

examples of crystal structures are then worked through as problems in X-ray analysis, ranging from the simple to the quite complex, and including some important polymer and defect structures in which the author has himself made distinguished contributions. Then in a chapter on direct and semi-direct methods an account is given of Fourier and isomorphous replacement methods, including the error and difference syntheses, and methods of calculation. Resolving power and determination of absolute configuration are also dealt with, and a very effective summary of the interpretation of Patterson maps is given. The use of molecular transforms is next described, with an interesting account of their use in aromatic ring systems, in polymer helices, and in haemoglobin. In a final chapter on crystal size and texture, consideration is given to the different causes of line broadening in X-ray diffraction, to small-angle scattering, and to diffraction effects shown by non-crystalline materials.

In this part of the book also is shown a wise and thoughtful approach, combined with much practical experience. Some of the methods described (for example of computation) are perhaps a little old-fashioned in these days of computer programmes, but only good can come to any student by a careful study of these earlier methods. Indeed they might be usefully regarded as essential training for the later developments.

The only error of fact that the reviewer could discover is the statement on page 403 that the Rochelle-salt structure is monoclinic. It is, of course, orthorhombic in the form used for the work described. Everywhere else the book is a model of lucid and accurate statement. It should be ideal for all chemists who are interested in crystallography or who have to concern themselves with the identification of materials. All students of X-ray crystallography would find it an excellent introduction to the subject. It is a most readable book, not too tedious and yet quite thorough in every topic with which it deals. It can be very strongly recommended.

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### Reports on Progress in Physics. Volume 24.

Edited by A. C. STICKLAND. Pp. iv + 424. London: The Institute of Physics and The Physical Society. 1961. Price £4.4.0.

The present volume of 'Reports on Progress in Physics' contains a number of articles of special interest to the crystallographer and solid-state physicist. H. Fröhlich gives a brief, excellently written account of the 'Theory of the Superconductive State'. An unusual, but very interesting feature is the section on 'The Psychology of Superconductivity'. In an article on 'Magnetic Domains' D. J. Craik and R. S. Tebble review the recent progress in the study of ferromagnetic domains in metals, alloys and ferrites. Emphasis is laid on experimental techniques and results of domain observations. The observations should be seen against the background of the theory of micromagnetism. This theory is not developed, but enough theoretical background is given for a discussion

of the experimental results. The longest contribution to the volume is that of W. P. Wolf on 'Ferrimagnetism'. It forms a full account of the subject, starting from discussions of crystal structures and preparation of compounds, and providing a bibliography of about 450 references. The emphasis is on physical properties and their present understanding in terms of the theory. Technical applications are only occasionally mentioned. Finally we should like to mention D. ter Haar's article on 'Theory and Application of the Density Matrix', which is also mainly concerned with solid-state problems. It surveys a large number of applications of the density-matrix technique to transport problems, relaxation phenomena, equilibrium statistical mechanics, and other fields, and gives an extensive list of references. Presumably it is too concisely written in order to allow the non-specialist to gain familiarity with this now widely used theoretical technique.

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### X-ray Analysis of Organic Structures. By S. C. NYBURG. Pp. xii + 434. New York and London: Academic Press Inc. Price \$13.00. 93s.

This volume is in two parts. The first outlines the nature of X-rays and the symmetry properties of crystals, and then goes on to discuss the intensity of X-ray reflexion, Fourier methods, etc., and finally the accuracy of X-ray results. In short it is a miniature text-book on the subject of X-ray analysis. It differs from many such texts in that its mathematics is extremely brief, being limited to a few formulae, and in the place of mathematical derivation it uses descriptive methods with the aid of many diagrams. In some places the book goes into considerable detail, for example arithmetic calculations are given of sample structure factors and of Fourier projections. Incidentally, here the author inadvertently illustrates a common form of mistake in that he has incorrectly transferred figures from Table 5-1 to the Table on p. 108. His use of the symbol  $\pm F(hk0)$  on these pages is also rather curious. The final sign should surely be inserted when numerical values are given to the  $F$ 's, and meantime there is either a positive or a negative sign needed, but not both. There are, naturally, many subjects omitted from this part of the book, e.g. least-squares methods, and the author admits in his preface that other 'cherished concepts' are absent. However, the brief account fulfils its aim quite well and should assist many readers to understand and use X-ray methods. The style is good, and many subjects are discussed in an interesting fashion. The determination of absolute configuration, for example, is given an excellent non-mathematical account, and the 'photo-sommateur' of von Eller is well described and illustrated.

The second and larger part of the book is a review of the structures of organic compounds, based almost entirely on X-ray work. Using a chemical system of classification, the account starts with the structures of the normal paraffins, and then goes on to deal with compounds containing the different functional groups. Then aromatic and alicyclic compounds, heterocyclic,