Book Reviews*

Friedel-Crafts Chemistry. By GEORGE A. OLAH (Case-Western Reserve University). Wiley/Interscience, New York, N. Y. 1973. 581 pp. $19.50.

Nearly ten years ago, a four-volume work, "Friedel-Crafts and Related Reactions," was published under the editorship of Professor Olah; now he has taken five chapters from that work and has added two more to make a single-volume survey of one of the most widely used reactions in organic chemistry.

The book begins with a delightfully written historical introduction, which gives much information about the men Friedel and Crafts, and includes reproductions of pages of their research notebooks recording some of their representative observations. The original chapter on Scope and General Aspects is followed by a new one on Recent Advances (1965–1972) containing 187 references. Unfortunately, the printer has set this chapter with the wrong running head (that of Chapter IV) throughout. This is only a minor irritation, but it does confuse matters when one riffles through the pages seeking this or the next chapter.

The original chapters on Catalysts and Solvents, and on Reactivity and Selectivity, then follow, and are augmented by a substantial new chapter with 136 references on Mechanistic Aspects. The original chapter on Practical Applications and Future Outlook closes the text and is followed by an 11-page index.

This book is likely to become a useful reference that many chemists will wish to buy for their personal libraries. They will find many topics beyond the strictly classical scope of the Friedel–Crafts reaction knowledgeably discussed (*e.g.*, halogenation, nitration). Although there are very many tables, comprehensive lists of examples of the reaction with yields such as are found in "Organic Reactions" are not among them. This is in keeping with the evident aim of the author to provide detailed insight, rather than encyclopedic detail.

Organic Syntheses. Volume 53. Edited by ARNOLD BROSSI. John Wiley & Sons, New York, N. Y. 1974. xiv + 193 pp. $10.50.

The latest volume continues the tradition of providing detailed descriptions of checked preparative methods for significant compounds, and also shows that the editors are concerned with keeping abreast of the times. Notes on safety and potential hazards abound, and spectroscopic and chromatographic methods for monitoring quality and identity are more noticeable. Compounds not of themselves of so much interest are included when their preparation demonstrates an advance in method, such as the preparation of cholestane by a modified Clemmensen reduction, and the preparation of 1-methylcyclohexanol by oxymercuration of cyclohexene followed by reduction with sodium borohydride.

There is an unusually large number of diazoalkanes in this volume; the directions for dideuteriodiazomethane should be particularly well received. A number of selective reductions, involving such reagents as sodium cyanoborohydride, lithium aluminum tri-*tert*-butoxyhydride, and diborane, are described. Taken altogether, the preparations adequately maintain the status of the series as an indispensable aid to the organic chemist.

Proteins—Structure and Function. By ALBERT LIGHT (Purdue University). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1974. viii + 165 pp. $6.95 paper.

The author states in the preface that the "elucidation of the amino acid sequence of the protein molecule is the particular aspect of protein chemistry that exists as the underlying theme" of this text. This is a fact.

In Chapter One he talks about Basic Principles of Protein Chemistry. He does not go into the chemistry of the individual amino acids, and this is in line with his prefacing statement that "the material is written at a level which presupposes an adequate undergraduate preparation in chemistry." After chapters on Purification of Proteins, Molecular Weight Determinations, and Amino Acid Analysis, he uses Chapters Five through Ten to cover various techniques of sequence analysis. Finally, in Chapter Eleven, he covers Structure Function and the Molecular Evolution of Proteins.

Although he chooses to follow sequence determination as an underlying theme, he does not give specific experimental details. He does include a short bibliography at the end of each chapter, but almost all of the items included are other texts or review articles. The major utility of the text would seem to be as a resource material for someone attempting to enter the area, but, unfortunately, along these lines, the author does not reference the specific topics he covers.

Still, the book should serve as a useful assembly of information for the student of protein chemistry, or to someone else unfamiliar with the topic but wishing to get into this area in his research program.

The text is not comparable to the "Structure and Action of Proteins" by Dickerson and Geis, and would not serve as a replacement for the latter as a supplemental text in the reviewer's biochemistry course. However, the two together would serve to give a thorough introduction to protein chemistry.

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Carbohydrate Chemistry. Volume 6. A Specialist Report. By J. S. BRIMACOMBE (University of Dundee). The Chemical Society, London. 1973. xii + 620 pp. £8.00.

This specialist periodical report published by the Chemical Society in London reviews the literature in carbohydrate chemistry from mid-January, 1972, to mid-January, 1973. The team of carbohydrate chemists from Britain and New Zealand headed by Professor Brimacombe which compiled this comprehensive report has done an excellent job in summarizing 3,330 papers. A difficulty inherent in a work like this is the presentation of seemingly unrelated topics in an interesting, pleasant-to-read manner. The authors surmounted this difficulty by emphasizing what they considered noteworthy achievements, while refraining from making sweeping generalizations on trends in carbohydrate research.

The report is divided into two parts; the first deals with mono-, di-, and trisaccharides and their derivatives, and the second with macromolecules. Part I, somewhat shorter, is written in 182 pages arranged in 27 chapters while Part II, which reviews macromolecules, contains 8 chapters and more than 400 pages. Part I starts with an introduction followed by six chapters on the free sugars and their oxygen derivatives, and five chapters on halogen-, nitrogen-, and sulfur-containing sugars. The deoxy and unsaturated derivatives are then discussed, followed by the branched chain and aldehydo sugars, the inorganic derivatives, and the cyclitols. The chapters on antibiotics and nucleosides treated next are of particular interest since they deal with areas in which significant progress has been achieved during the year. Thus, the total synthesis of the antibiotics gougerotin, plasticidin S, and kasugamycin is reported as well as the synthesis of numerous nucleosides of potential chemotherapeutic interest. Recent advances in instrumental analysis are discussed beginning with the application of proton, ^{19}F, and ^{13}C nmr spectroscopy to carbohydrate chemistry, followed by discussions of ir, mass spectrometry, X-ray crystallography, polarimetry, and finally separatory and analytical methods. Part I ends with a short chapter on alditole which might better have been presented earlier, possibly before the discussion of the instrumental methods.

There is a distinct difference between Parts I and II of this report, both in style and in arrangement, probably because both parts were compiled by different teams of reporters. Part II is divided into eight chapters which are much longer than the chapters in Part I. After a brief introduction and a chapter on the general methods of analysis and structural methods, the polysaccharides are treated in three chapters, one on plant and algal polysaccharides, another on microbial polysaccharides, and one on glycoproteins, glycopeptides, and animal polysaccharides. This last is by far the longest of the three chapters because of the sustained interest in this field. An extensive chapter covers the isolation and activity of various hydrolytic enzymes including the lysozymes which are of special current interest. Glycolipids and gangliosides are discussed in detail, and there is a long chapter on the chemical synthesis and modification of oligosaccharides, polysaccharides, glucoproteins, enzymes, and glycolipids.

This report, like the preceding five volumes in this series of Specialist Reports, will be extremely useful to researchers in carbo-

* Unsigned book reviews are by the Book Review Editor.

hydrate chemistry as well as to chemists interested in nucleosides, antibiotics, and macromolecules, enabling them to cover the literature in a given year quickly and thoroughly. This particular volume which shows certain improvements in format and arrangement over the previous ones is divided into enough chapters and subsections to enable the reader to reach quickly any subject of interest. The reporters and the Chemical Society are to be commended for this highly successful effort.

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Modeling Crystal Growth Rates from Solution. By MAKOTO OHARA (Yoshitomi Pharmaceutical Industries, Ltd.) and ROBERT C. REID (Massachusetts Institute of Technology). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1973. viii + 272 pp. $19.95.

This little book is a critical survey of several model theories on crystal growth from solution. It does not treat any developments since 1970, and may be essentially the same as the Sc.D. thesis of the same topic which Ohara, under Reid's direction, submitted to MIT in 1970. A cursory literature search of the period from 1970 to 1972 revealed a few articles which might well have been covered by the authors, so that the book cannot be considered completely up-to-date. This is of course common, but since the book did not appear until 1973 and is apparently produced by a photo-offset process directly from the typed manuscript, such a time lag seems excessive.

The main body of the book consists of seven chapters, one of which is devoted to comparisons between theory and experiment. Four types of theories are treated, each being classified by the nature of the assumed rate-determining step: two-dimensional nucleation theories, bulk diffusion theories, surface diffusion theories, and probabilistic theories. Theories dealing with crystallization from the melt are not included. Each theory is examined in some detail, with emphasis on underlying assumptions and mathematical derivations, but with much of the mathematical detail relegated to appendices, which constitute almost half of the book. In some cases, the authors provide further refinements or developments of the theory being discussed. There is no attempt made to provide an exhaustive survey of the literature of crystal growth theories, with reference being made primarily to the important articles which introduced new model theories.

The book would serve reasonably well as an introduction to the present theory of crystal growth, and since crystallization is a very important operation in many parts of the chemical process industry, it should prove useful for background information to chemical engineers who are interested in practical applications of crystallization. The writing is relatively clear in most parts of the book except for a few minor but annoying grammatical errors. The price of the book will likely preclude purchase by individuals, but the possibility exists that one could obtain nearly the same treatment by purchase of a copy of Ohara's thesis.

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Advances in Radiation Chemistry. Volume 3. Edited by M. BURTON and J. L. MAGEE (University of Notre Dame). Wiley-Interscience, New York, N. Y. 1972. ix + 297 pp. $19.95.

Radiation chemistry is an unusually broad field, and this series serves to bring together the diverse disciplines subsumed under its heading. Volume 3 performs the function well, with four chapters of roughly equal length (65 ± 20 pages and 190 ± 20 references apiece). The first two chapters dilate upon themes introduced in previous volumes of the series: "Short-Lived Transients" by P. K. Ludwig and "Some Topics in Radiation Chemical Synthesis of Organic Compounds" by I. V. Vereshchinskii. The chapter by Ludwig covers experimental techniques and results in the examination of intermediates with lifetimes in the range 10^{-6} to 10^{-11} sec, with as much discussion devoted to photochemical studies as to pulse radiolysis. Vereshchinskii's chapter surveys fifteen classes of radiation initiated and induced organic reactions, a few of which have potential utility, and reviews several dozen articles in the Russian literature.

The last two chapters introduce a new theme into the series, radiation biology ("a more turgid branch of radiation chemistry," to quote the editors' preface): "Radiation Chemical Mechanisms in Radiation Biology" by G. E. Adams and "X-Ray Damage to DNA and Loss of Biological Function: Effect of Sensitizing Agents" by P. T. Emmerson. The elucidation of molecular mechanisms for cell killing by ionizing radiation is an exciting endeavor, and these authors have written lucid introductions to a highly complex field. The hypothesis that DNA damage is principally involved allows some surprisingly straightforward surmises; the models proposed will be familiar to physical organic chemists. There is some overlap between the two chapters, particularly on the subject of sensitization by *N*-oxyls and by *N*-ethylmaleimide, but this enhances the clarity of the discussions by presenting the same material in different contexts.

It is necessary neither to possess the previous volumes of the series nor to be a professed radiation chemist in order to find Volume 3 useful and interesting.

Thomas Hellman Morton, *Brown University*

Rare-Earth Intermetallics. By W. E. WALLACE (University of Pittsburgh). Academic Press, New York, N. Y. 1973. xii + 266 pp. $22.50.

The main importance of this book is the author's compilation of extensive data in concise form of the bulk magnetic properties and low-temperature specific heats of a large number of rare earth (lanthanides) intermetallic systems. Included in the magnetic properties are temperature-dependent characteristics such as susceptibility and magnetization. The data section of the book has extensive tables and graphs that are well organized and easy to use. Separate chapters are given to the important intermetallics containing nickel and to those containing cobalt. The cobalt chapter contains a good discussion of the practical considerations involved in choosing material for permanent magnets. The data chapters have references to the published literature which has been reviewed through August, 1971.

The first part of the book contains a brief introduction to the theory of crystal field interactions as applied to magnetic and thermal behavior. Tabulated values of appropriate constants and eigenfunctions are given. Reference is made to the published literature where the crystal field parameters and eigenfunctions can be obtained for a variety of J values and symmetries. The author in collaboration with E. Segal (Ministry of Defense Scientific Department, Israel) have attached in an appendix the energies, eigenfunctions, and magnetic moments for the rare earth ions of $J = 8$ and $J = 15/2$ in a hexagonal field.

This book will be very useful to all types of material scientists and those directly involved with rare earth compounds.

Albert C. Parr, *University of Alabama*

Ions in Solution (2). An Introduction to Electrochemistry. By J. ROBBINS (Lanchester Polytechnic, Coventry). Oxford University Press, London. 1972. xii + 127 pp. $4.95.

This is one of the short textbooks which constitute the Oxford Chemistry Series. "Ions in Solution (3). Inorganic Properties" is in print but "Ions in Solution (1). Equilibria" will not be available until 1975.

The author indicates that "Ions in Solution (2)" is intended for a course in the British honors degree program. The level seems to be appropriate for an American undergraduate after he has completed a course in thermodynamics. The text begins with a fairly rigorous development of the Debye–Hückel theory and moves on to the theories of conductance and transport properties. The last two sections deal primarily with applications of emf measurements at equilibrium and with electrochemical methods in analytical chemistry. Thus the text cuts across the conventional divisions of this subject.

The author is careful to provide details, and there are a minimum of statements to the effect that equation X obviously follows from equation Y (when, in fact, there are a number of mathematical steps in between). A student with only an average background in calculus and thermodynamics should be able to work through the derivations and follow the discussions. In short, it is a very readable textbook.

A limitation to using this book for a course is that it is a short, introductory text, and, as such, only limited space is devoted to many topics—for example, two pages for fuel cells, pp 94–96, and one paragraph, p 114, for amperometric titrations. There are 19 miscellaneous problems with solutions at the end of the book, pp 117–121. While the problems are well chosen, the limited number will probably not provide sufficient practice for the student if the book were used for a course.

The book has a great deal of potential usefulness as a reference for undergraduate and beginning graduate students who need more information about electrochemistry than is available in standard physical chemistry textbooks. There is a good bibliography to help the student find more detailed discussions about specific topics.

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