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book reviews

Works intended for this column should be sent direct to the Book-Review Editor, whose address appears in this issue. All reviews are also available from **Crystallography Journals Online**, supplemented where possible with direct links to the publisher's information.

Structure and chemistry of crystalline solids. By B. Douglas and S.-M. Ho. Pp. X + 346. New York: Springer 2006. Price (hardcover) EUR 106.95. ISBN 978-0-387-26147-8.

In this monograph, the authors of a successful textbook on inorganic chemistry present a classification of more than 300 different structure types using a formal description of close packing (**P**) in terms of the degree of filling of tetrahedral (**T**) and/or octahedral (**O**) interstices. This system, called the **PTOT** formalism, was originally presented by the two authors in an article in *J. Chem. Education* [(1972), **49**, 74–80] several decades ago and provides a generalization of the concepts commonly used to describe ionic structures to all of inorganic solid-state chemistry, together with a rigorous nomenclature.

The book is divided into 12 chapters. After a short *Introduction* on historical aspects of symmetry and crystal chemistry and some very general comments on the advantages of the **PTOT** notation, the second part briefly introduces very basic aspects of crystallography. In the third chapter, the **PTOT** system is introduced and explained in a clear and understandable form. The derivation of its sometimes unwieldy notation is also explained in this chapter. In the following chapters 4 to 11, the 300 reference structures and structure types are described and discussed in terms of the **PTOT** system, using alternatively geometrical criteria or classes of solids as the key for subdivision into individual chapters.

Thus chapters called *Crystal structures of silica and metal silicates* (No. 10) are intermixed with titles such as *Structures involving P and O layers* (No. 5). The entries for individual structures and compounds are easily accessible *via* the extensive and well organized *Subject Index*.

As expected, the **PTOT** formalism works nicely for primarily ionic compounds such as NaCl but is tedious to apply to other systems, even fairly simple intermetallic compounds like $CaCu_5$, and sometimes emphasizes counter-intuitive 'non-chemical' features of the structure ('Fig. 4.14: The *2IP* structure of hexagonal close-packed graphite) for intermetallic compounds or covalently bonded solids.

Each of the structure types is discussed in its own small subsection, together with a figure either taken from the literature (the source of which is cited in full length in the figure caption) or produced by the authors using the commercial Windows/Macintosh program *CrystalMaker* (which is also cited in full length in each and every applicable caption). The omission of a separate bibliography is unfortunate, the more so as the discussions often contain references to alternative structural descriptions or precice values of individual lattice constants where a source would have been useful.

In my opinion, the quality of those illustrations that were reproduced from the literature is not acceptable, especially when taking the price of the book into account. The alternations in quality and design of the figures from one structure to the next also make it harder to follow the train of thought in this monograph. The poor figure quality is somewhat compensated by the CD included in the book, where the concepts of the **PTOT** notation are presented in an animated presentation and all structures are collected in the form of their respective *CrystalMaker* input files together with a demonstration version of the program for viewing.

Despite the title of this book, its use by students of material sciences, chemistry, physics or mineralogy cannot be recommended; with the exception of simple metals and ionic crystals, the description of crystal structures in terms of close packing and the **PTOT** notation is much too complicated and sometimes even confusing from the chemical point of view. Nevertheless, the content and ideas of the book – especially in conjunction with the material on the companion CD – can be seen as an additional source of information for people teaching structural chemistry, even if only to see familiar structures from a novel perspective.

Still it seems doubtful whether the price of more than 100 Euros for this book is appropriate in view of the quality of the illustrations and a number of editorial shortcomings, although some of these issues are remedied by the well designed companion CD.

Caroline Röhr

University of Freiburg
Faculty of Chemistry, Pharmacy and Earth Sciences
Institute of Inorganic and Analytical Chemistry
Hebelstrasse 27
D-79085 Freiburg i. Br.
Germany
E-mail: caroline@ruby.chemie.uni-freiburg.de

books received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally, a book of fundamental interest is included under this heading because of difficulty finding a suitable reviewer without great delay.

The chemical bond in inorganic chemistry. The bond valence model. By I. David Brown. Pp. 278. Oxford: Oxford University Press, 2006. Price (paperback) GBP 35.00. ISBN 0-19-929881-5.

This is the first paperback edition. The bond valence model is becoming increasingly popular in fields such as materials science and mineralogy. Unlike other models of inorganic bonding, it is simple, intuitive and predictive. Many applications are reviewed. *Contents*: 1. Historical introduction, 2. The ionic bond, 3. The bond valence model, 4. Anion and cation bonding strengths, 5. Liquids, 6. Cation coordination number, 7. Hydrogen bonds, 8. Electronically distorted structures, 9. Physical properties of bonds, 10. Space and space groups, 11. Modelling inorganic structures, 12. Lattice-induced strain, 13. Applications, 14. Chemical implications of the bond valence model. Appendices.