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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of magnetic measurements to chemical problems since the treatises by Klemm and by Bhatnagar and Mathur are now quite out-of-date.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. BRÉZINA 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 x 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