

Book reviews

Tailored Metal Catalysts, edited by Y. Iwasawa (*Catalysis by Metal Complexes Series*), D. Reidel, Dordrecht, 1986, xii + 333 pages, US\$59.50, ISBN 90-277-1866-0.

The tailored metal catalysts of the title are species in which metal complexes are attached to supports with well-defined properties and surface chemistry. These catalysts represent a new development in this field, and one which has considerable potential. Traditional supported heterogeneous catalysts are prepared by impregnation or ion exchange, and little is generally known about the precise nature of the active site. For other workers, approaching the subject from a knowledge of homogeneous catalysis, a philosophy of anchoring solution active species to any readily available support, with their structure and mode of action essentially unaltered, has often prevailed, with little thought being given to the contribution of the support. In this new generation of catalysts the aim is to produce well defined catalytic sites in which the surface chemistry of the support is used to generate active species with unusual structures or compositions.

The first chapter of the book, written by the editor, deals with metal catalysts attached to inorganic oxides. These supports have the particular advantages of mechanical rigidity and an inflexibility which prevents many of the deactivation processes common in polymer supported species. The types of solid support, the pathways for catalyst attachment and the methods of structural characterisation are considered in detail. Many practically applicable examples are also discussed. The second section details polymer attached catalysts, an area probably somewhat more familiar to most organometallic chemists. Again many examples are given and methods of metal attachment described. An interesting discussion is given of polymer protected colloidal catalysts.

R.F. Howe then reviews the preparation of heterogeneous catalysts from mononuclear carbonyl complexes on inorganic supports. The history of the use of such species is quite long, but an understanding of the surface chemistry important in conferring their unusual properties is more recent. Surface supported metal clusters as catalysts for reactions involving carbon monoxide are discussed by M. Ichikawa. Cluster catalysis has been a popular field in recent years, but is fraught with pitfalls since the active species are not always what they seem; both monomer formation and aggregation to give metal particles are common. This chapter considers particularly the preparation of catalysts containing well-defined metal clusters, through control of the combination of metals, particle size of the metal, metal/support interaction and degree of metal segregation. The final section of the book deals with asymmetrically modified nickel catalysts for the enantioselective reduction of carbonyl groups. This is something of a role-reversal compared with earlier chapters; the metal acts as the support and is the catalytic agent, whilst the chiral modifier adsorbed on it acts as a stereochemical regulator.

Like its predecessors in this series, this book is attractively printed and relatively error free. References are extensive into 1984 with a few from 1985. This is an extremely timely volume in an important and developing field. It is also an area which has been the subject of special initiatives by several major grant-awarding bodies and industrial concerns. This book may be warmly recommended to anyone working in the field or to anyone wishing to enter it.

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Organotransition Metal Chemistry; Fundamental Concepts and Applications, by A. Yamamoto, Wiley-Interscience, New York, 1986, xvi + 455 pages, UK £38.45, ISBN 0-471-89171-1.

The publication of a new text book is likely to be an important event for the teaching of any subject, and this is particularly the case in organometallic chemistry in which texts appropriate to beginners have been sparse. The utility and importance of organometallic chemistry has for some time not been reflected in its place in most student curricula, and this imbalance is long overdue for redress. Yamamoto's text is very readable, and although he is careful to say that it is not comprehensive, most important areas are covered. It should make a useful contribution to the teaching of the subject.

After a brief introduction, Chapters 2 and 3 deal respectively with fundamental coordination chemistry and bonding in transition metal organometallics. Chapter 4 gives a systematic survey of syntheses of transition metal complexes. Chapter 5 describes a range of experimental techniques useful to the organometallic chemist, illustrating particularly well Schlenck apparatus for handling air-sensitive materials. NMR spectra are also discussed, both as a means of characterisation and for the study of fluxional processes.

Fundamental processes in reactions of complexes described in Chapter 6 include ligand coordination and dissociation, oxidative addition and reductive elimination, insertion, β -hydride elimination and reactions of coordinated ligands. Chapter 7 discusses applications of transition metal complexes in homogeneous catalysis. The division between this and the following section on uses in organic synthesis seems to be a somewhat arbitrary one. Most areas of current significance are discussed with the curious exception of alkene metathesis. The final chapter deals with special topics, including organometallics in bioinorganic chemistry, supported catalysts and cluster catalysis.

This present volume makes no attempt to deal with organometallic compounds of the main group elements, and this may make it less attractive to lecturers aiming to give a comprehensive course. This would be a pity, since this is an excellent book, written in a readable style, at a suitable level to be used for teaching. An appropriate rather than an overwhelming number of up-to-date references are given, and the index makes the material very accessible. The book is well produced and errors are infrequent, which is particularly commendable in a work which has been translated. The diagrams, which I presume to be the author's own work, have sometimes been