

appreciation of the symmetry relationships that the author is trying to convey.

The third chapter entitled *Polyhalogen Cations* by J. Shamir is a survey of research developments in this field over the past decade. The review is primarily descriptive and will be of greater interest to inorganic chemists (especially those studying fluorine compounds) than to crystallographers. The author divides the subject into two groups, isopolyhalogen cations (consisting of only one type of halogen) and heteropolyhalogen cations (those containing more than one type of halogen). Of the cations in the latter group, most contain fluorine. For the isopolyhalogen cations, however, none involving fluorine are reported. The most extensive research on the isopolyhalogens involves iodine ( $I_2^+$ ,  $I_3^+$ ,  $I_4^+$ ,  $I_5^+$ , and  $I_7^+$ ) and to a lesser extent bromine. Virtually all of the anions associated with both groups of cations contain fluorine and, needless to say, many difficulties arise in the synthesis and handling of these compounds. Because of such problems in the synthesis and growing of suitable crystals, only a limited number of single-crystal X-ray structures of these compounds have been reported. Most of the molecular structural information is based on other methods such as  $^{19}\text{F}$  NMR and vibrational spectroscopy. Overall, the author has presented a well written summary of the physical, structural, and spectroscopic properties of polyhalogen cations that will be of considerable value to workers in the area.

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*Acta Cryst.* (1981). B37, 1481–1482.

**Crystal structures of clay minerals and their X-ray identification.** Edited by G. W. BRINDLEY and G. BROWN. Pp. 495. London: Mineralogical Society, 1980. Price £28.00, US \$70.00.

This long-awaited book is not a third edition of *The X-ray Identification and Crystal Structures of Clay Minerals* which was published in 1951 and updated in 1961. As indicated by the change in title, it is an entirely new book in concept and execution. Clay-mineral research was an active area in the last decades, and considerable progress was made, particularly in the field of structure determinations. The authors fully achieve the declared objective of providing an authoritative account of the fundamentals of the structures of clay minerals as well as a laboratory handbook. The book is divided into seven chapters written by six authors, all experts in the field. The transition from one chapter to the next is completely smooth and there are many cross-references.

In the first chapter, *Structures of Layer Silicates*, S. W. Bailey exhaustively surveys an impressive list of structure determinations, to which he himself has made a very significant contribution. Compilations of tables of structural details facilitate access to the data.

In the following chapter, *Order–Disorder in Clay Mineral Structures*, G. W. Brindley considers the entire range of clay minerals from the point of view of order–disorder phenomena. Attention is focused mainly on the effect of crystal size (small crystal size being treated as a structural disorder), on stacking faults and layer curvature. Ordering of cations in octahedral and tetrahedral sheets and in the interlayers receives little attention. Information about individual layer silicates is dispersed in chapter 1 and about interlayer cations in chapter 3, but I would have appreciated a more general discussion, comprising results obtained by methods other than X-ray diffraction.

In the third chapter, *Interlayer and Intercalation Complexes of Clay Minerals*, D. M. C. MacEwan and M. J. Wilson review aqueous and organic complexes of clay minerals and their use for mineral identification. The survey of clay–organic associations is necessarily very condensed. There are relatively few references to recent publications (eight covering the period 1972–1975, none later). The literature up to 1972 was extensively covered in the book *The Chemistry of Clay–Organic Reactions* by B. K. G. Theng (published by Adam Hilger, 1974). It might, therefore, have been preferable to restrict the discussion to clay–organic systems used for identification of clay minerals. The subject of demixing of cations, somewhat misplaced under the heading *Organic Complexes with 2:1 Clay Minerals*, also receives cursory treatment.

Chapter 4, *Interstratified Clay Minerals*, by R. C. Reynolds will, no doubt, prove to be invaluable to anyone dealing with clay minerals. Many of the clay-mineral assemblages we encounter are at least partly composed of interstratified material. The theoretical discussion of mixed-layer systems, the calculated diffraction profiles, some especially prepared for this book, as well as the numerous tables will surely have an immediate impact on the quality of many clay-mineral identifications.

Chapter 5, in which G. Brown and G. W. Brindley give the reader the benefit of their long years of experience of *X-ray Diffraction Procedures for Clay Mineral Identification* is a useful guide for the beginner and also contains much that is of interest to the veteran researcher. Methods of identification reported in the literature are critically discussed and diagnostic criteria are compiled in numerous informative tables.

In Chapter 6, *Associated Minerals*, G. Brown conveniently summarizes the X-ray diffraction patterns of minerals commonly associated with clays and discusses some of their relevant structural characteristics.

Chapter 7, by G. W. Brindley, deals with *Quantitative X-ray Mineral Analysis of Clays*. Although the emphasis is on the problem of clay-mineral analysis in particular, the author presents a very clear and concise account of methods of quantitative X-ray analysis in general.

Finally there are 35 pages of tables relating  $d$  in Å to  $2\theta$  for unresolved  $K\alpha$  and  $K\beta$  radiation from Cu, Co and Fe anodes, to an accuracy of  $0.02^\circ$   $2\theta$  for  $K\alpha$  and  $0.05^\circ$   $2\theta$  for  $K\beta$  radiation.

*Crystal Structures of Clay Minerals and their X-ray Identification* is not only a summary of the 'state of the art'. It is a major contribution to its advancement. This book is beautifully produced and illustrated and contains a wealth of information. It is indispensable to anyone concerned with clay minerals. Despite the price, many researchers will not be

satisfied with a library copy, but will wish to have this book permanently on their own bookshelf.

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*Acta Cryst.* (1981). B37, 1482.

### 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 in finding a suitable reviewer without great delay.*

**Synchrotron radiation research.** Edited by H. WINICK and S. DONIACH. Pp. xx + 754. New York: Plenum, 1980. Price US \$65.00. 'The explosive growth of interest in this extraordinary tool constitutes a major event in the recent history of scientific instrumentation.' With this observation, this book begins, and its size and weight well justify the

remark. It is hardly a year ago that we commented [*Acta Cryst.* (1980), A36, 333] on another overview of synchrotron radiation, edited by Kunz. The present book is not more up to date than Kunz (which consisted essentially of conference papers) but it is a fuller and more coherent text. There is a 40-page chapter devoted to single-crystal diffraction, with over 60 references to original literature, and there are separate chapters on small-angle scattering, on EXAFS, and on topography, as well as many chapters on non-crystallographic matters.

**Computing in crystallography.** Edited by R. DIAMOND, S. RAMASESHAN and K. VENKATESAN. Pp. 450. Bangalore: Indian Academy of Sciences, 1980. Price US \$17.00, Rs 125/-. Price for individuals US \$8.00, Rs 50/-. A review of this book, by D. S. Moss, has been published in the May issue of *Acta Crystallographica*, Section A, page 446.

**Computer processing of electron microscope images.** Edited by P. W. HAWKES. Pp. vi + 296. Berlin, Heidelberg, New York: Springer-Verlag, 1980. Price DM 65.00, US \$36.40. A review of this book, by A. M. Mikhailov, has been published in the July issue of *Acta Crystallographica*, Section A, pages 606-607.