

Book Reviews*

Synthetic Dyes in Biology, Medicine, and Chemistry. By E. GURR (Michrome Laboratories, London). Academic Press, London and New York. 1971. viii + 807 pp. £ 11.00.

This book is a compendium of nearly 500 dyes and colorants, selected from the standpoint of "dyes as colored organic chemical reagents." Outside of a short introduction, the content consists of a one- or two-page description of dyes, arranged in a logical group based on structure and chemical function. For each are given its electronic absorption curve (325–700 nm), its structure, solubility in fifteen different solvents, and a paragraph on its use and significance. All the dyes are also listed in two tables, one in order of wavelength of maximum absorption, the other in order of ionic or molecular weight. There is an eight-page list of references, but one gathers that much of the information given is original with the author. There is an author index, a general index with such entries as "Billiard table cloth", "cadavers, cosmetics for", "fluorides, reagents for", as well as the names of the dyes themselves.

The general emphasis is suited to the biologist and medicinal chemist, to whom the book would appear to be highly useful, but it should also be of considerable use in industrial research and development.

Antimicrobial Agents and Chemotherapy, 1970. Edited by G. L. HOBBS. American Society for Microbiology, Bethesda, Md. 1971. xi + 545 pp. \$15.00.

This is a serial publication in book form, and it contains the papers presented at the Tenth Interscience Conference on Antimicrobial Agents and Chemotherapy, which was held in October 1970. There are 102 papers in it, each of which is written in conventional journal style and reports original research. It is stated that the contents are regularly abstracted by *Chemical Abstracts* and *Biological Abstracts*. The papers range in subject matter from "Structure of Cinerubine" to "Holy Cross Football Team Hepatitis Outbreak." Author and subject indexes complete the volume.

Plastic Deformation of Polymers. Edited by A. PETERLIN (Research Triangle Institute). Marcel Dekker, Inc., New York, N. Y. 1971. xiv + 299 pp. \$17.50.

This book contains the papers presented at a symposium organized within the Division of Polymer Chemistry at the American Chemical Society Meeting in September 1969. There are fifteen papers, some of which are as short as 8 pages. They are not review papers, in general, but are reports of original research, and contain experimental sections. This fact raises the question of the appropriateness of reporting original research in this way, rather than by conventional journal publication. On the one hand, such results are likely to escape abstracting and indexing, and thus to become lost to search and retrieval processes; on the other hand, if the work is actually published in journals, book publication is redundant. Such books also generally lack comprehensiveness and cohesion.

There are short bibliographies and many excellent illustrations, but unhappily, no index is to be found. Did the publishers perhaps have misgivings about their commitment to publish the symposium and feel that it was not worth the cost and effort of indexing?

Chromatographie, Synthèse et Réactivité. By G. VERNIN. Dunod, Paris. 1970. xi + 211 pp. 39 F.

This softbound book is a laboratory manual and contains a series of experiments, each with a short bibliography and a theoretical discussion.

La Synthèse des ARN et Son Rôle dans le Développement Primitif et la Différenciation de l'Embryon. Edited by E. WOLFF (CNRS and Collège de France). Gordon and Breach, Paris, London, and New York. 1971. xiii + 152 pp. \$14.50.

This small book is Volume 2 of a series "Cours et Documents de Biologie," whose intended audience is the intermediate student and the researcher. The editor states that the title could have been "Essays in Molecular Embryology." There are eight chapters by as many authors, dealing with such subjects as synthesis of RNA *in vivo* and control of embryonic development. There is an author index but no subject index—a strange omission!

Colloidal and Morphological Behavior of Block and Graft Copolymers. Edited by G. E. MOLA (The Dow Chemical Co.). Plenum Press, New York, N. Y. 1971. xv + 327 pp. \$14.50.

One of the goals of applied polymer science has been the preparation of polymers of controlled structure, with these structures being designed by the chemist to yield materials having desirable properties for specified uses and applications. Two general types of polymers which have been investigated with this goal in mind are "block" and "graft" copolymers. In the first type, relatively long sequences made up of the same chemical unit alternate along the chain while in the second, chains consisting of one type of unit are attached to the backbone of a chain made up of units of another type. When these sequences or chains are of sufficient length and of sufficiently different chemical structure, the copolymer frequently exhibits colloidal behavior. For example, some of these materials form nonaqueous sols or act as emulsifying agents. Of probably greater interest, however, is the fact that these copolymers frequently undergo microscopic phase separation in the solid state, and, furthermore, the resulting materials often have very desirable properties. Under some conditions of preparation they are tough plastics of high impact strength; under other conditions, they are "thermoplastic" elastomers which have the following extremely interesting property. If one of the sequences is glass-like (e.g., the styrene sequences in styrene-butadiene block copolymers), these sequences aggregate into regions which act as temporary cross links within the elastomeric (butadiene) matrix. The possibility of destroying and re-forming these cross links by simply changing the temperature gives these elastomers a moldability not shared by typical vulcanizates, which contain permanent, chemical cross links. These unusual properties have inspired a great deal of research on such materials, and an American Chemical Society Symposium on this topic in 1970 has provided the articles for the book under review.

The twenty-three articles included in the book cover a wide variety of topics in the area specified. Not surprisingly, there are quite a few contributions dealing with the study of the morphology of these copolymers in the solid state, by electron microscopy and measurements of infrared dichroism and light-scattering intensities. Similarly emphasized are the mechanical properties of the solid materials, including copolymers containing ionic aggregates. Their synthesis and dilute-solution properties are also given considerable attention, as are their emulsifying ability and their properties in colloidal dispersion. Miscellaneous topics include the thermodynamics and general theory of the phase separation, the multiphase properties of membranes, and the behavior of blends of such copolymers with homopolymers. Discussions by the contributors and audience at the Symposium have not been recorded, but an adequate index to the topics has been included.

In my opinion, this is a useful and timely book. The research reported is quite current; publication has been prompt, thanks to the use of the photo-offset method on the original manuscripts provided by the authors. Much of the material covered is essential to workers in this research area, or to anyone simply interested in learning more about the properties of these unusual materials.

It should perhaps be noted that since these papers resulted from a symposium sponsored by the Polymer Division of the American Chemical Society, approximately 90% of this material has, in a sense, already been published elsewhere ("Polymer Preprints," published by the Polymer Division, ACS). In fact, three papers presented at the Symposium and included in "Polymer Preprints" are not included in the present collection. All of these papers were therefore available in essentially the same form almost a year ago, and at only a small fraction of the cost of the present volume.

J. E. Mark, *The University of Michigan*

Proceedings of the 3rd Symposium on Coordination Chemistry. Volume I. Contributed Papers. Edited by MIHÁLY T. BECK. Akadémiai Kiadó, Budapest. 1970. 525 pp. \$14.40.

This paperback contains an advance publication of the full text of the 48 contributed papers. A second volume is to contain the text of the lectures and the discussion material. This symposium dealt with the coordination chemistry of mixed ligand and outer-sphere complexes. The topics covered include five papers on solvent effects, four each on stability constants and Mössbauer

*Unsigned book reviews are by the Book Reviews Editor.

effects, three on kinetics, and two each on catalysts and nmr. References are included with each paper. There is no index.

David Badger, *Geneva College*

The Analysis of Air Pollutants. (A translation of *Die Analyse der Luft und ihrer Verunreinigungen in der freien Atmosphäre und an Arbeitsplatz*). By W. LEITHE. (Österreichischen Stickstoffwerke A. G.). Translated by R. KONDOR, Israel Program for Scientific Translations. Ann Arbor-Humphrey Science Publishers, Ann Arbor and London. 1970. x + 304 pp. \$18.75.

This book was originally written as a broad survey of the problems and methods of analysis of air pollutants. As published in German in 1968 it fulfilled its purpose. An eight-page addenda by the author has been added to the English translation along with an additional bibliography including references to the literature of 1969. The field of pollution analysis is expanding so rapidly, however, that the translation is a bit dated and of course does not include information pertaining to 1971 United States federal air standards.

While intended for readers with a background in analytical chemistry, this book can and does serve as an introduction to the field. An index is included and over 300 recent references are cited. In general, for each pollutant, the author reviews the possible methods of analysis and presents a detailed description of the most useful. He distinguishes between long-term procedures and individual determinations. This book would be a valuable addition to the library of anyone interested in air pollution.

David Badger, *Geneva College*

Gel Permeation Chromatography. Edited by KLAUS H. ALTGELT (Chevron Research Co.) and LEON SEGAL (Southern Regional Research Laboratory, U.S.D.A.). Marcel Dekker, Inc., New York, N. Y. 1971. xvii + 646 pp. \$24.75.

This is a collection of 43 papers originally presented in a four-day symposium organized jointly by the Divisions of Petroleum Chemistry, Analytical Chemistry, and Cellulose, Wood and Fiber Chemistry of the American Chemical Society for the 159th National Meeting at Houston, Texas, in February 1970. They subsequently appeared in various issues of *Separation Science* in 1970-1971. Many of the 66 authors are associated with industrial laboratories; a few are from universities and branches of the U. S. government. Apart from three from the University of Mainz and two from the British Petroleum Co., Ltd., all are from the United States. The papers are organized into four groups as follows: a fundamental introduction consisting of seven papers, four reviews of theory and evaluation methods for GPC, thirteen papers on new developments, and nineteen discussions of applications of GPC to problems in polymer and petroleum chemistry.

The rather basic and straightforward introductory papers provide an excellent background for the more sophisticated reviews of theory and applications. A broad range of applications of GPC in the study of synthetic polymers, natural fibers, and petroleum fractions is presented. One paper presents a summary, with a guide to relevant literature on the techniques and applications of gel filtration chromatography so widely used by biochemists.

In general the papers, though short, appear to be authoritative; certainly they are clearly and concisely written. They include a wealth of figures and tables and are well-referenced to pertinent literature through 1969. Clearly the strong point of the book is the breadth of theory and application included in a single volume.

Robert Jenness, *University of Minnesota*

Advances in Physical Organic Chemistry. Volume 8. Edited by V. GOLD (King's College, University of London). Academic Press, Inc., London. 1970. x + 426 pp. £ 6.75 (\$20.00).

The newest treatise in this physical organic series contains four widely diversified subjects, each of which has been presented in a clear and concise manner by prominent or leading figures in their fields. The bibliographies are generally complete through 1968, with an occasional later reference.

The first two articles deal predominantly with the study of reactive intermediates. Chapter One, by Bennett, Mile, Thomas, and Ward, reviews the generation and reaction of free radicals which have been formed at low temperatures using a rotating cryostat. The principles and construction of this cryostat, as well as its use in simple systems, are briefly described. Chapter Two, by Cacace, examines gaseous carbonium ions formed from the decay of tritiated molecules through mass spectrometric techniques.

Chapter Three, by Bentley and Johnstone, describes the mechanistic and structural problems in mass spectrometry. Elementary

knowledge of mass spectrometry is assumed, although a list of introductory books is included in the bibliography. The authors discuss classification of mass spectral processes and then show the relationship with other chemical processes, e.g., pyrolysis reactions, photochemistry, radiation chemistry, and carbonium ion chemistry.

Chapter Four, by Fendler and Fendler, canvasses the kinetic and mechanistic implications associated with micellar catalysis in organic reactions. This chapter provides the necessary background, albeit brief, as well as cites the principal books and reviews in the field. The literature references contain more recent dates with many 1969 and some early 1970. These authors give an excellent review of the subject, thus acquainting the neophyte to the potential applications in mechanistic physical organic chemistry.

Not only will this treatise simply add a Volume 8 to an ever-increasing number of books in this Advances series, but it will also be a valuable addition to any chemist's library.

George R. Newkome, *Louisiana State University*

Free-Radical Substitution Reactions. By K. U. INGOLD (National Research Council of Canada) and B. P. ROBERTS (University College of London). Wiley-Interscience, A Division of John Wiley & Sons Inc., London, England. 1971. vii + 245 pp. \$11.95.

Free-radical chemistry has come of age as the importance and utility of these interesting chemical species have become appreciated in numerous scientific fields. The study of free radicals can be divided into three periods. The first, which ended with World War II, saw the conclusive proof that free radicals exist both in the gas phase and in solution, and culminated with the successful development of a process for the manufacture of synthetic rubber for automobile tires.

The second period might be dated from the World War II years to 1957 when Walling's monograph appeared. Up to the publication of this book, there were few reviews of radical chemistry, and Walling's authoritative, mechanistic organization of the field captured chemists' imaginations.

The current period has seen an enormous flowering of research on free radicals. A large number of books now are available—the past two years alone has seen the publication of another textbook and four volumes of the "Advances" type. Numerous excellent monographs dealing with oxidation, radiation chemistry and biology, oxygen toxicity, electron-spin resonance, and preparative radical chemistry have been published. Several important books have been announced as in press, including a multiauthored monograph which will update Walling's book and a two-volume work on free radicals in molecular biology. The researcher who enters the free-radical field today can obtain help from a substantial and effective array of excellent reviews and books.

The book being reviewed here contributes importantly to this trend. Keith Ingold and Brian Roberts, a coworker of Alwyn Davies, have produced a novel and sophisticated book. The displacement reaction is the most common reaction which radicals undergo. (The addition reaction runs a close second.) The authors take as their aim the mechanistic organization and analysis of radical-displacement reactions, with the emphasis on those reactions which occur at covalently saturated, multivalent atoms. By restricting their attention to displacement at multivalent atoms, the authors eliminate from their review the vast literature on hydrogen or halogen abstractions, except when these reactions occur in special contexts. Thus, the book is narrower in scope than a monograph on the displacement reaction would demand; at the same time, it is a more manageable survey of the displacements at polyvalent atoms on which the authors wish to focus. This field had not previously been reviewed.

The book is organized according to the groups of the periodic table, and it is interesting to examine the distribution of the pages among the various elements. It might come as a surprise, for example, that about one-sixth of the book deals with group II elements; a like number of pages covers group IVA. By far the largest number of pages, almost one-third of the book, deal with group VIA, largely reactions at oxygen and sulfur.

The book is authoritative and critical, and the discussions on mechanisms are presented with clarity and insight. The literature survey is extremely thorough in the organic and organometallic areas; it is less so in the polymer field. Surprisingly, there is no subject index; this treasure trove badly needs it.

The experienced researcher will enjoy this book and will find much food for thought here; the neophyte will gain mechanistic insights. It is a pleasure to welcome this work to the literature on radicals.

William A. Pryor, *Louisiana State University, Baton Rouge*