

Book reviews

Gmelin Handbook of Inorganic Chemistry. Si — Silicon. Part A1. History.
Springer-Verlag Berlin etc., 1984, x + 168 pages, DM 587. ISBN 3-540-93508-8.

This volume, a slim one as the Gmelin series goes, is concerned with the history of silicon and some of its simple compounds. The description of the recognition and isolation of the element, methods of producing it, and some of its properties and uses takes up 72 pages, and the remainder of the book is concerned with historical aspects of hydrides (10 pages); oxides (4 pages); nitrides (7 pages); fluorides (including the interesting history of the etching of glass by hydrofluoric acid, which was first described in the 15th century) (33 pages); chlorides (11 pages); bromides (3 pages); iodides (3 pages); sulfides (7 pages); carbides (17 pages).

The section dealing with the history of silicon is by far the most interesting, and it is shown that the story extends over a markedly longer period than had previously been supposed. (In this account the most important relevant items of the literature are reproduced in the original text as well as in the English translation, so that the reader can judge for himself whether he should accept the author's conclusions.) The credit for the first isolation of elementary silicon must, it is concluded, go to Berzelius, who prepared it in 1824 by treating fluoro-silicic acid with potassium, earlier contenders for the distinction being effectively dismissed. Much credit must also go to Davy, who by 1803 had recognised that silicon was an oxide of the unknown element 'silicium' and indicated the ways in which it might be produced. (Having recently strongly criticized the use of the American style aluminum in a newly published dictionary of organometallic compounds, I was somewhat taken aback to learn that Davy, after initially proposing the names silicium and aluminium, later, by an odd lapse of taste, temporarily favoured silicum and aluminum!)

The account (by K. Rump) is well conceived and the translation from the original German in the main text is generally good, with just a few errors, though some passages are not quite correct in grammar or style, while not leaving any doubt about the meaning; e.g., "Further results to characterize this substance were again thought by G. Urry to be desirable". A tendency towards too literal translation is as its extreme in the Foreword, the last paragraph of which, for example, reads: "Quite similarly ran the development of our knowledge of several of the here-selected compounds of silicon: it became obvious that the widely-distributed accounts of the discovery of several of them required a certain correction. Thus for these materials also, for which likewise only recent decades have brought sufficient recognition of their nature, it has been attempted by the kind of citations selected to satisfy the desire of the reader for the knowledge of the facts of these matters." (Although the meaning of this paragraph can be worked out, the writing is clearly not that of a British, or even an American, author.) It is also surprising that it was thought relevant to comment that "The polypeptide linkage ... is so far unknown for silicon", and then to give only a 1943 reference in support of this statement.)

The book is very well produced, as is usual with this series, but, puzzlingly,

frequently throughout the text two or three lines (and occasionally more) are printed in bold type; I spent much time trying to decide whether this was a device to draw attention to especially important statements, and in the end decided, possibly wrongly, that the apparent emphasis is, in fact, random.

Because it is wholly historical this volume will be much less consulted than most of those in the series, and given its very high price, it will presumably be purchased only by institutions which automatically take all the Gmelin volumes and by a few specialist libraries of the history of chemistry.

*School of Chemistry and Molecular Sciences,
University of Sussex, Brighton BN1 9QJ, (Great Britain)*

COLIN EABORN

Activation of Saturated Hydrocarbons by Transition Metal Complexes, by A.E. Shilov, D. Reidel, Dordrecht, The Netherlands, 1984, ISBN 90-277-1628-5, pp. 203 + x, Dfl. 105, US\$ 39.

The activation of saturated hydrocarbons has usurped nitrogen fixation as the most popular goal of organometallic chemists. Like nitrogen fixation, methane activation can be achieved with some facility by bacteria, like nitrogen fixation it is really activation under mild conditions which is aimed at, and like nitrogen fixation one of the foremost contributors to the recent chemistry is A.E. Shilov. Consequently, it is wholly appropriate that Shilov should have produced one of the first books on the subject.

This is an excellent and useful book. Its coverage is reasonably complete and discusses the literature up to 1982. A short Introduction lead into Chapter 1 on reactions of metal complexes with compounds containing "activated" C-H bonds, which covers silylation and mercuration as well as metallations. Chapter 2 deals with alkane reactions with "superacids", atoms, and various radicals. Chapter 3 then introduces reactions with metal atoms and ions, and more especially with oxide surfaces. The organometallic meat of the book commences with Chapter 4, on homogeneous oxidation of alkanes. This really represents one of the two major areas of study, and is heavily mechanistic in its methods. It also includes biological oxidations and hydroxylations, and the related work on porphyrin complexes. This is a valuable discussion. The final Chapter deals with the other major area of study, direct reaction of transition metal compounds with alkanes, an area in which the author has made major contributions. It concentrates heavily on platinum(II), but does not ignore other systems.

In summary, this is a timely book, in which the author's training as a gas kineticist is revealed in his penchant for discussing mechanisms. It will prove valuable to a variety of researchers, and to organometallic chemists in particular, though perhaps not to nitrogen fixers, despite the cover note. However, it confirms Professor Shilov's eminence both as a nitrogen fixer and an alkane activator.

*AFRC Unit of Nitrogen Fixation,
University of Sussex, Brighton BN1 9QJ (Great Britain)*

G.J. LEIGH