

ken notation which has become well established in molecular physics and chemistry. However, anyone conversant with point groups can easily make the changes.

Although the book is mainly a mathematical text, physical facts are brought in to illustrate important points and to maintain interest in the mathematical results. The book does not give a discussion of the limits of validity of the one-electron band theory nor of exciton levels.

In the reviewer's opinion, a student who has had no previous exposure to the theory of point groups would have difficulty with this book; however, a relatively simple briefing on groups of symmetry operations and their use in constructing symmetrized functions should be sufficient introduction. The book is highly recommended to serious students of chemistry who wish to gain an appreciation of the electronic structure of crystalline solids.

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**Physiko-chemische Grundlagen und Tabellen zur Qualitativen Analyse (Mit Ausnahme der Gasanalyse).** By W. D. TREADWELL. Nach dem Tode des Verfassers herausgegeben von Prof. Dr. O. Gübeli, Zürich, und Dr. W. Proding, Wien. Verlag Franz Deuticke, Helfferstorferstrasse 4, Wien I, Austria. 1960. xi + 236 pp. 17.5 X 24.5 cm. Price, ost. S 168.—.

"By their fruits you shall know them" remains an infallible standard by which one may measure accurately the capacity and usefulness of an individual in any sphere of activity. Against a background of multitudinous analytical methods and much chemical trivia, the researches of W. D. Treadwell are a convincing reassurance that the analytical researcher need not be merely a sharpener of tools but may possess inherently a distinct approach to chemical problems.

Unmistakably, Treadwell's "Qualitative Analysis" indicates the direction which can be given to the solving of analytical problems by an adequate accumulation and integration of descriptive material. Perhaps a rearrangement of the title to emphasize analytical aspects would more appropriately describe the content of the book. With a total of 231 pages, approximately 54 pages are concerned with explanations for some three dozen physical chemical terms as well as tables of such physical constants as activity coefficients, solubility products, dissociation constants, and optimum acidities for precipitation, etc., of chemicals related to analytical procedures. The remainder of the book, in five sections, deals with methods of approach and preliminary examinations of materials with a view to qualitative separations of the common elements extended to include such metals as uranium, gold, titanium, molybdenum, etc. The procedure, preceded also by a detailed description of the physical and chemical properties of the elements involved, is largely the classical chloride-sulfide-carbonate separation with the final methods of identification involving a few of the more effective recently developed reagents. A similarly complete qualitative scheme for anions is included.

For those metals not included in the qualitative schemes, the author has supplied a supplement. In this section the physical properties, precipitants, methods of dissolution and separation are listed for the alkali metals, lanthanide series, and the rarer metals of the sulfide group. Momentarily, one's enthusiasm for this book is tempered by the contents of the final page. One cannot associate the proved competence and thoroughness of the author's work, here and elsewhere, with the antiquated procedure for the separation of the noble metals of column VIII. Neither the author nor any one else has yet succeeded in separating ruthenium by heating in oxygen at 700°. This small section of the volume is of little value.

Furthermore, the book may not be acceptable to those who, for either pedagogical or practical purposes, require some integration of the empirical separational procedures such as chromatography or ion exchange techniques. It would seem that the author could profitably have made some concession to the more effective ion exchange methods, even at the expense of reduced instructional value. This would have improved the out-dated section dealing with the separation of the lanthanide metals.

This is a book of chemical data and analytical methods, largely without detailed prescriptions. Most of the methods are classical with a small admixture of recently reported reagents; one must not expect a compilation of the latest precipitants or color reagents.

In this Reviewer's opinion the book is a useful contribution to analytical literature, an excellent classical text for qualitative courses at the university level, and a distinct asset to any chemical library.

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**Advances in Organic Chemistry. Methods and Results.**

Volume II. Edited by RALPH A. RAPHAEL, The University, Glasgow, Scotland, EDWARD C. TAYLOR, Princeton University, Princeton, New Jersey, and HANS WYNBERG, Rijksuniversiteit, Leiden, The Netherlands. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. vii + 504 pp. 16 X 23.5 cm. Price, \$15.00.

This second volume of what promises to be a most useful and stimulating series on new developments in organic chemistry continues the high standard of excellence set by Volume I. The objective of the editors is a series of volumes containing articles providing a critical appraisal and evaluation of new aspects of organic chemistry ripe for further development and of novel extensions to well-established methods, ideally by the originator of the method described or a practitioner expert in its use. This objective is very well realized in Volume II.

The topics covered and the authors are the following: Alkenylmagnesium Halides (65 pp.) by H. Normant (Paris); Dialkoxydihydrofurans and Diacycloxydihydrofurans as Synthetic Intermediates (49 pp.) by Niels Elming (Copenhagen); Ethynyl Ethers and Thioethers as Synthetic Intermediates (96 pp.) by J. F. Arens (Utrecht); Ketene in Organic Synthesis (51 pp.) by R. N. Lacey (Hull, England); Nuclear Magnetic Resonance in Organic Structural Elucidation (64 pp.) by Harold Conroy (New Haven, Conn.); Hydrogenation-Dehydrogenation Reactions (38 pp.) by L. M. Jackman (London); Ultraviolet Photochemistry of Simple Unsaturated Systems (59 pp.) by Paul de Mayo (London, Canada); The Chemistry of Muscarine (29 pp.) by C. H. Eugster (Zurich).

Alkenylmagnesium halides represent a most useful addition to synthetic methods involving the Grignard reagent; this brief review is timely. Dialkoxydihydrofurans and Diacycloxydihydrofurans are of more limited value but deserve the attention this review will focus on them. The chapter on ethynyl ethers and thioethers, the most exhaustive review in this volume, is an important survey of all of the work on these compounds and admirably illustrates their general utility. Ketene is an old chemical but new aspects of its chemistry make its inclusion here appropriate; the sections on isopropenyl acetate and  $\beta$ -propiolactone are especially interesting.

Nuclear magnetic resonance is probably the most important new development included in this volume. The theoretical part is somewhat too condensed to be easily understood but the examples are well chosen to illustrate the scope of the method.

Only a small portion of the field of hydrogenation-dehydrogenation reactions is covered in the sixth chapter—that dealing with homogeneous hydrogen transfer between organic molecules without catalysis by inorganic derivatives. Short sections on catalytic, photochemical and biochemical hydrogen transfer are barely illustrative.

Probably the most provocative topic is ultraviolet photochemistry of simple unsaturated systems. Photolysis promises to be of increasing importance in organic chemistry and the examples reviewed suggest much further work.

The final chapter on the chemistry of muscarine presents a concise review of the application of modern and older methods to structure elucidation of a simple but intractable molecule. A better choice might have been made to illustrate the application of modern techniques to such problems, but the chapter is well written and interesting.

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