Formation of a New Silicon-containing Ring System, 1,1,2,2,3,3-Hexamethyl-4,5-diphenyl-1,2,3-trisilacyclopent-4-ene

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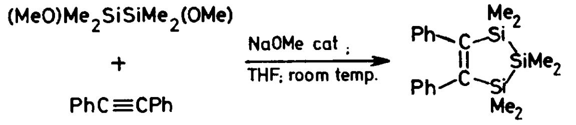
Summary Reaction of *sym*-dimethoxytetramethyldisilane with diphenylacetylene in the presence of NaOMe catalyst in tetrahydrofuran gave a new silicon-containing ring system, 1,1,2,2,3,3-hexamethyl-4,5-diphenyl-1,2,3-trisilacyclopent-4-ene.

THE chemistry of small ring silicon compounds, such as silacyclopropenes[1] and disilacyclobutenes[1a,1c,2] is a subject of current interest. However, there are no reports on the formation of five-membered ring silicon compounds in this type of homologue. We here report that the sodium methoxide catalysed reaction of *sym*-dimethoxytetramethyldisilane with diphenylacetylene in tetrahydrofuran (THF) gives 1,1,2,2,3,3-hexamethyl-4,5-diphenyl-1,2,3-trisilacyclopent-4-ene (I), the first reported example of this cyclic silicon system.

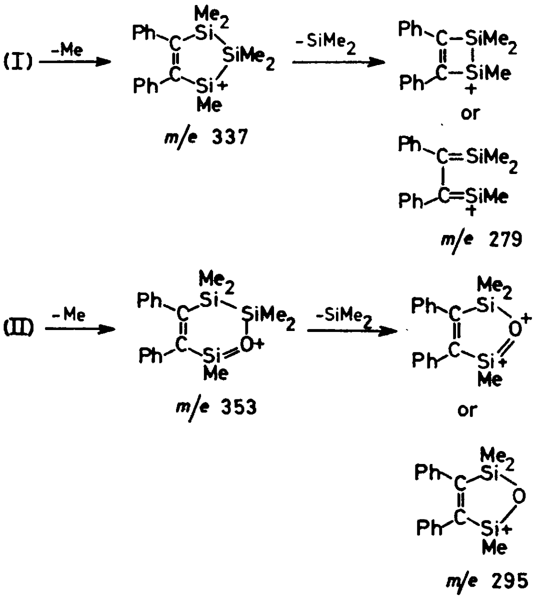


(I)

A mixture of the disilane (11·2 mmol) and diphenylacetylene (9·6 mmol) in tetrahydrofuran (10 ml) was stirred for 10 h in the presence of NaOMe (2·8 mmol) at room temperature under Ar. After the addition of 2·5 g of solid NH_4Cl the mixture was stirred (24 h) and filtered. Evaporation of the resulting solution gave a solid on cooling. On trituration with warm methanol, (I) remained as a crystalline solid (m.p. 161—163 °C;† 0·4 g, 30% based on the disilane used), which was recrystallized from THF–MeOH to give an analytical sample (m.p. 164—165 °C†), which gave satisfactory elemental analyses and the mass spectrum of which showed a strong molecular ion at *m/e* 352. Its ^1H n.m.r. spectrum (in CCl_4) showed two singlets in a 12 : 6 ratio, as expected, at δ 0·14 and 0·30, respectively, and an aromatic multiplet (10H) at 6·50—7·15. Its i.r. spectrum (KBr pellet) was also consistent with the structure (I) and exhibited strong bands at 1595 (Ph adjacent to the C=C bond) and 1243 cm^{-1} (Si–Me).

Compound (I) was fairly stable in air, but reacted readily with moisture in the presence of NaOMe yielding a new six-membered ring siloxane, 1,1,2,2,4,4-hexamethyl-5,6-diphenyl-1,2,4-trisila-3-oxacyclohex-5-ene (II), m.p. 88—90 °C, which gave satisfactory elemental analyses and the n.m.r. spectrum which showed two singlets due to Si–Me and a multiplet due to the phenyl ring at δ 0·08, 0·34, and 6·50—7·10 in a ratio of 12 : 6 : 10, respectively. The mass spectrum (mol. wt. 368) and i.r. absorptions at 1596 (Ph–C=C), 1245 (Si–Me), and 1010 cm^{-1} (Si–O–Si) also support the assigned structure.

Further, the mass spectra of compounds (I) and (II) showed that the dominant mode of the decompositions appears to be loss of CH_3 ($M - 15$) followed by loss of dimethylsilylene, forming the respective smaller ring ions (Scheme).



SCHEME

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† Sealed capillary.

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