

NEW BOOKS.

HANDBUCH DER STEREOCHEMIE. UNTER MITWIRKUNG VON DR. PAUL WALDEN, PROFESSOR DER PHYSIKALISCHEN UND ANALYTISCHEN CHEMIE AM POLYTECHNIKUM ZU RIGA HERAUSGEGEBEN VON DR. C. A. BISCHOFF, PROFESSOR DER ALLGEMEINEN CHEMIE DASELBST. 1060 Seiten und 250 Abbildungen. Frankfurt am Main: H. Bechhold. 1893-4. Price, 34 m.

In 1880, when the writer of this notice attended the most comprehensive course of lectures on organic chemistry at that time given in America, the lecturer devoted a portion of one hour to the subject of "Physical Isomerism." The theory of the asymmetric carbon atom, proposed almost simultaneously by van 't Hoff and Le Bel in 1874, was alluded to as offering a possible explanation of the opposite rotatory powers and the enantiomorphism of the tartaric acids, and was illustrated by two simple tetrahedral models. Nothing more was said, or could well have been said on the subject. At that time the paradoxical isomerism of fumaric and maleic acids was explained by supposing the latter to contain a carbon atom with free bonds, an assumption totally without experimental justification. Attempts to give structural formulas to the rapidly increasing number of isomers among the crotonic and cinnamic acids and allied bodies resulted only in the worst kind of confusion, and it gradually became evident that either the theory of structure was insufficient or the usual experiments relied on to establish the formulas were worthless. By 1887 a large division of organic chemistry was in an almost chaotic condition. The views of van 't Hoff and Le Bel had received but slight consideration, apparently for no other reason than that chemists had concluded that it was impossible to learn anything about the geometrical arrangement of atoms, and therefore that all attempts to explain phenomena on such hypotheses must be worthless. In this year Wislicenus, who had been one of the few to appreciate the possibilities of a "chemistry in space," published his pamphlet, *Ueber die räumliche Anordnung der Atome in organischen Molekullen*. The appearance of this work marks a point in the development of chemistry of equal or even greater importance than the announcement of the benzene theory by Kekulé; less than eight years have passed, and already the geometry of molecules has become the leading

idea in organic chemistry, to the study of which many of the best workers in the organic field are devoting themselves. How long an idea prematurely born may lie dormant is here well illustrated, Wollaston having in 1808 clearly stated the conception of a tetrahedral arrangement of four atoms about a fifth.

How fruitful the new theory has been, it needs only an inspection of the present book to see. A volume of over a thousand pages is largely devoted to the consideration of isomers which can be explained on the hypothesis of geometrical isomerism, and which cannot be explained on any other which has been proposed, and certainly not on the older conceptions of structure. The remarkable discovery of the isomeric cyclohexane derivatives by von Baeyer, and the brilliant work of Fischer on the carbohydrates are not only the direct offspring of this theory, but would have been impossible without it. One of the most striking evidences of rapid progress is that although the two sections of the *Handbuch* appeared in two successive years, the second has appended a supplement of nearly 200 pages, most of which was required to bring the work up to date.

Although the book is divided into a *general introduction* and a *special part*, the reader would err in supposing the latter to be of importance for the specialist only; it contains quite as much of general and theoretical interest as the former. The *general part* (134 pages) is devoted to an historical review of the subject, and in it may be found about every attempt to explain chemical phenomena by space relations. Of the *special part* the first section (296 pages) is devoted to the relation of stereochemical theories to the optical rotation of organic compounds, with a consideration of nearly all known cases. The proteids are omitted, as their chemical nature is not sufficiently understood. The second section (204 pages) treats of geometrical isomerism in a wider sense, and describes all compounds to which the theory may apply, whether they are at present known in more than one form or not, as well as those which while existing in several forms, cannot be explained by the theory as at present developed. The stereochemistry of nitrogen, as exhibited in the oximes and other bodies is fully treated. Both the older nomenclature and that of the Geneva Congress are used, and the classification is the purely artificial, but extremely convenient one used by Richter in his

Tabellen der Kohlenstoffverbindungen. The third section includes a chapter on the formation of rings (124 pages) which while not properly a part of stereochemistry, is valuable as containing a diagram of every kind of ring discovered or supposed to exist, into which carbon enters, as well as many wholly inorganic rings. One wonders what Kolbe would say about the hexa- and hepta-cyclic systems, were he now living. But little is said of the reactions by which these rings are formed, or of the proofs of their structure, but there are full references, which take the place of a broader discussion. This chapter forms a complete "Handbuch der Ringschliessung." Anyone looking up the various benzene theories will find in this work a good directory. The chapter on rings is followed by others on intramolecular transpositions, addition and splitting off of atoms and groups, and the limits of general reactions, in as far as these may be supposed to be influenced by the geometrical structure of the molecule. These constitute one of the most valuable and interesting parts of the work.

The authors are to be commended for having given considerable space to inorganic compounds. Not much was to be said on the subject, as it is still in its infancy; the inorganic ring systems which have an experimental warrant are as yet but few, and these of the simplest nature, and with the exception of a few observations and speculations on sulphur and ammonia derivatives we have yet to see the beginning of a stereochemistry of inorganic bodies. We regard inorganic structure and stereochemistry a promising field for investigators who do not believe that all the laws of chemistry worth knowing can be discovered by the study of carbon compounds only, and who have the courage to strike out in new lines, and the patience to search for new methods. With the view of aiding such pioneers the authors have given in a special chapter a list of inorganic substances occurring in more than one form, which will prove of value to investigators in this field. The list makes no pretension to completeness; we miss, for example, the metaphosphoric acids, some of which may in future prove to be stereoisomers.

A knowledge of stereochemistry has already become essential to a scientific understanding of the carbohydrates, and there are indications that it will play an important part in the chemistry

of fermentation and of the physiological processes. To those who are interested in these branches, as well as to the working organic chemist, and the teacher who is called on to give more than a bare outline of the subject, as well as to every one who wishes to keep up with the development of the science, this work may be heartily recommended.

H. N. STOKES.

A TEXT-BOOK OF ORGANIC CHEMISTRY. BY A. BERNTHSEN, PH. D., DIRECTOR OF THE SCIENTIFIC DEPARTMENT IN THE CHIEF LABORATORY OF THE BADEN ANILINE AND ALKALI MANUFACTORY, LUDWIGSHAFEN-AM-RHEIN; FORMERLY PROFESSOR OF CHEMISTRY IN THE UNIVERSITY OF HEIDELBERG. TRANSLATED BY GEORGE MCGOWAN, PH. D. pp. 596. New York: D. Van Nostrand Co. 1894. Price, \$2.50.

This book is a translation of the fourth German edition, appearing as the second English edition. The usefulness of Dr. Bernthsen's work is indicated by the fact that the fourth edition is called for within the brief space of six years. A comparison of the former and present editions impresses one with the tremendous activity and rapid development that have been going on recently in this field of chemical research. While this edition follows closely the plan of the previous ones, every part has been carefully revised and several chapters have been entirely rewritten, in order to present the most recent knowledge about the subjects considered. Among such specially revised subjects may be mentioned the following: stereochemical isomerism; the determination of molecular weights by physical methods; aldoximes and ketoximes; carbohydrates; ketonic acids, di-ketones, etc.; special benzene formulas; aromatic compounds of phosphorus, etc.; hydrogenized phthalic acids; dyes of the diphenylene-methane oxide, phenazine, oxazine, and thiazine groups; certain naphthalene derivatives; the quinoline and acridine groups; alkaloids, especially the derivatives of tropine; the terpenes and camphors. The system of international nomenclature adopted at the recent Geneva convention of chemists is used in connection with the former names. The book, as a whole, can well be pronounced a comprehensive embodiment of our present knowledge of the essential facts and theories of the organic chemistry of to-day. The author has made a very judicious use of references to original articles which have a historic value. There is a valuable index of nearly thirty pages.