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"Chiral Amino Siloxy Dienes in the Diels-Alder Reaction: Applications to the Asymmetric Synthesis of 4-Substituted and 4,5-Disubstituted Cyclohexenones, and the Total Synthesis of (–)-α-Elemene"

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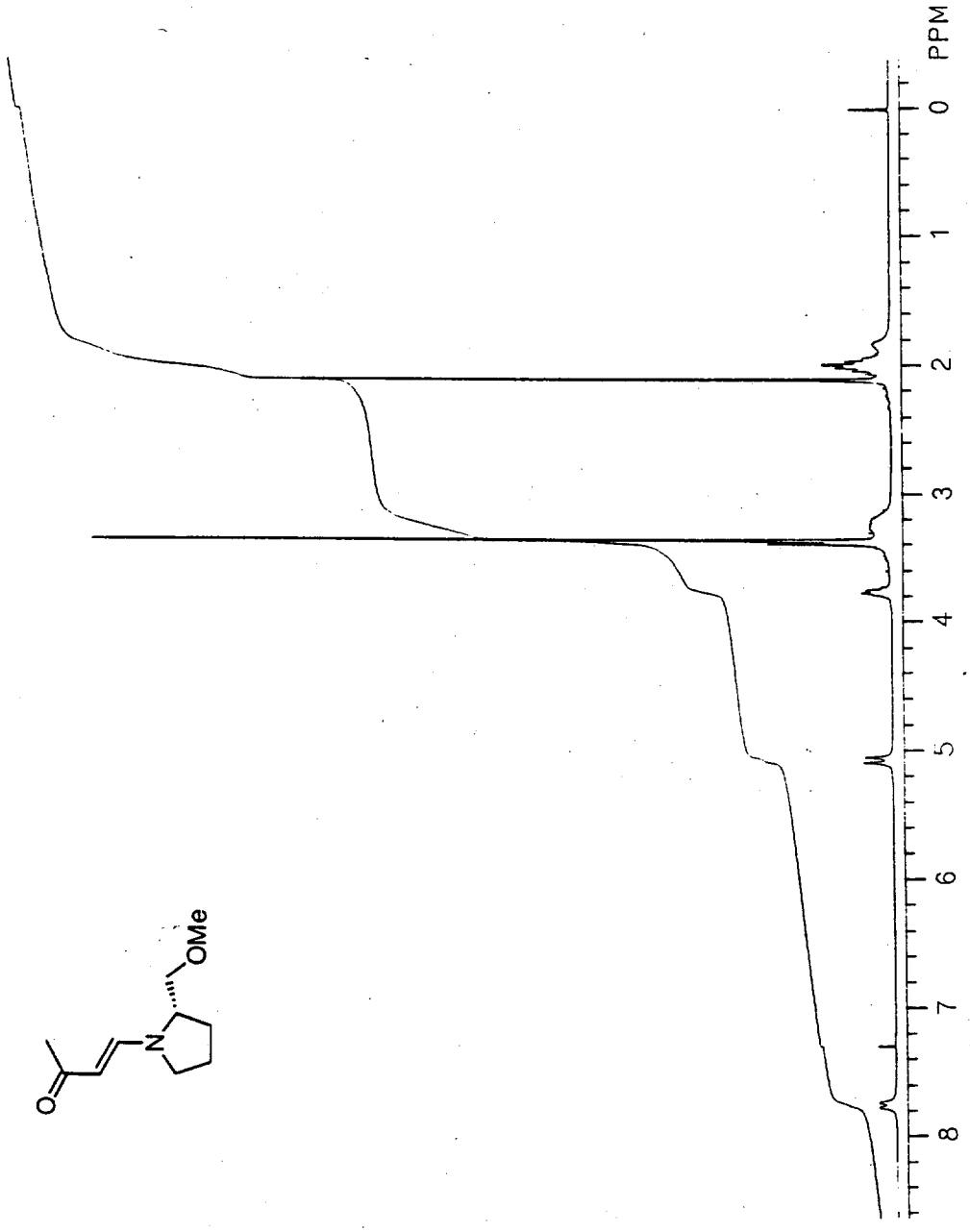
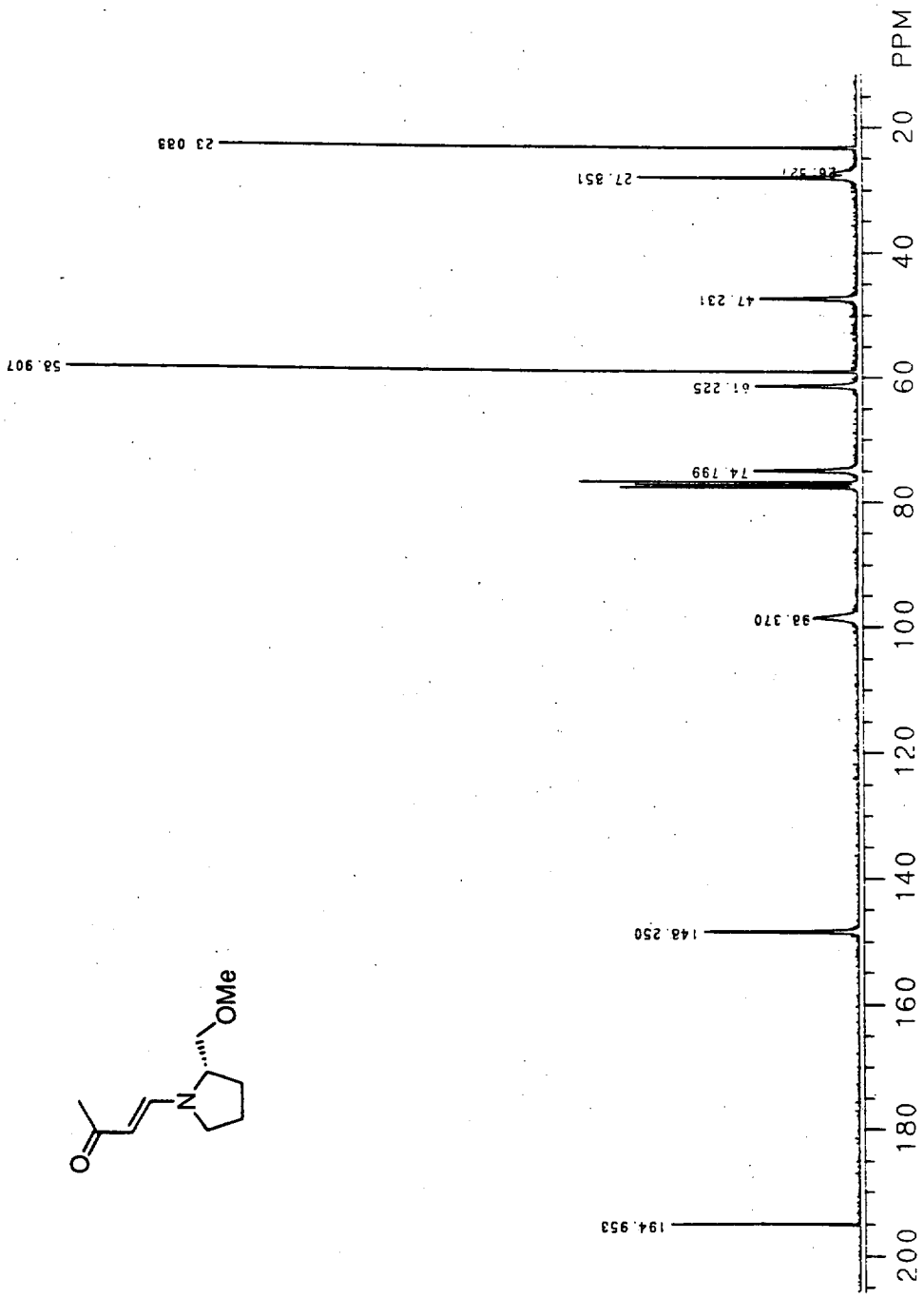
SUPPORTING INFORMATION

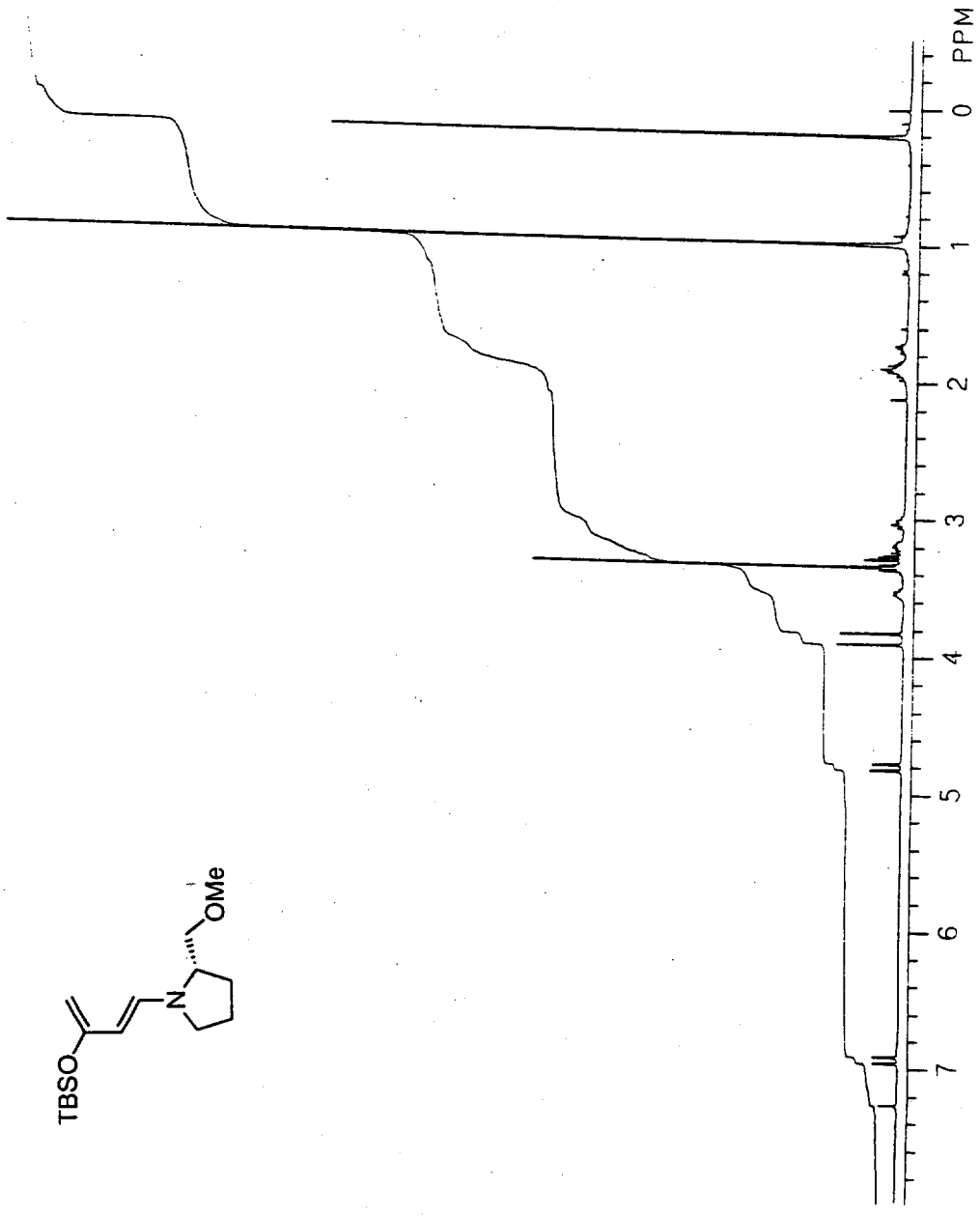
General Methods. All reactions were carried out under a nitrogen atmosphere. Tetrahydrofuran and diethyl ether were purified by distillation from potassium/benzophenone ketyl. Dichloromethane, benzene, toluene, and triethylamine were distilled from calcium hydride. All other reagents were reagent grade and purified where necessary. KHMDS was used from newly opened 100 mL bottles, purchased from Aldrich, Inc. Reactions were monitored by thin layer chromatography (TLC) using 250 mm Whatman precoated silica gel plates. Flash column chromatography was performed over EM Science Laboratories silica gel (230-400 mesh). Melting points are uncorrected. ^{1}H NMR and ^{13}C NMR chemical shifts are reported as δ values (ppm) relative to TMS, the internal standard. Mass spectra were from The Ohio State University Campus Chemical Instrumentation Center. Optical rotations were measured on Perkin-Elmer 241 polarimeter at the sodium D line (1 mL sample cell).



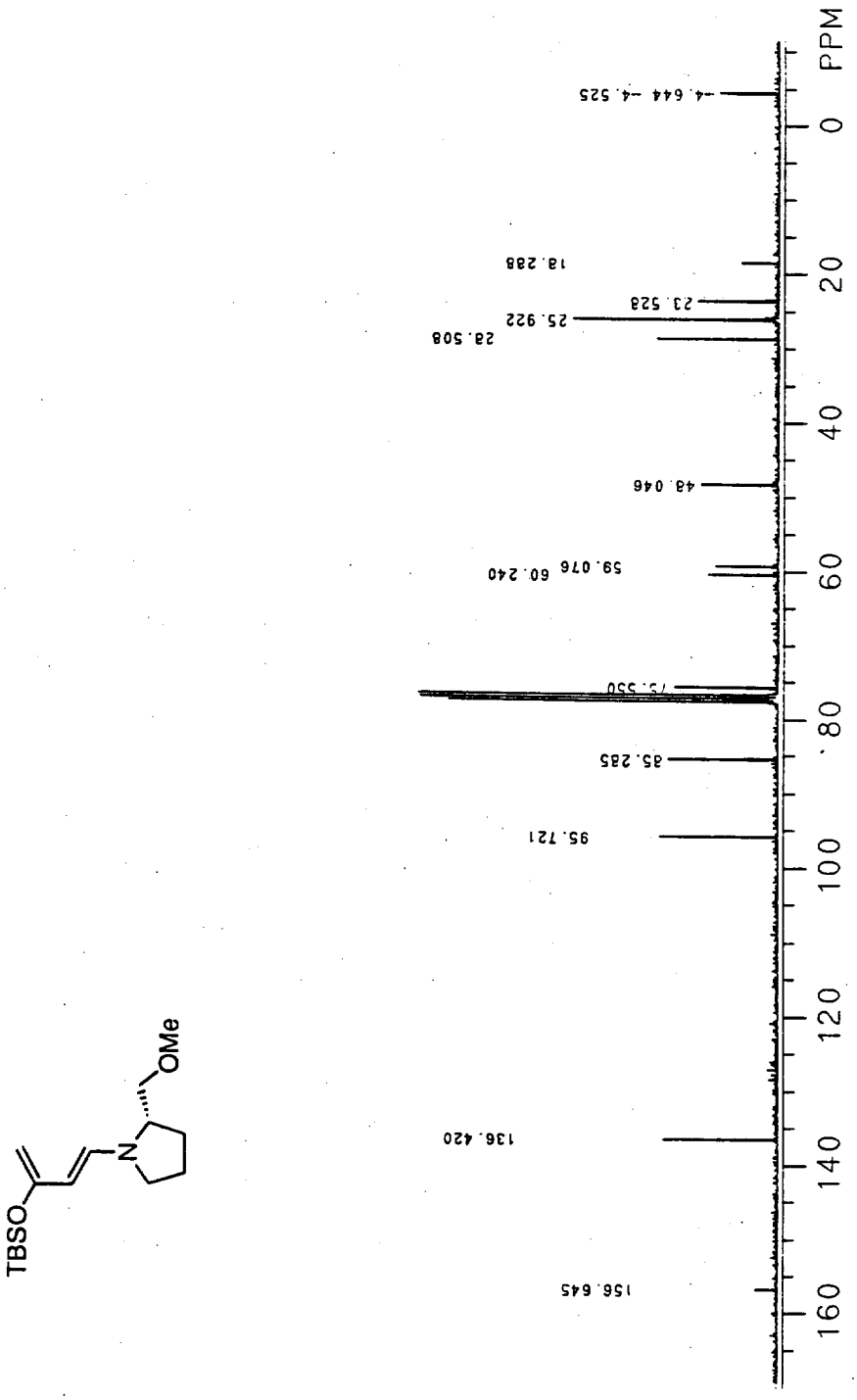
^{1}H NMR Spectrum of 2a (300 MHz, $CDCl_3$)



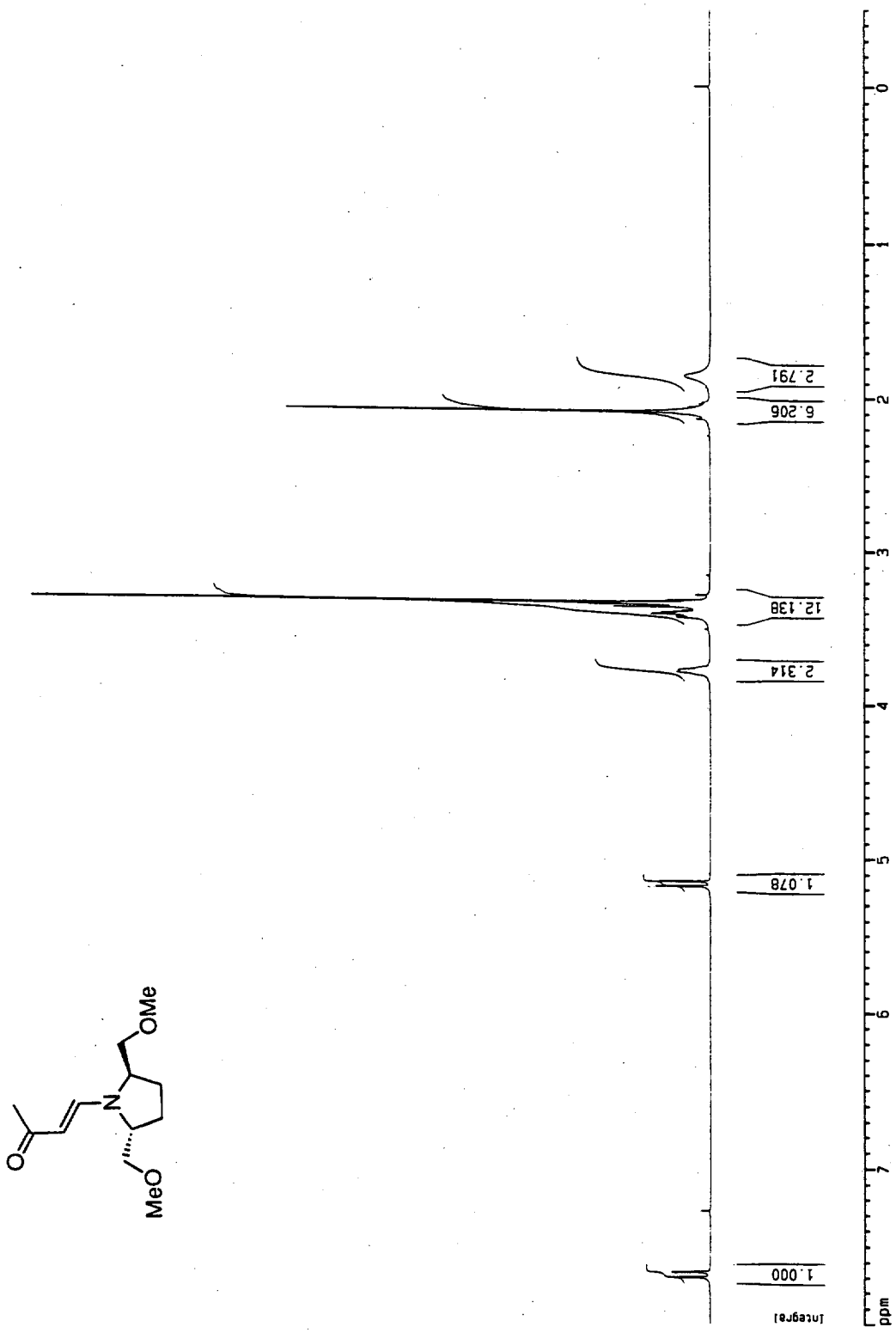
^{13}C NMR Spectrum of 2a (75 MHz, $CDCl_3$)



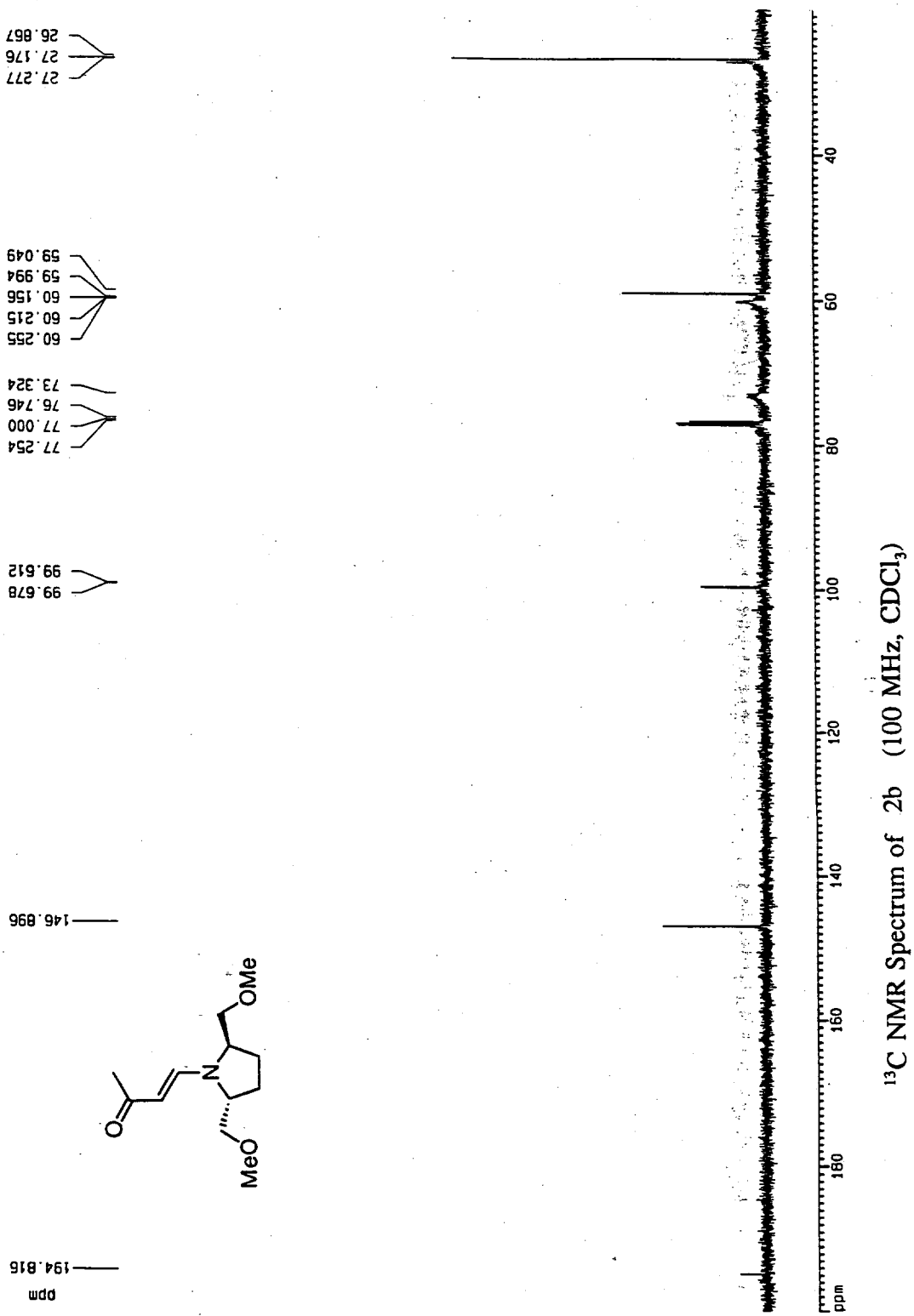
^{1}H NMR Spectrum of 3a (300 MHz, $CDCl_3$)



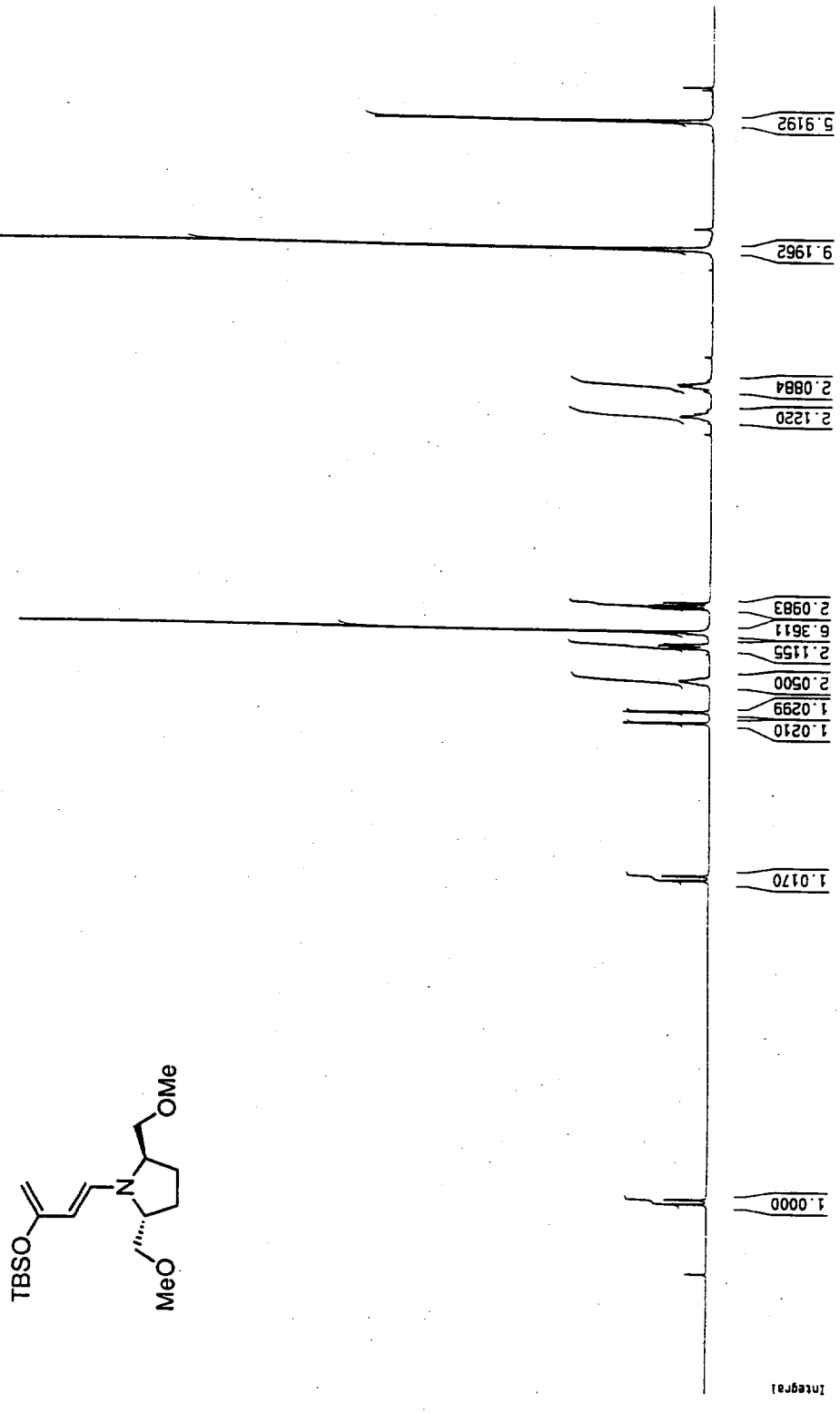
^{13}C NMR Spectrum of 3a (75 MHz, $CDCl_3$)



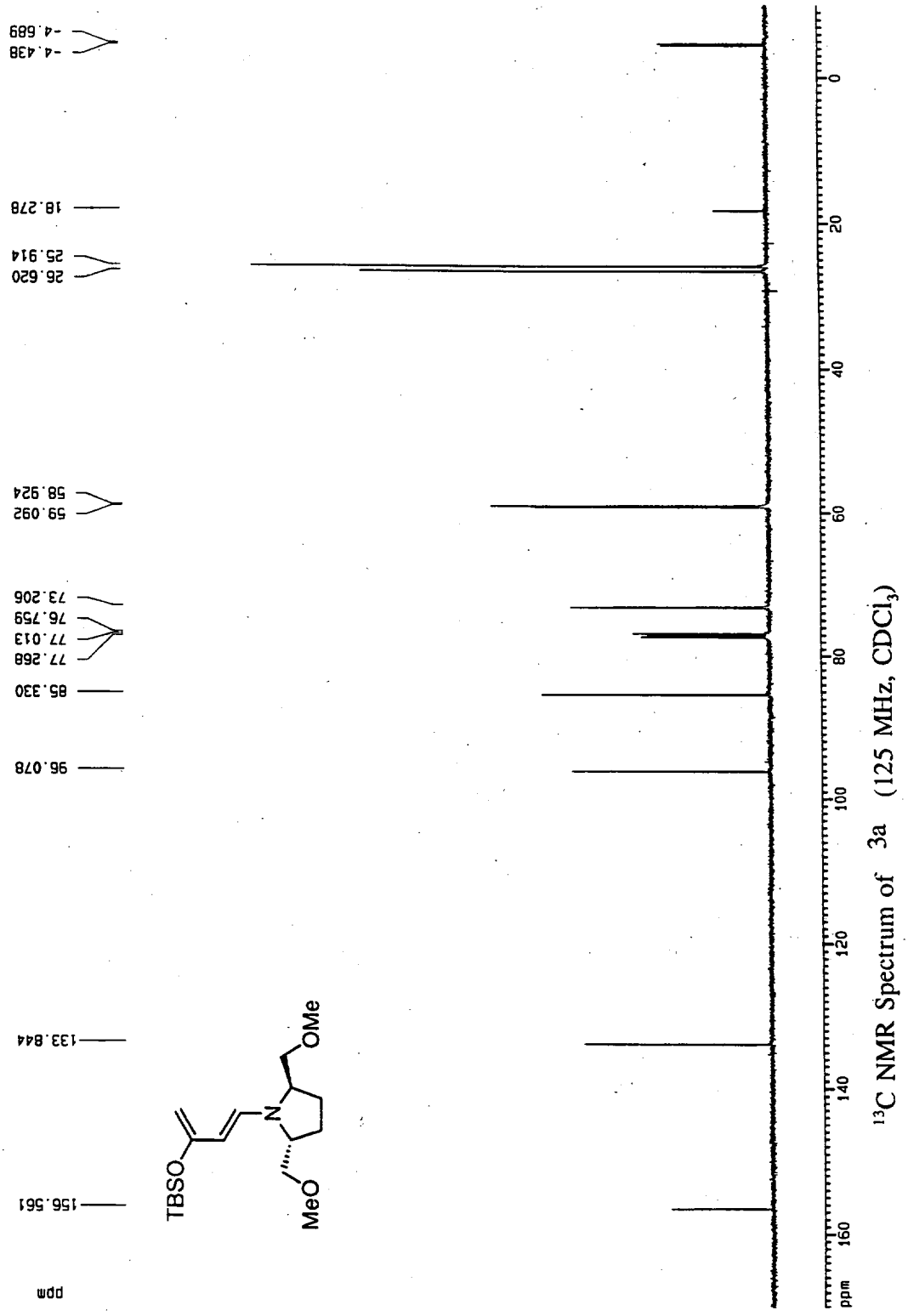
^{1}H NMR Spectrum of 2b (400 MHz, $CDCl_3$)



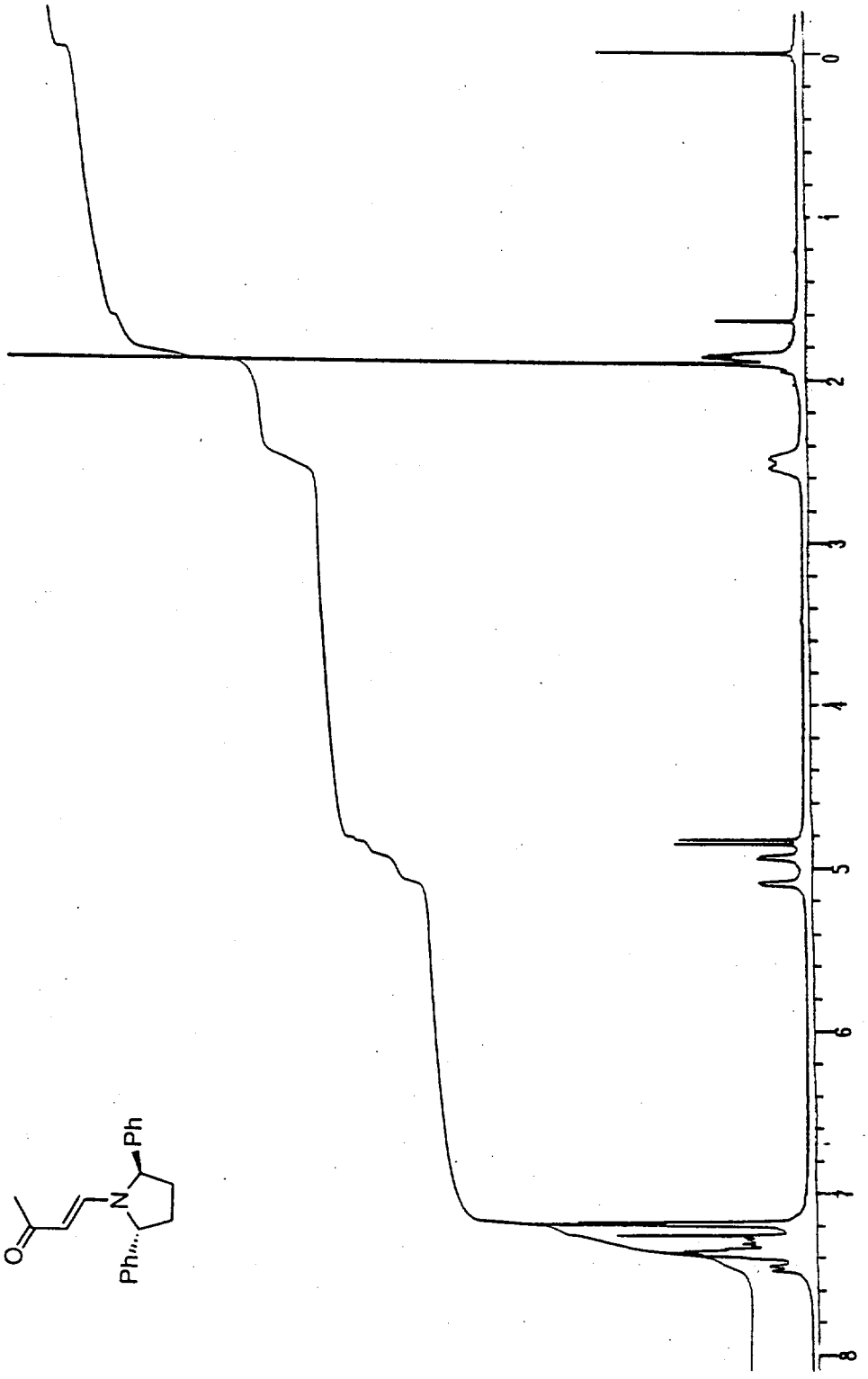
^{13}C NMR Spectrum of 2b (100 MHz, $CDCl_3$)



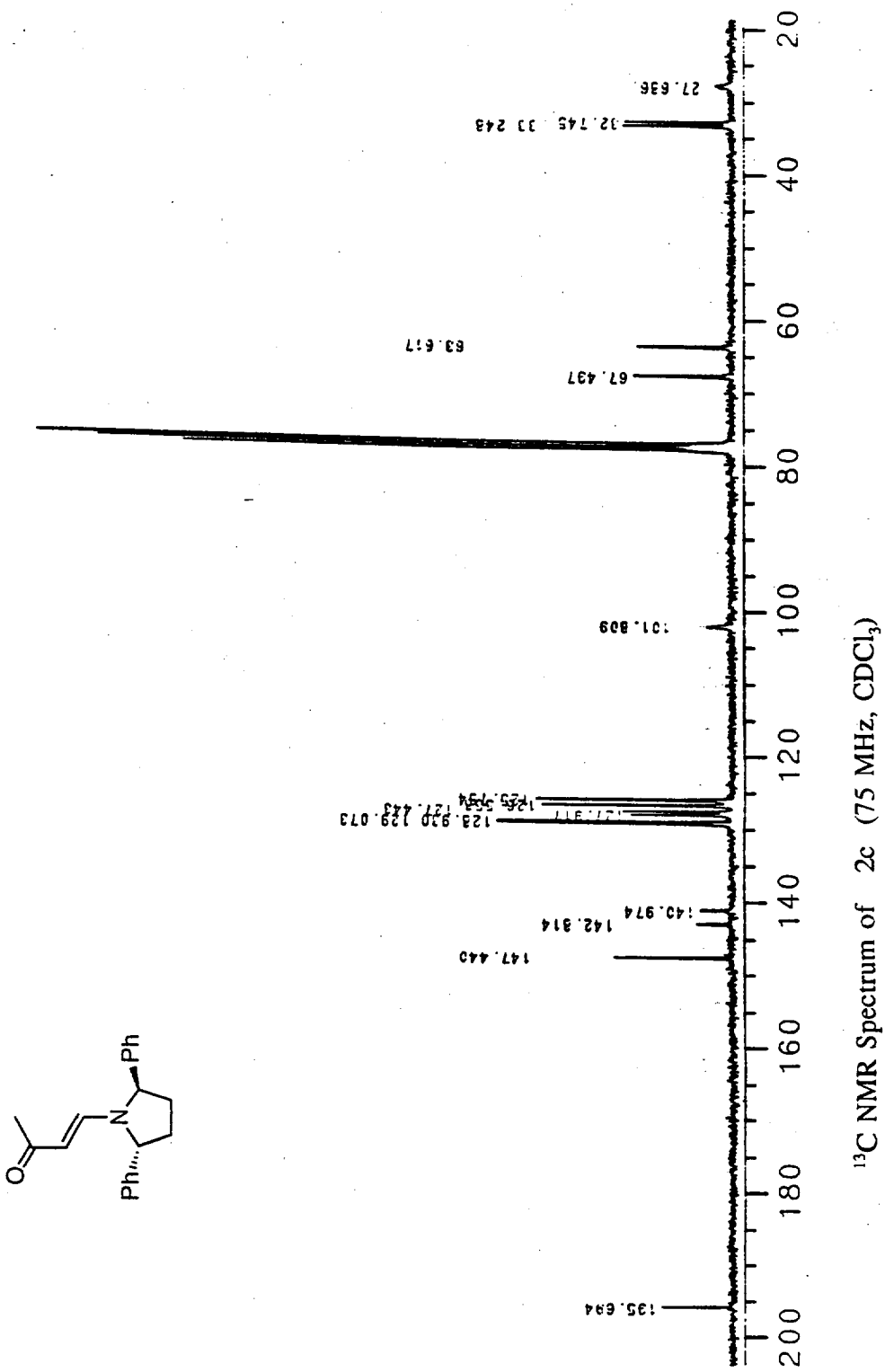
^{1}H NMR Spectrum of 3a (500 MHz, $CDCl_3$)



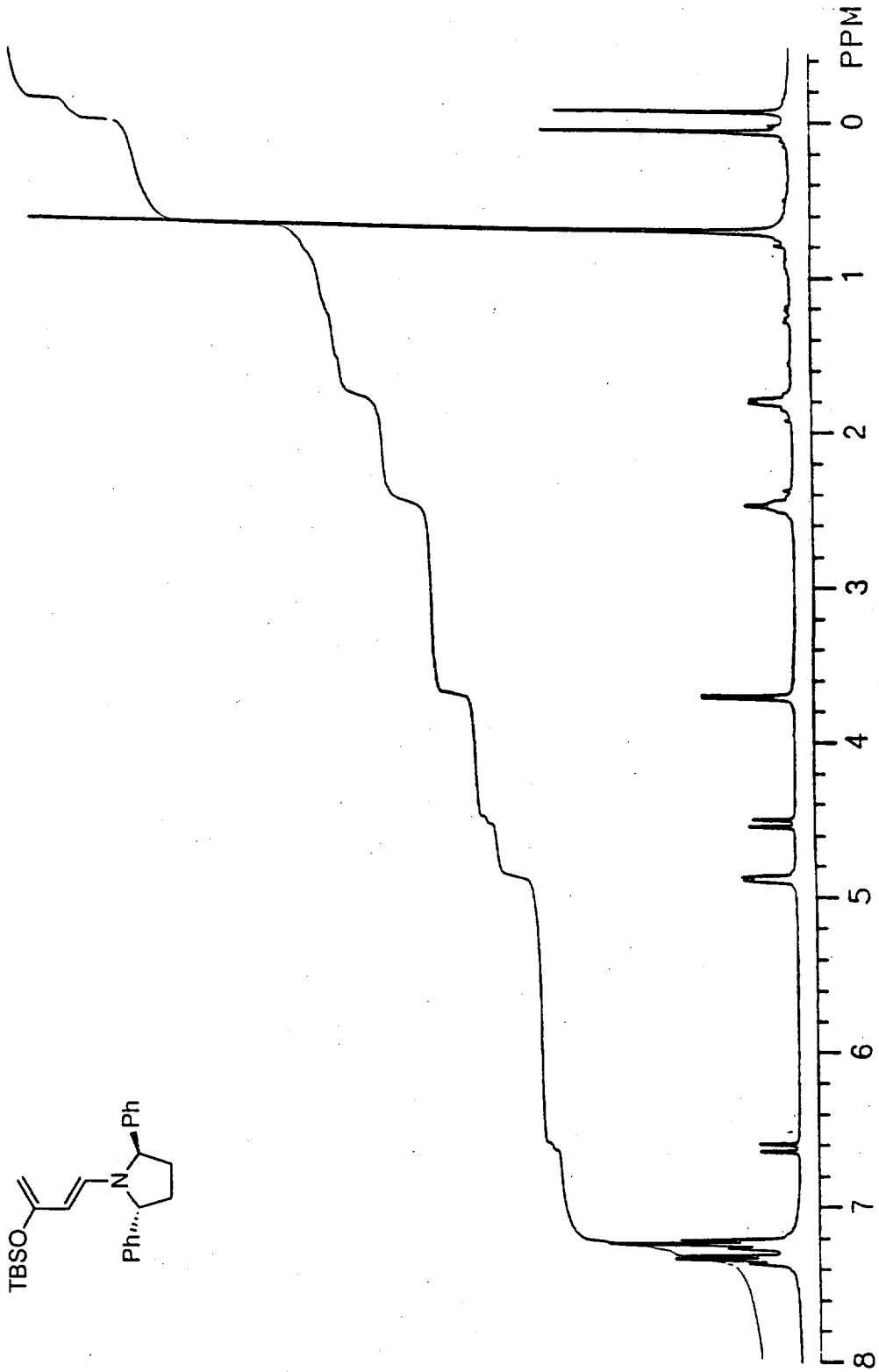
^{13}C NMR Spectrum of 3a (125 MHz, $CDCl_3$)



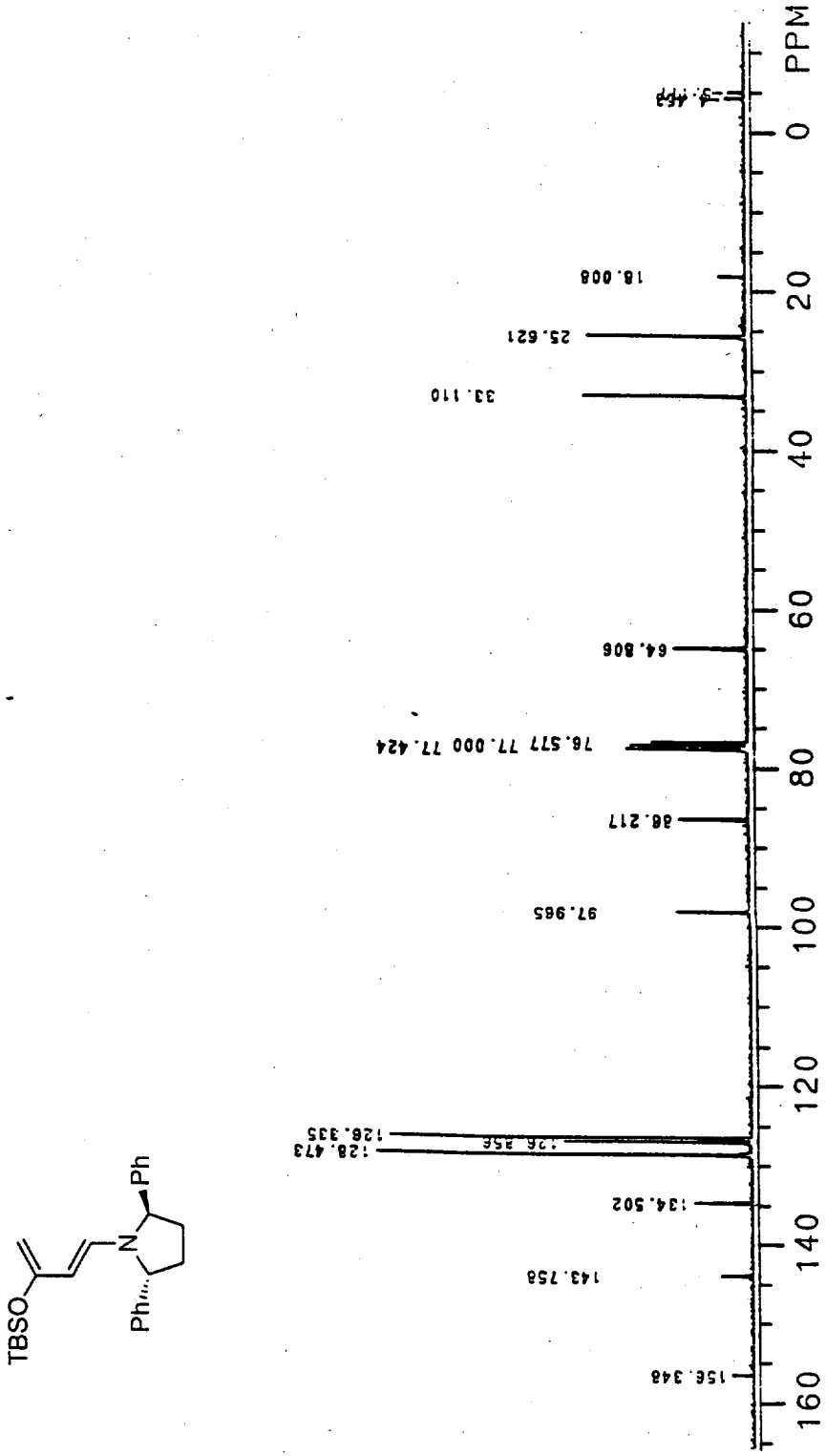
^{1}H NMR Spectrum of 2c (500 MHz, $CDCl_3$)



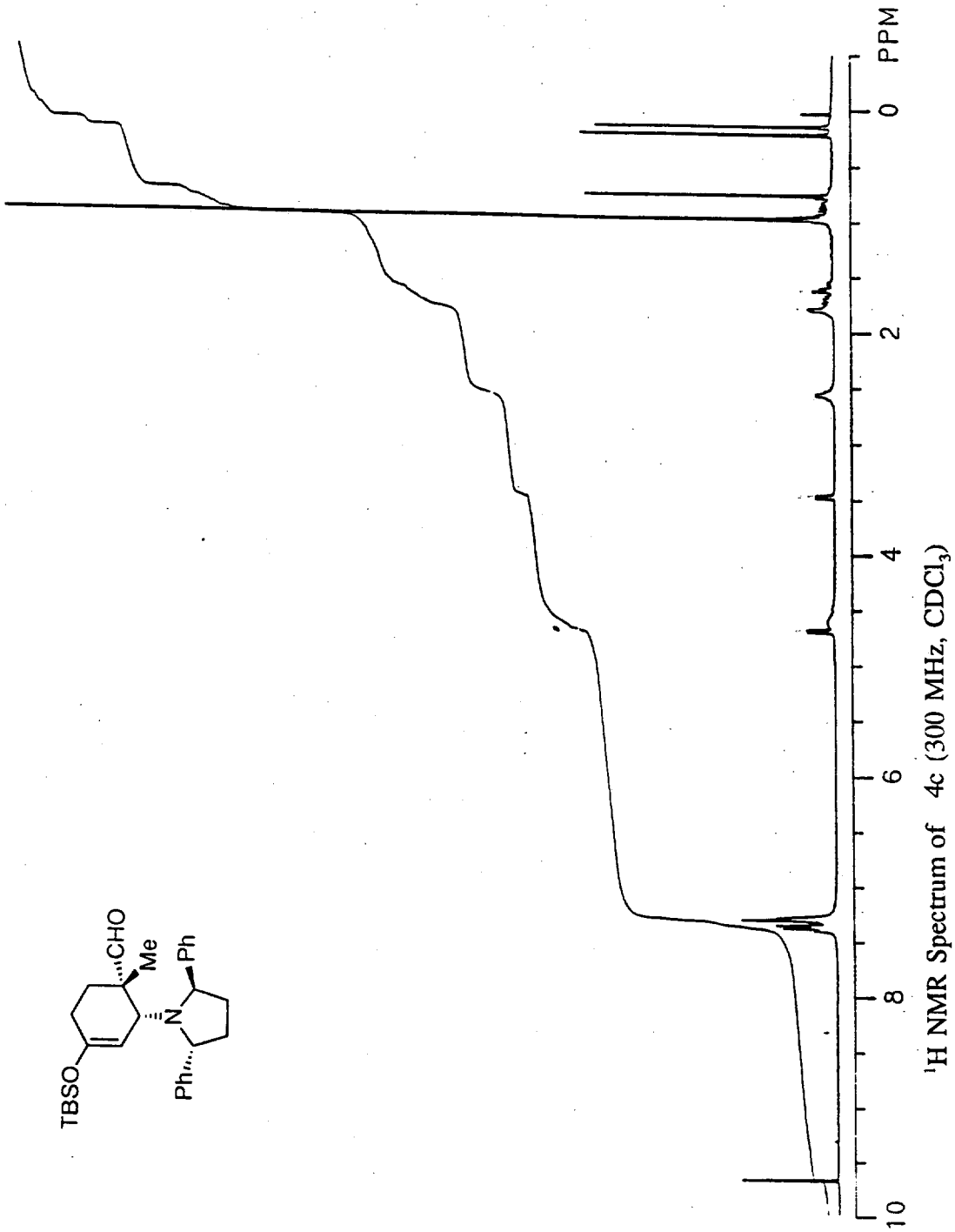
^{13}C NMR Spectrum of 2c (75 MHz, $CDCl_3$)



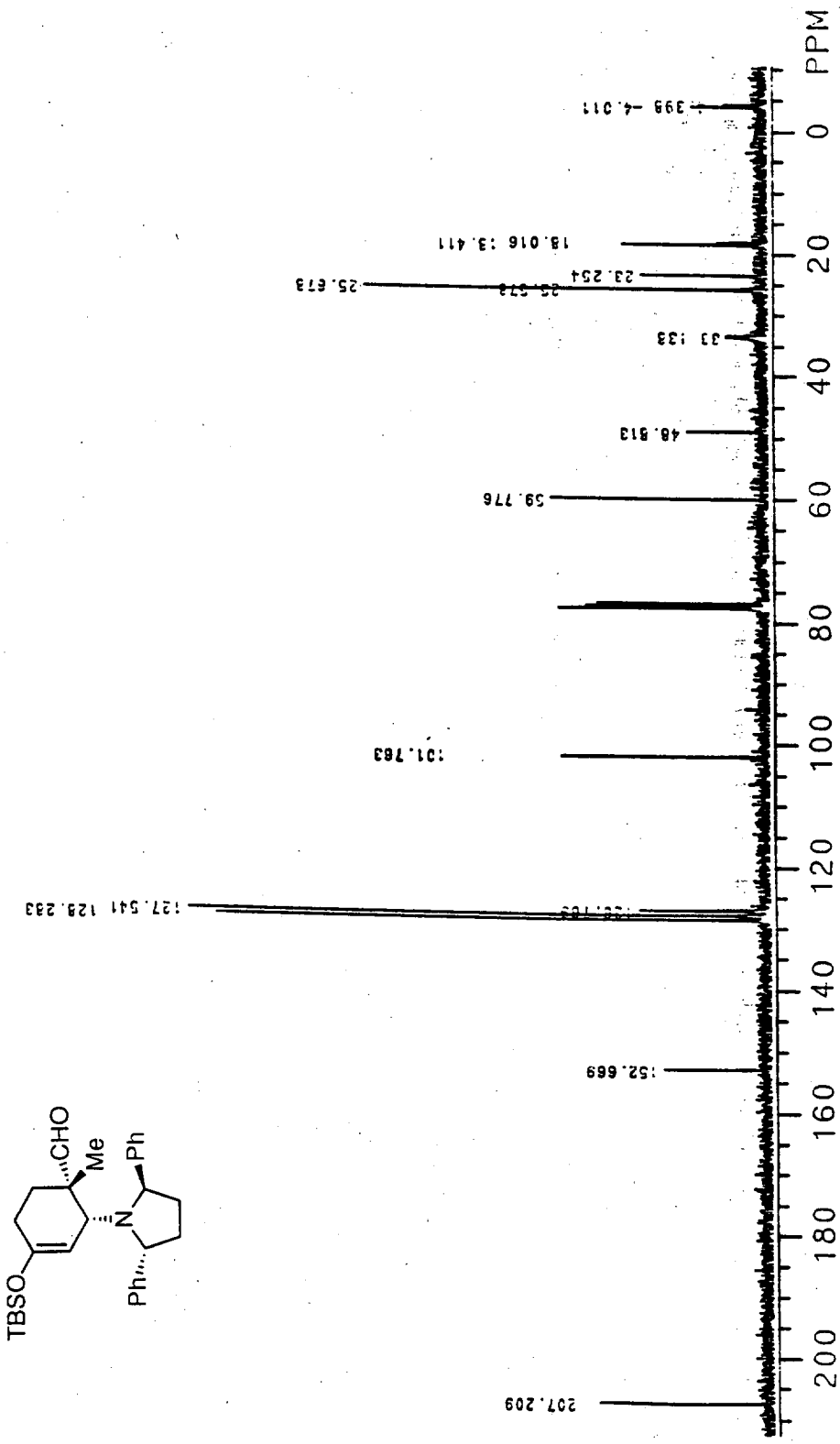
^{1}H NMR Spectrum of 3c (300 MHz, $CDCl_3$)



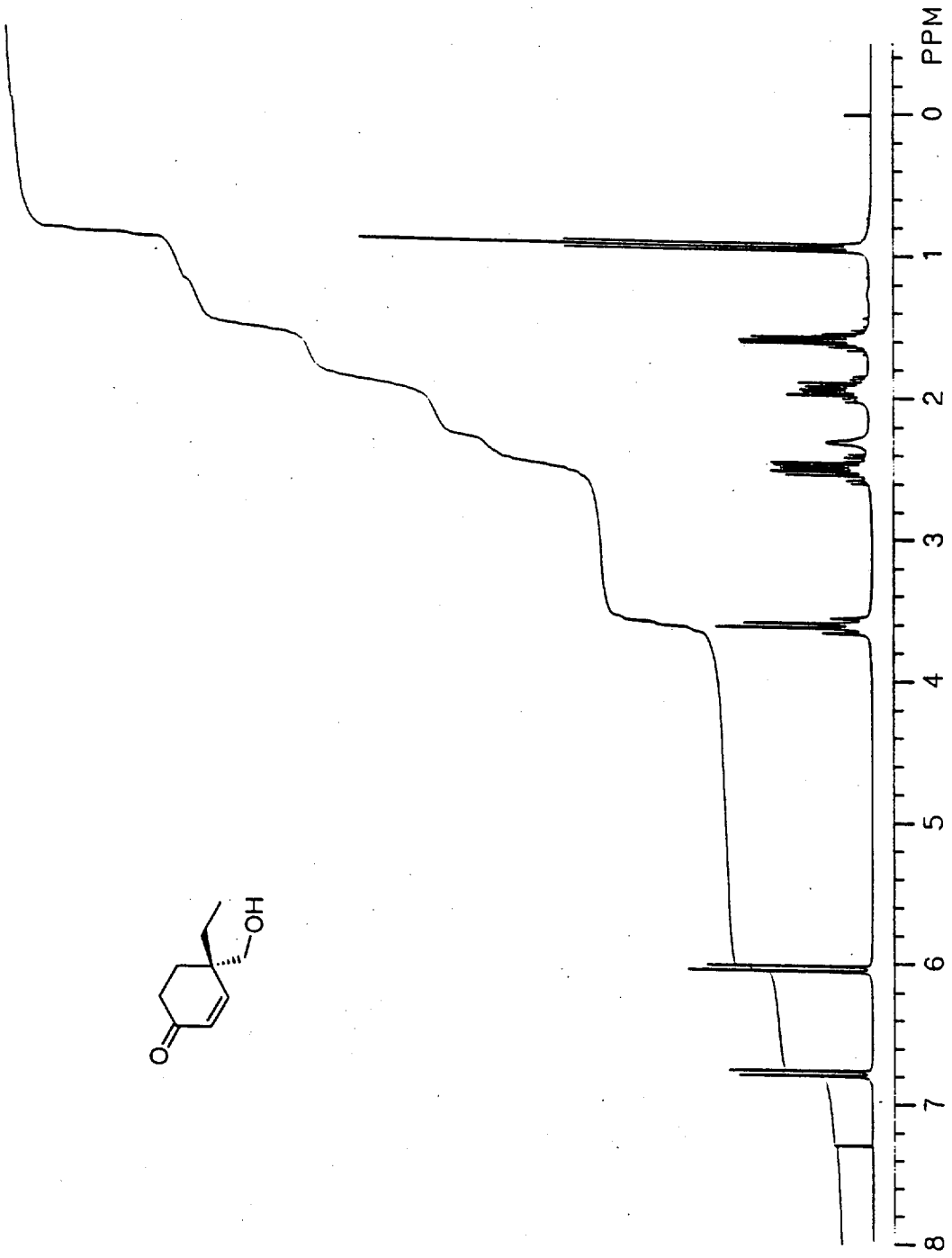
^{13}C NMR Spectrum of 3c (75 MHz, $CDCl_3$)



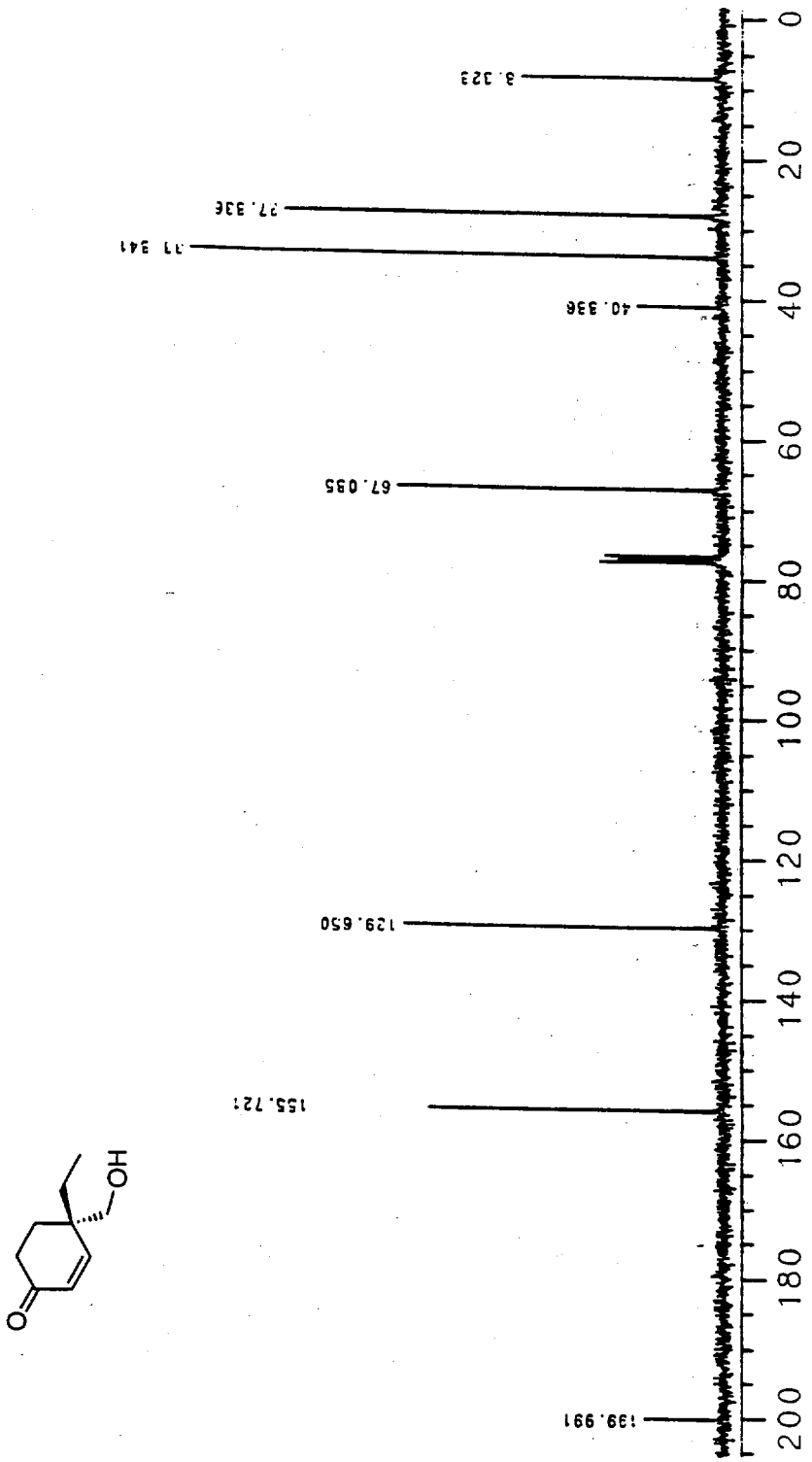
^{1}H NMR Spectrum of 4c (300 MHz, $CDCl_3$)



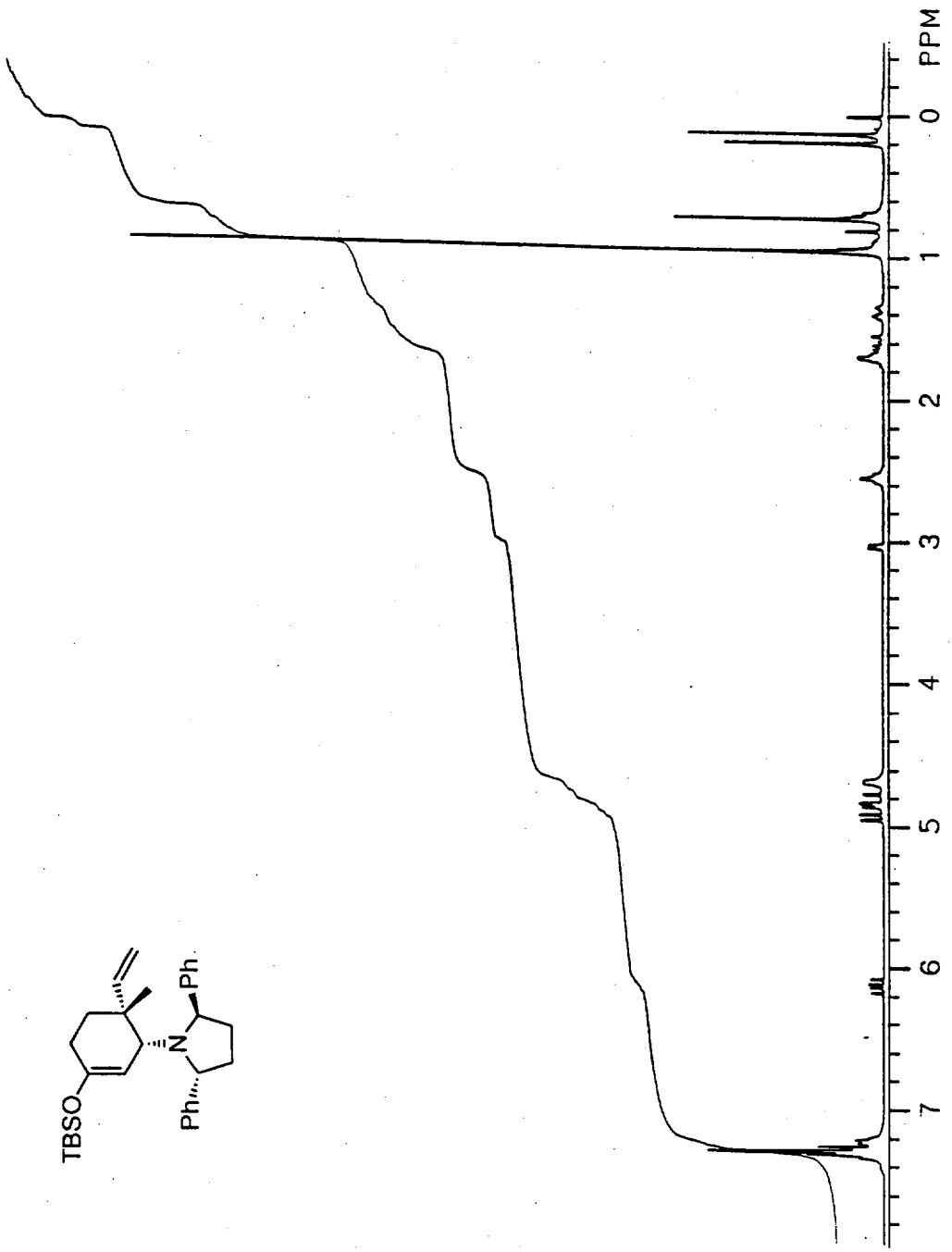
^{13}C NMR Spectrum of 4c (75 MHz, $CDCl_3$)



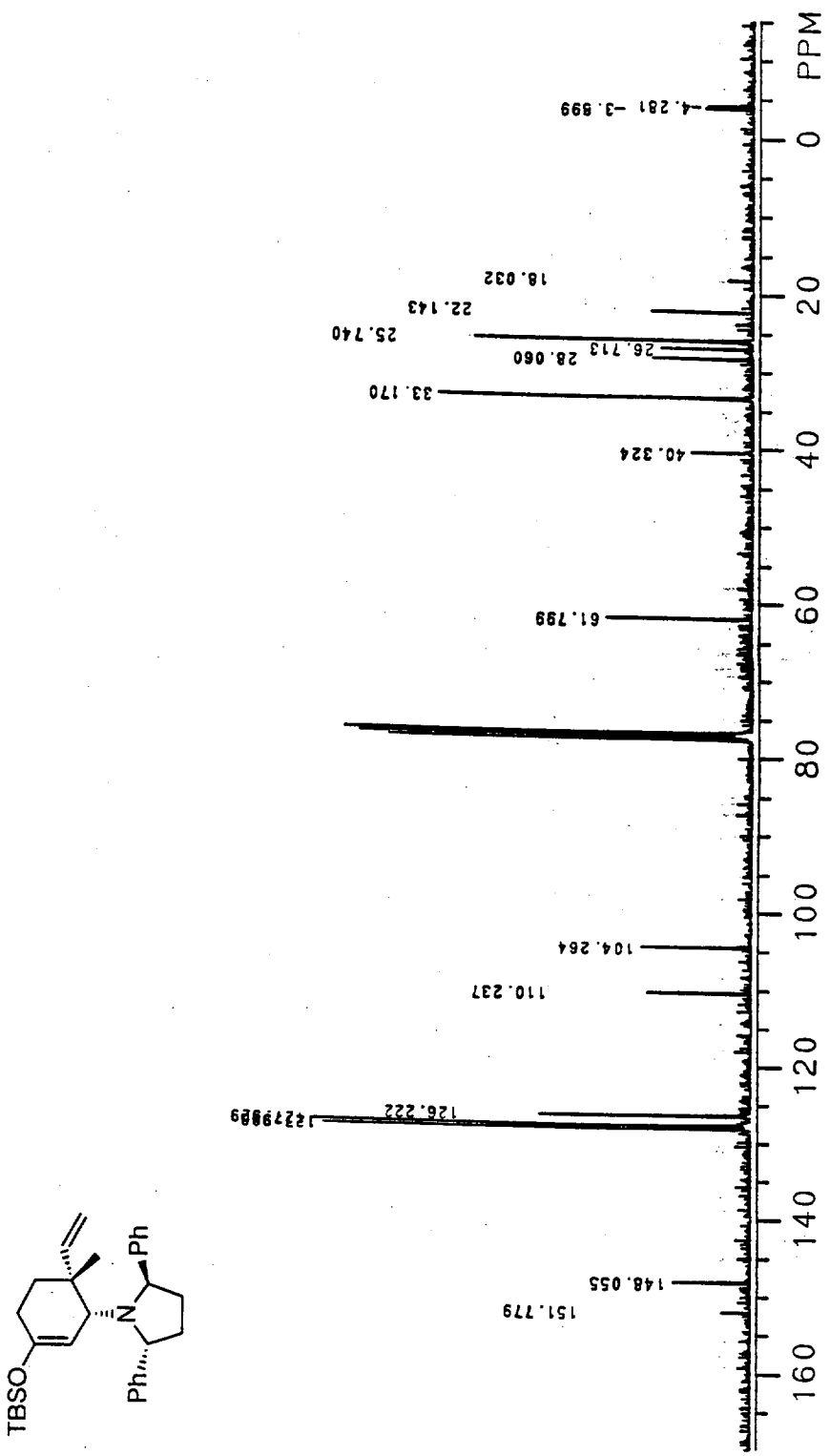
^{1}H NMR Spectrum of 7 (300 MHz, $CDCl_3$)



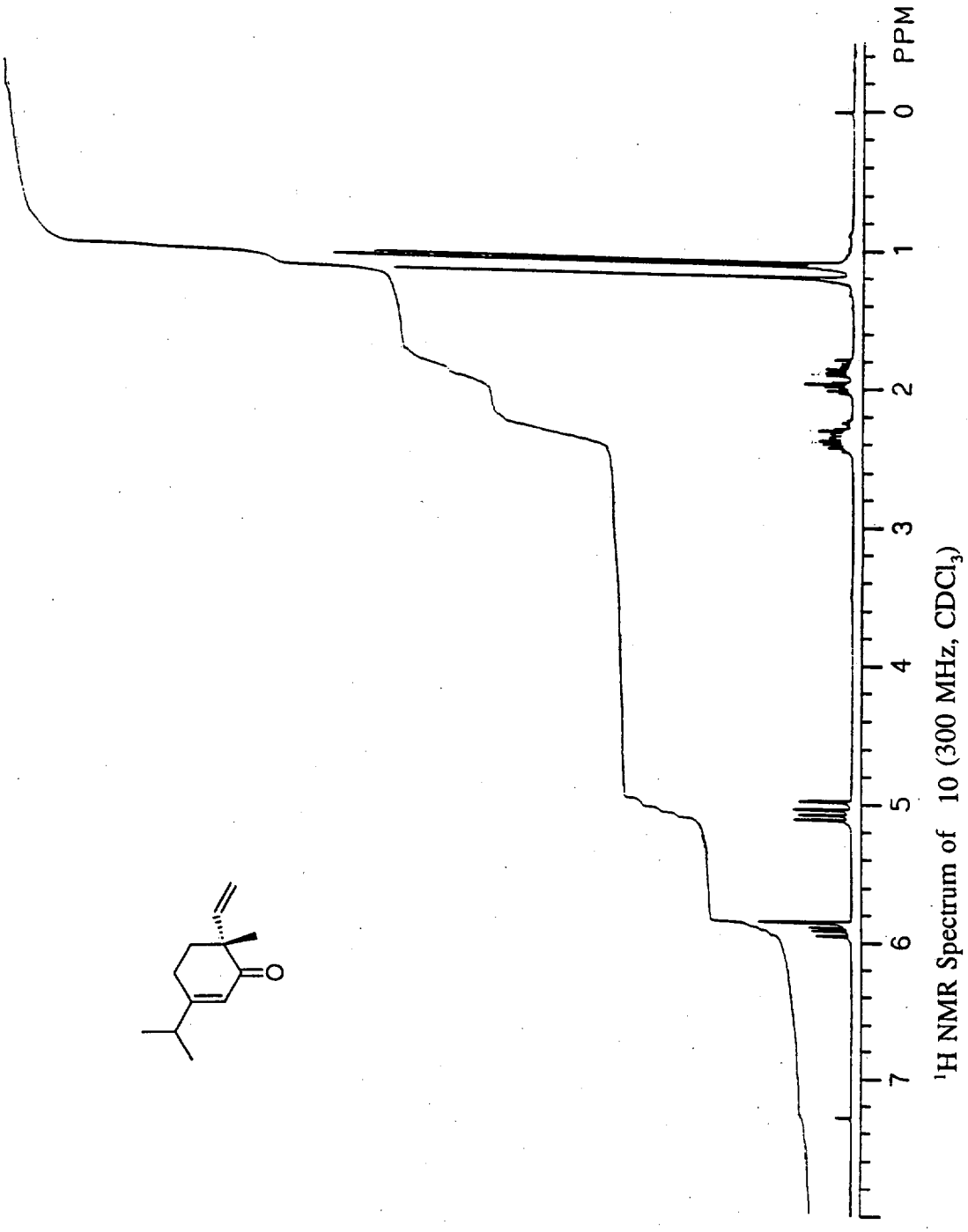
^{13}C NMR Spectrum of 7 (75 MHz, $CDCl_3$)



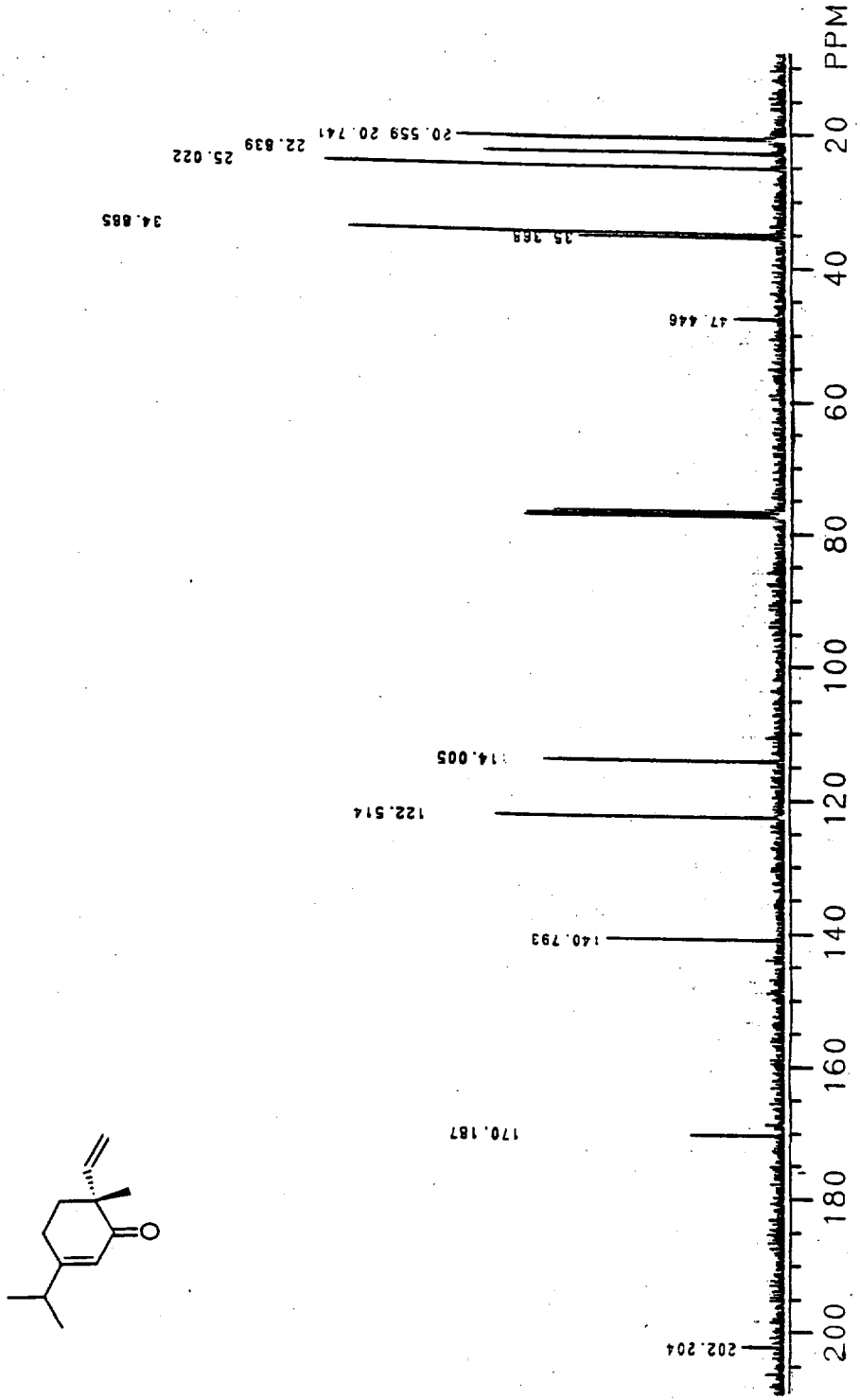
^{1}H NMR Spectrum of 8 (300 MHz, $CDCl_3$)



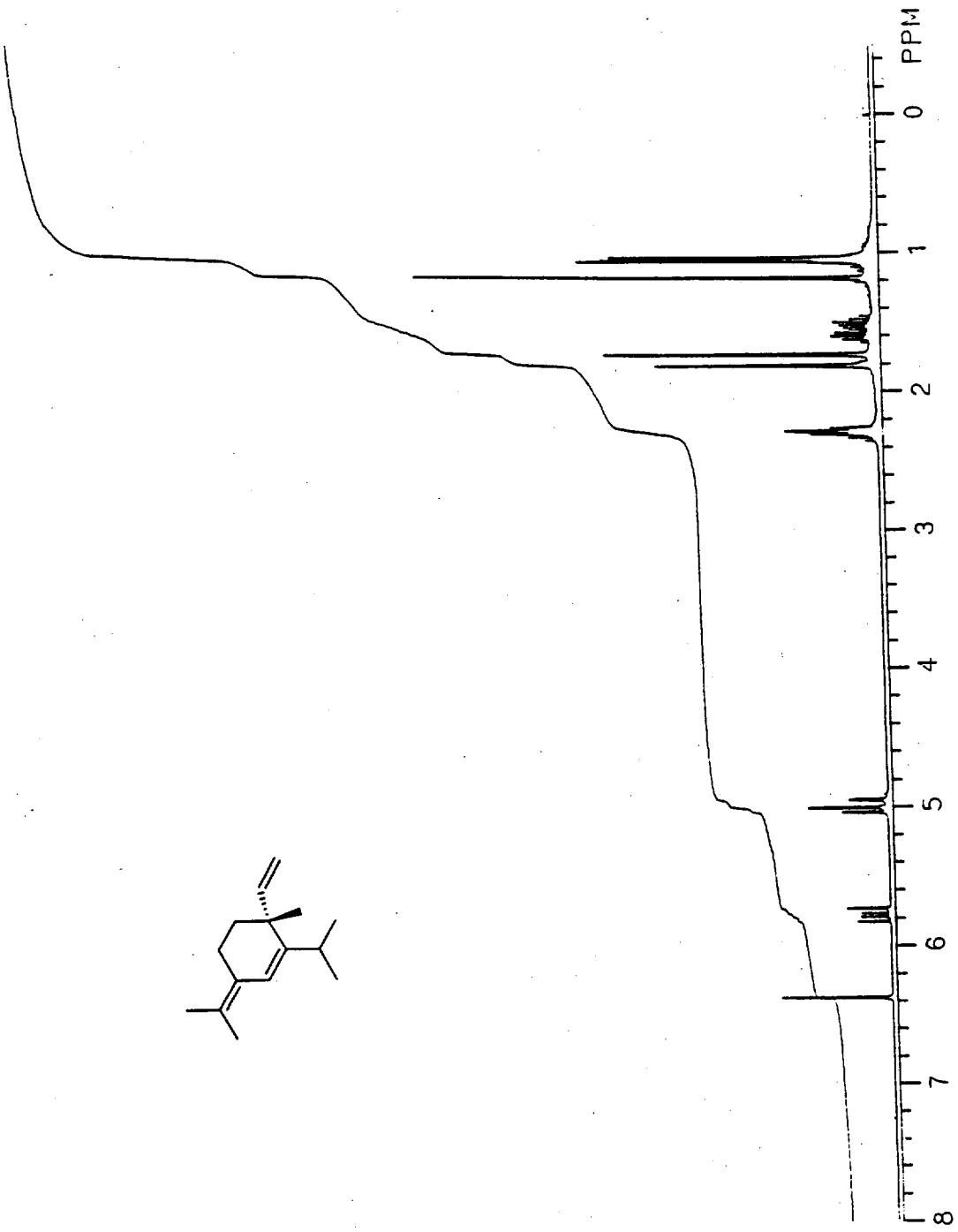
^{13}C NMR Spectrum of 8 (75 MHz, $CDCl_3$)



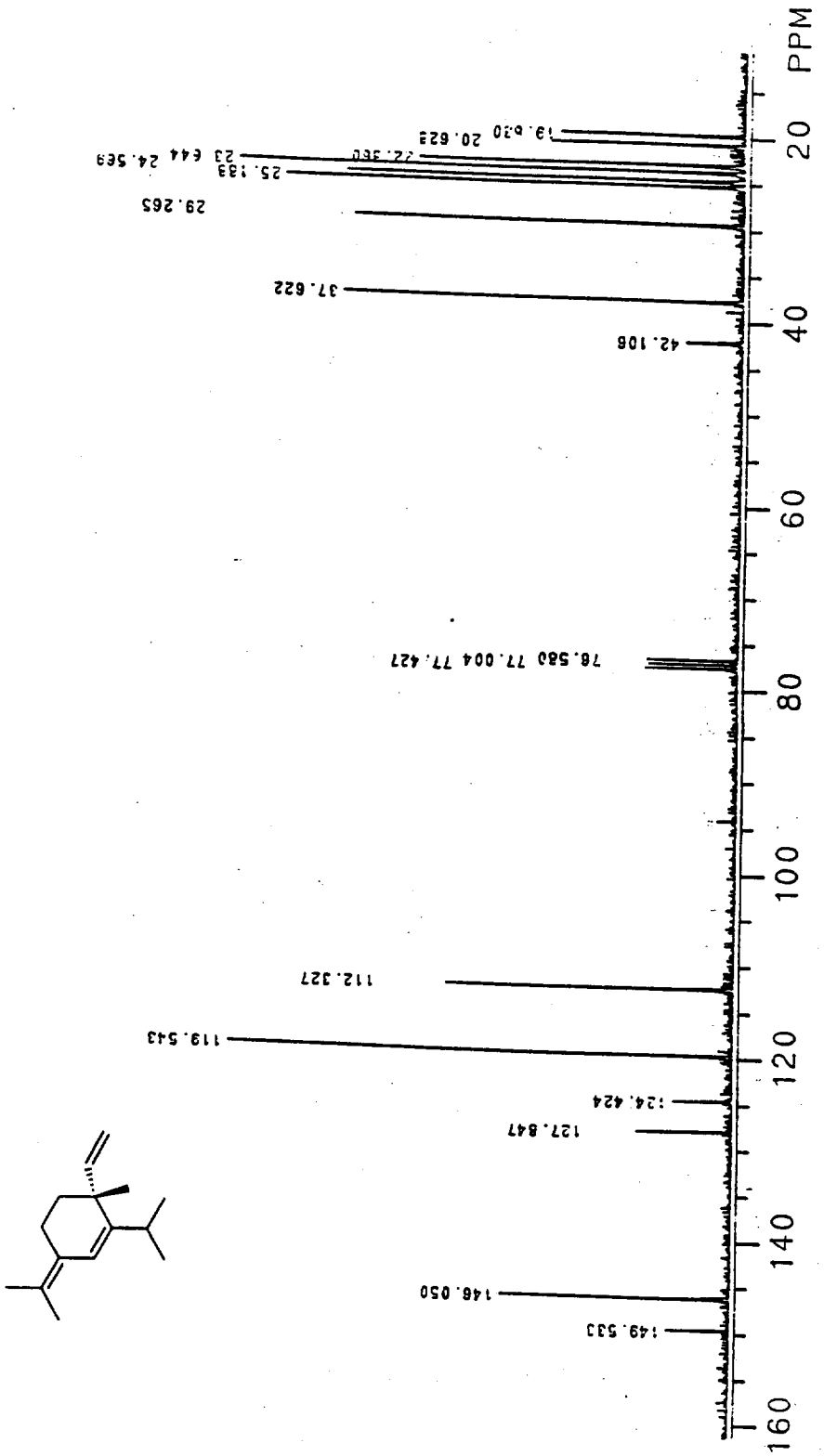
^{1}H NMR Spectrum of 10 (300 MHz, $CDCl_3$)



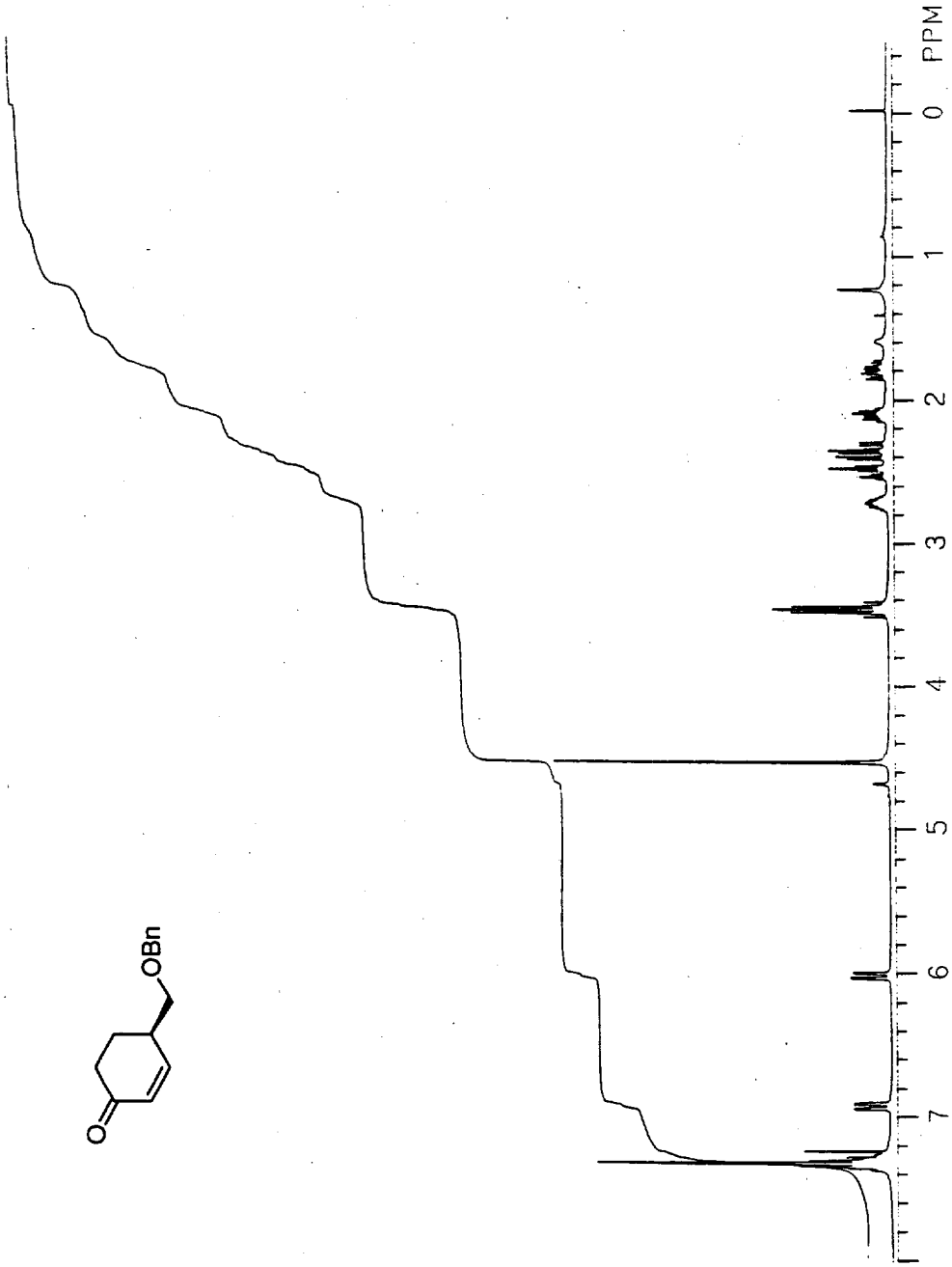
^{13}C NMR Spectrum of 10 (75 MHz, $CDCl_3$)



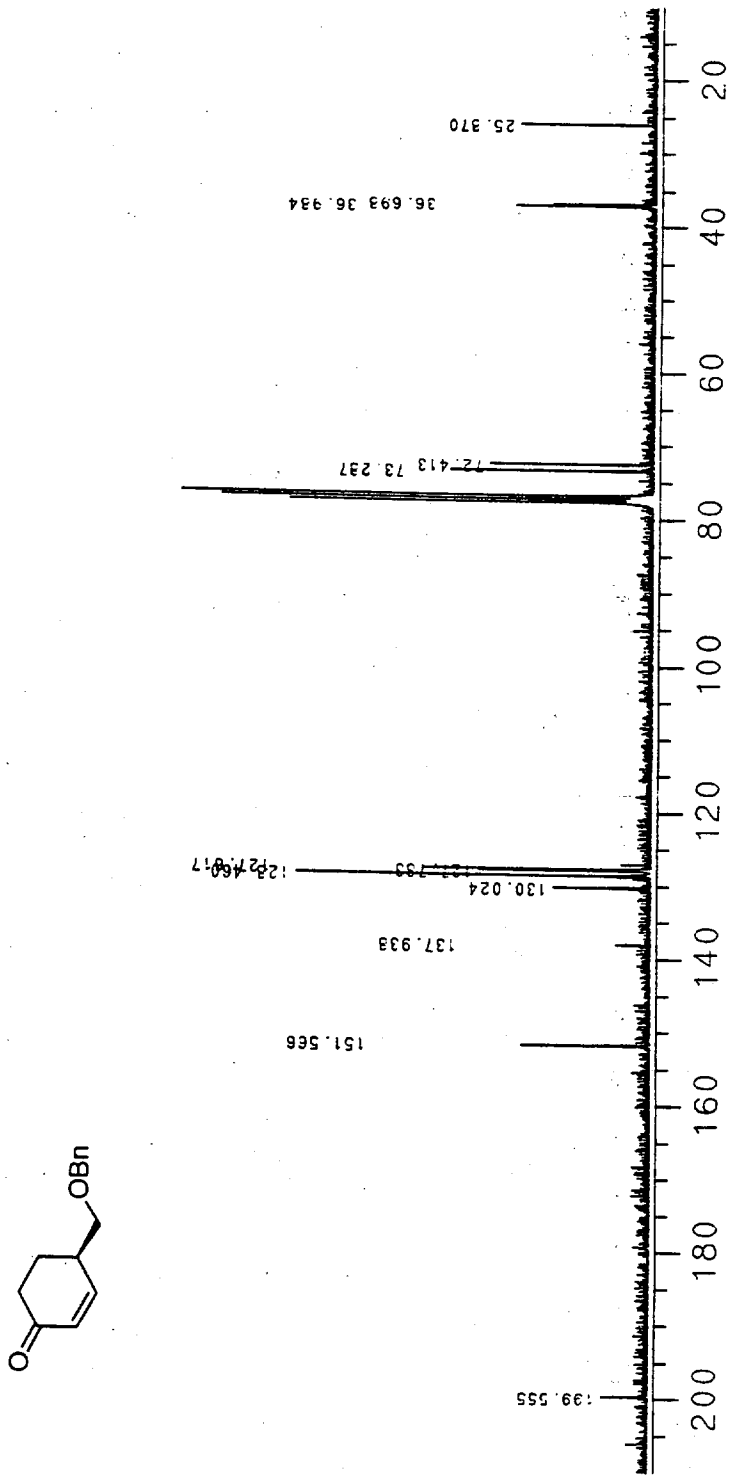
^{1}H NMR Spectrum of 11 (300 MHz, $CDCl_3$)



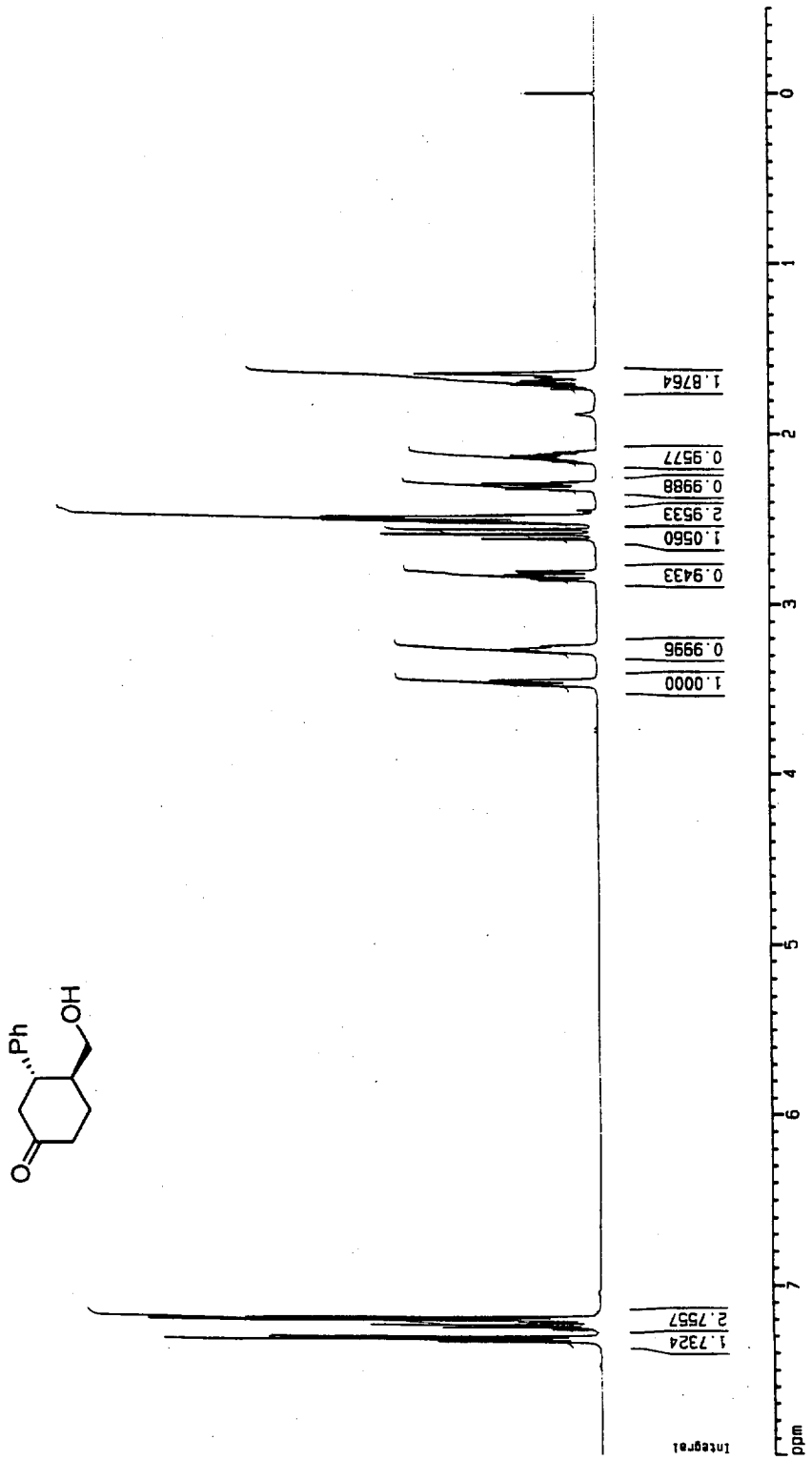
^{13}C NMR Spectrum of 11 (75 MHz, $CDCl_3$)



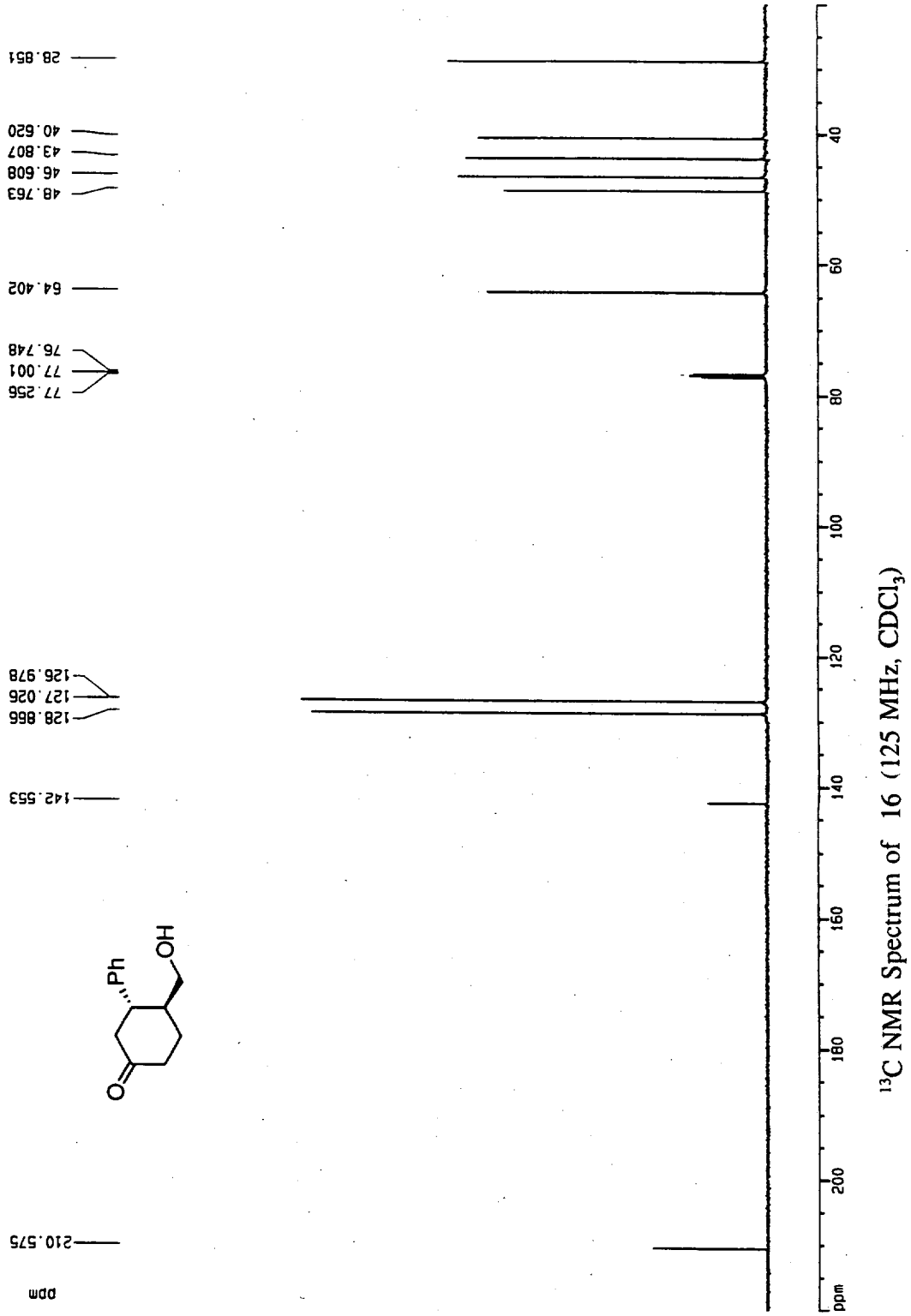
^{1}H NMR Spectrum of 6 (300 MHz, $CDCl_3$)



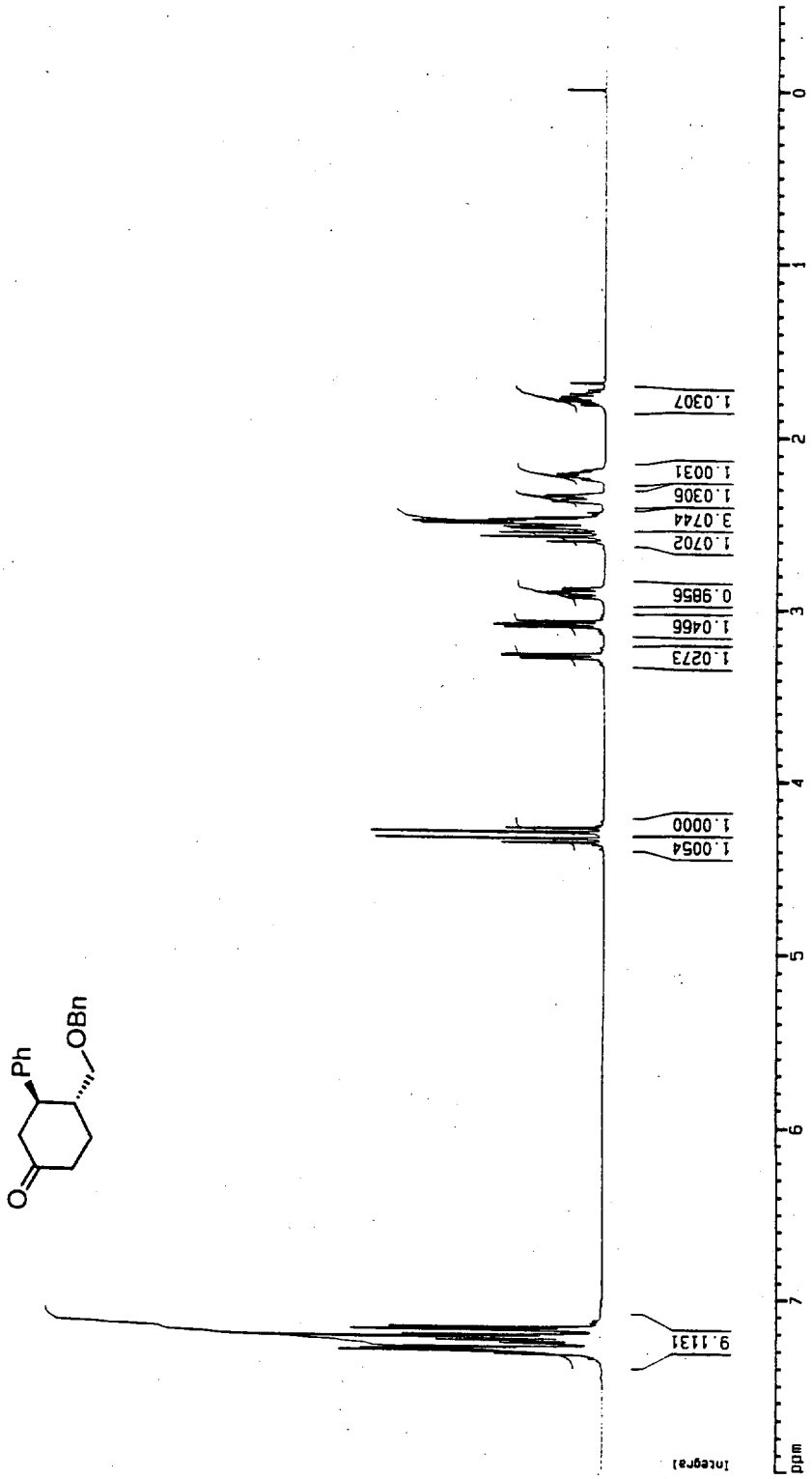
^{13}C NMR Spectrum of 6 (75 MHz, $CDCl_3$)



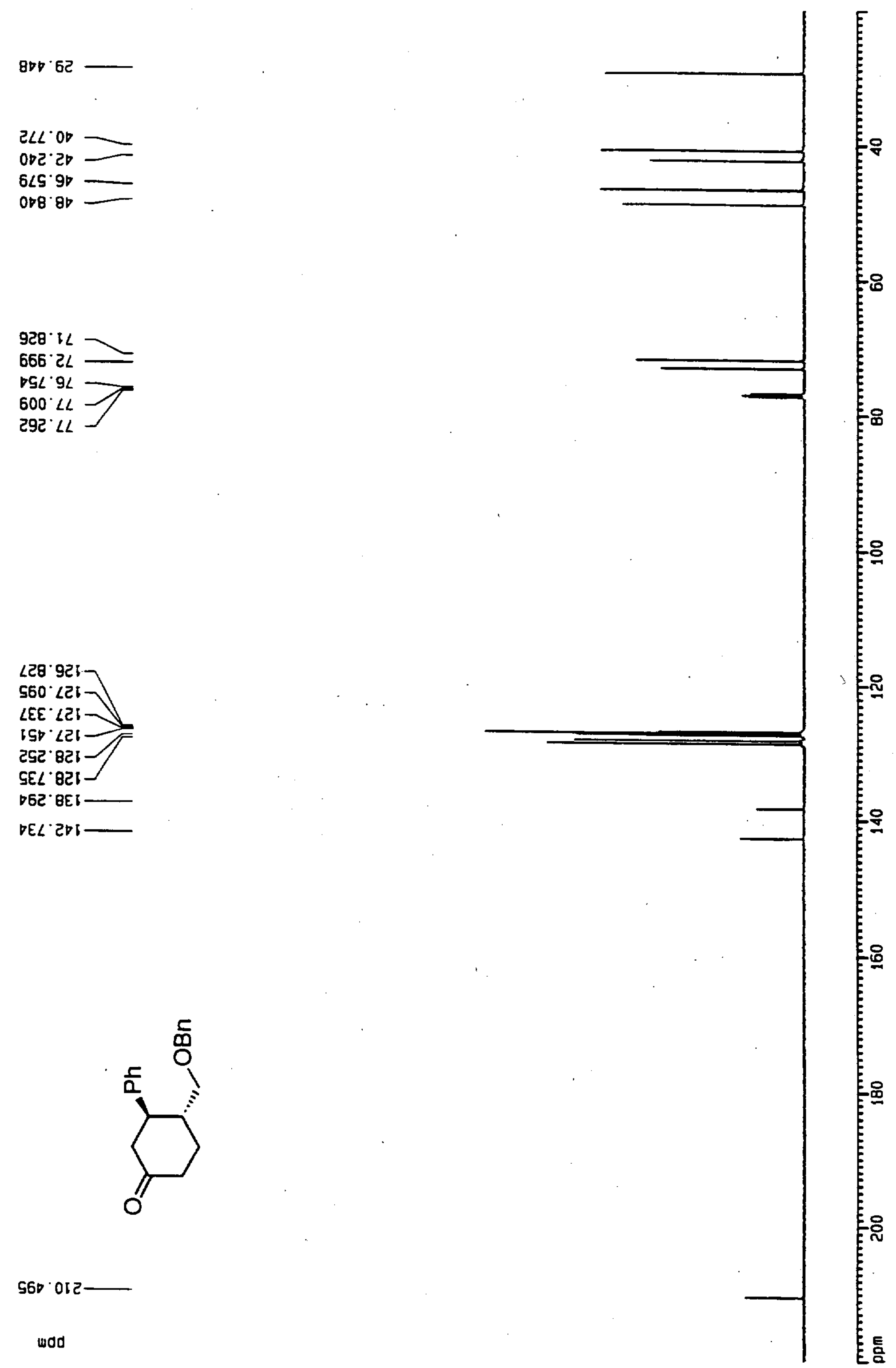
^{1}H NMR Spectrum of 16 (500 MHz, $CDCl_3$)



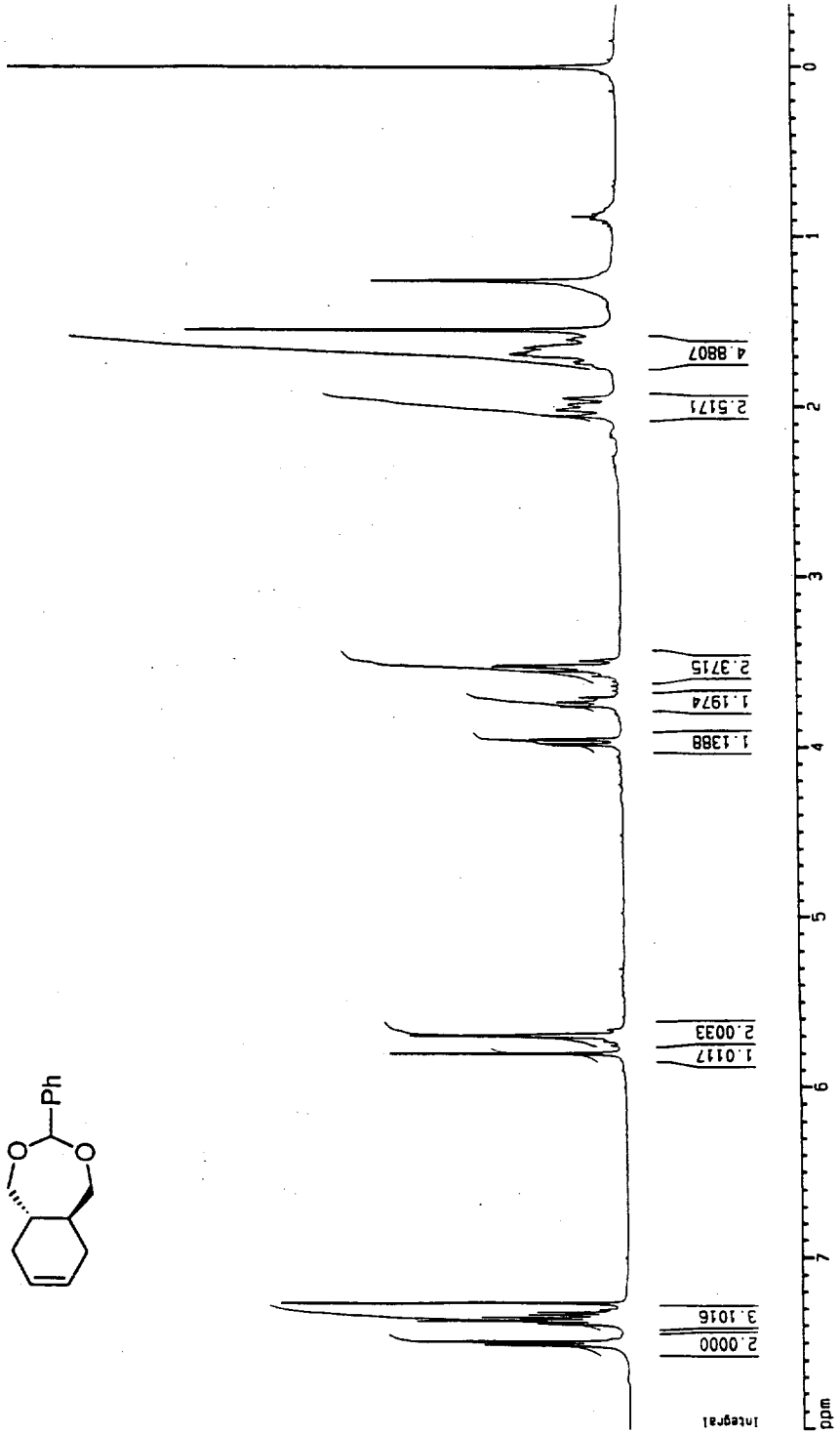
^{13}C NMR Spectrum of 16 (125 MHz, $CDCl_3$)



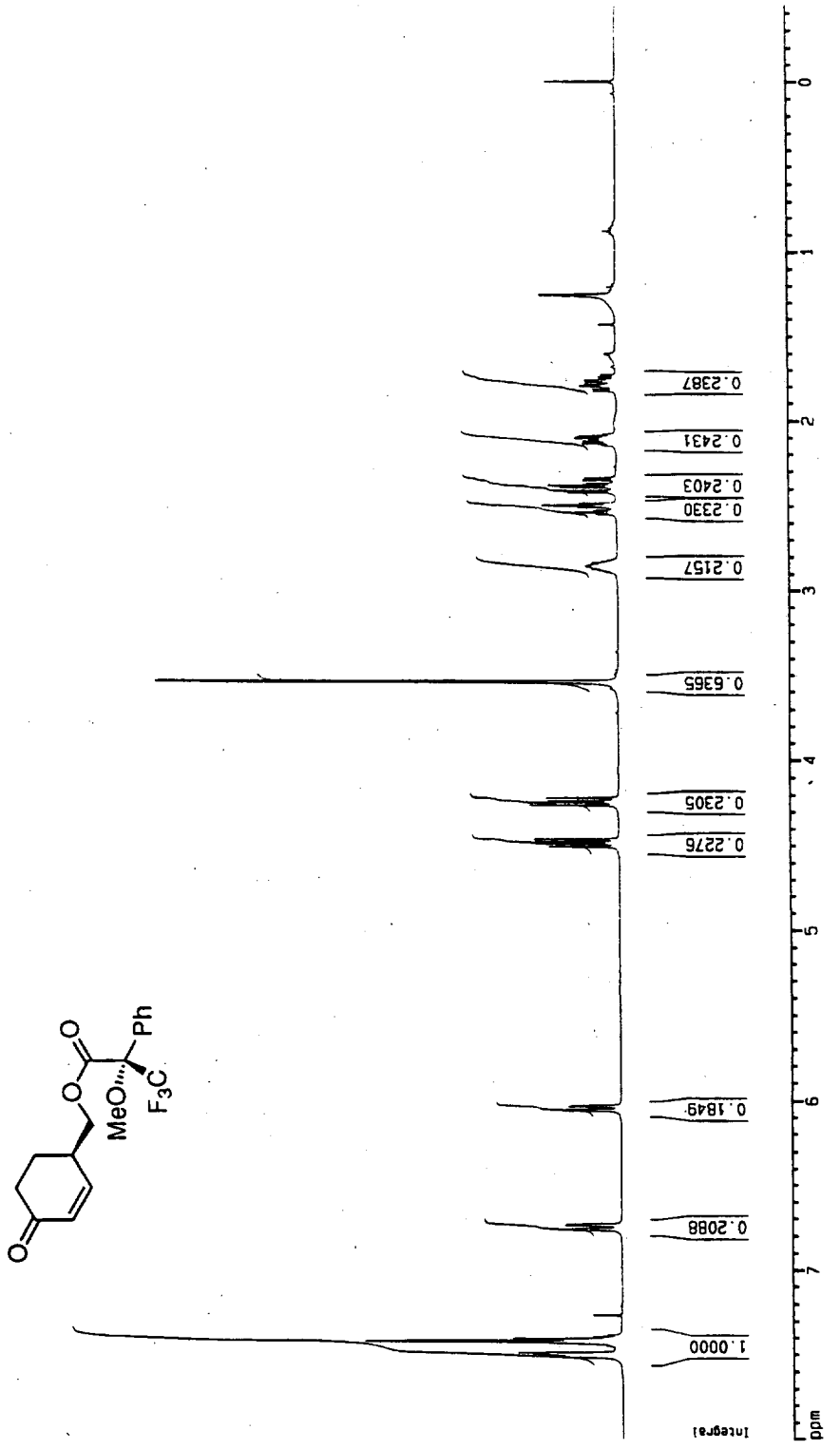
^{1}H NMR Spectrum of 18 (500 MHz, $CDCl_3$)



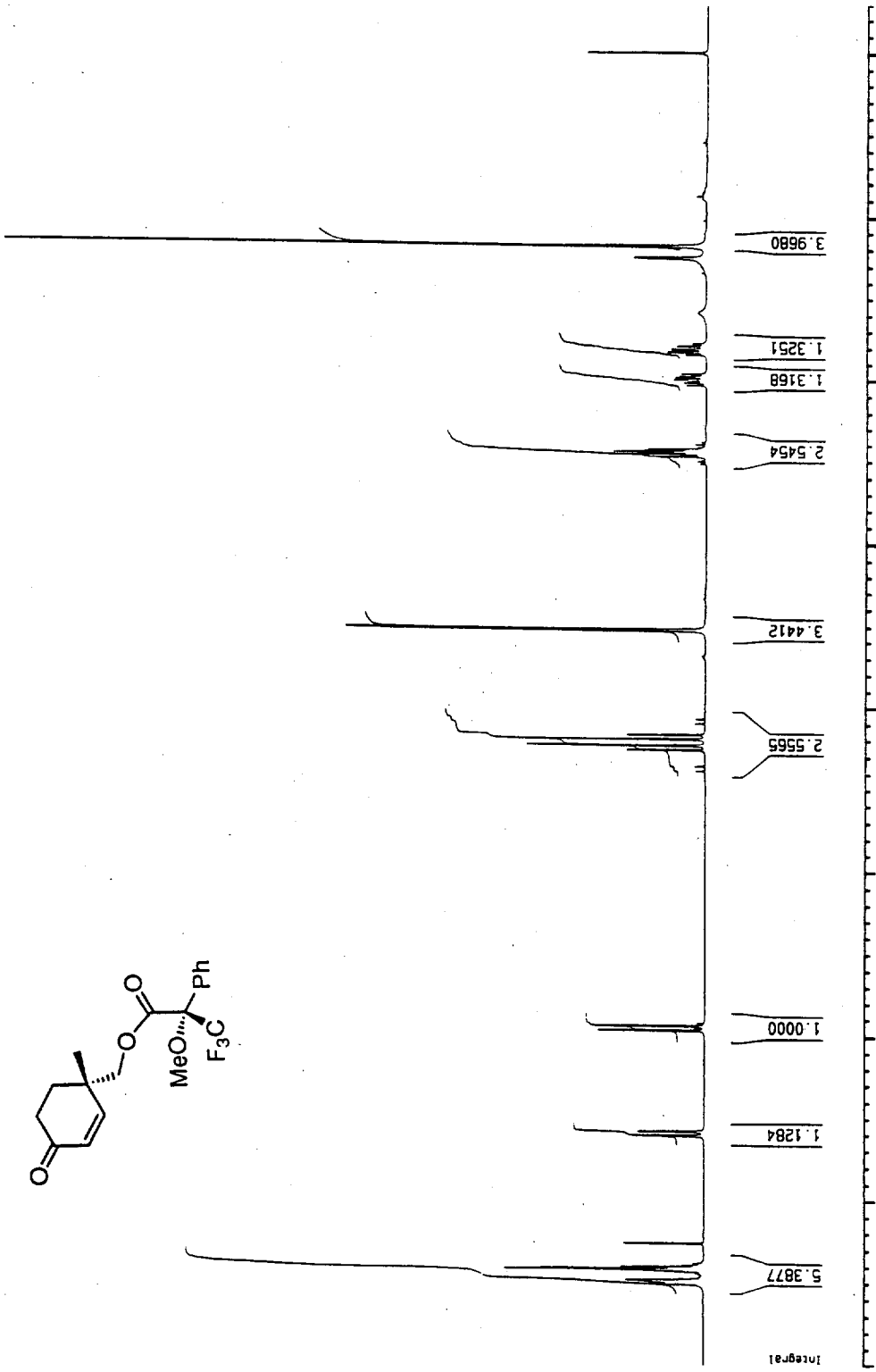
^{13}C NMR Spectrum of 18 (125 MHz, $CDCl_3$)



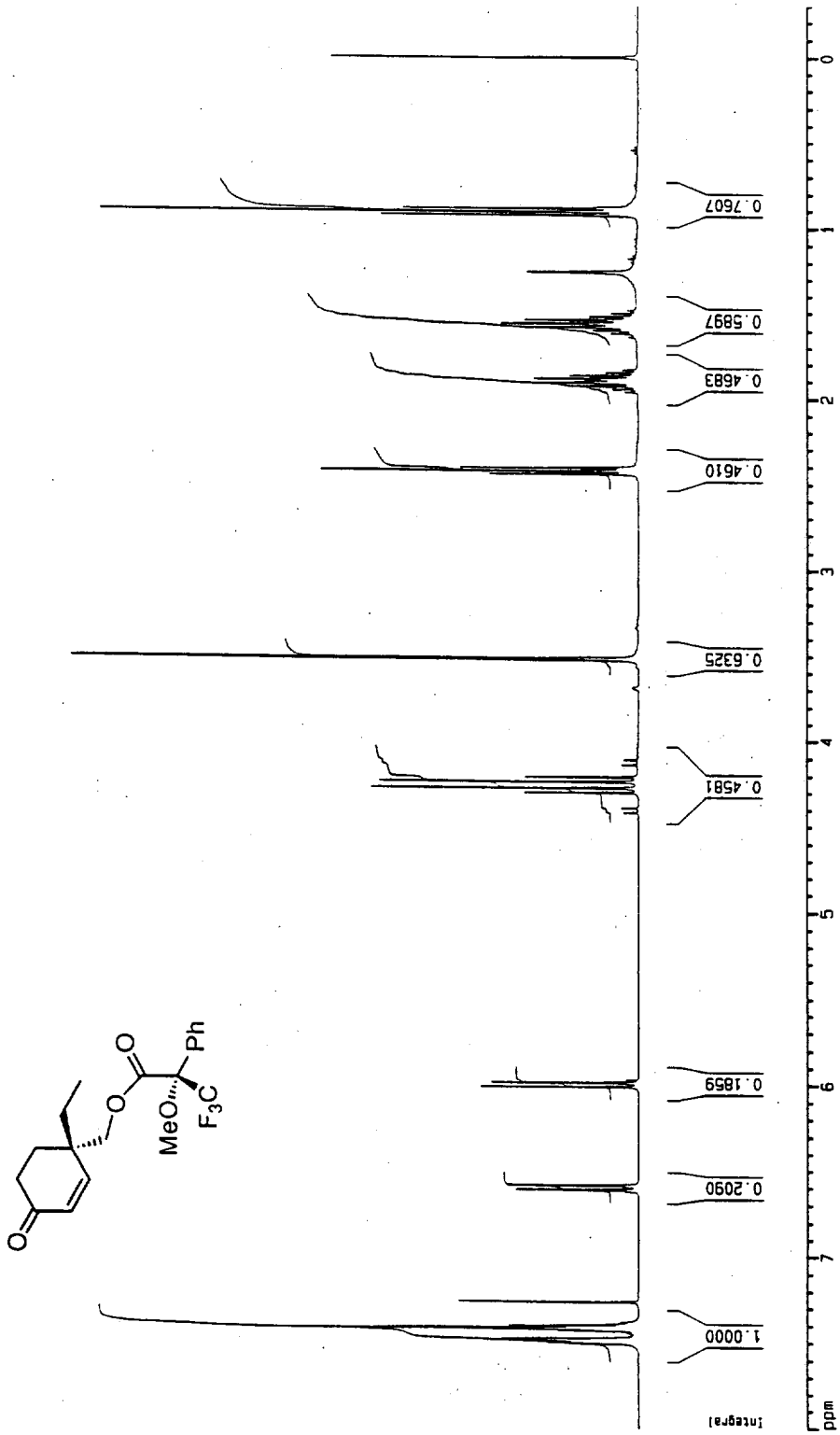
^{1}H NMR Spectrum of 23 (500 MHz, $CDCl_3$)



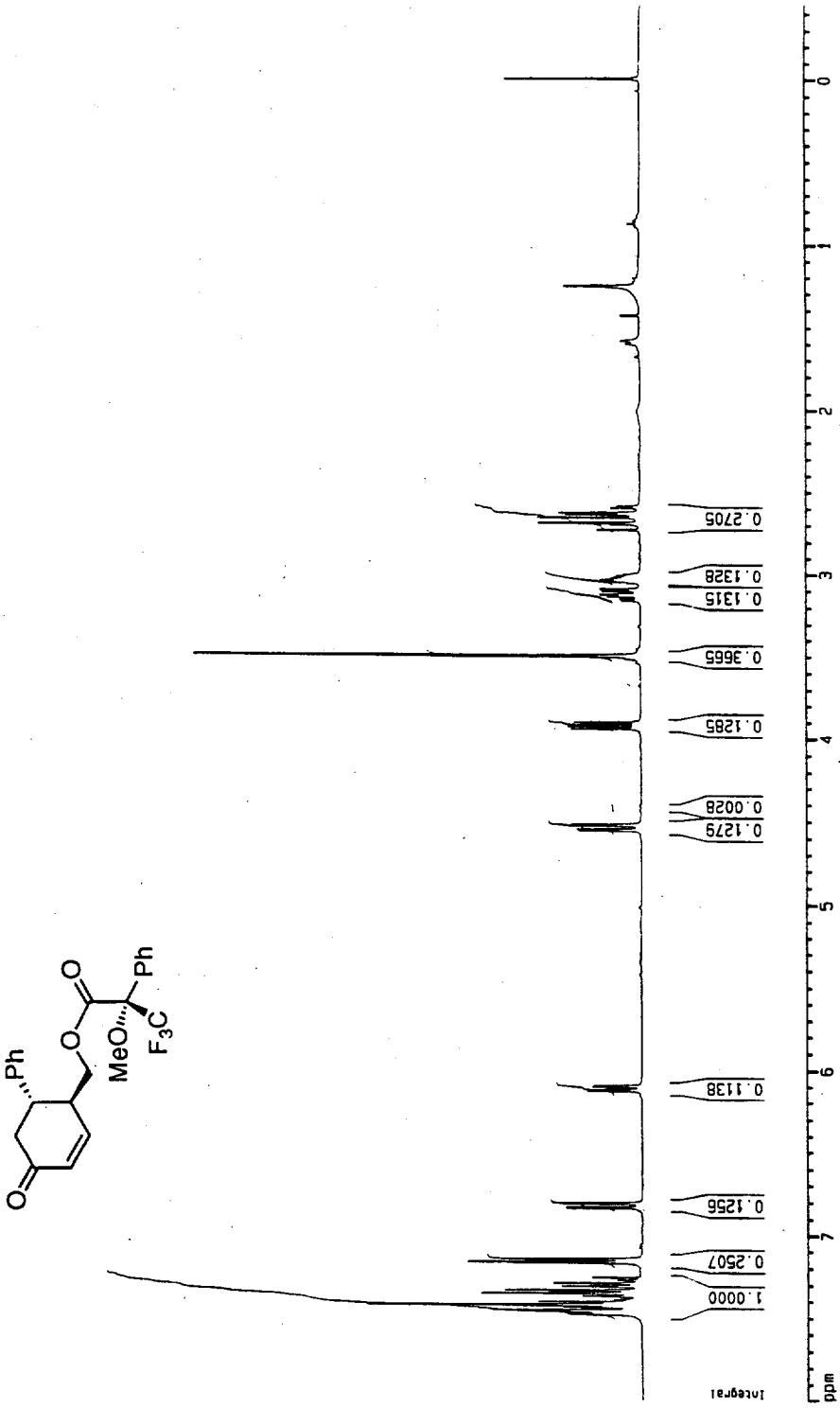
^{1}H NMR Spectrum of MTPA Ester Derived from (+)-13 (400 MHz, $CDCl_3$)



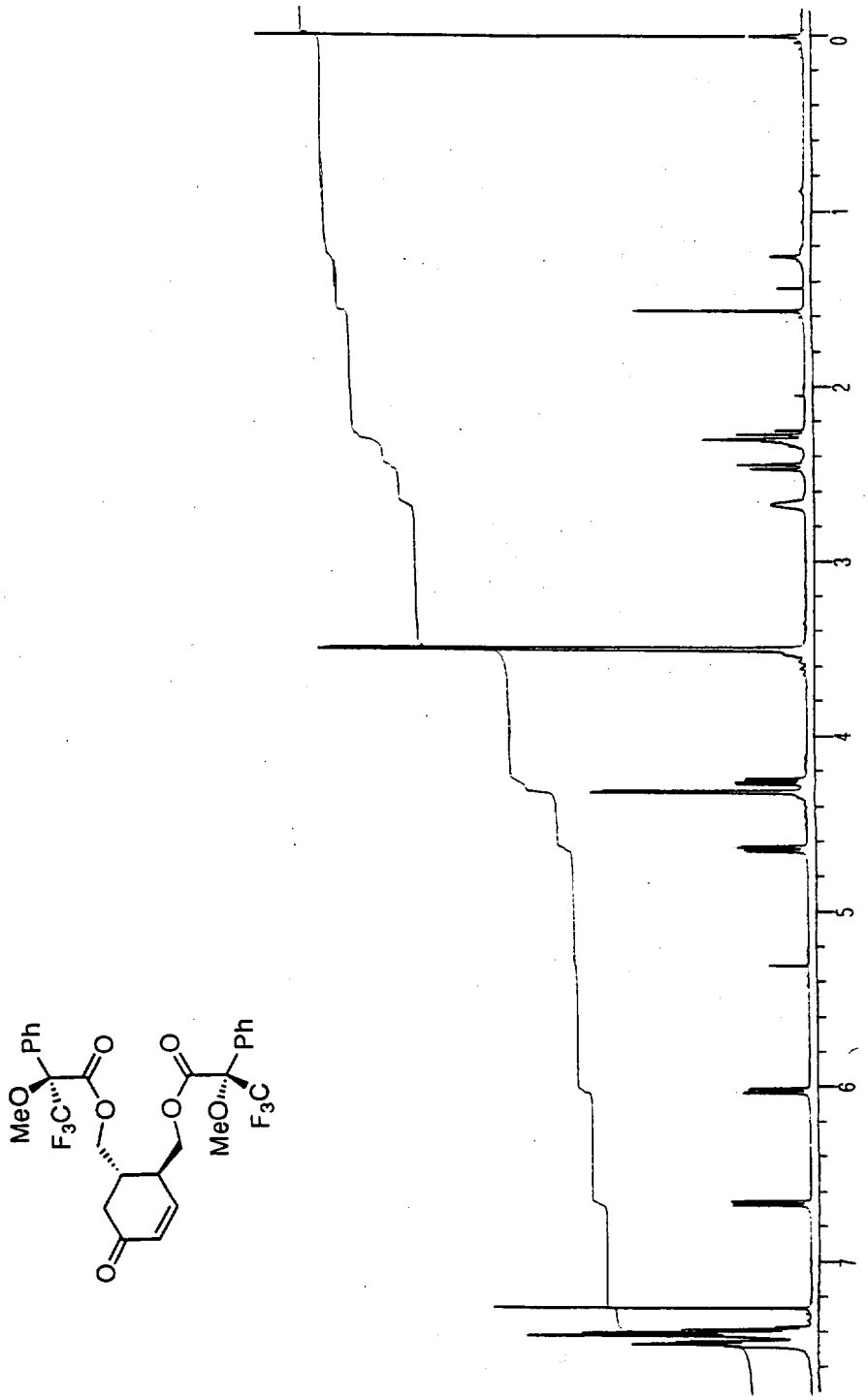
^{1}H NMR Spectrum of MTPA Ester Derived from (-)- 5 (400 MHz, $CDCl_3$)



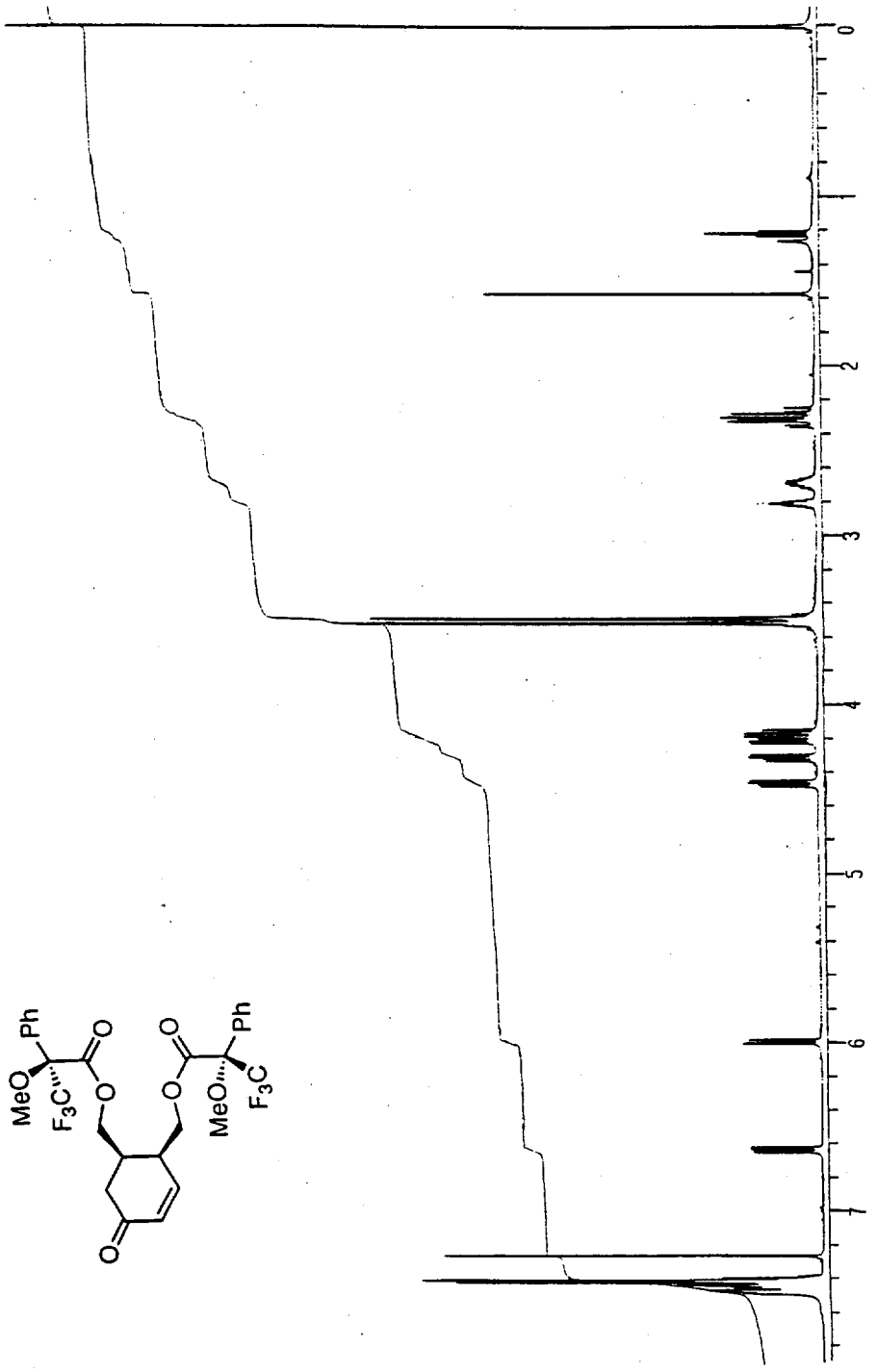
^{1}H NMR Spectrum of MTPA Ester Derived from (-)- 7 (400 MHz, $CDCl_3$)



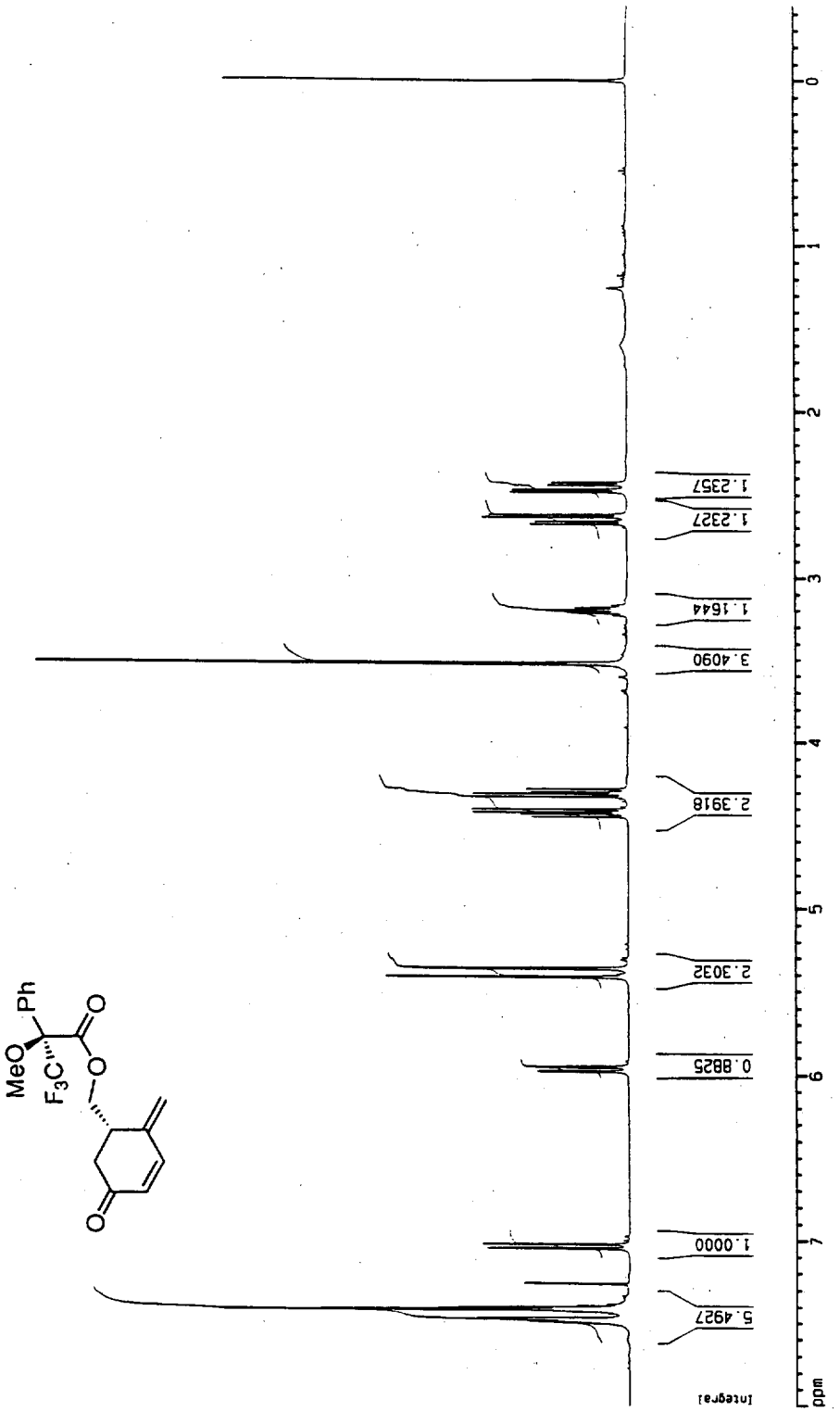
^{1}H NMR Spectrum of MTPA Ester Derived from (+)-16 (500 MHz, $CDCl_3$)



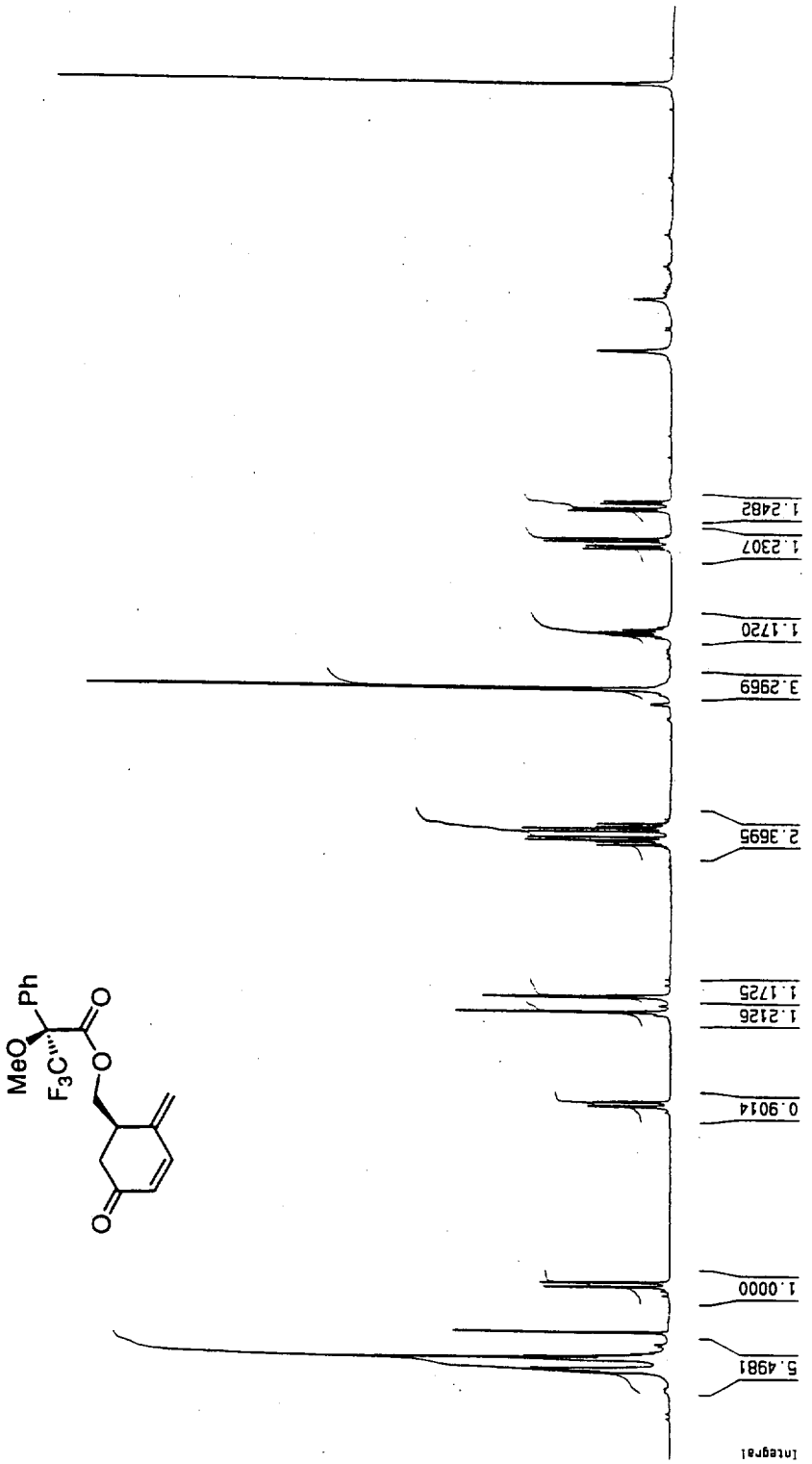
^{1}H NMR Spectrum of MTPA Diester 20 (500 MHz, $CDCl_3$)



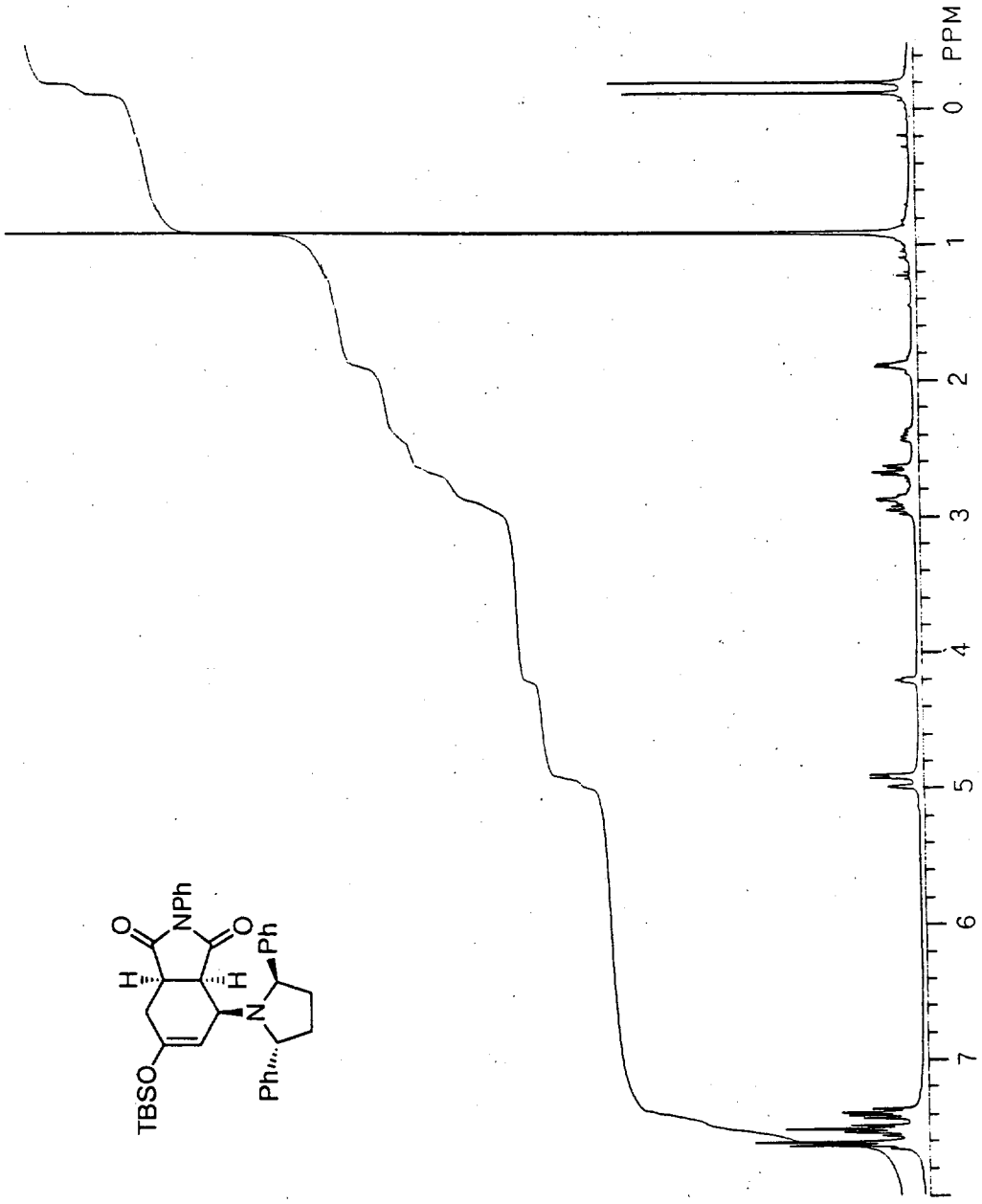
^{1}H NMR Spectrum of MTPA Diester 22 (500 MHz, $CDCl_3$)



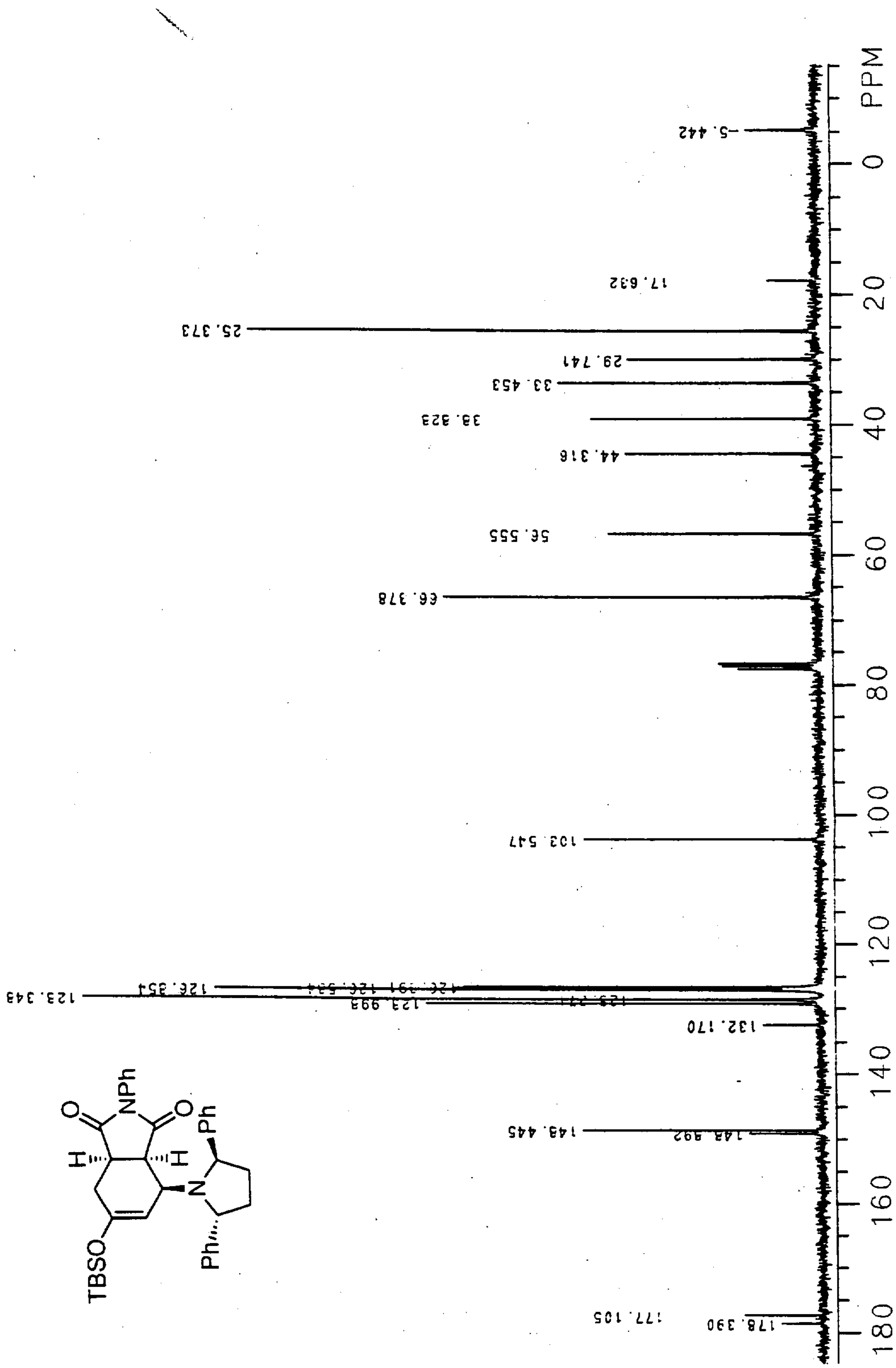
^{1}H NMR Spectrum of MTPA Ester 26 (500 MHz, $CDCl_3$)



^{1}H NMR Spectrum of MTPA Ester 28 (500 MHz, $CDCl_3$)



^{1}H NMR Spectrum of 29 (500 MHz, $CDCl_3$)



^{13}C NMR Spectrum of 29 (75 MHz, $CDCl_3$)