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Book reviews

Advances in Metal Carbene Chemistry

U Schubert (ed)

NATO ASI Series, Series C: Mathematical and Physical Sciences, Volume 269.
Kluwer Academic Publishers, Dordrecht/Boston/London, 1989.
xiv + 407 pages. $114.00 (USA), £64.00 (UK), DFl 200.00. ISBN 0 7923 0156 0

This interesting book, the proceedings of the NATO Advanced Research Workshop on Transition-Metal Carbene Complexes held in 1988, contains a wealth of information on carbene complexes presented by leaders in the field.

It opens with a brief review of the area which is followed by an account by E. O. Fischer of the early days of transition metal-carbene complexes. Some 41 papers are then presented which include data on carbyne to carbene conversions at dimetal centres, methylene complexes of ruthenium, osmium and iridium, cyclizations of alkynes and carbenes, electron-rich alkenes as sources of carbenes, carbenes from isocyanides, hydrocarbenes, carbene complexes in the development of polymer-supported coordination chemistry and many other interesting topics. A good proportion of the book is concerned with the uses of metal carbene complexes in organic synthesis.

The volume is produced from camera-ready manuscripts and the result is of a good standard.

This is an excellent treatise of an important topic; all libraries and workers in the field should have a copy.

R D W KEMMITT
University of Leicester

Environmental analysis using chromatography interfaces with atomic spectroscopy

Roy M Harrison and Spyridon Rapsomanikis (eds)

Ellis Horwood Series in Analytical Chemistry, Ellis Horwood, Chichester, 1989
£59.50. ISBN 0 853129797.

The subject material described by the title might suggest a rather specialized work of deep interest to a few but of little relevance to many. In fact this is not the case. Analytical chemistry has recognized that a calculation of the concentration of a compound in terms of the metal concentrations alone is not enough. It is necessary to know the *chemical* identity of the metal in addition to its gross concentration, e.g. whether the known amount of mercury present exists as inorganic mercury(II), mercury metal or methylmercury. This further refinement of analysis is known as speciation. In environmental terms it is particularly important; some arsenic compounds are very toxic, but some have very little toxicity. We do really need to know *what* is there, as well as *how much*.

In order to speciate, chemical derivatives of the same element need to be separated, e.g. Bu_3Sn^+ from Bu_2Sn^+, etc. In addition to this, many of the chemical species of environmental interest are present in intractable, non-volatile forms. Often they need to be released from strong binding to environmental material (e.g. algae, sediment, biota, etc.), derivatized to a more stable form (e.g. by conversion to hydrides) without loss of original chemical structure, and then separated from each other prior to detection. This very often involves liquid and gas chromatography and atomic spectroscopy. Hence the origin of this book.

It can be briefly said that the subject material is covered widely, clearly and authoritatively. Sufficient technical detail is included to enable the interested reader to construct the required systems in his own laboratory. The various drawbacks, alternatives and methodologies are described very competently. There is no doubt that workers already in the field will need to obtain a copy of this book.

The task of this review is more to convey the necessity of the speciation approach to a wider audience, and hence to encourage them to purchase this work. It can be repeated that it is now insufficient to detect only a single elemental concentration in a compound. Wide ranges in toxicity and other properties exist for the same element in different oxidation states or with different ligands. In order to assess the importance of an element in a given situation we need to know its full chemical identity. This is the message towards which this book is moving. For full identification, coupling of chromatography with mass spectrometry is required, but linkage of chromatography with atomic absorption usually speciates beyond much doubt. The book is useful and important and would be valuable to very many analytical chemists. It is not unreasonably priced.

Chapter details are as follows (some titles are abbreviated): Basic principles (S. J. De Mora), Atomic absorption (C. N. Newitt), Flame photometry (S. Kapila, D. O. Duebelbeis, S. E. Manahan and T. E.

Clevenger), Atomic plasma emission (Peter Uden), Atomic fluorescence (A. D'Ulivo), Interfaces between liquid chromatography and atomic absorption (Les Ebdon and Steve Hill), Tin and germanium (O. F. X. Donard and R. Pinel), Lead (M. Radojevic), Arsenic and antimony (S. C. Apte, A. G. Howard and A. T. Campbell), Mercury (S. Rapsomanikis), Selenium (A. G. Howard), Sulphur gases (M. T. Shabbeer and R. M. Harrison).

The names of these authors indicate the wide-ranging experience and authority behind the coverage in each chapter.

P J CRAIG
Leicester Polytechnic

Structure and bonding Vol. 70. Bioinorganic chemistry

M J Clarke, J B Goodenough, J A Ibers (eds)
Springer-Verlag, Heidelberg, 1988. 194 pp. DM148. ISBN

The first volume of *Structure and Bonding* appeared in 1966 with the stated aim of providing up-to-date authorative reviews from the different fields of inorganic chemistry, chemical-physics and biochemistry where the general subject concerns chemical bonding to metal atoms. This has been achieved with a high standard of the articles and their presentation; the present volume devoted to bioinorganic chemistry is no exception. The three reviews make both interesting and stimulating reading for all inorganic chemists—stimulating because they challenge our conceptions about inorganic systems and in doing so must broaden our thinking.

The first, and shorter, of the reviews is by K. Doi, B. C. Antanaitis and P. Aisen, entitled 'The binuclear iron centers of uteroferrin and the purple acid phosphatases'. Uteroferrin, from uterine secretions, is one of the more thoroughly studied enzymes of this group. As their name implies they catalyse the hydrolysis of phosphate groups, a function we would normally associate with zinc enzymes. The challenge to the inorganic chemist is to explain why this group uses an active binuclear iron centre, a centre more usually associated with redox activity. The review concentrates on the chemical and physical properties of these enzymes. Despite the use of an impressive array of spectroscopic techniques, the authors clearly show that there is still much that is not known, e.g. the nature of the iron ligands in the protein and the exact physiological role of the enzymes.

The other two reviews consider the research done on metal complexes as anticancer (antitumor) agents. The complexes considered comprise phosphine and cyclopentadienyl compounds! How many inorganic chemists would have considered using such ligands for chemotherapeutic use? Not many, including myself! S. J. Berners-Price and P. J. Sadler review 'Phospine and metal phosphine complexes: relationship of chemistry to anticancer and other biological activity'. The cover is extensive, with 230 references and details of the chemical and structural properties of phosphines and their metal complexes, and the relationship of these properties to the cytotoxicity and antitumour activity of the metal phosphine complexes. Much of the stimulus for the work in this area comes from the use of the triethyl phosphine gold(I) complex 'auranofin' as an antiarthritic drug. Not surprisingly it is the gold(I) complexes that predominate in this review. 'Transition and main-group cyclopentadienyl complexes: preclinical studies on a series of antitumour agents of different structural type' is the third and final review, by P. Kopf-Maier and H. Kopf. Following the success of *cis*-platinum as a wide-ranging antitumour agent, the search for other active metal complexes has been intense. Among those examined, surprisingly, were the organometallic π-cyclopentadienyl complexes. Antitumour activity of these compounds was reported in 1979 and 1984; the intense activity since these findings can be judged by the 1982 references cited in the review. The authors give an in-depth report on the structure–activity relationships and pharmacological properties of the many compounds studied. These mainly involve two types of compounds, the metallocene diacido complexes, Cp_2MX_2, ($M = Ti$ mostly) and the metallicenium salts $Cp_2M^+X^-$ ($M = Fe$ mainly). Antiviral, insecticidal and antiflammatory properties are also reviewed.

S H LAURIE
Leicester Polytechnic School of Chemistry