



News from Low-Valent Tetreles: Structures and Reactivity of Free and Co-ordinated Stannylenes

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Low-valent compounds of group 14 (tetrelles), so-called stannylenes, show a wide structural and reactivity diversity.[1] In this contribution, some recent in-progress investigations on stannylenes with alkoxy and amido substituents are discussed.

The molecular structure of the bis-substituted $[(OC)_5W]_2[Sn_2(O^tBu)_4]$ shows two rotational isomers of the pentacarbonyl fragments.[2] The ^{119}Sn solid state NMR spectrum of the mono-substituted derivative $[(OC)_5W][Sn_2(O^tBu)_4]$ surprisingly shows a similar chemical shift anisotropy on both the free and substituted tin atom, which is yet not fully understood.

The strong distortions in the molecular structure of the new dimeric heteroleptic stannylene $[Sn_2(\mu-NEt_2)_2Cl_2]$ are due to a weak but significant intermolecular chlorine-tin interaction in the crystal packing.

Complexation of the so-called Veith-stannylene $[Sn(N^tBu)_2SiMe_2]$ with $\{W(CO)_5\}$ usually is straightforward. The bonding of one molecule thf to tin in $[(OC)_5W][Sn(thf)(N^tBu)_2SiMe_2]$ is indicative for the increased Lewis acidity of the stannylene atom on co-ordinating even sterically demanding electron-releasing groups. A surprising finding, however, comes from the reproducible formation of di-stannylene complexes, in which a single O^{2-} atom co-ordinated tin atoms $[(OC)_5M]_2[Me_2Si(N^tBu)_2Sn]_2O(H)_2$ (M= Cr, W). The composition and formation of the complexes is not yet unambiguous. But there is strong structural evidence that these complexes are an intermediate step in the hydrolysis of the parent stannylene, which could be trapped by transition metal complexation.

Currently, we are extending our studies of stannylenes to the reactivity towards white phosphorus, P_4 . A lot of information has been gathered on the reactivity pathways with transition metal complexes focusing on structures and mechanisms.[3] Some reactions of the first p-block main group elements have been occasionally reported,[4] but up to now, no characterisation of products from stannylene- P_4 interactions could be published.[5] We will present preliminary experiments on this now field of stannylene chemistry.

References:

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- [4] see for example: Y. Peng, H. Fan, H. Zhu, H. W. Roesky, J. Magull, C. E. Hughes *Angew. Chem.* **2004**, 116, 3525-7; *Angew. Chem. Int. Ed.*, **2004**, 43(26), 3443-45.
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