

The book assumes a thorough familiarity with solid-state physics; previous knowledge of point defects and diffusion is essential. The background provided by standard first-year graduate solid-state physics courses, for example *Introduction to Solid State Physics* by Charles Kittel (Wiley, 1971) is not sufficient, and it is recommended that the prospective reader who is not already familiar with defects and diffusion research should read the book by Shewmon mentioned above prior to reading this work.

The book suffers from a number of editing problems that are distressing and may substantially confuse the neophyte. The references for data in tables are often in error, as are the table captions. Notation in the text sometimes does not correspond to that in the tables. (The discussion of the so-called Simmons-Balluffi experiment is particularly obscure because of compounding of such problems.)

Point Defects and Diffusion will be a useful addition as a reference in the library of any institution with a major effort in point defects or diffusion. The outrageous price (\$51.00 in the US) precludes purchase by most students and many libraries that must be careful about spending priorities. It is unfortunate that Flynn did not write a true monograph (his book is part of "The International Series of Monographs on Physics") about diffusion theory, which is the strongest part of his book. Such a monograph could have been shorter, less expensive, and accessible to more people.

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Statistical Mechanics

Donald Rapp

325 pp. Holt, Rinehart and Winston,
New York, 1972.

Donald Rapp of the University of Texas at Dallas has taken on the difficult task of writing a graduate-level text in the field of statistical mechanics. This task is difficult in two respects. The first difficulty is, of course, the subject matter itself. Statistical mechanics is a diverse, rapidly growing field of physics. The various subfields like solid-state physics, low-temperature physics and the theory of fluids require extensive coverage in themselves. The second point making Rapp's task difficult is the competition from other established texts in the same field. I mention in particular *Statistical Mechanics* by F. Reif, *Statistical Physics* by L. D. Landau and E. M. Lifshitz, and *Statistical Me-*

chanics by K. Huang.

Rapp's book is closest in layout to Huang's book. He begins with a brief discussion of thermodynamics, proceeds to a discussion of the basic principles of statistical mechanics and finishes with a discussion of some special topics. Each of these sections deserves comment.

Rapp's chapter devoted to thermodynamics is not very useful. The entire discussion covers four and one-half pages, and one would expect that only those already familiar with thermodynamics could follow the discussion. Consequently, if this book were to be used in a course covering thermodynamics and statistical mechanics, one would have to use another reference in treating the thermodynamics.

The main body of the book involves a discussion of the simplest statistical mechanical systems (Debye model, Bose-Einstein, Fermi-Dirac, and Boltzmann statistics, and so on). While the examples chosen are interesting and instructive, there are two major drawbacks to the presentation. First, the development in this section is not particularly systematic. The basic results in statistical mechanics that are more or less independent of the system treated are not clearly pointed out. The combinatorics that one usually discusses in connection with a general treatment of ensembles is carried out several times in treating different problems. The importance of the partition function and its most general properties are not emphasized. The author also has a trait of building up an idea and then relaxing on some of the most important points. This is particularly true in the treatment of the relationship between quantum and classical systems. For example, in the introduction to the first chapter Rapp discusses the importance of indistinguishability in statistical systems and then proceeds to discuss a system where the particles are completely distinguishable. This is justified by noting that "indistinguishable particles located at distinguishable lattice sites are referred to loosely as distinguishable particles." Such ambiguity at the very beginning of a discussion of an idea that is confusing to students under the best circumstances can certainly cause the students great difficulty in separating out the general principles involved.

A more serious drawback is the lack of a discussion of ensembles. The grand canonical ensemble (as far as I can discern) is not mentioned. The chemical potential is defined in a footnote rather late in the book. This lack of a general ensemble discussion limits the scope of the text considerably.

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The final section of the book is devoted to special topics. These chapters are entitled "The molecular partition function in terms of local bond properties," "The transition-state theory of chemical kinetics" and "The liquid state." Each of these chapters gives a rather detailed discussion of problems that all seem to come under the general heading of advanced topics in chemical physics.

In conclusion let me note that this book includes many interesting examples that are worked out in full detail. Because the strength of the book lies in these examples, it could be useful as a supplementary text in a course in statistical mechanics that emphasizes chemical-physics problems.

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Complex Permittivity: Theory and Measurement (B. K. P. Scaife, ed.)

We have learned that this book, reviewed in March, page 79, is published in the US by Crane, Russak. The US price is \$12.00.

new books

Elementary Particles

Optical Concepts in High-Energy Physics. K. Gottfried. 27 pp. CERN, Geneva, 1972.

Proceedings of the 1972 CERN School of Physics (Conf. Proc. 1972 CERN School of Physics. Grado, Italy, 15-31 May 1972). 597 pp. CERN, Geneva, 1972.

Nuclei, Nuclear Physics

Annual Review of Nuclear Science, Volume 22. Emilio Segre, ed. 506 pp. Annual Reviews, Palo Alto, Cal., 1972. \$10.00.

Nuclear Physics: An Introduction (2nd Ed.) W. E. Burcham, 686 pp. Longman, London, 1973. £6.50.

The Two Body Force in Nuclei. (Conf. Proc. 7-10 Sept. 1971, Gull Lake, Mich.) S. M. Austin, G. M. Crawley, eds. Plenum, New York, 1972. \$25.00.

Chemical Physics

Emission, Absorption and Transfer of Radiation in Heated Atmospheres. Baxter H. Armstrong, Ralph W. Nicholls. 295 pp. Pergamon, Elmsford, N.Y. \$21.00.

Fluids and Plasmas

Annual Review of Fluid Mechanics, Volume 5. M. Van Dyke, W. G. Vincenti, eds. 443 pp. Annual Reviews, Palo Alto, Cal. 1973. \$10.00.