developed in the last ten years. Although Section 6 contains some very useful material, the clarity of presentation of the textual material is not up to the high standard of the previous sections.

In sum, Volume IV is a fine addition to the other volumes. The earlier volumes of the pre-computer era now look rather dated. One hopes that Volume IV sets a standard that will be followed by future volumes in this series.

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X-ray diffraction. By L. V. Azaroff, R. Kaplow, N. Kato, R. J. Weiss, A. J. C. Wilson and R. A. Young. Pp. xiii+664. Figs. 197, Tables 33. New York: McGraw-Hill, 1974. Price £15.10.

It is inevitable that any book which claims to provide an authoritative treatment of modern developments in X-ray diffraction will be compared with the classics of Compton & Allison, Zachariasen, James and von Laue. Indeed, the authors have assumed a prior *familiarity* with those classics; mere acquaintance with the subject matter, one quickly discovers, is not enough! While the subject matter is such that one might expect most serious students to obtain their own copies, it is clear that this book will not be used by experienced workers in preference to either the literature which it summarizes or the before-mentioned classics.

The format of the book is straightforward enough. It starts with *Scattering by Atoms* which includes elastic scattering theory, inelastic scattering theory (exclusively concerned with Compton scattering) and an updating of the experimental results obtained since the author's book. Chapter 2 on *Kinematical Theory* sets out the many approximations in useful detail and develops the theory, first for spherically averaged samples and then for single crystals. After about one hundred pages one is somewhat surprised to start at the beginning again in chapter 3. The fact that the notation changes at this point (as do the style, the mode of development and the aims) is mentioned as a footnote in chapter 4. Chapters 3–5 summarize, in about 260 pages, the wave optical theory of plane-wave and spherical-wave diffraction by perfect and nearly perfect crystals. These chapters are comprehensive and well written and, since all previous textbooks have concentrated on plane-wave theories, they constitute the only introduction available to students of the subject in book form. Chapter 6 on *Powder Diffractometry* is of similar quality, giving both a lucid introduction to the powder method and an up-to-date account of line-profile and intensity analysis. The final chapter, which aims to deal with single-crystal intensities, describes the purpose of and design criteria for single-crystal diffractometers. Sections on spectral and background control follow, but the sense of direction is lost about halfway through the chapter.

Although this book was published in 1974, there are very few post-1970 references in the otherwise ample bibliography. Apart from the very small amount of cross-referencing there is no obvious product of a collaborative effort in the text. Chapters 3–5 (Kato) and 6 (Wilson/Young) are very good but the reader whose work spans both interests is very rare. The remainder of the chapters leave one wondering for whom the book was published. The preface tells us that crystal structure analysis, X-ray diffraction instrumentation, X-ray topography and computational methods in X-ray diffraction are all subjects on which excellent books, monographs and review articles are already available. To take X-ray topography as an example (others will have their own areas of familiarity) I do not believe that to be true. Indeed, had Professor Kato added two chapters on X-ray topography, based on his already substantial contribution, then would we have had a new classic text.

There is a clear need for an authoritative text in the general area outlined by this book and by its companion volume. This is not it.

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Molecular structure by diffraction methods. Vol. 2. By G. A. Sim and L. E. Sutton (Senior Reporters). Pp. xiii+513, Figs. 92, Tables 27. London: The Chemical Society, 1974. Price £17.50.

This second volume in the series is arranged according to the same format as Vol. 1 with three parts: *Electron Diffraction*, *Neutron Diffraction* and *X-ray Diffraction*. All three parts review papers published between April 1972 and March 1973 but the period covered is extended to August 1973 for the neutron diffraction section and to mid-autumn 1973 for the electron diffraction section. Because of the shorter period reviewed than in Vol. 1 and because the electron diffraction section is this time confined entirely to structural results, Vol. 2 is considerably shorter than the 824 pages of Vol. 1. It is a measure of the inflation of book prices, however, that the smaller Vol. 2 costs more. The reduction in size does not correspond to a reduction in the number of references in all sections. The electron diffraction part discusses 139 references (compared with 464 in Vol. 1), the part on neutron diffraction reports 72 references (96 in Vol. 1) and that concerned with X-ray diffraction has 741 references on organic structures, 168 on globular proteins and 1128 on inorganic structures. (The corresponding X-ray figures for Vol. 1 were 631, 146 and 1228.)

Throughout Vol. 2 there are useful references to Vol. 1. Diagrams are used liberally to supplement descriptions in the text and the many tables provide valuable numerical correlations. The team of Reporters is practically the same as for Vol. 1 and they are to be congratulated on having discussed so much factual information in a way which is concise and yet readable. There seem to be remarkably few errors. Every reader is bound to find some sections of the book which are particularly fascinating for him. For the reviewer, one of the most interesting features is the way in

which hydrogen bonding and other forms of intermolecular interaction keep cropping up in a volume which is largely devoted to intramolecular geometry. Exciting developments are reported in the globular protein section where the high-resolution structures of a fragment of an immunoglobulin and a Bence–Jones protein are briefly described. The reporter comments that these results might represent the most significant contribution of crystallography to medicine. Readers who found Vol. 1 interesting will certainly be rewarded by continuing their studies in Vol. 2. Besides being a must for every scientific library, many individual scientists concerned with structural chemistry will want to have their own copies.

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Experiments on simple magnetic model systems. By L. J. DE JONGH and A. R. MIEDEMA. Pp. 269, Figs. 95, Tables 19. London: Taylor & Francis, 1974. Price £4.00.

The original aim of theoretical physicists in devising the various magnetic model systems was to get a better understanding of experimental observations. These models are often made apparently too simple owing to otherwise insurmountable mathematical problems, and sometimes simplifications have produced gross features in the results. However, by careful choice of magnetic substances from the immense range provided by chemistry and metallurgy experimentalists have been able to find materials whose properties resemble quite closely those predicted from various theoretical models. Moreover, in recent years experiment has provided theory with data which may be compared with models that are superficially most unorthodox.

This book deals with non-metallic magnetic systems. After an introductory survey on the effects of lattice dimensionality and type of interaction, it is shown how general rules may be given for finding compounds which approximate a particular model system. Next, the experimental magnetic properties of many examples of actual materials are compared with theory for chain structures, layered structures and for three-dimensional magnetic systems. Among special topics discussed are neutron diffraction, spin wave theory, critical behaviour and field-dependent behaviour.

As the authors point out, the survey cannot be comprehensive. But it does offer to the theoretician a very useful guide to the available data and to the experimentalist a good survey of the existing theoretical work and of the extensive range of compounds already discovered. There are very many references (fourteen pages) and a valuable index of substances.

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Thermal vibrations in crystallography. By B. T. M. WILLIS & A. W. PRYOR. Pp. xv + 280, Figs. 82, Tables 24. Cambridge Univ. Press, 1975. Price £9.50.

This book consists of a quite extensive treatment of the nature of thermal vibrations in solids and their effect on X-ray and neutron scattering. I can think of no other book that covers the same field and its appearance fills an existing gap. The question should then be asked how well and how comprehensively the field is covered.

The book consists of three parts, the first of which treats the theory of lattice dynamics. This part is well written and admirably clear and detailed in its derivations. Noteworthy is also an attractive extension of the Born–von Karman theory to molecular crystals. Here and in the other two parts the simplifications of matrix notation are used extensively. The second part deals with the influence of thermal motion on the Bragg intensities and incorporates the useful tables of Peterse and Palm describing symmetry restrictions on β_{ij} for all existing special positions. On the same subject there is a rather puzzling statement (on page 103) that mirror planes and glide planes cause the same symmetry restriction (on the β tensor) as a two-fold axis. While this is, of course, true for macroscopic second-rank tensor properties, the β_{ij} of atoms in glide planes are obviously not restricted. The problem of the interaction between static disorder and apparent thermal motion is not treated, though it should have been mentioned in the discussion of the myoglobin Wilson plot. The examples given here include diamond, fluorite-type structures, alkali halides, face-centered cubic metals and some molecular crystals. Anhármonicity is discussed quite extensively. The third part of the book which deals with thermal diffuse scattering is much less detailed and also less well written than the preceding chapters. A brief discussion of X-ray TDS is followed by a treatment of inelastic scattering of slow neutrons, limited because 'it is unlikely that many crystallographers will use the technique itself'. The book ends with a discussion of the correction of Bragg intensities for thermal diffuse scattering and an appendix summarizing matrix algebra.

The book contains much that is useful, but is not quite a comprehensive treatment. Missing is a detailed discussion of thermal motion in molecular crystals as can be found, for example, in some of the chapters of the 1967 National Bureau of Standards Symposium on Molecular Dynamics and the Structure of Solids. One finds no evaluation of the relative merits of expressions for large librational motion and a description of only one, even though comparisons are available in the literature [*Acta Cryst.* (1972). B**28**, 1649]. Surprisingly absent is also a discussion of segmented rigid-body models applied by several crystallographers.

Nevertheless, this is a book that will find use in advanced teaching and as a reference in the research laboratory.

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