# BOOK REVIEWS

**Silicones and Their Uses.** By ROB ROY MCGREGOR, Administrative Fellow, Mellon Institute. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 1954. xv + 302 pp. 14.5 × 21 cm. Price, $7.00.

This handy volume consists of five chapters, headed "History of Silicones," "Commercial Silicones," "Physiological Response to Silicones," "Applications of Silicones to Specific Industries and Cost Considerations" and "Chemistry of Silicone Preparation." Four of the chapters are subdivided into several sections. The second chapter, in which the various types of commercial silicones are discussed in succession, occupies the major portion of the book (155 pages). A pre-preface (entitled "What Are Silicones?"), a preface, an introduction, a bibliography of 152 entries and an index of eight pages complete the work.

Dr. McGregor defines silicones not as organosiloxanes, but more broadly as "synthetic compounds containing the elements silicon and oxygen, and organic groups, the silicon being present in sufficient amount to affect the properties measurably." Such a definition, which would include even ethyl silicate, makes the scope of the book so broad as to require a great deal of judgment in the selection of what is to be discussed, and this is handled very well by the author. It turns out, of course, that the actual materials described in by far the greatest detail are the few organosiloxanes (few in terms of chemical possibilities) now being produced commercially in quantity. Dr. McGregor set out to write about these in terms of what the silicones are, how they are manufactured, and what they are good for; he strove further to write expressly "for engineers and designers," and to write "in non-chemical language in so far as possible." In these aims he certainly has succeeded, for here within two covers are all the properties, typical applications and suggested uses that the average engineer or designer could want. The book is recommended on this basis.

The close association of the author with the Dow-Corning Corporation, the major producer of silicones, undoubtedly has been of great aid to him in this enterprise. The book originated in a suggestion by Dow-Corning, and all of the resources of that organization evidently were made available. This situation has made it possible for the author to be highly specific about the silicone polymers he describes, and to give a wealth of authentic and detailed information about each. His coverage of the multitude of organosilicon materials also is more complete on that account, and the relative importance of product A over product B must be clearer to him than it is to the bewildered pamphlet searcher. These strong advantages will contribute to the success of the book. Occasionally, however, the same close association produces some disadvantages. For one thing, it probably is responsible for some blind spots about matters that are not D–C developments: the omission of any mention of the important water-soluble sodium silanolates for the treatment of masonry, for example, and the use of metal-coating resins in biophysical machines. The same tradition (or doctrine) leads to some statements and some omissions of statement in the chapter on History of Silicones that will certainly be challenged in some quarters.

In keeping with the stated aims of the book, the author points out in the introduction that it is not intended primarily for the chemist. Nevertheless, there is sufficient interest on the part of some chemists to prompt a review in THIS JOURNAL, and some comment on the sections devoted to chemistry will be sought. The chapter on History is informative and, for the most part, entertaining, but no serious exposition of chemistry comes until Chapter 5. Here the author starts out on the elementary level and develops the pertinent points of organosilicon chemistry one by one. He does not limit himself to the area of the title, "Chemistry of Silicone Preparation," but ranges over the entire field with some (perhaps unnecessary) emphasis on bygone reactions and syntheses. The large type and open plan of the book are particularly well adapted to the generous use of structural formulas, and the style is clear. There are some minor eyebrow-raisers, as (for example) the statement on page 31 that "the starting material for the preparation of silicones is silicon tetrachloride, $SiCl_4$" despite public announcements by both major producers that they use the direct preparation from elementary silicon. On pages 7 and 227 it is made plain that Wohler and then Combes missed the boat by not trying methyl chloride with silicon after they had worked out all the necessary details for the reaction of hydrogen chloride, even to the inclusion of copper powder. Your reviewer believes that they probably *did* try it, unsuccessfully; he himself spent over a year trying to get methyl chloride to react with silicon under the conditions of Wohler and Combes, but to no avail. It is not as simple as that.

Lastly, there is one omission that your reviewer cannot explain at all. Nothing is said about the newer silicone rubbers that have tensile strengths far beyond those given on pages 154 and 156, nor about the new reinforcing agents like hydrophobic silica or special alumina, despite some publications on these matters.

If a summary is needed, your reviewer recommends this book as a valuable and conscientious effort on the part of an able man to present the properties and uses of those silicones with which he is most familiar. While someone with quite different experience and associations would have written parts of it differently, it is hard to see how the author could have done so.

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**Hydrocarbons from Petroleum.** The Fractionation, Analysis, Isolation, Purification and Properties of Petroleum Hydrocarbons. An Account of the Work of the American Petroleum Institute Research Project 6. By FREDERICK D. ROSSINI, Silliman Professor and Head of the Department of Chemistry and Director of the Petroleum Research Laboratory, BEVERIDGE J. MAIR, Principal Research Chemist and Associate Director of American Petroleum Institute Research Project 6, and ANTON J. STREIFF, Senior Research Chemist and Supervisor of American Petroleum Institute Research Project 6 at the Carnegie Institute of Technology, Pittsburgh, Pennsylvania. Reinhold Publishing Corp., 330 West 42nd Street, New York 36, N. Y. 1953. xvi + 556 pp. 16 × 23.5 cm. Price, $18.50.

The authors have performed a valuable service in collating and interpreting the mass of data, representing more than three hundred man years of work on American Petroleum Institute Project since 1927. These data previously had been scattered over 140 technical and scientific publications. Their combined experience in performance of this work has enabled the authors to present this knowledge in a form most helpful to the reader. The subject matter includes information on the composition and analysis of hydrocarbons; the development and operation of apparatus for fractionating by distillation, extraction, adsorption and crystallization; purification and purity determinations of hydrocarbons; analysis and measurement of the physical properties of hydrocarbons; and other valuable data. The large number of charts, graphs and tables makes this a valuable reference book which will become one of the most quoted source books in the field.

The details of the techniques employed impress the reader with the meticulous care which has characterized the experimental work. While physical methods of separation have of necessity been the main approach in this analysis, it is certain that newer spectral methods developed during the Project will become of greater importance in the future. These methods will depend on the availability of the pure hydrocarbons needed as standards. As of October, 1952, 208 of these vital standards have been prepared in high purity and are available by purchase or loan from the Project.

Thermal diffusion and low pressure distillation may play an increasingly important role in the analysis of the higher boiling fractions of petroleum. While azeotropic distillation has been used to great advantage, it seems unfortunate that a greater application of extractive distillation was not made. This, as the authors point out, was due to the necessity for using more complex apparatus with concurrent increase in the cost of personnel for the operation. It is hoped that these difficulties can be circumvented so that this technique will be more available for aiding the solution of the problems of composition.

The work reported here was summarized in Business Week, November 21, 1953, as follows: "To see how this works take Project 44 assembling data on hydrocarbons and related compounds. This data is, according to API, the only authoritative and orderly classification of physical, thermodynamic and spectral properties of these chemical substances in existence today. A process engineer estimating yields from a process in a French petroleum refinery, a graduate student in chemistry investigating paraffins at the University of Bombay, a geologist in Venezuela, or a physicist in an American laboratory are all dependent on information from Project 44."

This book is a record of fundamental knowledge attained through industry-wide support. It is required reading for those interested in the chemistry of petroleum and is recommended as a model for scientists concerned with the promotion of fundamental research.

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**Mechanismes Biochimiques de l'Activite des Antibiotiques (Penicilline, Streptomycine, "Tyrothricine").** By MAURICE-MARIE JANOT, Professeur à la Faculté de Pharmacie de Paris, and JEAN KEUFER, Docteur ès Sciences. Masson et Cie, Éditeurs, 120, Boulevard Saint-Germain, Paris 6, France. 1953. 74 p. 17 × 25.5 cm. Price, 670 fr.

Most of the more effective chemicals employed for various therapeutic purposes still present problems concerning their modes of action. Discovery of the medical usefulness of an identified substance usually has led to attempts to determine its mechanism of action. In this respect the antibiotics have been no exception. Possibly because of the dramatic effectiveness of these agents and the practical potentialities of their study numerous publications pertinent to their mechanisms of action have appeared as demonstrated by the 433 references in the bibliography of this review. This comprehensive list of references includes some as recent as those of the 1952 Paris Symposium on The Mode of Action of Antibiotics. Some of the references not found in the bibliography have been too recent to permit inclusion and references to other reviews on the subject have been omitted.

In the introductory pages general information on various antibiotics, including sources, structures, activities and a few toxicities, has been presented; however, for the discussion on the mode of action the authors have limited their review to studies on penicillin, streptomycin and tyrothricin. A brief historical background is presented citing some interesting foreshadowings of the development of antibiotics. This monograph reviews observations which in some degree cannot fail to be new and stimulating to those who are interested but not experts in the field. For the latter the review should at least offer a useful bibliography and compilation of observations in convenient form.

After categorizing the various observations on the action of the three antibiotics with respect to influences on different aspects of metabolism, upon morphology and for physical influences, the authors have concluded that the modes of action are quite diverse and that one of the most important is interference with a co-factor in enzyme action. They have also stated that progress to full knowledge of the modes of action of the antibiotics can come only with progress of knowledge of the enzymes. The reviewer would like to suggest that prospects are good that advances in our knowledge of enzymes may be expected through studies of the mode of action of biologically active compounds such as the antibiotics. A stimulus to such advances should be provided readers of the good review by Prof. Janot and Dr. Keufer.

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## BOOKS RECEIVED

May 10, 1954–June 10, 1954

G. M. BADGER. "The Structures and Reactions of the Aromatic Compounds." Cambridge University Press, American Branch, 32 East 57th Street, New York 22, N. Y. 1954. 456 pp. $11.50.

J. D. H. DONNAY AND WERNER NOWACKI. "Crystal Data." The Geological Society of America, 419 West 117th Street, New York 27, N. Y. 1954. 719 pp. $5.00.

FRITZ FEIGL. "Spot Tests"—Volume I, Inorganic Applications and Volume II, Organic Applications. The Elsevier Press, 402 Lovett Boulevard, Houston, Texas. 1954. Volume I—518 pp. and Volume II—436 pp. Volume I—$6.50 and Volume II—$6.25.

FREEPORT SULPHUR COMPANY, Compiled by the Technical Staff and Edited by WILLIAM N. TULLER. "The Sulphur Data Book." McGraw-Hill Co., Inc., 330 West 42nd Street, New York 36, N. Y. 1954. 143 pp. $5.00.

V. M. GOLDSCHMIDT (the late). Edited by ALEX MUIR. "Geochemistry." Oxford University Press, 114 Fifth Avenue, New York 11, N. Y.

V. G. W. HARRISON (Edited by). "Proceedings of the Second International Congress on Rheology." Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. 451 pp. $10.00.

JOSEPH O. HIRSCHFELDER, CHARLES F. CURTISS AND R. BYRON BIRD. "Molecular Theory of Gases and Liquids." John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1954. 1219 pp. $20.00.

RALPH E. LAPP AND HOWARD L. ANDREWS. "Nuclear Radiation Physics." Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1954. 532 pp. First Edition—$5.50, list. Second Edition—$6.75, list.

R. D. LILLIE. "Histopathologic Technic and Practical Histochemistry." The Blakiston Co., Inc., 575 Madison Avenue, New York 22, N. Y. 1954. 501 pp. $7.50.

R. H. F. MANSKE AND H. L. HOLMES (Edited by). "The Alkaloids: Chemistry and Physiology," Volume IV. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. 357 pp. $8.50.

NATIONAL BUREAU OF STANDARDS. "Table of Secants and Cosecants to Nine Significant Figures at Hundredths of a Degree." Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 1954. 46 pp. 35 cents.

F. F. NORD (Edited by). "Advances in Enzymology," Volume XV. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1954. 547 pp. $11.00.

E. H. ERICH PIETSCH (Edited by). "Gmelins Handbuch, Der anorganischen Chemie. 'Schwefel,'" Teil A. Verlag Chemie, G.m.b.H., Weinham/Bergstrasse, Germany. 1953. 762 pp. $34.00.

GORDON SKINNER, HERRICK L. JOHNSTON AND CHARLES BECKETT. "Titanium and its Compounds." Herrick L. Johnston Enterprises, 540 West Poplar St., Columbus, Ohio. 1954. 174 pp. Hard bound covers—$5.00, paper bound cover—$3.50.

ALEXANDER N. WINCHELL. "The Optical Properties of Organic Compounds." Second Edition. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. 487 pp. $12.00.