

Neuere Methoden der Präparativen Organischen Chemie. Band III. Edited by WILHELM FÖRST. 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

second volume devoted to zone electrophoresis. Both books are intended as practical handbooks for use in the clinical and biochemical laboratory. Sections of both volumes are replete with clinical interpretations. Together with Ivor Smith, who is the editor and also a contributor, there are thirty other contributing authors, each writing about a subject related to his own work. They have attempted to select critically and adequately describe useful techniques rather than to make a review of the literature; and in this lies the value of their work.

Volume I deals mainly with paper chromatography. It begins with the description of a "Universal Apparatus," to which it has been intended, without complete success, to relate wherever possible all the methods described in the book. There follows a very worthwhile general discussion of the preparation of sample and reagent solutions, the choice of solvents and methods of selecting and preparing samples for separation. Sections follow on the separation of specific classes of compounds including amino acids (with new chapters on DNP and phenylthiohydantoin derivatives), various classes of naturally occurring heterocyclics and some of their derivatives, sugars, keto and other acids, phenolic acids, various lipids, drugs important in forensic work (with new chapters on alkaloids and "neutral" drugs), and steroids.

There are new chapters on plant phenols and tannins, inorganic ions and on handling, separating and locating radioactive compounds. While a useful chapter on the study of intermediary metabolism of labeled compounds provides some information on the separation and identification of sugar phosphates, it would be useful if in some future edition there were included a chapter on the chromatography of organic phosphorus compounds. There is a new section on ion exchange celluloses (available in powdered or paper forms), and a chapter on partition columns, but not a mention in it of ion exchange resins. Sections on ion exchange resin chromatography and on gas chromatography would both make worthwhile additions to a future edition. Also, wider reference might be made to the excellent commercially available micro-pipettes (rather than to various models of homemade capillaries with "cycle valve rubber teets" and other gimmicks) and to the good quality commercially available acetylated and other reverse phase papers.

Volume II is devoted to zone electrophoresis. It has a fragmental organization that permits technical fine points to serve as chapter subjects: high as opposed to low voltage separations of small molecules, electrophoresis of serum on paper as opposed to electrophoresis on cellulose acetate or opposed to electrophoresis on agar or starch gels. This causes unavoidable repetitions and incomplete coverage, and results from the fact that the individual authors of each section are presenting rather complete descriptions of types of research. This topicality has some value to the lab worker who can find a complete discussion of a method in one chapter.

The book contains complete directions for constructing and using equipment for electrophoresis on papers, films, gels, starch blocks and even rubber sponges. There is also a chapter on the use of continuous (hanging curtain) electrophoresis. The discussions spread throughout the book of the relative merits of high (1-10 kv.) as opposed to low voltage, of various supporting media and various other details are worth looking for. There is some coverage of the separation of small molecules, but more could be said about nucleotides, and there is no mention of sugar phosphates.

The main concern of Volume II is blood proteins. There are demonstrable changes in the serum of patients with infections, liver damage, inalignant conditions, genetic disorders, etc. As well as staining procedures for proteins, lipoproteins and glycoproteins, there are given complete descriptions of many immunological methods. These methods, when coupled with electrophoresis ("immunoelectrophoresis") provide an acutely sensitive way for discovering the purity or dispersity of a protein. Also there is a complete chapter on the detection and study of abnormal hemoglobins. Although Volume II lacks the breadth of appeal of Volume I, it should be of some worth to any biochemist who is working with proteins, or contemplating setting up some sort of electrophoretic apparatus. It belongs on the shelf in laboratories where there is active research with blood proteins.

These books cannot be expected to contain a complete guide to chromatographic and electrophoretic techniques. They are a practical collection of methods and gadgets and as such fill an important need.

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Characterisation of Organic Compounds. By F. WILD, M.A., Ph. D., F.R.I.C., Fellow and Senior Tutor of Downing College, and Research Chemist, Department of Medicine, University of Cambridge. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1960. viii + 306 pp. 14 × 21.5 cm. Price, Paper Edition, \$2.95.

The major concern in this book is the preparation of suitable derivatives of unknown organic materials. In this respect, the text represents a useful addition to the present literature in the field of qualitative organic analysis. It must be noted that this book does not pretend to be a complete discussion of the characterization of organic compounds. The standard techniques and tests for functional group classification are mentioned only in passing in the brief second chapter. Physical methods of functional group classification are not discussed.

Within the delineated area, the preparation of derivatives, the book is most useful. The bulk of the text is divided into chapters dealing with satisfactory derivatives of the various classes of organic compounds: hydrocarbons, halides, compounds containing the hydroxyl group, etc. The discussions are remarkably inclusive. For a given derivative there is generally a good discussion of the advantages, disadvantages and pitfalls in the use of the particular reaction, detailed, generalized experimental instructions, necessary information concerning the preparation of the reagent and important literature references. In certain cases, there is a brief discussion of theoretical principles involved in the derivative-forming reactions. The number of derivatives included is quite remarkable. No less than 35 reagents are mentioned for the preparation of hydrazones from aldehydes and ketones. Of these 35, only those most generally used are discussed in detail.

The material in each chapter is summarized by extensive tables of derivatives. While the number of compounds in the tables is somewhat less than that found in other standard textbooks of qualitative organic analysis, the number of derivatives per compound is much greater. For example, the available information concerning 16 different derivatives of the simple carboxylic acids has been tabulated. For the primary aliphatic amines the available properties of 26 derivatives have been included. It is this remarkable inclusiveness concerning the formation of derivatives which makes this book a valuable contribution to the field of qualitative organic analysis.

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Contributi Teorici e Sperimentali di Polarografia. Volume V. By GIOVANNI SEMERANO. Consiglio Nazionale Delle Ricerche, Piazzale delle Scienze, n. 7, Rome, Italy. 1960. 315 pp. 17 × 24 cm. Price, L. 2500.

Bibliografia Polarografica 1922-1959. Parte I. Elenco dei Lavori e Indice Degli Autori. Supplemento N. 12. By DOTT. LUCIANA GRIGGIO. Consiglio Nazionale Delle Ricerche, Piazzale delle Scienze, n. 7, Rome, Italy. 1960. 80 pp. 17 × 24 cm. Price, L. 1000.

This fifth volume of this well known continuing series presents papers that were presented at two conferences in August, 1959, at the University of Padua. The first twelve papers, from the first conference, deal with the broad subject of the relation between constitution and physico-chemical behavior. Since none of these papers is concerned with polarography they would seem to be out of place in this volume.

The second half of the volume comprises ten papers from the second conference on "Relationship between Polarographic Constants and Molecular Structure." These provide very good reviews of the current state of knowledge of several facets of the theme subject. Most of the papers are