

Book Review

An Introduction to Statistical Physics. W. G. V. Rosser,
John Wiley and Sons, 1982.

This new book is meant to serve as a one-semester undergraduate textbook for physics majors. The first two chapters include brief reviews of thermodynamics and of quantum mechanics, but not of classical mechanics. The ideas of probability and statistics are delegated to a five-page appendix. Undergraduates are not likely to know much about statistics and need an introduction which includes combinations, permutations, averages, and probability distributions.

The discussion of the ideas of microstates, macrostates, and ensembles in Chapter 2 is nicely done and carefully illustrated with numerical examples. Chapter 3 introduces the postulates underlying statistical mechanics and relates them to the laws of thermodynamics (in more detail than is common.) The temperature parameter β is set equal to $1/kT$ without proof.

The microcanonical ensemble is introduced (but not called by its name) in Chapter 4 and applied to an ideal paramagnet, a harmonic oscillator, and the velocity distribution of an ideal gas. Classical statistical mechanics is given but five pages.

It is not until Chapter 5 that equations are written in terms of partition functions. The partition functions of monatomic and diatomic molecules are then developed. Chapter 6 is a discussion of the Helmholtz and Gibbs energies and the requirements of thermodynamic equilibrium from both thermodynamic and statistical mechanical points of view; the chemical equilibrium constant for ideal gases is included here.

Chapter 7 is an "optional" chapter, devoted to a microscopic understanding of the ideas of heat and work. This topic is rarely so carefully treated and Professor Rosser's exposition is valuable.

The remainder of the book covers negative temperatures, Planck's radiation law, the heat capacity of a solid, and Fermi-Dirac-Bose-Einstein statistics.

Each chapter has a list of references and only about ten problems. Answers to the problems are in the back of the book.

I spent but a rainy Sunday perusing this book, while we all know that one cannot really know a textbook without living with it for a semester. I do feel that Professor Rossiter's book will be of value to instructors in lecture preparation and for auxiliary reading. I feel that most undergraduates will still find F. Reif's *Fundamentals of Statistical and Thermal Physics* (McGraw-Hill, 1965) to be the more appealing textbook.

Sandra C. Greer
Department of Chemistry
University of Maryland
College Park, Maryland 20742