

This new compound, on which details will be given in a later publication, contains a double bond and as functional groups an ether and a lactone group. On dehydrogenation with sulfur it yielded chamazulene.

As dehydrogenation of lactones usually involves decarboxylation,<sup>6</sup> it was inferred that chamazulene might be a C<sub>14</sub> compound. In fact our analysis of chamazulene and its derivatives agreed with formula C<sub>14</sub>H<sub>16</sub> for the azulene, rather than with the generally accepted C<sub>15</sub>H<sub>18</sub> formula.

	Calcd. for C <sub>14</sub> H <sub>16</sub>			Calcd. for C <sub>15</sub> H <sub>18</sub>			Found		
	C	H	N	C	H	N	C	H	N
Azulene	91.25	8.75		90.85	9.15		91.5	8.5	
TNB	60.45	4.82	10.52	61.31	5.15	10.22	60.1	4.5	10.4
Picrate	58.11	4.63	10.17	59.01	4.95	9.83	58.4	4.5	10.3
Mol. wt. <sup>a</sup>	413.4			427.4			413.3 ± 4		

<sup>a</sup> Determined by titration of the picrate.

Lithium aluminum hydride reduction of the lactone C<sub>15</sub>H<sub>20</sub>O<sub>3</sub>, followed by dehydration, yielded an azulene, which was identified as S-guaiazulene, the constitution of which has been firmly established as 1,4-dimethyl-7-isopropylazulene.<sup>7</sup>

This result indicated that the structures of

(6) L. Ruzicka and J. A. van Melsen, *Helv. Chim. Acta*, **14**, 397 (1931).

(7) Pl. A. Plattner, A. Fuerst, L. Marti and H. Schmid, *ibid.*, **32**, 2137 (1949).

chamazulene and S-guaiazulene differed only in respect of the substituent in the 7-position, which is the ethyl group in chamazulene and the isopropyl group in S-guaiazulene.

This assumption was confirmed in the following way. 2,8-Dimethylbicyclo[5.3.0]decan-5-one (I) was prepared from guaïol (isolated from guaiacwood oil) by hydrogenation to dihydroguaïol in presence of Raney nickel, followed by chromic acid oxidation. Treatment of the ketone (I) with ethylmagnesium bromide yielded the carbinol (II), b.p. 95–100° at 0.4 mm.; (*Anal.* Calcd. for C<sub>14</sub>H<sub>26</sub>O: C, 79.9; H, 12.5. Found: C, 80.2; H, 12.8). Upon dehydration and dehydrogenation with sulfur at 200°, the carbinol (II) was converted into an azulene, identified by its derivatives and its infrared spectrum as chamazulene.

We wish to thank Dr. A. Fuerst, Zürich, for kindly supplying a sample of chamazulene trinitrobenzoate. Chuit, Naef Co., Geneva, generously made available the guaiacwood oil.<sup>8</sup>

(8) Pl. A. Plattner and G. Magyar, *ibid.*, **25**, 581 (1942).

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RECEIVED JUNE 25, 1953

## BOOK REVIEWS

**Vitamins and Hormones—Advances in Research and Applications.** Volume X. By ROBERT S. HARRIS, Professor of Biochemistry of Nutrition, Massachusetts Institute of Technology, Cambridge, Massachusetts; G. F. MARRIAN, Professor of Medical Chemistry, University of Edinburgh, Edinburgh, Scotland; and KENNETH V. THIMANN, Professor of Plant Physiology, Harvard University, Cambridge, Massachusetts (Editors). Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y. 1952. xi + 421 pp. 16.5 × 23.5 cm. Price, \$8.00.

This volume contains ten review articles, the great majority of which are concerned with hormone research. The heavy weighting in this direction emphasizes the great interest and effort in this field.

Drawing heavily from clinical observations obtained from prisoner-of-war camps and undernourished populations during World War II, K. Cruickshank, writing on "Dietary Neuropathies," discusses the clinical syndromes and their relationships to nutritional deficiencies. "The Problem of the Absorption and Transportation of Fat-Soluble Vitamins" by A. E. Sobel reviews work mainly concerned with the transport of Vitamin A, as a model of the fat-soluble vitamins, and emphasizes the problem of poor absorption and transport, rather than insufficient intake, as a cause of deficiency. The limited amount of research on "The Nutrition of Crustacea" is indicated by the brevity of this review of E. Beerstecher, Jr., who points out, however, the possibilities of studies in this area in evaluating and applying principles of comparative physiology and biochemistry.

"Nutrition and the Anterior Pituitary with Special Reference to the General Adaptation Syndrome" by B. H. Ershoff is an extensive and excellent review in which are discussed the interrelationships between various nutrients and the endocrine glands. The profound and complex effects of nutrients upon the synthesis, secretion, metabolism and the

response of target organs, as well as the converse effects of the endocrine glands on the absorption, utilization, and requirements for specific dietary factors are very well described.

R. Booth and H. de Watteville in "Hormone Assays in Obstetrics and Gynecology" give a critical discussion of the use of hormone assays in gynecological and clinical practice. Specific methods are discussed and not only their usefulness but also their limitations are pointed out. R. P. Ogilvie presents a well organized review of "Experimental Glycosuria, Its Production, Prevention and Alleviation" under the broad classifications of insulin insufficiency, hormones, diet, glycogenolysis and kidney. K. L. Blaxter reviews "Some Effects of Thyroxine and Iodinated Casein on Dairy Cows, and Their Practical Significance." The effects upon the production and composition of milk, and upon the metabolism of the cow are discussed.

The last three articles deal more directly with the metabolism and the effects on metabolism of the steroid hormones. L. T. Samuels and C. D. West review "The Intermediary Metabolism of the Non-Benzenoid Steroid Hormones." Data and conclusions for the metabolism of androgens, progestins and the steroids of the adrenal cortex based upon experiments *in vitro* with various tissues, and also upon *in vivo* studies of urinary excretory products are included. An analysis of the relationship of adrenal cortex action to the central process of energy production of the cell based upon studies of cell enzymes is the subject of the excellent review, "The Influence of Corticoids on Enzymes of Carbohydrate Metabolism" by F. Vejar. The final article, "Steroids and Tissue Oxidation" by R. I. Dorfman, is concerned with steroid-enzyme relationships including effects upon tissue enzyme concentrations and upon specific enzyme systems.

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ROBERT R. BECKER

**The Molecular Theory of Fluids.** By HERBERT S. GREEN, A.R.C.S., Ph.D., D.Sc., Professor of Mathematical Physics at the University of Adelaide; formerly Visiting Professor at the Dublin Institute for Advanced Studies; formerly Member of the Princeton Institute for Advanced Study. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. viii + 264 pp. 16.5 × 23 cm., \$5.75.

There are two general methods of approaching the problem of the liquid state. One is to extend the methods of the solid state. The other is to modify the methods developed for gases. While Professor Green has endeavored to avoid extremes, his methods most nearly fall into the second category. For example, the vector analysis used is an adaptation of that developed by Chapman and Cowling for non-uniform gases. He makes use of the fact that fluid behavior is a consequence of its molecular structure which, in the equilibrium state, is most conveniently described by the radial distribution function. In a flowing liquid, the radial distribution is distorted into an ellipsoidal shape and sufficient knowledge of the distorted distribution would enable one to calculate viscosity. In viscous flow the drag, due to interaction of one flowing layer with its neighboring layers, is lessened by the expansion. This introduces the observed exponential decrease of viscosity with temperature. This treatment is to be contrasted with the relaxation theory of viscosity which arises naturally from regarding the liquid as a giant molecule and flow as analogous to a series of molecular rearrangements. Undoubtedly, both procedures have their special advantages.

Professor Green has written an excellent and interesting book. The notation may trouble the non-mathematical reader, but actually makes the results much more compact. The book presents the theory of liquids with few calculations or comparisons with experimental results. This work should certainly be read by everyone interested in liquid theory.

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HENRY EYRING

**Ferroelectricity.** By E. T. JAYNES. Princeton University Press, Princeton, New Jersey. 1953. viii + 137 pp. 15.5 × 23 cm. Price, \$2.00.

This is the first in a contemplated series of books under the general title *Investigations in Physics* to be published by the Princeton University Press under the distinguished editorship of Eugene Wigner and Robert Hofstadter. The present monograph is an extensive revision of a doctoral thesis presented to the Department of Physics of Princeton University in 1950. Production of the book directly from a typed manuscript has resulted in more than a few stenographic errors.

This work is intended "—to serve as a general introduction to the subject of ferroelectricity and guide to the literature, with review of various theories of BaTiO<sub>3</sub> that have been published—," including the author's own theory. In this reviewer's opinion this objective has in no sense been achieved and the title is definitely misleading. The pamphlet is actually a review of theories of ferroelectricity, and a rather good one. It is unfortunate that the title could not have been "Theoretical Basis of Ferroelectricity." The phenomena of ferroelectricity are sketchily described, the technological applications are ignored. The bibliography is useful and extensive.

There are two statements to which a chemist interested in the field may take exception. The first (p. 52) is that titanium dioxide has a weak temperature independent paramagnetism which may indicate that its electronic structure is not a closed shell arrangement. Both fact and conclusion are erroneous. The second is the statement (p. 68) that the TiO<sub>3</sub><sup>-2</sup> group can have an independent existence as an ion. This view is contrary to that held by most authorities in structural inorganic chemistry.

While this book cannot be recommended as a general introduction to the subject, and although the material is of a nature more often to be found as an article in, say, *Reviews of Modern Physics*, yet it can certainly be said to be useful, perhaps even indispensable, to workers in the field.

NORTHWESTERN UNIVERSITY  
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P. W. SELWOOD

**Substances Naturelles de Synthèse—Préparations et Méthodes de Laboratoire.** Volume IV. By LEON VEL-LUZ, Docteur ès Sciences Physiques (Editor). Masson et Cie, Editeurs, 120 Boulevard Saint-Germain, Paris 6<sup>e</sup>, France. 1952. 165 pp. 16 × 23.5 cm. Price, 1,800 Frs. (Broche); 2,200 Frs. (Cartonne Toile).

The fourth volume of this series contains procedures for the preparation of the following compounds, on a laboratory scale: *d*-pantothenic acid, adermine (vitamin-B<sub>6</sub>), riboflavin (vitamin-B<sub>2</sub>), testosterone, and *dl*- $\alpha$ -tocopherol (vitamin-E). In each instance the starting materials are readily accessible chemicals and a full sequence of intermediates is described. The methods have been selected with care and are fully documented with references to the original literature and with discussions of other methods of synthesis. Photomicrographs of eight compounds are included as a frontispiece.

As in the earlier volumes, important general reactions or methods encountered in the various preparations are included as notes following the experimental procedures. The current volume has notes on the following subjects: the Gabriel phthalimide synthesis, elimination of hydroxyl in the  $\alpha$ -position of a nitrogen heterocycle, the Amadori rearrangement, flavoproteins, a systematic survey of the formation of pyridines by cyclization reactions, and a good section on chromatographic absorption (including laboratory directions for some typical procedures).

It is evident that this volume has been prepared with great care. The typography and format of the book are pleasing and no typographical errors were observed by the reviewer. These volumes will prove to be extremely useful for advanced students in organic chemistry and research workers in the field of natural products.

DEPARTMENT OF CHEMISTRY  
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JOHN R. JOHNSON

**Methoden und Anwendungen der Massenspektroskopie.**

By DR. HEINZ EWALD, Max-Planck-Institut für Chemie, Mainz. Privat Dozent an der Technischen Hochschule München; and DR. HEINRICH HINTENBERGER, Max-Planck-Institut für Chemie, Mainz. Privat Dozent an der Universität Bern. Verlag Chemie, G.m.b.H., Weinheim/Bergstrasse, Germany, 1953. 288 pp. 18 × 24 cm. Price, DM 25.60.

In writing their monograph on mass spectroscopy, Ewald and Hintenberger set forth with the objectives of describing the current state of the art as well as its uses in physics and related fields. The authors state in their preface that the book is directed toward physicists who would or must use mass spectroscopes, to workers in other fields who want to evaluate the possibilities of the application of the methods to the solution of their problems and to advanced students who desire a survey of the field. The authors have attained their objectives by producing a well written volume in which there obtains a reasonable balance between the three aspects of the field, design theory, apparatus construction and applications. In accomplishing their objectives the authors have provided an answer to a question so often presented to the reviewer by novice mass spectroscopists, namely, "where can I find a book on this subject?"

Following a succinct (8 page), heavily documented (82 literature references) history of the development of mass spectroscopy, the authors treat in succession, the production of ions—25 pages, ion optics—55 pages, apparatus—56 pages, mass and abundance measurement—30 pages, and uses—73 pages. Each chapter and in some cases each principal subdivision of a chapter ends with the bibliography appropriate to the chapter or subdivision. The literature coverage appears to extend into late 1951. The quality and balance of the individual chapters may be best described by the statement that a practicing mass spectroscopist will feel that his speciality has been slighted while all other aspects have been fairly treated. The volume is profusely

illustrated—a total of 133 figures, with drawings of construction details, and the paths of ions through various arrangements of fields, circuit diagrams, suggested layouts of equipment including a photograph of an isotope separation laboratory and reproductions of the various kinds of mass spectra.

To the chemist of The United States who now usually buys a commercially manufactured mass spectroscopy the chapter VIII on applications will probably be of greatest interest, and thus for only this chapter will the detailed content be summarized. Under "uses" the authors consider the following subjects, atomic weight determination, isotope separation, nuclear reactions, geologic time and paleotemperature scale determinations, the formation of ions by electron impact, and chemical problems including molecular structure determination, chemical analysis and isotopic tracer techniques. In the construction of each of these subsections of their chapter VIII the authors follow the same general plan—namely, a brief and clear description of the theory involved, followed by one or more examples of actual applications taken from the literature. There are no extended compilations of the mass spectra of substances or of the appearance potentials of ions in mass spectra.

The paper and typography are good but the cover of the volume was not designed for the hard use this book will receive. The handling of one copy associated with the preparation of the foregoing review has resulted in a sad state of appearance of its cover.

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D. P. STEVENSON

**Advances in Carbohydrate Chemistry.** Volume 7. By CLAUDE S. HUDSON, National Institutes of Health, Bethesda, Maryland; MELVILLE L. WOLFROM, Department of Chemistry, Ohio State University, Columbus, Ohio; and SIDNEY M. CANTOR, American Sugar Refining Company, Philadelphia, Pennsylvania (Editors). Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. 1952. ix + 370 pp. 16 × 23.5 cm. Price \$7.50.

Volume 7 of the "Advances in Carbohydrate Chemistry" series continues the general pattern of excellence set by its predecessors. This issue is directed specifically to the student of carbohydrate chemistry but the discussions are so written as to be appreciated by all whose interest is in chemistry and in the scientific method. Each of the eight chapters, individually written by well known investigators in the field, presents a clear, authoritative treatise upon a selected phase of carbohydrate chemistry. The methyl ethers of the aldopentoses and of rhamnose and fucose are presented by R. A. Laidlaw and (the late) E. G. V. Percival. The known chemistry of a new class of hexosan, the 1,6-anhydrohexofuranoses, is discussed by R. S. Dimler; fructose and its derivatives by C. P. Barry and John Honeyman, psicose, sorbose, tagatose and their derivatives by J. V. Karabinos, and the acetals and ketals of the tetritols, pentitols and hexitols by S. A. Barker and E. J. Bourne are each reviewed in detail. Burckhardt Helferich describes the chemistry of glycals. A. B. Foster and M. Stacey present a detailed discussion of the structure and chemistry of the 2-amino-2-deoxy sugars. The final chapter by C. T. Greenwood deals with the size and shape of some polysaccharides as determined by physico-chemical methods. This discussion is most timely in view of the rapid advance made in our knowledge of the components of polysaccharide molecules while at the same time, owing to their amorphous character, we remain uncertain as to the molecular dimensions of the molecules under examination. The present volume further emphasizes the value of tabulated reference tables in providing quick access to the origi-

nal literature. The extent of this service can be judged from the some 1000 citations included in the volume.

It seems appropriate here to express an appreciation of the work done by those who have written for the "Advances" and by those of the editorial staff whose efforts have so ably integrated and set forward the accumulated knowledge in each individual discipline to the date of issue.

THE INSTITUTE OF PAPER CHEMISTRY  
APPLETON, WISCONSIN

E. V. WHITE

## BOOKS RECEIVED

June 10, 1953–July 10, 1953

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J. DUCLAUX. "Collides et Gels." Gauthier-Villars, Librairie du Bureau des Longitudes, de l'Ecole Polytechnique, Quai des Grands-Augustins, 53, Paris, France. 1953. 292 pp. 2.000 fr. (U.S., \$6.03).

A. P. DUNLOP AND F. N. PETERS. "The Furans." American Chemical Society Monograph Series. Reinhold Publishing Corporation, 330 West 42nd Street, New York 18, N. Y. 1953. 867 pp. \$18.00.

S. L. FRIESS AND A. WEISSBERGER (Editors). "Technique of Organic Chemistry." Volume VIII—Investigation of Rates and Mechanisms of Reactions. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1953. 760 pp. \$12.50.

J. A. A. KETELAAR. "Chemical Constitution—An Introduction to the Theory of the Chemical Bond." Elsevier Publishing Company, 402 Lovett Boulevard, Houston, Texas. 1953. 398 pp. \$6.50.

W. PARRISH, M. G. EKSTEIN AND B. W. IRWIN. "Data for X-Ray Analysis. Volume II. Tables for Computing the Lattice Constant of Cubic Crystals." North American Philips Co., Inc., Research and Control Instruments Division, 750 S. Fulton Avenue, Mount Vernon, N. Y. 1953. 83 pp. \$2.00.

W. PARRISH AND B. W. IRWIN. "Data for X-Ray Analysis. Volume I. Charts for Solution of Bragg's Equation." North American Philips Co., Inc., Research and Control Instruments Division, 750 S. Fulton Avenue, Mount Vernon, N. Y. 1953. 100 pp. \$2.00.

J. MONTEATH ROBERTSON. "Organic Crystals and Molecules." Cornell University Press, Ithaca, New York. 1953. 340 pp. \$5.00.

J. C. E. SIMPSON. "Condensed Pyridazine and Pyrazine Rings (Cinnolines, Phthalazines, and Quinoxalines)." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1953. 394 pp. \$12.50; Subscription Price, \$11.25.

CHARLES F. SQUIRE. "Low Temperature Physics." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 18, N. Y. 1953. 244 pp. \$6.50.

RALPH W. G. WYCKOFF. "Crystal Structures," Section III and Supplement II. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1953. Section III, 660 pp. \$14.50; Supplement II, 148 pp. \$4.00.

ENRIQUE V. ZAPPI. "Tratado de Quimica Organica." Segunda Edicion. Libreria "El Ateneo" Editorial, Florida 340—Cordoba 2099, Buenos Aires, Argentina. 1952. *Serie Aciclica*: 2189 pp. 3 Ts.Enc.m\$ 480.00 equivalente: u\$ 35.55. *Serie Ciclica*: 1804 pp. 3 Ts.Enc.m\$ 480.00 equivalente: u\$ 35.55.