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Book review

ORGANOMETALLIC PHOTOCHEMISTRY, by G. L. Geoffroy and M. S. Wrighton, Academic Press, New York/London, 1979, ix + 335 pages, $39.50.

Strohmeier's 1964 survey article on photochemical substitution reactions of metal carbonyls and their derivatives (Angew. Chem., 76 (1964) 873) represented the first review dealing entirely with the photochemistry of organometallic compounds. Since that year, several reviews have appeared to reflect systematic and, more recently, rapid growth of research in this field. The publication of the book by Geoffroy and Wrighton as the field of organometallic photochemistry begins to move toward a respectable level of understanding is therefore an extremely well timed event.

The primary purpose of this book according to the authors is to provide a firm basis upon which future studies in organometallic photochemistry can be built. The book is comprised of eight chapters, all of which deal with transition-metal complexes. Chapter 1 provides background material on the classes of organometallic compounds discussed by the authors (structure and bonding, the 18-valence-electron rule, and low-lying excited states) as well as an introduction to photochemistry in general. The discussion of the various types of excited states is particularly useful; the other sections are somewhat limited in usefulness by their brevity. Chapters 2-8 represent detailed and comprehensive reviews of the photochemical studies conducted on seven different classes of organometallic compounds. Within each chapter, the material is arranged according to the central metal and is presented in the order of triads in the periodic table. As expected, metal carbonyls (including various derivatives), treated in Chapter 2, provide the largest body of information (313 references) and dominate the book (157 pages).

A very substantial part of this chapter, including reproductions of the original tables and figures, derives from the work of Professor Wrighton and co-workers. Chapter 3 (48 pages) deals with the photochemistry of metal-olefin complexes and includes a discussion of copper(I)-photoassisted reactions. The relatively short Chapters 4-8 are devoted respectively to arene, cyclopentadienyl, isocyanide, hydride, and alkyl complexes. The photochemistry of each of these classes of compounds is still in a developing stage, and thus the basis for critical comparison and discussion is severely limited. Chapters 3-8 end with brief, one-paragraph summaries of the current status of the respective areas. The subject index includes chemical formulas.

The book is clearly written and amply illustrated to include numerous reproductions of the electronic spectra. It contains a large number of tables with spectroscopic data, as well as several simple, easy to follow molecular orbital diagrams of representative organometallic compounds. Its format and production are both excellent. The literature is covered through 1978, and a few 1979 references are included. For a first edition the errors are minimal; those that affect scientific accuracy of the presentation include C_6H_6O in equation (2-88), page 160 (which should be $C_5H_4O_2$, photo-α-pyrone), and structure (LXXIX) on page 323 (a dinuclear intermediate would appear to be involved instead). Moreover, the statement on page 12 that "..... all organometallics are low-spin systems...." is not entirely correct, most notable exceptions being some manganese(II) complexes such as $Mn(C_5H_5)_2$ and Nast's $Na_2[Mn(C{\equiv}CR)_4]$.

These minor errors notwithstanding, the book is a welcome addition to the literature in organometallic chemistry. It represents a thorough and, to the extent possible, critical review of the field, and it should provide much stimulus for further research. It can be recommended to any active researcher in organometallic chemistry (including theory) or inorganic photochemistry, and certainly to those who help bridge the two fields. As a text, it would

appear to be suitable for a special topics course at the undergraduate or graduate level.

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