Book Reviews*

Infraspecific Chemical Taxa of Medicinal Plants. By P. TETENYI (Research Institute for Medicinal Plants, Budapest). Chemical Publishing Co., Inc., New York, N. Y. 1970. 225 pp. $15.00.

This book is about variations of the content or production of specific compounds within the same species of plant, and presents the author's ideas on the differentiation of species and biogenetic processes. It is divided into a "General Part," in which the subject as a whole is explained and elaborated, and a "Specific Part," which consists of a tabular presentation of reported analyses, quantitative and qualitative, of about 750 species of plants for a selected group of "active substances." The book has some peculiar features, such as a subject index (only a page and a half) buried in the middle, and a slightly awkward style that is due to translation from the Hungarian, but it should nevertheless be of much interest to chemists and others concerned with biogenesis of natural products. The extensive bibliography, which is rich in citations of Russian work in this area, should be particularly valuable.

The Chemistry of the Hydroxyl Group. Parts 1 and 2. Edited by S. PATAI (The Hebrew University of Jerusalem). Wiley-Interscience, New York, N. Y. 1971. xiv + 639 and viii + 596 pp. $24.95 each part.

These two Parts constitute another volume in a very valuable series, "The Chemistry of Functional Groups." They contain twenty chapters written by altogether thirty-three authors of widely international origin. The topics of the chapters seem to encompass all aspects of the subject, from mass spectra and radiation chemistry to the classical organic subjects. Only oxidation and reduction of the hydroxyl groups are missing. There are two particularly interesting chapters that are closely related, "Acidity and Inter- and Intra-Molecular H-Bonds" and "Hydroxide-Alkoxide Ion Equilibria," but, curiously, they appear in separate volumes. In spite of the comprehensive coverage of the chapter subjects, one can find holes in the substructure. The chapter on "Displacement of Hydroxyl Groups," for example, has a section on displacement by the amino group, but it does not mention the vapor-phase conversion of alcohols to amines over surface catalysts, and the utilization of the Chapman rearrangement to convert phenols to anilines is overlooked, except for presenting an isolated example as though it were a unique instance, Notwithstanding the varying quality of the chapters inevitable when so many authors are involved, the work is an important contribution to organic chemistry.

The two parts are numbered consecutively, and the indexes (author and subject) appear at the end of Part 2 only. The editors' Foreword is dated January 1970, but, unfortunately, no other clue is given as to how up to date the coverage of the literature is.

Principles of Organic Synthesis. By R. O. C. NORMAN (University of York). Barnes & Noble, Inc., New York, N. Y. 1971. xiii + 722 pp. $9.50 paper ($16.75).

This book is a Science Paperback edition of the hard-cover version first published by Methuen & Co. in 1968. Basically, it is an intermediate-level textbook of organic chemistry oriented and organized in terms of both classical and modern methods of synthesis, functional group transformations, and applications. Much of its emphasis is also placed on mechanistic aspects of the reactions considered. In addition, conditions and yields are often cited, along with critical procedural details and precautions. However, it is not a laboratory manual but a guide to the rationale and scope of the currently more important reactions in organic synthesis. It is therefore primarily a text for learning rather than reference.

The first part presents and illustrates basic principles and concepts underlying organic chemical reactions: chemical thermodynamics, molecular structural theory, chemical kinetics, reaction mechanisms, and stereochemistry. The treatment of these topics is exemplified for the most part by familiar reactions and concludes with a brief list of references for further reading and a set of problems at the end of each chapter.

The second part, which represents nearly three-quarters of the book, takes up synthetic methods and applications under the headings: formation of aliphatic carbon–carbon bonds (*via* organometallic reagents, base- and acid-catalyzed condensations, and four-center reactions), formation of aliphatic carbon–nitrogen bonds, aromatic electrophilic and nucleophilic substitution reactions, aromatic diazonium salts, molecular rearrangements, free-radical reactions, oxidation, reduction, synthesis of heterocyclic systems, and synthesis of some naturally occurring compounds. Included in the latter are valuable comments about the nature of the reactions involved in each stage of ten major syntheses. Lists of general references and sets of problems are also appended to each chapter.

Since most of the topics are included in the larger present-day textbooks of organic chemistry, this book will probably have only a limited market, at least in this country. However, for supplementary study or as a text for a second course in organic chemistry, it has much to offer. Concisely but clearly written, it contains a considerable body of useful, well organized (and indexed) information, drawn primarily from current research practice, on a wide variety of synthetic reactions and applications. If any criticism is in order it might be directed to the lack of separate sections on such topics as the use of protecting groups in synthesis other than in the formation of peptides.

Albert W. Burgstahler, *The University of Kansas*

Introduction to Crystal Geometry. By M. J. BUERGER (Massachusetts Institute of Technology and University of Connecticut). McGraw-Hill Book Co., New York, N. Y. 1971. xii + 204 pp. $12.50.

Professor Buerger has written this book to serve as an undergraduate level text which requires only high school geometry to read. At present, most books in solid state physics and materials science have introductory chapters on crystallography which are of little use in understanding the subject itself. This book carefully takes the reader through symmetry operations, point symmetries, point groups, lattice types, coordinate systems, space groups, and the relation of symmetry operations to the surface morphology of crystals. Standard crystallographic terminology is logically developed and explained so that the reader is well prepared to read more advanced texts on the subject.

It is unfortunate that Professor Buerger states that all crystals assume polyhedral shapes of crystallographic symmetries when grown "unhindered and in an environment of radial symmetry." However, all crystal growers will excuse this generalization as he has forgiven their forays into crystallography.

J. R. Carruthers, *Bell Telephone Laboratories, Inc*

Methoden der Enzymatischen Analyse. Second Edition. Edited by HANS ULRICH BERGMEYER. Verlag Chemie, Weinheim/Bergstrasse, Germany. 1970. Volume I, lxix + 1085 pp. Volume II, lxix + 2220 pp. DM 285.00 (after Oct 1, 1971, DM 325.00).

The quantitative analysis of chemical constituents in biological material has gained widespread interest among biologists of various backgrounds. Within this analytical approach, enzymatic methods combine the advantages of specificity and sensitivity. It was the achievement of H. U. Bergmeyer to collect the manifold analytical applications of enzymes and present this subject under the title, "Methods of Enzymatic Analysis." His success as editor is well documented by two English editions since the appearance of the first German edition in 1967. In the second German edition, which is enlarged to two volumes, Bergmeyer received the cooperation of 225 specialists contributing analytical procedures proven in their laboratories. Besides updated versions of the methods included in the first edition, the estimation of numerous additional enzymes and metabolites is presented.

More than one-third of Volume I is devoted to a very useful general introduction, including topics on practical enzyme kinetics, stability of chemical constituents in biological material, procedures for the extraction of metabolites, and a review of available analytical methods applicable to biological material. The remaining part of Volume I includes the procedures for the measurement of enzymatic activities. The information presented in the latter part has been considerably extended, now including separate chapters for classes of enzymes which in the first edition were individually listed under "Others." The text on the analysis of enzymes is divided into four parts, representing oxydoreductases, transferases, hydrolases, and the group of lyases, isomerases, and ligases. Each of these chapters is further subdivided according to the increasing specificity of the enzymes involved.

* Unsigned book reviews are by the Book Review Editor.

Volume II contains the methods for the determination of metabolites. Again, as compared to the first edition (and second English edition), the amount of information has considerably increased. Detailed analytical procedures for the analysis of more than 150 individual compounds are given, in addition to methods for the analysis of chemically closely related substances like 20-keto steroids and CoA derivatives of higher fatty acids. In most cases the enzymes used in the determination of metabolites are commercially available. If not, isolation and purification procedures are included in the presented methods of analysis. In many instances, several enzymatic methods are given for the estimation of one compound. In addition to the generally well-tested and proven procedures several promising analytical approaches involving enzymes are included; these are clearly characterized as preliminary work. Although several examples of the application of fluorometry in enzymatic analysis are presented, this reviewer feels that the increasing demands for sensitive analytical procedures applicable for the determination of low concentrations of compounds in small amounts of biological material would justify a separate chapter with appropriate specific procedures based on the fluorometric measurement of pyridine nucleotides.

In both volumes the descriptions of the methods are conveniently divided into principle, optimal analytical conditions, necessary instruments and reagents, analytical procedure, calculation, range of results, sources of error, specificity of the method, and references. Useful comments are made on the stability of reagents and on their proper handling. Volume I contains a separate chapter devoted to biochemicals, including data on the characteristics and purity of commercially available enzymes, coenzymes, and various substrates. The tables at the end of Volume II with data on the content of metabolites in various tissues should prove valuable as a reference in the laboratory. The latter statement can be applied to both volumes of the book as a whole: it will be an invaluable companion in any biochemical laboratory concerned with modern aspects of the quantitative analysis of biological material. Furthermore, the "Bergmeyer" should find its place as an advisor in matters of practical enzymology to all those interested in enzymes. Hopefully, an English translation of this second German edition will follow soon.

Fedor Medzihradsky, *The University of Michigan*

Thermochemistry of Transition Metal Complexes. By S. J. Ashcroft and C. T. Mortimer (University of Keele, England). Academic Press, New York, N. Y. 1970. vii + 478 pp. £6.50.

During the past decade there has been a surge of interest in the direct calorimetric measurement of enthalpies of formation of metal complexes. This book should be useful to those working in chemical fields involving the energetics of transition metal complex formation and also to those who desire an overall summary of the state of knowledge of the thermochemistry of transition metal complexes. In addition it is an excellent reference work. Its preparation involved the survey of approximately 1000 papers published prior to mid-1968.

In the main body of the text the thermochemistry of metal complexes of specific ligands is presented, discussed, and correlated under the following chapter headings: Amines, Oximes, and Imines; Carboxylate and Carbonyl Groups; Pyridine and Related Ligands; Imidazole and Derivatives; Unsaturated Hydrocarbons; Ammonia; Halides and Pseudo-halides; Oxygen-containing Anions; and Hydroxide, Peroxide, and Aquo Complexes. Additional data and discussion are included under the chapter headings: Platinum Group and Lanthanides and Actinides. There are author, subject, metal-complex, and ligand indexes. The authors are to be commended for this undertaking which brings together in a very concise manner a large amount of useful information.

Reed M. Izatt, *Brigham Young University*

Introduction to Molecular Spectroscopy. By E. F. Brittain, W. O. George, and C. H. J. Wells (Kingston Polytechnic, England). Academic Press, London and New York. 1970. xi + 387 pp. £6.00.

Molecular spectroscopy is perhaps peculiarly limited in this book to consideration of spectroscopic methods which are "generally applicable" and are "available to students." This category includes electronic, vibrational, nuclear magnetic resonance, and mass spectrometry. Leaving aside the limitation, the text consists of an introduction with five subdivisions—The Electromagnetic Spectrum, Interaction of Radiation with Matter, Wave Mechanics, Symmetry Concepts, and Mass Spectrometry—followed by a separate chapter on each spectroscopic method. The sophisticated spectroscopist reading the introduction is likely to have the hair on his/or her head bristle because of the unmodified generalizations. In reality, however, a continued reading will remove this particular objection for it quickly becomes apparent that the authors have ingeniously led the reader (presumably undergraduate students or chemists in other disciplines wanting a concise treatment of these particular forms of "molecular spectroscopy") around a maze of intricate material and back into the maze with a superficial comprehension of the general plan—not a bad idea. An *excellent* set of experiments is presented, and an admirable and more or less successful attempt is made to clearly define or identify terms and symbols by repeating the identification in tables even when it may already appear in the text.

Nevertheless, there are some pretty serious flaws. References are far too few to permit the reader to easily delve into the subject matter which is so hastily skimmed. In one or two cases this is combined with serious misstatement of fact as in the discussion of vibrational selection rules in electronic transitions. There *is not a single mention of Herzberg–Teller rules* or sources where these rules are discussed.

The discussion of equipment is so sparse that one might think very little equipment exists. The explosion of Raman spectroscopy resulting from the advent of laser excitation is dismissed with two lackadaisical sentences. Summing, one might do much worse than to use this text for the purposes for which it is designed, but then again, one could do better.

Elliot Charney, *National Institutes of Health*

Electrochemical Reactions in Nonaqueous Systems. By Charles K. Mann (Florida State University) and Karen K. Barnes (St. Andrews Presbyterian College). Marcel Dekker, Inc., New York, N. Y. 1971. viii + 560 pp. $34.50.

During the last decade it became increasingly evident that solvent properties often strongly influence the course of chemical reactions. This awareness led to an increased interest in the chemistry of nonaqueous solvents as evidenced by several monographs and treatises recently published on this subject. The present book should be a welcome addition to nonaqueous literature.

The book consists of a short introductory chapter on the interpretation of electrochemical measurements, ten chapters on electrochemical behavior of organic systems arranged according to functional groups, one chapter on organic sulfur compounds, one on organometallic compounds, and the last chapter on electrochemical behavior of inorganic systems. Because of the heavy emphasis on organic systems it seems that the title of the monograph is somewhat misleading.

Chapters 2–13 are competently written and the literature is thoroughly covered through 1968 with a few later references. There is an abundance of numerical data; for example, the table on polarographic reduction of polynuclear aromatic hydrocarbons covers 36 pages. In view of the large amount of material covered, the authors, understandably, could not critically evaluate all of the information. Nevertheless, some assessment of relative importance of various contributions is evident.

The weakest part of this monograph seems to be the first and last chapters. The introductory chapter on electrochemical measurements is certainly too brief to provide a novice in the field with even a rudimentary background. The last chapter on electrochemistry of inorganic systems is quite terse and, while it briefly mentions some of the more important work in the field, there is little resemblance to the thoroughness with which the organic systems were discussed.

In summary, chemists interested in the field of organic electrochemistry will find this book invaluable. Those interested in broader aspects of electrochemistry in nonaqueous systems will have to supplement it with other materials.

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