naturally occurring assemblages are accompanied by photomicrographs of ore mineral suites. Apart from the brevity of the descriptions, the occurrences described are necessarily selective. However, an exhaustive treatment of this aspect was not the authors' objective. Again, many references to more detailed accounts are quoted.

In the final section of the book, the authors incorporate the 'natural assemblages' concept into their crystal-chemical classification to produce an overall classification system which they suggest fits best 'the peculiarities and genesis' of these minerals. All the sulphides known up to the end of January 1981 are tabulated according to this classification, together with their chemical formula, symmetry and unit-cell parameters.

Over 400 references constitute a most extensive source of information. However, the index is disappointing, consisting only of a list of mineral names and their major X-ray diffraction lines. There is no topic index and the entire central section on natural assemblages has been omitted from the index.

This is a well produced book, free from typographic errors. Those involved in sulphide mineralogy and crystal chemistry will find it a valuable source of reference. However, its appeal will probably be restricted to this group of specialists.

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Acta Cryst. (1985). B**41**, 454

Topics in nucleic acid structure. Part 2. Edited by S. NEIDLE. Pp. ix+309. London: Macmillan, 1982. Price £47.00.

This book is the second volume in what appears to be an excellent series on nucleic acid structure. It is geared for graduate students and researchers in the field, and, in fact, I have recently recommended two of the articles from it to be assigned reading for an international school on 'The Structure of Chromatin and DNA'. Its seven chapters cover a wide area of the field from analysis of the three-dimensional structures of nucleic acids and proteins through functional and topological implications of hairpin loops in supercoiled DNA.

Some of the topics covered include a timely review by D. Patel and his collaborators on the energetics and structural dynamics of the DNA double-helix dodecamer d(CGCGAATTCGCG) and selectively modified analogues of it. They focus on the power of techniques applied to nucleic acids in solution, *e.g.* NMR and differential scanning calorimetry, to elucidate structural information. In the case of DNA-B, this is especially important as at present only one such structure has been determined by X-ray crystallographic methods, *i.e.* this same dodecamer by R. Dickerson's group [Wing *et al.* (1980). *Nature* (*London*), **286**, 567]. The conformational effects of single base insertions, *i.e.* precursors of 'nonsense' mutations, as well as the change from a G-C to a G-U base pair, *i.e.* a 'missense' mutation, are examined.

W. Olson gives a comprehensive review of theoretical studies on nucleic acid conformation covering potential-energy studies, chain statistics and model building. The conformational analysis of the building blocks of nucleic acids is examined in detail, paying special attention to the furanose ring, which plays a pivotal role in DNA and RNA structures. From this she goes on to build a coherent theoretical picture of the flexibility of long-chain polynucleotides including various models of novel helical structures as well as a model for the interconnection between right- and left-handed double-helical DNA structures.

H. T. Wright presents an in-depth look at four recently determined tRNA crystal structures and compares them with that of the first tRNA structure: yeast $tRNA^{Phe}$. These consist of chain *initiator* tRNA's from yeast and *E. coli*, and two yeast chain *elongator* tRNA's: $tRNA^{Asp}$ and $tRNA^{Gly}$. He discusses "What is unique about initiator tRNA's" relative to chain elongators, and although the X-ray refinement is still in a preliminary stage and the crystallization conditions used are quite different from $tRNA^{Phe}$, he is able to point out some *key* differences between these two classes of tRNA's. In parallel for the newly determined chain *elongator* yeast $tRNA^{Asp}$, which was determined to higher resolution, he describes how the angle between the two major double-helical stems opens up, giving a kind of 'boomerang' shape to the structure as contrasted with the 'L' shape of $tRNA^{Phe}$ and the two initiator tRNA's. The structure of yeast $tRNA^{Gly}$, grown from 50% dioxane, is also discussed. Here, however, due to the low resolution (4-5 Å) of the X-ray data, and the poor final figures of merit, 0·55, the author is extremely careful in not over-interpreting the structural results.

A. McPherson presents an up-to-date survey of crystallographic studies on nucleic acid binding proteins. In order to give some experimental feel for the quality of the work, he includes photographs of the protein crystals and X-ray diffraction patterns, as well as a schematic illustration of a model of the current state of each structure.

Additional topics include 'Hairpin Loops in Supercoiled DNA' by D. M. J. Lilley, 'Recognition of Natural and Chemically-Damaged Nucleic Acids by Peptides and Proteins' by C. Hélène and collaborators, and a paper by D. Rhodes on 'The Helical Periodicities of DNA in Solution and in Chromatin'.

Dr Neidle has done an excellent job editing this volume, which is also quite well illustrated. It should reside in most technical libraries and the personal collections of serious researchers in the field.

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Acta Cryst. (1985). B**41**, 454-455

Solid state chemistry and its applications. By ANTHONY R. WEST. Pp. 734. Chichester: John Wiley, 1984. Price £37.00.

In his introductory chapter author West of the Department of Chemistry at the University of Aberdeen writes 'Solid state chemistry is concerned with the synthesis, structure,

properties and applications of solid materials'. As such, he notes that it overlaps (or encompasses) solid-state physics, materials science, metallurgy, ceramics and mineralogy. Crystallography and much of physical and inorganic chemistry could also be added to the list. It is, consequently, a difficult task to write a textbook which covers all of this.

However, as pointed out by H. S. Johnston in his foreword to the 1967 text, *Solid-State Chemistry* by N. B. Hannay, '[this branch of chemistry] is not a body of knowledge that must be covered but rather a set of methods of predicting chemical events'. And the methods are connected by a common viewpoint - the microscopic viewpoint - which emphasizes the atomic arrangement of the solid and relates the properties and behavior of the solid to this atomic arrangement.

It is the atomic-arrangement viewpoint that unifies West's new, thick (734 pages) introductory solid-state chemistry textbook. Most of the fundamental concepts and tools are introduced in the book's twenty-one chapters, along with a considerable amount of data skillfully incorporated as examples and applications. The first chapters are on physical methods: preparation of materials, various types of physical characterization, thermal analysis and X-ray diffraction. The methods of characterization are not covered exhaustively but extensively enough to show their potentials. Recent techniques such as 'magic angle spinning' solid-state NMR and EXAFS spectroscopy are included.

There is a series of chapters on crystallography, description of crystal structures and discussion of factors which influence crystal structure. Crystal structure determination is not covered. After this are chapters on crystal defects (particularly well illustrated), solid solutions, phase diagrams and phase transitions. Conventional models and terminology are used here and throughout.

The remaining 40% of the book emphasizes the more applied aspects of solid-state science. There are chapters on ionic conductivity, electronic conductivity and band theory, thermoelectric and ferroelectric effects, magnetic properties, luminescence and lasers, and individual chapters on glass, cement and refractories. There is a brief concluding chapter on organic solid-state chemistry which includes polymerization reactions in solids and electron-conducting polymers.

There are eight, short, somewhat orphaned appendices that contain a miscellany of techniques and data. If this information is extraneous to any of the chapters, then perhaps it could have been omitted altogether. Finally, there is a separate chemical formula index as well as a subject and author index and both appear to be quite detailed and complete.

Physically, the volume is attractively presented and largely free from other than trivial typographic errors. The illustrations are plentiful and informative.

The author's technique can best be demonstrated by consideration of a typical chapter. For example, in Chapter 13, he introduces the concepts and formulae of ionic conductivity in solids and establishes what constitutes normal behavior. Then he considers special-case 'fast-ion conductors' with specific examples described in considerable detail. This is followed by a discussion of means of measuring conductivity (perhaps too extensively as the detailed equations are considered at great length). Next is a discussion of specific, modern-day applications of fast-ion conductors including batteries, sensors and fuel cells. The chapter is concluded with a list of questions for the student and a fairly comprehensive bibliography on the subject.

The level of this text is introductory and largely non-mathematical although all relevant formulae are developed and used. The exposition of concepts, models and processes is clear but it is the author's approach, which emphasizes practical applications, that makes this text exceptional. This emphasis on the practical, a liberal use of anecdotes and well chosen, illustrative examples will successfully keep the student's interest and aid understanding. Frequent reference to possible future applications and intriguing research-topic suggestions should alert all readers to the opportunities in this burgeoning field.

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Acta Cryst. (1985). B41, 455-456

Thermodynamics of silicates. By O. P. MCHEDLOV-PETROSSYAN, V. I. BABUSHKIN and G. M. MATVEYE. Pp. xvi+459. Berlin: Springer-Verlag, 1985. Price DM 250.00, US$98.00.

The crystallography of oxides in general and silicates in particular has long been accorded a special place in structural investigations on account of the number of unique structures which occur. Although these share certain common architectural features, it has proven remarkably difficult to predict the existence of new phases and create 'tailored' structures. Moreover, the structural elements present in poorly ordered materials, such as gels and glasses, have been elucidated only in part by crystallographic methods.

Thermodynamics forms a valuable complementary technique to crystallography inasmuch as it provides an independent method of analysing structural stability and order. Like crystallography, it requires perseverance in its application and suffers from certain limitations in the range and extent of its applicability. Very extensive applications to silicates are being made in Russia and Eastern Europe, and the authors, whose own contributions to the field are of great importance, are well placed to produce this book, the English-language version of which is welcome because it makes this body of information more widely accessible.

The book commences with an introductory chapter on basic thermodynamics and concludes with one on irreversible processes. It is in the introductory chapter that irritating mistakes are most apparent: formal thermodynamics has changed little in the past half-century, and many of the errors could and should have been eliminated. The reader whose native tongue is English will mentally change 'effect' to 'affect' (pages 2 and 3) and the scientist will be able to supply the missing equation at the foot of page 13, but other mistakes are more subtle and the beginner seeking an introduction to the thermodynamics of solids should be directed elsewhere.

The real value of the book lies in its central portions which review the applications of thermodynamics to compound formation and decomposition, melting and glass