

BOOK REVIEW

Organometallic and Coordination Chemistry of Platinum. By U. BELLUCO. Academic Press, London, 1974. xii + 701 pp. \$45.50.

While the homogeneous catalytic chemistry of platinum is not particularly rich when compared to that of palladium, rhodium, and nickel, it does contain examples of such important catalytic processes as the hydrogenation and isomerization of olefins, the oligomerization and polymerization of olefins and acetylenes and a few oxidations and carbonylations. There are also reactions essentially unique to platinum which are of preparative importance such as hydrosilylation and hydrogen-deuterium exchange. Despite this numerical inferiority, the mechanisms of platinum catalyzed reactions are frequently more soundly based than those of palladium, rhodium, and nickel. This is due to the greater stability of platinum complexes which simplifies the isolation and study of important intermediates such as hydrides, alkyls, and olefin complexes. Since it is likely that reactions of these materials such as oxidative additions, reductive eliminations, insertions, etc., are common elementary steps in all complex catalyzed reactions and possibly in heterogeneous catalysis as well, the study of the complex chemistry of platinum has substantial heuristic value. This book, therefore, will be of interest to those with a desire to better their understanding of the intimate mechanisms of catalytic reactions.

Organization is logical, proceeding from the chemistry of coordination compounds of the various oxidation states of platinum and a discussion of substitution reactions to chapters devoted to hydride complexes, platinum-carbon sigma bonded complexes, complexes with Pt-Si, -Ge, -Sn, and -Pb bonds, and complexes with unsaturated hydrocarbons. Each of these chapters progresses from a brief introduction which puts the material to be covered into perspective (historical and otherwise) to preparation, bonding and structure, rates, and mechanisms. Sufficient spectroscopic, crystallographic, kinetic and thermodynamic data are presented for this volume to serve as a useful reference. There is,

of course, a chapter dealing with homogeneous catalytic processes.

The book concludes with two appendixes undoubtedly added in proof. The first contains brief summaries of selected papers relevant to each of the preceding chapters which are presented without analysis. The second is a list of 183 additional more recent references. In all, the literature has been surveyed to about mid-1973.

Given a topic as large as that encompassed by the title, it is not surprising that the author has decided not to be comprehensive but rather to devote himself to a critical survey of those most recent advances in the coordination chemistry of platinum of special relevance to homogeneous catalysis. In this he succeeds admirably in the chapters on hydride and Pt-C sigma bonded complexes and complexes with unsaturated hydrocarbons which are excellent reviews of these subjects. Unfortunately, the chapter on homogeneous catalysis is something of a mixed bag. While topics such as the SnCl_2 catalyzed formation of Pt(II)-olefin complexes and the isomerization and hydrogenation of olefins are dealt with in some detail, important subjects such as hydrosilylation and H-D exchange receive scant coverage. A number, including some rather obscure reactions, are merely mentioned. Each topic is followed by a section on similar catalysis by other d^8 metal complexes. However, since these sections are compilations rather than critical comparisons with the Pt systems, this is of dubious value.

On balance, the book is a worthy addition to Academic Press' series of monographs on organometallic chemistry. Like its predecessors which include treatises on the organic chemistry of such other catalytically important metals as Pd and Ni, and broader topics such as organotransition metal chemistry, metal carbonyl spectra, and zerovalent metal compounds, it will be welcomed by both students and practicing chemists.

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