Das erste Kapitel (50 S.) 'Symmetry and the solid state' bringt nach einer kurzen historischen Einführung Definitionen und Sätze der Gruppen- und Darstellungstheorie über Punktgruppen und Raumgruppen. Kapitel 2 (30 S.) 'Symmetry-adapted functions for the point groups' beschäftigt sich mit den irreduziblen Darstellungen und den angepassten Kugelfunktionen der Punktgruppen. In Kapitel 3 (90 S.) findet man Angaben über Raumgruppen, Bravais-Gitter, reziprokes Gitter, irreduzible Darstellungen der Translationsgruppen sowie Symmetrie-Operationen und Darstellungen der Raumgruppen. Kapitel 4 (55 S.) ist den Beziehungen der Darstellungen einer Gruppe und denen ihrer Normalteiler gewidmet (und geht erheblich über die Grenzen kristallographischer oder kristallphysikalischer Probleme hinaus). Kapitel 5 (193 S.) enthält die Tabellen der eindeutigen Darstellungen der Raumgruppen, Kapitel 6 (151 S.) diejenigen der zweideutigen Darstellungen der Punkt- und Raumgruppen. Kapitel 7 (113 S.) schliesslich beschäftigt sich mit den Schwarz-Weiss-Gruppen und ihren Darstellungen. Ein kurzer Anhang und 52 S. Literaturverzeichnis sowie ein ausführliches Register beschliessen den Band.

Die im Titel angekündigte systematische Theorie der Symmetrie der Festkörper findet sich in dem Band leider nicht. Es handelt sich eher um eine Beschreibung der Symmetrie durch Matrixgruppen als um eine geschlossene Theorie. Zwar finden sich viele einzelne Angaben zu dem Thema, doch ist die Darstellung wenig zusammenhängend und nicht genügend durchgearbeitet. Der Hauptwert liegt in den Teilen, die zur Darstellungstheorie Beziehung haben und in den umfangreichen Tabellen. Hier führen theoretischer Teil und Beispiele zum Verständnis und zur Anwendung. Wertvoll ist ferner das umfassende Literaturverzeichnis, das zu den Quellen führt. Ein ausgezeichnetes Register erleichtert das Zurechtfinden.

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The structures of non-molecular solids. By GRAHAM M. CLARK. Pp.v+365, 193 Figs., 55 Tables. London: Applied Science, 1972. Price £9·00.

To anyone interested in structures, any book which attempts to classify and relate the vast number now known in the solid state is of considerable importance, and this one is no exception. The emphasis in this book, which virtually excludes the simple packing of molecules, is on structural descriptions based on the linking of polyhedra, where classification depends solely on the geometry of the structure and not, for example, on the type of chemical bonding.

The first part of the book deals briefly with fundamental principles relating to structure, such as the closest packing of spheres, the prediction of shapes of complex ions by valence-shell electron-pair repulsion theory, crystal-field theory, the linking of polyhedra, and defects in the solid state. No attempt is made to deal with structure determination; the only direct reference to classical crystallography is a two-page treatment of crystal symmetry.

The larger part of the book then classifies and describes structures on the basis of the linking of polyhedra involved. Each chapter deals with a particular type of linking, for example with structures containing polyhedra sharing only edges, or those sharing vertices and edges; within a chapter classification is on the basis of tetrahedra, octahedra and other polyhedra, and then on the number of linkages involved. The final chapter considers crystal energetics, with a useful discussion of the influence of lattice energy compared with that of radius ratio on the structures adopted by the alkali metal halides.

There is a list of references at the end of each chapter, a general bibliography and separate formula and subject indexes. The book has numerous diagrams, some of which would benefit in clarity from shading, to increase the three-dimensional impression; a particular example is the structure of Mo_8O_{23}, which is almost incomprehensible to anyone unfamiliar with this type of representation.

The linked polyhedra approach leads to some fascinating insights into structures not previously described in this way. However, the almost exclusive use of this treatment, although sometimes accompanied by a close packing of spheres description, does lead to some peculiarities. Thus a description of sodium chloride in terms of octahedra linked through edges and vertices, although precise, appears rather artificial and not as useful as the more often encountered 'ball and stick' picture.

Despite some factual errors the book is recommended reading for those interested in the classification of inorganic structures, although, in the reviewer's opinion, it by no means provides a definitive answer to the problem of such classification.

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Thermodynamics of crystals. By DUANE C. WALLACE. Pp.xviii+484. New York: John Wiley, 1972. Price £8·85.

As the title suggests, this book should prove useful to anyone interested in understanding and/or calculating the thermodynamic properties of crystals from atomistic lattice models. The first four chapters outline the basic theory necessary to calculate the equilibrium thermodynamic properties of a perfect crystal from the interatomic potential function in the absence of externally applied electric or magnetic fields. Although, as the author admits, this is a 'well-worn trail' much traveled since Born & Huang's (1957) classic, the literature is full of niggling points left unresolved in Born's work. One example is the correct formulation of the thermodynamics of strained crystals; while Born & Huang state that the method of long waves is applicable only to zero-pressure crystal configurations, it has since been shown that this method can also yield the elastic constants appropriate for the propagation of elastic waves in a pre-stressed crystal. Because the literature on this point is scattered, it is useful to have the basic theory presented in a way which resolves this difficulty as well as the associated problem of reconciling the methods of long waves and homogeneous static deformation. Similarly, it is useful to have recent anharmonic formulations, the renormalized and self-consistant phonon theories, presented in concert with the basic theory.