

Book Reviews

The Organometallic Chemistry of the Transition Metals. R. H. Crabtree, John Wiley, Chichester, 1988, pp. 422, £34.50.

This book is intended for senior undergraduate and graduate courses in organometallic chemistry. It is based on a course given at Yale University for a number of years by the author.

The Introduction and Chapter 2 summarize basic principles of organometallic chemistry (i.e., *trans* effect, crystal field and 18-electron rule, etc.). Chapter 3 is concerned with metal alkyls, their stability, preparation and properties. In Chapter 4 the author examines the mechanistic paths of the substitution reactions concerning the interchange between carbon monoxide and phosphines. Chapter 5 is a survey of π bond ligands, i.e., alkene and alkyne complexes, allyl and cyclopentadienyl compounds. Chapters 6, 7 and 8 present an excellent discussion of fundamental processes for organotransition-metal complexes (oxidative addition, reductive elimination, insertion, nucleophilic and electrophilic addition). Chapter 9, dealing with homogeneous catalysis, is concerned with alkene isomerization, hydrogenation, hydrosilation, hydroformylation, and hydrocyanation of butadiene. In Chapter 10 the main methods of identifying a new complex (IR and NMR spectroscopy) and assigning its stereochemistry are examined. Metal-carbene complexes are extensively covered in Chapter 11 summarizing fundamental synthetic processes and reactions. In Chapters 12–13 particular aspects of organometallic chemistry are treated, such as the activation of small molecules, nitrogen fixation and survey of bio-organometallic reactions. Finally, Chapter 14 contains a comprehensive survey of applications to organic synthesis, examining many reactions on coordinated ligands.

Overall the book is well organized, each chapter containing references and problems. This book is also a unified and coherent treatment of organometallic chemistry from a mechanistic perspective.

R. Bertani

Surface Organometallic Chemistry: Molecular Approaches to Surface Catalysis. Edited by J.-M. Basset, B. C. Gates, J.-P. Candy, A. Choplin, M. Leconte, F. Quignard and C. Santini. NATO-ASI Series, Series C: Mathematical and Physical Sciences – Vol. 231,

Kluwer Academic Publishers, Dordrecht, 1988. ISBN 90-277-2724-4. Price US\$ 94.—, Dfl. 175.—, £54.—.

This book is the outcome of a NATO Workshop held in 1986 on surface organometallic chemistry and surface catalysis. Besides catalysis, four main topics are considered: (i) reactions of organometallics with surface of metal oxides, metals and zeolites; (ii) molecular models of surfaces, metal oxides and metals; (iii) molecular approaches to the mechanisms of surface reactions; (iv) synthesis and modifications of zeolites and related microporous solids.

The first Chapter gives a short summary of the structure and reactivity of metal oxide surfaces. Most understanding of these surfaces is based on acid–base and redox chemistry. This chemistry has developed from X-ray and spectroscopic data. The second Chapter deals with the reactions of organometallics with oxide surfaces that lead to well-defined surface species including mononuclear and polynuclear complexes and monometallic and bimetallic particles. The subsequent Chapters cover some catalytic aspects. Surface-bound organometallics have been proved with a number of catalytic test reactions and encouraging progress in tailoring specific organometallic surface structure for catalytic applications is reported. A new class of catalysts arising from the reactions of organometallics with metal particles already on supports, leading to intermetallic phases, is studied. In Chapters 7 and 8 high-nuclearity molecular metal clusters are examined as excellent models for metal particles on surfaces, in particular, complexes of early transition metals in higher oxidation states mimic oxide surface structure at a molecular level. Chapters 9 and 10 deal with modelling of the mechanisms of surface reactions on the basis of the reactivity of molecular models studying alkene ammoxidation and metathesis reactions. Chapters 11 and 12 describe some of the most compelling opportunities offered by metal oxides with regular structures (for example zeolites). This section is completed by a review providing an introduction to aluminosilicate clays. The intracrystalline spaces of all these systems offer new chemistries and exciting opportunities for the design of new supported structures.

This book is fascinating to read and is warmly recommended to coordination chemists as well as surface and catalysis scientists, who will find here a wealth of stimulating ideas.

R. Bertani