

Metal Carbonyls and Related Compounds, J. Chatt, P. L. Pauson and L. M. Venanzi.

The chapters are uniformly excellent and the personality of the authors and their methods of delineating a research problem are evident. In a few cases, the bulk of the work in the field has been done in an author's laboratory, so that coverage is rather complete. This is particularly true of the chapters by H. C. Brown and by H. Zeiss.

Inorganic chemists have entered the field of organometallics with chief emphasis on complexes of the transition elements. This reviewer was particularly impressed with the remarkable new syntheses of organic compounds. From an organic point of view, the best is yet to come. In fact a recent publication by Hubel and Hoogzand describes the synthesis of 1,2,4-tri-*t*-butylbenzene, a compound of a type which has defied synthesis by classical methods. An excellent beginning in the field of organic synthesis *via* transition metal complexes has been made by Zeiss and his co-workers with their syntheses of various methyl-substituted aromatics.

The role of the other metals in organic chemistry is well illustrated in the chapters on benzyne chemistry, organoboranes and organo-aluminum compounds. All these chapters show that each new organometallic provides a unique chemistry with important contributions to both fundamental science and to industry. The newest of these is the elegant hydroboration reaction; this reviewer finds some interesting similarities between hydroboration and the cobalt-catalyzed hydroformylation reaction.

The book is recommended for all chemists. Those interested in catalysis (especially heterogeneous catalysis involving transition metals) would do well to read this book. Some of their postulated intermediates may have been synthesized.

The book is up-to-date with over 1700 references, including many to work published in 1960. The figures and formulas are clear, the type is legible, and the binding is excellent.

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**Cahiers de Synthèse Organique. Méthodes et Tableaux D'Application. Volume VII. Cyclisations.** By JEAN MATHIEU, ANDRÉ ALLAIS, ET JACQUES VALLS. Published under the direction of Léon Velluz. Masson et Cie., 120 boulevard Saint-Germain, Paris 6, France. 1961. 309 pp. 15.5 × 22.5 cm. Price, broché, 100 NF, cartonné toile, 110 NF.

**Cahiers de Synthèse Organique. Méthodes et Tableaux D'Application. Volume VIII. Cyclisations.** By JEAN MATHIEU, ANDRÉ ALLAIS, ET JACQUES VALLS. Published under the direction of Léon Velluz. Masson et Cie., 120 boulevard Saint-Germain, Paris 6, France. 1961. 233 pp. 15.5 × 22.5 cm. Price, broché, 75 NF.; cartonné toile, 85 NF.

The organization and objectives of this series of "Cahiers" have been described in reviews of previous volumes: *J. Am. Chem. Soc.*, **80**, 1773 (1958), for Vol. I; **80**, 3802 (1958), for Vol. II; and **80**, 3486 (1958), for Vol. III. The high standards established previously for the series have been maintained in Volumes VII and VIII. Practicing organic chemists, both academic and industrial, will find these volumes interesting and provocative reading and so well-worth careful study that a special point should be made to see that the series is available in their personal and professional libraries. Briefly restated, the series of volumes systematically organizes organic syntheses in terms of reaction possibilities, subdivided into chapters dealing with major reaction types, such as alkylation (Vol. II), acylation (Vol. IV), cleavage (Vol. V), rearrangement (Vol. VI) and migration (Vol. VI).

Volume VII consists of chapter 18 on "monomolecular carbocyclizations" or intramolecular cyclizations in which a carbon-carbon bond is formed. Volume VIII consists of chapter 19 on polymolecular (intermolecular) carbocyclizations. Each chapter (Volume in these two "Cahiers") consists of (1) a synopsis of reaction types indicated by formulas (7 pages, each vol.); (2) a discussion of principles (types of reaction) involved in the classification given in the synopsis (8 pages, each vol.); (3) a discussion entitled mechanism (2 pages, Vol. VIII only); (4) a discussion entitled applications

(18; 25 pages) with comments on various methods, covered in the instant volume only, of forming selected ring types including heterocycles; (5) the main body of the collected and classified syntheses (140; 104 pages); (6) tables of additional examples (89; 48 pages); and (7) a table giving cross references to all preparations of all cyclic compounds in Volumes I-VIII (33 pages). There are several noteworthy features relative to these sections that deserve comment.

The system of classification comes off rather well and this is fortunate because the success of the undertaking depends thereon. There are 20 subdivisions and 54 sub-subdivisions of the classifications of reactions in Vol. VII and in Vol. VIII. 15 and 44. This diversity, a total of 98 separate reaction types, is more apparent than real, however: as of Vol. VII nearly one-third is devoted to the Dieckmann condensation and some closely related aldol-type cyclizations, another third to intramolecular benzenoid alkylations and acylations, and a relatively lengthy section to the Fischer indole synthesis. Some of the minor reaction types are bizarre enough to interest the most unimpressible. Vol. VIII covers the diene synthesis in 60 pages of text and tables (one-third of the volume.) This is supported by a very valuable collection of recent references. Of 206 cited in the appropriate applications section, 100 are since 1950. There are many more references cited in the Table of additional examples. The hazard is that the classification according to formation of bond types presupposes a knowledge of the mechanism of the reaction. Thus, whether A + B combine to give a cyclic compound C or react to give D which cyclizes to C determines whether a reaction will be classified as intra- (Vol. VII) or inter- (Vol. VIII) molecular. The diene synthesis, which appears in Vol. VIII, is an example. How much the ambiguities arising from this situation will hamper the user of the volumes probably will depend on the individual and the type of use he attempts. In fact, the reviewer has found, as he has gone over the system looking for omissions or peculiar classifications, that the absence of some reaction within a given code group where it might appear was an interesting indication of possibly untried reactions. It appears, however, that this type of treatise should be used as a source of collected information about types of syntheses and not about synthesis of a given type of compound. Its function and purpose is to codify reactions—not products—and its utility should be related thereto.

Mechanisms of the reactions are discussed with the reaction itself. Thus, the mechanism of the diene reaction is covered briefly in Vol. VIII, p. 93, and that of the Fischer indole synthesis in Vol. VII, p. 183. The mechanisms of some of the reactions, such as the Dieckmann and aldol types, have been discussed in previous volumes with their acyclic counter-parts. The volumes are replete with examples taken from the literature of the last few years. It should be noted that the formations of many heterocycles are discussed.

These volumes are probably the most useful of their type and all organic chemists will surely be appreciative of the tremendous effort the authors have devoted to the task of assembling this material. It hardly seems appropriate, in view of this, to cite shortcomings and omissions. There is no pretense that these volumes exhaustively compile all of the known data on organic syntheses. They will be very valuable for what they are to students and to academic and industrial chemists.

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**Cobalt: Its Chemistry, Metallurgy and Uses. ACS Monograph 149.** Edited by ROLAND S. YOUNG, Consulting Chemical Engineer, Victoria, B.C. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1960. vii + 424 pp. 16 × 23.5 cm. Price, \$15.00.

This monograph contains a good deal of useful information about cobalt chemistry, evidently selected and organized with the applied chemist and metallurgist in mind rather than the pure research chemist or the classroom. A listing of principal chapter headings or contents will serve as an illustration: Occurrence of Cobalt (25 pp.), Chemical and Physical Properties, Simple Compounds, and Coordination Compounds (10, 14 and 69 pp.); Magnetic, Electrical, and Electronic Applications, Cobalt Alloys, Metallurgical Applications (27, 38 and 10 pp.); Cobalt in Biology and Bio-

chemistry, Radioactive Cobalt, Analysis of Cobalt (31, 25 and 27 pp.). About half of the material is provided by specialists writing individual chapters; these are D. H. Busch, A. G. Metcalfe, E. A. Nesbitt, C. R. Whittemore, M. F. L. Johnson, D. M. Richman and E. J. Henley.

On a more critical level, the monograph may be compared with that which it replaces (A.C.S. Monograph 108, R. S. Young, 1948). Even more striking than the over-all expansion from 181 to 424 pages is that of individual sections. The first monograph devoted ten pages to cobalt chemistry, including one page to coordination compounds! Radioactivity of cobalt was covered in one line. Thus we see well illustrated the explosive expansion of chemistry in general and of inorganic chemistry in particular during the past fifteen years. By contrast, though, the section on analysis of cobalt is largely unchanged.

While the present monograph is excellent by comparison with the previous one, there are important defects. The chapters are uneven and are not well articulated. Thus the one on "Simple Compounds of Cobalt" is old fashioned and even archaic in its discussion of color changes; solubilities are reported only sporadically and there are no thermodynamic data. For example, good values are available for the solubility of  $\text{Co}(\text{C}_2\text{O}_4)_2$  (*sic*), but this is not mentioned although the compound itself is described. On the other hand, the chapter on coordination chemistry provides a good up to date review for any chemist, although with somewhat of an over-emphasis on polydentate chelates and their involved stereochemistry. Correspondingly less well covered are reaction kinetics and mechanisms and ligand field theory. Some mention should have been made of the omnipresent photochemical sensitivity of cobalt complexes.

The chapter on radioisotopes contains what seems to be rather trivial information, such as the annual sales of  $\text{Co}^{60}$  since 1948. Some of the discussion is confusing, to this reader at least, who is not accustomed to regarding the curie as a unit of power rather than one of disintegration rate.

Some errors in the crystallographic data are (courtesy Prof. J. Donohue); on page 65, the lattice constants for hexagonal cobalt include the statement that  $a$  varies from 2.5013 to 2.514 Å, but should read kX. units instead. The wide range of  $c/a$  values given is not consistent with those for  $a$  and  $c$ ; also, there is no point in giving such exact lattice parameters unless the associated temperatures also are provided. Readers should check the original literature to eliminate these and other difficulties. On p. 158, the lattice parameter should read 3.5441 Å, not 3.5331.

Contrary to the implication in the Preface, it simply is not possible to provide in one volume complete information on all aspects of the chemistry of so versatile an element as cobalt. Its coverage is therefore understandably incomplete, but is so in a spotty way, and the reader may not always be aware of areas missed. He may also find the variable level of sophistication confusing as well as annoying.

In summary, while the new monograph is a great improvement of the previous one, it is by no means a definitive work, and its usefulness is perhaps greatest to those chemists in the mining and producing industries where it does make sense to organize chemistry by elements.

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**The Biochemistry of Mucopolysaccharides of Connective Tissue.** Biochemistry Society Symposium No. 20 held at the Royal College of Surgeons, London, on 13 February, 1960. Organized by J. K. GRANT. Edited by F. CLARK AND J. K. GRANT. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1961. 125 pp. 16 × 25 cm. Price, \$4.75.

This is a record of a symposium held in England a year or so ago under the auspices of the Biochemical Society. It is the twentieth such volume to appear throughout the years and the second devoted to the biochemistry of mucopolysaccharides. As its title tells, this small but excellent book deals with the chemical nature of those mucopolysaccharides which are found in the "ground substance" or extracellular material of connective tissue. There are seven communications in all, each by an authority in his particular field. These deal with the chemical makeup of the chondroitin sul-

fates and sulfated polysaccharides, the structure and function of hyaluronates and the histological techniques employed to demonstrate the presence of mucopolysaccharides in connective tissue. In addition, there is a survey of the more modern methods employed for the separation and analysis of these substances. The brief chapter of Storey on the role of nucleotides in the interconversion of sugars and in glucoside synthesis is particularly fine reading, for it brings together work of the past few years in this rapidly developing field. Although this reviewer is not aware of the manner in which the symposium was organized, it is apparent that the Biochemical Society drew almost exclusively upon specialists in the field from the British Isles. Save for one, there are no papers by outstanding authorities from other countries. Had there been, the volume might have been the richer. In sum, let it be said that this small volume, restricted as it is in subject matter, is nevertheless a good account of the work which has been achieved in a field which has grown increasingly important. The book is recommended as first rate reading for all who are interested in the field of mucopolysaccharides.

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NEW YORK 21, NEW YORK

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## BOOKS RECEIVED

August 10, 1961—September 10, 1961

AUGUSTINE O. ALLEN. "The Radiation Chemistry of Water and Aqueous Solutions." D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. 204 pp. \$6.00.

J. C. BEVINGTON. "Radical Polymerization." Academic Press, Inc., (London) Ltd., 17 Old Queen Street, London, S.W. 1, England. 1961. 188 pp. \$6.00.

J. T. DAVIES and E. K. RIDEAL. "Interfacial Phenomena." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1961. 474 pp. \$14.00.

ROBERT R. DREISBACH. "Physical Properties of Chemical Compounds—III." Advances in Chemistry Series Number 29. American Chemical Society, 1155 Sixteenth Street, N.W., Washington 6, D. C. 1961. 489 pp. \$6.50.

W. GERRARD. "The Organic Chemistry of Boron." Academic Press, Inc. (London) Ltd., 17 Old Queen Street, London, S.W. 1, England. 1961. 308 pp. \$9.00.

ROY A. GREEP AND ROY V. TALMAGE, Edited by. "The Parathyroids. Proceedings of a Symposium on Advances in Parathyroid Research, held at The Rice Institute, now Rice University, Houston, Texas." Charles C. Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Illinois. 1961. 473 pp. \$12.25.

M. HAÏSSINSKY, Edited by. "The Chemical and Biological Action of Radiations." Volume V. I. "Mechanism of the Radiolysis of Water by Gamma Rays or Electrons." By A. O. Allen. II. "Action des Rayons Alpha sur les Solutions Aqueuses." By J. Pucheault. III. "Diffusion Kinetics in Radiation Chemistry." By A. Kuppermann. IV. "Mass Spectrometry and Radiation Chemistry." By D. P. Stevenson and D. O. Schissler. Academic Press, Inc., (London) Ltd., 17 Old Queen Street, London, S.W. 1, England. 1961. 278 pp. \$8.00.

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY. "Abstracts of Scientific Papers presented at the XVIIIth International Congress of Pure and Applied Chemistry. Montreal, Canada, August, 1961." University of Toronto Press, Toronto 5, Canada. 1961. 290 pp. \$6.00.

ERNEST JENCKEL AND ALFRED NOGAJ. "Forschungsberichte des Landes Nordrhein-Westfalen." Nr. 932. "Die anomale Diffusion in dem System Polystyrol-Toluol." Westdeutscher Verlag, Ophovenerstrasse 3, Opladen/Rhld., Germany. 1961. 42 pp. DM. 13.50.