

## LETTERS TO THE EDITOR

# Liquid-Phase Oxidation of Pentamethyldisilane with Oxygen

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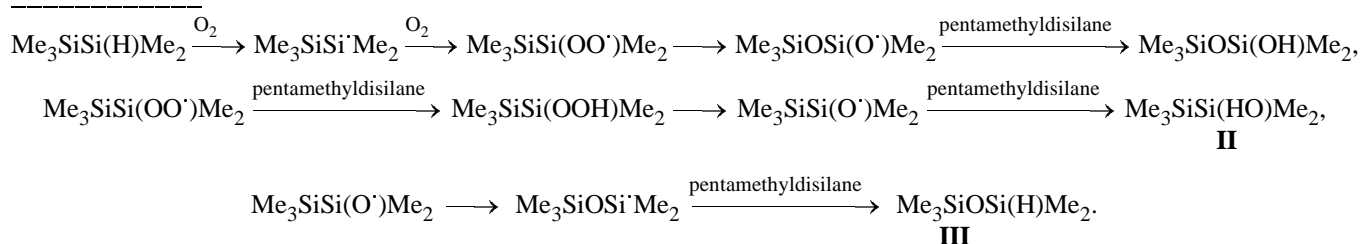
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Tris(trimethylsilyl)silane reacts with oxygen to form bis(trimethylsiloxy)(trimethylsilyl)silane ( $\text{Me}_3\text{SiO})_2\text{Si}(\text{H})\text{SiMe}_3$  as a major reaction product [1]. Oxidation of pentamethyldisilane can be used as a model reaction for studying oxidative conversions of silane polymers [2]. However, this reaction has not yet been studied.

Using IR spectroscopy, gas chromatography, and mass spectrometry we found that the major oxidation

products of pentamethyldisilane at 25–65°C are pentamethyldisiloxanol (**I**), pentamethyldisilanol (**II**), and pentamethyldisiloxane (**III**). The IR spectra of oxidized pentamethyldisilane samples contained absorption bands at 1060 and 3200–3600  $\text{cm}^{-1}$ , characteristic of Si–O and O–H bonds, respectively. The silylhydroperoxide  $\text{Me}_3\text{SiSi}(\text{OOH})\text{Me}_2$  was not found among the reaction products. The formation of the major reaction products can be represented by the following scheme.



Pentamethyldisilane was prepared from chloropentamethyldisilane [3]. Pentamethyldisilanol (**II**) and pentamethyldisiloxanol (**I**) were synthesized starting from chloropentamethyldisilane and 3-acetoxy-1,1,1,3,3-pentamethyldisiloxane, respectively [4, 5]. Pentamethyldisiloxane (**III**) is a commercial product (ABCR).

The oxidation of pentamethyldisilane with oxygen was performed in a temperature-controlled glass reactor with a magnetic stirrer. The temperature of the reaction mixture was maintained constant to within  $\pm 1^\circ\text{C}$ . Oxygen was fed from a rubber balloon at 1 atm.

Thin-layer chromatography was performed on Silicagel-60 F254 plates (Merck). The IR spectra were obtained on a Nicolet-205 FT-IR spectrophotometer in a NaCl cell (0.5 mm) with a standard resolution of 2  $\text{cm}^{-1}$  in the range 400–4000  $\text{cm}^{-1}$ . Gas chromatography–mass spectrometry was performed on an HP-5890 gas chromatograph with an HP-5972 mass-selective detector, column HP-5, temperature program

70–280°C (10 deg/min).

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