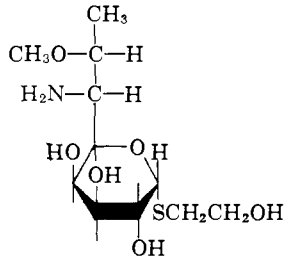
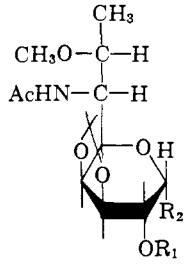
substance. Methylation of the two free hydroxyls of **6** with sodium hydride and methyl iodide in dimethylformamide then gave **4** which was isolated by countercurrent distribution and crystallized.

In the celesticetin series the same group of reactions was used. Hydrazinolysis cleaved the amide and gave β-hydroxyethylthiocelestosaminide, **7**, as a crystalline compound. Acetylation with acetic anhydride in ethanol, followed without purification by treatment with acetone and sulfuric acid, afforded **8**. The latter was noncrystalline but was purified by countercurrent distribution. Raney nickel desulfurization of **8** provided the expected compound, **9**. Methylation by the earlier procedure again led to **4**, isolated by countercurrent distribution. It was identical with the corresponding compound from lincomycin by mixture melting point, analysis, infrared spectrum, and n.m.r. pattern.

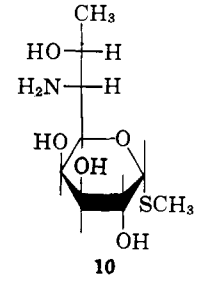


7



8, R_2 = SCH_2CH_2OH, R_1 = H
9, R_1 = R_2 = H
4, R_2 = H; R_1 = Me

The stereochemistry at carbon 1 was deduced by comparison of the n.m.r. of compound **7** with that of the corresponding material, α-methylthiolincosaminide (**10**), obtained from lincomycin. Since the J values of 4.5 c.p.s. for the doublet ascribed to the anomeric hydrogen at carbon 1 are identical for both compounds, and the remaining stereochemistry of the two compounds is the same, the thio grouping must be α as in lincomycin.



10

It is of interest to note that the same octose, substituted differently at three sites, is produced by two distinctly different actinomycetes, and that both substances are active antibiotics. The biosynthetic implications are under investigation.

Acknowledgment.—Grateful acknowledgment is made of the analytical work of W. A. Struck and associates, n.m.r. curves from George Slomp, and helpful advice from F. Kagan.

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THE UPJOHN COMPANY
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H. HOEKSEMA

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BOOK REVIEWS

The Inorganic Chemistry of Nitrogen. By WILLIAM L. JOLLY, University of California, Berkeley, Calif. W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1964. xi + 124 pp. 12 × 24 cm. Price, $5.75.

The editors of the series of monographs of which this volume is a part, state in the foreword that these volumes fulfill the following three functions: (1) a selection of these volumes can be used as a "textbook for an advanced inorganic chemistry course that makes full use of physical chemistry prerequisites"; (2) the series in total constitutes a reference treatise of inorganic chemistry systematized by physical principles; and (3) each monograph by itself represents a specialist's introduction to a specific research field. It is the opinion of the reviewer that the present volume could very well form one of a selected series to fulfill function 1, and that this volume delightfully fulfills function 3, providing as it does an exceedingly attractive introduction to research in the inorganic compounds of nitrogen. The volume is, however, too brief and provides an insufficient number of references to the original literature to serve as an effective reference treatise.

This book is divided into eleven chapters entitled The Unique Features of Nitrogen; Elementary Nitrogen; Ammonia; Nitrogen–Halogen Compounds; the Hydronitrogens and Hydroxylamine; Nitrogen Oxides and Oxy-Acids; Sulfur–Nitrogen Compounds; Phosphorus–Nitrogen Compounds; Carbon–Nitrogen Compounds; Boron–Nitrogen Compounds; Thermodynamics of Nitrogen Compounds. This book is attractively written and reflects the broad experience of the author in nitrogen chemistry. The small size of the volume makes it inevitable that numerous topics which many inorganic chemists would consider important will be omitted, and the reviewer missed seeing some of his "pet" topics. The reviewer found few typographical or other errors.

In view of the modern character of most of the writing, it is a bit surprising to find that the author relapses into the obsolete jargon of the "solvent-system" concept of acids and bases on p. 28 in stating that "such acids (as CH_3COOH) are strong in ammonia." However, such relapses as this are rare. The reviewer is delighted to recommend this very attractive volume to all serious chemistry students as well as to professional chemists generally. Certainly, no inorganic chemist will wish to be without it.

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The Monosaccharides. By JAROSLAV STANĚK, MILOSLAV ČERNÝ, JAN KOCOUREK, and JOSEF PACÁK. Academic Press, Inc., 111 Fifth Ave., New York, N. Y. 1963. 1006 pp. 17.5 × 25 cm. Price, $32.00.

Few, if any, sub-disciplines of organic chemistry are overlapped by more varied interests than the carbohydrate field. Here the physical organic chemist, the biochemist, the immunochemist, and the industrial chemist, as well as a host of

others, find a common ground. Characteristically, a major part of the research in the carbohydrate field is pursued by those whose principal interests lie elsewhere. For this reason, general texts dealing with the carbohydrates play a very important role and, since there are comparatively few such texts, the appearance of a new one of substantial proportions may be regarded as a particularly significant and welcome event. The present volume is a translation, rearrangement, and enlargement of the first edition which appeared in the Czech language in 1960; it is issued by the publishing house of the Czechoslovak Academy of Sciences and printed in Czechoslovakia, distribution in Western Europe and the Western Hemisphere being handled by Academic Press, Inc.

As seems inevitable, the area covered by the present volume is more restricted than is the case with most of the earlier general texts; a companion volume dealing with the oligosaccharides has, however, recently appeared (J. Staněk, M. Černý, and J. Pacák, "The Oligosaccharides," Academic Press, Inc., New York, N. Y., 1964). The organic chemistry of the monosaccharides is covered in a thorough fashion, much of the material being commendably up-to-date. As the treatment is primarily descriptive with extensive tables of carbohydrate derivatives as well as generous references to key papers and reviews, the book will certainly prove highly useful to all those seeking factual information concerning the organic chemistry of the monosaccharides.

The rich variety of the interests represented by the carbohydrate field precludes the possibility that any one volume, even one as generous as the present one, could satisfy all users. The biochemist will find only one chapter, "Synthesis and Transformations of Sugars in Living Systems," specifically devoted to his subject; the younger organic chemists who may regard the modern stereochemical and mechanistic concepts as the common language of organic chemistry will likewise be disappointed. Save for an isolated sub-section on the conformation of the monosaccharides and the rare arrows in formulas, the approach is purely descriptive.

Whatever its faults (and there are, inevitably, many minor ones) we should be very grateful to our Czech colleagues for undertaking such a formidable task. The work which they have produced splendidly supplements the existing general texts and fully deserves a place beside them in specialized and institutional libraries.

There is still a definite need for a general text representing a synthesis of the carbohydrate field in strictly modern terms and published at a price which is commensurate with the purse of the average organic chemist.

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Gas Phase Chromatography. Volume I, Gas Chromatography. Volume II, Capillary Chromatography. Volume III, Tables for Gas Chromatography. By RUDOLF KAISER, Badische Anilin- und Sodafabrik AG Ludwigshafen. Translated by P. H. Scott. Butterworth, Inc., 7235 Wisconsin Ave., Washington 14, D. C. 1963. 14.5 × 22.5 cm. Vol. I: 199 pp. Price, $7.95. Vol. II: 120 pp. Price, $6.95. Vol. III: 162 pp. Price, $7.75.

As the reader can see by the above titles, Kaiser has pretty well covered the field of gas chromatography (GC). Volume I appears to cover the literature through 1959 with an occasional reference to 1960 literature. Volumes II and III appear contemporary covering material published through mid-1961. Scott has done a commendable job of translating the German although occasional inconsistencies are present. Their infrequency attest to a concientious effort.

Volume I.—It occurs to this reviewer that the wide acceptance of more recent GC volumes by Purnell, Littlewood, and others, will limit the appeal of Volume I, with its older literature. However, Kaiser notes that his emphasis is on the technique and apparatus of GC and he does achieve this objective. In fact, the material in these areas is almost encyclopedic and perhaps not as critically selected as it should be. His succinct treatment of theory is notable both for the inclusion of the Jones–Kieselbach rate equation for HETP and for the complete lack of discussion of the significance of its terms. This would seem essential to an understanding of the kinetic column processes. Also, the James and Martin pressure correction (and a modification of it) is said to be of limited validity even though it has been independently derived by Giddings, Kieselbach, Sternberg, and others. An amplification of this statement would have been proper. Kaiser's definition of resolution warrants more general consideration along with an interpretation of its theoretical significance, *i.e.*, its derivation. Also, chromathermography and PTGC are considered separate techniques in the current literature so it is unfortunate that no distinction is made in this volume. On the whole, the treatment of GC theory is basic with a minimum of interpretation.

In the chapter dealing with the column, performance is expressed as the number of theoretical plates per meter which leads to some confusion as one works through equations. Kaiser also notes that, as a rule, high-boiling liquids are separated on short columns and low-boiling materials on long columns. This is somewhat misleading since column temperature can enter into this question, to say nothing of HETP. The practical recommendations for the preparation of columns, however, are correct and lucid, again emphasizing the strong experimental aspect of this volume. The treatment of carrier gases, Chapter 2.2, is excellent with regard to the treatment of needle valves and necessary temperature control to achieve constant flow. Perhaps more details of pneumatic sample injectors (drilling plans, etc.) are included than is warranted (Chapter 2.3) although detectors are very well treated indeed (Chapter 2.4). Kaiser's expression for sensitivity includes long term drift (mv./hr.) in the noise term and this seems unnecessary. This represents the only difference between his and Stross' expression for sensitivity. Chapter 2.7 combines discussion of multi-column operation, trapping, trace analysis, preparatory scale, and process GC. The last is brief but quite informative. The other topics are treated as expected from the pertinent literature. The inclusion of a short section on low-pressure instruments is surprising since the author acknowledges the ineffectualness of this mode of operation.

Analytical interpretation of the chromatogram is covered in Chapters 3.0–3.3. Very little new material is contained in this treatment although a criterion for nearly-superimposed peaks is given as $w \sim t_r n^{-1/2}$ (p. 165). The peak width does vary directly as retention, t_r, only if n, the number of theoretical plates, is a constant. The t_r dependence of the rate equation terms demonstrates this is not the case.

Volume I may be summarized as containing much well-presented apparatus and technique material but falls short on relating basic aspects of rate theory to column performance.

Volume II.—As in Volume I, the author indicates his emphasis on the practical aspects of capillary columns which he feels have been neglected because of experimental difficulties. He properly emphasizes the speed and "resolving" power of capillaries. It must be pointed out that resolving power is temperature, length, HETP, and liquid phase (both kind and loading) dependent and is not unique with capillaries. The author erroneously gives Desty credit for the first capillary chromatogram (1958) when in fact Golay clearly compared capillary with packed columns at both high and low speeds at Lansing (1957), and these chromatograms were published in the proceedings (1958) and patent application. The theory is the Golay–Desty treatment with R. P. W. Scott's interpretations included. The statement that sample size should be limited to that producing 90% of maximum n does not take into account the fact that, in many cases, 70, 50, or even 20% of n is all that is needed for adequate resolution. There is some confusion between K and k (p. 17) and Kaiser notes that k and r cannot be predicted so that K should be used. The fact is that K is most easily derived from k and r.

There is an excellent discussion of small flow measurements for capillary columns, and the section on preparation of capillary columns is extensive and extremely well done. It is highly recommended. The same recommendation applies to the discussion of flame ionization with its excellent literature coverage.

Qualitative analysis by color tests, precipitation tests, methylene insertion reaction, and retention indices is well treated as is the quantitative interpretation. The need to ensure a linear response from the ionization-type detectors was not sufficiently emphasized in this reviewer's estimation. This is the real limitation to quantitative work with capillary columns as Halasz has so well noted.

On the whole, this volume is concise and well worth studying for its content. It should be noted that the author has not complied with the wishes of Perkin-Elmer and Golay to have their