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## BOOK REVIEWS

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**Magnetochemistry.** Second Edition. Completely Revised and Rewritten. By PIERCE W. SELWOOD, Professor of Chemistry, Northwestern University. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1956. xii + 435 pp. 16 × 23.5 cm. Price, \$11.50.

The subject of magnetochemistry has proliferated in the thirteen years since the first edition of this monograph appeared and the second edition, which has been revised, expanded and brought up-to-date, is a most welcome addition to the literature. The author states that about one-half of the available references, covering the literature through 1955 *Chemical Abstracts*, have been included in this edition. The present volume is unique in providing a modern survey of the applications of magnetic measurements to chemical problems since the treatises by Klemm and by Bhatnagar and Mathur are now quite out-of-date. The author has largely avoided repetition of material adequately covered elsewhere and his treatment complements those in other books on magnetism by Van Vleck, Stoner, Bates and Bozorth, all of which represent the viewpoint of the physicist.

The first three chapters of the new edition are devoted to experimental methods of measuring average susceptibilities, principal susceptibilities and specific magnetization; these provide a practical guide to current practice which should be studied by anyone contemplating experimental work of this type. A nine-page chapter on resonance methods and a chapter on diamagnetic anisotropy are new. The chapters covering diamagnetism of molecules, diamagnetism of atoms, paramagnetism of atoms, paramagnetism of molecules and ferromagnetism have been partly rewritten, numerous references added and many helpful tables of data inserted. A new chapter reviews applications of atomic paramagnetism, particularly to glasses, irradiated solids and luminescent solids. Antiferromagnetism not even listed in the index to the first edition, now receives a separate chapter. The applications of ferromagnetism and antiferromagnetism to structural inorganic chemistry are stressed rather than the technological applications. The chapter on metallic diamagnetism and paramagnetism has been completely rewritten and the book concludes with an interesting account of magnetochemistry and heterogeneous catalysis, a subject to which Selwood and his students have made extensive contributions.

The most disappointing features of the new edition to this reviewer are the scanty treatment accorded to resonance methods and to theoretical developments. Nuclear magnetic resonance and paramagnetic resonance are already important tools for investigating chemical problems and each already has an extensive literature. Although many references to specific applications have been inserted through the text, in addition to the brief chapter introducing the methods, the reader must turn elsewhere for an adequate review of experimental methods or of results. Important theoretical developments often receive no attention. Thus Pauling's theory of the magnetic properties of metals and the band theory each receive only a reference. Since readable introductions to many of these topics are rare the casual reader will no doubt often fail to gain an understanding of the physical bases of the phenomena. However, by exclusion of such material it has undoubtedly been possible to keep down the size and cost of the book.

Although emphasis throughout is on experimental methods and results it avoids being a mere compendium of references. Brief summaries of pertinent theoretical work provide, in many cases, the background for understanding and interpreting the data. References have been chosen which for the most part offer either a theoretical or practical advance with the result that nearly every application of magnetism to chemistry is at least mentioned. The treatment of experimental articles is critical and, reflecting the wide experience of the author, many doubtful results are questioned (such as the "superparamagnetism" of Kobozev, *et al.*). Direct or implied suggestions for research

abound and should stimulate workers in a variety of fields to apply magnetochemical methods to their problems.

The new edition will be indispensable to workers in the field particularly in view of the fact that the two-thousand listed references come largely from journals not usually read by the chemist and often not available. The volume is highly recommended as a comprehensive guide to "classical" magnetochemistry to anyone interested in structural chemistry, solid state physics or the application of magnetic measurements in chemistry. The style is clear and readable, the organization good and the background required of the reader very modest.

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**Die Polarographie in der Medizin, Biochemie und Pharmazie.** By M. BŘEZINA and P. ZUMAN, Polarographisches Institut der Tschechoslowakischen Akademie der Wissenschaften, Prag. Akademische Verlagsgesellschaft, Geest und Portig K.-G., Sternwartenstrasse 8, Leipzig C 1, Germany. 1956. 800 pp. 17.5 × 25 cm. Price, DM 48.

This monograph, which is a "revised and enlarged translation" of the first (1952) Czech edition, deals with the use of the polarograph in analyzing not only biological, clinical and pharmaceutical materials, but virtually every other kind of organic sample as well. Most of its pages are devoted to the determination of organic substances, but there is also a quite comprehensive treatment of the determination of inorganic constituents. Its subject is thus both important and broad, and one cannot but welcome this extensive treatment by two well-known contributors to the polarographic literature.

The nature and scope of the treatment may be illustrated by the contents of the section dealing with the determination of lead. Here, within twenty pages, are given descriptions of methods for dealing with thirty different kinds of samples, including, for example, blood, fingernails, tin cans, cadavers and port wine. Most of the procedures are given in enough detail to permit their practical execution without the necessity of consulting the original literature: this should be especially valuable to the busy clinical analyst. Where two or more procedures for analyzing similar samples have been proposed, all are usually described in about equal detail. This has the advantage of placing at the reader's disposal an extensive summary of the work in this field up to about 1954, and especially of that portion of it which is due to the authors and their Czech colleagues. However, it will be regretted that room could not be found for a critical evaluation of the merits of the various procedures or for some description of the chemical and electrochemical processes on which they are based.

Though the authors have succeeded in giving an admirably thorough presentation of their own country's achievements in polarographic analysis, there are some noteworthy gaps in their coverage of the remainder of the literature. Derivative polarography (attributed to Vogel and Riha alone) is discussed at some length, though without reference either to an important paper by Lingane and Williams or to the related and no less meritorious technique of polarography with superimposed a.-c. On the other hand, rotating solid metal electrodes are dismissed very briefly, and such other techniques as electro-separations at controlled potential and coulometry at controlled current are not even mentioned. Nor is any reference made to the fundamental work of Elving, *et al.*, on the influence of ionic strength in organic polarography.

Although the extensive table of "the most important" half-wave potentials of inorganic and organic substances will be gladly received by those concerned with descriptive polarography, it is marred by a number of errors and other defects. The errors may be typified by two examples. The values on p. 667 for the half-wave potentials of the "copper(I) copper(II)" couple in sulfate and citrate media are

evidently derived from the work of Kalousek, which actually involved mixed potentials and had nothing to do with copper(I). On p. 665  $E_{1/2}$  is given as  $-0.54$  v. vs. N.C.E. for the process  $\text{Re(I)} \rightarrow \text{Re(II)}$  in 1 *M* perchloric acid: though no reference is given, the only possible source known to this reviewer is a paper by Lingane which gives a different half-wave potential, a different oxidation state of the starting material, and a different concentration of the supporting electrolyte, and also describes three additional waves of which no mention is made in the table. In the organic section of the table, the consistent use of trivial rather than systematic names of organic compounds is regrettable, as is the frequent failure to give full details concerning supporting electrolyte composition. As in the remainder of the book, American sources are poorly represented in this table—the reviewer sought in vain for any mention of a long and important series of papers by Elving, *et al.*—and over half of those which are listed are over ten years old.

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**Fortschritte der Chemie Organischer Naturstoffe (Progress in the Chemistry of Organic Natural Products).** Volume XIII. Edited by L. ZECHMEISTER, California Institute of Technology, Pasadena. Springer-Verlag, Mölkerbastei 5, Wien 1, Austria. 1956. xii + 624 pp. 16.5 × 23.5 cm. Price, \$24.75; Ganzleinen, \$25.60.

Earlier volumes in this series have presented comprehensive reviews by leading workers on topics which, while of current interest, have not become hackneyed by repeated reviewing. The present volume continues this valuable tradition, although some of the chapters have been anticipated to a greater or less degree by reviews published elsewhere.

The chapter on infrared spectra of natural products by A. R. H. Cole discusses instrumentation, and then considers numerous applications to problems in the structure of natural products, principally of steroids and terpenoids. Cole wisely does not attempt to duplicate the comprehensive collections of information about infrared spectra of organic compounds which are available in the writings of Bellamy and of Norman Jones, but his chapter is interesting and useful.

O.Th. Schmidt's review of gallotannins and related compounds gives a good summary of a field with which most organic chemists are probably not very familiar; the reader should note that "genetisch" in this chapter is apparently synonymous with the word "biogenetic" in English.

The cardiac drugs have offered one of the most complex structural problems in the whole steroid field, and in spite of many outstanding researches, particularly the classical studies of W. L. Jacobs, the structural problems are not all solved. Ch. Tamm gives a comprehensive and timely review of the chemistry of the glycosides and the aglycones.

Tropolone chemistry is reviewed by one of its most active exponents, Nozoe; the coverage is not as comprehensive as that in the recent review article by Pauson, but Nozoe's paper contains some new material and is a readable summary.

J. R. Price contributes an interesting and well-written chapter on alkaloids which can be considered to be related to anthranilic acid; the alkaloids considered include those of the quinoline, acridine, furoquinoline and quinazoline types.

The chemistry and pharmacology of the *Rauwolfia* alkaloids are discussed by Chatterjee, Pakrashi and Werner; this paper is comprehensive, is admirably up to date (Woodward's total synthesis of reserpine is included) and will undoubtedly be very useful to the many workers in this field. The section on pharmacology is particularly well done.

The great advances made in method of polypeptide synthesis in the last decade, and the large amount of work currently going on in the field of protein structure, make the last chapter, by Grassmann and Wünsch, particularly timely. They present a comprehensive and valuable, although occasionally rather uncritical, survey of methods of synthesis of the peptide bond; the chapter is, as far as the reviewer knows, the most complete and up to date discussion available.

In summary, all of the chapters will be useful to the specialist, and they all make instructive and broadening reading to the organic chemist who is interested in structural and theoretical problems. The emphasis of the whole book is on structural organic chemistry; possibly a chapter or two of more biological and biochemical nature, such as have appeared in earlier volumes of the series, would have provided some welcome variety.

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