reminding students of points that they had forgotten or helping them with material they had not understood. It is a text which should find an expanding market in British universities.

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Inorganic Syntheses, Volume 32

Marcetta Y. Darensbourg, (Editor in Chief)
John Wiley & Sons, New York, 1998
xxiii + 331 pages. £51.95
ISBN 0-471-24921-1

Inorganic Syntheses is a well-established series, which provides for organometallic and inorganic chemists a source book of syntheses which have been corroborated in independent laboratories. This volume is dedicated to the late Sir Geoffrey Wilkinson, Nobel Laureate, who was for many years one of the International Associates of *Inorganic Syntheses.* As the dedication rightly states, 'His monumental contributions to inorganic and organometallic chemistry, and in particular his emphasis on the importance of synthetic chemistry, will long be remembered.'

The Editor in Chief, Marcetta Darensbourg, has emphasized the importance of ligand design in coordination chemistry in this volume. Therefore, Chapter 1 describes the syntheses on a large scale of water-soluble phosphines. The water solubility of these phosphines has been induced either by the introduction of sulphonic acid groups or substituents capable of forming strong hydrogen bonds.

Chapter 2 describes the synthesis of compounds which have been developed as models for the co-ordination environments of metalloenzymes. The biomimetic ligand syntheses which are included focus specifically on models for the common metal-binding amino-acid residues histidine (imidazoles), cysteine (thiolates) and methionine (thioethers). Derivatives of the pyrazolylborates, which are very widely used in such studies, are described, and their use in the development of isolated metal sites with sterically bulky ligands is stressed in the context of small-molecule activation.

The biological theme is continued in Chapter 3; an alternative synthesis of cisplatin, which is now widely used as an anticancer chemotherapeutic agent, is described, as well as the syntheses of complexes with labile ligands, which have proved to be such effective synthons in coordination and organometallic chemistry.

Chapter 4 is devoted to the syntheses of Main-Group and transition-metal cluster compounds, and includes the description of synthetic procedures for borazine derivatives, transition-metal complexes of the lacunary heteropolytungstate $[P_2W_{17}O_{16}]^{10-}$, metal carbonyl cluster anions, (e.g. $[Os_3(CO)_{11}]^{2-}$), heterometallic cluster compounds of platinum and ruthenium, and high-nuclearity hydrido-decaruthenium clusters.

Finally, Chapter 5 describes the syntheses of Main-Group and transition-metal hydrides: six-coordinate silicon hydrides, manganese carbonyl hydrides and phosphine hydrides of iridium in oxidation states III and V are discussed.

Althogether the Editor has brought together a collection of syntheses which provide a useful starting point for new excursions into inorganic and organometallic chemistry. I am sure Geoff Wilkinson would have approved whole-heartedly.

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Microcluster Physics
Springer Series in Materials Science, Vol. 20

S. Sugano and H. Koizumi
2nd edition, Springer-Verlag, Berlin, 1998
xii + 236 pages. £49.50
ISBN 3-540-63974-8

This book is about the physics of elemental particles containing some ten to a thousand atoms, and is a second, completely revised edition of Professor Suganos earlier book on the same subject which was originally published in 1991 as the 20th volume in Springers *Materials Science Series.* That earlier edition was based on lectures given to graduate students (significantly, mainly in physics), and covered a new field that was experiencing very rapid growth. Continuing considerable interest in the area is reflected by the length of this volume (50 longer than the original) and by the similar increase in the number of papers cited (there are 253 references in this new edition). Professor Sugano originally focused his attention on particles containing some ten to a thousand atoms because that is the range within which properties change most markedly, from those of small molecules to those characteristic of fragments of bulk materials. Larger particles containing from 10^3 to 10^5 atoms, which the authors refer to as 'fine particles', have properties that differ from those of bulk materials, but the differences can usually be attributed to their greater proportion of surface atoms and to surface irregularities. It is Professor Suganos thesis that microclusters as defined here show quantum-mechanical properties, notably electronic energy levels, that depend upon their shape, like those of molecules.

An introductory chapter defines and explores the characteristics of microclusters, placing them in context between fine particles and small molecules, and noting the normal polyhedral shapes and shell periodicity of microclusters. Later chapters deal with their dynamics — whether they are more realistically regarded as like solids

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.

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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