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Book Review

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Organosilicon chemistry VI: from molecules to materials

Wiley-VCH, 2005,
2 volumes, 1038 pp; price £140
ISBN 3-527-31214-5 (hardcover)

Since the first example of organosilicon chemistry was reported in 1863, with the synthesis of tetraethylsilane by Friedel and Crafts, this field has continued to grow and expand into ever more diverse areas of science. These developments are reflected in *Organosilicon Chemistry VI: From Molecules to Materials*, which is the latest contribution in the series published following the biennial conference on organosilicon chemistry. This edition brings together the presentations made at the 2nd European Silicon Days Meetings held in Munich in September 2003. In *Organosilicon Chemistry VI* one of the contributions leads with the question 'Is there a future for silicon chemistry?' and concludes with 'an emphatic yes'. Reflecting this enthusiasm, this series has witnessed a steady growth in size from one volume to the next. This collection continues this trend and contains 150 short accounts, spread over two volumes, covering most aspects of modern silicon chemistry and not just organosilicon chemistry as suggested by the title. The topics discussed range from theoretical and fundamental studies of reactive silicon species to silicon-based materials and their many industrial applications. Reflecting this diversity of subjects, and following an introduction in which they summarize the key developments, the editors have grouped the contributions into six chapters covering organosilicon-based reactive intermediates; molecular inorganic silicon chemistry; transition metals in organosilicon-based chemistry; silicon in organic and bioorganic chemistry; and organosilicon compounds for industrial applications and silicon-based materials.

The first volume contains accounts covering predominantly the more academic or fundamental aspects of modern silicon chemistry. This starts with a selection of articles describing continuing developments in the chemistry of low coordinate silicon compounds such as silylenes, silyl radicals and cations. The chemistry of silyl anions, which are now available containing a variety of substituents, is covered in the largest chapter, containing almost one-third of the articles, which cover many other aspects of main group inorganic silicon chemistry, including aspects of the direct process. Transition metal silicon chemistry offers considerable potential for the synthesis of new compounds and materials and these contributions are collected in a separate chapter. In the first paper in this chapter, two general approaches are identified for the development of new silicon–metal chemistry; one based on d^0 metal–silicon single bonds and the other on metal–silicon multiple bonds. As one example of this second approach, silylene complexes ($L_nM{=}SiR_2$) have been implicated in a number of important catalytic processes, including the direct process and hydrosilylation. Reflecting this, these reactions form a key focus for much of the chemistry discussed in this chapter. The final chapter in volume one deals with organic and biological silicon chemistry. Surprisingly, given the activity around the world in this area, there is little here for the synthetic organic chemist. However there is some fascinating chemistry described, including a series of papers on enantioselective reactions of silyl and silyl-stabilized anions and some insights into the relatively unexplored world of silamedicinal chemistry.

The second volume focuses on more applied aspects. This starts with a chapter dealing with industrial applications of organosilicon compounds. This is an incredibly diverse section dealing with subjects ranging from new catalysts for siloxane synthesis to the structural modifications of the silicon components used in applications as varied as aluminium production, textile and fabric care, and construction sealants. For example, the last class includes a major article describing how an understanding of the unique organo-inorganic hybrid nature of many silicon compounds can help provide a significant benefit for the weather-proofing of classical building materials such as bricks, limestone and plaster. The last chapter in the book extends this focus to solid silicon based materials with articles discussing analytical and structural aspects as well as applications.

Almost all the articles provide at least a few additional references with some having quite extensive bibliographies containing citations as recent as 2004. Consequently, whilst none of these contributions is intended as a comprehensive account, they do provide a convenient initial source of information for the specialist or interested newcomer to the field. Since much of current organosilicon chemistry spans traditional disciplines several articles could equally be placed in different chapters. To aid the reader locate these, the book concludes with both an author and subject index. However, the latter appears to be simply a compilation of the individual article keywords and, therefore, is not as helpful as it could be. For example, this contains two entries for DFT calculations (DFT calculations and density functional calculation) but nothing under enzyme or inhibition which could lead one to miss the interesting articles on silane diol protease inhibitors and serotonin/noradrenalin reuptake inhibitors.

In conclusion, this set continues to provide an accessible overview of the fascinating diversity of science found in modern silicon chemistry. Reflecting its origins as the output of a single conference, this is not a general reference work. However, these books will be of use to those wishing to keep abreast of the many developments in this field.

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