
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 silanulates 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, SiCl₄," 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.