Year Book of the Physical Society

The Physical Society has instituted the publication of an annual *Year Book*, and that for 1955 is now ready. The *Year Book* will each year contain the Presidential Address, special lectures, obituary notices, accounts and other similar matter previously published in the *Proceedings of the Physical Society*, and appears in a format uniform with the *Proceedings*.

The current volume includes the following items: the Presidential Address 'Progress and problems of physics to-day' by H. S. W. Massey; the Rutherford Memorial Lecture by P. M. S. Blackett; the 39th Guthrie Lecture Magnetism in retrospect and prospect' by E. C. Stoner; and the 18th Thomas Young Oration 'The basic data of colour-matching' by W. S. Stiles. There are also obituary notices of A. Einstein and G. F. C. Searle.

The *Year Book* contains 92 pages; the price is 10*s*.

Electron-density errors at special positions

An error occurs in the above article by Cruickshank & Rollett (*Acta Cryst.* (1953), **6**, 705). Equation (13) should read

$$m' = \sum_{\text{sub-form}} h \sin(\theta-\alpha)/|h \sin(\theta-\alpha)| .$$

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Röntgen-Strukturanalyse von Kristallen. Von R. Kohlhaas und H. Otto. S. iv+212 mit 163 Abb. Berlin: Akademie Verlag. 1955. Preis DM. 23·00.

Dies gut geschriebene und vorzüglich hergestellte Buch gibt, dem Untertitel gemäss, eine elementare Einführung in Röntgenstrukturanalyse von Kristallen. Als solche ist sie straff zusammengehalten, frei von offensichtlichen Fehlern und inhaltsreich. Häufig sind so wenig Erklärungen gegeben, dass die Ableitung von Formeln an Hand der zugehörigen Abbildungen dem Unbewanderten zu schwer sein dürfte. So fällt z. B. das Braggsche Gesetz auf S. 71 wie eine Sternschnuppe vom Himmel. Ich vermute, dass die Studenten, an die das Buch sich richtet, die Ableitung noch aus der Physikvorlesung kennen. Dies jedoch kann nicht von dem Begriff Gitterkomplex erwartet werden, der auf S. 31 benutzt, aber erst S. 41 erklärt wird.

Die sieben Kapitel des Buches behandeln 1. Kristallographische Grundlagen (Miller Index, Symmetrie, Achsentransformationen), 2. Röntgenstrahlen, 3. Drehdiagramme und Kristallzelle, 4. Indizierung, 5. Symmetriebestimmung der Elementarzelle, 7. Pulveraufnahmen. Alle Fouriermethoden sind fortgelassen, obwohl die Berechnung des Strukturfaktors sehr nahe dahin führt. Die Diskussion der Indizierungsmethoden wird mit Recht an den Drehaufnahmen begonnen. Dass aber die Verfasser volle acht Seiten dem Schiebold–Sauter Verfahren, zwei Seiten dem Bouman–de Jong Verfahren und eine halbe Seite dem Präcessions Verfahren widmen, leuchtet mir nicht ein, denn selbst wenn Präcessionskammern in Deutschland zur Zeit noch wenig verbreitet sind, so ist ihre Diskussion zum Verständnis der im Ausland weitaus bevorzugten Methode wesentlich.

Bei den Methoden zur Berechnung des Strukturfactors halten sich die Verfasser mit allerlei mehr oder weniger brauchbaren graphischen Verfahren auf, ohne das weitaus nützlichste Hilfsmittel, die Beevers–Lipson Streifen auch nur zu erwähnen. Auch in experimentellen Dingen bleibt die Besprechung unnötig beschränkt, so z. B. auf eine Seite die von Monochromatoren handelt, oder darin dass nirgends Angaben über die Belichtungszeiten bei den besprochenen Verfahren gemacht sind.

Die Strukturermittlung mit Röntgenstrahlen hat sich in den angelsächsischen Ländern an Lehr- und Industrielaboratorien in den Händen der Chemiker ungleich intensiver entwickelt als in Deutschland, wo die unzureichende mathematische Ausbildung der Chemiker dies Gebiet lange Zeit bei den Physikern belassen hat, die wiederum den chemischen Problemen fern standen. Eine gute Einführung für Deutsche Chemiestudenten zu schreiben ist daher eine wichtige und dankbare Aufgabe. Sie wird, unter anderm, nicht vor dem geringen Mass von geometrischer Anschauung oder formaler Vektoralgebra zurückscheuen dürfen, das eine wesentlich übersichtlichere Darstellung des reziproken Gitters ergeben hätte als die auf S. 92–93 gegebene. Auch in Bezug auf die Fouriermethoden wird ein solches Buch die Selbstbeschränkung aufgeben müssen. Wir möchten den Verfassern wünschen dass ihr Buch sich in einer Neuauflage, oder durch einen zweiten Band, nach dieser Richtung hin erweitern und modernisieren liesse.

P. P. Ewald

Polytechnic Institute of Brooklyn
Brooklyn 1, *N.Y., U.S.A.*

Einige Fragen zur Theorie der Lumineszenz der Kristalle. By E. I. Adirowitsch. (Translated from the Russian by H. Vogel.) Pp. 298 with 123 figs. Berlin: Akademie-Verlag. 1953. Price DM. 19.

For the reader of German who is interested in luminescence this translation by Helmut Vogel of the author's 1951 Russian monograph provides an important and provocative work.

The beginner in the field will find the first four chapters useful. The careful distinction between luminescence and

other forms of light emission in the first chapter, the summary of the band theory of solids as applied to luminescence in the third, and the treatment of decay laws of phosphorescence in the fourth have considerable pedagogic value. The survey of the history of luminescence in the second chapter suffers from an almost exclusive concentration on decay laws of phosphorescence. Important topics such as the glow-curve work of Urbach, Randall & Wilkins, and Garlick, or the chemical concentration studies of the Eindhoven group are omitted. In the field of decay curves, however, there is extensive reference to (and criticism of) the work of others.

The more advanced reader will find worth-while material in the chapters on radiationless transitions in crystal phosphors.

The absence of an index is regrettable.

J. J. DROPKIN

Polytechnic Institute of Brooklyn
Brooklyn 1, *N.Y., U.S.A.*

The Theory of Cohesion. By M. A. JASWON. Pp. viii+245 with 42 figs. London: Pergamon Press; New York and London: Interscience Publishers. 1954. Price 37*s*.6*d*; $5·75.

The author has intended this book as an outline of the principal ideas and physical concepts underlying the various approaches to the problems of cohesion rather than as a practical guide on the detailed application of any one method. The emphasis is on pointing out the logical construction of the theoretical methods and on delineating clearly the nature and limitations of the approximations involved.

The theory of cohesion—the term is used in its most general sense by Jaswon—deals with the determination of the stable states, and particularly of the energy of the ground state, of many-body systems. Since exact solutions cannot be obtained, the main concern of the theory is the construction of suitable procedures of approximation. In particular, these are developed around two major problems, namely, the interaction between electrons, and the motion of a single electron under the influence of many centers of force. The importance of these two problems stems from the attempt to replace the exact forces acting on the electrons during the passage of time by suitable average interactions of the rest of the system with independent particles. Clearly, this is most successful in situations of high symmetry and large number of particles. In dealing with systems of intermediate size and complex structure, as well as in the study of the more refined properties of the more symmetrical systems, such approximations are less satisfactory.

In order to make the book self-contained, three chapters on wave mechanics, the hydrogen atom and perturbation methods precede the discussion of the main topics. The framework of cohesion theory is then developed by treating thoroughly those simple systems which have served as the starting point of the formulation of its main concepts. Thus, the helium atom exemplifies atomic cohesion. The chapter devoted to it is concerned at length with the problem of electron interactions, discussing the significance of the one-electron approximations of the Hartree and Hartree–Fock equations. In the following chapter the H_2^+ molecule illustrates the problem of many equivalent force centers, and subsequently both parts of the many-particle problem are combined in the treatment of H_2. This leads directly into a critical examination of the physical content of the molecular orbital and Heitler–London approximations, and some of the refinements of these theories, either by formal mathematical procedure or by physical argument, are pointed out.

In terms of the same concepts two other chapters deal with the principles of constructing molecular orbitals in solids, and the wave functions of co-valent structures. An additional chapter is concerned entirely with metals, emphasizing the construction of self-consistent one-electron wave functions by the cellular method, and the importance of the resulting nearly-free character of the conduction electrons in the explanation of metallic properties. Refinements of the basic approach, which are needed to deal with the transition metals and alloys, are explained in terms of various specialized approximations. Here attention is often drawn to more recent contributions, mostly from the British literature.

The presentation is very clear and, while concise, never hurried. Though mostly qualitative, the book gives a useful survey of the mathematical techniques of the many-body problem. The beginning chapters, in particular, contain good explanations of a large number of minor—but sometimes troublesome—points arising in the construction of acceptable wave functions which are usually glossed over.

Because of the nature of its approach, this book should attract a rather large audience. Workers in many fields in which new experimental techniques and a shift of emphasis to fundamental problems have made the understanding of cohesion a matter of considerable interest will find it an excellent, self-contained introduction not requiring very special preparation.

H. JURETSCHKE

Polytechnic Institute of Brooklyn
Brooklyn 1, *N.Y., U.S.A.*