parameters differing by only a few percent of a cell-edge dimension, to have different crystal structures!) Unfortunately, the layer-stacking point of view requires the use of unfamiliar notations, and the reader will be surprised (and perhaps somewhat frightened) to find the NaCl structure denoted by the symbols

NaCl $\quad Na_0^A Cl_{17}^C Na_{33}^B Cl_5^A Na_{67}^C Cl_{83}^B$

or

NaCl (*cF* 8) $\quad Na_0^{1+4} Cl_0^5 Cl_5^{1+4} Na_5^5$

These notations are perhaps more suitable for computers than for people, and it will be interesting to see whether some advantage can be taken of this situation.

Next there is a review of the physics and chemistry of structural stability. This is a complicated business, because geometrical effects, chemical bond effects, electronegativity effects, and energy band effects can all make important contributions to the free energy of an alloy system. These contributions cannot be calculated very accurately, and only small energy differences decide the stability of one structure compared to another. Another serious difficulty in making a theory of structural stability is that, in metals, atomic sizes are a function of the structure, rather than vice versa. Metals are *not* made of billiard balls! Thus the "theories" can at present provide only ad hoc explanations or, at best, prohibitions (such as Hume-Rothery's 15-percent rule), not predictions.

Finally, the actual structures are introduced—hundreds of them. Each is described with a short paragraph usually in terms either of layer stacking or of relationships to other structures. Most of the discussions are accompanied by very useful drawings, and in each case references are given to the experimental structural determination. This section of the book should prove indispensable to those working with metals having complex structures.

Simply because of its incredible information density, the reading of this book entails a fair amount of work. One can only imagine how much work it was to write it, and Pearson deserves our thanks for having done so.

A. C. LAWSON
BERND T. MATTHIAS
Institute for Pure and Applied Physical Sciences, University of California, San Diego

Solid State Processes

Point Defects and Diffusion. C. P. FLYNN. Oxford University Press, New York, 1972. xii, 826 pp., illus. $51. International Series of Monographs on Physics.

Diffusion is an important phenomenon controlling many solid state reactions and transformations. The utilization of diffusion, or, in as many occasions, the reduction of its effect, is not only of fundamental interest, but also of significance for various technological problems. This requires the understanding of the diffusion phenomenon and hence the study of point defect properties. Research activities in this field have grown steadily over the last 20-some years or so. It is interesting now to compare the book *Atom Movements*, a seminar proceedings published by the American Society for Metals in 1951, with this book by Flynn. One is certainly impressed by the wide range of problems associated with diffusion being studied in recent years.

This book is a comprehensive one, covering a broad spectrum of fundamental aspects of diffusion and point defect properties. It is also quite an impressive one in the depth that the author can manage in treating such a broad range of subject matter. For example, there is a fine chapter on the electronic states of point defects and, in the other domain of diffusion phenomena, an equally comprehensive treatment of the precipitation problem. It is perhaps not unusual to see such a variety of topics discussed by different experts in a conference proceedings, but to find them systematically developed by one author is not common.

This book first shows the fundamental aspects of the equilibrium point defects and how the vibrational and electronic properties of the crystal change as a result of interaction with the defects. After the author has established the basic properties of point defects, he considers their diffusional behavior under different driving forces in various types of crystals. The characteristics of point defects in the four main classes of crystals, molecular, ionic, valence, and metallic, occupy the last part of the book. The author approaches the subject usually by a qualitative discussion of the physics involved, then proceeds to formulate the problem in detail. Considerable effort has been spent in showing the details of many mathematical derivations in the book. It appears to be the intention of the author that this book be used as an advanced level textbook. It should serve this purpose very well. Graduate students after completing the first one or two years' courses in physics or some related field should not encounter difficulties in understanding the material, and they will probably find this book a useful stepping-stone to the research field of point defects.

Some outstanding problems of current research interest have been included, among them the question of the validity of using the reaction rate theory to treat the details of the atomic jumping process, particularly the isotope effect; the dynamical theory of diffusion and the quantum effect of light interstitials in diffusion; the dielectric screening of impurity atoms in metallic and valence crystals; and the use of magnetic and optical resonance techniques to measure defect properties. These topics, of particular interest to the author, are explored to considerable depth. Researchers currently investigating diffusion and point defects would find the book very useful indeed.

PAUL S. HO
IBM Watson Research Center, Yorktown Heights, New York

Books Received

Advances in Metabolic Disorders. Vol. 6. Rachmiel Levine and Rolf Luft, Eds. Academic Press, New York, 1972. xiv, 236 pp., illus. $13.

Advances in Virus Research. Vol. 17. Kenneth M. Smith, Max A. Lauffer, and Frederik B. Bang, Eds. Academic Press, New York, 1972. x, 336 pp., illus. $17.50.

Aerosols and Atmospheric Chemistry. Proceedings of a symposium, Los Angeles, Mar. 1971. G. M. Hidy, Ed. Academic Press, New York, 1972. xviii, 348 pp., illus. $14.50.

Albert Einstein. Creator and Rebel. Banesh Hoffmann with the collaboration of Helen Dukas. Viking, New York, 1972. xvi, 272 pp., illus. $8.95.

Annual Report on Support of University Research 1971–72. National Research Council of Canada, Ottawa, 1972. xiv, 618 pp. Paper, $2.50. N.R.C. No. 12724.

Annual Reports on the Progress of Chemistry. Vol. 68, 1971, Section A: General, Physical, and Inorganic Chemistry. The Chemical Society, London, 1972 (available from the Publications Officer, Blackhorse Road, Letchworth, Herts., England). xvi, 546 pp., illus. £6.

Annual Review of Materials Science. Vol. 2. Robert A. Huggins, Richard H.

(*Continued on page 706*)