Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.

Electron diffraction. By T. B. RYMER. Pp. x+165. London: Methuen, 1970. Price £2·50 U. K. only.

First it should be stated clearly that the book is designed primarily for general reading by students of physics. It is therefore more an introduction to the principles of electron diffraction than a monograph for workers in the field (or in related fields). It covers the whole spectrum of electron diffraction. Starting with a historical outline it describes the principles of electron-diffraction cameras including low-energy diffraction and gas diffraction cameras. The kinematical theory of diffraction is explained with special reference to electron diffraction. The interpretation of electron-diffraction patterns is demonstrated by examples. Later chapters treat the dynamical theory of electron diffraction. Here the limitations of such a textbook are perhaps most obvious: in order to keep the treatment short, the author restricts himself mainly to the two-wave case. It is evident that the omitted multi-wave case is extremely important for electron diffraction in crystals. A further chapter introduces the reader to low-energy electron diffraction. In the part about electron diffraction by gases again the limitations of such a short treatment become apparent: the important consequences have been left out, which result from the replacement of the atomic scattering factor in the Born approximation by complex factors ('anomalous scattering' of electrons). Some short notes on electron interference and electron diffraction effects in electron microscopy conclude the text.

The book is not difficult to read; unfortunately the author's nomenclature is very little related to normal crystallographic nomenclature, but this seems to be the case in most treatments of electron diffraction. As already mentioned above, the book is well suited for students and perhaps also as the first introductory text for chemists interested in a more complete study of the basic physical principles of electron diffraction.

W. HOPPE

Max-Planck-Institut für Eiweiss- und Lederforschung
8 München 15, den
Schillerstrasse 46
Germany

Electron diffraction in gases. By MICHAEL I. DAVIS. Pp. viii+181. New York: Marcel Dekker, 1971. Price $12.50.

Electron diffraction as a technique for the study of the structures of gas molecules is about forty years old. It is a technique of great power, yielding measurements of internuclear distances and root-mean-square amplitudes of vibration, accurate in many cases to a few thousandths of an Ångstrom. The number of laboratories engaged in research with gas electron diffraction has grown from about six in the late thirties to about two dozen, and the list of molecules studied has grown to many hundreds. It is surprising, therefore, that no book describing the elements of the method has heretofore been written. Several good review articles are available, however, and in aggregate have tended to take the place of a single text or reference work.

Dr Davis's modest little book, a photo-offset reproduction of a typewritten manuscript, is meant 'to present the technique...in a fashion suited to the needs of a graduate student who might be contemplating doing research in the area'. It consists of ten chapters of which the first six are devoted to scattering theory (elastic and inelastic scattering from atoms, and scattering from rigid and vibrating molecules) and four to the experiment (apparatus, methods of data handling, and diffraction data analysis). The former appear to this reviewer to be an adequate presentation and to meet the author's objective; on the other hand, the latter are rather sketchily done and amount to little more than a qualitative description which will be quite insufficient for anyone who wishes to know what really happens when the buttons on the black boxes are pushed.

There are a number of annoying typographical errors and omissions (for example, an r^2 instead of an r^e term in the denominator of equation (9) and a missing $1/r^e$ factor in the last term of equation (11) both in Chap. 6). Some of the formulas are confusing because of poor alignment of factors or signs: in Chap. 6, equation (1) might suggest to the uninitiated that the factor sin $(sr)/sr$ is an exponent, and the term $-sl_{ij}^2/r_{ij}^e$ in equation (12) might be misinterpreted to be a factor. There are many statements that give quite wrong impressions; consider, for example, the remark concerning the electron-gun filament supply: 'The voltage required to produce an adequate heating current is of the order of a kilovolt'. Many, perhaps most, apparatuses have 6–12 volt filament power supplies. These points are mentioned because they affect to some extent the usefulness of the book to that group for which it was expressly designed, namely the non-experts.

Despite its shortcomings, Dr Davis's book will be valuable to those interested in learning something about a powerful structural tool previously unfamiliar to them. It exposes the theory in sufficient depth to satisfy most people interested in the structural results, it touches on the methods of structure analysis at a reasonable depth, and its weakness in the descriptions of the apparatus and experiment will be quickly negated by those who are in contact with them. Dr Davis has accomplished his objective, and I, for one, shall be recommending it to new graduate students.

A final remark: in view of the small size of the book (the 177 pages of offset printing translate to about 90 of normal type) and the complete absence of real art work, the price is outrageously high.

K. HEDBERG

Department of Chemistry
Oregon State University
Corvallis
Oregon 97331
U.S.A.