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Book reviews

Catalysis: Science and Technology. Volume 8

J R Anderson and M Boudart (eds)
Springer-Verlag, Berlin, 1987
262 pages, DM 148,-

This is the eighth volume in a series of reviews which has already encompasssed many aspects of catalytic chemistry. The purpose of the series is to collect authoritative and definitive chapters on the main areas of contemporary pure and applied catalysis and is of special interest to workers concerned with the latter area. The present volume contains five further comprehensive reviews covering the historical development of catalytic oxidation processes (G Chinchen, P Davies and R J Sampson), catalytic metathesis of alkenes (J C Mol and J A Moulijn), physicochemical aspects of mass and heat transfer in heterogeneous catalysis (J J Carberry), small scale laboratory reactors (K C Pratt) and EPR methods in heterogeneous catalysis (J J Lunsford). Of these the chapter on catalytic metathesis of alkenes is likely to be of most interest to those readers concerned with applications of organometallic chemistry. The authors are all acknowledged experts in their respective fields and this is reflected in the breadth, detail and quality of all the articles.

The first chapter addresses a subject which is of central importance to a substantial part of large scale chemical industry, namely catalytic oxidation processes. This very readable account contains a useful introduction to the background to catalytic oxidation technology, the historical development of which is then exemplified by reference to processes for the production of sulphuric acid, nitric acid and maleic anhydride. This effectively complements a chapter by G K Boreskov on more fundamental aspects of the catalytic activation of dioxygen in an earlier volume of the series. Alkenes are important intermediates in many processes in the organic chemicals industry and methods for their interconversion can assume considerable importance when alkene availability does not match market requirements. One such process is the catalytic metathesis of alkenes which is covered in Chapter 2 with some emphasis on fundamental principles, mechanistic insights obtained from homogeneous catalysis studies and potential novel applications. Metathesis is currently assuming greater significance in terms of the ring opening polymerisation of cycloalkenes and the chapter is therefore particularly timely. The third chapter contains an important contribution on physicochemical aspects of mass and heat transfer in heterogeneous catalysis, the understanding of which is of prime importance to the use of catalysts on the production scale. Chapter 4 provides a very useful critical overview of the most common small scale laboratory activity. The various reactor configurations are described, together with their advantages and disadvantages, construction principles and practical advice. The final chapter contains a very readable account of the use of EPR methods in heterogeneous catalysis. Following an introduction to EPR, its applications to eleven types of catalytic reactions is describes and evidence is given for the role of paramagnetic oxygen ions, mainly O^-, in such diverse reactions as H_2-D_2 exchange, the oxidation of carbon monoxide and the partial oxidation of methane to methanol.

Overall, therefore, this book contains a mixed but thoroughly useful set of reviews and the price, considering the quality and usefulness of the book is quite reasonable. However, in order to secure complete coverage of the field the whole series must be purchased and I expect that this will limit sales to libraries and organisations with significant catalytic interests.

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Principles of Organometallic Chemistry (Second Edition)

P Powell
Chapman and Hall, London, 1988. 414 pages. £30 hardback; £13.95 paperback. ISBN 0 412 27580 5; 0 412 27590 2

The first edition of Principles of Organometallic Chemistry was published in 1968 and was co-authored by G.E. Coates, M.L.H. Green, K. Wade and the sole-author of the Second Edition, P. Powell. The First Edition proved to be a valuable and well-used book; it really had no serious rival as a general text for undergraduates. Twenty years on, the Second Edition will have to compete with other recently published texts, including A.W. Parkins and R.C. Poller's "Introduction to Organometallic Chemisty", MacMillan (1986) and I. Haiduc and J.J. Zuckerman's "Basic Organometallic Chemistry", de Gruyter (1985). That there is now a good choice of basic texts appropriate for undergraduates reflects the current importance and interest in organometallic chemistry. The tremendous increase in knowledge gained over the past twenty or so years makes the task of producing a text of manageable size a very daunting and a highly selective one. The selectivity in the choice of material covered clearly allows great scope for any reviewer to be critical. This reviewer, however, generally likes the choice of material in Powell's