

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

Acta Cryst. (1981). B37, 492

Structure and bonding in solid state chemistry. By M. F. C. LADD. Pp. 326, Figs. 151. Chichester: Ellis Horwood Ltd, 1979. Price £16.50.

This is an interesting and well written textbook. It discusses the properties of solids at a level comparable to that of a good physical chemistry text, but in considerably more detail. The organization is based upon the principal types of solids, with an introductory *Preamble* followed by chapters entitled *Ionic Compounds*, *Covalent Compounds*, *Van der Waal's Compounds*, and *Metallic Compounds*, and a brief closing chapter. Each of the principal chapters discusses the nature of the cohesive forces of a particular type and uses this discussion as a basis for consideration of the structures and properties of solids in which that type of force is dominant. This works well, with the possible exception of Chapter 3 (*Covalent Compounds*) which consists of 65 pages of elementary quantum mechanics (from black-body radiation through conjugated molecules) and one page of applications to solids. Although the material is handled well and the inclusion of basic quantum mechanics is entirely in keeping with the logical structure of the book, it seems unlikely that a book whose focus is on the solid state will be a major source for many students who are learning quantum mechanics. My preference would have been to sacrifice much of this material and to devote more space to topics such as hydrogen bonding (which receives only passing mention), lower-dimensional solids, and solid-state transformations. The most serious error I noted was the statement on p. 89 that '...compounds such as NeF_4 , ArF_4 , and KrCl_4 have been prepared and studied'.

Nonetheless, this is a very attractive book. The writing style is concise but clear throughout. The material should be accessible to the student who has some knowledge of thermodynamics and elementary physics. An unusual feature is the inclusion of appendices at the end of each chapter. These appendices, 23 in number, present such diverse material as directions for construction of a stereoscopic viewer, discussion of partial molar quantities, and an introduction to quantum statistics. They accomplish well the author's goal of removing from the main text material which 'might distract readers from the development of the subject'. Another very attractive feature is the presence of a large number (about 40 by rough count) of stereoscopic crystal structure diagrams. These are well prepared and contribute significantly to the effectiveness of the book. A number of problems follow each chapter, with complete solutions provided at the end of the book. Introductory material on problem-solving techniques, physical constants, and unit conversion factors, together with a very complete glossary of symbols, is included. All things considered, this is a well conceived and carefully prepared book. It will probably find

more use as supplementary reading than as the principal text for a single course.

R. J. DOEDENS

*Chemistry Department
University of California
Irvine
California 92717
USA*

Acta Cryst. (1981). B37, 492–493

Modern X-ray analysis on single crystals. By PETER LUGER. Pp. xiii + 312. Berlin, New York: Walter de Gruyter, 1980. Price DM 96.00.

For anyone starting on X-ray crystal structure determination, this book is a 'must'. It takes the reader through all the stages in the process, from selection of the crystal and the X-radiation to the final calculation of the molecular geometry and the representation of the structure in diagrammatical form. The essential theory is given at every stage but it never overwhelms the practical bias of the book. This excellent balance is largely achieved by the fact that three typical structure determinations – those of potassium hydrogen tartrate (KAMTRA), ammonium tetrasulphurpentanitride oxide (NITROS), and sucrose (SUCROS) – are followed in detail through all the various stages described in the book. KAMTRA belongs to the space group $P2_12_1$ and the solution of its structure by the Patterson heavy-atom method is described. NITROS belongs to the centrosymmetric space group $C2/m$ and SUCROS to the non-centrosymmetric $P2_1$ and their structure solutions by direct methods are explained, including the use of the *MULTAN* suite of computer programs. At every point, the techniques described are up-to-date and commonly used, so the reader is taught good standard crystallographic practice. With a few exceptions, the explanations of theory and descriptions of practical techniques are clear and they read very easily in spite of not being written in the author's native language. (He is Professor of Crystallography at the Freie Universität Berlin.) The author acknowledges the help of Professor G. A. Jeffrey in the linguistic revision of the English manuscript, and Professor Jeffrey should be congratulated on the general high standard of the text. A few infelicities in the English have escaped his attention but the meaning is always obvious. There are also a few typographical errors.

The first chapter of the book explains all the mathematics needed for crystallographic theory, particularly matrices and determinants and basis transformations, and then goes on to discuss Fourier series and transformations and diffraction theory in relation to the reciprocal lattice. Readers who, like the reviewer, are not mathematically inclined should not be