understanding of high resolution n.m.r. spectra and the application of symmetry methods is the subject of the second article in this volume. An elementary description of symmetry elements and operations is given, followed by discussions of the symmetry of non-rigid systems, permutation groups, factorization of the Hamiltonian matrix, the X approximation, and a brief section on sub-spectral analysis. Appendices include a discussion of matrices and vectors, a 'worked example' for the $A_2A_2'XX'X''X''$ system, and character tables. Unfortunately this chapter does not meet the stated aims of the editors. The subject matter is not developed with particular clarity, and is further confused by an inconsistent and clumsy numbering of sections, subsections, and equations, *etc.* (especially pages 118, 119 and 122). The definitions of magnetic equivalence and inequivalence are confusing and incompletely referenced. Although standard textbooks on n.m.r. and on symmetry are listed in the bibliography it is surprising to find no reference to the book by Corio. Group character tables are available in many texts, their reproduction here would be worthwhile had they been specifically adapted to n.m.r. There are errors in the C_{5h} and C_{6h} tables. Speaking of errors, a hypothetically oriented methane molecule is expected to have a five line spectrum (page 120).

If greater attention is paid to the editorial philosophy this series should be a worthwhile and valuable one. The first volume is highly recommended to anyone working in these specific areas of n.m.r. but the unitiated might have a difficult time bridging the gap between introduction and latest development.

D. F. R. GILSON

Department of Chemistry
McGill University
Montreal
Quebec
Canada

Crystals. By PETR KRATOCHVIL. Pp. Ill. London: Iliffe, 1967. Price (paperback) 15 *s.*

'Physics paperbacks' are a series of monographs which claim to provide an 'inexpensive, succinct, rapidly absorbed yet comprehensive introduction to a number of advanced physics subjects for science and technological students.... Each monograph has been written by a distinguished Czech physicist, and edited, and where necessary updated, by an English specialist'. The author's introduction notes the vast progress made in electrical engineering during recent years and makes it clear that the book is aimed mainly at readers interested in this field and more particularly in the development properties and technical applications of metals and semi-conductors.

The book consists of four chapters:

(1) The structure of matter
(2) Crystal structure
(3) Origin of crystals
(4) Properties of crystals and their applications.

Chapter 3 is only slightly less in length than the other three put together and this tends to throw the book out of balance because of too great detail on specialist topics such as zone melting and methods of growing crystals, while other more interesting topics are declared to be beyond the scope of this book. Three instances of this irritating feature (particularly when no guidance is given for further reading – in fact there is no bibliography, as such, anywhere in the book) were noted: (*a*) interactions between defects (p. 31) (*b*) influence of grain boundaries on physical properties of materials (p. 44) (*c*) the dependence of the electron structure of metals on valency (p. 101). However, any book in this interdisciplinary field is welcome and it does avoid the Scylla of too much theoretical crystallography and, apart from the exceptions noted above, the Charybdis of too much practical detail.

If the book lacks anything it is on the geometrical side, using the word geometry in its most general sense. The usual geometrical topics, which are essential in any book on crystals, are discussed; *e.g.* space lattice, dislocations and close packing. On the other hand polymorphism is not mentioned, nor are liquid crystals nor the many aspects of morphology, which, though particularly applicable to crystalline polymers, are also of interest in a much wider field, *e.g.* spherulites, lamellae, fibres and microfibrils. Reference is however, made to dendrites and whiskers. This is understandable in a book mainly concerned with metals and semi-conductors. The title *Crystals* perhaps raises too many hopes.

The production is good and the index is quite adequate. There are printing errors but on the whole these are not troublesome. A few mistakes were detected; there may be others. Some of these arise from translation and can be readily corrected by the reader, *e.g.* 'tetrahedron' is obviously meant where 'quadrilateral' is used (on p. 20) referring to the four bonds of the carbon atom. On p. 29, in Fig. 10, the labelling of the axes does not correspond with the text. A mistake due to inadequate updating was noted on p. 16 where noble gases are 'totally inert in chemical reactions'. What about the recently discovered chemistry of xenon? An example of a more substantial mistake occurs on p. 9 where 'every element then has its own particular atomic number and this determines its physical properties'. Here was a chance to mention the allotropy of the elements (one aspect of polymorphism) and avoid this error. For example the two forms of tin have the same atomic number but widely differing densities.

This book can certainly be recommended for students but is too light weight for those who would wish to delve more deeply.

J. R. S. WARING

I. C. I. Ltd.
Dyestuffs Division
P.O. Box No. 42
Hexagon House
Blackley
Manchester M9 3DA
England

X-ray diffraction methods in polymer science. By LEROY E. ALEXANDER. Pp. 582 + xv. New York: Wiley – Interscience, 1969.

This monograph is a most valuable compilation of material which, up to now, has been scattered through a wide range of journals such as *J. Polymer Sci., Kolloid-Z., Phil. Mag., Helv. Chim. Acta, Makromol. Chem., Nuovo Cimento, Acta Cryst., Nippon Kagaku Zasshi, etc., etc.* Among other purely factual items are almost five hundred references to specific papers in the text and a further five hundred refer-