BOOK REVIEWS

Mecanismes Electroniques en Chimie Organique. Augmented 2nd Edition. By MARC JULIA, Faculty of Science, Paris. Gauthier-Villars, 55 quai des Grands-Augustins, Paris (VIe), France. 1963. 113 pp. 16 × 24 cm. Price, 16 NF.

This small paper-back (102 pp.) was prepared as a guide and stimulus to studies of electronic mechanisms in organic chemistry. The hope was stated in the preface that the book may serve to help diminish organic chemistry's reputation as "an assembly of kitchen recipes."

Most aspects of the theory of organic chemistry are considered concisely and with clarity but, unfortunately, in much too uncritical and doctrinal a manner. Except for broad reference to the well known but now out-dated works by Dewar, Alexander, and Ingold and a French publication by Mathieu and Allais in 1957, the text is without documentation.

The book may well contribute to a promotion of already obsolete ideas or inadequate interpretations. The following specific comments should adequately illustrate the basis for this judgment. On p. 15, much stress is placed on the significance of the "resonance energy" of butadiene, a concept which only recently was strongly challenged by Dewar (see *J. Am. Chem. Soc.*, **85** 837 (1963)). Hyperconjugation rationalized through no-bond resonance is used on p. 18 to explain the decreasing heats of hydrogenation observed as ethylene is progressively substituted by methyl groups. Such one-parameter explanations are often useful rough approximations when concerned with very large effects. However, in this case, a difference of only 6.2 kcal. separates the heats of hydrogenation of ethylene and tetramethylethylene. In order to illustrate as objectively as possible the disservice rendered to beginning students by such flippant rationalizations, the reviewer approached separately three physical organic chemists for explanations of this hydrogenation data. One considered that hyperconjugation, whatever the term really means, may be of importance. All believed the relative strengths of the kinds of C–H bonds made would contribute to the observed heats to an important degree. One felt that differences in the strengths of the double bonds may be important but would attribute the differences to changes in hybridization rather than to "hyperconjugation." None felt that the data could be profitably rationalized at this time. The statements on p. 19 that charge distribution in the ground state of a conjugated system favors reaction at certain localities obscures the all important fact that reactions proceed by way of the most favorable transition states. The great pedagogical value of energy–reaction coordinate diagrams in the rationalization of the energetics of reactions is not employed with some serious consequences. The catalysis provided by aluminum chloride in the chlorination of benzene is used (p. 84) to prove that the substitution is electrophilic rather than to exemplify the resistance displayed by benzene to electrophilic attack. Thus, although the book is admirably concise, self-consistent, and undoubtedly of considerable intellectual appeal to a beginning student, the lack of critical evaluation together with the largely outdated approach renders the effort of doubtful value.

A "budding" chemist would be well advised to consult a better documented text where the prevailing theory of organic chemistry is presented more rigorously and with much more respect for the complexity of the subject.

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Boron Hydrides. By WILLIAM N. LIPSCOMB, Professor of Chemistry, Harvard University. The Physical Inorganic Chemistry Series, W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. ix + 275 pp. 16 × 23.5 cm. Price, $14.00.

An appropriate alternative title for this book might have been "Lipscomborology"; and then for anyone having recent contact with the lore of polyboranes and related substances, such a title would be a complete and adequate review of the book. However, for chemists not so closely in touch with the subject, let it be said that the major part of our present knowledge of the structural patterns of the polyboranes came directly from X-ray studies by Lipscomb and his immediate colleagues, and that the very useful electronic and topological rationale of these structures also was primarily his work. Accordingly, no boron chemist need be surprised to find here a book which elaborates in considerable detail the rules of connectivity and basis for predicting the stability of boron networks; but many of us might not have been aware of the large amount of closely reasoned computation underlying these relatively simple ideas and rules.

After the first chapter has described the known structural patterns and the second chapter has elaborated the topology of such structures by use of the group theory of symmetry and the styx numerology, the third chapter elaborates the methods of developing the molecular orbitals for such frames. At this point we find great respect for the electronic computor, whose cooperation the author seems to have requested with utmost courtesy, and whose high ability to deal with extremely multiplex systems of secular equations is honored by elaborate tables of numerical results. For estimation of charge distributions in polyboranes and in the corresponding polyboranide anions or carboranes, three different methods of simplification were used, and careful arguments are given for choosing among the somewhat conflicting results of nonfinal theories. Chapter 4, on interpretation of nuclear magnetic resonance results, has bearing here.

The author pleads for more experimental-chemical results which might relate fairly directly to the theoretically derived charge distributions. There is indeed room for much further pertinent work on chemical reactions, but one might hope for more good, hard thought about the theoretical meaning of chemical facts already known, than one author could be expected to accomplish in a summary such as Chapter 5. Here the chemical facts of the subject are presented in large measure by tables, often with little judgment of validity or relative importance, but with a major attempt to see relations to theory. It is abundantly apparent that the author regards this fact–theory correlation as incomplete, for we find at many points strong hints for further thought and more experimentation.

In sum, then, this book is required *study* for anyone who hopes to understand the polyboranes—and we still do not have to consign all of the fun to the computor. The bibliography of 339 references offers ample assistance for finding the more detailed knowledge upon which a thorough study must depend.

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Radionuclide. Zweite, völlig neubearbeitete Auflage von Radioaktive Isotope. By Dr. KURT SCHMEISER, Knapsack-Griesheim AG., Werk Knapsack Bei Köln. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf (West), Germany. 1963. 282 pp. 25.5 × 17 cm. Price, DM 59.

The stated goal of this relatively small book is to be a guide for the practical use of radioactivity in research and development in a variety of fields. The author uses about one-fourth of the space for a simple treatment of nuclear structure, the production of radionuclides, the laws of radioactive decay, the statistical limitations of measurement, and the interactions of radiation with matter. These sections are by no means incisive, but they serve to give an adequate background for the more detailed treatment of instrumentation and techniques that form the main part of the book.

About one-half of the book deals with the common instruments for the detection of radioactivity and with the techniques for using them with various radionuclide sources. Scintillation counting is treated quite completely from its uses for γ-ray spectrometry through the techniques for the assay of radioactive samples in liquid scintillator systems. The author brings up all of the many practical problems lying between the collection of raw measurements and the calculation of quantitative measures of relative or absolute activity, giving (generally graphically)