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Book reviews

Gmelin Handbook of Inorganic Chemistry, 8th Edition, Sn. Organotin Compounds. Part 17, Springer Verlag, Berlin, 1989, xiv + 245 pages, DM1133.00. ISBN 3-540-93596-7 and 0-387-93596-7.

This latest addition (written by H. Schumann and I. Schumann) to the excellent Gmelin series on organotin compounds continues the coverage of mononuclear organotin compounds containing tin–oxygen bonds, and is concerned mainly with compounds of the types $RSn(OR')_3$, $RSn(OR')_2(OR'')$, $R_2Sn(X)OR'$, $RR'Sn(X)OR''$, $RSn(X)(OR')_2$, and $RSnX_2(OR')$, where R is usually an alkyl or aryl group and X is hydrogen, halogen, or pseudohalogen. Related cyclic species such as $Me(Br)Sn \leftarrow O{=}C(Me)CH{=}CMeO$ are also dealt with. The closing date for literature coverage is 1987. There is, as usual in this series on organotin compounds, a very useful list of more recently published books, reviews, or papers of general significance in the field, especially papers dealing with analytical methods or toxicity and applications. There is also a list of relevant patents.

The selection and presentation of the material are of the high standard we take for granted in the Gmelin volumes. The series on organotin compounds, invaluable to organotin chemists, will probably be more widely consulted as interest in their biological and chemotherapeutic aspects increases.

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Advances in Physical Organic Chemistry, Vol. 25; edited by D. Bethell, Academic Press, London, 1989, £60.00. ISBN 0-12-033525-5.

This series of volumes maintains a consistently high standard, and in spite of its unpromising title commonly contains material of direct interest to organometallic chemists. In this latest volume such interest attaches especially to the chapter (165 pages) by G.R.J. Thatcher and R. Kluger entitled "Mechanism and Catalysis of Nucleophilic Substitution in Phosphate Esters". This authoritative survey will mainly be read by phosphorus chemists, but much of the material (e.g. that on apicophilicities and *d*-orbital effects) has a wider relevance, especially, in view of the mechanistic analogies between reactions at silicon and phosphorus centres, to organosilicon chemists. A chapter (96 pages) by U. Berg and J. Sandström entitled "Static and Dynamic Stereochemistry of Alkyl and Analogous Groups" is also of relevance to those interested in structures and conformations of alkyl derivatives of metals, although organosilicon compounds are the only organometallic species actually considered.

I had hoped that the chapter (179 pages) by M. Ballester entitled "Perchloro-organic Chemistry: Structure, Spectroscopy and Reaction Pathways" would deal

with the interesting perchlororganic derivatives of metals, but it is confined strictly to organic compounds. Not surprisingly, since it is written by the outstanding contributor to this branch of chemistry, it provides an excellent survey of the field, which has some very unusual features. Those chemists who are not aware of the very remarkable properties of perchlorobenzyl radicals (in my experience the great majority) will find this account of them very surprising. The radical $(Cl_5C_6)_3C\cdot$, for example, is a bright red solid, completely dissociated; its half-life in air is estimated to be about 100 years, and it is inert towards concentrated sulphuric acid, nitric acid, chlorine, and bromine. As the author points out these 'inert free radicals' are "trivalent-carbon species possessing a general stability considerably higher than that of the overwhelming majority of normal tetravalent carbon compounds and materials."

The volume is well produced and is good value at today's prices.

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The Chemistry of the Metal–Carbon Bond, Volume 5; Organometallic Compounds in Organic and Biological Syntheses; edited by Frank R. Hartley, John Wiley and Sons, New York, 1989, xv + 590 pages, £120, ISBN 0-471-91556-4.

This is the fifth volume in a now well established series of books on the metal–carbon bond, within the *Chemistry of Functional Groups Series*. Its remit is the use of organometallics in organic and biological synthesis. The previous volume was also concerned with organometallics in synthesis, and focussed largely on the derivatives of main group metals. By contrast, most of the chapters here deal mainly with transition metal derivatives, and much of the material is organised according to the reactions, rather than the elements under consideration.

The first part of the book deals with synthetic techniques, and three relatively new areas are discussed in detail. The first of these, by D. Bremner, deals with sonochemistry, which has found very wide application in organometallic chemistry, particularly in surface reactions. It is only very recently that theories have been developed to explain the rate accelerations observed. The second chapter deals with organic photochemistry, and is a useful account of the subject, though the applications to serious multi-step organic syntheses were few. The third section, on phase transfer catalysis, deals with a very wide range of reactions; there is an excellent account of the palladium catalysed carbonylation reactions reported by Alper's group. One notable feature of the second and third of these sections is that they focus almost exclusively on transition metals; surely there were some reactions of main group systems which would have been appropriate.

Part 2 of the book is entitled Synthetic Reactions, and again contains three chapters. H. Brunner, on Enantioselective Syntheses with Optically Active Transition Metal Catalysts, runs through the standard series of reduction, oxidation and C–C bond formation. This is a nicely compact account of a field which is expanding so rapidly as to become unmanageable. Chapter 5, by Gabor Speier, details Organometallic Oxidation Catalysts, whilst Chapter 6, by W. James Feast and Vernon C. Gibson, considers Olefin Metathesis. Both are good clear accounts.

Part 3 is entited Synthetic Reagents, and here is a move towards organometallics