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Book review

Activation and Catalytic Reactions of Saturated Hydrocarbons in the Presence of Metal Complexes Alexander E. Shilov and Gregory B. Shul'pin, Kluwer Academic Publishers, The Netherlands, 2000, xiv + 534 pp., ISBN 0-7923-6101-6

This book, published as a monograph in the *Catalysis by Metal Complexes series* is an extensively updated edition of a previous book by Dr. Shilov (*Activation of Saturated Hydrocarbons by Transition Metal Complexes*, 1984, Kluwer Academic Publishers). The amount of material presented here is more than double that in the previous book. This reflects the substantial research activities in this area over the last decade. Overall, the book is well written and comprehensive in summarizing reactions of hydrocarbons with transition metal complexes. It is also quite free of mistakes, although a few typo and grammatical errors are inevitable. With a few exceptions, the symbols and terms are well defined.

Although the title of the book specifies saturated hydrocarbons, reactions involving aromatics and substituted aromatics are also covered. The authors also noted that the activation of hydrocarbons is a broader subject than activation of C–H bond, as the former includes activation of C–C bonds.

The organization of the book is similar to the previous one. After the introductory Chapter I, Chapter II covers hydrocarbon transformation that does not involve metals or their compounds. This includes pyrolysis, and reactions with atoms, free radicals, molecular oxygen, peroxides, superacids, and others. Chapter III is a very brief description of heterogeneous catalysis of hydrocarbons, with an emphasis on oxidation. This topic is not the focus of this book, and one should not expect a comprehensive treatment. Nonetheless, there are some important information and references missing, such as detailed structure of hydrocarbon fragments on noble metal surfaces, and current understanding of catalysis by solid acids, including zeolites, and selective oxidation.

The main body of the book, from Chapter IV to Chapter XI, covers reactions with metal complexes, and the last chapter, Chapter XI is devoted to discussion of enzyme catalysis. Here, the authors did an excellent job of a comprehensive presentation of the material. A large number of recent references are included. Chapter IV deals with activation of C–H bonds by low-valent metal complexes except Pt, and Chapter V deals with reactions with bare atoms and ions. Chapter VI focuses on the discussion of the mechanisms of oxidative addition of hydrocarbons to the metal centers. Here, results from both experimental and modeling studies are presented. What is missing from this chapter are generalizing conclusions or insights that one would hope to see from an experience researcher like Dr. Shilov.

The reactions of hydrocarbons and metal alkyls with platinum complexes occupy the entire Chapter VII. Some results, previously only available in the Russian scientific literature, are described in greater details than others. Because the Russian literature is not readily available, it would be difficult for the readers to obtain additional information from them. In this chapter, there are also terms used without definition. Both low- and high-valent platinum complexes are included. Thus, this chapter serves as an transition to the next chapter, Chapter VIII, which deals with hydrocarbon reactions with high-valent metal complexes.

Chapters XI and X deal with catalytic oxidation reactions, with Chapter XI covering reactions with molecular oxygen, and Chapter X covering reactions

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with other oxidants. Finally, Chapter XI introduces enzymatic oxidation reactions.

In summary, in spite of some inevitable editorial errors and the relatively few omissions of important information, this is a highly valuable reference for researchers in the field. The authors should be congratulated for this nice piece of work. For the central theme of this book, which is hydrocarbon reactions with metal complexes, the information provided is comprehensive and current. However, without a comprehensive compound index, it is not always easy to find specific information.

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