cludes structural types of chemical compounds, nature of chemical bonds, atomic and ionic dimensions and co-ordination; (*c*) crystal physics (*Kristallphysik*), in which cleavage, hardness, density and optical properties are discussed, often, when possible, in the light of crystal chemistry. A separate chapter on crystal growth and solution completes this part.

The second part begins with a chapter dealing with the application of physical chemistry to mineralogy and petrology: crystallization from melts, phase rule and thermal-equilibrium diagrams illustrated by systems involving common rock-forming minerals. The next chapter deals in a compact but comprehensive way with magmatic rocks, including their classification, texture, composition, and genesis. The role of volatile constituents, especially in the formation of pegmatites and mineral veins, is very clearly discussed. A chapter on weathering forms a prelude to the chapter on sedimentary rocks, and these in turn are followed by a chapter on metamorphic rocks, in which there is also a very good account of ultrametamorphism and petrotectonics. A very brief chapter on geochemistry concludes the second part. The third part, headed 'Appendix', consists of tables. The crystallographical tables include tables of the 32 classes, the 230 space groups and ionic and atomic radii. The mineralogical tables, compiled by S. Koritnig, contain over 300 common minerals, for each of which the following data are provided: space group and dimension of unit cell, dominant faces, cleavage, hardness, density, colour, streak, optical constants, and mode of occurrence. The petrological tables consist of chemical and mineral analyses of selected typical rocks (51 igneous, 23 sedimentary and 18 metamorphic). The list of literature is well selected, but the important book of Vernadsky, *La Géochimie*, mentioned in the text, should have been given in the list of books. Subject and author indexes are satisfactory, and at the very end of the book a detachable Wulff's stereographic net is appended.

The book is very well printed and the diagrams, drawings and photographs are well reproduced. The factual material is well selected and arranged, and with the help of the tables, as well as data dispersed throughout the text, the book can serve as a very valuable reference source. The style is pleasing and clear even to a non-German reader, and what is especially striking is the beautiful balance achieved between the factual material and the explanatory text. Speculations are discreet and set in a critical light. In its comprehensiveness, abundance of data and clarity this book is of value not only to students but also to teachers and research workers.

Of course this book, like many other good books, has some trifling faults as well as deep qualities. Some of them are in the nature of misprints, like that of Gottlob Abraham Werner (p. 200 *et al.*) instead of Abraham Gottlob Werner, or slightly imperfect figures (Figs. 20, 156) or the omission of the name of Barlow as co-discoverer with Fedorov and Schoenflies of space groups (p. 44). Other faults, in the reviewer's opinion, lie in the method or order of presentation of certain parts of crystallography. This, however, must be considered as a matter of opinion. One of such faults is probably due to the transition between the old and the new systems of representation of point groups and space groups and the use of certain elements of symmetry in preference to others. For example, in giving a list of elements of symmetry the author does not discuss the inversion-rotation axes, but he later gives the Hermann–Mauguin symbols some of which include inversion-rotation axes. It would seem that neither Schoenflies nor Hermann–Mauguin symbols are adequately discussed at the beginning, and in neither of the tables are they properly explained. The use of letter *p* for polar axes is also given at the very end of tables and not at the beginning as it should be. Another difficulty is created by the employment of figures for the number of axes used in conjunction with the Hermann–Mauguin symbols for the axes. In this way the full symmetry of class $m3m$ is given as $3.4\ 4.\bar{6}\ 6.2\ 3m\ 6m$, which is most confusing. It would probably be better to use the old-fashioned symbols for axes, such as $3A_4\ 4A_3\ 6A_2$, etc. Another small point: electron-density maps are really incomprehensible without some explanation of them in terms of Fourier analysis, but four of such maps are given (pp. 55, 57, 67, 68) before Fourier analysis is even mentioned (p. 138). A clear presentation of modern crystallography is not an easy task, especially considering the necessity of adjusting new points of view and new symbols and nomenclature to the old, well-established ideas. Probably every new book on crystallography at the present time suffers from 'growth pains' of this kind, and one cannot really blame Prof. Correns for these small defects in an otherwise first-class book.

Prof. Correns has covered such a vast range of topics—from structural parts of crystals to geospheres—that his book provides an excellent introduction not only to mineralogy as such but to crystallography, petrology and to geochemistry if this be considered in its widest sense. For a work of such compass and erudition the book is quite compact, and it is this compactness combined with the excellent arrangement of the material which makes it so useful.

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Materiewellen und ihre Interferenzen. By M. VON LAUE. Pp. viii+392, with 156 figs. Leipzig: Akademische Verlagsgesellschaft Geest und Portig K.-G. 2nd ed., 1948. Price DM. 34·00.

This practically unchanged edition of Prof. Laue's book, which was first published in 1944, is a companion to his recent book on X-ray diffraction (*Röntgenstrahlinterferenzen*, Leipzig, 1941). The present work consists mainly of an extensive and admirable account of the purely theoretical aspects of the diffraction of electrons by matter, especially crystals, together with a short description of the diffraction of molecular rays and neutrons.

A detailed treatment on these lines is not generally called for in the practical applications of electron-diffraction techniques to the study of the structure of surfaces and thin films; nevertheless, to appreciate fully the physical principles of the processes involved and to ensure clarity in the interpretation of the phenomena, such a theoretical background is essential.

An excellent, brief, but broad introduction to the subject is provided by Chapter I, which describes the paths of electrons and other corpuscles in matter, the

mechanical theory of single scattering, Rutherford's law, wave mechanics and the discovery of electron diffraction. Chapter II outlines the geometrical theory of electron diffraction by atoms in terms of Schrödinger's equation and Dirac's theory, and extends this to the interference maxima obtained from molecules in gases and vapours. Chapter III, on the geometrical theory of electron diffraction by crystals, begins with the now familiar definitions of the reciprocal lattice, and proceeds to give Laue's expressions for the intensity of electrons in any direction resulting from diffraction of a plane wave by a parallelepipedal crystal, Ewald's construction for the strong diffracted rays and, finally, the intensity distribution in ring patterns from polycrystalline specimens and in single spot patterns. Effects due to crystal shape are also discussed. A short description of diffraction of molecular rays and neutrons is given in the fourth chapter. The highest development of the theory of electron diffraction by crystals, namely, the dynamic theory with its many assumptions and approximations, forms the subject matter of the fifth and longest chapter. The author has made it clear that this is still incomplete in that he has not been able to take into account the unknown variation of fields near the surface of the crystal. The effect of heat motion in crystals on the diffraction phenomena is not discussed and it is hoped that this gap will be filled in a later edition.

As one who finds the Gothic alphabet confusing, I would like to express the further hope that some day an internationally accepted system of symbols and notation will be achieved.

This important book can be warmly recommended to the advanced physics student and to all workers in the field of structure analysis. No reader can fail to appreciate and be stimulated by Laue's brief discussion of causality in relation to the development of the particle–wave idea.

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Gmelin Handbuch der anorganischen Chemie. Platin *A* 5. Pp. 188+viii, with 61 figs. Clausthal-Zellerfeld: Gmelin-Verlag. 1949. Price DM. 43·00.

This part, which consists of pp. 533–718 inclusive of the volume on 'Platinum', is concerned not at all with platinum itself, but deals comprehensively and exclusively with the alloy systems of ruthenium, rhodium and palladium, (*a*) with one another, and (*b*) with all other metals *except* the remaining platinum metals. In the case of more than half of the 279 two- to five-component systems reviewed, copious cross-references are given to the patent literature on the subject. This is especially valuable as the patent literature is frequently the only source of information available. Valuable also is the specific mention of those binary systems with these metals, of which there is no record in the literature. The provision of a double index makes reference to a particular alloy system very easy. The published information regarding these alloys has been extracted in great detail and includes phase diagrams, crystal-structure data, mechanical, magnetic, electrical, thermal, chemical and other properties. Included also is a full discussion of the sorption of hydrogen by the alloys of palladium with silver and gold and mention of its sorption by alloys with copper, nickel and rhodium. The original literature has been reviewed up to the end of June 1948.

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Gmelin Handbuch der anorganischen Chemie. Antimon *B* 3. Pp. 69+xliv, with 4 figs. Clausthal-Zellerfeld: Gmelin-Verlag. 1949. Price DM. 24·75.

This part completes the volume devoted to antimony in the eighth edition of the *Gmelin Handbuch*. It covers the compounds of antimony with the less electro-negative non-metals, particularly sulphur and selenium, and as usual includes with much detailed and up-to-date physico-chemical data (literature references up to the middle of 1948 are given) some fascinating oddities from the byways of descriptive chemistry. It does not perhaps contain all the oddities which a crystallographer or mineralogist might expect; thus we learn that precipitated Sb_2S_3 is converted by a pressure of 1000 atm. to a form called metastibnite, but we are not told that this name was applied much earlier to an amorphous form of Sb_2S_3 found naturally, or indeed that naturally occurring crystalline Sb_2S_3 is called stibnite by English-speaking writers. A curious omission among the wealth of physical data (including optical data) on crystalline Sb_2S_3 is the refractive indices. Crystallographic details appear to be accurate, and a good feature is a statement of the method (e.g. 'powder photograph with Mo *K* radiation') when two substances are reported to have been shown to be the same by X-ray examination.

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Books Received

The undermentioned works have been received by the Editors. Mention here does not preclude review at a later date.

Angewandte Gitterphysik. By W. Kleber. Pp. viii+215, with 54 figs. Berlin: de Gruyter. 2nd improved ed. 1949.

An Introduction to Luminescence of Solids. By H. W. Leverenz. Pp. xv+569, with 143 figs., 23 tables and 1 chart. New York: Wiley; London: Chapman and Hall. 1950. Price $12; 96*s*.

An Index of Mineral Species and Varieties Arranged Chemically. By M. H. Hey. Pp. xx+609. London: printed by order of the Trustees of the British Museum. 1950. Price 30*s*.

Plasticity of Crystals. By E. Schmid and W. Boas. Pp. 353+xvi, with 222 figs. and 42 tables. Translated from the German. London: F. A. Hughes & Co. 1950. Price 35*s*.