

*The Polyaddition of Diphenylsilane to  
Difunctional Unsaturated Compounds*

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Since about 1947, it has been known that trichlorosilane adds to olefinic double bonds, under the influence of peroxide catalysts<sup>1)</sup>, azo catalysts<sup>2)</sup>, and platinum

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1) L. H. Sommer et al., *J. Am. Chem. Soc.*, **69**, 188 (1947); **70**, 484 (1948); C. A. Burkhard et al., *ibid.*, **69**, 2687 (1947); R. H. Krieble, U. S. Pat., 2,524,529. (1950).  
2) R. V. Lipscomb, U. S. Pat., 2,570,462 (1951).

catalysts<sup>3,4</sup>. Methylchlorosilane<sup>5</sup>, phenylsilane<sup>6</sup>, diphenylsilane<sup>6</sup> and phenylmethylsilane<sup>6</sup> also have been added to olefins, by the same method. Tribromosilane has been added to olefins, under the influence of ultraviolet light<sup>7</sup> and also at elevated temperatures<sup>8</sup>.

Recently, platinum catalyzed additions of some chloro- and ethoxysilanes to a variety of vinyl<sup>9</sup>, allyl<sup>9</sup> and methacrylic monomers<sup>10</sup> have been reported to give polymeric products in good yield under mild conditions.

I have now carried addition reaction between difunctional unsaturated compounds. (divinyltetramethyldisiloxane or

diallyl phthalate etc.) and diphenylsilane. In this case, the polyaddition products were obtained as resinous solid or viscous oily liquids.

Diallyl phthalate (4.92 g., 0.02 mol.), diphenylsilane (3.68 g., 0.02 mol.) and platinum black catalyst (0.03 g.) were placed in a glass tube and it was sealed in a stream of nitrogen. The tube was heated at 110~120°C in an air oven for 50 hours. The reaction product was dissolved in benzene (100 c.c.) and reprecipitated with methanol (200 c.c.). The precipitate was separated and dried in a vacuum desiccator at 50°C for 7 days and analyzed for silicon and the molecular weight was determined by cryoscopic method in benzene.

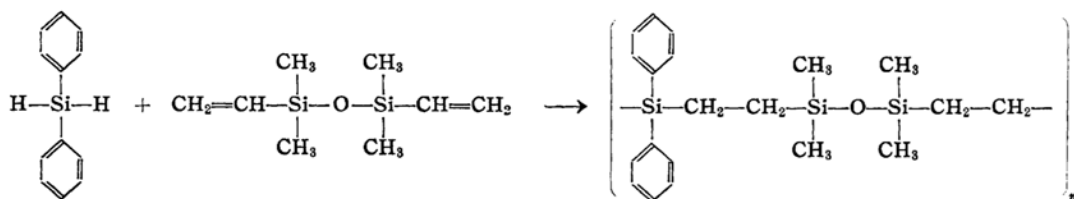
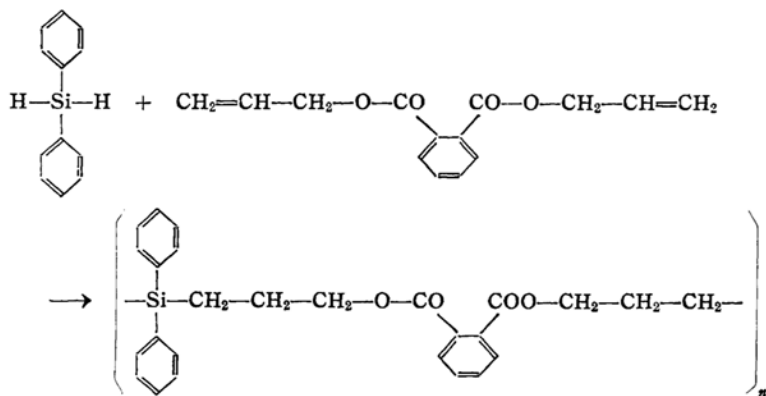
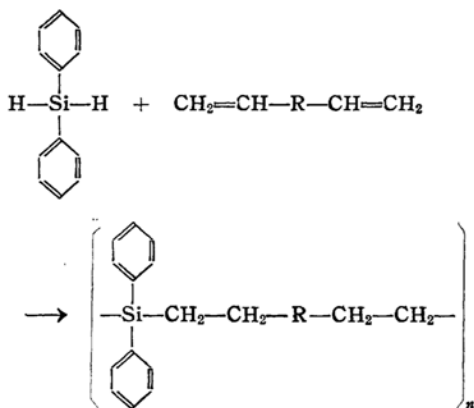
Anal. Found: Si, 5.34. Calcd. for  $C_{28}H_{26}O_4Si$ : Si, 5.83 %. Mol. Wt., 2390. Yield, 76 %.

Divinyltetramethyldisiloxane (3.72 g., 0.02 mol.), diphenylsilane (3.68 g.) and platinum black (0.03 g.) were placed in a glass sealed tube. The tube was heated at 110~120°C in an air oven for 50 hours. The reaction product was dissolved in benzene and reprecipitated with methanol. The product was dried in a vacuum desiccator at 50°C, for 7 days, analyzed for silicon, and the molecular weight was determined.

Anal. Found: Si, 22.46. Calcd. for  $C_{20}H_{30}OSi_2$ : Si, 22.70 %. Mol. Wt., 2160. Yield, 78 %.

Further study is in progress.

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3) G. H. Wagner, Brit. Pat., 670,617 (1952), U.S. Pat., 2,632,013, 2,637,738 (1953).

4) J. L. Speier et al., *J. Am. Chem. Soc.*, **79**, 974 (1957).

5) E. T. McBee et al., *ibid.*, **79**, 2326, 2329 (1957).

6) J. L. Speier et al., *ibid.*, **78**, 2278 (1956).

7) A. J. Topchiev et al., *Doklady Akad. Nauk. S.S.S.R.*, **86**, 965 (1952).

8) A. J. Barry et al., U.S. Pat., 2626,271 (1953).

9) L. Goodman et al., *J. Am. Chem. Soc.*, **79**, 3073 (1957).

10) L. H. Sommer et al., *ibid.*, **79**, 2768 (1957).