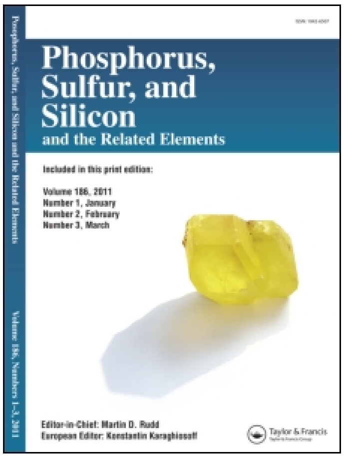

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# Preparation and Reactions of Permethylated Cyclooligosilane Alkali Metal Derivatives

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# PREPARATION AND REACTIONS OF PERMETHYLATED CYCLOOLIGOSILANE ALKALI METAL DERIVATIVES

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Abstract A simple way for the synthesis of potassium undecametylcyclohexasilane is described and discussed.

## Introduction

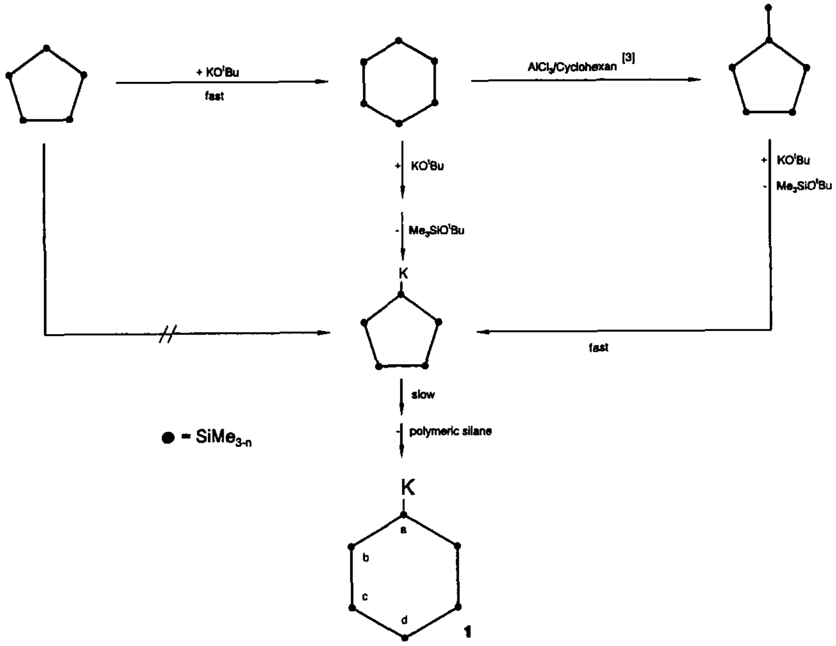
The highly reactive potassium undecamethylcyclohexasilane is a suitable starting material for the synthesis of several cyclic silanes. Potassium undecamethylcyclohexasilane 1 has been synthesized by two methods. Both methods have some disadvantages[1a-b]. On the basis of these facts we tried to develop a simple way to synthesize potassium undecamethylcyclohexasilane.

## Synthesis

Potassium undecamethylcyclohexasilane is formed in the reaction of the permethylated cyclohexasilane with potassium t-butanolate in glyme solvents at room temperature over a period of two weeks. This provides a simple access to 1.

The observed reaction products can be rationalized by a complicated ring-chain-ring-equilibrium. The first step is a Si-Si-bond cleavage followed by a methyl group shift. Trimethyl(t-butoxy)silane is the byproduct. The resulting potassium nonamethylcyclopentasilane reacts slowly to 1. The byproduct of this step is a polymeric silane. The theoretical yield is nearly 80% of the starting cyclosilane. Practically the reaction of 1, e.g., with propylchloride yields 65 - 75% propylundecamethylcyclohexasilane.

Conversions of decamethylcyclopentasilane and trimethylsilylnonamethylcyclopentasilane with potassium t-butanolate leads only to 1 in the described way. Potassium nonamethylcyclopentasilane is only an intermediate which can not be isolated.



1 reacts with zirconocenedichloride at -78°C to a dark red colored product (mp: 188-190°C), which is the first group IV derivative of a cyclic silane. A second substitution step does not occur even in the presence of two equivalents of potassium undecamethylcyclohexasilane.

Si-Si-bonds are formed when 1 is reacted with phenylthiooligosilanes. Alkali metal thiophenolates, which are byproducts in the reaction can be easily removed. Also reaction of triethyl- or tributylstannylundecamethylcyclohexasilane with alkali metal silanes leads to the formation of Si-Si-bonds. In contrast to the related alkali metal halide elimination reactions of organohalooligosilanes, transmetallations are never observed in these reactions. Examples are described in [2].

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