

zero-time exchange unless hexacyanoruthenate(II) ion also was added as carrier. At carrier concentrations of 0.002 *M* the zero-time exchange in several experiments was ~60%, and the half-times of the homogeneous exchange reaction were in the range 2–5 sec. These half-times also are consistent with a specific rate of ~10³ mole/l./sec., if a second-order law is assumed.

The reactions have been separated in the presence of carriers by coprecipitation of the hexacyanoferrate(II) ion with thallium(I) calcium hexacyanoruthenate(II) and with lead(II) hexacyanoruthen-

ate(II). The zero-time exchanges were 85 and 80%, respectively. The progress of the exchange was followed using the latter separation procedure, and the rate observed is consistent with our other measurements.

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RECEIVED MAY 29, 1954

BOOK REVIEWS

Advances in Carbohydrate Chemistry. Volume 8. Edited by CLAUDE S. HUDSON, National Institutes of Health, Bethesda, Maryland, and MELVILLE L. WOLFROM, Department of Chemistry, The Ohio State University, Columbus, Ohio. Academic Press, Inc., 125 East 23rd Street, New York 10, New York. 1954. xvii + 408 pp. 16 × 23.5 cm. Price \$10.00.

The current volume of these "Advances" opens on a sad note—the announcement of the death of its senior editor, Claude S. Hudson, on December 27, 1952. The book represents the final publication under his name and is truly a fitting culmination to his more than fifty years of productive research, writing and editing in the field of carbohydrate chemistry. In fact, Dr. Hudson had spent most of the day before his sudden and unexpected death editing manuscripts for this volume.

Volume 8 maintains the same high standards for its historical and critical reviews that had been set in the earlier numbers. The topics chosen seem to be particularly timely and to be of great usefulness for teachers, research workers and others whose interests lie in many fields of organic, bio and even industrial chemistry. The current issue is introduced by an obituary of Sir James Irvine, whose character and pioneering activities in carbohydrate chemistry have been outlined by E. L. Hirst, of The University, Edinburgh, Scotland.

The "Relative Reactivities of Hydroxyl Groups of Carbohydrates," (44 pp.), by James M. Sugihara, discusses configurational relationships and neighboring-group effects, selective etherification, selective esterification and hydrolysis, and selective oxidation of the hydroxyl groups in carbohydrates.

"The Chemistry of the 2-Desoxysugars" (61 pp.), by W. G. Overend and M. Stacey, describes the occurrence, detection and isolation of these biologically important substances, and then the methods that have been developed for the biosynthesis and chemical synthesis of the sugars, their *O*- and *N*-glycosides, phosphate esters and other derivatives. The relatively simple and inexpensive preparation of 2-deoxy-D-ribose from D-glucose that was announced by Dr. John C. Sowden in September, 1953, appeared too late for inclusion in this review.

"Sulfonic Esters of Carbohydrates" (109 pp.), by R. Stuart Tipson, is an exhaustive and critical treatise documented by about 1200 references to more than 500 original papers. It can be studied profitably by all of us who use "tosyl," "mesyl" or "nasyl" groups in our researches. Individual chapters cover the methods for sulfonylation, physical and chemical properties of the esters, reductive desulfonylation and desulfonyloxylation, the action of alkaline reagents, and the action of alkali metal halides and other salts on sulfonic esters.

"The Methyl Ethers of D-Mannose" (14 pp.), by G. O. Aspinall, continues the systematic cataloguing of the methyl ethers of sugars that was begun in volumes 5, 6 and 7 with D-glucose, D-galactose, the aldopentoses, L-rhamnose and

the D- and L-fucoses. Syntheses and proofs of structure are included.

"The Chemical Synthesis of D-Glucuronic Acid" (19 pp.), by C. L. Mehlretter, and "D-Glucuronic Acid in Metabolism" (25 pp.), by H. G. Bray, form a natural pair of interesting articles. In the former will be found a description of the most satisfactory preparative method to date for D-glucuronolactone, while the latter is concerned mainly with the investigations into the origin of D-glucuronic acid and the mechanism of D-glucuronide formation.

"The Substituted-Sucrose Structure of Melezitose" (14 pp.), by Edward J. Hehre, may be considered an epilogue to the review on melezitose, by C. S. Hudson, that appeared in Volume 2. A major question had been raised by Dr. Hudson concerning the actual presence of the sucrose moiety in melezitose. In this article Dr. Hehre has described his own search for a specific hydrolytic enzyme, his success with several variants of *Proteus* bacteria, and his final isolation and identification of crystalline sucrose from melezitose.

"Composition of Cane Juice and Cane Final Molasses" (24 pp.), by W. W. Binkley and M. L. Wolfrom, summarizes the available data on the carbohydrates, enzymes, vitamins, nitrogen compounds, non-nitrogenous acids, pigments, waxes, sterols, lipids and inorganic components in the expressible juice from sugar cane and in the blackstrap or final molasses.

"Seaweed Polysaccharides" (36 pp.), by T. Mori, concludes Volume 8. Because of the growing interest and use of seaweed in food and industry, the varied carbohydrates derived from these algae have been the subject of many studies. This review deals mainly with the composition and structure of agar, the mucilage of *Dulsea edulis*, carrageenin from Irish moss and the similar mucilages of closely related seaweeds, fucoidin, laminarin and several other carbohydrates from seaweeds. For additional information, particularly on the preparation and industrial uses of these substances, the reader may be referred to the recent book "Polysaccharide Chemistry," by R. L. Whistler and C. L. Smart, by the same publishers (1953).

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Gegenstrom-Verteilung. By H. M. RAUEN and W. STAMM. Verlag von Julius Springer, Berlin W. 35, Reichpietschufer 20, West Berlin. 1953. vii + 81 pp. 15.5 × 23.5. DM. 12.80.

The majority of research workers who will find use for the method of "Countercurrent Distribution" are not particularly interested in the more technical aspects of the method. They will not wish to take time for a major study of this method of separation any more than of the other approaches such as chromatography, distillation, electrophoresis, etc., of which there is now such a vast literature. Yet no separation method can be used to best advantage without a basic

understanding of the principles involved. For this reason a relatively short but clear treatment of the subject is certainly worthwhile. "Gegenstrom-Verteilung" can be recommended to anyone for a basic understanding of the subject. Those interested in the more technical aspects can find ample literature references given for further study.

For the over-all objective of the isolation of substances in a pure state when they are found in complicated mixtures, the successive application of different techniques is obviously the most effective. However, when this is not possible and because of some unique property the highest separating power practical by countercurrent distribution is desired, it will become necessary to pay greater attention to details. Such information could be given only in a much longer account. This is primarily concerned with the analytical details which are presented by the numerous fractions at the end of a run.

Now that mechanical equipment for accomplishing quantitative multiple extractions is becoming readily available, the greatest problem of the method will be compounding of suitable systems. Actual experience with a system is the best means of evaluating it. The authors give a considerable number of systems for various classes of solutes but could have devoted more space to this problem. It is to be expected that as time passes many more systems will be reported. That this will be true is indicated by the great increase in the number of different systems successfully used and given in the literature during the past year.

Drs. Rauen and Stamm have written a very worthwhile review of the subject of countercurrent distribution.

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Theoretische Organische Chemie. Edited by WALTER HÜCKEL, Göttingen. Verlag Chemie, G.m.b.H., Weinheim/Bergstr., Germany. 1953. Teil I, 145 pp, DM 10,-. Teil II, 160 pp. DM 10,-, 15 X 22.5 cm.

These books are reprints, without change, of volumes 34 and 35 of the "FIAT Review of German Science," published previously in 1948. Since most, if not all, of the material here reviewed has appeared in the journal literature, the books are comparable with a compilation of selections from back issues of "Annual Reports on the Progress of Chemistry" with, of course, the greatest emphasis laid upon the work of German chemists. The titles of the nine chapters, and their authors, are: in Part I, General Structural Chemistry and Chemical Binding (W. Hückel), Stereochemistry (W. Hückel), Free Carbon-radicals and -biradicals (F. Seel), and Courses of Reactions (W. Hückel); and, in Part II, Association, Dipole Moment and Surface Tension (W. Hückel), Constitution and Physical Properties (W. Hückel), Absorption Spectra (G. Scheibe), Raman Spectra (J. Goubeau), and Mechanism and Kinetics of polymerization Processes (G. V. Schulz).

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BOOKS RECEIVED

June 10, 1954—July 10, 1954

CARL A. BENNETT AND NORMAN L. FRANKLIN. "Statistical Analysis in Chemistry and the Chemical Industry." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. 724 pp. \$8.00.

WERNER BRUGEL. "Einführung in die Ultrarotspektroskopie." Dietrich Steinkopff Verlag, 16, Darmstadt, Holzhof-Allee 35, Germany. 1954. 366 pp. Brosch, DM 46.-, Geb., DM 49.-.

H. O. J. COLLIER. "Chemotherapy of Infections." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. 248 pp. \$4.00.

FRIEDRICH CRAMER. "Einschlussverbindungen." Springer-Verlag, Reichpietschufer 20, Berlin W 35, West Berlin, Germany. 1954. 115 pp. DM 14.80.

HANS ERBING AND F. HORST MÜLLER. "Kräfte und Strukturen bei Kolloiden." Verlag Dr. Dietrich Steinkopff Darmstadt, Holzhof-Allee 35, Germany. 1954. 174 pp. Kart, DM 26.-.

DAVID N. GREENBERG (Edited by). "Chemical Pathways of Metabolism." Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. 460 pp. \$11.00.

FRANK H. JOHNSON, HENRY EYRING AND MILTON J. POLISSAR. "The Kinetic Basis of Molecular Biology." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. 874 pp. \$15.00.

HAROLD P. KLUG AND LEROY E. ALEXANDER. "X-Ray Diffraction Procedures." John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1954. 716 pp. \$15.00.

J. M. LUCK (Editor), H. S. LORING AND G. MACKINNEY (Associate Editors). "Annual Review of Biochemistry, Volume 23." Annual Reviews, Inc., Stanford, California. 1954. 636 pp. \$7.00.

A. P. VINOGRADOV. "The Elementary Chemical Composition of Marine Organisms." Translated from Vinogradov's original Russian by Julia Efron and Jane K. Setlow, with bibliography edited and newly enlarged by Virginia W. Odum. Sears Foundation for Marine Research, Yale University, New Haven, Connecticut. 1953. 647 pp. \$17.00.

WILLIAM J. WISWESSER. "A Line-Formula Chemical Notation." Thomas Y. Crowell Company, 432 Fourth Avenue, New York 16, N. Y. 1954. 149 pp. \$2.00.

L. ZECHMEISTER. "Fortschritte der Chemie Organischer Naturstoffe," Volume X. (Progress in the Chemistry of Organic Natural Products). Springer-Verlag, Molkerbastei 5, Wien 1, Austria. 1953. 529 pp. Brosch, \$19.00; Ganzleinen, \$19.80.