

Thus, the author presents a large number of qualitative tests (with many references) which can be useful in determining what functional groups are present. In practice, however, organic chemists rely very heavily on spectroscopic techniques which in many cases have replaced the traditional qualitative tests.

A reasonably wide range of potential derivatives is indicated for each class of compounds (again, with references). Unfortunately, the experimental directions for preparing these derivatives are generally quite brief. Since the preparation of derivatives often is the most difficult problem for students, it would be extremely helpful if a number of more detailed experimental examples were presented for each type of derivative; possibly along the lines of the examples in "Organic Reactions." The same comment applies to the other available texts dealing with this subject.

A rather large number of typographical errors have slipped through. These are less bothersome than a few of the "mechanisms" which are put forth. The physical appearance of the book is good and the price, currently about seven dollars, is reasonable.

It is the opinion of the reviewer that although this book does not present a completely balanced approach to the identification of organic compounds and probably requires a companion text or the equivalent supplied by the instructor, it will prove to be useful to both students and instructors as a convenient introduction to functional group analysis and as a source of references to the original literature.

DEPARTMENT OF CHEMISTRY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE 39, MASSACHUSETTS WILLIAM R. MOORE

The Organic Chemistry of Boron. By W. GERRARD, Head of Department of Chemistry, Mathematics, Biology and Geology, The Northern Polytechnic, London. Academic Press Inc. (London), Ltd., 17 Old Queen Street, London, S.W. 1, England. 1961. x + 308 pp. 16 × 23.5 cm. Price, \$9.00.

The chemistry of boron compounds involving hydrocarbon groups has been expanding so rapidly, especially in variety of types of compounds and reactions, that it is no longer easy for an expert in the field to maintain a broad knowledge of new developments; and a really complete understanding of the subject would be a most admirable accomplishment. A task of that kind is attempted in this new book by a very prolific student of organoboron chemistry, and if the goal is not perfectly achieved, at least the result is very useful to anyone having an interest in boron chemistry and the broader principles which it implies. To a narrow specialist in the field, there is much here which is both exciting and surprising.

The quality of the presentation is highly variable, ranging from concise obscurity to eloquent clarity. The first chapter makes no very good impression, for it discusses the reactivity of oxygen compounds with Lewis acids, most obscurely under the title "Reactivity of Alkyl and Aryl Groups" without even one RO-B compound as an example; but in Chapter II we find a good presentation of just what one needs to know in order to work well with borate esters and their more complex homologs, the RO-boroxines. Then quite logically one encounters the reactions of boron halides with alcohols and phenols, with a full review of mechanisms as well as products including borocyclics. Then the following discussion of boron-carboxyl compounds, such as tetra-acetyl diborate and many others (and aldehyde combinations as well) is presented with adequate background. The B-C bonded compounds then are discussed in a logical order, culminating in tetraarylboron salts and oxidative fission of the B-C bond.

Some forty pages are devoted to the boron hydrides as such and in the form of derivatives, with discussion of their synthesis and the application of various B-H compounds to the reduction of organic compounds. The greatest emphasis upon donor-acceptor bonding (other than in reaction intermediates) is found in the chapter on boron-nitrogen compounds, which includes also the polymeric tendencies of =N-B= compounds and the borazines. More specialized topics follow afterward: boron-phosphorus chemistry including P-O-B bondings and boron halides with phosphite esters, as well as P-B polymers; boron-

sulfur chemistry emphasizing rings, and then miscellaneous heterocyclics. The final chapter, discussing infrared spectra of boron compounds, should be helpful as a source of ideas for making assignments.

In any monograph such as this, one might long consider whether the writing is best done by a scholar who only collects the work of others and tries to understand it, or by a research worker in the field. The scholar may be unbiased in his selection of material but lack intimate understanding of how the knowledge was obtained, whereas the research specialist may overemphasize what he understands best—his own work. In the present book we find an interesting hybrid: an intimate impression of the author's own primary interests and extensive contributions, but sometimes considerable enthusiasm for the work of certain others as well. On subjects far from the central interest there may be little said, or inaccuracies may enter, especially when there is an attempt to read beneath the surface of what has been published. For example, this reviewer is surprised at being credited with a leading role in the development of the metal-hydride approach to boron hydrides, whereas at the time when that began (1943) he was doing very different work 1700 miles away. Also the reviewer's analytical error leading to the formula $(Me_2N)_3B_3H_4$ is perpetuated, even though the correct formula $(Me_2NBH_2)_3$ was shouted in the presence of the author and published nearly two years ago.

However, such inaccuracies may be forgiven in a book which risks controversy in the process of stirring up much thought about fundamental principles. We must credit Professor Gerrard with a very useful book, better than which might be too much to expect.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF SOUTHERN CALIFORNIA ANTON B. BURG
LOS ANGELES 7, CALIFORNIA

Chromatographic Reviews. Progress in Chromatography, Electrophoresis and Related Methods. Volume III. Edited by MICHAEL LEDERER, Istituto di Chimica Generale ed Inorganica, Rome, Italy. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. 187 pp. 17.5 × 24 cm. Price, \$10.25.

Each year the review articles appearing in the *Journal of Chromatography* have been republished, all in English, as "Chromatographic Reviews." Of the eight articles in the current volume, one was translated from the original German, and two had not been published before.

The current Reviews contain the following material: the conditions and mechanisms that lead to multiple zones in chromatography (R. A. Keller and J. C. Giddings); starch column and starch gel electrophoresis (electrochromatography) (H. Bloemendahl); continuous electrophoresis (continuous electrochromatography) (Z. Pučar); original work on the paper chromatography of phenols and related, biochemically important compounds (L. Reio); chromatography of lipids on silicic acid (J. J. Wren); a previously unpublished progress report on the paper chromatography of inorganic ions (M. Lederer); an extensive, hitherto unpublished summary of the electrochromatographic separations of inorganic ions (R. A. Bailey and L. Yaffe). Most of these summaries are condensed citations with little comparison or evaluation of the original observations.

This volume of the Reviews is indispensable to everyone whose special interests encompass the subject matter that is included. Owing to their highly specialized nature and their condensed style, the several summaries will be of much less interest to the general reader, students and teachers.

As the cuts for six of the articles and the type for five had already been prepared for the *Journal of Chromatography*, the price of the Reviews seems surprisingly high. Specifically, one volume of the *Journal of Chromatography* containing about 600 pages is priced at \$15.00; the present Reviews with only 187 pages at \$10.20. The former equals 2.5 cents per page; the latter, with cloth binding, 5.5 cents per page.

CHEMISTRY DIVISION
ARGONNE NATIONAL LABORATORY HAROLD H. STRAIN
ARGONNE, ILLINOIS