ist's bookshelf, with extensive material available for study in considering new research directions.

DOUGLAS L. DORSET

Electron Diffraction Department
Medical Foundation of Buffalo, Inc.
73 High Street
Buffalo
NY 14203
USA

Acta Cryst. (1994). A**50**, 259

Modern powder diffraction. Reviews in mineralogy, Vol. 20. Edited by D. L. BISH and J. E. POST. Pp. xi + 369. Washington, DC: The Mineralogical Society of America, 1990. Price (paper) US $25.00. ISBN 0-939950-24-3.

At the November 1989 annual meetings of the Mineralogical Society of America and the Geological Society of America in St. Louis, D. L. Bish and J. E. Post convened a short course on advanced methods in powder diffractometry. The course content has been published as one of the *Reviews in Mineralogy* series familiar to subscribers to *American Mineralogist*.

Powder diffraction is currently one of the most exciting subfields of crystallography. Recent advances in light sources, instrumentation and software have greatly increased the amount of information available from a powder diffractogram. The authors seek to illustrate the state of the art in powder diffraction, to describe how to obtain high-quality powder diffraction data and to demonstrate how to extract maximum information from the data.

This volume consists of 11 chapters by several prominent authors. In *Principles of powder diffraction*, R. C. Reynolds gives a brief summary of the principles of powder diffraction and basic diffraction theory. This treatment should be useful for beginners but is also worthwhile for experts to review occasionally. Ron Jenkins discusses *Instrumentation* and *Experimental procedures* well in limited space. The discussion of instrumentation neglects to illustrate Guinier geometry and to discuss the special problems associated with synchrotron radiation but is a useful refresher. The treatment of experimental procedure highlights the variety of powder diffraction instruments, applications and users. In *Sample preparation for X-ray diffraction*, D. L. Bish and R. C. Reynolds give a short and accurate discussion of grinding and (underappreciated) particle size effects. Understanding these effects is critical for obtaining high-quality data, especially at synchrotron sources. This discussion duplicates some of the material in Chapter 3. Especially useful is the treatment of microabsorption on pp. 82–83. Also discussed are specialized clay sample-preparation techniques.

The treatment of *Quantitative analysis* by R. L. Snyder and D. L. Bish summarizes classical methods, pointing out the potential microabsorption effects on internal standard methods. The exciting developments in using Rietveld analysis for quantitative analysis are demonstrated, as is D. K. Smith's development of quantitative analysis techniques using observed patterns. This last technique is particularly useful for amorphous and poorly crystalline materials, as well as for phases of unknown structures. Chapter 6, *Diffraction by small and disordered crystals* is, in contrast to the rest of the book, a specialist discussion of the diffraction encountered in clays and other low-dimensional materials. D. K. Smith summarizes the contents of the various crystallographic databases and discusses the software available for performing various powder diffraction tasks in *Computer analysis of diffraction data*.

The core of the book lies in Chapter 8, *Profile fitting of powder diffraction patterns*, by S. A. Howard and K. D. Preston, and in Chapter 9, *Rietveld refinement of crystal structures using powder X-ray diffraction data*, by J. E. Post and D. L. Bish. These chapters are an excellent summary of the mathematics and history of profile fitting, complete with discussion of the pitfalls and sources of error. The authors summarize coherently things that many of us have learned the hard way! A cogent discussion of the trade-offs in data collection and refinement strategy is given. Particularly useful are the discussions of errors, false minima and preferred orientation. The listing of normalized profile functions on p. 218 will be consulted often. There are hints of the power of difference Fourier techniques when applied with care to powder data.

The characteristics of synchrotron radiation and its applications are summarized well by L. W. Finger in *Synchrotron powder diffraction*. It is very useful to have documentation of the pseudo-Voight profile function used in the generalized structure analysis system (GSAS) of A. Larson and R. B. Von Dreele. Although brief, the discussion of sample preparation for synchrotron experiments covers the key points. R. B. Von Dreele summarizes briefly the history of neutron diffraction, instrument design and applications - particularly hydrogen location and cation distribution. The potential power of combined neutron/X-ray studies is pointed out.

Although part of a series of reviews in mineralogy, this book belongs on the shelves of every powder diffractionist and, most importantly, on those of members of the new species, powder crystallographers. The book is well produced and there are very few errors. Better buy two - both of my copies are already getting dog-eared.

JAMES A. KADUK

Amoco Corporation
Amoco Research Center
PO Box 3011 *MC F*-9
Naperville
IL 60566
USA

Acta Cryst. (1994). A**50**, 259–260

Introduction to crystallography. (Revised edition.) By C. HAMMOND. Pp. x + 132. Oxford: Oxford University Press for the Royal Microscopical Society, 1992. Price £10.95 (paper). ISBN 0-19-856433.

This short text is designed as a 'user-friendly' handbook of elementary crystallography. As its sponsorship indicates, it is intended to introduce practising microscopists to those crystallographic concepts that are essential in understanding

the electrical or mechanical properties of materials and the geometry of diffraction underlying the mechanisms of image formation. The work would be equally useful for undergraduate or graduate students in materials science and related fields. It is an expanded and revised edition of the author's 1989 work of the same title.

The first five chapters provide the reader with a good survey of the basic concepts of crystal geometry. Two- and three-dimensional patterns, lattices and symmetry are presented with precision and clarity. To illustrate the concepts presented, the crystal structures of several simple compounds are discussed in detail. Good-quality illustrations, including some of Escher's symmetry-based fantasies, help in understanding the problems discussed. In Chapter 6, the author deals skilfully with the reciprocal lattice, which later, in Chapter 7 - new to this edition - serves as a powerful tool to explain diffraction effects. Each chapter is followed by very useful exercises, for some of which answers are given. A not particularly up-to-date reading list of other works covering these classical topics is also provided. Two appendices list suppliers of model-building kits and computer programs for teaching crystallography. Appendix 3 provides interesting biographical notes on famous (and on some less well known) crystallographers whose names and concepts appear in the text. Appendix 4 provides a summary of geometrical relationships but omits the general forms for the triclinic system as being 'rather lengthy.' This edition features an additional appendix that deals with vector nomenclature and analysis for readers with limited mathematical backgrounds.

All in all, this little book satisfies all the requirements for a popular introductory text. It is concise and simple, but not simplistic, well presented and full of excellent didactic hints. Its attractiveness is surely enhanced by the low price of this paperback edition.

MICHEL SABAT

Department of Chemistry
University of Virginia
Charlottesville
VA 22901
USA