

terminations. Identical amounts (0.32 mg.) of the D and L isomers were mixed. The melting point of the mixture was 104–105° which was in good agreement with the melting of the synthetic DL-*threo* derivative,⁵ m.p. 104–105°. The mixture melting point of the mechanically prepared DL-*threo* derivative with the synthetic DL-*threo* compound was not depressed, m.p. 104–105°.

Acknowledgment.—This investigation was made possible by Research Grant CY 3772 of the National Institutes of Health, Public Health Service.

(9) Predoctoral Research Fellow, National Institutes of Health (1-FL-GM-20693).

DEPARTMENT OF CHEMISTRY
WAYNE STATE UNIVERSITY
DETROIT, MICHIGAN

CALVIN L. STEVENS
PETER BLUMBERGS
DONALD L. WOOD⁹

RECEIVED MAY 28, 1964

BOOK REVIEWS

Friedel-Crafts and Related Reactions. Volume I. Edited by GEORGE A. OLAH, Research Scientist, Dow Chemical of Canada, Limited, Sarnia, Ontario. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York 16, N. Y. 1963. 1031 pp. 16 × 24 cm. Price, \$29.50.

Volume I presents the general aspects of "Friedel-Crafts and Related Reactions" and lays the groundwork for three subsequent volumes: II, "Alkylation and Related Reactions"; III, "Acylation and Related Reactions"; and IV, "Miscellaneous Reactions."

Long needed has been an authoritative source book of this type to bring into comprehensive and coordinated review the extensive subject matter relating to Friedel-Crafts chemistry, *i.e.*, "electrophilic organic reactions catalyzed by electron deficient compounds."

Although the product of many contributing authors, this is much more than a disjointed compilation of chapters haphazardly assembled by the editor. As an architect visualizes his final structure, so has Dr. Olah carefully designed this compendium, with a harmonious blending of many parts. The net effect is best described by C. K. Ingold in the Introduction: "The arrangement of chapters is logical and the place of each in the complete account is so obvious and natural that one notices very little the discontinuities of style and approach that so often spoil the reading of multi-author books." The authoritative nature of this work comes not only from the quality of the contributing authors—each an expert in his own field—but also from the stature of the editor and his own contributions. Of the 13 chapters in Volume I, five are authored or coauthored by Dr. Olah.

In his opening chapter, he provides an excellent historical background, starting with biographical sketches of Messrs. Friedel and Crafts. This is followed with a penetrating review of their initial discovery, including clear reproductions of key entries in Friedel's laboratory notebook. In the second chapter, Dr. Olah sets forth the definition and scope of the material to be covered in Vol. I and in later volumes. With its 657 references, this chapter in itself is a significant contribution to the field. The clarity of expression and the underlying logic for setting up the limitations and the scope to be covered bring a remarkable degree of order to what had become a tangled network of fact and theory.

Presented in logical sequence thereafter are background chapters on the nature of Friedel-Crafts catalysts, leading off with a general review of proton acids and Lewis acids. This is followed by a comprehensive outline of active Lewis catalysts from Groups I through VIII, with a thorough treatment of the role of cocatalysts, solvents, and reaction variables. The unique role of boron compounds is recognized in a separate chapter covering coordination compounds of the boron halides, which is followed by a review of coordination compounds of aluminum and gallium halides.

A chapter on intermediate complexes deals with the species involved in the reaction itself. Further mechanistic insights are provided by discussions of spectroscopic investigations and application of isotopic techniques. The three final chapters

cover reaction and selectivity, thermodynamic considerations, and stereochemical aspects.

This work will be of value both to students and to experts in the field. Although it provides a comprehensive review of a rapidly expanding area of research, it is far more than an encyclopedic source of knowledge. In providing a critical evaluation of conflicting data and diverse theoretical interpretations, it achieves a cohesive view of an extremely complex field.

As it comes off the press, it is as up-to-date as a major work can be. The wisdom and courage of the editor are evident in his monumental undertaking of planning the work as a whole and proceeding with all volumes simultaneously. As the first volume was published, Vol. II and III were being printed, with Vol. IV soon to follow. These volumes will serve as a sound and solid foundation on which to build in future efforts to bring up-to-date the story of Friedel-Crafts and related reactions.

BATTELLE MEMORIAL INSTITUTE
COLUMBUS, OHIO 43201

A. P. LIEN

Molecular Biochemistry. By EDWARD M. KOSOWER, Department of Chemistry, State University of New York, Long Island Center, Stony Brook, N. Y. McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. 1962. xii + 304 pp. 16 × 23.5 cm. Price, \$12.50.

The mechanisms of chemical reactions have been and are today of major concern to organic chemists and biochemists. Although the biochemist deals mainly with enzymatic reactions either *in vitro* or *in vivo*, these reactions obey the same laws as do chemical reactions which do not require enzymes. Enzymes may lower the energy of activation of chemical reactions and introduce special steric and entropy factors, but they still can be rationalized by a consideration of the electronic structure of molecules. There exist many text books dealing with mechanisms of reactions, but biochemists have done relatively little in this field. Possibly the biochemists felt that such texts were not urgently needed since the concepts available in existing texts could be applied to enzymatic reactions. However, the need for such a text was visualized by Dr. Kosower and prompted him to write "Molecular Biochemistry." He has defined molecular biochemistry as the study of the detailed mechanisms of the chemical transformations in biology as they are described by biochemists, and has attempted to use the physical-organic approach to explain these chemical transformations.

Dr. Kosower has organized his book into three major parts: the first, a survey of metabolic reactions; the second, a discussion of reaction mechanisms; and the third, a brief treatment of the concept of "active site" of enzymes. Very little use is made of molecular orbital theory in this book.

Biological processes dealing with glycolysis, the Krebs tri-carboxylic acid cycle, biological oxidation and oxidative phosphorylation, photosynthesis, the urea cycle, transamination, biosynthesis of purines and pyrimidines, and the biosynthesis of fatty acids and cholesterol are covered in the first part of the book. The second part covers reaction mechanisms of carboxylation,