

## Book reviews

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*Spectroscopic Methods in Organometallic Chemistry*; Edited by W.O. George, Butterworths, London, 1970, 224 pp. £4.80.

This book is based on six lectures given at a symposium at Kingston Polytechnic, and suffers from the customary defects of such a compilation. The methods covered are *Vibrational Spectroscopy*, *Mössbauer Spectroscopy*, *Nuclear Magnetic Resonance*, *Mass Spectrometry*, *Electron Spin Resonance*, and *Electronic Spectroscopy*. All the chapters (except the last) are of approximately the same length, which presumably reflects their origin in one hour talks rather than their relative importance.

The chapters are very uneven in terms of their coverage of the subject. Some chapters give a good description of what can or cannot be done with a particular technique, others do not. For example, the chapter on electron spin resonance deals only with transition metal complexes, and no mention is made of the use of this method in studies of organometallic radical intermediates. Too many examples are culled from non-organometallic areas (e.g. the NMR line broadening in ethanol) when appropriate organometallic examples could have been chosen. Some of the diagrams and tables give away their origin as slides. In a book, tables should not on the whole be of the type "Nuclear Properties of Some Nuclei of Organometallic Importance", but rather "Nuclear Properties of the Principal Nuclei of Organometallic Importance".

The inclusion of abstracts of research papers (at any rate in the form actually printed) is a mistake. Little significant information is given, and most of the research reported has probably been published by now.

To conclude, this book represents an opportunity wasted, in spite of good chapters on *Vibrational Spectroscopy* by A.J. Downs and *Mass Spectrometry* by T.R. Spalding. However, publishers will no doubt continue to publish books of this type as long as Libraries are prepared to buy them. Ours has unfortunately, bought this one!

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*Carbene Chemistry*, by W. Kirmse, Academic Press, New York, N.Y., 1971, 2nd ed., xi + 615 pages, \$25.-

The first edition of "Carbene Chemistry" was published in 1964. As the author points out, activity in this field continues at a vigorous pace, and in the six years following

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the appearance of the first edition, the number of research papers devoted in one way or another to the chemistry of divalent carbon has almost tripled. It is no surprise that Kirmse's second edition is larger (615 pages) than his first edition (302 pages).

Organometallic chemistry has played an important role in the development of divalent carbon transfer chemistry. Halomethyl and various  $\alpha$ -haloalkyl derivatives of almost all main group metals, of some metalloids (boron, silicon, phosphorus, sulfur) and even of some transition metals (iron, iridium, cobalt) undergo  $\alpha$ -elimination of metal halide to either generate a free carbene (as in the case of the phenyl(trihalomethyl)mercury compounds) or to transfer the methylene bridge connecting the metal and halogen atoms to a suitable carbenophile in a bimolecular reaction (as in the case of  $\text{ICH}_2\text{ZnI}$ ). Of particular synthetic utility in this connection are the derivatives of lithium, zinc and mercury. Chapter 3 of Kirmse's second edition is devoted to organometallic methylene transfer agents of this type. It covers, in five sections, the metal-catalyzed decomposition of diazoalkanes; the Simmons-Smith reaction (involving halomethyl derivatives of zinc, cadmium, magnesium and aluminum); organolithium reagents (*e.g.*,  $\text{LiCCl}_3$ ); the halomethylmercury reagents; organosilicon and organotin reagents. In a sixth section there is a brief review of carbene complexes of transition metals. The discussion of these six topics is of necessity rather brief (38 pages total), but a good overview of this organometallic aspect of carbene chemistry can be obtained.

In another chapter, the reactions of carbenes and carbenoids with organosilicon and organogermanium compounds (*i.e.*, insertions into Si-H, Ge-H, Si-C, Ge-C, Si-Cl bonds), organophosphorus compounds and miscellaneous organometallic compounds are covered. In the final chapter of this book (written by guest authors P.P. Gaspar and B.J. Herold), Group IV element carbene analogs, the divalent compounds of silicon, germanium and tin, are discussed in some detail (43 pages).

In terms of a well-rounded, quite thorough and authoritatively written treatment of the field of carbene chemistry and the less well-defined field of noncarbene divalent carbon transfer chemistry, this book is superb. It certainly will be of interest to all organic chemists. Organometallic chemists interested in synthesis would do well to read through this book, for the field of carbene chemistry has now matured, and carbenes and carbenoids have taken their place beside the more traditional synthetic reagents based on carbanions, carbonium ions and free radicals.

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