

times accentuated by the occasional lack of accuracy or precision in the treatment. For instance, the orthogonality of the transformation between the symmetry co-ordinates and  $\sqrt{m_k}$  times the Cartesian co-ordinates (not Cartesian co-ordinates themselves, cf. p. 57) is not always correctly applied. In this way errors are apparently caused, such as in the normal co-ordinates given on p. 76 (translational normal co-ordinates should always be the displacements of the centre of mass), and the obvious discrepancy in physical dimensions of the displacements given in the table on the same page and in the Hamiltonian function given on the next. The scarcity of references to original works and the equations being unnumbered are minor points that might also be regretted.

In Chapter x the authors discuss at some length the different views held by Born and Raman regarding the optical branch of crystal vibrations, and refute Born's theory. To the reviewer's mind, such a controversial subject would best be left out of a book designed chiefly to illustrate the group-theoretical method. The theoretical arguments which follow a rather confused pattern do not strictly lead to any definite conclusions, in spite of the authors' claims. Actually there are only two points for discussion, namely, the possible solutions of the equations of motion and the boundary conditions. As the general solutions of the lattice motion are exactly known and well understood by anyone familiar with wave motions, the qualitative arguments given by the authors about imaginary displacements are unnecessarily mystifying. As regards the boundary conditions, evidently nothing can be achieved by qualitative arguments in view of Ledermann's proof that the frequency distribution is independent of boundary conditions. (In connexion with the experiments quoted by the authors, it may be of interest to mention that a manuscript has just come to the

reviewer describing some accurate intensity measurements by Welsh, Crawford & Staple on the Raman spectrum of NaCl. The resolving power of the experimental set-up is three times that of the most accurate experiments by Krishnan; the results fully confirm Born's theory as worked out explicitly by Born & Bradburn. The observed maxima are too broad to be discrete lines and even the strongest line is only 50% above the continuum intensity.)

Several chapters of the book are devoted to crystals. The general ideas of the space groups are somewhat sketchily developed in Chapters II and XI. No application of group representation theory peculiar to space groups is given in the book; for the authors consider only the Raman vibrations which can all be described in terms of waves with infinite wave lengths, if the elementary cell is taken as eight times the real elementary cell of the lattice. Such vibrations of infinite wave lengths are well known to be equivalent to vibrations of a molecule containing as many atoms as there are atoms in the crystal elementary cell. For the designation of the point groups and space groups the authors use the older Schoenflies notations which are usually replaced by the more rational Mauguin-Hermann notations in the more recent publications on space groups.

On the whole it is safe to say that every physicist interested in knowing the broadest aspect of the applications of group theory to physics will find the book with its large number of actual examples over a wide range of subjects, and presented with considerable details, a treatise both useful and stimulating.

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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.*

**The Optical Principles of the Diffraction of X-rays.** By R. W. JAMES, being vol. II of **The Crystalline State**. Pp. xv+623, with 224 figs. London: G. Bell and Sons, Ltd. 1948. Price 80s.

**Probleme der Naturwissenschaften.** By P. NIGGLI. Pp. 240, with 100 figs. Basel: Birkhäuser. 1949. Price 18.50 Swiss francs.

**Einführung in die Mineralogie (Kristallographie und Petrologie).** By C. W. CORRENS. Pp. 414, with 405 figs. Berlin: Springer. 1949. Price DM. 38.00; bound DM. 41.60.

**Mineralogische Tabellen.** By H. STRUNZ. Pp. xiv+308, with 73 figs. Leipzig: Akademische Verlagsgesellschaft Geest und Portig K.-G. 1949. Price DM. 21.00.

**Gmelin Handbuch der anorganischen Chemie. Antimon B2.** Pp. 368+xiv. Clausthal-Zellerfeld: Gmelin-Verlag. 1949. Price DM. 83.60.

**Gmelin Handbuch der anorganischen Chemie. Antimon B3.** Pp. 69+xliv, with 4 figs. Clausthal-Zellerfeld: Gmelin-Verlag. 1949. Price DM. 24.75.

**Gmelin Handbuch der anorganischen Chemie. Platin A5.** Pp. 188+viii, with 61 figs. Clausthal-Zellerfeld: Gmelin-Verlag. 1949. Price DM. 43.00.

**Materiewellen und ihre Interferenzen.** By M. VON LAUE. Pp. viii+392, with 156 figs. Leipzig: Akademische Verlagsgesellschaft Geest und Portig K.-G. 1948. Price DM. 34.00.

**Materialprüfung mit Röntgenstrahlen unter besonderer Berücksichtigung der Röntgenmetallkunde.** By R. GLOCKER. Pp. viii+440, with 349 figs. Berlin, Göttingen and Heidelberg: Springer. 3rd ed. 1949.

**On the Systems formed by Points Regularly Distributed on a Plane or in Space.** By M. A. BRAVAIS, translated by AMOS J. SHALER from *Journal de l'École Polytechnique* (1850), 19, 1, being Memoir No. 1 of the Crystallographic Society of America. Obtainable through the Secretary-Treasurer Dr W. Parrish, Philips Laboratories, Inc., Irvington-on-Hudson, New York, U.S.A. Pp. viii+113, with 41 figs. 1949. Price \$3.90.