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Book Review

***Heterogeneous Catalysis in Organic Chemistry*, G.V. Smith and F. Notheisz, Academic Press, San Diego, 1999, pp. 346. ISBN 0-12-651645-6; US$89.95.**

Whereas *homogeneous catalysis* of organic reactions has become an indispensable part of *organic chemistry*, the contrary could be said about *heterogeneous catalysis*. One of the reasons is that homogeneous systems allow mechanistic information to be obtained more easily than heterogeneous ones and therefore the understanding of the former has developed faster. Furthermore, heterogeneous catalysis is often considered as a case of 'black magic' and the barrier towards using heterogeneous catalysts is still quite high, although such reactions are much easier to conduct. It is the aim of this book, as the authors state in the preface, to lower this 'intrinsic' barrier, since heterogeneous catalysis is in many cases not only the preferable alternative, but also an attractive interdisciplinary field, covering aspects from solid state physics to preparative chemistry. The reviewer must admit that, at least in his case, the small barrier existing before reading the book had disappeared thereafter.

The book is organized into seven chapters — Introduction to Catalysis, Hydrogenations, Enantioselective Hydrogenations, Hydrogenolysis, Bond Breaking Reactions, Oxidations and Immobilized Homogeneous Catalysis. The division into various subchapters of informative headings allows fast access to any topic. Just by browsing through the list of contents, the reader obtains complete information on the large variety of reactions discussed in the book. An excellent subject and author index enable fast location of the information required. This information is presented very clearly by giving first a reaction scheme and relevant experimental results before discussing briefly the mechanism. Selection of data is such that the reader can estimate the synthetic value of the reaction and the experimental basis of the proposed mechanism. In only a few cases is there a kind of over-information, such as reporting the specific optical rotation values of products without giving the number of the enantiomerically pure compounds (p. 22). Very informative is the use of boxes highlighting the bond or molecule which undergoes a specific reaction (Chapter 4 on hydrogenolysis; note some mismatch in the formula of azides and diazirines on pp. 199, 200). Chemical structures and mechanistic schemes are easily legible (except Fig. 2.1, where the H atoms are difficult to locate, and in Fig. 2.30, where some H atoms are missing) and typographical errors are rare (such as *styrl* on p.40). Of considerable value for the non-expert are also the general introductions to each chapter, like that on *oxidation* (p. 229 ff.).

Old and newly coined terms are always clearly defined in a concise way at the beginning of each chapter. A nice example is the question as to what the addition of deuterium (D_2) across a π-bond should be called (p. 30), *deuteration* or *deuteriogenation*, both of which are proposed in the literature. Neither of them, conclude the authors, since the first term would include just an *exchange* of protium for deuterium, and the second seems awkward because it implies the existence of an element *deuteriogen*. But this isotope is named *deuterium* and, by analogy with *hydrogen*ation, the term *deuterium*ation is proposed and used. In a few instances the definition is not always as accurate, as in the case of *enantiomeric excess* (p. 54, the word *concentration* is missing) and of the difference between *homogeneous* and *heterogeneous* catalysts, which is related to the opposite solubilities based on 'small and big size' (p. 99).

In summarising, this book can be highly recommended to any chemist interested in chemical reactions and who possesses a barrier against the use of a heterogeneous catalyst to solve a synthetic problem. Even if there is no barrier, a wealth of valuable information compressed into a reasonable number of readable pages rewards any reader. The book should be also used with success for teaching organic synthesis, in order to lower the barriers between homogeneous and heterogeneous catalysis.

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