
Books

Kinetic Theory of Gases. (International Series on Pure & Applied Physics.) By R. D. Present. 280 pp. McGraw-Hill Book Co., Inc., New York, 1958. \$7.75. *Reviewed by I. Amdur, Massachusetts Institute of Technology.*

There has long been need for a new text on the kinetic theory of gases which introduces the subject and then continues to develop it to a moderately advanced stage. Previous texts of this type are now sufficiently old to lack important new material which Dr. Present has included. Since there appears to be a rapidly increasing interest in the kinetic theory of gases and related fields this lack of current material has hitherto required considerable supplementation of older texts.

The coverage of the book is good. Two chapters deal with distribution functions, one with general aspects, the other with the Maxwell-Boltzmann distribution law and related topics. A chapter discusses the mean free path method in relation to transport phenomena and additional chapters are used to treat mutual diffusion, free molecule diffusion, and thermal diffusion. Intermolecular forces are first introduced in relation to gas imperfections and viscosity and later in a chapter which deals with the nature and the determination of intermolecular forces. There is an excellent treatment of collision dynamics which includes a discussion of the scattering of a particle by a central force field, the development of relations for differential and total collision cross sections and the applications to mutual diffusion and rates of chemical reaction. There is a discussion of Brownian motion and density fluctuations and a chapter near the end of the book which introduces advanced transport theory in terms of the Maxwell-Chapman treatment. A particularly interesting chapter is one entitled "Fundamental Experiments and Experimental Procedures".

There are a number of features in the text that deserve special comment. The momentum transfer method is used very effectively in presenting elementary treatments of mutual diffusion and thermal diffusion. The topics which are discussed and the sequence in which they are introduced reflect a discriminating selection and an arrangement which is well suited for teaching. The problems are nontrivial, varied in character, and stimulating. The emphasis on the role of intermolecular forces in transport properties and certain equilibrium properties is highly desirable. In the opinion of the reviewer, earlier texts at the same level suffered from lack of this emphasis. The chapter on fundamental

experiments and experimental procedures, previously referred to, serves to relieve the necessarily abstract character of many of the topics which are discussed, and in addition illustrates the relation between the equations obtained for various properties and the working equations of the laboratory which are used in the experimental measurements of these properties. Finally, the text is characterized by a terseness of expression and a clarity of language that are not found in scientific texts as often as one might wish. Ambiguities are uncommon and words appear to have been selected and used with the same care as mathematical expressions.

Dr. Present has performed a valuable service in writing a stimulating text of high quality which is suitable for graduate instruction in physics, chemistry, and various engineering fields.

Elementary Statistical Physics. By C. Kittel. 228 pp. John Wiley & Sons, Inc., New York, 1958. \$8.00. *Reviewed by T. Teichmann, Lockheed Missile Systems Division.*

While the subject of statistical mechanics provides one of the most elegant, and, in many ways, complete sections of theoretical physics, its treatment in textbook form has always presented grave problems to the author. An exposition in elegant mathematical form generally presupposes a degree of sophistication on the part of the reader which makes it difficult for him to appreciate fully the import of the results, while on the other hand more casual treatment may disregard some of the important niceties of the subject and may give a misleading picture of its logical completeness.

Professor Kittel has adopted a rather different approach to either of these in that his presentation consists in substance of a large number of examples interlarded with a gradually developing theoretical exposition. This approach has the advantage in that it enables the student to tackle problems at an early stage in his development of the subject while at the same time stimulating him to consider more complete and rigorous treatments mentioned here, but treated extensively elsewhere.

In addition to the standard topics usually found in books of this kind, such as chemical potentials, perfect gas properties, and black body radiation, a good deal of attention is given in this book to a usable treatment of noise problems and transport problems. In addition to the many examples in the text and at the end of chapters, there are frequent references to relevant experimental and numerical results and, where necessary, mathematical results are derived in the most economical form. The author has resisted the temptation so prevalent in the subject of flexing his mathematical muscles and thus does not distract the beginning reader from the more significant physical principles. The presentation should enable the beginner to develop the ability to treat many of the problems he may expect to come across and at the same time indicate to him those areas worthy of deeper study elsewhere.