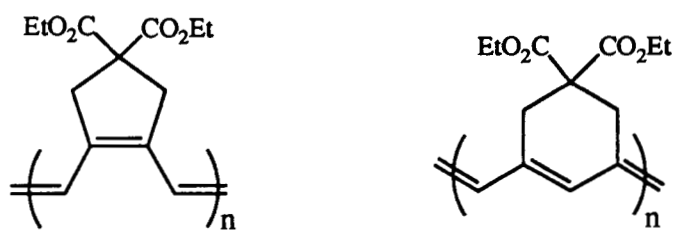
$Mo(CH\text{-}t\text{-}Bu)(NAr)[OCMe(CF_3)_2]_2$ in dimethoxyethane will smoothly polymerize the diethylmalonate derivative ($X = C(CO_2Et)_2$) in a living manner, as shown by observation of new H_α resonances at 13.03 and 12.41 ppm that are characteristic of α proton resonances in vinyl alkylidene complexes, the linear increase in molecular weight with monomer conversion, and the synthesis of narrow dispersity block copolymers containing MTD. No resonances in the range of 7.5 to 8.5 ppm characteristic of β protons in vinyl alkylidene complexes were observed, suggesting that no disubstituted alkylidene complexes were present. We tentatively assign the new H_α resonances to complexes in which a five-membered ring or six-membered ring is attached to the alkylidene carbon atom. The absolute molecular weight of all polymers has been determined by on-line solution viscometry on the GPC effluent. Determination of the absolute molecular weight directly in this manner is possible for polymers that may be considered solvated "random coils", and is now routine in our laboratory.

Poly$\mathbf{1}_n$ (**1** = dipropargyldiethylmalonate; Table II) is very soluble in DME, THF, acetone, toluene, dichloromethane, chloroform, and acetonitrile, but not pentane. Approximately 5% of a polymer with double the expected molecular weight appears in poly$\mathbf{1}_{80}$, which we ascribe to a small amount of cross-linking through "dangling" terminal triple bonds. No acetylenic C-H bonds were detected in a solution IR spectrum of poly$\mathbf{1}_{80}$. The ^{13}C NMR spectrum of poly$\mathbf{1}_{80}$ reveals two carbonyl carbon resonances, while the ^{13}C NMR spectrum of poly**1** prepared using a $MoCl_5$ catalyst, which is proposed to contain six-membered rings, revealed only one carbonyl carbon resonance.[15] Therefore we speculate that poly$\mathbf{1}_n$ consists of a random distribution of five-membered and six-membered rings formed through what is nominally tail-to-tail and head-to-tail cyclopolymerization of the two acetylenic bonds in the monomer, viz.