

## Book Reviews

*Works intended for notice in this column should be sent direct to the Editor (A. J. C. Wilson, Department of Physics, University College, Cathays Park, Cardiff, Great Britain). As far as practicable books will be reviewed in a country different from that of publication.*

**X-ray powder data for ore minerals: The Peacock Atlas.** L. G. BERRY and R. M. THOMPSON. New York: Geological Society of America Memoir 85, 1962. Pp. vi+281 and 27 plates. Price: \$8.25.

Those familiar with the ASTM cards of X-ray powder data and various other compilations of powder data for minerals may question the need for this book. Apart from the convenience of having assembled in one orderly volume authenticated data for nearly three hundred opaque minerals, the overwhelming justification is in the atlas of powder photographs of every mineral listed. Not only are these excellently reproduced but they are all on the common scale of 1 mm to 1 degree  $\theta$ .

The minerals are arranged with few exceptions in Dana's classification in the order: elements, sulphides, sulphosalts, *etc.*, and with the following indexes: Alphabetical of mineral species, Chemical, Strongest powder lines, Locality of specimens used for measurement. Most of the films and specimen spindles used are preserved for reference in North America.

For each mineral pattern there are given the name and structural chemical formula, crystal system and space group, lattice dimensions, and number of formulae units in the unit cell. Notes and references to the source of the cell dimensions and a brief statement of the structure where known are also provided. Mineralogists will appreciate the inclusion of the sources of the material giving the standard pattern and of other materials yielding identical patterns. In most cases the following information is given for each powder line: intensity ( $I$ ) by visual estimate against a standard film; measured value of  $\theta$ ; measured value of  $d$ ; and the indices and spacings of planes calculated from cell dimensions.

A comparison of a large proportion of the patterns with reference films in the Department of Mineralogy, British Museum has failed to reveal significant discrepancies and the book is singularly free from typographical errors. It is a very careful work of measurement and compilation made by mineralogists familiar with the materials they have examined, and is thus of much greater value than data collected from a variety of sources. The book stems from an idea of the late M. A. Peacock as long ago as 1941.

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**Diffuse X-ray Reflections from Crystals.** By W. A. WOOSTER. Pp. 200. Oxford: The Clarendon Press. Price 35s. (U.K. only).

This small volume is intended to give students of crystallography an idea of the complicated influences of dynamic

and static disorder phenomena on X-ray diffraction. The interpretation of diffuse reflexions has become an important field of structure research, but the quantitative treatment of these problems involves a complicated mathematical background. The author has chosen a very simple manner of representation, which facilitates the studies considerably. In case of the treatment of thermal vibrations, a high standard is reached. Here the determination of elastic constants of a crystal is treated as well as the spectrum of elastic vibrations. Even experimental methods for the evaluation of diffuse X-ray photographs are broadly discussed, thus enabling the reader to begin the solution of a special problem starting from this book.

On the other hand the treatment of the X-ray effects due to structural disorder provides only a very brief survey of the problems involved. The 'classical' cases, such as superstructure formation in the Cu-Au-systems, age hardening of Al-Cu alloys, stacking disorder, and the very special problem of disorder-effects in diamond crystals are discussed qualitatively. The addition of diffraction photographs with the aid of an optical diffraction apparatus is very instructive.

In the last chapter diffuse scattering of structures containing molecules is discussed; the author himself is aware of the difficulty that it remains uncertain whether he is dealing with static (displacements or distortion of the molecules) or dynamic (thermal) disorder.

The reviewer has found only a very few errors. One omission should be mentioned here. The author uses abbreviations such as *rel*, *relp* and others throughout the book, the significance of which it is not easy to find out in some cases. It would be advisable to add explanations of these abbreviations, which are not generally known to students, to the Index of Symbols.

The book may be recommended to all advanced students interested in diffraction phenomena and the theory of elasticity and thermal vibrations.

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**Proceedings of the International Conference on Magnetism and Crystallography. Kyoto, 25-30 September, 1961. Volume I. Magnetism.** Journal of the Physical Society of Japan. Volume 17. Supplement B-I 1962. Pp. xi+718. Price: U.S. \$ 9.00.

This volume reports on almost 200 original contributions to the Conference. Obviously such a volume cannot be reviewed in great detail. However, it is possible to mention a number of important contributions and

trends but the choice mentioned expresses fields of magnetism of special interest to me.

In theory of magnetism the volume shows clearly the importance of the spin screw model for the magnetism of the rare earths. Theories reached at three different centres, which are in fact largely synonymous, are described.

The session on nuclear magnetic resonance in metals contains five papers. All these are thought to be important because they illustrate a new method of investigating the magnetic interactions between carriers in materials. Thus, polarization of conduction electrons and other fundamental phenomena can now be tackled by means of nuclear magnetic resonance.

Two sessions on metals and alloys are varied but it is clear that the number of studies using the Mössbauer effect is growing.

There were four sessions dealing with oxides and other compounds, two of them relating to anisotropy, relaxation and magnetic resonance. A paper by J. F. Dillon of the Bell Laboratories describing a new kind of line broadening in doped garnets is of importance. This deals with the excitation of the rare earth impurities into excited states in the microwave field leading to line broadening, *i.e.* a sort of paramagnetic resonance in a ferromagnetic.

Magnetism at low temperatures is leading to interesting results. One example is a paper by the workers at Oxford on substances with large magnetic dipole interactions. Some of these substances are a good example of a simple ferromagnetic model where experiments can be accurately interpreted theoretically.

There were, of course, sessions on magnetic thin films and on technical magnetization. One of the most important contributions in these sessions was the one by Flanders and Shtrikman of the Franklin Institute on the anisotropy distribution of ferromagnetic powders. A fine paper on the analysis of magnetothermal measurements by Bates and Pacey is included in the session on technical magnetization.

It would lead too far to go into further details but the volume will obviously serve as a document to the status of theory and practice of magnetism in 1962. It is useful for reference purposes but will not be of interest to anyone but people specializing in magnetism.

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**Proceedings of the International Conference on Magnetism and Crystallography. Kyoto, 25-30 September 1961. Volume II. Electron and neutron diffraction.** Journal of the Physical Society of Japan, Volume 17, Supplement B-II 1962. Pp. iv + 397. Price: U.S. \$ 6.00.

The 'papers' in this volume\* are in fact little more than extended abstracts, averaging about 3 pages in length, with the remarks made in discussion appended and often running to a page or more. As contributions were meant to describe recent and mostly unpublished work, the volume provides an excellent survey of the state of the subject in mid-1961. The longer papers surveying recent progress in particular aspects, with which each session opened, provide the necessary background, and the references at the end of practically every short paper permit the earnest student to follow the subject further.

Some idea of the scope of this volume is provided by the headings of the seven sessions included in it: Gas Electron Diffraction; Scattering Phenomena in Electron Diffraction; Diffraction Effects in Electron Microscopic Images; Structure Studies by Electron Diffraction; Application and Technique of Electron Diffraction; General Problems, Technique and Apparatus of Neutron Diffraction; Inelastic Scattering in Neutron Diffraction and Structure Studies of Neutron Diffraction. The text is very clearly printed and illustrated with many diagrams; electron diffraction diagrams and micrographs are reproduced on art paper. The volume is bound as a journal part, naturally enough, but those likely to make much use of it (and they will be many) would be well advised to invest in a stouter binding. The chief of the nine editors, Dr Shizuo Miyake, is to be congratulated on the speed and excellence of his work. To have such a volume of proceedings ready within little more than six months of the end of the meeting, instead of the more usual year, doubles its value to those who were unable to be present (and possibly also to those who were fortunate enough to be there).

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\* Volume I is reviewed above. For a review of Volume III see *Acta Cryst.* **16**, 236.