

## BOOK REVIEWS

**Synthetic Methods of Organic Chemistry—An Annual Survey.** Vol. 6. By W. THEILHEIMER. Interscience Publishers, Inc., 350 Fifth Avenue, New York 1, N. Y. 1952. xi + 401 pp. 16.5 × 23.5 cm. Price, \$12.90.

Volume 6 of this useful survey of the current synthetic methods of organic chemistry constitutes the first volume of a new series. The previous five volumes, covering the literature from 1942 through 1950, completed the first series with a cumulative index in volume 5 published in 1951. In volume 6 the author continues to survey new methods for the synthesis of organic compound and records improvements and new applications of known methods. The various reactions have been classified according to the types of chemical bonds which are formed or broken. They are further broken down according to whether the reaction is addition, rearrangement, exchange or elimination. Although at first this classification seemed somewhat obscure and devious, after one becomes accustomed to thinking in these terms, the advantages of the system become more obvious. The advantages to the organic chemist of having handy in a few volumes a survey of the many different organic reactions are obvious in this day of increased publication. It is the thought of the author that these volumes should be used for immediate reference in the laboratory. However, the abstracts of reaction conditions are seldom such as to permit the direct application to experiments and it is nearly always necessary to go back to the original literature references, which are given. Therefore, although the books do "provide a quick survey of the situation at hand and obviate the necessity of first surveying the entire literature," the book will find most use as a starting point in the library for chasing down particular reactions. The classification is supplemented by several indexes in the back of the book including subject index, reaction index according to the systematic symbols, a list of additional reagents used, and finally a supplementary cross reference between Volume 6 and the previous five volumes.

Any survey of current literature will inevitably include material which cannot stand the test of time. Theilheimer is no exception to this rule, and this reviewer noted several instances where a more critical attitude on the part of the author would have served to correct errors in nomenclature, and to omit reactions of doubtful character which may not stand up under broader applications. However, for all this, the effort to survey the synthetic reactions of organic chemistry in a series of up-to-date volumes is a very worthwhile project and every active organic chemist will wish to have these volumes available.

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**Kartothek der Thiazolverbindungen.** By BERNHARD PRIJS, Wissenschaftlicher Assistent an der Universität Basel. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, New York. 1952. 16 × 22 cm. Volume I, 346 pp.; Volume II, 334 pp.; Volume III, 335 pp.; Volume IV, 328 pp. Price, \$42.50.

Dr. Prijs has succeeded admirably in his attempt to assemble and organize in comprehensive fashion the voluminous literature on thiazole compounds. Since the last complete review of this class of substances in the 4th edition of Beilstein, the literature has grown very rapidly and the earlier collection is now thoroughly out-of-date.

The collection of Dr. Prijs is assembled in loose-leaf style to allow the insertion at proper points of pages on new substances or new results as they appear in order to overcome the universal tendency of such compilations to become out-of-date rapidly.

The compilation itself is a collection of individual leaves, each giving data on the preparation, properties and reactions of individual compounds. The arrangement is systematic and easily understood and is supplemented by three in-

dices, one according to substituents of parent substances, one according to reactions, and one general index. A supplementary index replacing page numbers (obsolete with supplementary pages) by molecular formulas is planned.

This bibliographic collection should prove very useful for workers in this field.

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MARSHALL GATES

**Soluble Silicates—Their Properties and Uses.** Volume 1: Chemistry. American Chemical Society Monograph Series. By JAMES G. VAIL, D.Sc., Member of the Board of Directors. Assisted by JOHN H. WILLS, Ph.D., and the staff of Philadelphia Quartz Company. Reinhold Publishing Corporation, 330 West 42nd St., New York 36, 1952. xii + 357 pp. 16 × 23.5 cm. Price, \$9.00.

"Soluble Silicates in Industry," A.C.S. Monograph #46, by James G. Vail, was published in 1928. In the following years new literature on sodium silicates increased on a logarithmic scale, so a complete revision of the original monograph was undertaken by Vail and his associates in the Philadelphia Quartz Company. "Soluble Silicates, Vol. I" deals with the principal physical and chemical properties, while Vol. II will be concerned primarily with industrial applications.

"The soluble silicates, industrially speaking, are derived from silica, the most abundant substance (about 60%) of the lithosphere; sodium salts, mostly derived from common salt, and water." In 1949 the U. S. production of the anhydrous Na<sub>2</sub>O:3.3 SiO<sub>2</sub> glass was 465,000 short tons, while that of other countries probably totalled 250,000 tons.

Chapter 2 describes techniques of manufacture and of quality control. A ternary diagram for Na<sub>2</sub>O-SiO<sub>2</sub>-H<sub>2</sub>O depicts 5 areas of composition which are economically important. The percentage weight ratios Na<sub>2</sub>O:SiO<sub>2</sub> of the liquid sodium silicates vary from 1:1.6 to 1:3.75, the viscosities to 587,000 poises and the densities from 1.318 to 1.871.

Chapter 3, "The Homogeneous Systems," has three main parts, Glasses, Concentrated Hydrous Systems and Dilute Hydrous Systems. The twenty-five pages dealing with glasses ought to be required reading for all students of glass technology since the system Na<sub>2</sub>O-SiO<sub>2</sub> constitutes the simplest prototype of glass, and properties are correlated with composition in a lucid manner. The following section, "Concentrated Hydrous Systems," presents graphs showing the dependence of density, viscosity, refractive index, etc., as a junction of the Na<sub>2</sub>O-SiO<sub>2</sub>-H<sub>2</sub>O compositions. The increasing colloidal character in the more siliceous compositions is evident.

Chapter 4 presents detailed data on equilibria in the anhydrous alkali-silica systems and also in those systems when water is the third component. The data are mainly from Geophysical Laboratory publications, but even if not, they show the influence of the teachings of that great Laboratory. The tables of physical and optical properties of pure compounds are arranged for ready reference and some of the characteristic crystal habits of certain hydrates are illustrated by good photomicrographs.

Chapter 5, "Complex Systems," fills more than half of the book, but is conveniently divided into many sub-topics. It begins with a discussion of the sol-gel transformations, as affected by acids, by dehydrating agents, and by other agents which upset the colloidal balance. "The general picture is one of declining specific surface and kinetic motion." The changes can be followed by measurements of viscosity, and by optical, electrical and other means. Polysilicic acid is formed by condensation of simple acid molecules with elimination of H<sub>2</sub>O. Syneresis (exudation of water) accompanies the process. Gelling starts more rapidly at pH values near 7 than in more alkaline or more acid systems. The dried gels may be porous or non-porous depending upon conditions of formation.

About 60 pages are devoted to processes and products involving metals and silicates, beginning with the Group I metals, Cu, Ag and Hg. Anticatalysts and catalysts, cements, surface coatings, absorbents, treatment of boiler waters, and adhesives receive attention. A very durable gel for softening water by base exchange is  $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2 \cdot x\text{H}_2\text{O}$ .

The final seventy pages present an admirable summary of the properties of the soluble silicates which determine their behavior in detergency and dispersion. To quote from page 331: "Discussion of wetting power, interfacial tensions at solid-liquid and liquid-liquid interfaces, solvent action, water softening, rinsing, emulsification, suspension, redeposition, the protective action of films, suds formation, hydrogen and hydroxyl ion concentrations, critical micelle concentration, changes in absorption of various spectral bands under the influence of silica, the relation of silicates to hydrogen peroxide and chlorine bleaches, has given a general view which should serve as a background for the consideration of specific applications."

One cannot read this book without being impressed by its authoritative character, the index lists about 900 author references and over 2000 subject references. Silicenes are merely touched upon as they represent a separate group of chemicals having properties quite distinct from the classic "Soluble Silicates of Industry."

A feature of the book which reflects these busy times in which we live is the near absence of tables of numerical data. Rather are the results shown in graphical form and the trends indicated.

Dr. James G. Vail and Dr. John H. Wills have done a real service to science and technology by this new book. It is a fitting memorial to Dr. Vail who closed a very productive career of industrial chemistry and of international relief work with the "faith that a better knowledge of soluble silicates will constructively serve the people of our day and generation and be a link of common interest between them, whoever and wherever they may be."

MINNESOTA MINING & MANUFACTURING CO.  
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**Experimental Nucleonics.** By ERNST BLEULER, Professor of Physics, Purdue University, and GEORGE J. GOLDSMITH, Instructor in Physics, Purdue University. Rinehart and Company, Inc., 232 Madison Avenue, New York 16, N. Y. 1952. xv + 393 pp. 16 X 23.5 cm. Price, \$6.50.

Drs. Bleuler and Goldsmith have done an excellent job of filling the need for a good basic experimental text for a course in elementary nucleonics. Their book has been developed from a course given for the past three years at Purdue, and plainly shows the advantages which an author may gain from direct teaching experience in the subject on which he is writing. The presentation is excellent, well organized, and sufficiently self-explanatory to be comprehensible to students with a fairly elementary training in college-level physics and chemistry. Twenty-four experiments are presented, giving a comprehensive survey of the major experimental techniques, chemical as well as physical, now in use in nuclear research.

An especially fine feature of the book is that the great majority of the experiments described are independent of accelerators, so that even very small institutions with a minimum of expensive special equipment may design a suitable laboratory program to accompany a course. The experiments described involve a minimum of health hazards, which is again a great aid to institutions with restricted facilities. The authors apologize in their preface for being influenced in their choice of illustrative material by the equipment available to them at Purdue; this failing was not apparent to the reviewer.

The book does, of course, contain some omissions; in so brief a survey of such a wide and complex field this is inevitable. The recent development of halogen-quenched Geiger-Müller tubes, with indefinite shelf-life and very superior stability, is not mentioned; neither is the sometimes

all-important problem of chemical exchange between radioisotopes and added carrier material. In the introductory section on health and safety precautions, no mention is made of the useful technique of decontamination by dilution with stable isotopes, and this reviewer would like to see the paramount importance of distance as a protection from radiation emphasized more than is done.

It would be unfair to particularize these few failings without at least mentioning some of the many good features of the book. The chapter on health and safety precautions is very well done, the section on radiation units and tolerance dose being especially clear. Notes on particular precautions to be observed in experiments where a hazard does exist are also inserted into the descriptions of the experiments, as a reminder to the students. The section on counting losses is excellent, as is the section on statistical fluctuations. And, to take a final example, the descriptive background material accompanying each experiment is extremely clear and complete. Indeed, one danger in using this book is that the tendency may arise to treat it as a complete reference book, which the authors certainly did not intend it to be. It is a laboratory text, and a very good one; any teacher planning to institute a laboratory course in nucleonics should consider its use.

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## BOOKS RECEIVED

December 10, 1952–January 10, 1953

ATOMIC ENERGY SECTION, DEPARTMENT OF SECURITY COUNCIL AFFAIRS, UNITED NATIONS, NEW YORK. "An International Bibliography on Atomic Energy." Volume 2—Scientific Aspects. Supplement No. 1. Columbia University Press, 2960 Broadway, New York 27, N. Y. 1952. 328 pp. \$3.50.

COLLOQUES INTERNATIONAUX DU CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE. "Electrolyse—Paris, 23 au 27 Mai 1952." Service des Publications, Centre National de la Recherche Scientifique, 45, Rue d'Ulm, Paris-Ve, France. 1952. 146 pp. 1,500 fr.

HEINZ EWALD AND HEINRICH HINTENBERGER. "Methoden und Anwendungen der Massenspektroskopie." Verlag Chemie, GMBH, Weinheim/Bergstrasse, Germany. 1953. 288 pp. DM 25.60.

HERBERT S. GREEN. "The Molecular Theory of Fluids." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. 264 pp. \$5.75.

HENRI GUERIN. "Traite de Manipulation et D'Analyse des Gaz." Masson et Cie, Editeurs, 120 Boulevard Saint-Germain, Paris-6<sup>e</sup>, France. 1952. 636 pp. Broche 4.500 fr. Cartonne toile 5.100 fr.

NORMAN F. M. HENRY AND KATHLEEN LONSDALE (edited by). "International Tables for X-Ray Crystallography." Volume I—Symmetry Groups. The Kynoch Press, Birmingham, England. 1952. 553 pp. 5 Guineas.

CLAUDE S. HUDSON, MELVILLE L. WOLFROM, AND SIDNEY M. CANTOR (Edited by). "Advances in Carbohydrate Chemistry." Volume 7. Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y. 1952. 370 pp. \$7.50.

RAY PEPINSKY (edited by). "Computing Methods and the Phase Problem in X-Ray Crystal Analysis." Report of a Conference Held at The Pennsylvania State College, April 6–8, 1950. The X-Ray Crystal Analysis Laboratory, Department of Physics, The Pennsylvania State College, State College, Pa. 1952. 390 pp. \$7.50.

S. JAMES SHAND. "Rocks for Chemists—An Introduction to Petrology for Chemists and Students of Chemistry." Pitman Publishing Corporation, 2 West 45th Street, New York 36, N. Y. 1952. 178 pp. \$4.50.