

distribution, Molecular orbitals and the self-consistent field, Valence bond theory, Some recent developments, Electric and magnetic effects, The calculation of electronic wave functions, and 4 appendices: Quantum mechanical principles, Atomic orbitals and angular momentum, Symmetry and group concepts, Relativistic terms in the Hamiltonian. At the end of the book there are author and subject indexes.

There are many books on the market on these subjects. The great value of this book, however, lies in the way of presentation which is pedagogical and clear. The task of covering the large number of subjects in a relatively short book has been achieved by placing the emphasis on explanation and interpretation rather than detailed derivation. This is particularly evident in the first four chapters and in the appendices. Simple and illustrative examples are worked through; however, exercises especially set for the reader would have improved the book. The book is intended to be self contained and this is fulfilled if the reader has a good background in elementary quantum mechanics or is prepared to take a rather large number of statements for granted. After each chapter there is a reference list to the key literature so the reader has some guidance in finding more detailed treatments.

The subject index at the end of the book is somewhat incomplete and the reader may look in vain for subjects which are in fact treated in the book.

For the crystallographer who is intending to look for details in the electron distribution the book should be a very good introduction. It gives a unified and clear survey of the methods available for calculating electron distributions and of the limitations of these methods.

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Structure and bonding. Volume 6. Edited by P. HEMMERICH, C. K. JØRGENSEN, J. B. NEILANDS, R. S. NYHOLM, D. REINEN & R. J. P. WILLIAMS. Pp. 159. Berlin: Springer-Verlag, 1969. Price (soft cover) DM 34, \$ 8.50.

This volume contains the following papers: *Valence-Shell Expansion Studied by Radio-Frequency Spectroscopy* by E. A. C. Lucken; *Ligand-Field Spectroscopy and Chemical Bonding in Cr³⁺-containing Oxidic Solids* by D. Reinen; *Spectra of 3d Five-coordinate Complexes* by M. Ciampolini; *Valence-Shell Expansion Studied by Ultraviolet Spectroscopy* by C. K. Jørgensen; *Polynuclear Complexes of Iron and their Biological Implications* by Th. G. Spiro & P. Saltman and *Ionic Radii and Enthalpies of Hydration of Ions* by D. F. C. Morris.

Drs Lucken and Jørgensen present very carefully considered reviews of experimental and theoretical data relating to the extent of $p_{\pi}-d_{\pi}$ and $p_{\sigma}-d_{\sigma}$ contributions to bonding. After reading these papers the reviewer found himself in agreement with Dr Lucken's conclusive remark: '... in very few of the examples presented it has been possible to provide *clear* (my italics) evidence for outer *d*-orbital participation in bonding...'

A very thorough discussion of the electronic spectra of chromium (III)-containing solids is given by Dr Reinen who

shows that a satisfactory interpretation of spectral parameters in compounds of this type must go beyond a ligand-field approach and, perhaps, even beyond a simple molecular orbital approach.

The spectra of 3d five-coordinate complexes receives a lucid and comprehensive treatment by Dr Ciampolini and Drs Spiro and Saltman present an account of the interesting and difficult field of polynuclear iron complexes. Their discussion of the biological implications is tantalizing as it shows how little we know about such 'vital' compounds.

The volume closes with a 'mini-contribution' by Dr Morris, which is an appendix to his earlier review on the same topic in Volume 4 of this series, and serves to set the record straight about the neglect of an earlier contribution by K. Fajans. All in all, this volume makes very interesting reading.

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Solid phase peptide synthesis. By J. M. STEWART and J. D. YOUNG. Pp. xi + 103. Kent, England: Freeman, 1969. Price 48 s.

The book comprises three chapters. The first deals with basic principles of solid phase peptide synthesis, the choice of protecting groups and methods of coupling. The second and third give a detailed account of laboratory techniques and apparatus used in solid phase synthesis. There are also useful appendices dealing with addresses of suppliers of glassware, apparatus, chemicals and reagents, the molecular weights of amino-acids and derivatives, formulae of protecting groups and reagents, and a list of representative peptides prepared by the method. The presentation is crisp and clear, and the inexperienced reader must be left with the impression that peptide synthesis is now delightfully straightforward. Indeed, now that commercial automatic synthesizers are available crystallographers may feel urged, with Stewart and Young's instruction manual for guidance, to rush to their benches and prepare that dodecapeptide themselves!

Beware! The scope and limitations of solid phase synthesis are dealt with cursorily in a one-page postscript. In fairness to the authors, information concerning these shortcomings is slow to appear in the literature. Nevertheless there are increasing numbers of people with long experience in the synthesis of peptides who have had a singular lack of success in applying the method to the synthesis of pure peptides of decapeptide size or above. There are also many smaller sequences that present problems.

The reviewer recommends this book only to the crystallographer who is most enthusiastic about his chemistry.

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