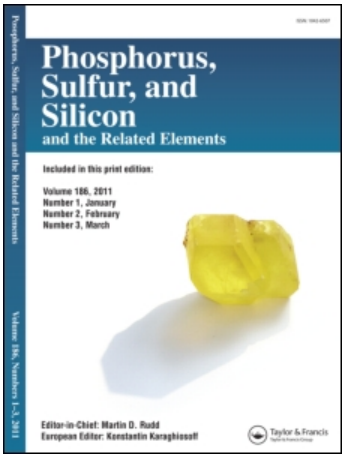

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Reaction Pathways towards Novel Open Chain and Cyclic Stannasilanes

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Cyclic stannasilaalkanes are formed by rearrangement reactions of open chain and branched Si-Sn derivatives. Furthermore, we report on first attempts towards three membered Si-Sn rings via lithio or potassio substituted stannanes.

Keywords: silicon-tin compounds; stannanes; oligosilanes

INTRODUCTION

Recently, we reporteded on cyclic Si-Sn compounds[1, 2] which were synthesized using `one pot´ reactions of oligomeric silanes with chlorostannanes in the presence of magnesium or stepwise syntheses *via* hydrido and chloro substituted Si-Sn chains[3].

Here we describe base-catalyzed ring closing reactions of linear and branched stannasilane chains yielding unusual five or six membered rings containing tin atoms in addition to silicon.

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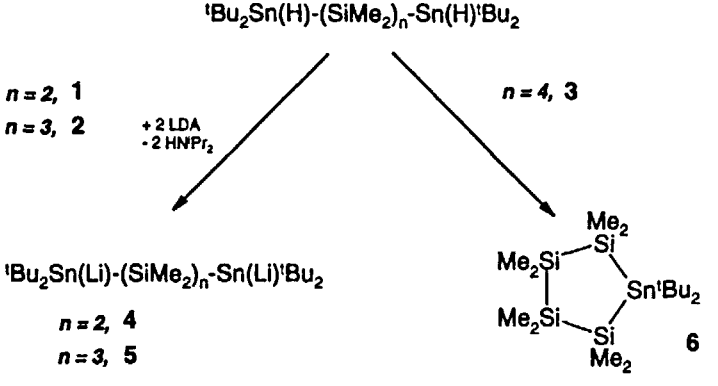
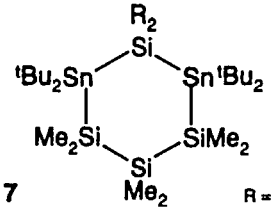
RESULTS AND DISCUSSION

As in recent reactions, hydrido-substituted α,ω-stannaoligosilanes (n=2, **1**; n=3, **2**; n=4, **3**) were used as precursors. Reacting **1** with two equivalents of lithium diisopropyl amide (LDA) results in α,ω-dimetallated species **4** and **5** with Si chain lengths of two and three atoms. Surprisingly, in case of the tetrasilane chain the reaction quantitatively yields the stannatetrasilacyclopentane **6**.



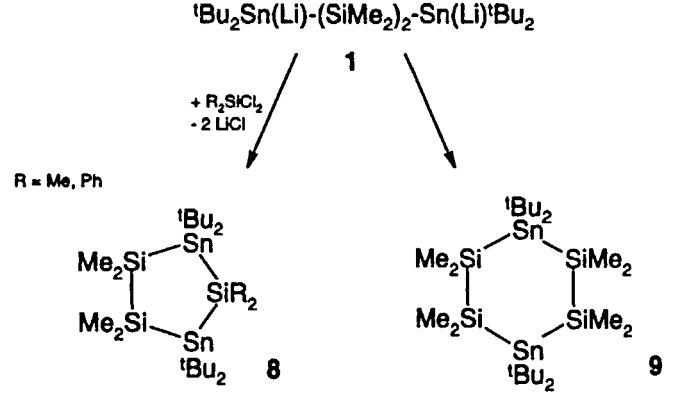
Scheme 1: Reactions of 1-3 with 2 equiv. of LDA

Up to now, it was not possible to clarify the reaction mechanism for the cleavage of the di-tert.butylstannyl group. The α,ω-dimetallated species **5** with three Si atoms in the chain is then reacted with R_2SiCl_2 yielding the expected six-membered ring **7**; no byproducts are observed.



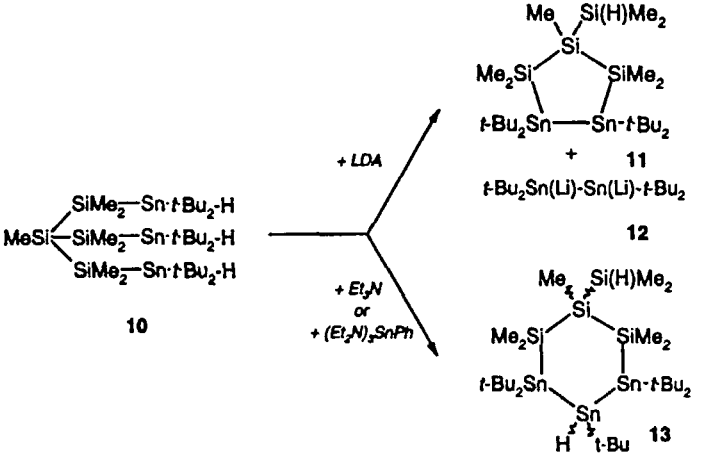
7 R = Me, Ph

When reacting the 1,4-dilithio-substituted stannasilane chain **4** with R_2SiCl_2, we find compound **8** which is accompanied by the unexpected byproduct **9**. Seemingly, a reaction similar to the preparation of **6** takes place. In contrast to the four-membered silicon chain, the shorter two-membered chain cannot react on an intramolecular reaction pathway, therefore two Sn-Si-Si fragments combine to compound **9**.



Scheme 2: Formation of **8** and **9**

Reactions of the branched stannasilane **10** with three equivalents of LDA yield the cyclopentane **11** and the distannide **12**. Similar to the reaction of the open chain tetrasilane, no lithiated Si-Sn products can be observed.[4]

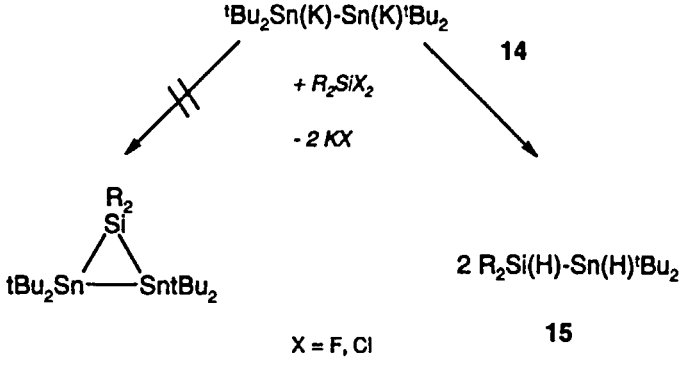


Scheme 3: Base -catalyzed rearrangement of **10**

Treatment of **10** with amines lead to an amine-catalyzed intramolecular ring closing reaction yielding the six membered ring **13**. The formation of **13** is the result of a silicon-tin, and surprisingly a tin-carbon bond cleavage; in addition, two tin-tin bonds have been formed.[4]

First attempts towards three-membered Si-Sn rings by reacting the dipotassio distannide **14** with diorganodichloro- or difluorosilanes did not

result in the expected ring systems. Surprisingly, the 1,2-dihydridostannasilanes **15** are formed in nearly quantitative yield.



Scheme 4: Reaction of **14** with diorganodichlorosilanes

Further studies towards the new 1,3-dichloro substituted disilylstannes **16** and 1-sila-2,3-distannapropanes **17** are in progress and will be reported later.

Cl-SiR_2-Sn^tBu_2-SiR_2-Cl **16**

Cl-SiR_2-Sn^tBu_2-Sn^tBu_2-Cl **17**

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