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Journal of Organometallic Chemistry 519 (1996) 285–286

Journal of Organometallic Chemistry

Book review

Comprehensive Organometallic Chemistry II
E.W. Abel, F.G.A. Stone and G. Wilkinson (eds.), Pergamon, Oxford, 1995, 9000 pages, £2795, US$4470. ISBN 0-08-0406084

It is not as easy as it might seem to produce an appropriate review of this set of 14 volumes, whose publication is a major event in organometallic chemistry. In the light of the wholly justified acclaim with which *Comprehensive Organometallic Chemistry* was received on its publication in 1982, and of the fact that the original Editors-in-Chief continued to serve for this supplement, thereby ensuring its quality, there was never any doubt that it would enjoy similar success. Reviewers can look for some imbalance in the space allowed for the various elements or specific topics and for what they see as surprising omissions, and even point to minor errors, but in the end the only really important comment is that these volumes, along with the earlier set, should be in every library associated with degree-level teaching or research in chemistry. Obviously they will be of most immediate value to those involved in research in organometallic chemistry or organic synthesis, but there are now very few branches of chemistry to which organometallic compounds have no relevance.

However, a reviewer commenting on a publication of this size, cost and importance is expected to devote a substantial amount of space to it. Prompted by this requirement to say more, I confess with some trepidation since I may well be alone in my reaction, that I find myself a little disappointed with this supplement, feeling that it does not quite reach the exceptional standard of the original work. This is because some of the surveys are less comprehensive than I had expected, and because they sometimes seem to consist largely of examples of novel compounds without any indication of how new findings have affected generalizations and concepts presented in the earlier volumes. Certainly, the emphasis is very heavily on isolation of new compounds and very little attention is given to ideas, mechanism and theory.

No doubt my view is coloured by the fact that the element with which I am most familiar is one of those dealt with least satisfactorily, the author of the main section, entitled 'Organosilanes', having been given seriously inadequate space. At present *CA Selects Plus in Organosilicon Chemistry* provides abstracts of approximately 20000 articles or patents each year. Many of these refer to industrial aspects of polymer species or to organic syntheses, and a few to basic studies of organopolysilanes and carbocyclic silanes. All four of these topics are covered in separate special sections in the volumes under review, but I estimate that this leaves, at a rough estimate, at least 4000 articles each year relevant to the core chemistry falling under the heading 'Organosilanes', and so perhaps some 40000 for the 13 year period surveyed. This compares with a total of ca. 350 references listed in the 44 pages of the relevant section. In contrast, 80 pages with 420 references are devoted to the much more restricted chemistry of organogermanium compounds, allowing the authors to provide a good, reasonably comprehensive survey of the field. Several other Main Group elements, however, are less generously treated. Given the degree of selectivity this implies, it is perhaps not surprising that, for example, the accounts of compounds containing Si–O and Si–S bonds do not mention the preparations of the first silicon (normal) cyanates and thiocyanate, or that the otherwise effective concise survey of silanol structures omits reference to arguably the most interesting development in that field during the period surveyed, namely the observation of hydrogen bonding between SiOH centres and the π-electrons of aryl groups, initially by the late Yu.T. Struchkov and his colleagues.

As a counter to the above criticism it must be said that the coverage of transition elements seems to be much more complete: for example, the impressive treatment of iron consists of 267 pages with almost 3000 references. In various places throughout the volumes, where the reviewers have been allowed sufficient space, there are some particularly pleasing accounts: for example that by R. West of polysilanes, that by G. van Koten, S.L. James et al. of copper and gold, and that by A. Grohmann and H. Schmidbaur of gold. In an important volume that had no counterpart in the original set, 1339 pages are devoted to the use of transition metal organometallics in organic synthesis.

I particularly welcome Volume 13 by M.I. Bruce, which in 1283 pages gives references to diffraction studies of all ca. 35000 structures of organometallic compounds established between 1927 and mid 1993. In spite of the admirable service provided by the Cam-

Elsevier Science S.A.
PII S0022-328X(96)06181-5

bridge Crystallographic Data Centre (CCDC) and related sources, it is to my mind very helpful to be able to find out in seconds from this volume whether a particular compound has been studied, and also to browse through the entries on a particular element to examine the range of structures available. An excellent feature is that the list includes compounds for which the nature of the structure was clearly established but which for some reason (usually the low precision of the data) crystallographic details were not published and so gave rise to no entry at the CCDC. Professor Bruce's wise decision in this respect prompts me to protest about the increasing tendency of editors of journals, on the advice of referees, to reject any account of a structure for which the R factor based on $I > 2\sigma(I)$ is larger than ca. 10.

I suggest that if the form of the molecule appears to have been established beyond doubt (which is very often the case even for R factors well above 10) then it should be published, though with limited or no geometrical parameters, sufficient supplementary material should be available in databases or elsewhere to allow a sceptic to assess the validity of the assignment. Most organometallic, and indeed organic chemists, use X-ray diffraction to identify and establish the nature of a new compound, and the precise values of the parameters, although sometimes providing additional interesting information as a bonus, are of only secondary concern. It is illogical, and an unacceptable waste of resources, to deny publication of brief reports of structures about which there is no real doubt.

Some additional minor comments are as follows: (a) The description of the coverage of the volumes as being for 1982–1994 is a little exaggerated. There are very few 1994 references, and in some chapters suspiciously small numbers of 1993 references. (b) In the chapter on alkali metal derivatives, some 17 pages are, anomalously, devoted to compounds that do not contain metal–carbon bonds, and although this is a very interesting survey the space could more appropriately have been used to give more information on authentic organometallic species; only ca. 10 pages are devoted to these, even though the Structure Index volume lists over 300 organolithium compounds alone for which structures have been established, mainly since 1982. (c) In some places the authors fail to refer to relevant Gmelin volumes, which provide truly comprehensive coverage of the areas dealt with: this is especially noticeable in the case of indium, for which a 1991 Gmelin publication provides a complete account of all organoindium compounds published up to spring 1991. (d) There are excellent author indexes and reasonable subject indexes for each volume, and the last volume consists of complete formula and subject indexes.

Any criticisms I make above lead finally to the observation that in a perfect world these volumes could have been better, but as it is they are merely invaluable and indispensable.

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