

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.

Struktur und Eigenschaften der Krystalle. By HELMUT G. F. WINKLER. Pp. viii+258, with 62 figs. and 79 tables. Berlin; Göttingen; Heidelberg: Springer. 1950. Price DM. 16.80.

After a short introduction on macroscopic crystal symmetry, the book is divided into two parts entitled 'Crystal structure and properties', and 'Properties and crystal structure' respectively. As expressed in the preface, these topics form two different sections through the domain of crystallography: in the first part the different kinds of chemical bond, structure types and disorder phenomena are discussed; in the second part heat conduction, compressibility, thermal expansion, optical properties, hardness and cleavage are treated.

The classification of structures is different from that usually adopted. The basis is not the bond type but a scheme which, one might say, corresponds in crystal optics to the division into isotropic, negatively and positively birefringent crystals. The classification runs: isometric structures; layer structures and distinct layer structures; chain structures and distinct chain structures. Thus, for example, the closely connected rocksalt and calcite structures come under quite different categories, likewise the cubic and hexagonal close-packed arrangements, whilst, on the other hand, feldspar and rhombic sulphur come together in the chain-structure category. 'Die hier angewandte Systematik der Kristallgitter dient also nur dazu, dass bei ihnen beobachtete physikalische Verhalten ordnend dazu stellen. Sie ist durch die Art unserer Problemstellung bedingt und will und kann nicht die bewährte Systematik, z.B. der Silikate, die sich auf die Bauzusammenhänge gründet ersetzen.'

The author states that often the anisotropy of the structure is not visible from the atomic arrangement. One might remark that with structures in which this difficulty may be encountered, even the proposed strict empirical classification is not always unambiguous and independent of the property concerned. Thus the cleavage of selenium (p. 220) is incompatible with its assignment to the category of distinct chain structures (p. 119).

The book, which aims to fill a gap in the German literature, brings much information in an easily readable way.

A few suggestions for possible improvements in detail may follow. The style could gain in exactness: by 'velocity of the light in a layer' is always meant the velocity of the light vibration lying in the layer; and also in concinnity by avoiding useless repetitions, in which respect the volume of the book could be considerably reduced without any loss of content. A close packing with a period longer than the AB or ABC period of the simplest hexagonal or cubic piling is called *fehlgeordnet* (p. 142; the paper cited is not responsible for this confusion). On p. 134 it is stated that a change in modification by change of conditions is governed by the energy tending to be most favourable. However, two modifications changing in stability at a transition point do not change their energy relation! When interpreting the hardness of diamond on the 111 face (p. 212), the number of carbon bonds between subsequent planes being as 1 to 3 alternately, the *mean*

number of bonds is taken to be responsible for the observed hardness, as first one plane should be ground off, next the other. This image seems rather tendentious. In the 20-page chapter on cleavage it is not mentioned that the (100) cleavage of the CsCl structure conflicts with the simple rules given, which are said to hold qualitatively in all cases. It is remarked (p. 228) that Niggli in 1941 pointed out the connexions between the (100) cleavage of rocksalt and the fact that only one of the six bonds per ion is disrupted by the cleavage; this statement must undoubtedly have been made many times before.

In the preface the author acknowledges his debt to some recent English books. It struck the reviewer that in the section on bond types (pp. 11-84) many passages were an almost literal translation of Evans's well-known *Crystal Chemistry*.

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Untersuchungen über die Fouriersynthese der Ladungsverteilung in Kristallen. I. Verfahren und Geräte zur mehrdimensionalen Fouriersynthese. By W. DE BEAUCLAIR. Berlin: Akademie-Verlag. 1949. Price \$4.50.

Untersuchungen über die Fouriersynthese der Ladungsverteilung in Kristallen. II. Phasenfaktorentafel zur kristallographischen zweidimensionalen Fouriersynthese in Punkten eines Achtundvierzigstel-Netzes. By W. DE BEAUCLAIR and U. SINOGOWITZ. Berlin: Akademie-Verlag. 1949. Price \$11.40.

The first volume gives a brief and not sufficiently profound introduction to the principles of Fourier synthesis of crystal structures. Thus, for example, all that is explained of the phase problem is that a necessary condition for carrying out a Fourier synthesis is that $\rho(x, y, z) = \rho(-x, -y, -z)$ or $\rho(x, y) = \rho(-x, -y)$ in the three- and two-dimensional cases respectively. The author does not explain how this restricts the phase angles to the values 0 and $\pm\pi$, and that the determination of the signs of the amplitudes is the basic problem. All computational problems connected with the ambiguity of sign are completely neglected. Since Fourier syntheses have been carried out successfully even with general phase angles, and in view of the very good account given by the author of many electrical and mechanical devices, one regrets all the more that the phase problem has been completely omitted.

The discussion of the accuracy required for Fourier synthesis is also to be criticized. There is no reason why, in the case of a three-dimensional synthesis, the density of steps in the third dimension has to be less than in the other two dimensions. Furthermore, it is no common procedure to correct measured F values by interpolation; this can be done in some special cases only. The accuracy of ordinary measurements will not be better than a few percent at high intensities and 20-40% at very low