

Neuere Methoden der Präparativen Organischen Chemie. Band III. Edited by WILHELM FOERST. Verlag Chemie, G.m.b.H., Pappelallee 3 Weinheim/Bergstr., Germany. 1961. 326 pp. 20.5 × 18 cm. Price, kart. DM. 14.50; geb. DM. 18.—.

The volume at hand is part III, appearing simultaneously with part II, of a collection whose first installment was released about twenty years ago, and which has enjoyed considerable popularity among practicing synthetic organic chemists. The series is based upon contributions from experts in selected areas, and in general these have been published in "Angewandte Chemie" during the last three years. The articles in the collection are verbatim reprints from the "Angewandte" with addenda supplied by the original contributors in order to include late developments (through 1959).

The quality and organization of reviews in "Angewandte Chemie" are too well known to require any comment here beyond the reminder that the discussions comprise the history of a reaction, its scope and limitations, as well as mechanistic considerations insofar as these might be of aid in planning experimental procedures. Each section includes a copious supply of preparative directions for actual examples, much in the style of Houben-Weyl, which are sufficient for reproduction without recourse to the original work.

The preparative methods covered are: (1) Reactions of sulfur with araliphatic and aliphatic compounds. This chapter deals with the Willgerodt reaction and with a number of oxidations or dehydrogenations by sulfur, which often exhibits surprising reactivity and selectivity. (2) The many recent advances regarding the introduction of substituents into pyridine are admirably summarized here. (3) This chapter is devoted to the rapid advances made in the use of triphenyl methylene phosphoranes ($(C_6H_5)_3P=CR_2$) for the preparation of olefins from carbonyl compounds (Wittig reaction), which has become an important adjunct to the older, elimination-type procedures. (4) N-Bromosuccinimide and its reactions are reviewed here. (5) Heterocyclic ring systems, containing primarily O and S as hetero atoms, are available by rearrangement of the corresponding α -acyllactones or -thiolactones. (6) The vast field of synthetic uses of amides, in particular of formamide is reviewed including routes to purines, pyrimidines, imidazoles, oxazoles, triazines and other applications. (7) Chloramine is a versatile and reactive substance whose many uses, often overlooked, are set forth in these pages. (8) Esters, anides and anhydrides of phosphoric acid have been investigated with increasing emphasis, owing to their importance in fields as divergent as nucleic acids, coenzymes and insecticides. (9) This section deals with the long-known but still unexhausted transformations of pyrylium salts into aromatic heterocycles. Chapter (10) presents ways to introduce acetylenic linkages and chapter (11) summarizes the widely variegated syntheses possible with diazoketones.

An interest in even one of these subjects will easily justify reference to the collection under review; the printer has endeavored to make the volume widely available by providing a paper-back edition at a moderate price.

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An Introduction to Transition-Metal Chemistry. Ligand-Field Theory. By LESLIE E. ORGEL, Fellow of Peterhouse College, Assistant Director of Research, Department of Theoretical Chemistry, University of Cambridge. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. 180 pp. 14.5 × 22 cm. Price, \$4.50.

This brief introduction to the subject of ligand-field theory should be welcomed by most inorganic chemists. The metals included are primarily those which have a partly-filled *d*-electron shell in their ions; of this group, only the first transition-metal series, from titanium through zinc, is discussed extensively. The treatment is not rigorous; in fact, it is almost entirely non-mathematical. While this might be felt a handicap by those who wish to make their own numerical ligand-field calculations, there are adequate references to text books and review articles, with occasional citations of the most recent original papers.

After a short preliminary chapter which sets forth the scope of the book and provides the necessary definitions, the topic of orbitals and energies is first introduced. The spatial distribution of electrons in the various relevant orbitals is described qualitatively, then the manner in which the energies of these orbitals are modified according to the electrostatic crystal-field theory and again according to the molecular-orbital theory. This description is carried through first for a single *d*-electron, and subsequently repeated and extended to the many electron case.

A great many topics are mentioned in the remaining chapters of the book. New topics are treated in a more or less uniform fashion as they are introduced. First there is given the purely ionic, electrostatic point of view where it is applicable. Next the ligand-field corrections to this model are described and energy level separations are given if the experimental data are available. Then the molecular-orbital description of the same problem is presented. The final step in the presentation is the synthesis of these several methods of attack to arrive at a description which is the most useful for the particular problem under discussion. This final description or suggested method of approach is usually composed of some combination of ligand-field and molecular-orbital theories. Some of the topics discussed in this manner are stereochemistry (including the Jahn-Teller effect), (thermodynamic) stability of transition-metal compounds, spectra, and reaction rates and mechanisms. The question of covalent *vs.* ionic bonding is considered at some length. The degree or extent of covalency is defined in terms of delocalization of electrons on the metallic ion. The ligand-field theory is compared with the familiar valence-bond theory and some of the deficiencies of the latter are brought out. Measurements of magnetic resonance and magnetic susceptibility are found to be particularly useful in the study of this question.

The last three chapters deal with compounds of perhaps less familiar types: the compounds of lowest and also of highest valency, and the hydrocarbon complexes which are being investigated so thoroughly just now. The types of ligands which stabilize the extreme valence states of the transition metals are discussed as well as other requirements that must be satisfied. The discussion of hydrocarbon complexes, from ethylene complexes of platinum to the exotic "sandwich" compounds, shows that molecular orbital theory is needed for an adequate treatment of their properties.

It will be seen from this summary that a large number of subjects is presented in a relatively few pages. Yet the explanations are so clear, and there is so little extraneous material, that each subject appears to be very fully introduced. While this book will not equip the reader to become a fully-developed ligand-field theorist (which, of course, is not its aim), it will nonetheless give him an excellent background for understanding the more comprehensive papers on the subject.

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Chromatographic and Electrophoretic Techniques. Volume I. Chromatography. Edited by IVOR SMITH, B.Sc., Ph.D., F.R.I.C. Lecturer in Chemistry and Biochemistry, Courtauld Institute, Middlesex Hospital, London; Postgraduate Lecturer in Chromatographic and Electrophoretic Methods, Brunel College, Acton, London. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. xvii + 617 pp. 14.5 × 22 cm. Price, \$10.75.

Chromatographic and Electrophoretic Techniques. Volume II. Zone Electrophoresis. Edited by IVOR SMITH, B.Sc., Ph.D., F.R.I.C. Lecturer in Chemistry and Biochemistry, Courtauld Institute, Middlesex Hospital, London; Postgraduate Lecturer in Chromatographic and Electrophoretic Methods, Brunel College of Technology, London. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. viii + 215 pp. 14.5 × 22 cm. Price, \$5.50.

A second, enlarged and updated edition of "Chromatographic Techniques" has made its appearance after less than three years. It is accompanied by a new and slimmer