

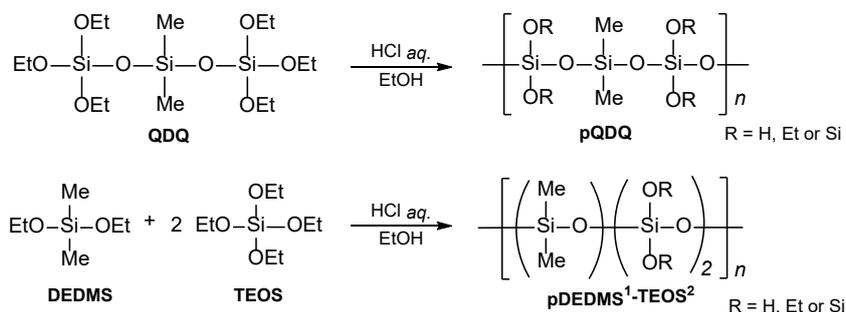
## Synthesis and Properties of Polysiloxanes from Monomers Consisting of Different Silicon Units

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Polysiloxanes have attracted much attention because of their unique properties such as transparency, thermal stability, and mechanical strength. Although material properties of polysiloxanes can be changed by the unit structure of silicon atoms with the chemical structural formulae of  $[R_{(4-n)}SiO_{0.5}]_n$  M (n=1), D (n=2), T (n=3), and Q (n=4)<sup>1)</sup>, there are few reports on the synthesis of oligomers consisting of multiple components and their polymerization. In this study, we synthesized alkoxytrisiloxane monomers with QDQ and TDT structures, prepared polymer and gel films by sol-gel process, and measured them by GPC, NMR, IR, UV-Vis, TGA, and tensile strength test.

The polymers, pQDQ, pTDT, an equivalent of diethoxy(dimethyl)silane (DEDMS) and two equivalents of tetraethoxysilane (TEOS) polymer pDEDMS<sup>1</sup>-TEOS<sup>2</sup>, and an equivalent of DEDMS and two equivalents of tetraethoxysilane (TEOS) polymer pDEDMS<sup>1</sup>-TEOS<sup>2</sup>, were prepared respectively. The polymers with approximately  $M_w$  10,000 were obtained. Transparent gel films were obtained from pQDQ, pDEDMS<sup>1</sup>-TEOS<sup>2</sup>, and pTDT, although pDEDMS<sup>1</sup>-MTES<sup>2</sup> could not be obtained because pDEDMS<sup>1</sup>-MTES<sup>2</sup> could not solidify. The gel films between pQDQ and pDEDMS<sup>1</sup>-TEOS<sup>2</sup> showed similar structure and properties except for tensile strength; pQDQ film showed higher young's modulus and breaking stress than those of pDEDMS<sup>1</sup>-TEOS<sup>2</sup> film, which suggesting that arrangement of Q and D units affect mechanical strength of the gel films. pTDT had weaker mechanical strength than that of pQDQ, which is due to the lower cross-linking point of the ethoxy group in pTDT.



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