

the equation $k_1 = k_1^0 (1 + b[\text{LiClO}_4])$, with b equal to 16 and 11, respectively. In these cases, k^0 exceeds k_{ext}^0 substantially, k_1/k_t being 4.1 and 3.9, respectively, with no added salt, decreasing sharply during the early salt additions and subsequently only slowly. Where lithium perchlorate displays the unusually large salt effect it is evidently eliminating a definite substantial portion of, but not all, ion-pair return.

Our interpretation is that two varieties of ion-pair coexist in these cases of acetolysis: (i) the previously² discussed "intimate" or "internal" type consisting of a pair of ions in contact, with no inter-

posed solvent molecules; and (ii) the "external" or "solvent-separated" type, the usual conception of a pair of solvated ions held together by coulombic attraction in a solvent of low dielectric constant. In acetolysis some systems return essentially only from the first of these ion-pair stages (internal return²). Others return also from the second of these stages and here, lithium perchlorate can be specifically effective in preventing such return.

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RECEIVED MARCH 12, 1954

BOOK REVIEWS

Biochemie. Naturforschung und Medizin in Deutschland 1939-1946. Edited by RICHARD KUHN, Kaiser-Wilhelm-Institut für Medizinische Forschung, Heidelberg. Verlag Chemie, G.m.b.H., Weinheim/Bergstr., Germany. 1953. Vol. II, 241 pp. Vol. III, 201 pp. Vol. IV, 318 pp. 15 × 22 cm. Price, DM 15, -, DM 13, -, and DM 17, -, respectively.

These volumes encompass practically every aspect of German biochemical endeavor from 1939-1946. Most of the references may be found in American literature such as "Advances in. . ." series, "Vitamins and Hormones," etc. However, "Biochemie" presents a complete and succinct aggregate of the German investigations, some of which are from journals not appearing in American libraries or reviews.

Particularly noteworthy in volume II are the chapters on "Pflanzliche Giftstoffe" and "Tierische Gifte" by B. Witkop and H. Behringer, respectively. Although "Biochemie der Tumoren" by H. Lettre, "Blastokoline" by F. Moewus, "Immunchemie" by H. Schmidt and O. Westphal and "Serologie" by H. Schmidt are comprehensive, the contents have since been thoroughly covered by American articles. Other chapters on "Radioactive Tracers" by K. Starke and "Electron Microscopy" by G. Bergold seem primitive in the light of present knowledge.

The contents of volume III are unusually well written and informative. "Aminosäuren, Peptide und Proteine" by Th. Wieland, "Polysaccharide" and "Lignin" by K. Freudenberg, and "Sterine und verwandte Naturstoffe" by H. Lettre present thorough coverage of these multifaceted subjects. "Gärungsfermente" by O. Warburg and "Fermente der biologischen Oxydation" by F. Lynen are not only reviews but carefully woven stories of progress in those fields. "Süßmandel—Emulsion und verwandte Carbohydrasen" by B. Helferich is an autobibliography.

In volume IV, U. Westphal's presentation of "Hormone" is scholarly, but studies on pituitary hormones and adrenocortical steroids have advanced so rapidly since 1946 that much of the information is either passé or strictly of historical value. Although "Vitamine" by G. Wendt falls within the latter category, some of the references, especially to enzyme-vitamin interrelationships, are still refreshing enough to be of interest. The same is true of "Wuchsstoffe" by E. F. Möller and F. Weygand. K. Scharrer's treatment of "Agrikulturchemie" read much like an abstract of "Bodenkunde u. Pflanzenernähr."

In general, the photomicrographs, charts and chemical formulas are clearly reproduced and lucid. Certainly these volumes represent excellent reference compilations for both the novice and experienced investigator.

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Les Proteines: Rapports et Discussions. Neuvieme Conseil de Chimie tenu a l'Universite de Bruxelles du 6 au 14 Avril 1953. By Institut International de Chimie Solvay. R. Sroops, Editeur, 76-78 Rue Coudenberg, Brussels, Belgium. 1953. 350 pp. 17.5 × 24.5 cm. Price, 700 Belgian Francs.

The Proceedings of the Ninth Solvay Conference, held at Brussels in April, 1953, have now been recorded in this valuable book on proteins. The inherent interest of the book is enhanced by its prompt publication, only a few months after the conference. It deserves close attention from all who are seriously concerned with modern protein chemistry. The emphasis throughout is on proteins as chemical substances and—in the last two papers—on systems involving enzyme proteins; there is no attempt to discuss the intermediary metabolism of proteins or their role in nutrition.

K. O. Pedersen opens with a paper on the molecular weights of proteins, with special emphasis on recent developments in ultracentrifuge studies, and a critical examination of the sources of some discrepancies in published measurements. An extensive table of recent molecular weight values derived from sedimentation and diffusion is included. Linus Pauling discusses the configuration of polypeptide chains in proteins. This is in many ways the best exposition yet published by Pauling of the structure of the α -helix, the pleated sheets and other related configurations of polypeptide chains. The great importance of these configurations for the understanding of protein structure now appears indubitable. Sir Lawrence Bragg follows with a brief but valuable discussion of recent developments, and current thinking, in the work of the group concerned with X-ray study of proteins at Cambridge. It is perhaps appropriate to remark here that major developments have occurred in the Cambridge laboratories during the last six months—unfortunately too late to be recorded here. J. D. Watson and F. H. C. Crick provide a short note on the stereochemical structure of deoxyribose nucleic acid—one of the most important of recent developments in biochemistry, which has been expounded at greater length elsewhere. A. C. Chibnall gives a critical discussion of the chemical constitution of the proteins, with special emphasis on the development of new approaches to the problem of determining the sequence of amino acid residues in peptide chains. R. L. M. Syge discusses electrophoresis, chromatography and related physical methods in relation to protein chemistry, in a highly suggestive paper which deserves close attention from all who are interested in this field. V. Desreux and E. Fredericq discuss fractionation and purification of proteins. The discussion is relatively brief, considering the vastness of the field, and quite properly lays major emphasis on some of the newest developments in techniques of fractionation. M. L. Anson gives a provocative discussion of

protein denaturation, providing many suggestions for possible future work. K. Linderström-Lang discusses the degradation of proteins by proteolytic enzymes, developing a systematic mathematical analysis for several types of hypothetical model systems and comparing the results with a number of important systems which have been studied experimentally. Even though the mathematical discussion should be regarded as preliminary, this paper goes far beyond any analysis previously attempted, to this reviewer's knowledge. It breaks important new ground and deserves the closest study by all who are concerned with such enzyme-substrate systems. The final paper by Hugo Theorell discusses the relations between prosthetic groups and proteins, with special emphasis on flavoproteins, on pyridine nucleotide proteins and on hemoproteins. Theorell has made major contributions to our knowledge of all these classes of proteins; so it is not surprising that this is a penetrating and admirable survey.

The quality of the whole discussion is uniformly high. Practically every contributor is an outstanding authority in the field which he discusses. Each paper or group of papers is followed by several pages of printed discussion; the discussion is lively and deals with many matters of fundamental importance, so that this constitutes one of the most interesting parts of the book.

The book is well printed, but typographical errors are very numerous. All the papers are printed in English, except one which is in French; most of the discussion is in English also. The typographical errors are probably largely due to the fact that the editor and publishers were working mostly with material in a foreign language. Fortunately, so far as I have discovered, the great majority of these errors are trivial and none is seriously misleading. It is regrettable that there is no index.

The Solvay Council is to be congratulated on the organization of the conference and on the book which has resulted from it. Those who are concerned with the present frontiers of knowledge in protein chemistry will find this book practically essential.

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Fibres from Synthetic Polymers. Edited by ROWLAND HILL, B.Sc., Ph.D., Imperial Chemical Industries, Ltd., "Terylene" Council, Welwyn and Manchester. Elsevier Publishing Company, 402 Lovett Boulevard, Houston, Texas. 1953. xv + 554 pp. 17 × 25 cm. Price, \$12.50.

This volume on purely synthetic fibers (as opposed to regenerated natural fibers or chemically altered ones) is an outstanding work. It is the effort of nineteen authors (including the editor who contributes also a brief historical introductory chapter), all English except for one American (G. H. Fremon) and two German fiber experts. Eleven of the authors are associated with Imperial Chemical Industries, Ltd.

The volume is directed toward the applied polymer scientist. However, fully two-thirds of the book is devoted to the basic aspects of linear polymers. These first thirteen chapters not only furnish authoritative summaries of the present-day chemistry of linear polymers, but also provide a basic conceptual understanding of the properties of synthetic fibers and the processes for making them. The latter are described chiefly in the last seven chapters of the volume.

In addition to basic ideas on polymerization, molecular weight, polymer structure and texture, melting phenomena and solubility, nearly all linear polymer formation reactions, both addition and condensation, are discussed. The technologies of melt extrusion, wet spinning and dry spinning of fibers are reviewed. The final four chapters deal with the properties and applications of synthetic fibers themselves, including their dyeing.

All of the presentations are clearly written and factual. References (including patents) are well selected and form a useful addition to the volume although their order is not always chronological. Particular commendation must go to the editor for the excellent organization of the book and to the authors who have fitted their individual chapters

into one of the best collaborative volumes this reviewer has examined.

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C. S. FULLER

Chemistry of Carbon Compounds. A Modern Comprehensive Treatise. By E. H. RODD, A.C.G.I., D.I.C., D.S.C., F.R.I.C. (Editor). The Elsevier Press, 402 Lovett Boulevard, Houston, Texas. Volume I, Part B. Aliphatic Compounds. 1952. pp. xvii + 779-1462. 17 × 23 cm. Price, \$17.50; to subscr., \$15.00. Volume II, Part A. Alicyclic Compounds. 1953. xxiii + 487 pp. 17 × 23 cm. Price, \$12.50; to subscr., \$11.25.

Two more sections of "Chemistry of Carbon Compounds" are now available, and they exhibit the high standards of coverage and exposition of the first section, reviewed in these pages last year (THIS JOURNAL, 75, 251 (1953)).

Part B of Volume I, which completes the treatment of aliphatic compounds, covers those bi- and polyfunctional compounds not treated in Part A of this volume, and thus contains in addition to systematically developed chapters on less important fields, discussions of sugars and carbohydrates, and amino acids and proteins. Unfortunately the systematic development has not allowed treatment of all the naturally occurring α -amino acids together, tyrosine, tryptophan, histidine and the like being reserved for later discussion. Whether the disadvantages of departing from system to handle all the amino acids together outweigh the advantages of such integral treatment seems to have been settled in favor of systematic handling in this case.

Volume II, covering the alicyclic compounds, is, like Volume I, divided into two parts, the first of which is now available. It contains a systematic development of alicyclic chemistry, beginning with a brief general treatment and proceeding through the various monocyclic systems to polynuclear systems of isolated, condensed, spiro and bridged types. Sections on carotenoids and polymers complete this part of Volume II. (Part B of Volume II will be devoted to terpenes and steroids.) Dr. R. A. Raphael has prepared all but two of the chapters of Part A.

All serious students of organic chemistry will wish to be familiar with these volumes.

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MARSHALL GATES

Biological Transformations of Starch and Cellulose, A Symposium held at The London School of Hygiene and Tropical Medicine on 21 February 1953. *Biochemical Society Symposia* No. 11. By R. T. WILLIAMS (Editor). Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1953. iii + 84 pp. 16 × 25 cm. Price, \$2.25.

This symposium contains clear and concise reviews by E. J. Bourne on the synthesis of polysaccharides similar to amylose and amylopectin by phosphorylases and other trans-glycosidases; by W. J. Whelan on the enzymic hydrolysis of these polysaccharides; and by G. O. Aspinall on the chemistry and chemical degradation of cellulose. These topics have been more fully reviewed elsewhere; the last especially receives very sketchy treatment here, particularly with regard to oxidative degradations. A less familiar note is struck by Helen Porter in an attempt to assess the significance of the starch-forming or starch-splitting enzymes in the living leaf: it has been found that destarched leaves supplied with (say) radioactive glucose and ordinary fructose will synthesize a sucrose in which the two moieties are almost equally radioactive, though the free fructose gains very little activity; this leads to the view that free glucose and fructose are not interconvertible, that they are slowly and with consumption of energy converted into derivatives, probably phosphates, which are readily interconvertible and readily used to form sucrose or (in the case of the glucose derivative) starch. M. V. Tracey's critical review of studies on cellulases is welcome because the literature is so scattered; he points out that the insolubility of