or liquids or fluxional — and with ways of treating their energies, electronic structures and magnetic properties. Jellium, liquid-drop and other models for treating microclusters are outlined. The discussion focuses initially on metal clusters (notably alkali metals, aluminium, copper and other transition metals), but extends to semiconductor clusters, notably of carbon (including fullerenes and nanotubes), silicon and germanium. Later chapters deal with rare-gas and molecular clusters.

The final chapter, entitled 'Chemical bonds and related topics' may catch the eye of chemists, only to disappoint them in that the material there is an assortment of chemical and physical aspects not covered elsewhere. This is a book for physicists that illustrates how differently physicists and chemists view subjects and phenomena, and how each discipline has developed its own terminology and rationales for common subject matter. Though much of the book is concerned with what chemists refer to as naked metal clusters, no attempt is made to compare the species considered here with comparable microclusters clothed in ligands, as extensively studied by molecular chemists, or to relate them to charged aggregates of metal atoms of the type found in many alloy systems, as studied by solid-state chemists. Readers of this journal will find information in this book about microclusters of metal atoms of the types that, if they were supported on suitable surfaces, might well show heterogeneous catalytic activity. However, they will have to work hard to translate what they find here into a form they can use. By contrast, the reader interested in how different types of atoms or molecules may aggregate in the gas phase may well find much of interest.

To conclude: the reader interested in an up-to-date discussion of the geometrical and electronic structures of small (10–1000-atom) aggregates of metal, carbon and silicon atoms, or of similar aggregates of rare-gas atoms or water or ammonia molecules, in the language of physics and with few attempts to relate the subject matter to similar chemical systems, will find much of interest. The chemist seeking enlightenment will be disappointed that the authors all too rarely express themselves in such simple familiar concepts as the number of valence-shell electrons associated with particular aggregates.

K. WADE
University of Durham

Advances in Organometallic Chemistry, Volume 42

F. G. A. Stone and R. West (eds)
Academic Press, London, 1998
vii + 422 pages. £70.00
ISBN 0-12-031142-9

The latest volume in this well-established series comprises five substantial chapters covering a wide range of contemporary organometallic chemistry. The book gets off to an excellent start with its longest chapter (145 pages, 520 references) by Whitmire on 'Main Group–transition metal cluster compounds of the Group 15 elements'. The review excludes R_3E- and R_2E-containing fragments and concentrates on species in which the Group 15 element contributes all its valence electrons, except one external lone pair, which may be bonding or nonbonding, to cluster formation. The chapter is well organized and it is easy to find compounds of a particular structural type, or to look at the utility of a synthetic route.

A chapter by Jones and Klosin concerning 'Transition metal complexes of arynes, strained cyclic alkynes and strained cyclic cumulenes' gives a thorough review of this rapidly growing area since the end of the 1980s. Ogino and Tobita review the currently very active field of 'Bridged silylene and germylene complexes' and look forward to further studies in which these interesting species are investigated more thoroughly as catalysts or models for surface-active sites. Whittall *et al.* give a timely review, 'Organometallic complexes in nonlinear optics 1: Second-order nonlinearities', describing both transition metal and Main Group compounds. Approximately the first one-third of the review deals with the background to nonlinear optics, including theory, experimental techniques and computational methods, and this will be useful to the organometallic chemist unfamiliar with the area. Although some aspects of the structure–NLO property relationship are becoming understood, there is clearly a great deal of work to be carried out to investigate the many variables available in organometallic compounds. Gauvin, Harrod and Woo tackle the industrially important area of catalytic dehydrocoupling. With the more stringent environmental restrictions on coupling reactions involving element halides and Wurtz-type procedures, homo- and heterodehydrocoupling for the formation of element–element bonds is becoming increasingly studied. The review concentrates on the Group 14 elements but does include other *p*-block elements and should provoke more interest into a potentially lucrative area.

As expected from previous volumes in this series, the book is well produced and has clear diagrams and schemes but is not without a number of typographical errors, some of which could have been avoided with a simple spell-check. Readers of this journal will probably find the chapters on NLO materials and dehydrocoupling

of most interest but the book should be available to any laboratory where organometallic chemistry is studied.

PAUL D. LICKISS
Imperial College, London

Metal Sites in Proteins and Models: Phosphatases, Lewis Acids and Vanadium
H. A. O. Hill, P. J. Sadler and A. J. Thomson (eds)
Springer-Verlag, Berlin, 1997
xii + 215 pages. £76.00.
ISBN 3-540-62874-6

Given the diverse topics it discusses, this volume of the long-running *Structure and Bonding* series is best considered as one of a set of three volumes dedicated to modern aspects of bioinorganic chemistry. Volume 88 of the same series deals with iron biochemistry, and Volume 90 discusses other redox metallocentres in proteins. This book, Volume 89, contains six chapters divided equally between the three titular headings, each written by world leaders in their respective fields.

Chapter 1, by Kimura, Koike and Shionoya, describes some recent advances in synthetically modelling the chemistry of mononuclear zinc hydrolases. This a discussion of recent highlights in a widely studied area which emphasizes the authors' own work; unfortunately, to some extent this review duplicates other fairly recent discussions by them of this material. Chapter 2, by Auld, is dedicated to amide hydrolysis catalysis by proteases. It begins with a brief introduction to zinc protein chemistry, which is followed by a concise description of spectroscopic and structural data from protease enzymes pertaining to their catalytic mechanism. This would be an excellent introduction to the field for the biochemically literate reader.

Chapter 3, by Slebodnick, Hamstra and Pecoraro, gives an overview of vanadium biochemistry and biomimetic chemistry, ranging from vanadium-containing enzymes and their model compounds, via vanadium-containing insulin mimics, to vanadate-effected peptide photocleavage. The chapter draws these disparate subjects together very successfully, by giving an introduction to the relevant chemistry of vanadium and then stressing the chemistry underlying the biochemical phenomena. These authors also end with the provocative suggestion that the best-studied vanadium enzymes, the haloperoxidases, may act as metal-free phosphatases *in vivo*. Chapter 4, by Butler and Baldwin, reviews in more detail the vanadium haloperoxidases. Although there is inevitably some overlap with the previous chapter, this is an informed description of catalysis by these unusual and environmentally relevant enzymes.

The book ends with two chapters on phosphatases. Chapter 5, by Gani and Wilkie, is a review of enzymic phosphate monoester hydrolysis, concentrating on the role of metal ions in the several catalytic cycles employed by phosphatases, and on how recent crystallographic data on these enzymes have revealed new mechanistic features. Finally, Klabunde and Krebs present a short chapter on the purple acid phosphatases. This again complements a briefer discussion already given in Chapter 5. However, knowledge of these intriguing enzymes has recently been transformed by structural studies performed in these authors' laboratories, so this discussion of their own results is timely.

Aside from a statistical smattering of typographical errors the quality of reproduction of the text and figures in this book is very good. All of the chapters are clearly written and thoroughly referenced, covering the literature up to late 1996 or early 1997. To conclude, this is a research-level text which would be of interest to chemists or biochemists working in these areas. Although the three-volume set described above should together comprise a useful and up-to date reference on bioinorganic catalysis, this volume on its own is probably not an essential library purchase.

M. A. HALCROW
University of Leeds

