

Press, London and New York, V. Gold, Ed.], and a short paper defending the analogy is found in *J. Am. Chem. Soc.*, **87**, 3774 (1965).

Chapter 4. Alkene-Forming Condensation Reactions. This brief chapter contains little more than textbook material; it is somewhat useful for recent references.

Chapter 5. Detection and Determination of the Alkenes. This is an excellent chapter which gives a rapid review of almost every detection or determination method that has been applied to alkenes and excellent leading references on each; difficulties encountered are fairly well covered. The discussion of ozonization was not good but other chemical methods received adequate coverage. The discussion of vapor phase chromatography was good, but the possibility of rearrangement on the column should have been discussed (examples as of allylic or allenic systems might have been cited). The elementary introduction on infrared methods might well have been omitted. The author appears to underestimate the importance of nuclear magnetic resonance, and the improved Raman spectrophotometers should make that method of greater importance.

Chapter 6. Alkene Complexes of Some Transition Metals. This chapter describes complexes of di- and oligo-olefins with some of the transition metals; complexes arising from reactions between such olefins and metal carbonyls receive major attention. No attempt is made to review π -cyclopentadienyl-, π -arene-, and π -allylmetal complexes. It seems more surprising that complexes of monoolefins with metals such as silver, copper, mercury, etc., are excluded. The approach is purely factual; a variety of compounds is described and evidence for the proposed structures is reviewed. There is no discussion of the mechanism of formation of the complexes and very little on the nature of the bonds involved. A number of other reviews are cited in the present chapter and still more have continued to appear in publications such as *Advances in Organometallic Chemistry*, *Advances in Inorganic Chemistry and Radiochemistry*, and *Progress in Inorganic Chemistry*.

Chapter 7. Alkene Rearrangements. This excellent chapter is divided as follows: *cis-trans* isomerism, prototropic rearrangements, anionotropic rearrangements, and miscellaneous alkene rearrangements. The section on allylic rearrangements might well have been omitted because it duplicates material which is presented more completely in Chapter 10, but some of the examples of more extended systems are not covered in the latter. The final section is very brief. It might be mentioned that the review of prototropy in enyne systems (p 433) is so brief that it is misleading; there has been extensive work in this field.

Chapter 8. Nucleophilic Attacks on Carbon-Carbon Double Bonds. This fine chapter covers material not well reviewed elsewhere. Included are nucleophilic additions, ring formation, vinylic substitution, fragmentation reactions, cyclodimerization, and nucleophilic isomerization. No attempt is made to cover the many synthetic studies which involve such nucleophilic attacks, but papers which afford clarification of mechanisms involved are very well summarized. The subjects of vinylic substitutions and fragmentation reactions are very active at present and much has transpired since this chapter was written.

Chapter 9. Reaction of Alkenes with Radicals and Carbenes. The subject of reactions of alkenes with radicals is indeed a broad one, and even after the wise decision to omit radical polymerizations was made, it is clear that the subject has not been covered completely. The result is a thought-provoking treatment which does present much of the newer material in well-organized fashion.

Although reactions of alkenes with carbenes do not as yet possess as extensive a literature, the subject is growing even more rapidly. The material presented in the present chapter is provocative but far from complete. Very recently two book-length reviews of the chemistry of carbenes have appeared.

Chapter 10. Allylic Reactions. This brief chapter consists of three parts. The first on nucleophilic substitution reactions of allylic compounds summarizes and brings up to date the much larger review of this subject published in 1956. The second section on allylic isomerization reactions covers material which was barely mentioned in the earlier review. The chapter concludes with a short section on allylic Grignard reagents; this topic was covered in the earlier review and is now brought up to date. There has been much work on allylic compounds since 1956 and this excellent review is most welcome.

Chapter 11. Cycloaddition Reaction of Alkenes. This excellent chapter, the longest in the book, defines and classifies cycloaddition reactions; it then discusses these under the headings three-membered rings, four-membered rings, 1,3-dipolar cycloadditions, and the Diels-Alder reaction. The relatively short section on three-membered rings duplicates the earlier treatment (Chapter 9) on

carbenes and might have been omitted. The other sections present excellent well-organized coverage of these important topics.

Chapter 12. Conjugated Dienes. This brief chapter is well written but provides no more than minimal coverage of this important class of olefins. Some idea of how brief the treatment is can be gained by comparing the number of references (147) with the number for the following chapter on the far-less-common cumulenes (377). The discussion is organized in sections on synthesis, physical properties (boiling points, magnetic properties, electronic absorption spectra, nuclear magnetic resonance spectra, and chemical properties); the treatment is modern and useful. It seems surprising that polyenes should not have received more thorough discussion in the present treatise, although there is some mention of these higher conjugated compounds in the present chapter.

Chapter 13. Cumulenes. No review of allene chemistry has appeared previously in English and the present survey is welcome. The field is very active at present and the 50 pages devoted to the subject is somewhat meager; however, excellent tables of the allenes synthesized by the different methods help to make the chapter more comprehensive. Coverage of the mechanisms side of various allene reactions is inadequate, but otherwise the review is quite complete through 1962. Other cumulenes are discussed under the headings pentatetraenes and cumulenes with an odd number of double bonds (butatrienes, hexapentaenes, octaheptaenes, and decanonaenes). A feature of the review is a fine section on the theory of the cumulene bond (thermodynamics, electric and magnetic properties, vibration-rotation phenomena, and electronic theory). The reader should be warned that a variety of recent developments has already made a few parts of the review out of date.

Chapter 14. Ketenes. This well-organized review of the syntheses and reactions of ketenes is timely and will be useful. Coverage of dimerizations and other cycloaddition reactions of these compounds is more complete than in Chapter 11.

In summary it may be said of this treatise on alkenes that the objectives set forth by the editor have in general been achieved. This book should be in every research library of chemistry, and organic chemists working directly in the alkene field will doubtless want to own a copy in spite of the high price. The editor has explained the omission of two very important topics in alkene chemistry by the fact that chapters on "Electrophilic Attacks on Alkenes" and on "Biochemical Formation and Reactions of Alkenes" were promised but were not delivered. It is to be hoped that these omissions can be remedied by publication of a suitable supplementary volume.

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Theorie und Praxis der Gravimetrischen Analyse. Band III. Bestimmung der Nichtmetalle. By Dr. LASZLO ERDEY, Professor an der Technischen Universität Budapest, Mitglied der Ungarischen Akademie der Wissenschaften. Akadémiai Kiadó, Verlag der Ungarischen Akademie der Wissenschaften, Alkotmány utca 21, Budapest V. Hungary. 1964. 340 pp. 17 × 24 cm. \$13.00.

This volume is the last in a three-part series on gravimetric analysis. According to the publisher's statement on the book jacket, the plan of the series is the following: the first volume deals with theoretical topics; the second covers methods for determining individual cations; and this, the third volume, is given over to methods available for the gravimetric determination of various anions of F, Cl, Br, I, S, N, P, C, Si, and B. The text also includes an account of methods for carrying out separations of ions that might interfere with a specific gravimetric analysis.

The procedures described in the volume under review are generally familiar to the analytical chemist. For a number of the procedures the author provides supplementary information derived mainly from experiments in his own laboratory. As examples of the latter, one can cite the thermal analytical curve for ammonium phosphomolybdate and a procedure for separating the phosphates by paper chromatography. The material in the volume is well organized and can therefore be useful in many circumstances. It is to be noted, however, that the volume is not a complete treatise. Thus, no mention is made whatever of certain procedures (e.g., the Schöniger flask method for organo-sulfur compounds) that are as well known as some of those described by the author (e.g., the

Schöniger flask method for organo-chlorine compounds). Further, the references are rather scant, especially from the viewpoint of an American chemist.

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The Biosynthesis of Macromolecules. By VERNON M. INGRAM, Massachusetts Institute of Technology. W. A. Benjamin, Inc., 1 Park Ave., New York, N. Y. 1965. xv + 223 pp. 14 × 22 cm. \$8.00; \$3.95, paperback.

I have read this interesting monograph on "The Biosynthesis of Macromolecules" and find it a valuable and rewarding survey of important modern aspects of the field of molecular biology. A book of this type is particularly useful for students interested in the area of biopolymer structure and function without being expert in the specific details of research problems.

It is particularly gratifying to be able to obtain well-presented information on such areas as DNA and RNA structure, and at

the same time have a description of the biological actions of these materials. I found that the discussion of the physical chemistry of DNA and RNA, although abbreviated and simplified, was lucid and well explained.

The chapter on protein synthesis and genetic control and primary protein structure contains a concise account of the most important recent experiments carried out. The presentation proceeds in a simple unencumbered fashion from the amino acid activation step of protein biosynthesis through the numerous stages before the finished protein appears.

Perhaps the least rewarding of the chapters is that of polysaccharides. I find that the presentations are much too abbreviated. The structural aspects of polysaccharides are too simplified, and the sections on the mechanism of formation barely touch the details of polysaccharide synthesis and breakdown.

This book is an important source material for seniors or first-year graduate students who want an over-all view of modern aspects of biopolymer research.

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