

considerable degree of ingenuity displayed in the syntheses attempted.

The Azulenes are the subject of the following two chapters. Work in this area is appropriately and expertly presented by E. Heilbronner and W. Keller-Schierlein of the E. T. H. of Zurich. The LCAO-MO model of Azulene, its electronic ground state and its electronic excited state form the chief topics of discussion of one chapter, while the pathways to the azulenes are described in the second.

Tetsuo Nozoe (Tohoku University, Sendai, Japan) discusses the seven-membered aromatic compounds. Recognition by Hückel, as early as 1931, of the theoretical similarity of the  $C_7H_7^+$  ring and the benzene ring, Dewar's assignment of the seven-membered aromatic system to colchicine and stipitacic acid and the work of Dauben and Doering and their respective co-workers dealing with the synthesis of tropone focused attention on this non-benzenoid aromatic ring system. The citation of over five hundred references is indicative of the attention which this topic has received by Dr. Nozoe. This material is well organized. The last portion of this book is devoted to Cyclooctatetraene (R. A. Raphael, Glasgow University) and to the Cyclopolycylofins (Wilson Baker and J. F. W. McOmie).

There is a fifty page index—author and subject. This book was edited by David Ginsburg of the Israel Institute of Technology of Haifa, and organic chemists are indebted to the editor, authors and publishers for this scholarly contribution.

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**Gas-Chromatographie.** By DR. RUDOLF KAISER, Deutsche Akademie der Wissenschaften zu Berlin, Forschungsgemeinschaft der Naturwissenschaftlichen, Technischen und Medizinischen Institut, Institut für Verfahrenstechnik der Organischen Chemie, Leipzig. Akademische Verlagsgesellschaft Geest und Portig, K.-G., Sternwartenstrasse 8, Leipzig, C 1, Germany. 1960. X + 223 pp. 17 X 23.5 cm. Price, DM., 32. —.

The literature on gas chromatography is enriched by the publication of this brief monograph. The author has set himself practical objectives in the writing of this book instead of following a more or less balanced treatment of the subject, which is already available in other monographs.

Without omitting the essential theoretical principles and without giving a collection of recipes, emphasis is placed on the experimental technique. This is done in a logical and systematic manner and it is complemented with excellent graphical illustrations.

The book is divided into four main chapters preceded by a brief introduction. The first chapter, 20 pages, deals with the theory of the separation process. A succinct exposition of the theory of capillary columns is included for the first time in monographs of this type. The second chapter which accounts for more than 50% of the book, 125 pages, deals with the gas chromatograph as such and it is concerned with the description, construction and function of all the essential and secondary parts of the instrument. Instructions for coating capillary columns as well as for the building of ionization detectors are included. An exclusive section is devoted to special gas chromatographs where high temperature, low pressure and automatic sampling devices are described among other special-purpose instruments.

The third chapter, 34 pages, treats briefly but critically the presentation and interpretation of the analytical results. A few specific applications of the gas chromatographic method to the determination of thermodynamic constants is also given. The last chapter of the book is a useful appendix of 25 pages of tables. Liquid stationary phases and adsorbents used for certain separations, retention volumes of aliphatic and aromatic compounds and Bayer's selectivity coefficients are listed.

The coverage of original papers, conferences and symposia is comprehensive and up-to-date, considering that the book was written in 1959. In addition to Russian and other European publications, a significant amount of unpublished information coming from Dr. Kaiser's own laboratory and his associates is made available. As a whole, the author's own objectives seem to be well accomplished: A practical

introduction to gas chromatography for students of this subject and a useful guide for professionals concerned with problems of instrument design, construction and specific applications.

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**Chromatographie en Chimie Organique et Biologique.**

**Volume I. Généralités. Applications en Chimie Organique.** By E. LEDERER, Professeur à la Faculté des Sciences de Paris. Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1959. xi + 672 pp. 17.5 X 25 cm. Price, broché, 9.000 fr.; cartonné toile, 10.000 fr.

This volume is the first of two which deal, in this series of monographs on organic chemistry, with the rapidly advancing uses of chromatography of all kinds. The present volume is concerned with general principles, techniques and applications to organic chemistry, while the second will be concerned more in the applications to biological chemistry, *i.e.*, the area from which the subject has derived most of its stimulus.

The main idea of this work is "to give to any chemist a complete text which would allow him to effect most of the chromatographic separations, without consulting the original works." To achieve this objective, the editor, E. Lederer, has called upon specialists (19 contributors) who, with him, drew up the 16 chapters of 671 pp. which compose this work. The 19 authors and their addresses are cited at the beginning of the work, which allows the reader, if not satisfied upon any point, to apply directly to the authors in question.

The first part of this work consists of four general chapters which deal with theories of adsorption, ion exchange, partition and gas chromatography, respectively. Another chapter deals with applications of radioisotope techniques in chromatography.

In the second part of the book each chapter deals with the applications of chromatography to some specified class of compounds, namely, hydrocarbons, mono- and polyhydric alcohols, aldehydes and ketones, acids, nitrogen compounds, volatile amines, alkaloids, halogen compounds and synthetic dyes. Finally a chapter deals with the separation of stereoisomers. Since the entire second volume will deal with the classes of physiologically important substances (sugars, phosphate esters, sterols, amino acids, proteins, purines and pyrimidines, pigments, vitamins, hormones, antibiotics, etc., etc.), the classes of compounds dealt with in this volume seem somewhat arbitrarily chosen.

An extensive bibliography consists of references placed at the end of each chapter, and there is both an author index, a subject index, and a table of contents.

The treatment in the chapters which comprise the first part of the book is somewhat uneven. In the chapter on adsorption chromatography, after a brief historical account and a treatment of the theory governing these separations, some technical problems are considered. Factors which influence the separations are dealt with, and an account is given of the main adsorbents used and the solvents. A comprehensive table presents the reagents which may be used to reveal colorless compounds on the chromatographic columns, and for each such reagent there is a bibliography. A table emphasizes the secondary effects that may occur during adsorption chromatography. In this chapter one misses a list showing the manufacturers, or sources, of the different adsorbents which is given in a later chapter that deals with ion exchange materials. For example, one is at a loss to know the identity of "Floridin XXF" or where this naturally occurring silicate may be obtained. The possible effect of resins on the substances chromatographed is mentioned, though somewhat briefly and superficially. Even so, the treatment of partition chromatography dwells on some inconsequential minutiae, *e.g.*, ascending chromatography in tubes is described only to conclude its main use is for demonstration purposes. Similarly, the author dwells somewhat unduly upon the circular chromatographic method which is of relatively little application.

The chapter on gas chromatography will be read with interest. This technique is attractive by its accuracy and by the range of its use. The authors claim that all gases or

compounds that can be volatilized up to 500° can be chromatographed.

While the chapter on radioisotopic technique gives some useful technical information, it hardly seems profitable to describe the preparation of so few isotopically labeled compounds.

Although this may be remedied in the later volume, there seems to be no reference in this work to the method of high voltage paper electrophoresis which has been used so elegantly in conjunction with chromatography in the analysis of the peptides that result from enzymic digests of proteins, *i.e.*, the so-called "finger printing" technique.

The second part of the book contains information upon which the chromatography of different classes of compounds may be attempted. The authors describe the appropriate solvents, reagents, the useful precautions, and state precisely the preferred technique. Very useful features are the very complete tables of  $R_f$  values for the different compounds. For example, the techniques for the separation of sorbitol, mannitol, sucrose, glucose, fructose are clearly given. Similarly, the chapter which deals with phenolic compounds contains helpful information about the separation of such compounds as gallic acid, protocatechuic acid, cinnamic, coumaric, caffeic and homogentisic acids (all of which incidentally are of natural importance and, therefore, also relate to the subject of Volume II). It is surprising that in the chapter on acids the authors describe so very briefly the separation of naturally occurring organic acids. This is the more regrettable since this subject will apparently not be dealt with in Volume II, notwithstanding that it will be devoted to chromatography in relation to biology. But the chapter on separation of stereoisomers is rewarding, as it describes for example the separation of such compounds as allohydroxyproline and hydroxy-L-proline.

A few obvious lapses and misspellings mar the otherwise satisfactory standard of the work. The utility of this work, however, lies in the amount of collected information which is designed to permit investigators to carry out chromatographic separations upon a wide range of compounds. Although the present volume contains much that is useful to this end, Volume II will be awaited with special interest by those who are primarily concerned with the widespread uses of chromatography in biochemistry. Although a number of other handbooks on chromatography are now available, this additional one contains much that will be useful to those who need to know about this rapidly moving field.

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#### Advances in Organic Chemistry: Methods and Results.

Volume I. Edited by RALPH A. RAPHAEL, The University, Glasgow, Scotland, EDWARD C. TAYLOR, Princeton University, Princeton, New Jersey, and HANS WYNBERG, Tulane University, New Orleans, Louisiana, and Rijkswissenschaft, Leiden, The Netherlands. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. ix + 387 pp. 16 × 23.5 cm. Price, \$12.00.

This is the first volume of a projected series of publications in organic chemistry that will provide a critical appraisal and evaluation of new aspects in the process of development, and of novel extensions to well-established methods. It is the intention of the editors to select contributors who have either developed the method described or been actively engaged in the particular field. This objective has been fully realized in the present volume. The editors are supported by an advisory board of twenty distinguished European and American chemists.

The scope of coverage is indicated by the six topics included in the present volume: The Kolbe Electrolytic Synthesis (34 pp.), by B. C. L. Weedon (London); Polyphosphoric Acid as a Reagent in Organic Chemistry (46 pp.), by F. Uhlig (Wiesbaden-Biebrich, Germany) and H. R. Snyder (Urbana, Illinois); The Wittig Reaction (20 pp.), by S. Trippett (Leeds, England); Hydroxylation Methods (45 pp.), by F. D. Gunstone (Fife, Scotland); The Selective Degradation of Proteins (90 pp.), by E. O. P. Thompson (Melbourne, Australia); Optical Rotatory Dispersion and the Study of Organic Structures (110 pp.), by W. Klyne (London).

The individual contributors have been given wide latitude with respect to the style and character of their articles, a practice that is quite appropriate to this sort of publication and has produced highly gratifying results. Some of the subjects are covered in detailed fashion and include typical experimental procedures. In other chapters the subject is surveyed broadly and particular aspects are selected for discussion and appraisal. Each chapter is provided with an extensive, alphabetical list of references and there are also comprehensive author and subject indexes. In general the literature has been covered through 1958, with occasional 1959 citations. The type is clear and the text is free of typographical errors. Structural formulas are used generously and are well reproduced.

Articles of the kind here presented will facilitate and encourage the acceptance and general application of new methods and techniques. This volume sets a high standard of excellence and will prove useful and stimulating to graduate students and research workers in organic chemistry and related fields.

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Progress in Dielectrics. Volume I. General Editor, J. B. BRKS, B.A., Ph.D., Sc.D., D. Inst. P., A.M.I.E.E. American Editor, J. H. SCHULMAN, Ph.D. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960 ix + 312 pp. 15.5 × 24.5 cm. Price, \$11.00.

The intent of this proposed annual series, to judge from the Editor's introductory remarks and the scope of the present volume, is to review developments of both scientific and technological interest in quite a wide variety of dielectric properties. This volume contains seven review articles by British and American authors. About half the book is concerned with dielectric breakdown effects. (1) J. H. Mason discusses breakdown in solids from the viewpoint of the insulation designer who must necessarily consider the problem in its broadest sense: the nature of breakdown in a number of practical insulating materials, the influence on dielectric strength of temperature and mechanical stress, the role of gradual deteriorative effects, the subtleties of practical testing procedures, and similar topics. (2) In crystals, the incipient stage of high-field breakdown is frequently characterized by the formation of visible paths oriented along particular crystallographic directions. J. H. Davison reviews the extensive experimental and theoretical studies of such directional effects, which range from a general tendency toward breakdown in some one direction to the formation of intricate "star patterns." These studies have been most fruitful in furnishing insights into the basic mechanism of breakdown in solids. An interesting by-product of the experimental technique is the use of the star patterns, which can be obtained simply and easily, as a direct visual tool for identifying the symmetry of complex crystals. (3) Breakdown in liquids is discussed by T. J. Lewis, with emphasis on the mechanisms of field-induced conductivity. The primary processes are field-enhanced electron emission from the cathode, by the Schottky mechanism or some closely related process, followed by avalanche multiplication in the liquid. Lewis reviews the current development of the analytical theory of these basic processes, in an experimental context of recent investigations of conduction and breakdown in hydrocarbons, in which sufficient control of the experimental conditions (extremely pure samples, reproducible electrodes, etc.) has been achieved to permit systematic comparisons of experiment and theory. (4) T. W. Liao and R. E. Plump discuss several practical aspects of the use of gaseous dielectrics, chiefly electronegative gases such as SF<sub>6</sub> in which a high cross-section for electron capture inhibits the growth of avalanches and results in a high dielectric strength. A number of gases are compared in such properties as dielectric strength, thermal and chemical stability, and efficiency of heat transfer. The multiatomic gases are particularly useful in this latter respect both because of high molecular heat capacity and a high absorption coefficient for thermal radiation.

The much abbreviated descriptions above give a rather inadequate idea of the impressive quantity, and the high density, of information that the articles contain. The