

trum (in KBr) indicated the presence of zwitterion formation.

In accord with this structural assignment, refluxing III for 12 hours in 10% sodium carbonate solution gave rise to N-benzylpyrrole and I.

This represents the first recorded Diels-Alder addition with a pyrrole acting as a diene. We hope

to report shortly on further rearrangements of the adduct and its hydrogenation products.

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BOOK REVIEWS

Organic Syntheses. Vol. 36. By N. J. LEONARD, Editor-in-Chief, John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1956. vi + 120 pp. 15.5 × 23.5 cm. Price, \$3.75.

"Tried and true" directions for preparing 35 organic compounds are reported in Volume 36 of "Organic Syntheses." This volume maintains the high standards of its predecessors in its editing, experimental directions and indexing. The compounds treated range from the very simple, such as propionaldehyde, to the somewhat more complex, such as 2-hydroxycyclodecanone. The editors wisely refrain from including syntheses of very complex compounds, which would have limited applicability and interest.

Probably one of the most useful preparations will be the one for diazomethane from *p*-tolylsulfonylethylmethylnitrosamide. The advantage of this method is that the starting material is stable and soluble in organic solvents.

This new volume will take its place as a worthy addition to the "Organic Syntheses" series, which has for many years been one of the most valuable reference works for the organic chemist.

DEPARTMENT OF CHEMISTRY
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CARL J. CLAUS

The Chemistry of Petrochemicals. By MELVIN J. ASTLE, Professor of Chemistry, Case Institute of Technology, Cleveland, Ohio. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1956. v + 267 pp. 16 × 23.5 cm. Price, \$6.50.

This volume is a valuable source of general information and literature references on organic chemical compounds produced from petroleum. The 14 chapters contain 255 pages of text, many equations and tables of data, and 582 literature references. However, there is no author index and the bibliographies for each chapter are not alphabetically arranged.

The discussion is reminiscent of the books of Carleton Ellis. There is much useful information presented in sufficient detail to introduce the reader to the subject. For example, alkylation is covered in 9 pages, 7 on alkylation of paraffins and 2 on alkylation of aromatics. Two and one-half pages are devoted to the theory of alkylation. This section is based almost entirely on the work of Schmerling. The bibliography omits some important papers in this field, particularly those of Dr. P. D. Bartlett and associates.

The discussion of alkylation with hydrogen fluoride starts off with the statement, "Hydrogen Fluoride is increasing in importance as an alkylation catalyst." There is no mention of the fact that HF alkylation was an important process for producing aviation alkylate during World War II, and that nearly all of these HF alkylation plants were shut down, or converted to other use, at the end of the war. In regard to the Ziegler process (p. 103) for poly-

olefins, it is now more or less generally known that mixed catalyses are better than aluminum alkyls alone.

There are other spots in the text which indicate a lack of familiarity with what has actually been going on in industry. For example, on page 155, a process for concentrating benzene by adsorption is described as though the plant had been built and operated. Actually this process for concentrating benzene by adsorption never got beyond the drawing board stage.

On the scientific side, there is a tendency toward rather loose statements, such as the introductory sentence of chapter 2, which reads, "Inasmuch as petroleum is made up largely of paraffin hydrocarbons, these compounds must be considered to be the ultimate starting materials for the preparation of petrochemicals." Benzene and toluene occur in natural petroleum and have been separated commercially as noted on page 153. It is quite clear that paraffins and cycloparaffins naturally occurring in petroleum are not the "ultimate" starting materials for all petrochemicals. However, it is probably true that on a tonnage basis, the chemicals produced from the paraffin and cycloparaffin constituents of petroleum will probably be more important than those produced from the naturally occurring aromatics in petroleum.

The title of this book illustrates the fact that the word "petrochemical" is better adapted to economic rather than scientific discussion. On page 2 there is an estimate that there will be 35 billion pounds of "petrochemicals" produced in 1956 of which 10.5 billion pounds will be "inorganic petrochemicals." However, the book omits entirely any discussion of the chemistry of the "inorganic petrochemicals" such as ammonia and sulfur.

The word "petrochemical," as used in the petroleum industry, brings together products which are economically related, but not chemically related.

In spite of a certain degree of superficiality, which is perhaps unavoidable in a book covering so wide a range of topics, this book should prove of real value to those who need an introduction to the field of the organic chemistry of hydrocarbons, and the more simple organic compounds derivable from hydrocarbons.

RESEARCH AND DEVELOPMENT DEPT.

SUN OIL COMPANY
MARCUS HOOK, PA.

STEWART S. KURTZ, JR.

Polymer Solutions. By H. TOMPA. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1956. xiv + 325 pp. 10.0 × 16.5 cm. Price \$8.50.

This is a comprehensive review of current concepts of the solution properties of high polymeric substances. The author has wisely omitted a treatment of polyelectrolytes since this is more properly in the domain of electrolyte theory. Throughout, Dr. Tompa compares theory with experimental results. The book is practically self-contained. All the basic formulas of the thermodynamics of solutions and of the statistics of coiled molecules are derived from first principles. When the author discusses

viscosity and light scattering, he explains the theories in physical terms but does not derive the formulas since this would require a much larger book.

The author is to be congratulated for the manner in which he has been able to distil the many complicated theories of high polymer solutions down to their essentials. His style is lucid, and his choice of subjects and the extent to which he discusses them is excellent. This book should be studied by everyone concerned with solutions of synthetic high polymers. Workers in the field are looking forward to the day when the properties of the final plastic can be explained in a thorough-going fashion as can now be done for solutions of polymers.

INSTITUTE OF POLYMER RESEARCH
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Vacuum Deposition of Thin Films. By L. HOLLAND, Head of the Vacuum Coating Research Laboratory, Edwards High Vacuum Ltd. With a foreword by PROFESSOR S. TOLANSKY, F.R.S. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y., 1956. xix + 541 pp. + 25 plates. 15 × 23 cm. Price, \$10.00.

This book is long overdue. Today, vacuum coating is an important industry and no longer just a laboratory procedure, and Mr. Holland's volume will be useful to every worker in the field. It covers all phases of vacuum coating from the point of view of the technologist. This is not a theoretical treatise but a practical volume written by one with adequate theoretical background and wide experience.

The chapters each stand by themselves without any particular continuity or grouping. The first discusses general techniques and equipment used in the production of high vacuum. The many design sketches and detailed explanations will be of value to those designing their own vacuum evaporators and will increase the understanding of others who purchase commercial units. Sources and the thickness distribution of the deposited films are described in chapters 4 and 5. Distribution functions are derived mathematically and numerous graphs depict the experimental results obtained for different sources and receivers of various shapes.

Cleaning of surfaces prior to coating and the techniques for evaporating metals and alloys are discussed in chapters 3 and 6. Problems of reactions between charge and heater and selective evaporation of alloy components are detailed and tested solutions are given.

The difficulties of degassing plastic materials and coating them are treated in chapters 2 and 12. Systems for handling commercial quantities of materials are described and the vacuum properties of plastics and lacquers used for substrates are tabulated.

The properties of deposited films are discussed in detail and the influence of rate of evaporation, substrate temperature, gas pressure, angle of incidence, etc., is evaluated. This information is carried over into a chapter on the preparation of thin films for electrical purposes in the commercial production of resistors, capacitors and electrodes. Separate chapters are devoted to very detailed treatments of the preparation and properties of aluminum and oxide films.

Chapters 9 and 10 are concerned with optical coatings. Methods of preparing anti-reflection films, high reflection films and interference filters are described. Apparatus for controlling the deposition of optical films and the properties of these coatings is given in detail. In a related vein is a section on shadow-casting and surface replication as used in light and electron microscopy. The emphasis here is on the vacuum techniques and apparatus, not on the microscope applications.

The widely used and poorly understood process of cathodic sputtering is the subject of a complete chapter. The various theories are discussed and their disagreements are enumerated. Properties of films produced by sputtering are described and illustrated graphically, and apparatus for sputtering is shown.

The entire book is admirably documented and the bibliography of 557 references is invaluable. However, considering the large number of topics discussed, an expansion of the index would be very desirable. Also, this reviewer would have appreciated a more thorough discussion of the

formation and properties of metallic blacks which are treated only very briefly. Of more commercial interest is the aluminizing of television kinescopes which requires specialized apparatus that might well have been described.

It is to be hoped that subsequent printings will rectify the unusual number of misprints and other minor errors which exist throughout the book, but in no way detract from its value.

RESEARCH DEPARTMENT
CENTRAL SCIENTIFIC COMPANY
CHICAGO, ILLINOIS

R. G. PICARD

Advances in Carbohydrate Chemistry. Vol. 11. By MELVILLE L. WOLFROM, Editor, and R. STUART TIPSON, Associate Editor. Academic Press, Inc., Publishers, 111 Fifth Avenue, New York 3, N. Y., 1956. xviii + 465 pp. 15.5 × 23.5 cm. Price, \$11.00.

Readers of the previous volumes of this series need only be told that the editors, their board of advisors and the various contributors have joined forces to turn out a work of exceptional interest. This book amply demonstrates that the research worker will find those areas of science most rewarding where different fields of specialization overlap. Enzymology, microbiology, physical chemistry and organic chemistry supply the *leitmotif*.

The chapter dealing with the biosynthesis of the monosaccharides will be read by many grateful people. Sixty five tightly written pages cover all the significant work from Adolf von Baeyer's speculations about the polymerization of formaldehyde to the complex realities of enzyme systems and photochemistry currently under investigation. L. Hough and J. K. N. Jones take leave of their readers with a challenging statement:

"More than one hundred enzymes, and many of their coenzymes, have been recognized in animal mitochondria. Whether or not such an organization of enzymes is present in such a cell unit for performing a sequence of reactions with carbohydrates remains to be determined."

F. Shafizadeh's chapter dealing with branched-chain sugars of natural origin is an appropriate sequel. His system of naming these compounds is logical, and it could have been used advantageously in the preceding article.

J. M. Bobbitt focusses our attention on the periodate oxidation of carbohydrates, and he brings into relief the functioning of this analytically important reagent. References to other reviews dealing with periodic acid enhance the usefulness of this chapter. S. Bayne and J. A. Fewster supply a comprehensive survey of the chemistry and biochemistry of the osones, and Andrew Bečlik discusses the biosynthesis, chemical synthesis and properties of kojic acid. G. R. Barker's chapter on nucleic acids supplements and brings up to date the work published by the associate editor, R. Stuart Tipson, in *Volume I* of this series. Aspects of the Physical Chemistry of Starch, and an Addendum: The Size and Shape of Some Polysaccharide Molecules, by C. T. Greenwood point up the functions of physicochemical techniques in the study of the nature of polysaccharides. The descriptive chemistry of furan, pyrrole and other heterocyclic compounds obtained from condensation reactions of monosaccharides with β -ketonic esters is presented by F. García Gonzáles. A generalized cumulative author and subject index to *Volumes 1-10* is included.

There is an obituary of the late Kurt H. Meyer by R. W. Jeanloz. The current crop of students will find much inspiration in the personal life and achievements of the departed. The diversity of his scientific interests and his warm friendliness are movingly described by his former student.

The reviewer may be considered captious in pointing out a few little notes. Why didn't someone do something about: "Observation of mixed melting points is mandatory." Or, "General consensus of opinion"? There are ambivalent feelings toward the typographical pun in a statement dealing with the use of periodic acid: "Aliquots of the reaction mixture are periodically removed." The author who suggests a system for the naming of branched-chain sugars forgets to use it in a couple of places. Some of the charts would have been easier on the eyes if larger type and more space had been used. In the anniversary year of W. H.