

Novel Five- and Six-Membered Diazasilacycloalkanes: Synthesis, Structure and Properties

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The reactions of *N,N'*-dimethylethylenediamine **1** and *N,N'*-diphenylethylenediamine **2** with equimolar amounts of 1,2-dichlorotetramethyldisilane **3** give six-membered heterocycles. Five-membered rings are formed in the reaction of the diamines **1** and **2** with 1,1,2,2-tetrachlorodimethyldisilane **4** as well as with hexachlorodisilane **5**. Whilst the conversions of the disilanes **3** and **4** with the diamine **2** gave no products of a disproportionation reaction, the treatment of the disilane **4** with the diamine **1** and of the disilane **5** with both diamines resulted in cyclic aminosubstituted monosilanes which originate from the disproportionation of **4** and **5** beside the expected five-membered cyclic disilanes. All compounds have been characterized by multi-nuclear NMR, IR and mass spectroscopy. In case of the *N*-phenylsubstituted compounds **6**, **7** and **9** the crystal structures have been determined by X-ray diffraction analysis. Bis- [*N,N'*-diphenyl-2-methyl-1,3-diaza-2-silacyclopentane] **6** crystallizes in the chiral orthorhombic space group $P2_12_12_1$ ($Z = 4$). Both silaimidazolidine rings in **6** show half chair conformation. All nitrogen atoms of this molecule are almost planarized (sum of angles: 356.3° at N1, 359.5° at N2, 356.7° at N3 and 357.5° at N4). Bis- [*N,N'*-diphenyl-2-chloro-1,3-diaza-2-silacyclopentane] **7**, resulting from the reaction of disilane **5** with diamine **2**, crystallizes in the orthorhombic space group *Pbcn* ($Z = 4$). Its nitrogen atoms are almost planar (sum of angles: 357.9° at N1, 356.7° at N2). *N,N'*-diphenyl-2,2,3,3-tetramethyl-1,4-diaza-2,3-disilacyclohexane **9** crystallizes in the chiral monoclinic space group $P2_1$ ($Z = 2$) and shows a twisted conformation. One nitrogen atom has a trigonal planar environment (sum of angles: 359.9° at N1), while the angle sum of the second one indicates a trigonal pyramidal conformation (sum of angles at N2: 350.6°).

Key words: Aminosilane, Disilane, Heterocycle, Diazasilacyclopentane, Diazadisilacyclohexane