

## Book Reviews

*Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.*

### **The chemistry of extended defects in non-metallic solids.**

Edited by LEROY EYRING & MICHAEL O'KEEFFE. Pp.vi +669. Amsterdam: North Holland, 1970. Price f. 108, £12-60, \$30.00.

This volume contains thirty-seven papers and discussions given at an Advanced Studies Institute in Arizona, April 1969. The treatment was interdisciplinary and reflected the opinions of chemists, metallurgists and physicists. While most of the subject matter relates to oxide systems, there is also a treatment of silicides, chalcogenides and halides.

An average metallurgical text might not give more than a few of its pages to extended defects, but here, chemical crystallographers have devoted 650 pages to the subject and the editors have curtailed the first introductory lectures and much of the discussion. Accordingly, no plateau has been reached in the defect state of solids and the initiative which was once the province of metallurgists and physicists has been shown to be actively taken by chemists.

The defects described play an important role in structural relations which are an essential part of crystal chemistry. Moreover, as is pointed out, chemical compounds are sufficiently more complex than metals for a new terminology of defects to be worth while. Thus the term 'extended defect' can now mean practically anything beyond a single vacancy. The book gives a full treatment of vacancy clusters, different types of fault planes and defect surfaces, channels of defects in cation disordered electrolytes, anti-phase boundaries, etc.

The various ideas are developed clearly in the text. The first papers given from the chemical viewpoint, deal with thermodynamics of phases and geometrical descriptions of structural faults. The middle section of the book contains papers of experimental observations which include dislocation interpretation of faults by metallurgists and crystallographers. The final papers include defects in magnetic structures, the kinetics of defect clustering and decomposition in non-metallic solid solutions and vacancy filling of defect oxide structures under pressure.

For chemists, there are valuable contributions on non-stoichiometry and its accommodation in certain crystals by the introduction of disordered crystallographic shear planes. Various theories are proposed for the regular distribution of these planes.

For those working in the field of defects in other disciplines, the book provides exciting reading. As a developing branch of solid state chemistry it provides many intriguing problems in thermodynamics, in structure, and in phase transformations.

I. MINKOFF

*Department of Materials Engineering  
Technion  
Haifa  
Israel*

### **Structure and bonding. Vol 8.**

Edited by P. HEMMERICH, C. K. JØRGENSEN, J. B. NEILANDS, Sir RONALD S. NYHOLM, D. REINEN, R. J. P. WILLIAMS. Pp. 196. Berlin: Springer-Verlag, 1970. Price (soft cover) DM. 42., U.S. \$ 11.60.

The long-standing aim of this series is the encouragement of 'developing new frontiers in borderline areas'. This present volume is sub-titled 'Biochemistry' and it contains four articles essentially devoted to the metal-ligand bond[s] in proteins and enzymes. A *prima facie* claim of meeting the series' objective is obvious and each article is a worthwhile summary of the way in which physical methods of one kind or another have contributed to an understanding of structure and function.

Bearden and Dunham take us through Mössbauer measurements of model complexes and of heme and non-heme proteins. I am not devoted to the view that Mössbauer spectroscopy has provided really unequivocal information on electronic configuration, nature of the metal-ligand bond and so on but this review is a lucid one. Nuclear magnetic resonance spectroscopy of hemes and hemoproteins is discussed by Wüthrich; this is a rapidly changing field as ultra-high resolution and <sup>13</sup>C-spectra become available. Hill, Röder and Williams concentrate on recent developments in our knowledge of the nature of the cytochrome protein, p-450; this review is a particularly nice synthesis of the way in which different spectroscopic methods complement one another.

Finally, Lindskog surveys the rôle of cobalt(II) in carbonic anhydrase, carboxypeptidase, alkaline phosphatase, alcohol dehydrogenase, phosphoglucomutase and other proteins.

Crystallographers reading this volume will probably see a large number of problems which could benefit from diffraction analysis – maybe that is as much as the editors could have hoped for.

R. MASON

*The Chemical Laboratory  
The University of Sussex  
Falmer  
Brighton  
Sussex  
England*