rather haphazard way through the book) on the descriptive chemistry of the elements and their compounds, for this remains the ineluctable basis of the science, in spite of all modern advances, and, in the reviewer's opinion, provides one touchstone for assessing the value of an elementary treatise. Unfortunately the hope of discovering a presentation clearly 'correlated and systematized by new principles' was sadly disappointed. Instead there appears a jejune and in some places perfunctory treatment inferior to what may be found in a large number of well-established elementary text-books. For example, in the only reference to aluminium chloride, on p. 136, the author writes 'Aluminum chloride, $AlCl_3$ or $AlCl_3.6H_2O$, is made by treating aluminum or aluminum hydroxide with hydrochloric acid'. Throughout the book there is a distracting confusion between the accepted meanings of the terms 'basic' and 'alkaline'. The chapters concerned with the compounds of carbon ('Organic Chemistry' and 'Biochemistry') contain, in addition to such advanced subjects as an account of the author's views on the structure of proteins and some discussion of the formulae and properties of important vitamins and of high polymers, the surprising statements 'formic acid can be made by distilling ants, ... an important aromatic alcohol is phenol'.

The stress laid upon recent structural development is welcome and timely, although not unexpected from one who has himself played so prominent a part in it. From its earliest pages the whole book is pervaded by a modern structural attitude towards chemical processes, which is nowhere better exemplified than in the excellent chapter on 'Water'. A reader should, however, be aware that he would be unwise in assuming that all the structures portrayed in the numerous interesting drawings are securely based upon published experimental facts. In presenting structures for the tetra- and hexa-thionic ions on p. 368 the author gives no hint that they are controversial, and that inorganic chemists still eagerly await a settlement by diffraction methods. If Prof. Pauling disposes of evidence for such a decision it is to be hoped that he will publish it without delay. It is disappointing that an obsolete formulation for 'bleaching powder' should appear on p. 269, for the final elucidation of its true formula is a particularly apt and instructive example of the impact of diffraction technique on modern inorganic chemistry.

The classical topics of physical chemistry are treated with an agreeable freshness, which here and there degenerates into imprecision, as in the faulty explanation of the difficult term 'component' on pp. 11 and 431, and in the unfortunate choice of the system hydrogen and *bromine* to illustrate a photochemical chain reaction on pp. 410–11. It seems probable that Chapter 10, on 'Covalence and Electronic Structure' will prove rather stiff reading for a novice, who, following p. 49, has previously begun the study of electricity at the sealing-wax stage. The conceptions of wave-mechanical 'resonance' and 'hybridization' appear abruptly on p. 224, without any introduction or significant explanation. A welcome feature in the theoretical chapters is the excellent choice of worked examples to clarify the application of important principles, and throughout there is a wealth of informative tabulations.

The book, which is lavishly illustrated by aptly chosen figures and structural drawings, is very clearly printed and admirably bound. Although in comparison with elementary text-books of chemistry in current use in Great Britain its price is high, none of these British books attempts to collect in the same volume all the diverse topics, germane to present day chemistry, that appear in *General Chemistry*.

W. G. PALMER

University Chemical Laboratory
Cambridge, England

Tables for Direct Determination of Crystal Structures. By V. VAND. Pp. 110. Glasgow: Chemistry Department of the University. 1953. Price 14*s*. or $2·00.

These *Tables* contain the structure amplitudes of 1–4 atoms in non-centrosymmetrical, and 1–10 atoms in centrosymmetrical distributions over the points dividing the translation of a one-dimensional lattice in 16 equal parts. The atoms are assumed as equal point masses. A first set of tables enumerates the possible atomic arrangements and lists the eight first structure amplitudes (of which the higher ones are repetitions). In a second set the enumeration proceeds according to increasing absolute values of the structure amplitudes for $h = 1$, and in case of equality for $h = 2$ or 3, and the atomic positions are listed as they belong to the structure amplitudes.

The title of the *Tables* may appear misleading to those who hope to find in them the painless way to arrive at actual structures. The limitation to the one-dimensional case, to atoms of equal scattering power and, to some extent also, the limitation to a rather crude subdivision of the cell make these *Tables* at best the precursor of a practical tool. They are, however, of considerable value to all those who are interested in the theoretical aspects of structure determination and, in general, in the relation between crystal space and Fourier space. A further discussion of the *Tables* will be found in the article by V. Vand in this issue (*Acta Cryst.* (1954), **7**, 343).

P. P. EWALD

Polytechnic Institute of Brooklyn
Brooklyn 2, *N.Y., U.S.A.*

Anleitung zu optischen Untersuchungen mit dem Polarisationsmikroskop. By M. BEREK; edited by C. H. CLAUSSEN, A. DRIESEN & S. RÖSCH. Pp. xiii+366 with 285 figs. and 21 tables. Stuttgart: Schweizerbart'sche Verlagsbuchhandlung. 2nd ed., 1953. Price DM. 29·00.

Diese bekannte und ausgezeichnete Einführung zum Arbeiten mit dem Polarisationsmikroskop, welche längere Zeit im Buchhandel gefehlt hatte, liegt nun in einer zweiten, umgearbeiteten Auflage vor, welche nach dem von M. Berek († 15. 10. 49) nachgelassenen Manuskript von seinen Mitarbeitern in den Leitz-Werken C. H. Claussen, A. Driesen & S. Rösch besorgt wurde. Gegenüber der 1. Auflage wurde, was durchaus zu begrüssen ist, der geometrisch-kristallographische Abschnitt wesentlich gekürzt und dafür die optischen Grundlagen eingehender behandelt. Im methodischen Teil bemerkt man mit

Freuden eine vermehrte Berücksichtigung der in neuerer Zeit vielfach ganz zu Unrecht vernachlässigten konoskopischen Methoden. Dabei werden interessanterweise zur Auswertung der Interferenzbilder Polarkoordinaten an Stelle der bis jetzt ausschliesslich benutzen rechtwinkligen eingeführt. Das Kapitel über die U-Tischmethoden ist ebenfalls wesentlich erweitert, wobei u.a. ein neues Verfahren für die Berücksichtigung des Brechungsunterschiedes zwischen Kristall und Segment angegeben wird. Der Abschnitt über die Auflichtmethoden enthält eine ausgezeichnete Zusammenfassung über die von Berek entwickelten quantitativen Methoden. In apparativer Hinsicht beschränkt sich die Darstellung auf die Erzeugnisse der Firma Leitz-Wetzlar, was jedoch in Anbetracht des hervorragenden Anteils, welcher Berek an deren Schaffung hatte, sowie angesichts der Stellung der Herausgeber durchaus verständlich ist. Das Buch kann bestens empfohlen werden. Für eine Neuauflage wünschte sich der Referent die Zitierung der neuern Spezialliteratur.

CONRAD BURRI

Mineralogisch-Petrographisches Institut
E.T.H., Zürich, Schweiz

Verfärbung und Lumineszenz. Beiträge zur Mineralphysik.

By K. PRZIBRAM. Pp. xiii+275 with 69 figs. Vienna: Springer. 1953. Price S 210; DM. 34·70; $8·25; S.fr. 35·50; 59*s*.

This book could hardly have been written by another author. Przibram is by profession and training a physicist, but a great part of his interest and love was always directed towards mineralogy. The physicist's contribution to the book is rather an introduction to the second part, in which he applies his knowledge and experience to problems of mineralogy.

Przibram does not have to excuse himself, as he does in the preface, for putting great emphasis on the research done in his own laboratory. As a scientist who has specialized in the field for more than thirty years and was a pioneer in it long before solid-state physics became the fashion, he is well entitled to present the results of his life work. And in doing it, by no means does he neglect the contributions from other sides: he is full of praise for the achievements of the Göttingen school, refers to Seitz and Mott for theoretical interpretation, etc. For the reader who is not at home in the subject, it is certainly useful to learn about the results obtained by authors who are not so frequently quoted in the literature, not only by those of the Vienna Radium Institut, but many others such as Röntgen & Joffe, Rexer, Smekal, Doelter, etc. The very complete bibliography at the end of the volume contains 923 references.

Much space in each chapter is given over to the historical development, and sometimes the enumeration of partially contradicting statements may become a little confusing. The chapter dealing with experimental methods is altogether essentially of historical interest and will not be very helpful to the reader accustomed to modern equipment, except to teach him how, with relatively simple means, important discoveries can be made, or at least could be made. There were no photomultipliers, no recording spectrophotometers, no electronics, no Co^{60} γ sources equivalent to many hundred grams of radium, although in the Vienna Radium Institut, of which Przibram was a distinguished member for many years, at least more than 0·5 g. of radium metal were at hand. A home made monochromator in connection with alkali photocells and a string electrometer was the most accomplished measuring instrument—this already far superior to the earlier visual spectrophotometer.

As mentioned above, the book is divided into two parts of about equal length, the first of which deals with the phenomena observed in artificially colored crystals: experimental methods, formation of color centers under various conditions, photoelectric effect, theoretical interpretation of color centers, colored glasses, coloration by colloids, and luminescence. Referring to more detailed books, the chapter on luminescence gives a short survey of this large domain. Without increasing its length, much could have been gained in clearness by inserting a figure representing the energy-level scheme instead of the verbal explanation on p. 95; such a figure would be even more useful for the transitions occurring in 'radiophotoluminescence' which are very incompletely explained by the level scheme given in the text on p. 109. Otherwise, it is fully justified that relatively much space of the luminescence chapter is devoted to radioluminescence, radiothermoluminescence (including the method of glow curves developed in Przibram's Institut long before it came to general use) and radiophotoluminescence—phenomena which were among the main subjects studied in the Vienna Radium Institut.

The second part of the book begins with a discussion of the possibility that natural minerals owe their color to the presence of radioactive elements in their interiors or in the surrounding soil. Two thirds of this part are devoted to two paradigms: rock salt and fluorite; in either case numerous samples obtained from various locations are discussed with respect to their coloration, morphology, radioactivity of their original surroundings, presence of impurities or colloidal particles, etc. Other minerals, such as quartz, corundum, calcite, various sulfates, nitrates, phosphates and silicates, are dealt with in shorter sections. A last chapter deals with haloes in natural minerals and their probable origin.

The book is printed on excellent paper; the reproduction of the figures, many of them in half tone after original photographs, could not be better.

PETER PRINGSHEIM

Chemistry Division
Argonne National Laboratory
Lemont, Illinois, U.S.A.

Tafeln zum Bestimmen der Minerale nach äusseren Kennzeichen.

By H. v. PHILIPSBORN. Pp. xxvii+244 with 10 plates and 289 figs. Stuttgart: Schweizerbart'sche Verlagsbuchhandlung. 1953. Price DM. 17·00.

The main portion of this text, pp. 1–167, consists of tables for the determination of minerals by means of easily recognizable physical properties, such as luster, color, crystallization, streak, and hardness. These tables are an extension of those by Albin Weisbach, first published in 1866, which passed through thirteen editions.