the 2004 Hougen Scholar at the University of Wisconsin, Madison.

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