
 BOOK REVIEWS

Structure Reports for 1954. Volume 18. General Editor, A. J. C. WILSON; Section Editors, W. B. PEARSON (Metals), A. M. BIJVOET (Inorganic Compounds) and J. DONOHUE (Organic Compounds). Published for the International Union of Crystallography N.V.A. Oosthoek's Uitgevers Mij, Domstraati-3 Utrecht, The Netherlands. 1961. viii + 845 pp. 17.5 × 25 cm. Price, \$33.50.

To anyone who is concerned with molecular structures or crystal structures, "Structure Reports" is an essential and indispensable set of volumes. The present volume completes the set through 1954, counting the first seven volumes of its predecessor, the Strukturbericht. Completion of the gap in this series a few years ago now makes it possible for the Editors to bring this valuable addition to the literature more nearly up to date.

These reports of molecular and crystal structures are more than abstracts. The Editors and Abstractors succeed admirably in their objectives of complete coverage of the literature, and the presentation of information sufficiently complete that no further structural information could be gained by consulting the paper itself. Indeed, one frequently finds in these abstracts very useful corrections of errors in the original papers, results of further calculations sometimes omitted by the authors, and comparisons of the results with references to current literature which may not have been available to the original authors at the time of first publication. Clearly the efforts have been great, and the results are quite successful. Also clearly, the literature has doubled in a space of about 10 years, and one must hope that every encouragement will be given to the continuation of publication of these volumes at this same high level as the current literature is approached.

Even though the minimum criterion for reporting a paper is the determination or redetermination of a unit cell, there is also included a very large number of other related reports on molecular structure (*e.g.*, electron diffraction) or crystal structure (*e.g.*, powder data, texture, etc.) in these volumes. The Russian journals and some less accessible journals are well covered. Ordinarily, one may expect to find the unit cell and space group, atomic positions and parameters, the interatomic and intermolecular distances, bond angles, details of structure analysis and discussion and related references. Particularly valuable are the occasional editorial comments, which are always in brackets.

The indexing system is complete and useful. A subject index and author index are both available, but most valuable is the formula index in alphabetical order of chemical symbols. An additional index of carbon compounds is also quite useful for the rapid location of compounds. One must be sure to look for the symbol of each element of an intermetallic or inorganic compound in order to use the formula index properly.

Certainly every technical library, every structural research group, as well as every diffraction laboratory should have these volumes readily accessible.

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International Tables for X-Ray Crystallography. Volume III. Physical and Chemical Tables. KATHLEEN LONSDALE, General Editor. CAROLINE H. MACGILLAVRY and GERARD D. RIECK, Editors. The Kynoch Press, Witton, Birmingham 6, England. 1962. xvi + 362 pp. 21.5 × 28.5 cm. Price, £5. 15. 0.

The initial revolutionary impact upon the physical sciences of the discovery of X-ray diffraction dates back some fifty years. Subsequent developments in theory and practice have given rise to X-ray crystallography as a well defined field affording a range of methods for the study of diverse structural problems. Especially notable are the increasingly powerful single-crystal techniques for the determination of complex structure; such techniques, it is fair to say, have supplied the basic information utilized by several recent Nobel Laureates in fashioning their outstanding achievements.

The three volumes of the "International Tables for X-Ray Crystallography," comprising approximately 1400 pages of expertly prepared and edited material, are admirably suited to foster the further applications and development of X-ray crystallography in whatever directions these may take. Although any structural study with some claim to sophistication will use information distributed among all three volumes, "Vol. I. Symmetry Groups" rather stands by itself, and no crystallographer

would willingly dispense with it. "Vol. II. Mathematical Tables" and "Vol. III. Physical and Chemical Tables" complement one another so closely as to make the whole greater than the sum of the parts. The scope of these volumes is well beyond that implied by their titles. The tables are there—as comprehensive tabulations of quantitative information ranging from the vital to the merely convenient. But the tables are accompanied and, where need be, are dominated by excellent summarizing discussions of the pertinent operations or principles, including references to exhaustive treatments thereof. "Section 3. Measurement and Interpretation of Intensities," pp. 133–253 of Vol. III, illustrates the treatment of a particularly important subject. No less than five experts contribute to the 24 pages (of which less than six are tables) of "Sec. 3.1. X-Ray Intensity Measurements." The earnest reader of this collaborative product must inevitably gain a good picture of the requirements, applications and special virtues or failings of both the photographic and counter techniques for intensity measurement; he gets, in any case, a clear indication of where his further reading should lie. Other major topics of "Sec. 3, 3.2. Absorption, 3.3. Atomic Scattering Factors, 3.4. Compton Scattering of X-Rays," run more to comprehensive tables, but receive similarly expert summarizing discussions. The data pertaining to X-ray scattering are exhaustive, and are supplemented by tables pertaining to electron and neutron scattering. Indeed, it is the general practice in both Vol. II and III to provide "bonuses" of this sort.

Volume III is divided into eight general sections of which the content and sequence of the first four are particularly adapted to the requirements of structure investigation by single crystal techniques. Section 1, pp. 3–36, "Examination and Preparation of Specimens," displays a commendable insistence upon the useful connections of a wide variety of physical properties with structure. Section 2, "X-Rays and Their Interactions with Crystals," pp. 39–129, is concerned (among other things) with fundamental units and constants, the quantitative characterization of X-rays, and, for the most part, the geometrical aspects of the interaction of X-rays with crystals. An exception to the last statement, and an example of an interesting bonus item, is "Thermal Expansion in Relation to Structure." Section 3 was chosen for earlier comment. Section 4, pp. 255–285, "Interatomic and Interionic Distances," provides critically compiled working tables which, to be sure, should not allow one to ignore original sources. Section 5, pp. 287–329, "Texture and Line-Broadening Analysis. Small-Angle Scattering," presents an authoritative treatment of a very important field. "Protection Against Radiation Injury," pp. 333–338, is the laudable subject of Section 6. A "Dictionary of Crystallographic and Other Terms for Volume III," pp. 339–354 (in five languages) and a "General Subject Index for Volumes I, II and III," pp. 355–362, constitute the respective Sections 7 and 8.

Viewed as completely dependable, constantly used working equipment, the "International Tables for X-Ray Crystallography" come at trifling cost. The gratitude of all who are appreciative of the fundamental role of structure in nature is due the numerous expert contributors to these volumes, especially Dame Kathleen Lonsdale, General Editor, and most generous contributor.

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Steroid Drugs. By NORMAN APPELZWEIG, Director, Norman Applezweig Associates, Consulting Biochemists. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, New York. 1962. xv + 742 pp. 16 × 23.5 cm. Price, \$7.50.

This book consists of four parts. The first, consisting of 30 pages, is concerned with the history and background of steroid product development. The second describes in 46 pages steroid production processes. The third, consisting of 208 pages, is entitled: "Steroids in Drug Therapy" although actually more than therapeutic use is described. An attempt is made to review the basic biology of the steroid hormones and the role that synthetic and natural steroids play in modifying these processes. Part 4 is concerned with the classification and tabular listing of biologically active steroids, and the author requires 438 pages for this effort. A short, but useful, index concludes the book.

This is indeed an extraordinary effort to present every aspect of steroidology from the basic chemistry of these compounds to their commercial preparation, their physiological activities, their clinical utilities and some aspects of their biochemistry. The author has stated in his preface that he is indeed seeking to

reach a wide audience including "the businessmen, the pharmaceutical executives, the government officials who must make decisions to spend research dollars" as well as stock brokers, chemists, teachers, biologists and clinicians. Probably no single one of these individuals will be entirely satisfied since the biologist, for example, will find some of the biology rather elementary, and the chemist may find the description of some of the processing not too informative. Nonetheless, the author has succeeded in presenting an extremely readable account of each of the phases of what has become a far flung industrial and research empire.

The author finds the important therapeutic applications to be in inflammatory disease, cancer, problems of reproduction, renal and cardiovascular disease, atherosclerosis, growth and aging, and in a group of minor conditions affecting hemodynamics, central nervous function and skin and hair (including cosmetic applications). In discussing these presently practiced therapeutic applications, the author automatically recognizes the ubiquity of the steroids as regulatory hormones. It is indeed a fact that very few if any tissues and organ systems are exempt from steroid regulatory activity. That therapy is necessarily an application of steroid physiology is, on the other hand, clearly debatable in many instances. The author recognizes this in stating: "Already the use of the natural steroid hormones and their modification has assumed enormous importance in the treatment of diseases which are not primarily due to endocrine dysfunction." It is primarily for this reason that the steroids are considered as drugs which act to stimulate hypoactive tissues or to inhibit tissues which are excessively active. The remarkable feature of these drugs is that, used for a specific effect, they have a large number of "side effects." These side effects are merely reflective of the inherent biological activity of the steroid molecule in one or more special configurations.

Perhaps the greatest service that the book renders is the painstaking cataloging of biological activities for well over one thousand compounds. The structural formula of each is given along with the major functional potency or potencies. Moreover, wherever possible the author gives quantitative data on relative potencies in a special tabular listing. Finally, a most useful table is a list of the commercially available steroid drugs with the trade name of each and the name of the manufacturer.

There are a number of additional useful features of this book including a fairly comprehensive bibliography to each of the several chapters. It is rather interesting that in presenting citations to the biological literature the author is careful to give the title of each publication, whereas in referring to production processes only the author and journal are given. Much more important are the detailed discussions of endocrine principles involved in the use of various types of steroid. The author thus becomes involved in such diverse questions as: "Is coronary atherogenesis an endocrine problem?" aldosterone and edema, disorders of menstruation, hormones and carcinogenesis and so on. The degree of attention given to each of these matters is, as might be expected, quite varied and to some extent reflects practical usage rather than biological interest. However, a generally well balanced presentation is made, particularly in view of the type of audience envisaged by the author.

In summary, this book merits careful reading as a treatise on steroid chemistry, industrial technology and biology. In addition to this analytical presentation, an extraordinary service is done in the steroid cataloging and classification, and in the presentation of biological activity and chemical structure.

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Anorganische und Allgemeine Chemie in Einzeldarstellungen. Band III. Chemische Bindung und Molekülstruktur. By L. E. SUTTON, D. Phil., F.R.S., Oxford. Translated by Dr. EKKEHARD FLUCK, Heidelberg. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1961. vii + 122 pp. 15.5 × 23 cm. Price, DM. 19.80.

This book is the compilation of a series of lectures given by Dr. Sutton before the scientific and mathematical faculty at the University of Heidelberg and it was translated into German by Dr. Ekkehard Fluck. The book treats the molecular structure and chemical bonding of inorganic compounds, principally. The material is divided into the following seven chapters.

1. Basis of Atomic Structure
2. Molecular Structure of Diatomic Molecules
3. Stereochemistry of Polyatomic Molecules
4. Resonance Electron Delocalization
5. d-Orbitals and Chemical Bonding
6. Coordination Compounds of the Transition Metals
7. The Aromatic Complexes of the Transition Metals

Sutton makes much use of group theory in discussing various compounds as well as in developing crystal field theory. The text is well illustrated, showing many diagrams of molecular orbitals. Of necessity the theories developed are largely qualitative but

liberal use is made of the known parameters of molecular structure. The resulting discussion is useful and interesting. Those who are interested in molecular structure and who are not deterred by the language barrier will find the book a valuable addition to the literature.

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Heterocyclic Chemistry. An Introduction. By ADRIEN ALBERT, Ph.D., D.Sc., F.R.I.C., Professor of Medical Chemistry in the Australian National University, Canberra. Oxford University Press, Inc., 417 Fifth Avenue, New York 16, N. Y. 1959. viii + 424 pp. 14.5 × 22 cm. Price, \$9.00.

This excellent book treats heterocyclic chemistry in a unified fashion and succeeds in presenting in a very readable style a coherent picture of underlying principles. The experimental results of heterocyclic chemistry are now summarized in descriptive (ring system) monographs which adequately cover the field. However, in organic and theoretical organic texts purporting to cover the entire field of organic chemistry, heterocyclic chemistry is either not mentioned or is treated in a cursory manner certainly not commensurate with its chemical significance and its proportion of organic compounds. Therefore, there has been an urgent need for books to fill this void. Of the few texts on heterocyclic chemistry published to date, only this book and one by A. R. Katritzky have broken with precedent and presented the subject in new ways.

The general format of the book is novel and good. The major part is devoted to heteroaromatics which are divided into π -deficient (Ch. IV) and π -excessive (Ch. V and VI) sections. The theoretical basis for the chemical differences is discussed in these chapters as well as in introductory Chapter III. Included with the "parent" π -excessive rings containing NH (Ch. V) or O and S (Ch. VI) electron-donating centers, is the effect of introducing varying numbers of electron-attracting sp^2 nitrogens ($=N-$) to give imidazole, tetrazole, oxazole, thiadiazole, etc. In view of the reactivity of some of these azoles and their derivatives toward nucleophiles, it may seem misleading to classify them as π -excessive (having an electron-donating hetero center). However, the varying and possibly vanishing degree of π -excessiveness and the presence, e.g., in thiazole, of centers of both π -deficiency and π -excess is pointed out.

The three main chapters consider physical and chemical properties in a correlative manner, taking up first the unsubstituted rings and proceeding to reactions at substituted carbons and then to reactions in side chains. Use of the same sequence of subdivisions in each chapter facilitates comparison between π -deficient and π -excessive types. Comparison within these types is accomplished by having all the appropriate ring systems under each subdivision. These subdivisions are: (a) solubility, (b) acidic and basic strength, (c) ultraviolet spectra, (d) action of acid and alkali, including ring stability, (e) nature of tautomeric derivatives, (f) electrophilic substitution, (g) nucleophilic substitution, (h) addition reactions, (i) oxidations and reductions, (j) homolytic reactions and (k) side-chain reactions. These units total about two-thirds of each of the three main chapters and are followed by a section of "monographs" discussing ring-syntheses and the general significance of compounds containing the rings (arranged systematically), with references to the latest reviews and monographs. One valuable feature is the inclusion throughout the text of recent literature references, totaling 950, to all significant items. The chapter on heteroethylenics discusses dihydro and polyhydro derivatives of heteroaromatics of the previous chapters and also brings in new ring systems having varying degrees of π -electronic character in their uncharged (e.g., γ -pyrone) and charged (e.g., 4-methoxypyronium cation) forms. Further comparisons of heterocycles (differing in number and nature of hetero atoms) with each other and with their carbocyclic analogs as well as the effects of substituents are discussed in separate short chapters on Spectra (43 pp.), Ionization Constants (11 pp.), Oxidation-Reduction Potentials and Dipole Moments (11 pp.), and Rational Approaches to Ring Syntheses (8 pp.). The format of the book makes clear where gaps exist in present knowledge both in relation to type of reaction and to ring system. It also makes clear certain effects of heterocyclic rings on reactions and properties which are obscured by the frequent admonition to regard heterocycles simply as somewhat modified carbocycles (analogous to nitrobenzene, etc.).

The inclusion of heteroparaffinics (Ch. II, 27 pp.), the polyhydro portion (ca. 7 pp.) of heteroethylenics (Ch. VII) and Interpretation of Complex Formulae (Ch. XI, 10 pp.) has a certain justification. However, they are mainly descriptive portions which illustrate the principle quite clearly stated in the first two sentences of Chapter II: *saturated heterocyclics are essentially aliphatic in nature*. These items could be omitted without loss to the main contribution of this text: the organization of hetero-