Book Reviews

Electronic Properties of Inorganic Quasi-One-Dimensional Compounds. Part I. Theoretical. Part II. Experimental. Part I: Edited by P. Monceau. D. Reidel Publishing Company: Dordrecht, The Netherlands. 1985. xi + 253 pp. $48.00. ISBN 90-277-1789-3. Part II: Edited by P. Monceau. D. Reidel Publishing Company: Dordrecht, The Netherlands. 1985. xi + 323 pp. $58.00. ISBN 90-277-1800-8.

If one were to make generalizations (always dangerous of course) about chemists and physicists it could be said that physicists know a lot about a little but chemists a little about a lot. In the context of the subject matter of these two volumes, the chemist is interested in designing new systems which would exhibit particular types of behavior by employing the diversity presented by the periodic table and the physicist in studying one or two systems in as much detail as possible using the theoretical and experimental tools currently available to him. **Theoretical**. The philosophy of these two volumes lies firmly in the second camp. On the back of both it is suggested that the material will be of interest to "research workers and specialists in synthetic chemistry". These two books will be read by the solid-state physics community and that group of solid-state chemists happy with the jargon and mathematical techniques that they use.

Part I contains a series of well-written, highly specialized theoretical articles on aspects of low-dimensional behavior including superconductivity, the enigmatic soliton problem, and the depinning of charge density waves. There is also a nice overview of the properties of conducting MSe_3 systems by Barisic. Part II, labeled "Experimental", also contains a good bit of theory. Carneiro's concise article on platinum chain compounds usefully relates the two, and the other chapters in this volume do rely on a knowledge of a wide range of theoretical concepts from solid-state physics.

One is immediately led to a comparison of these books with the series "Extended Linear Chain Compounds" edited by Joel S. Miller (reviewed in *J. Am. Chem. Soc.* **1983**, *105*, 4118) and published in 1982 by Plenum Press. For the chemist this series is much broader in coverage and well directed toward chemical problems in contrast to the one edited by Monceau, reflecting the general sentiment of the opening lines of this review. However, for the scientist who really wants to get to the bottom of Peierls distortions, charge density waves and the physical phenomena which they strongly influence, then serious study of these two volumes would be a good start, but one which should not be undertaken lightly.

Jeremy K. Burdett, *The University of Chicago*

Electrochemical Synthesis of Inorganic Compounds. By Zoltan Nagy (Argonne National Laboratory). Plenum Press: New York and London. 1985. xiii + 474 pp. $75.00. ISBN 0-306-41938-60.

This book consists of an alphabetical listing (according to element) of journal and patent references for the electrochemical syntheses of inorganic compounds. The references span the 75 year period ending in 1983. An entry for each compound consists of the title, authors, and journal or patent where the description of the electrochemical synthesis may be found. The book is strictly a reference work and is essentially an encyclopedia of electrochemical syntheses reported for inorganic compounds. These run the gamut from the production of Eu(II) from Eu(III) solutions to references for the synthesis of partially oxidized linear chain $Pt(CN)_4^{2-}$ compounds. The book includes the electrochemical syntheses of several compounds of trans uranium elements and many references to the synthesis of interesting solid-state materials (i.e., phosphides and silicides). I believe that the book will be a valuable addition to a departmental library or the personal library of a specialist in this area.

Kent R. Mann, *University of Minnesota*

Transition Metal Chemistry, Volume 9. Edited by Gordon A. Melson (Virginia Commonweatlh University) and Brian N. Figgis (University of Western Australia). Marcel Dekker, Inc.: New York. 1985. vi + 312 pp. $65.00, hardbound. ISBN 0-8247-7188-5.

The inorganic chemistry community will be pleased to find that this series of volumes, originally edited by Prof. R. Carlin, has resumed publication under the leadership of Profs. Melson and Figgis. Their absence from 1972 to 1982 was certainly apparent and fortunately the wait for volume 9 was only 3 years. The book is divided into two chapters. The first, by Prof. M. A. Hitchman of the University of Tasmania, is an excellent review, mainly of experimental results, of the study of the polarized crystal spectra of what are now considered the "classical" type of transition metal coordination compounds. The majority of the discussion is in terms of crystal and ligand field concepts which are so valuable when applied to this type of compound. Unfortunately the chapter seems a bit dated as the vast majority of the references are pre-1980. The second chapter by H. van Dam and A. Oskam of the University of Amsterdam deals with a very timely application of UV photoelectron spectroscopy. Once again the treatment is mainly centered on the experimental results and, with the exception of a section of β-diketonates, deals mostly with what would be referred to as organometallic complexes of transition metals, complexes containing carbonyl and cyclopentadienyl ligands, and the currently very important metal–metal bonded organometallic clusters. Fortunately for this fast moving area of research the chapter is nicely up to date with almost half of the references being to post-1980 work.

Gary J. Long, *University of Missouri—Rolla*

Processes for Major Addition-Type Plastics and Their Monomers, 2nd Edition. By Lyle F. Albright (Purdue University). Robert E. Krieger Publishers: Malabar, FL. 1985. VIII + 298 pp. $32.50. ISBN 0-89874-074-6.

Addition-type monomers and polymers covered are those related to ethylene, propylene, vinyl chloride, and styrene. This up-dates the first edition published in 1974. This book is most useful as a textbook reference and for designing of processes for the polymers discussed.

Eli M. Pearce, *Polytechnic Institute of New York*

Semi-Empirical Methods of Quantum Chemistry By Joanna Sadlej (University of Warsaw). John Wiley & Sons: New York. 1985. xiv + 386 pp. $100.00.

The scope of this book is considerably broader than might be anticipated from the title. It begins with a rather long chapter dealing primarily with the ab initio Hartree–Fock method but includes also a section on configuration interaction. The next two chapters take up the CNDO, INDO, and related techniques and are followed by an examination of their effectiveness in determining various molecular properties, e.g., ionization potentials, geometries, force constants, etc. Various means of analyzing and predicting chemical reactivity, such as atomic charges and molecular electrostatic potentials, are discussed, with several pages devoted to each. Some specific reaction mechanisms are analyzed in detail in terms of the MINDO/2 procedure.

An impressive feature of the book is three long chapters devoted to (1) the quantitative treatment of molecular spectra, including NMR, ESR, IR, and electronic; (2) hydrogen-bonded systems; and (3) quantum biochemistry/pharmacology. These are not simply superficial surveys; for example, there is a detailed treatment of the molecular Hamiltonian in the presence of a magnetic field. The examples given in these chapters are primarily, but not entirely, drawn from semiempirical computations.

Throughout the book, the author tries, insofar as is practical, to provide in-depth explanations and background for the concepts that are introduced. The presentation is not always as smooth and well-organized as might be desired, but with some effort, a great deal of useful information and insight can be obtained from this book. The coverage is not uniform; for instance, the extended-Hückel method is summarized in one page in an appendix. There is a reasonable subject index, and extensive references are given at the end of each chapter. Unfortunately these do not go beyond the end of 1978. According to the preface, which was written in 1979, this is an up-dated version of an original Polish edition that was published in 1976. The length of time that has elapsed between the up-dating, in 1979, and the actual publishing of this English edition in 1985 is certainly regrettable. Despite these limitations, however, this would be a helpful instructional and reference book for anyone involved in quantum chemical computations, especially of the semi-empirical variety.

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