Supplementary Information

Rhodium-Catalyzed Aryl- and Alkylation–Oligomerization of Alkynoates with Organoboron Reagents Giving Salicylates

Yuichi Yasuhara, Takahiro Nishimura,* and Tamio Hayashi*

Department of Chemistry, Graduate School of Science, Kyoto University, Sakyo, Kyoto 606-8502, Japan
E-mail: tnishi@kuchem.kyoto-u.ac.jp; thayashi@kuchem.kyoto-u.ac.jp

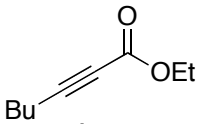
Contents of Supporting Information:

General. All anaerobic and moisture-sensitive manipulations were carried out with standard Schlenk techniques under predried nitrogen or with glove box techniques under argon. NMR spectra were recorded on a JEOL JNM LA-500 spectrometer (500 MHz for ^{1}H, 125 MHz for ^{13}C). Chemical shifts are reported in δ ppm referenced to an internal $SiMe_4$ standard for ^{1}H NMR, chloroform-*d* (δ 77.16) for ^{13}C NMR unless otherwise noted: the following abbreviations are used; s: singlet, d: doublet, t: triplet, q: quartet, sext: sextet, sept: septet, m: multiplet, br: broad. Elemental analysis was performed at the Micro analytical center, Kyoto University. High-resolution mass spectra were obtained with a Bruker micrOTOF spectrometer. Flash column chromatography was performed with Silica Gel 60 N (spherical, neutral) (Cica-Reagent). Preparative thin-layer chromatography was performed with Silica Gel 60 PF_{254} (Merck).

Materials. Et_2O was purified by passing through a neutral alumina column under nitrogen atmosphere. 1,4-Dioxane was distilled over benzophenone ketyl. Methanol was distilled over magnesium turnings. Triethylamine was distilled over KOH. 2-Pentynoic acid (Aldrich), *n*-BuLi (1.60 M solution in hexane, Kanto Chemicals), *n*-butylboronic acid (TCI), methyl 2-butynoate (TCI), ethyl 2-butynoate (TCI), methylboronic acid (Wako Chemicals), 4-phenyl-1-butyne (Wako Chemicals), 1-hexyne (Wako Chemicals), methyl chloroformate (Wako Chemicals), and ethyl chloroformate (Wako Chemicals) were used as received. $[Rh(OH)(cod)]_2$,[1] 4-(2-naphthyl)-1-butyne,[2] 5-(*tert*-butyldiphenylsiloxy)-1-pentyne,[3] Methyl 2-bromo-3-methyl-2-butenoate[4] were prepared according to literature procedures. All other chemicals were purchased from commercial suppliers and used as received.

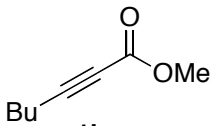
A General Procedure for Preparation of Alkynoates (1a, 1b, 1e, 1f, 1g). To a solution of the corresponding terminal alkyne (20 mmol) in Et_2O (20 mL) was slowly added *n*-BuLi (1.60 M in hexane, 22 mmol) at –78 °C. After stirring at –78 °C for 30 min, the mixture was transferred to a solution of methyl chloroformate (1.7 mL, 22 mmol) or ethyl chloroformate (2.1 mL, 22 mmol) in Et_2O (20 mL) at –78 °C via a cannula, and the resulting solution was stirred for 30 min. The cooling bath was removed to warm up to room temperature and the mixture was stirred for additional 12 h. It was quenched with H_2O (20 mL) and extracted with Et_2O (3 × 20 mL). The combined organic layers were washed with brine (20 mL), dried ($MgSO_4$), filtered, and concentrated on a rotary evaporator. The residue was purified by flash column chromatography on silica gel eluting with EtOAc/hexane.

(1) R. Uson, L. A. Oro and J. A. Cabeza, *Inorg. Synth.,* 1985, **23**, 129.
(2) L. Zhang and S. A. Kozmin, *J. Am. Chem. Soc.,* 2004, **126**, 10204.
(3) K. Muranaka, A. Sano, S. Ichikawa and A. Matsuda, *Bioorg. Med. Chem.,* 2008, **16**, 5862.
(4) M. Lloveras, I. Ramos, E. Molins and A. Messeguer, *Tetrahedron,* 2000, **56**, 3391.



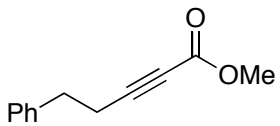
1a

Compound **1a**: 92% yield. ^{1}H NMR ($CDCl_3$) δ 0.92 (t, *J* = 7.3 Hz, 3H), 1.31 (t, *J* = 7.2 Hz, 3H), 1.39–1.48 (m, 2H), 1.52–1.62 (m, 2H), 2.33 (t, *J* = 7.1 Hz, 2H), 4.22 (q, *J* = 7.2 Hz, 2H); ^{13}C NMR ($CDCl_3$) δ 13.6, 14.2, 18.5, 22.1, 29.7, 61.9, 73.3, 89.6, 154.0. HRMS (ESI) calcd for $C_9H_{14}O_2Na$ $(M+Na)^+$ 177.0886, found 177.0891.



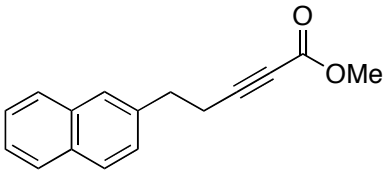
1b

Compound **1b**: 35% yield. ^{1}H NMR ($CDCl_3$) δ 0.92 (t, *J* = 7.3 Hz, 3H), 1.39–1.48 (m, 2H), 1.52–1.61 (m, 2H), 2.34 (t, *J* = 7.1 Hz, 2H), 3.76 (s, 3H); ^{13}C NMR ($CDCL_3$) δ 13.6, 18.5, 22.1, 29.7, 52.7, 73.0, 90.1, 154.4. HRMS (ESI) calcd for $C_8H_{12}O_2Na$ $(M+Na)^+$ 163.0730, found 163.0725.



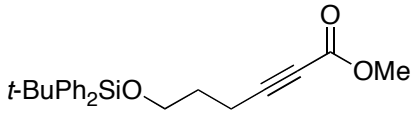
1e

Compound **1e**: 70% yield. ^{1}H NMR ($CDCl_3$) δ 2.62 (t, *J* = 7.6 Hz, 2H), 2.90 (t, *J* = 7.6 Hz, 2H), 3.75 (s, 3H), 7.18–7.26 (m, 3H), 7.28–7.34 (m, 2H); ^{13}C NMR ($CDCL_3$) δ 21.0, 34.0, 52.7, 73.5, 88.9, 126.8, 128.5, 128.7, 139.7, 154.3. HRMS (ESI) calcd for $C_{12}H_{12}O_2Na$ $(M+Na)^+$ 211.0730, found 211.0732.



1f

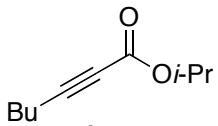
Compound **1f**: 64% yield. ^{1}H NMR ($CDCl_3$) δ 2.69 (t, *J* = 7.6 Hz, 2H), 3.03 (t, *J* = 7.6 Hz, 2H), 3.73 (s, 3H), 7.32 (dd, *J* = 8.4, 1.7 Hz, 1H), 7.38–7.49 (m, 2H), 7.64 (s, 1H), 7.73–7.83 (m, 3H); ^{13}C NMR ($CDCl_3$) δ 20.9, 34.1, 52.7, 73.6, 88.8, 125.7, 126.2, 126.8, 126.9, 127.7, 127.8, 128.3, 132.4, 133.6, 137.1, 154.2. HRMS (ESI) calcd for $C_{16}H_{14}O_2Na$ $(M+Na)^+$ 261.0886, found 261.0891.



1g

Compound **1g**: 93% yield. ^{1}H NMR ($CDCl_3$) δ 1.05 (s, 9H), 1.76–1.85 (m, 2H), 2.50 (t, J = 7.2 Hz, 2H), 3.73 (t, J = 5.9 Hz, 2H), 3.75 (s, 3H), 7.34–7.46 (m, 6H), 7.61–7.69 (m, 4H); ^{13}C NMR ($CDCl_3$) δ 15.4, 19.4, 27.0, 30.6, 52.7, 62.1, 73.1, 89.6, 127.8, 129.8, 133.7, 135.7, 154.3. HRMS (ESI) calcd for $C_{23}H_{28}O_3SiNa$ $(M+Na)^+$ 403.1700, found 403.1698.

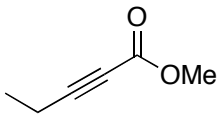
Procedure for Preparation of 1c. To a solution of 2-heptynoic acid (1.6 g, 12.7 mmol) in *i*-PrOH (10 mL) was added *conc*. H_2SO_4 (0.20 mL), and the solution was refluxed for 18 h. After cooling to room temperature, the reaction mixture was quenched with H_2O (10 mL) and extracted with Et_2O (3 × 10 mL). The combined organic layers were washed with brine (10 mL), dried ($MgSO_4$), filtered, and concentrated on a rotary evaporator. The residue was purified by flash column chromatography on silica gel eluting with EtOAc/hexane (1/30) to give **1c** (1.4 g, 67% yield).



1c

Compound **1c**: ^{1}H NMR ($CDCl_3$) δ 0.92 (t, J = 7.3 Hz, 3H), 1.29 (d, J = 6.3 Hz, 6H), 1.39–1.48 (m, 2H), 1.51–1.61 (m, 2H), 2.33 (t, J = 7.1 Hz, 2H), 5.08 (sept, J = 6.3 Hz, 1H); ^{13}C NMR ($CDCl_3$) δ 13.6, 18.5, 21.8, 22.1, 29.7, 69.7, 73.6, 89.2, 153.6. HRMS (ESI) calcd for $C_{10}H_{16}O_2Na$ $(M+Na)^+$ 191.1043, found 191.1043.

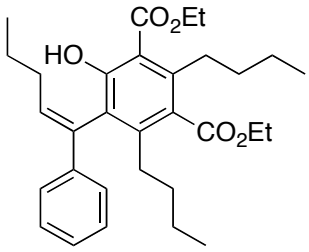
Procedure for Preparation of 1d. To a solution of 2-pentynoic acid (6.6 g, 67 mmol) in MeOH (14 mL) was added *conc*. H_2SO_4 (0.20 mL), and the solution was refluxed for 10 h. After cooling to room temperature, the reaction mixture was quenched with H_2O (20 mL) and extracted with pentane (3 × 20 mL). The combined organic layers were washed with brine (20 mL), dried ($MgSO_4$), filtered, and concentrated on a rotary evaporator. The residue was purified by Kugelrohr distillation (b.p. 78 °C, 17 mmHg) to give **1d** (4.6 g, 61% yield).



1d

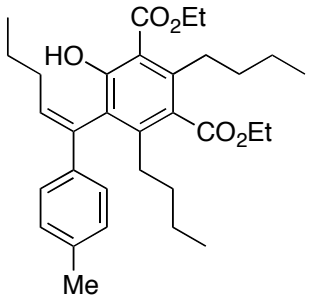
Compound **1d**: ^{1}H NMR ($CDCl_3$) δ 1.21 (t, J = 7.5 Hz, 3H), 2.35 (q, J = 7.5 Hz, 2H), 3.76 (s, 3H); ^{13}C NMR ($CDCl_3$) δ 12.5, 12.7, 52.7, 72.3, 91.0, 154.4. HRMS (ESI) calcd for $C_6H_8O_2Na$ $(M+Na)^+$ 135.0417, found 135.0418.

A Typical Procedure for Rhodium-Catalyzed Synthesis of Phenol Derivatives by Addition of Arylboroxines to Ethyl 2-Heptynoate (1a). To a solution of $[Rh(OH)(cod)]_2$ (3.3 mg, 0.014 mmol Rh) and phenylboroxine (93.2 mg, 0.299 mmol) in 1,4-dioxane (0.60 mL) was added ethyl 2-heptynoate (**1a**) (44.7 mg, 0.29 mmol). After stirring at 70 °C for 3 h, the mixture was diluted with Et_2O (3.0 mL), and filtered through a plug of silica gel. The plug was washed with Et_2O (20 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/12) to give a mixture of **3a-(*E*)** and **3a-(*Z*)** (38.3 mg, 0.077 mmol, 80% yield, *E*/*Z* = 10/90). The stereochemistry was determined by NOESY analysis. The results obtained for the addition of other arylboronic acids are summarized in Table 1.



3a-(*Z*)

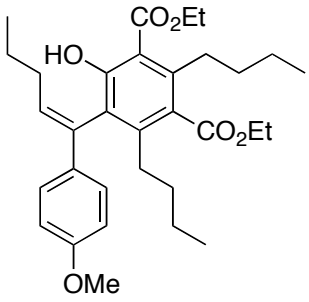
3a-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.73 (t, *J* = 7.2 Hz, 3H), 0.91 (t, *J* = 7.4 Hz, 3H), 0.94 (t, *J* = 7.4 Hz, 3H), 1.09–1.20 (m, 3H), 1.20–1.53 (m, 5H), 1.37 (t, *J* = 7.2 Hz, 3H), 1.44 (t, *J* = 7.2 Hz, 3H), 1.57–1.66 (m, 2H), 1.86 (ddt, *J* = 15.0, 8.1, 7.0 Hz, 1H), 1.96 (ddt, *J* = 15.0, 8.4, 7.0 Hz, 1H), 2.20–2.36 (m, 2H), 2.84 (dt, *J* = 13.1, 8.2 Hz, 1H), 2.88 (dt, *J* = 13.1, 8.3 Hz, 1H), 4.34 (q, *J* =7.2 Hz, 2H), 4.46 (q, *J* = 7.2 Hz, 2H), 6.34 (t, *J* = 7.0 Hz, 1H), 7.14–7.20 (m, 1H), 7.20–7.25 (m, 4H), 11.13 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.7, 14.1, 14.2, 14.3, 22.4, 23.4, 23.5, 32.1, 32.2, 32.5, 33.4, 34.3, 61.2, 62.0, 110.7, 126.1, 126.4, 126.9, 128.4, 128.9, 132.6, 134.7, 141.0, 141.2, 144.9, 159.8, 170.3, 171.5. HRMS (ESI) calcd for $C_{31}H_{42}O_5Na$ $(M+Na)^+$ 517.2924, found 517.2936. **3a-(*E*)**: Vinylic and phenolic protons are observed at δ 5.65 (t, *J* = 7.5 Hz, 1H) and 10.95 (s, 1H), respectively.



3b-(*Z*)

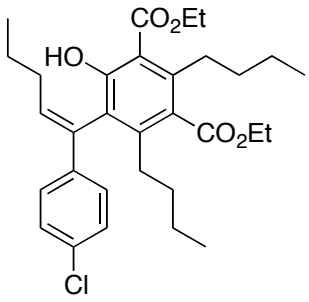
3b-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.74 (t, *J* = 7.1 Hz, 3H), 0.90 (t, *J* = 7.4 Hz, 3H), 0.94 (t, *J* = 7.4 Hz, 3H), 1.10–1.23 (m, 3H), 1.23–1.56 (m, 5H), 1.37 (t, *J* = 7.1 Hz, 3H), 1.43 (t, *J* = 7.1 Hz, 3H), 1.56–1.66 (m, 2H), 1.85 (ddt, *J* = 15.1, 8.0, 7.0 Hz, 1H), 1.94 (ddt, *J* = 15.1, 8.2, 7.0 Hz, 1H), 2.22–2.35 (m, 2H), 2.29 (s, 3H), 2.83 (dt, *J* = 13.8, 8.4 Hz, 1H), 2.87 (dt, *J* = 13.8, 8.4 Hz, 1H), 4.34 (q, *J* = 7.1 Hz, 2H), 4.45 (q, *J* = 7.1 Hz, 2H), 6.30 (t, *J* = 7.0 Hz, 1H), 7.04 (d, *J*

= 8.1 Hz, 2H), 7.12 (d, *J* = 8.1 Hz, 2H), 11.01 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.8, 14.1, 14.22, 14.24, 14.3, 21.2, 22.5, 23.5, 23.6, 32.1, 32.2, 32.5, 33.4, 34.3, 61.2, 62.0, 110.8, 125.9, 126.5, 128.9, 129.1, 131.6, 134.4, 136.6, 138.1, 141.1, 144.9, 159.7, 170.4, 171.5. HRMS (ESI) calcd for $C_{32}H_{44}O_5Na$ $(M+Na)^+$ 531.3081, found 531.3088. **3b-(*E*)**: Vinylic and phenolic protons are observed at δ 5.61 (t, *J* = 7.5 Hz, 1H) and 10.84 (s, 1H), respectively.



3c-(*Z*)

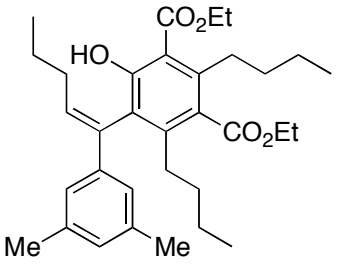
3c-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.74 (t, *J* = 7.0 Hz, 3H), 0.90 (t, *J* = 7.5 Hz, 3H), 0.94 (t, *J* = 7.3 Hz, 3H), 1.09–1.22 (m, 3H), 1.22–1.52 (m, 5H), 1.37 (t, *J* = 7.2 Hz, 3H), 1.43 (t, *J* = 7.1 Hz, 3H), 1.56–1.67 (m, 2H), 1.84 (ddt, *J* = 15.1, 7.9, 7.1 Hz, 1H), 1.93 (ddt, *J* = 15.1, 8.2, 7.1 Hz, 1H), 2.21–2.34 (m, 2H), 2.83 (dt, *J* = 13.9, 8.3 Hz, 1H), 2.88 (dt, *J* = 13.9, 8.3 Hz, 1H), 3.76 (s, 3H), 4.34 (q, *J* = 7.2 Hz, 2H), 4.45 (q, *J* = 7.1 Hz, 2H), 6.24 (t, *J* = 7.1 Hz, 1H), 6.78 (d, *J* = 8.8 Hz, 2H), 7.16 (d, *J* = 8.8 Hz, 2H), 11.00 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.8, 14.1, 14.21, 14.23, 14.3, 22.5, 23.5, 23.6, 32.0, 32.2, 32.5, 33.3, 34.3, 55.4, 61.2, 62.0, 110.9, 113.9, 126.5, 127.1, 128.9, 130.7, 133.7, 134.0, 141.1, 144.9, 158.9, 159.6, 170.4, 171.5. HRMS (ESI) calcd for $C_{32}H_{44}O_6Na$ $(M+Na)^+$ 547.3030, found 547.3030. **3c-(*E*)**: Vinylic and phenolic protons are observed at δ 5.58 (t, *J* = 7.3 Hz, 1H) and 10.80 (s, 1H), respectively.



3d-(*Z*)

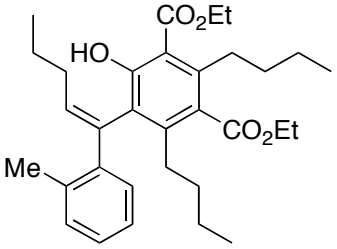
3d-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.75 (t, *J* = 7.1 Hz, 3H), 0.90 (t, *J* = 7.4 Hz, 3H), 0.95 (t, *J* = 7.4 Hz, 3H), 1.09–1.21 (m, 3H), 1.22–1.52 (m, 5H), 1.37 (t, *J* = 7.2 Hz, 3H), 1.44 (t, *J* = 7.2 Hz, 3H), 1.52–1.66 (m, 2H), 1.86 (ddt, *J* = 15.2, 8.1, 7.1 Hz, 1H), 1.94 (ddt, *J* = 15.2, 8.2, 7.1 Hz, 1H), 2.15–2.35 (m, 2H), 2.85 (dt, *J* = 13.8, 8.2 Hz, 1H), 2.89 (dt, *J* = 13.8, 8.2 Hz, 1H), 4.35 (q, *J* = 7.2 Hz, 2H), 4.46 (q, *J* = 7.2 Hz, 2H), 6.33 (t, *J* = 7.1 Hz, 1H), 7.17 (d, *J* = 8.8 Hz, 2H), 7.20 (d, *J* = 8.8 Hz, 2H), 11.31 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.7, 14.1, 14.19, 14.21, 14.3, 22.4, 23.4, 23.6, 32.0, 32.2, 32.5, 33.4, 34.3, 61.3, 62.1, 110.6, 125.9, 127.3, 128.6, 129.0, 132.7, 133.1, 133.7, 139.6, 141.6, 145.0, 160.0, 170.2, 171.6. HRMS (ESI) calcd for $C_{31}H_{41}O_5ClNa$ $(M+Na)^+$ 551.2535, found 551.2539. **3d-(*E*)**: Vinylic and phenolic protons

are observed at δ 5.65 (t, *J* = 7.4 Hz, 1H) and 11.19 (s, 1H), respectively.



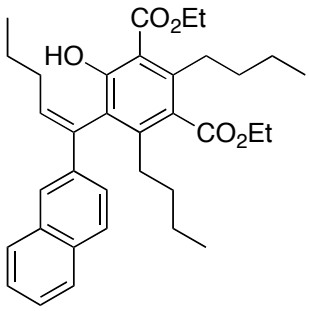
3e-(*Z*)

3e-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.75 (t, *J* = 7.1 Hz, 3H), 0.90 (t, *J* = 7.4 Hz, 3H), 0.94 (t, *J* = 7.4 Hz, 3H), 1.10–1.23 (m, 3H), 1.23–1.53 (m, 5H), 1.37 (t, *J* = 7.1 Hz, 3H), 1.44 (t, *J* = 7.2 Hz, 3H), 1.57–1.67 (m, 2H), 1.83 (ddt, *J* = 15.1, 8.1, 7.0 Hz, 1H), 1.92 (ddt, *J* = 15.1, 8.2, 7.0 Hz, 1H), 2.24 (s, 6H), 2.23–2.35 (m, 2H), 2.78–2.92 (m, 2H), 4.34 (q, *J* = 7.1 Hz, 2H), 4.46 (q, *J* = 7.2 Hz, 2H), 6.27 (t, *J* = 7.0 Hz, 1H), 6.82 (s, 1H), 6.84 (s, 2H), 11.03 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.7, 14.1, 14.2, 14.3, 21.5, 22.5, 23.5, 23.6, 32.1, 32.2, 32.5, 33.4, 34.3, 61.2, 62.0, 110.8, 124.0, 126.6, 128.76, 128.81, 132.5, 134.9, 137.7, 141.0, 141.2, 144.9, 159.7, 170.4, 171.5. HRMS (ESI) calcd for $C_{33}H_{46}O_5Na$ $(M+Na)^+$ 545.3237, found 545.3230. **3e-(*E*)**: Vinylic and phenolic protons are observed at δ 5.60 (t, *J* = 7.4 Hz, 1H) and 10.80 (s, 1H), respectively.



3f-(*Z*)

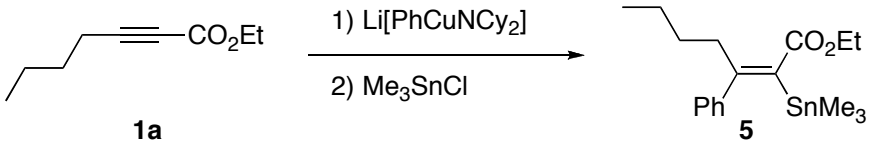
3f-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.76 (t, *J* = 7.4 Hz, 3H), 0.92 (t, *J* = 7.3 Hz, 3H), 0.91–1.06 (m, 1H), 0.93 (t, *J* = 7.3 Hz, 3H), 1.06–1.54 (m, 7H), 1.34 (t, *J* = 7.1 Hz, 3H), 1.44 (t, *J* = 7.1 Hz, 3H), 1.54–1.67 (m, 2H), 1.87 (ddt, *J* = 15.0, 8.0, 7.0 Hz, 1H), 1.99–2.12 (m, 1H), 2.21 (ddd, *J* = 13.1, 11.3, 5.1 Hz, 1H), 2.26 (ddd, *J* = 13.1, 11.2, 5.2 Hz, 1H), 2.39 (s, 3H), 2.79 (dt, *J* = 13.3, 8.3 Hz, 1H), 2.86 (dt, *J* = 13.3, 8.3 Hz, 1H), 4.31 (q, *J* = 7.1 Hz, 2H), 4.47 (q, *J* = 7.1 Hz, 2H), 5.96 (dd, *J* = 8.0, 6.3 Hz, 1H), 7.00–7.21 (m, 4H), 11.25 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 14.1, 14.2, 14.25, 14.27, 20.9, 22.4, 23.5, 23.6, 32.30, 32.31, 32.5, 33.4, 34.3, 61.2, 62.0, 110.7, 125.8, 126.5, 127.5, 128.9, 129.4, 131.1, 133.2, 135.1, 137.5, 141.0, 141.7, 144.7, 159.7, 170.3, 171.6. HRMS (ESI) calcd for $C_{32}H_{44}O_5Na$ $(M+Na)^+$ 531.3081, found 531.3089. **3f-(*E*)**: Vinylic and phenolic protons are observed at δ 5.71 (t, *J* = 7.4 Hz, 1H) and 10.94 (s, 1H), respectively.



3g-(*Z*)

3g-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.68 (t, *J* = 7.3 Hz, 3H), 0.94 (t, *J* = 7.5 Hz, 3H), 0.96 (t, *J* = 7.3 Hz, 3H), 1.05–1.24 (m, 3H), 1.24–1.45 (m, 3H), 1.36 (t, *J* = 7.0 Hz, 3H), 1.45 (t, *J* = 7.1 Hz, 3H), 1.45–1.57 (m, 2H), 1.60–1.69 (m, 2H), 1.92 (ddt, *J* = 15.2, 8.0, 7.1 Hz, 1H), 2.01 (ddt, *J* = 15.2, 8.2, 7.1 Hz, 1H), 2.29 (ddd, *J* = 12.9, 10.7, 5.9 Hz, 1H), 2.33 (ddd, *J* = 12.9, 11.8, 5.0 Hz, 1H), 2.84–2.94 (m, 2H), 4.34 (q, *J* = 7.0 Hz, 2H), 4.47 (q, *J* = 7.1 Hz, 2H), 6.49 (t, *J* = 7.1 Hz, 1H), 7.34–7.42 (m, 2H), 7.51 (s, 1H), 7.54 (dd, *J* = 8.7, 1.7 Hz, 1H), 7.67–7.79 (m, 3H), 11.18 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.7, 14.1, 14.2, 14.26, 14.31, 22.5, 23.4, 23.6, 32.1, 32.2, 32.6, 33.4, 34.3, 61.2, 62.1, 110.8, 124.5, 124.8, 125.6, 126.0, 126.3, 127.6, 128.0, 128.3, 129.0, 132.8, 133.3, 133.7, 134.7, 138.4, 141.4, 145.1, 159.9, 170.3, 171.6. HRMS (ESI) calcd for $C_{35}H_{44}O_5Na$ $(M+Na)^+$ 567.3081, found 567.3092. **3g-(*E*)**: Vinylic and phenolic protons are observed at δ 5.73 (t, *J* = 7.6 Hz, 1H) and 11.03 (s, 1H), respectively.

Preparation of (*Z*)-Ethyl 3-Phenyl-2-(trimethylstannyl)hept-2-enoate 5.[5]



1a **5**

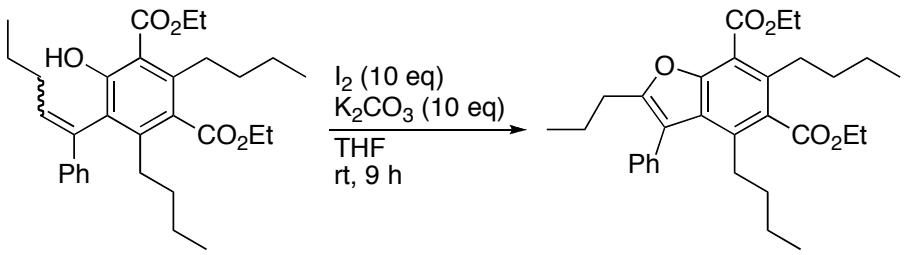
To a solution of dicyclohexylamine (598 mg, 3.30 mmol) in Et_2O (18 mL) was added methyllithium (1.12 M in Et_2O, 2.9 mL, 3.3 mmol) at –30 °C, and the mixture was stirred at –30 °C for 30 min. To the mixture was added CuI (629 mg, 3.30 mmol), and the resulting white slurry was stirred at –30 °C for 30 min. PhLi (1.15 M in cyclohexane and Et_2O, 2.9 mL, 3.3 mmol) was added, and the mixture was cooled to –78 °C after being stirred at –30 °C for 30 min. Ethyl 2-heptynoate (**1a**) was added, and the mixture was stirred at –78 °C for 30 min. Me_3SnCl was added, and the mixture was stirred at –78 °C for 1 h. The mixture was allowed to warm to room temperature and it was further stirred at room temperature for 2 h. Aqueous NH_4Cl (2 mL) was added and the mixture was filtered through a pad of celite using Et_2O as an eluent. The filtrate was washed with H_2O, brine, dried ($MgSO_4$), filtered, and concentrated on a rotary evaporator. The residue containing **5-(*E*)** and **5-(*Z*)** (28/72) was subjected to flash column chromatography on silica gel eluting with EtOAc/hexane (1/100), and it was further purified by GPC to give **5-(*Z*)** (499 mg, 1.26 mmol, 42% yield). ^{1}H NMR ($CDCl_3$) δ –0.14 (s, satellite peaks: d, $J_{^{119}Sn\text{-}H}$ = 56.3 Hz; d, $J_{^{117}Sn\text{-}H}$ = 53.8 Hz, 9H), 0.81 (t, *J* =

(5) T. Tsuda, T. Yoshida and T. Saegusa, *J. Org. Chem.*, 1988, **53**, 607.

7.1 Hz, 3H), 1.19–1.30 (m, 4H), 1.33 (t, *J* = 7.1 Hz, 3H), 2.60 (t, *J* = 7.4 Hz, 2H), 4.22 (q, *J* = 7.1 Hz, 2H), 7.14–7.19 (m, 2H), 7.26–7.35 (m, 3H). ^{13}C NMR ($CDCl_3$) δ –7.4, 14.0, 14.7, 22.6, 30.5, 37.1, 60.3, 127.6, 128.0, 128.3, 136.2, 144.2, 159.0, 172.7. HRMS (ESI) calcd for $C_{18}H_{28}O_2SnNa$ $(M+Na)^+$ 419.1006, found 419.1002.

Procedure for Rhodium-Catalyzed Addition of (*Z*)-Ethyl 3-Phenyl-2-(trimethylstannyl)hept-2-enoate (5) to Ethyl 2-Heptynoate (1a) (Scheme 5). To a solution of **5** (132 mg, 0.33 mmol) in 1,4-dioxane (0.40 mL) and H_2O (40 μL) was added successively ethyl 2-heptynoate (**1a**) (26.2 mg, 0.17 mmol) and $[Rh(OH)(cod)]_2$ (1.9 mg, 0.0084 mmol Rh). After stirring at 100 °C for 3 h, the mixture was diluted with Et_2O (3.0 mL), and filtered through a plug of silica gel. The plug was washed with Et_2O (20 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/10) to give a mixture of **3a-(*E*)** and **3a-(*Z*)** (19.9 mg, 0.040 mmol, 47% yield, *E*/*Z* = 8/92).

Transformation of 3a into 6.

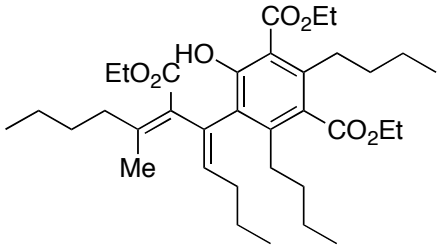


3a **6**

To a solution of **3a** (50.6 mg, 0.102 mmol) in THF (1.0 mL) was added successively K_2CO_3 (138 mg, 1.0 mmol) and I_2 (127 mg, 1.0 mmol) at 0 °C. The cooling bath was removed to warm up to room temperature and the mixture was stirred for additional 9 h. It was quenched with sat. $Na_2S_2O_3$ aq (2 mL) and extracted with Et_2O (3 × 2 mL). The combined organic layers were washed with brine (5 mL), dried ($MgSO_4$), filtered, and concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/10) to give **6** (46.9 mg, 0.0953 mmol, 93% yield). ^{1}H NMR ($CDCl_3$) δ 0.57 (t, *J* = 7.3 Hz, 3H), 0.73 (sext, *J* = 7.3 Hz, 2H), 0.89 (t, *J* = 7.4 Hz, 3H), 0.92 (t, *J* = 7.4 Hz, 3H), 1.09–1.23 (m, 2H), 1.35 (t, *J* = 7.1 Hz, 3H), 1.38 (sext, *J* = 7.4 Hz, 2H), 1.44 (t, *J* = 7.1 Hz, 3H), 1.53–1.67 (m, 2H), 1.67 (sext, *J* = 7.4 Hz, 2H), 2.28–2.42 (m, 2H), 2.55 (t, *J* = 7.4 Hz, 2H), 2.72–2.85 (m, 2H), 4.35 (q, *J* = 7.1 Hz, 2H), 4.49 (q, *J* = 7.1 Hz, 2H), 7.29–7.35 (m, 2H), 7.35–7.44 (m, 3H); ^{13}C NMR ($CDCl_3$) 13.6, 13.9, 14.0, 14.3, 14.5, 21.7, 22.9, 23.3, 28.4, 30.4, 31.4, 34.0, 34.4, 61.2, 61.4, 114.9, 117.6, 125.9, 127.8, 128.2, 130.6, 130.9, 133.7, 134.5, 135.9, 151.9, 156.9, 166.5, 170.3. HRMS (ESI) calcd for $C_{31}H_{40}O_5Na$ $(M+Na)^+$ 515.2768, found 515.2771.

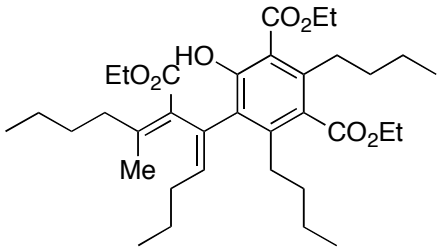
A Typical Procedure for Rhodium-Catalyzed Synthesis of Phenol Derivatives by Addition of Methylboronic Acid (7) to Alkynoates. To a solution of $[Rh(OH)(cod)]_2$ (5.6 mg, 0.025 mmol of Rh) and methylboronic acid (74.8 mg, 1.25 mmol) in 1,4-dioxane (1.0

mL) was added ethyl 2-heptynoate (**1a**) (77.1 mg, 0.50 mmol). After stirring at 70 °C for 12 h, the mixture was diluted with Et_2O (3.0 mL), and filtered through a plug of silica gel. The plug was washed with Et_2O (20 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/7) to give **8a-(*E*)** (46.4 mg, 0.079 mmol, 64% yield) and **8a-(*Z*)** (6.9 mg, 0.012 mmol, 10% yield). The yields were based on the alkynoate. The stereochemistry of **8a-(*E*)** was determined by NOESY analysis. The stereochemistry of **8e-(*Z*)** was determined by X-ray crystal analysis (Figure S1, vide infra) and NOESY analysis. The results obtained for the addition to other alkynoates are summarized in Table 2.



8a-(*E*)

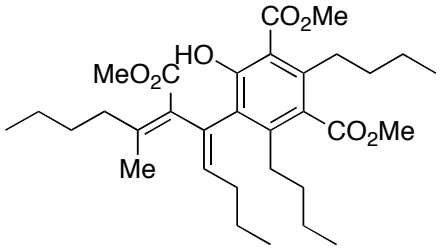
8a-(*E*): ^{1}H NMR ($CDCl_3$) δ 0.86 (t, *J* = 7.2 Hz, 3H), 0.87 (t, *J* = 7.4 Hz, 3H), 0.89 (t, *J* = 7.8 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H), 1.08 (t, *J* = 7.1 Hz, 3H), 1.23–1.62 (m, 14H), 1.37 (t, *J* = 7.2 Hz, 3H), 1.39 (t, *J* = 7.1 Hz, 3H), 1.78 (dtd, *J* = 15.0, 8.1, 6.8 Hz, 1H), 1.88 (s, 3H), 1.98 (ddt, *J* = 15.0, 8.7, 6.2 Hz, 1H), 2.12 (ddd, *J* = 12.6, 9.0, 6.1 Hz, 1H), 2.14 (ddd, *J* = 12.6, 9.2, 6.7 Hz, 1H), 2.30 (td, *J* = 12.6, 4.8 Hz, 1H), 2.51 (td, *J* = 12.6, 4.8 Hz, 1H), 2.65 (ddd, *J* = 13.3, 9.9, 6.6 Hz, 1H), 2.78 (ddd, *J* = 13.3, 10.1, 6.4 Hz, 1H), 3.99 (dq, *J* = 10.7, 7.1 Hz, 1H), 4.03 (dq, *J* = 10.7, 7.1 Hz, 1H), 4.34 (q, *J* = 7.1 Hz, 2H), 4.41 (q, *J* = 7.2 Hz, 2H), 5.88 (dd, *J* = 8.1, 6.2 Hz, 1H), 9.78 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 14.0, 14.05, 14.07, 14.20, 14.22, 14.3, 19.9, 22.2, 22.9, 23.4, 23.6, 30.5, 31.7, 31.9, 32.81, 32.82, 34.1, 37.2, 60.6, 61.1, 61.7, 113.4, 124.5, 128.3, 129.2, 132.4, 139.6, 140.2, 141.4, 144.1, 157.4, 169.6, 170.3, 170.6. HRMS (ESI) calcd for $C_{35}H_{54}O_7Na$ $(M+Na)^+$ 609.3762, found 609.3764.



8a-(*Z*)

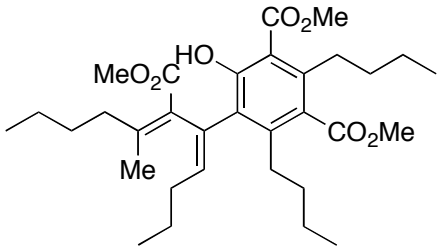
8a-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.87 (t, *J* = 7.3 Hz, 3H), 0.90 (t, *J* = 7.3 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H), 0.96 (t, *J* = 7.3 Hz, 3H), 1.11 (t, *J* = 7.1 Hz, 3H), 1.21–1.42 (m, 6H), 1.36 (t, *J* = 7.2 Hz, 3H), 1.38 (t, *J* = 7.2 Hz, 3H), 1.42–1.60 (m, 8H), 1.85 (s, 3H), 2.06 (br s, 2H), 2.25 (t, *J* = 7.9 Hz, 2H), 2.38 (br s, 1H), 2.55 (br s, 1H), 2.67 (t, *J* = 8.2 Hz, 2H), 4.02 (q, *J* = 7.2 Hz, 2H), 4.32 (q, *J* = 7.1 Hz, 2H), 4.39 (q, *J* = 7.2 Hz, 2H), 5.64 (t, *J* = 7.2 Hz, 1H), 9.67 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.95, 14.00, 14.06, 14.10, 14.26, 14.29, 21.0, 22.5, 23.0, 23.4, 23.7, 30.9,

31.7, 32.2, 32.7, 34.0, 34.1, 36.2, 60.7, 61.0, 61.6, 114.1, 127.7, 127.9, 128.1, 130.1, 138.6, 139.4, 143.5, 146.0, 157.8, 169.2, 170.37, 170.43. HRMS (ESI) calcd for $C_{35}H_{54}O_7Na$ $(M+Na)^+$ 609.3762, found 609.3753.



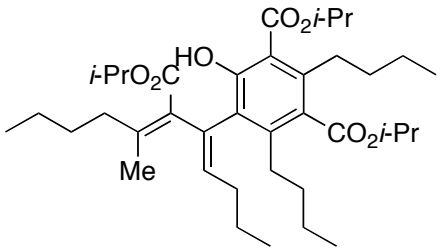
8b-(*E*)

8b-(*E*): ^{1}H NMR ($CDCl_3$) δ 0.866 (t, *J* = 7.1 Hz, 3H), 0.870 (t, *J* = 7.5 Hz, 3H), 0.89 (t, *J* = 7.3 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H), 1.22–1.57 (m, 14H), 1.77 (dtd, *J* = 15.0, 8.1, 6.8 Hz, 1H), 1.88 (s, 3H), 1.96 (ddt, *J* = 15.0, 8.5, 6.3 Hz, 1H), 2.11 (ddd, *J* = 13.0, 9.2, 6.1 Hz, 1H), 2.14 (ddd, *J* = 13.0, 9.4, 6.7 Hz, 1H), 2.29 (td, *J* = 12.6, 5.1 Hz, 1H), 2.48 (td, *J* = 12.6, 5.1 Hz, 1H), 2.64 (ddd, *J* = 13.5, 9.7, 6.6 Hz, 1H), 2.70 (ddd, *J* = 13.5, 9.4, 7.0 Hz, 1H), 3.56 (s, 3H), 3.85 (s, 3H), 3.93 (s, 3H), 5.87 (dd, *J* = 8.1, 6.3 Hz, 1H), 9.68 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 14.0, 14.1, 14.2, 19.9, 22.2, 22.9, 23.4, 23.6, 30.5, 31.7, 31.9, 32.77, 32.83, 34.0, 37.2, 51.5, 51.9, 52.4, 113.4, 124.5, 128.1, 129.3, 132.1, 139.6, 140.5, 142.3, 144.2, 157.3, 169.9, 170.7, 170.9. HRMS (ESI) calcd for $C_{32}H_{48}O_7Na$ $(M+Na)^+$ 567.3292, found 567.3273. Anal. Calcd for $C_{32}H_{48}O_7$: C, 70.56; H, 8.88. Found: C, 70.49; H, 8.77.



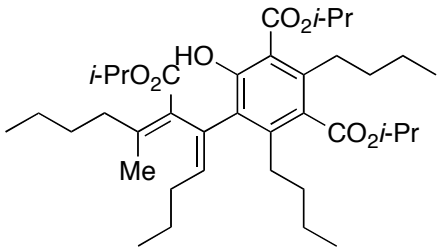
8b-(*Z*)

8b-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.88 (t, *J* = 7.3 Hz, 3H), 0.90 (t, *J* = 7.3 Hz, 3H), 0.91 (t, *J* = 7.2 Hz, 3H), 0.96 (t, *J* = 7.4 Hz, 3H), 1.20–1.54 (m, 14H), 1.85 (s, 3H), 2.06 (br d, *J* = 6.8 Hz, 2H), 2.25 (t, *J* = 7.8 Hz, 2H), 2.30–2.73 (m, 4H), 3.56 (s, 3H), 3.84 (s, 3H), 3.90 (s, 3H), 5.64 (t, *J* = 7.2 Hz, 1H), 9.57 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 14.0, 14.1, 14.3, 21.1, 22.4, 23.0, 23.4, 23.6, 30.9, 31.5, 32.2, 32.7, 33.9, 34.0, 36.2, 51.6, 51.9, 52.3, 114.1, 127.5, 127.7, 127.9, 130.1, 138.8, 139.7, 143.8, 147.1, 157.8, 169.5, 170.78, 170.81. HRMS (ESI) calcd for $C_{32}H_{48}O_7Na$ $(M+Na)^+$ 567.3292, found 567.3288.



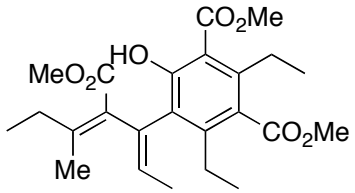
8c-(*E*)

8c-(*E*): ^{1}H NMR ($CDCl_3$) 0.86 (t, *J* = 7.4 Hz, 3H), 0.88 (t, *J* = 7.6 Hz, 3H), 0.89 (t, *J* = 7.3 Hz, 3H), 0.91 (t, *J* = 7.3 Hz, 3H), 1.01 (d, *J* = 6.3 Hz, 3H), 1.10 (d, *J* = 6.4 Hz, 3H), 1.16–1.59 (m, 14H), 1.35 (d, *J* = 6.3 Hz, 3H), 1.36 (d, *J* = 6.3 Hz, 3H), 1.37 (d, *J* = 6.3 Hz, 6H), 1.79 (dtd, *J* = 15.0, 8.2, 6.9 Hz, 1H), 1.87 (s, 3H), 1.99 (ddt, *J* = 15.0, 8.7, 6.1 Hz, 1H), 2.10 (ddd, *J* = 13.0, 9.5, 5.9 Hz, 1H), 2.13 (ddd, *J* = 13.0, 9.5, 6.4 Hz, 1H), 2.30 (td, *J* = 12.7, 4.7 Hz, 1H), 2.52 (td, *J* = 12.7, 4.7 Hz, 1H), 2.64 (ddd, *J* = 13.3, 10.2, 6.5 Hz, 1H), 2.80 (ddd, *J* = 13.3, 10.1, 6.5 Hz, 1H), 4.88 (sept, *J* = 6.3 Hz, 1H), 5.24 (sept, *J* = 6.3 Hz, 1H), 5.32 (sept, *J* = 6.3 Hz, 1H), 5.88 (dd, *J* = 8.2, 6.1 Hz, 1H), 9.69 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 19.0, 19.1, 24.6, 26.29, 26.34, 26.71, 26.74, 26.75, 26.80, 27.1, 27.9, 28.4, 28.6, 35.3, 36.6, 36.8, 37.6, 37.7, 39.0, 42.1, 72.9, 73.6, 74.3, 118.6, 129.2, 133.3, 133.9, 137.5, 144.3, 144.6, 145.2, 148.7, 162.1, 174.1, 174.6, 174.9. HRMS (ESI) calcd for $C_{38}H_{60}O_7Na$ $(M+Na)^+$ 651.4231, found 651.4231.



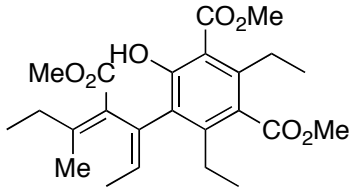
8c-(*Z*)

8c-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.87 (t, *J* = 7.2 Hz, 3H), 0.89 (t, *J* = 7.5 Hz, 3H), 0.91 (t, *J* = 7.5 Hz, 3H), 0.97 (t, *J* = 7.3 Hz, 3H), 1.08 (d, *J* = 6.3 Hz, 6H), 1.20–1.42 (m, 6H), 1.34 (d, *J* = 6.3 Hz, 6H), 1.36 (d, *J* = 6.3 Hz, 6H), 1.42–1.59 (m, 8H), 1.84 (s, 3H), 2.06 (br s, 2H), 2.23 (t, *J* = 7.8 Hz, 2H), 2.36 (br s, 1H), 2.57 (br s, 1H), 2.67 (br s, 2H), 4.88 (sept, *J* = 6.3 Hz, 1H), 5.22 (sept, *J* = 6.3 Hz, 1H), 5.30 (sept, *J* = 6.3 Hz, 1H), 5.64 (t, *J* = 7.3 Hz, 1H), 9.60 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 14.1, 14.3, 20.9, 21.6, 21.88, 21.93, 22.5, 23.1, 23.5, 23.7, 30.8, 31.8, 32.3, 32.6, 34.1, 34.2, 36.2, 68.3, 68.7, 69.3, 114.5, 127.5, 128.27, 128.29, 130.1, 138.5, 139.0, 143.2, 144.8, 157.6, 168.8, 169.87, 169.94. HRMS (ESI) calcd for $C_{38}H_{60}O_7Na$ $(M+Na)^+$ 651.4231, found 651.4221.



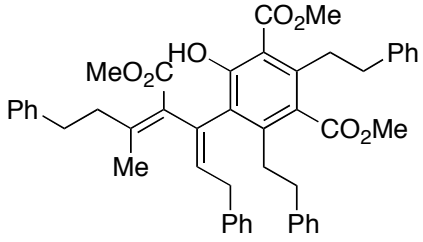
8d-(*E*)

8d-(*E*): ^{1}H NMR ($CDCl_3$) δ 1.04 (t, *J* = 7.5 Hz, 3H), 1.06 (t, *J* = 7.5 Hz, 3H), 1.17 (t, *J* = 7.5 Hz, 3H), 1.56 (d, *J* = 6.9 Hz, 3H), 1.87 (s, 3H), 2.13 (dq, *J* = 13.2, 7.5 Hz, 1H), 2.17 (dq, *J* = 13.2, 7.5 Hz, 1H), 2.33 (dq, *J* = 13.6, 7.5 Hz, 1H), 2.53 (dq, *J* = 13.6, 7.5 Hz, 1H), 2.70 (dq, *J* = 13.8, 7.5 Hz, 1H), 2.73 (dq, *J* = 13.8, 7.5 Hz, 1H), 3.57 (s, 3H), 3.87 (s, 3H), 3.94 (s, 3H), 5.97 (q, *J* = 6.9 Hz, 1H), 9.68 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 12.9, 14.9, 15.5, 15.9, 19.2, 24.8, 26.3, 30.5, 51.7, 52.0, 52.4, 113.5, 124.1, 127.9, 130.7, 131.5, 134.0, 141.6, 144.0, 145.4, 157.2, 169.9, 170.7, 170.9. HRMS (ESI) calcd for $C_{24}H_{32}O_7Na$ $(M+Na)^+$ 455.2040, found 455.2038.



8d-(*Z*)

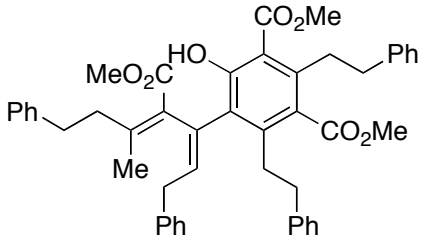
8d-(*Z*): ^{1}H NMR ($CDCl_3$) δ 1.07 (t, *J* = 7.5 Hz, 3H), 1.11 (t, *J* = 7.5 Hz, 3H), 1.16 (t, *J* = 7.5 Hz, 3H), 1.75 (d, *J* = 6.9 Hz, 3H), 1.87 (s, 3H), 2.29 (q, *J* = 7.5 Hz, 2H), 2.29–2.67 (m, 2H), 2.57–2.75 (m, 2H), 3.57 (s, 3H), 3.87 (s, 3H), 3.92 (s, 3H), 5.75 (q, *J* = 6.9 Hz, 1H), 9.47 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.3, 15.8, 15.9, 16.0, 20.5, 24.6, 26.1, 29.6, 51.7, 52.0, 52.4, 114.4, 126.5, 127.5, 127.6, 131.1, 133.4, 140.8, 144.9, 148.7, 157.5, 169.4, 170.6, 170.8. HRMS (ESI) calcd for $C_{24}H_{32}O_7Na$ $(M+Na)^+$ 455.2040, found 455.2046.



8e-(*E*)

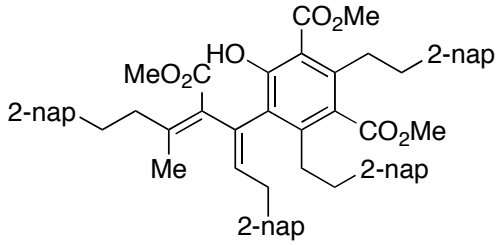
8e-(*E*): ^{1}H NMR ($CDCl_3$) δ 1.79 (s, 3H), 2.36 (ddd, *J* = 13.1, 10.6, 5.7 Hz, 1H), 2.45 (ddd, *J* = 13.1, 10.7, 5.8 Hz, 1H), 2.62–2.98 (m, 8H), 3.08 (ddd, *J* =13.5, 10.0, 6.2 Hz, 1H), 3.11 (ddd, *J* = 13.5, 10.2, 7.2 Hz, 1H), 3.20 (dd, *J* = 16.3, 7.6 Hz, 1H), 3.40 (dd, *J* = 16.3, 6.7 Hz, 1H), 3.57 (s, 3H), 3.91 (s, 3H), 4.00 (s, 3H), 6.10 (dd, *J* = 7.6, 6.7 Hz, 1H), 7.09–7.34 (m, 20H), 10.68 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 20.1, 33.5, 34.8, 35.7, 36.3, 36.4, 38.1, 39.9, 51.7, 52.4, 52.7, 112.5, 125.1, 126.0, 126.1, 126.2, 128.2, 128.3, 128.4, 128.5, 128.6, 128.65, 128.70,

128.8, 130.1, 132.5, 137.5, 139.9, 140.2, 141.1, 141.7, 141.8, 142.0, 144.1, 159.0, 169.8, 170.5, 171.1. HRMS (ESI) calcd for $C_{48}H_{48}O_7Na$ $(M+Na)^+$ 759.3292, found 759.3265.



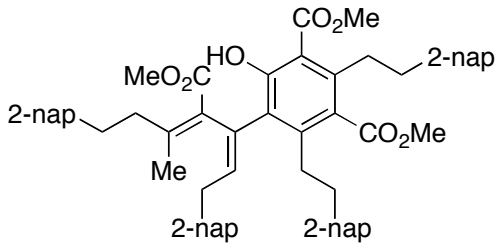
8e-(*Z*)

8e-(*Z*): ^{1}H NMR ($CDCl_3$) δ 1.94 (s, 3H), 2.46–3.17 (m, 10H), 2.84 (t, *J* = 8.0 Hz, 2H), 3.38 (d, *J* = 7.1 Hz, 2H), 3.55 (s, 3H), 3.88 (s, 3H), 3.97 (s, 3H), 5.86 (t, *J* = 7.1 Hz, 1H), 6.77–6.83 (m, 2H), 7.10–7.34 (m, 18H), 10.69 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 21.4, 33.4, 34.9, 35.6, 36.4, 37.7, 37.9, 38.2, 51.5, 52.2, 52.5, 112.0, 125.8, 125.9, 126.1, 126.2, 127.6, 127.9, 128.06, 128.14, 128.28, 128.35, 128.39, 128.5, 128.7, 128.8, 130.5, 136.0, 139.3, 139.8, 141.6, 142.0, 143.5, 146.4, 160.0, 169.0, 170.6, 171.1. HRMS (ESI) calcd for $C_{48}H_{48}O_7Na$ $(M+Na)^+$ 759.3292, found 759.329



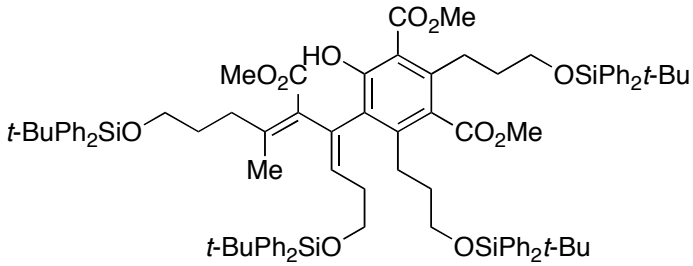
8f-(*E*)

8f-(*E*): ^{1}H NMR ($CDCl_3$) δ 1.81 (s, 3H), 2.47 (ddd, *J* = 13.2, 10.3, 5.8 Hz, 1H), 2.56 (ddd, *J* = 13.2, 10.3, 5.9 Hz, 1H), 2.74–3.05 (m, 6H), 3.05–3.15 (m, 2H), 3.15–3.27 (m, 2H), 3.40 (dd, *J* = 16.3, 7.8 Hz, 1H), 3.55 (s, 3H), 3.59 (dd, *J* = 16.3, 6.6 Hz, 1H), 3.90 (s, 3H), 4.02 (s, 3H), 6.22 (dd, *J* = 7.8, 6.6 Hz, 1H), 7.21 (dd, *J* = 8.4, 1.6 Hz, 1H), 7.23–7.27 (m, 1H), 7.30–7.48 (m, 11H), 7.53 (s, 1H), 7.60 (s, 1H), 7.62 (s, 1H), 7.64–7.84 (m, 12H), 10.60 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 20.2, 33.3, 34.9, 35.5, 36.50, 36.54, 38.2, 39.7, 51.8, 52.4, 52.8, 112.9, 125.2, 125.3, 125.4, 125.47, 125.48, 126.00, 126.04, 126.05, 126.12, 126.2, 126.4, 126.5, 126.9, 127.0, 127.2, 127.3, 127.48, 127.53, 127.59, 127.60, 127.69, 127.74, 127.8, 128.1, 128.2, 128.3, 128.9, 130.4, 132.17, 132.21, 132.28, 132.30, 132.7, 133.73, 133.74, 133.80, 133.84, 137.4, 137.5, 139.2, 139.3, 139.5, 140.3, 141.5, 144.1, 158.9, 169.8, 170.5, 171.1. HRMS (ESI) calcd for $C_{64}H_{56}O_7Na$ $(M+Na)^+$ 959.3918, found 959.3885.



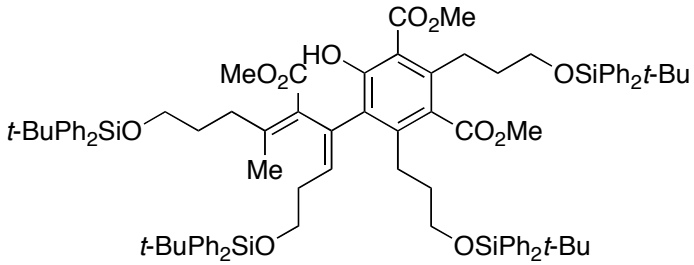
8f-(*Z*)

8f-(*Z*): ^{1}H NMR ($CDCl_3$) δ 2.01 (s, 3H), 2.60–3.30 (m, 12H), 3.49 (d, *J* = 7.2 Hz, 2H), 3.55 (s, 3H), 3.87 (s, 3H), 3.99 (s, 3H), 5.95 (t, *J* = 7.3 Hz, 1H), 6.68 (dd, *J* = 8.3, 1.6 Hz, 1H), 7.20–7.84 (m, 27H), 10.71 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 21.7, 33.3, 35.1, 35.6, 36.8, 38.0, 38.1, 38.2, 51.6, 52.4, 52.7, 112.2, 125.2, 125.3, 125.4, 125.8, 125.9, 126.0, 126.1, 126.2, 126.3, 126.7, 126.96, 126.98, 127.13, 127.39, 127.44, 127.57, 127.59, 127.61, 127.64, 127.70, 127.78, 127.79, 127.83, 127.9, 128.0, 128.06, 128.08, 128.2, 128.5, 128.7, 131.0, 132.1, 132.2, 132.3, 132.4, 133.6, 133.8, 133.86, 133.89, 136.0, 137.3, 139.15, 139.17, 139.60, 139.64, 143.8, 146.7, 160.3, 169.0, 170.8, 171.2. HRMS (ESI) calcd for $C_{64}H_{56}O_7Na$ $(M+Na)^+$ 959.3918, found 959.3931.



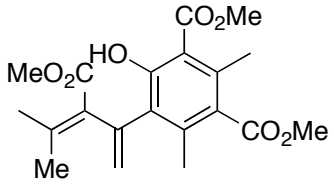
8g-(*E*)

8g-(*E*): ^{1}H NMR ($CDCl_3$) δ 1.01 (s, 9H), 1.03 (s, 9H), 1.04 (s, 9H), 1.07 (s, 9H), 1.56–1.82 (m, 4H), 1.72 (s, 3H), 1.82–1.92 (m, 2H), 2.00–2.16 (m, 2H), 2.16–2.28 (m, 2H), 2.45 (td, *J* = 12.7, 4.3 Hz, 1H), 2.56 (td, *J* = 12.7, 4.6 Hz, 1H), 2.69–2.87 (m, 2H), 3.43 (s, 3H), 3.53 (dd, *J* = 10.0, 6.3 Hz, 1H), 3.57 (dd, *J* = 10.0, 6.3 Hz, 1H), 3.60–3.72 (m, 6H), 3.70 (s, 3H), 3.78 (s, 3H), 5.96 (t, *J* = 6.9 Hz, 1H), 7.28–7.47 (m, 24H), 7.56–7.74 (m, 16H), 9.83 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 19.3, 19.36, 19.39 19.44, 19.9, 26.96, 27.01, 27.03, 27.1, 28.7, 30.3, 31.4, 33.2, 33.5, 34.2, 34.7, 51.6, 52.1, 52.4, 63.1, 64.0, 64.3, 64.5, 113.7, 124.6, 127.75, 127.76, 127.78, 127.79, 128.5, 129.68, 129.73, 130.8, 132.2, 133.7, 133.8, 134.0, 134.07, 134.08, 134.09, 135.6, 135.66, 135.69, 135.70, 135.72, 136.0, 140.0, 141.8, 143.7, 157.3, 169.6, 170.3, 170.8. HRMS (ESI) calcd for $C_{92}H_{112}O_{11}Si_4Na$ $(M+Na)^+$ 1527.7174, found 1527.7173.



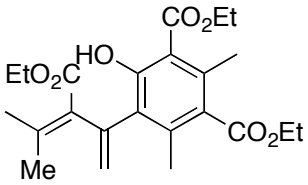
8g-(*Z*)

8g-(*Z*): ^{1}H NMR ($CDCl_3$) δ 1.01 (s, 9H), 1.04 (s, 9H), 1.05 (s, 9H), 1.07 (s, 9H), 1.59–1.94 (m, 6H), 1.68 (s, 3H), 2.03–2.87 (m, 8H), 3.40 (s, 3H), 3.56 (t, *J* = 5.9 Hz, 2H), 3.60–3.74 (m, 6H), 3.68 (s, 3H), 3.77 (s, 3H), 5.71 (t, *J* = 7.0 Hz, 1H), 7.26–7.46 (m, 24H), 7.56–7.74 (m, 16H), 9.24 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 19.3, 19.39, 19.43, 21.3, 26.98, 27.02, 27.04, 28.5, 29.9, 31.8, 33.1, 33.6, 34.5, 34.6, 51.5, 52.1, 52.3, 63.3, 64.0, 64.3, 64.5, 115.2, 127.3, 127.7, 127.8, 127.9, 129.7, 129.8, 131.8, 133.8, 134.0, 134.08, 134.11, 135.70, 135.73, 139.0, 142.8, 147.5, 157.0, 168.6, 170.3, 170.4. HRMS (ESI) calcd for $C_{92}H_{112}O_{11}Si_4Na$ $(M+Na)^+$ 1527.7174, found 1527.7173.



8h

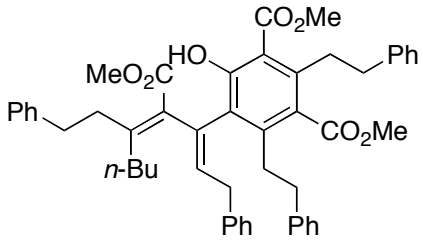
8h: ^{1}H NMR ($CDCl_3$) δ 1.94 (s, 3H), 1.95 (s, 3H), 2.24 (s, 3H), 2.38 (s, 3H), 3.58 (s, 3H), 3.89 (s, 3H), 3.93 (s, 3H), 5.30 (d, *J* = 1.8 Hz, 1H), 5.50 (d, *J* = 1.8 Hz, 1H), 10.91 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 17.8, 20.1, 22.9, 23.6, 51.5, 52.3, 52.4, 111.5, 123.5, 127.8, 128.9, 130.3, 135.7, 139.2, 139.5, 143.0, 159.7, 169.3, 170.8, 171.6. HRMS (ESI) calcd for $C_{20}H_{24}O_7Na$ $(M+Na)^+$ 399.1414, found 399.1417.



8i

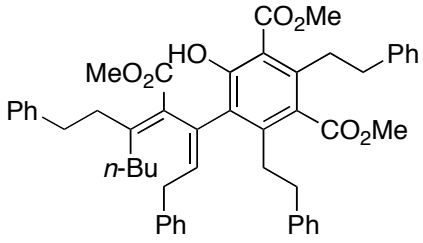
8i: ^{1}H NMR ($CDCl_3$) δ 1.12 (t, *J* = 7.1 Hz, 3H), 1.37 (t, *J* = 7.1 Hz, 3H), 1.40 (t, *J* = 7.1 Hz, 3H), 1.96 (s, 6H), 2.25 (s, 3H), 2.42 (s, 3H), 4.05 (q, *J* = 7.1 Hz, 2H), 4.37 (q, *J* = 7.1 Hz, 2H), 4.41 (q, *J* = 7.1 Hz, 2H), 5.31 (s, 1H), 5.51 (s, 1H), 10.94 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 14.20, 14.22, 17.9, 19.9, 22.9, 23.4, 60.5, 61.3, 61.8, 111.6, 123.4, 127.7, 129.0, 130.6, 135.4, 139.07, 139.13, 142.2, 159.5, 168.8, 170.2, 171.1. HRMS (ESI) calcd for $C_{23}H_{30}O_7Na$ $(M+Na)^+$ 441.1884, found 441.1872.

Rhodium-Catalyzed Synthesis of Phenol Derivative by Addition of *n*-Butylboronic Acid (9) to Methyl 5-Phenyl-2-pentynoate (1e). To a solution of $[Rh(OH)(cod)]_2$ (5.4 mg, 0.024 mmol Rh) and *n*-butylboronic acid (**9**) (128 mg, 1.25 mmol) in 1,4-dioxane (1.0 mL) was added methyl 5-phenyl-2-pentynoate (**1e**) (90.5 mg, 0.48 mmol). After stirring at 70 °C for 12 h, the mixture was diluted with Et_2O (3.0 mL), and filtered through a plug of silica gel. The plug was washed with Et_2O (20 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/7) to give **10-(*E*)** (44.6 mg, 0.057 mmol, 48% yield) and **10-(*Z*)** (16.8 mg, 0.022 mmol, 18% yield).



10-(*E*)

10-(*E*): ^{1}H NMR ($CDCl_3$) δ 0.73 (t, *J* = 7.3 Hz, 3H), 0.91–1.05 (m, 2H), 1.05–1.16 (m, 1H), 1.30–1.42 (m, 1H), 1.92 (td, *J* = 12.5, 4.8 Hz, 1H), 2.31 (td, *J* = 12.5, 4.3 Hz, 1H), 2.35 (dt, *J* = 13.3, 6.0 Hz, 1H), 2.38 (dt, *J* = 13.3, 6.0 Hz, 1H), 2.59–2.78 (m, 4H), 2.78–2.97 (m, 4H), 3.05 (ddd, *J* = 13.3, 10.8, 5.9 Hz, 1H), 3.13 (ddd, *J* = 13.3, 10.3, 6.8 Hz, 1H), 3.19 (dd, *J* = 16.2, 8.0 Hz, 1H), 3.43 (dd, *J* = 16.2, 6.3 Hz, 1H), 3.57 (s, 3H), 3.92 (s, 3H), 4.02 (s, 3H), 6.14 (dd, *J* = 8.0, 6.3 Hz, 1H), 7.07–7.29 (m, 18H), 7.32 (t, *J* = 7.5 Hz, 2H), 10.68 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 13.9, 23.3, 30.9, 32.6, 33.4, 35.1, 35.8, 36.46, 36.48, 36.6, 38.1, 51.8, 52.4, 52.8, 112.6, 125.2, 126.0, 126.1, 126.3, 128.2, 128.3, 128.4, 128.50, 128.52, 128.68, 128.72, 128.9, 129.9, 132.5, 137.0, 140.0, 140.2, 141.8, 142.0, 142.1, 144.3, 145.7, 159.1, 170.1, 170.5, 171.2. HRMS (ESI) calcd for $C_{51}H_{54}O_7Na$ $(M+Na)^+$ 801.3762, found 801.3762.

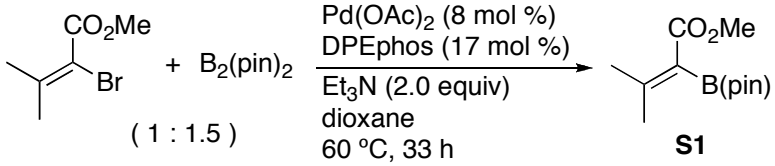


10-(*Z*)

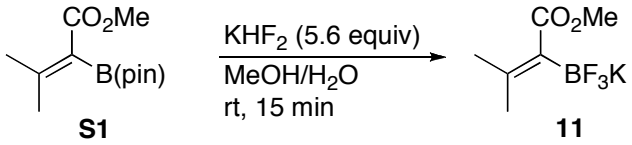
10-(*Z*): ^{1}H NMR ($CDCl_3$) δ 0.83 (t, *J* = 7.0 Hz, 3H), 1.10–1.45 (m, 4H), 1.97–2.44 (m, 2H), 2.44–3.25 (m, 12H), 3.44 (br d, *J* = 7.3 Hz, 2H), 3.59 (s, 3H), 3.88 (s, 3H), 3.98 (s, 3H), 5.91 (t, *J* = 7.3 Hz, 1H), 6.77 (d, *J* = 6.5 Hz, 2H), 7.08–7.34 (m, 18H), 10.84 (s, 1H); ^{13}C NMR ($CDCl_3$) δ 14.2, 23.5, 29.7, 33.2, 33.9, 35.0, 35.2, 35.7, 36.6, 38.1, 51.9, 52.4, 52.7, 112.6, 126.0, 126.1, 126.2, 126.4, 127.7, 128.2, 128.3, 128.46, 128.48, 128.53, 128.6, 128.7, 128.8, 128.9, 130.4, 136.8, 139.3, 139.9, 141.6, 141.8, 142.2, 143.1, 150.0, 159.7, 170.1, 170.7,

171.2. HRMS (ESI) calcd for $C_{51}H_{54}O_7Na$ $(M+Na)^+$ 801.3762, found 801.3762.

Preparation of Potassium Alkenyltrifluoroborate 11.



$Pd(OAc)_2$ (90 mg, 0.40 mmol) and DPEphos (441 mg, 0.82 mmol) were dissolved in 1,4-dioxane (10 mL), and the mixture was stirred at room temperature for 10 min. To the mixture were added successively triethylamine (1.4 mL, 10 mmol), methyl 2-bromo-3-methyl-2-butenoate[4] (0.95 g, 4.9 mmol), and bis(pinacolato)diboron (1.1 mL, 7.5 mmol), and the mixture was heated at 60 °C for 33 h. The mixture was filtered through a plug of silica gel. The plug was washed with Et_2O (50 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by flash column chromatography on silica gel eluting with EtOAc/hexane (1/9) to give **S1** (0.31 g, 26% yield). ^1H NMR ($CDCl_3$) δ 1.30 (s, 12H), 1.99 (s, 3H), 2.06 (s, 3H), 3.70 (s, 3H); ^{13}C NMR ($CDCl_3$) δ 23.4, 24.7, 25.8, 51.2, 83.8, 161.5, 169.9. HRMS (ESI) calcd for $C_{12}H_{21}BO_4Na$ $(M+Na)^+$ 263.1427, found 263.1421.



To a solution of **S1** (0.30 g, 1.2 mmol) in methanol (2.0 mL) was added a solution of KHF_2 (0.52 g, 6.7 mmol) in H_2O (1.5 mL), and the mixture was stirred at room temperature for 15 min. The solvent was removed under reduced pressure, and the residue was extracted with hot acetone (3 × 3.0 mL). The combined extracts were concentrated on a rotary evaporator to give a white solids. The collected solids were washed with Et_2O (3 × 2.0 mL) to give **11** (179 mg, 73% yield). ^1H NMR (acetone-d_6, the chemical shifts are referenced to residual acetone (2.05 ppm)) δ 1.57 (s, 3H), 1.76 (s, 3H), 3.58 (s, 3H); ^{13}C NMR (acetone-d_6, the chemical shifts are referenced to residual acetone (29.84 ppm)) δ 22.5, 23.6, 50.6, 138.8, 177.5. HRMS (ESI) calcd for $C_6H_9BF_3O_2Na_2$ $(M–K+2Na)^+$ 227.0439, found 227.0439.

Procedure for Rhodium-Catalyzed Addition of Potassium Alkenyltrifluoroborate 11 to Methyl 2-Butynoate (1h) (Scheme 7). To a solution of $[Rh(OH)(cod)]_2$ (1.7 mg, 0.0076 mmol Rh) and **11** (61.8 mg, 0.30 mmol) in 1,4-dioxane (0.30 mL) and H_2O (30 μL) was added methyl 2-butynoate (**1h**) (14.5 mg, 0.15 mmol). After stirring at 70 °C for 3 h, the mixture was diluted with Et_2O (3.0 mL), and filtered through a plug of silica gel. The plug was washed with Et_2O (20 mL) and the combined filtrates were concentrated on a rotary evaporator. The residue was purified by preparative TLC on silica gel eluting with EtOAc/hexane (1/7) to give **8h** (7.9 mg, 0.021 mmol, 43% yield).

Data for X-ray Crystal Structure of 8e-(*Z*). Colorless crystals of **8e-(*Z*)** suitable for X-ray crystallographic analysis were obtained by recrystallization from CH_2Cl_2/hexane. The ORTEP drawing of **8e-(*Z*)** is shown in Figure S1. The crystal structure has been deposited at the Cambridge Crystallographic Centre (deposition number: CCDC 746346). The data can be obtained free of charge via www.ccdc.cam.ac.uk/data_request/cif.

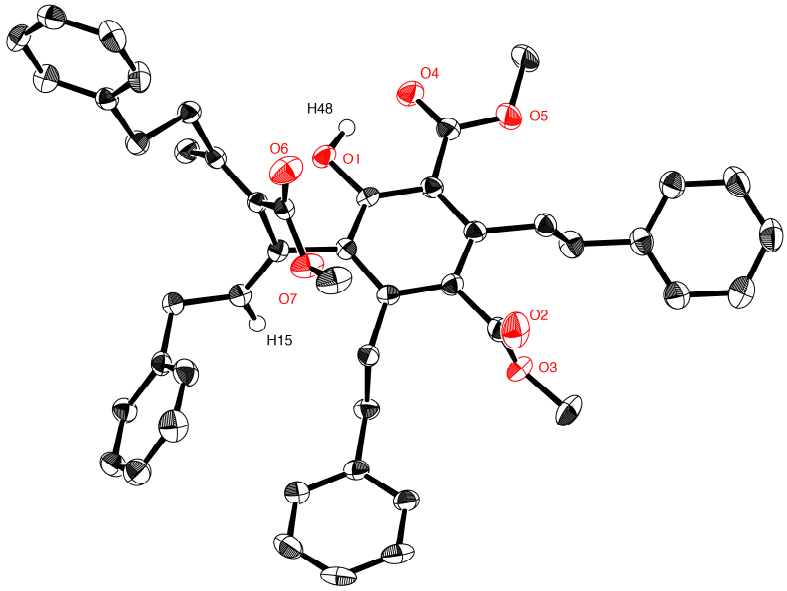


Figure S1. ORTEP illustration of **8e-(*Z*)** with thermal ellipsoids drawn at 50% probability level (Hydrogen atoms are omitted for clarity except for phenol and vinyl hydrogens).

Table S1. Crystal Data of **8e-(*Z*)**

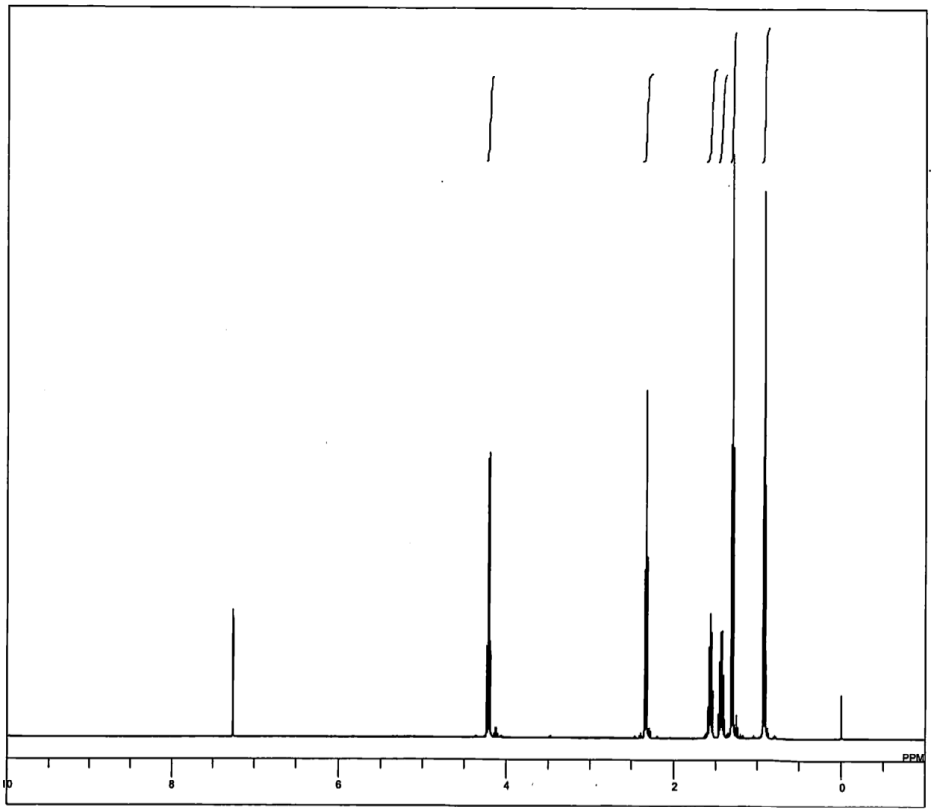
Empirical Formula	$C_{48}H_{48}O_7$
Formula Weight	736.90
Crystal Color, Habit	colorless, prism
Crystal Dimensions	0.30 × 0.20 × 0.10 mm
Crystal System	monoclinic
Lattice Type	Primitive
Indexing Images	3 oscillations at 90.0 seconds
Detector Position	127.40 mm
Pixel Size	0.200 mm
Lattice Parameters	a = 20.104(5) Å b = 9.780(2) Å c = 20.524(4) Å β = 97.459(10)° V = 4001.5(15) Å^3
Space Group	$P2_1/c$ (#14)
Z value	4
D_{calc}	1.223 g/cm^3
F_{000}	1568.00
μ(MoKα)	0.808 cm^{-1}

Table S2. Intensity Measurements

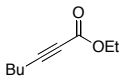
Diffractometer	Rigaku RAXIS-RAPID
Radiation	MoKα (λ = 0.71075 Å) graphite monochromated
Detector Aperture	280 nm × 256 nm
Data Images	55 exposures
ω oscillation Range (χ = 45.0, ϕ = 30.0)	130.0 – 190.0°
Exposure Rate	200.0 sec./°
ω oscillation Range (χ = 45.0, ϕ = 210.0)	0.0 – 160.0°
Exposure Rate	200.0 sec./°
Detector Position	127.40 mm
Pixel Size	0.200 mm
$2\theta_{max}$	55.0°
No. of Reflections Measured	Total: 36067 Unique: 9129 (R_{int} = 0.087)
Corrections	Lorentz-polarization

Table S3. Structure Solution and Refinement

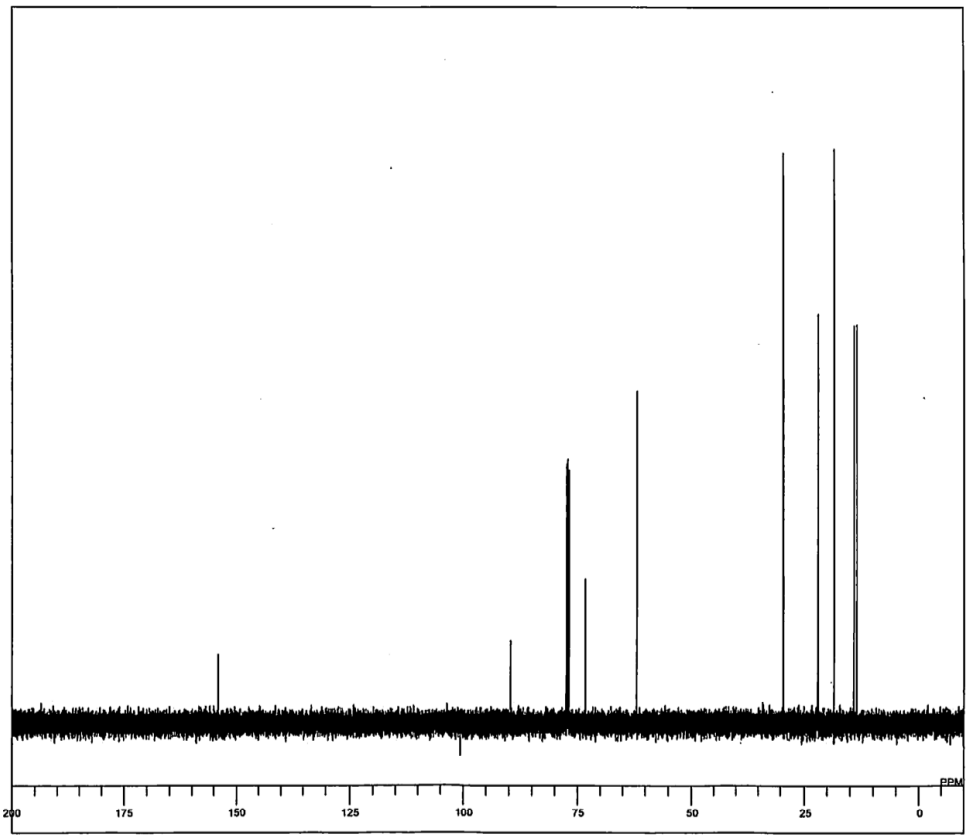
Structure Solution	Direct Methods (SIR92)
Refinement	Full-matrix least-squares on F^2
Function Minimized	$\Sigma\ w\ (F_0^2 - F_c^2)^2$
Least Squares Weights	$w = 1/[\sigma^2(F_0^2) + (0.0698 \cdot P)^2 + 2.0178 \cdot P]$ where $P = (Max(F_0^2,0) + 2F_c^2)/3$
$2\theta_{max}$ cutoff	55.0°
Anomalous Dispersion	All non-hydrogen atoms
No. Observations (All reflections)	9129
No. Variables	501
Reflection/Parameter Ratio	18.22
Residuals: R1 (I>2.00σ(I))	0.0662
Residuals: R (All reflections)	0.1235
Residuals: wR2 (All reflections)	0.1736
Goodness of Fit Indicator	1.026
Max Shift/Error in Final Cycle	0.001
Maximum peak in Final Diff. Map	0.40 e/Å^3
Minimum peak in Final Diff. Map	–0.44 e/Å^3



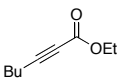
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Ethyl 2-heptynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1150
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 20:20:03 2009



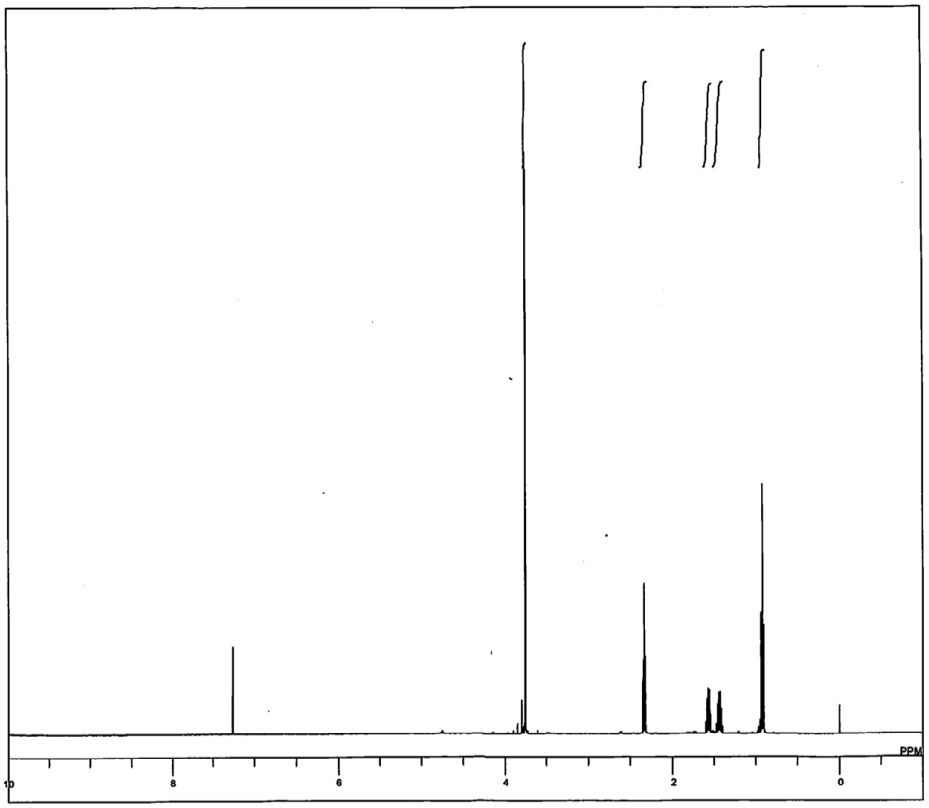
1a



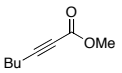
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	160
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Ethyl 2-heptynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1051
CSPED	10 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 18:30:27 2009



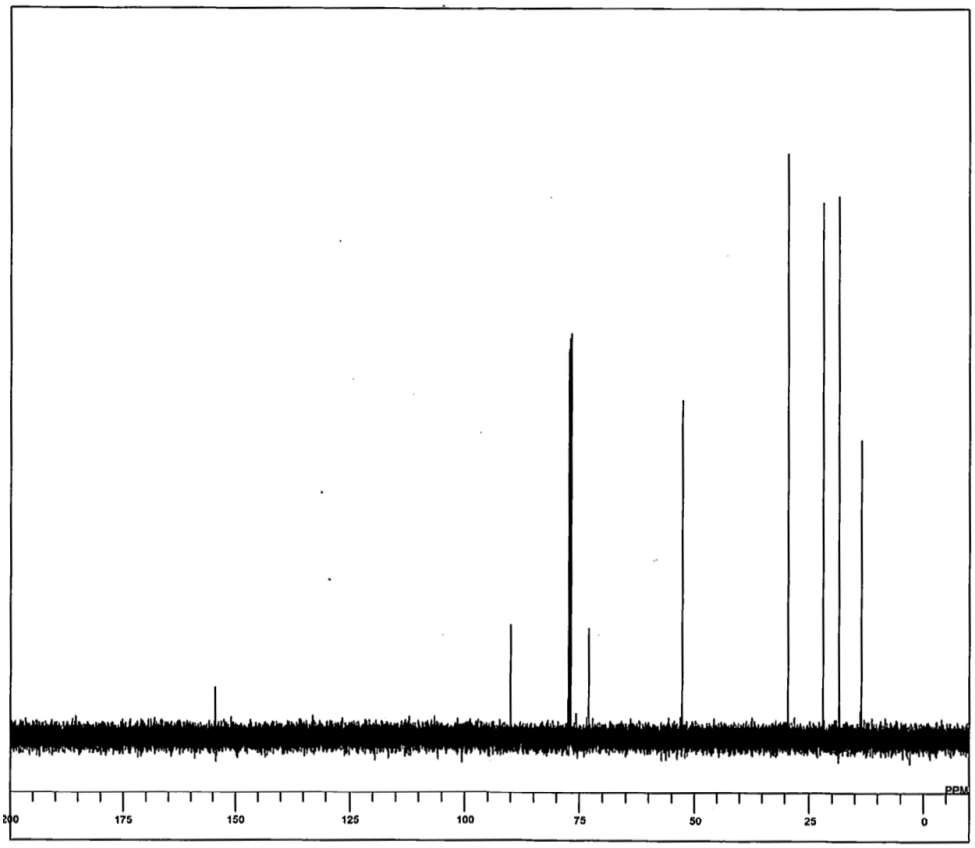
1a



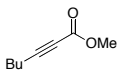
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128685.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 2-heptynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	595
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 18:03:35 2009



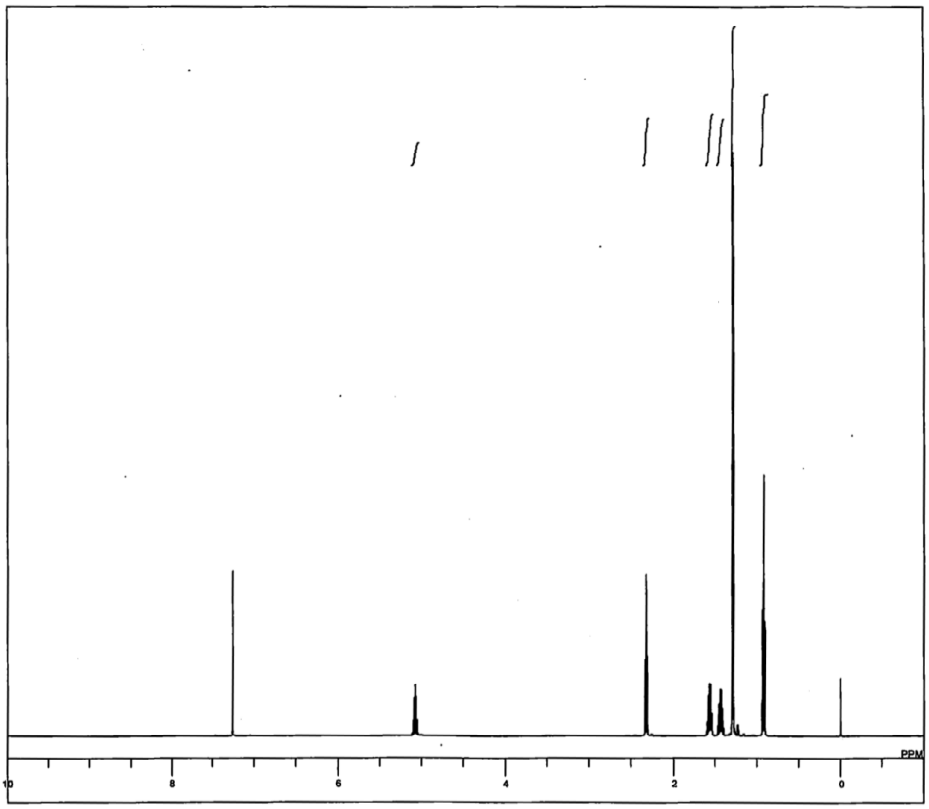
1b



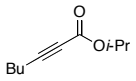
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 2-heptynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	589
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 18:14:19 2009



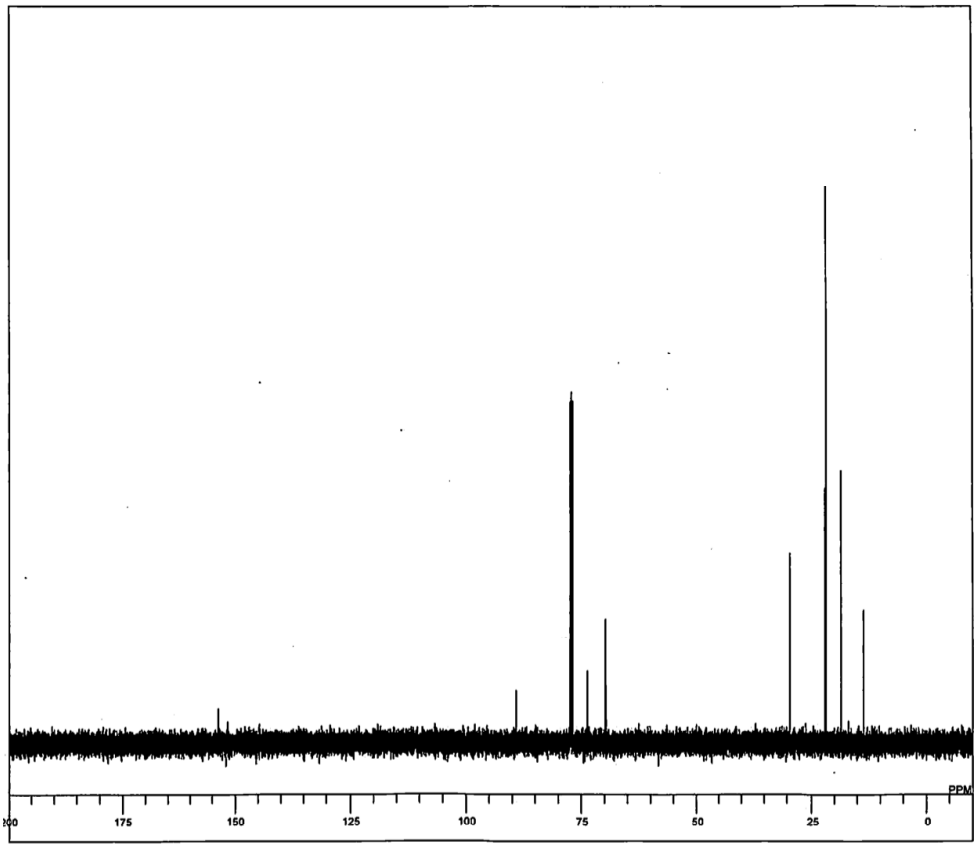
1b



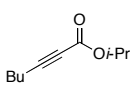
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	126885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	24
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	126250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-132-pdt-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	590
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue May 12 15:31:25 2009



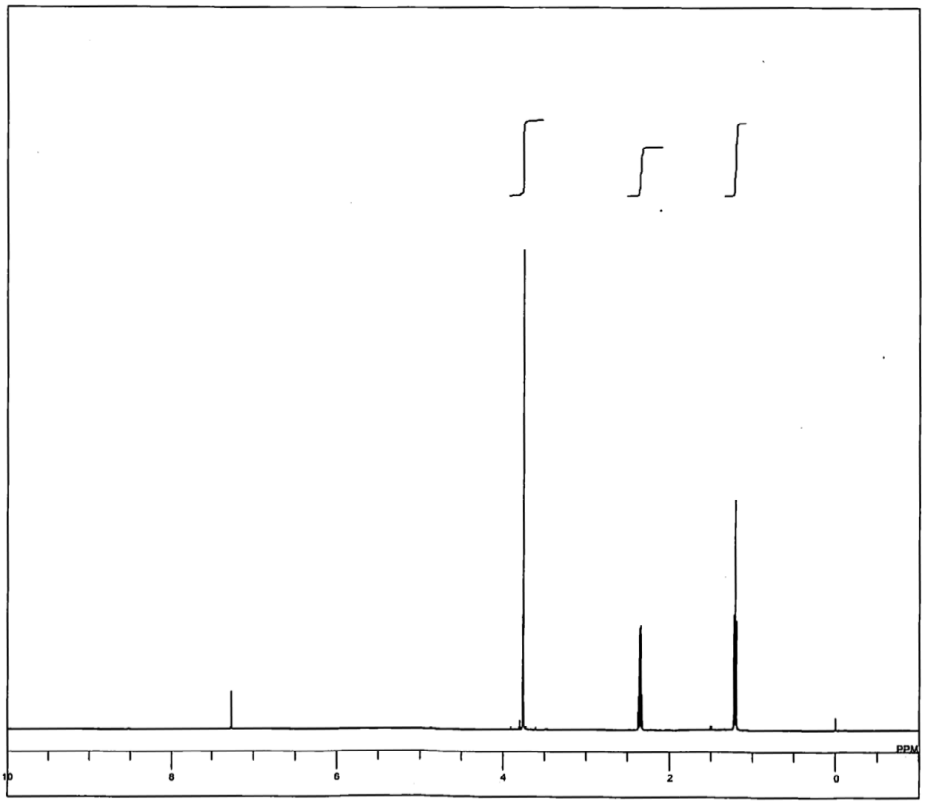
1c



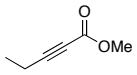
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with biLevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	126250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-132-pdt-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	587
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue May 12 15:42:59 2009



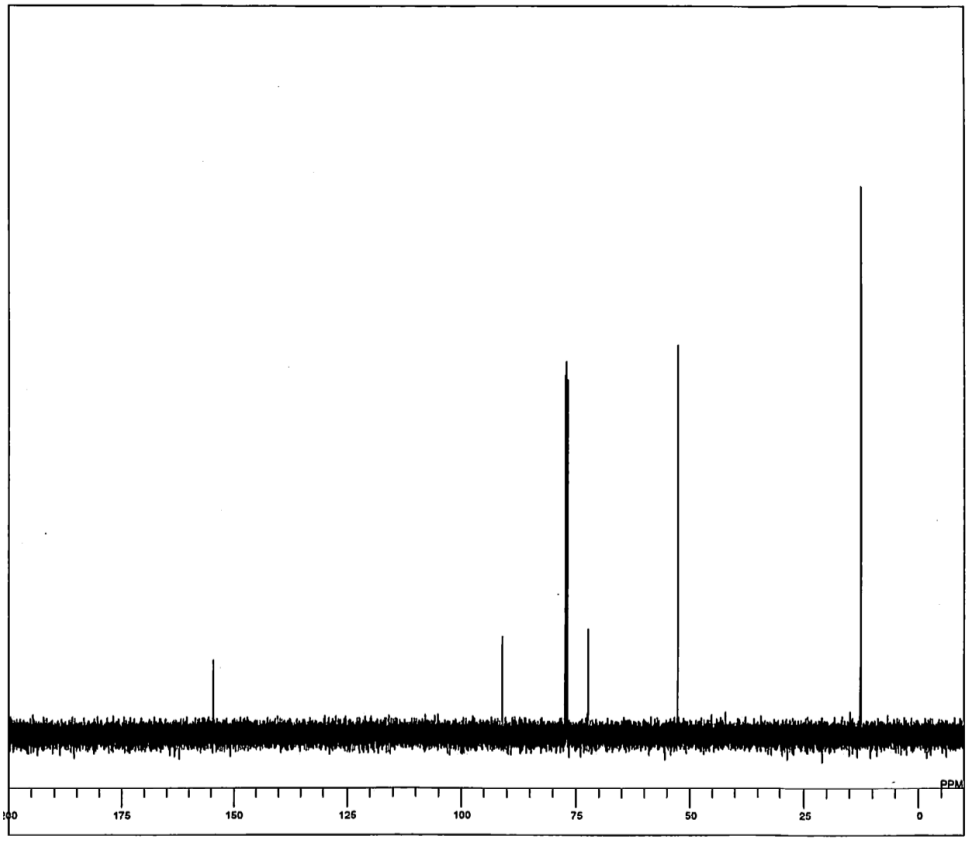
1c



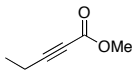
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 2-pentynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	670
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 20:27:28 2009



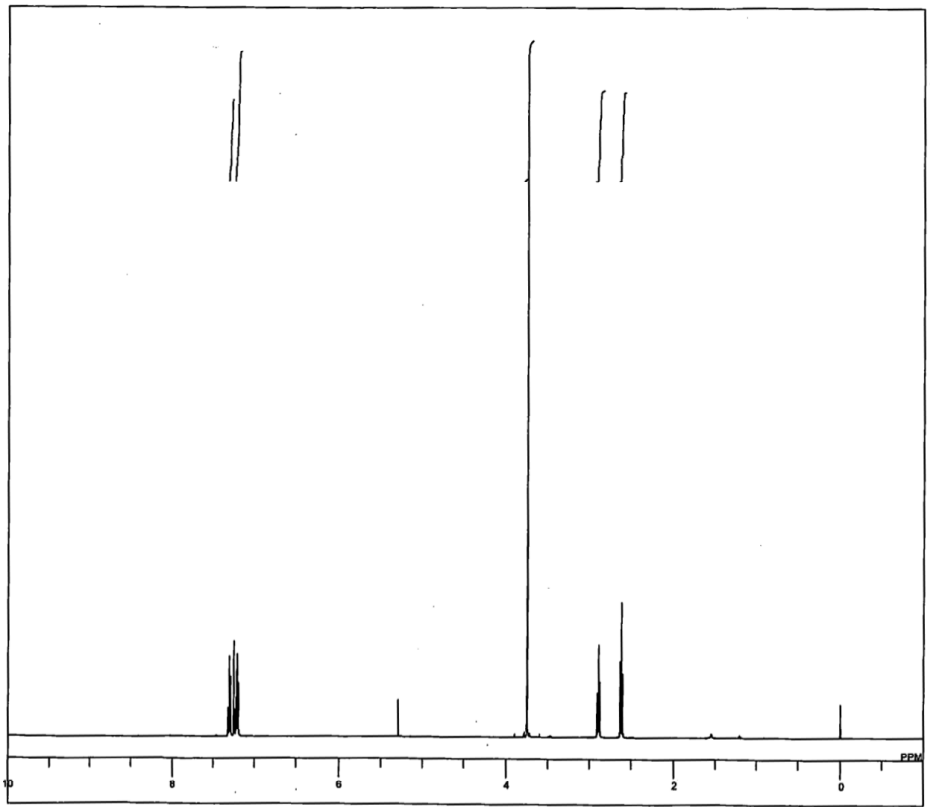
1d



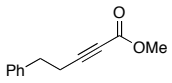
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	14304.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	29
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 2-pentynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	669
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 20:36:45 2009



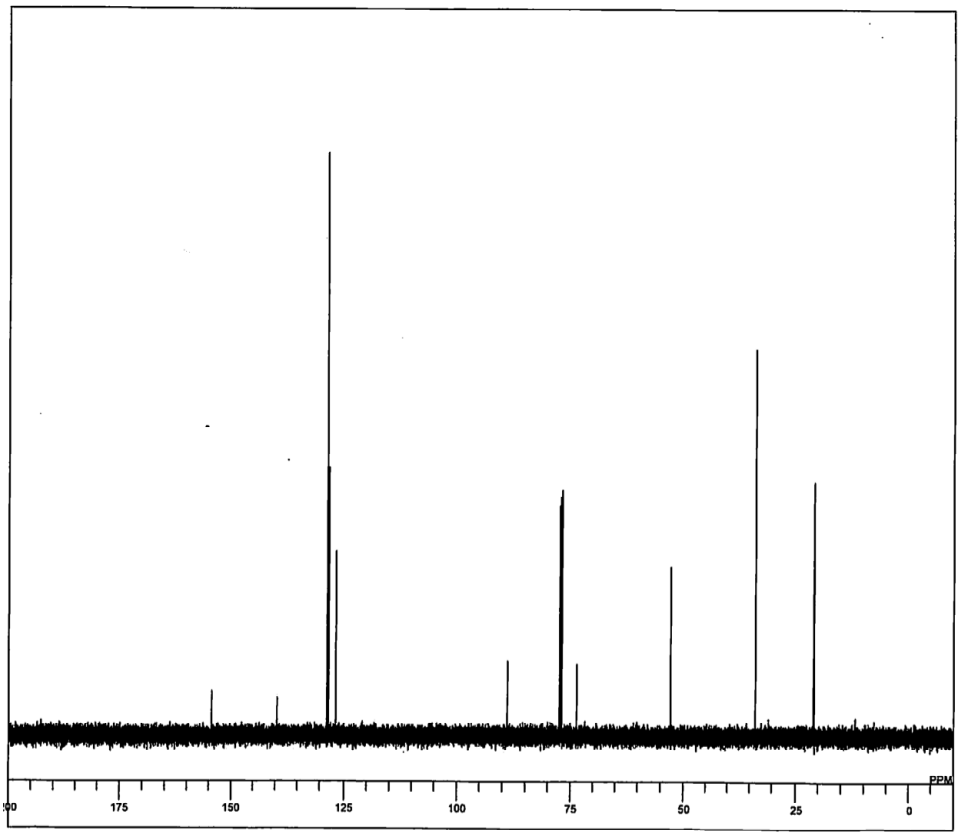
1d



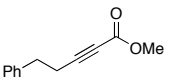
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	23
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 5-phenyl-2-pentynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	721
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 13:25:54 2009



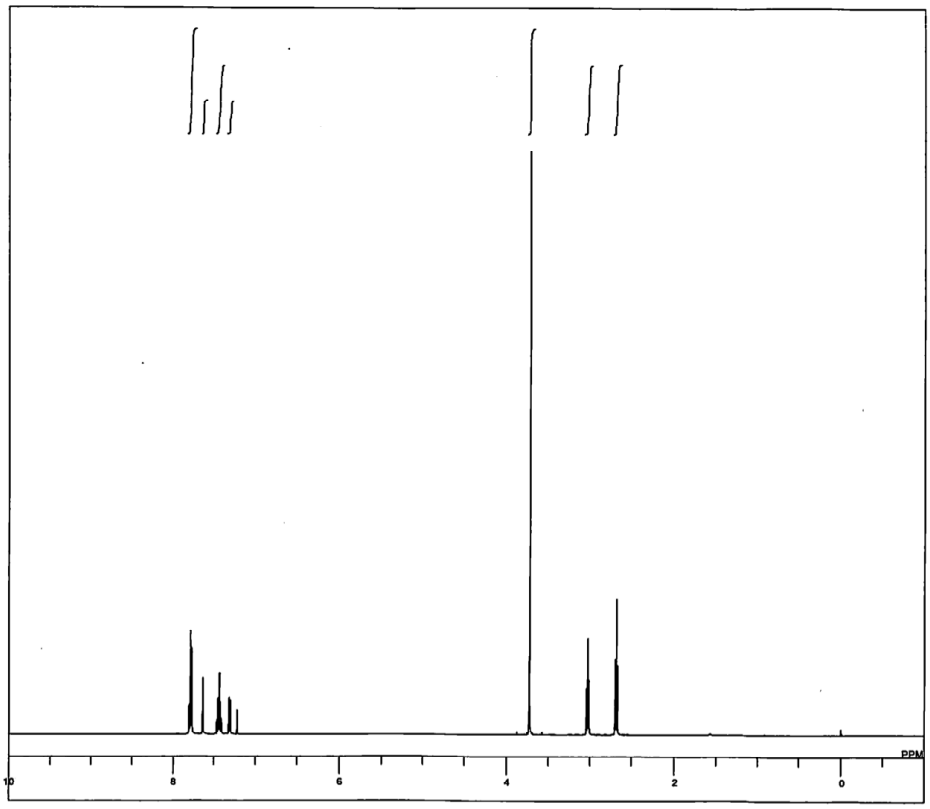
1e



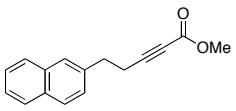
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 5-phenyl-2-pentynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	716
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 13:34:29 2009



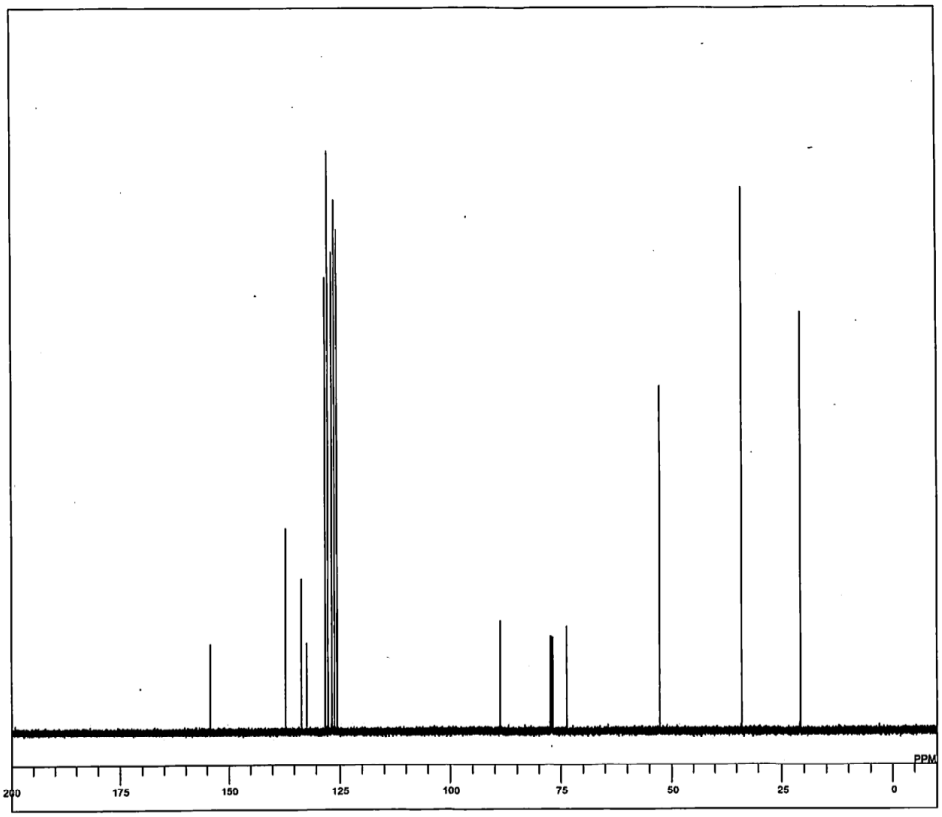
1e



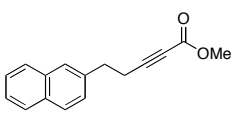
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 5-(2-naphthyl)-2-pentynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	664
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 12:00:05 2009



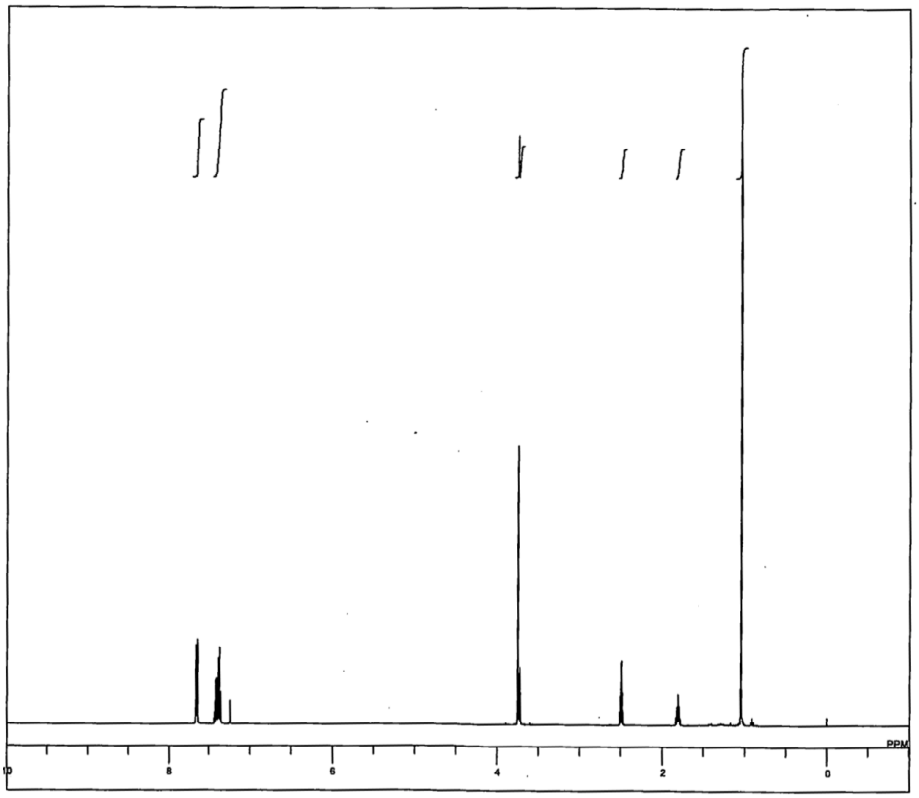
1f



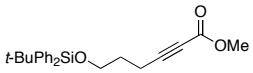
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 5-(2-naphthyl)-2-pentynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	663
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 12:09:24 2009



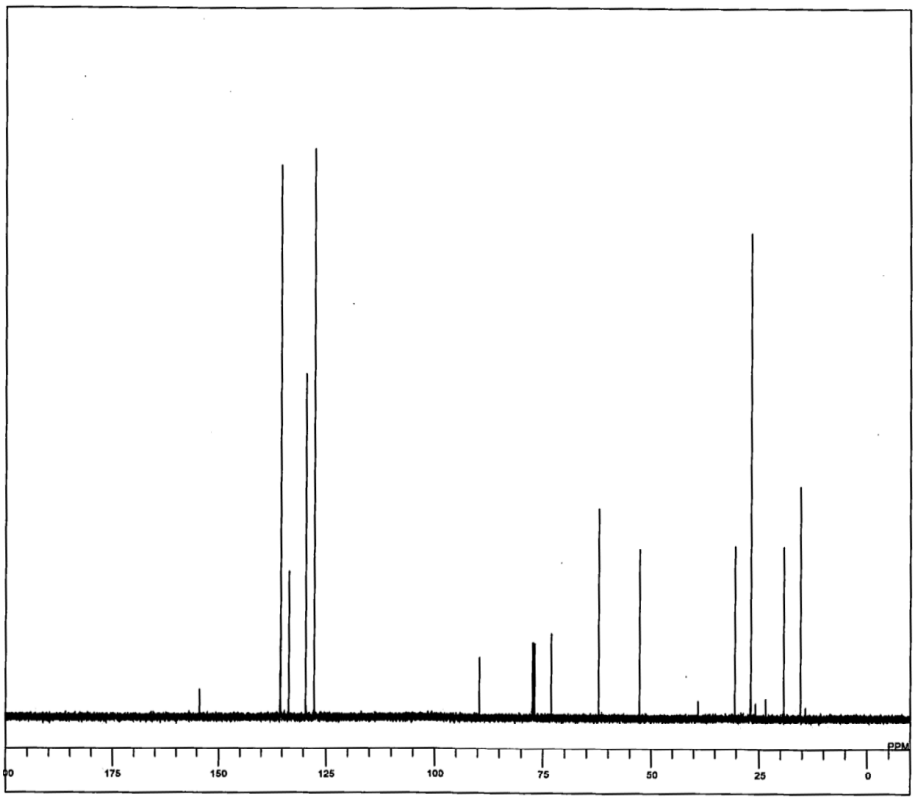
1f



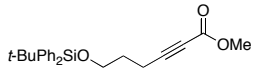
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	18
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 6-(tertbutyl)diphenylsilyl-2-hexynoate-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	677
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 12:16:10 2009



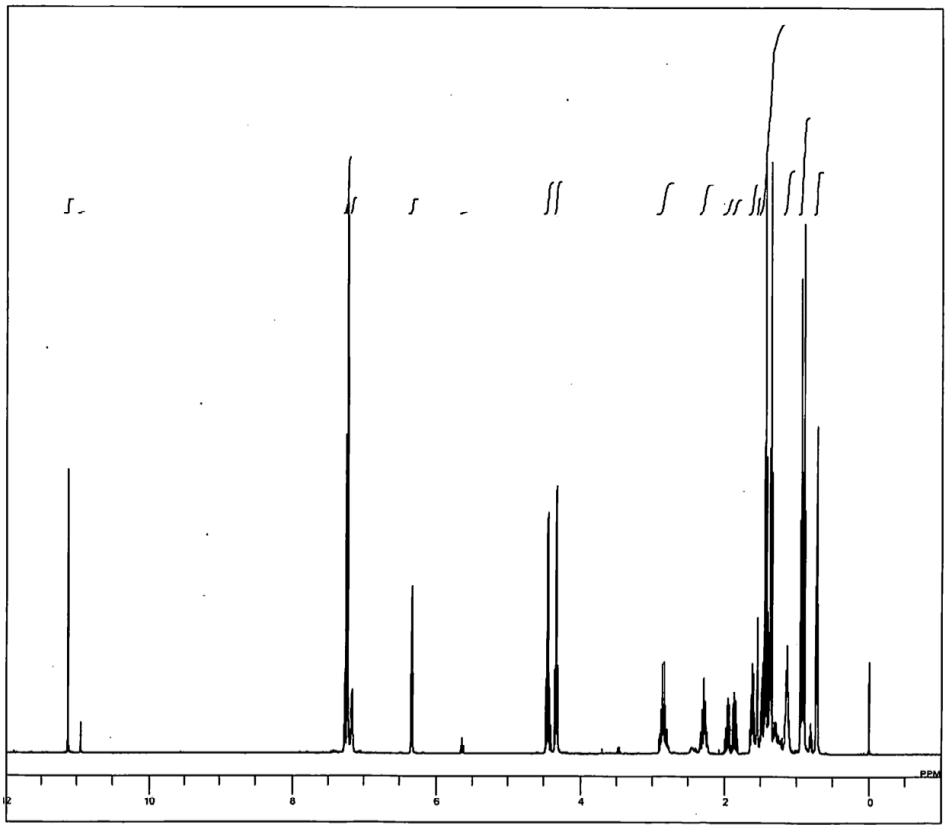
1g



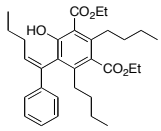
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	29
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	Methyl 6-(tertbutyl)diphenylsilyl-2-hexynoate-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	670
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 28 12:25:53 2009



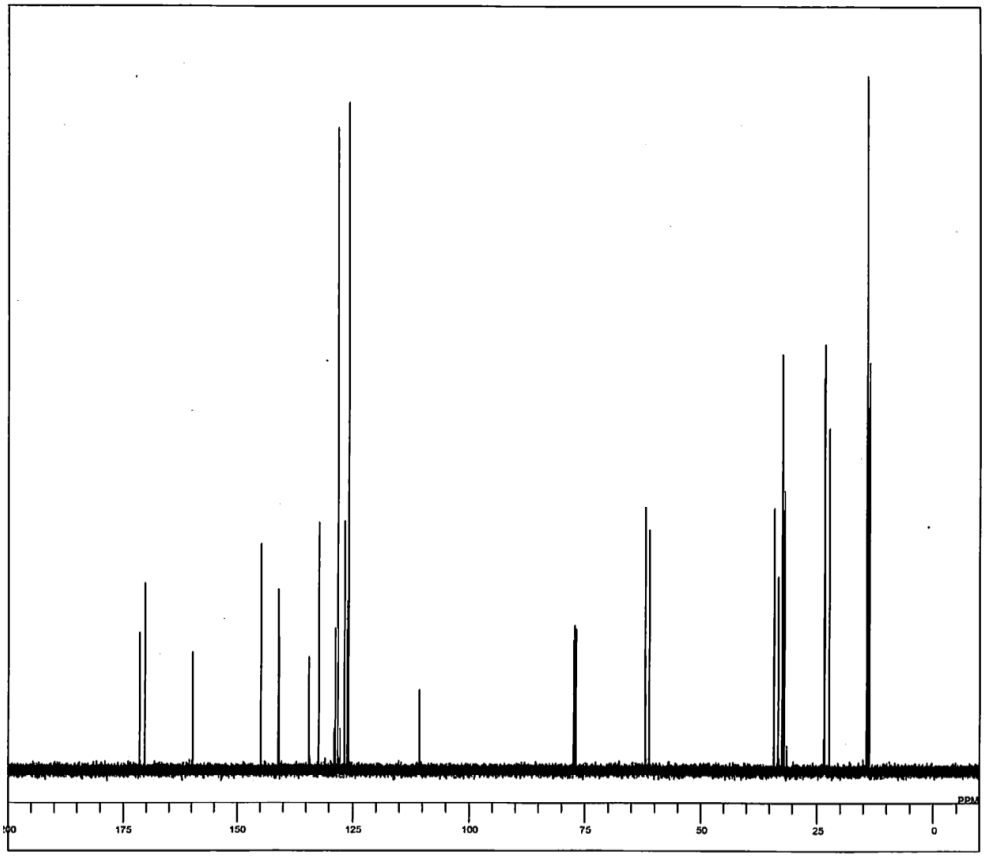
1g



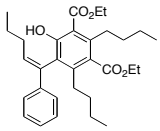
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	24
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-23-gpc-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	346
LKSIG	530
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Jul 09 16:56:44 2009



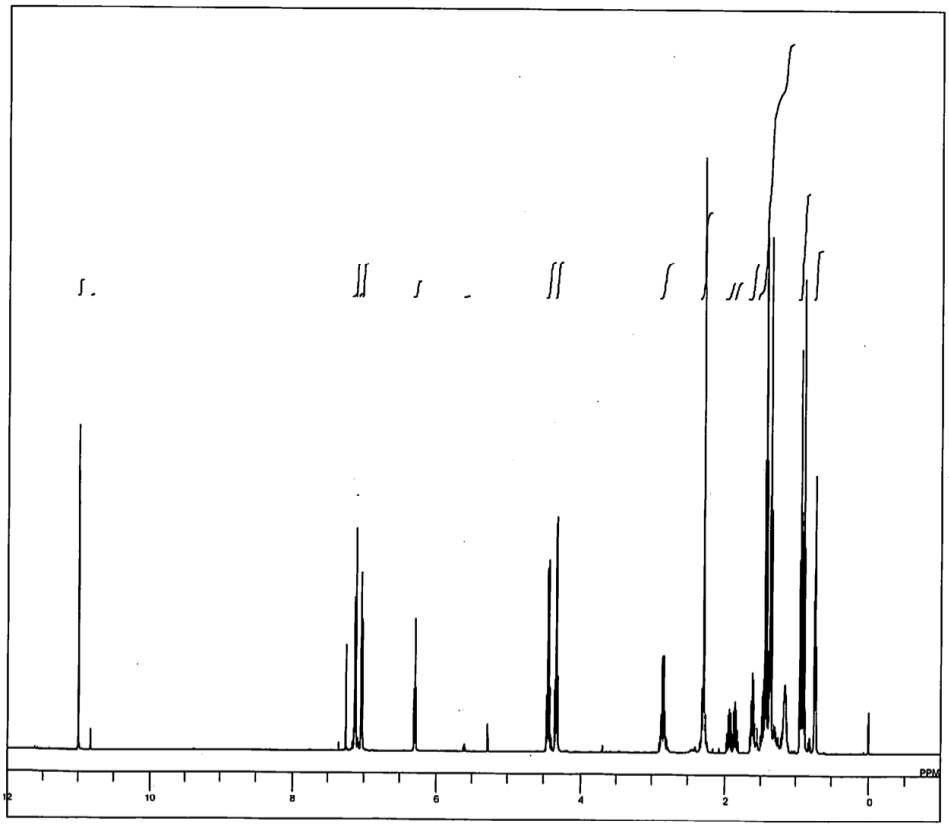
3a-(*Z*)



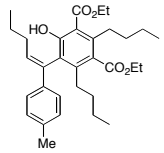
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	360
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-23-gpc-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	924
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Jul 09 22:46:10 2009



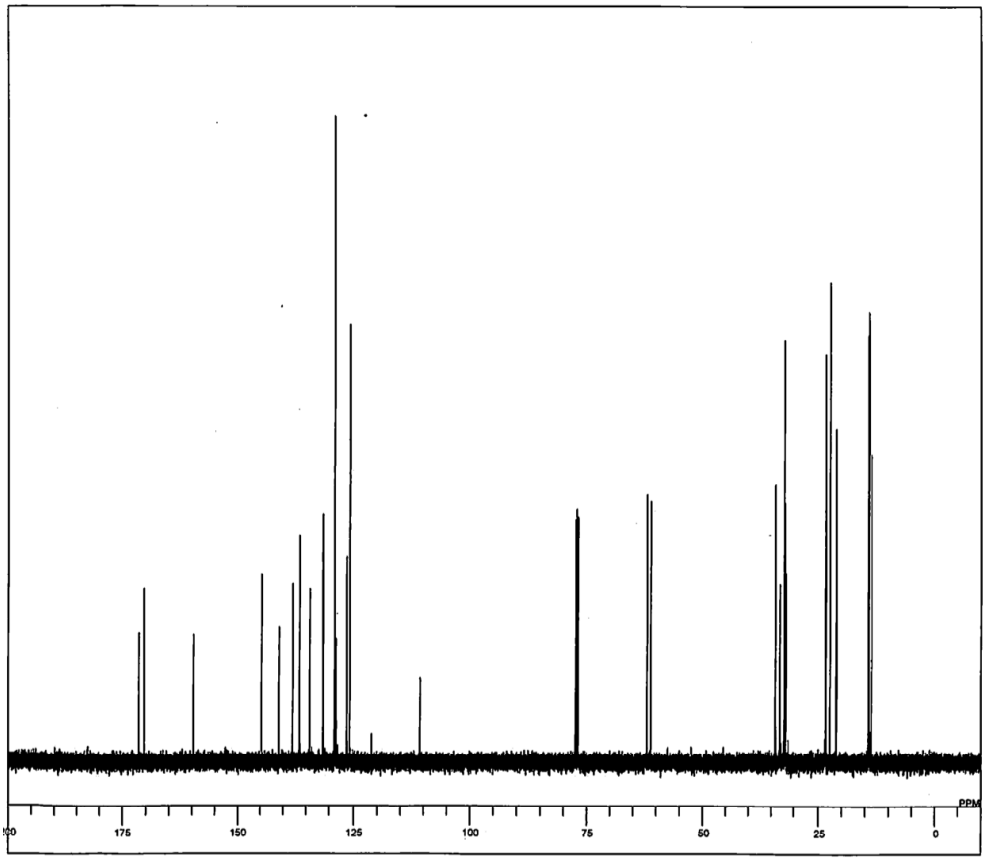
3a-(*Z*)



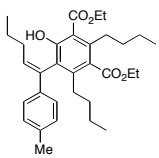
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	24
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	18
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-25-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	927
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Jul 15 09:51:52 2009



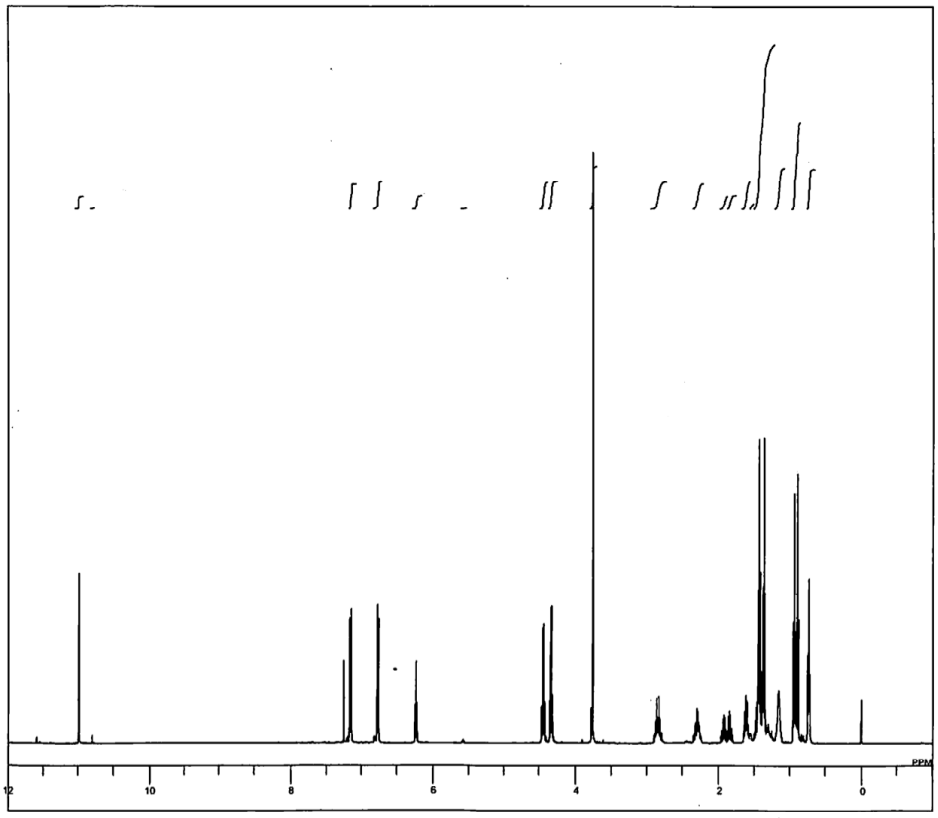
3b-(*Z*)



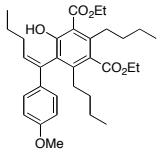
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-25-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	913
CSPED	10 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Jul 15 10:06:40 2009



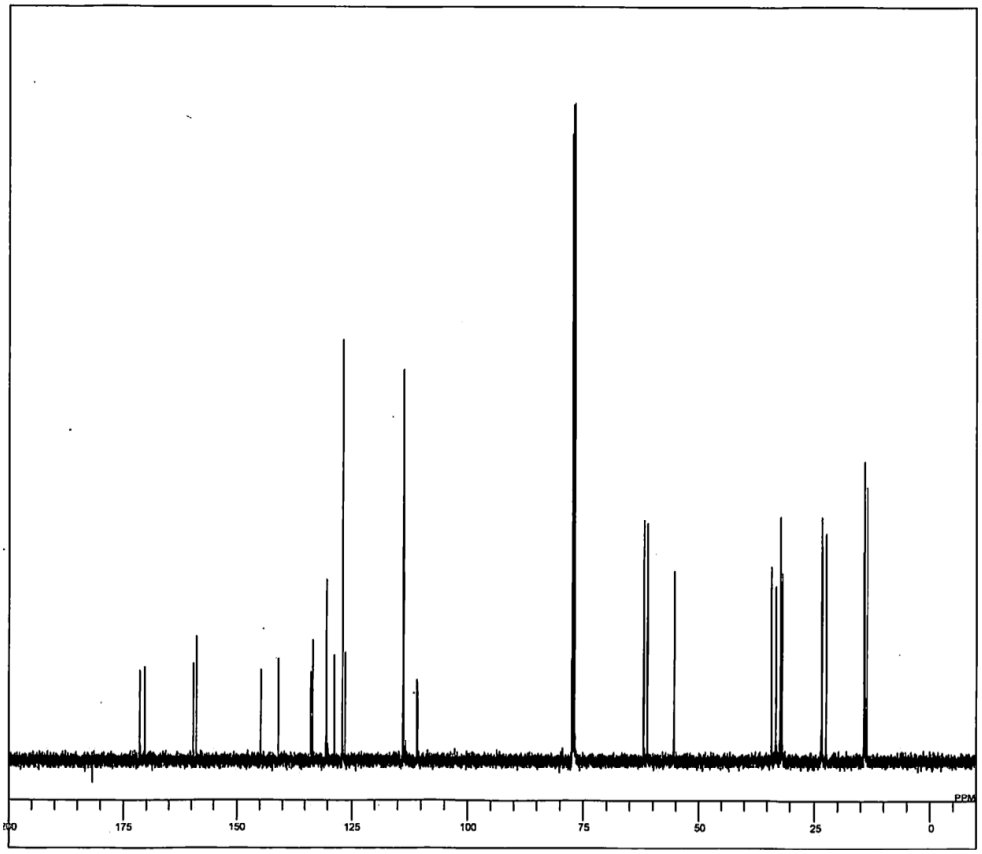
3b-(*Z*)



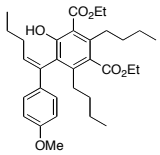
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	40
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-79-1H.als
SF	th5et
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	829
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Aug 17 12:12:54 2009



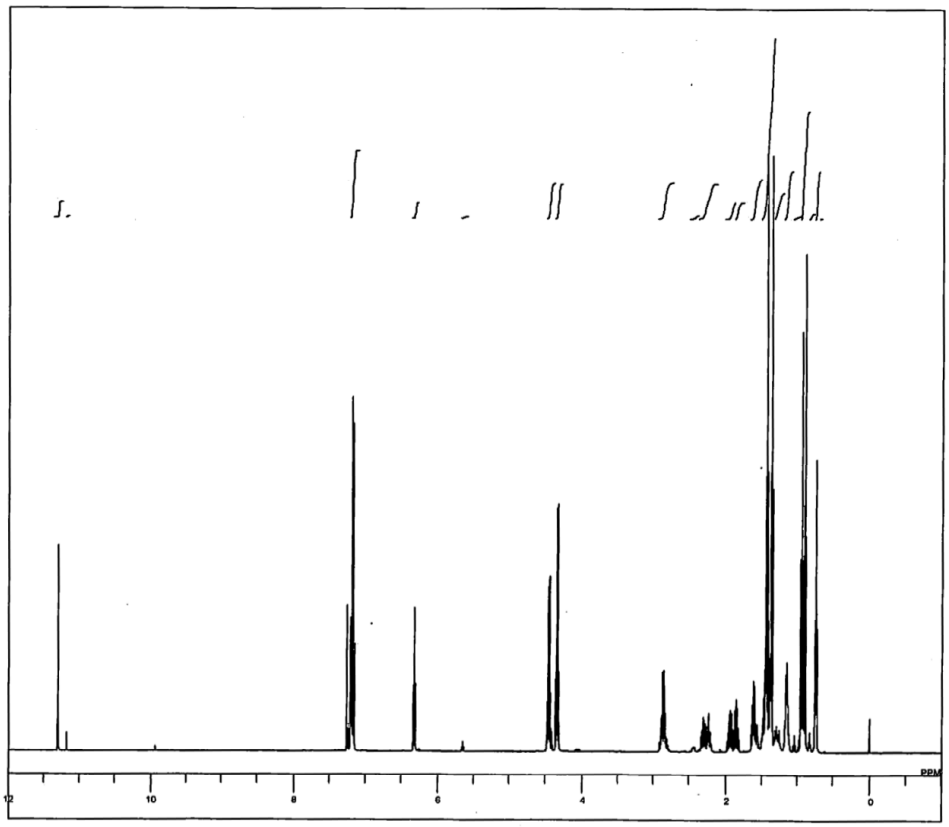
3c-(*Z*)



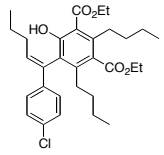
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	512
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-19-79-13C.als
SF	th5et
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	813
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Aug 17 12:38:47 2009



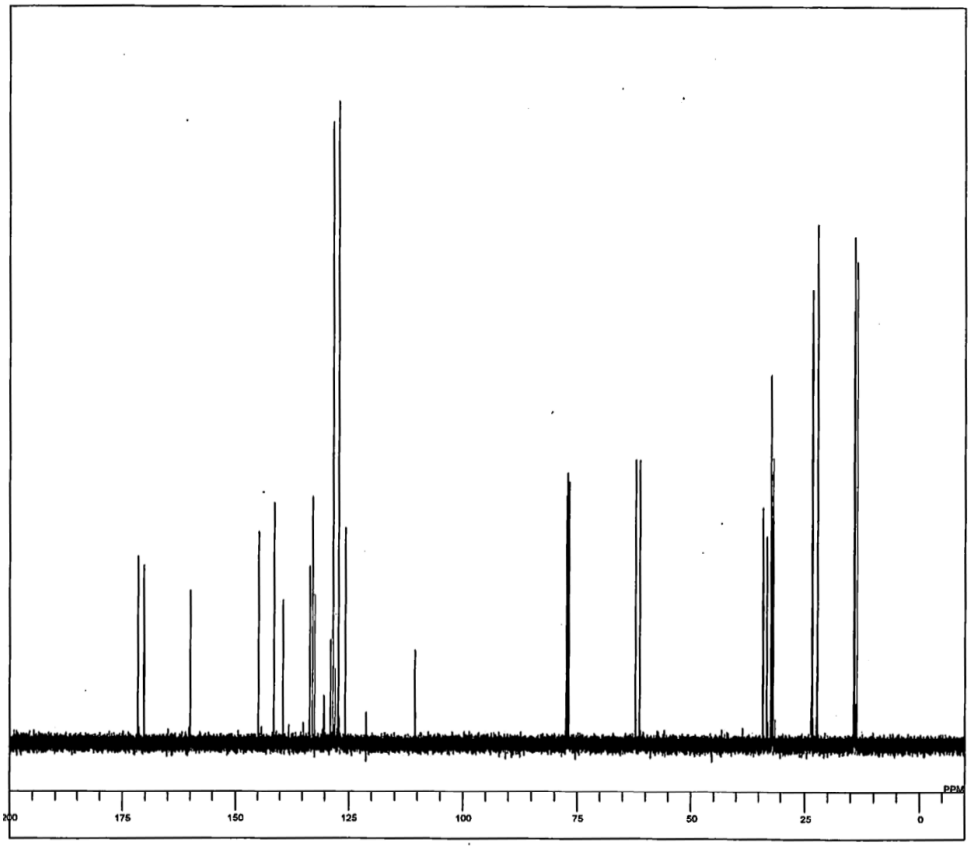
3c-(*Z*)



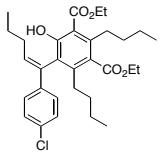
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	24
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-24-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	348
LKSIG	956
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Jul 13 15:07:04 2009



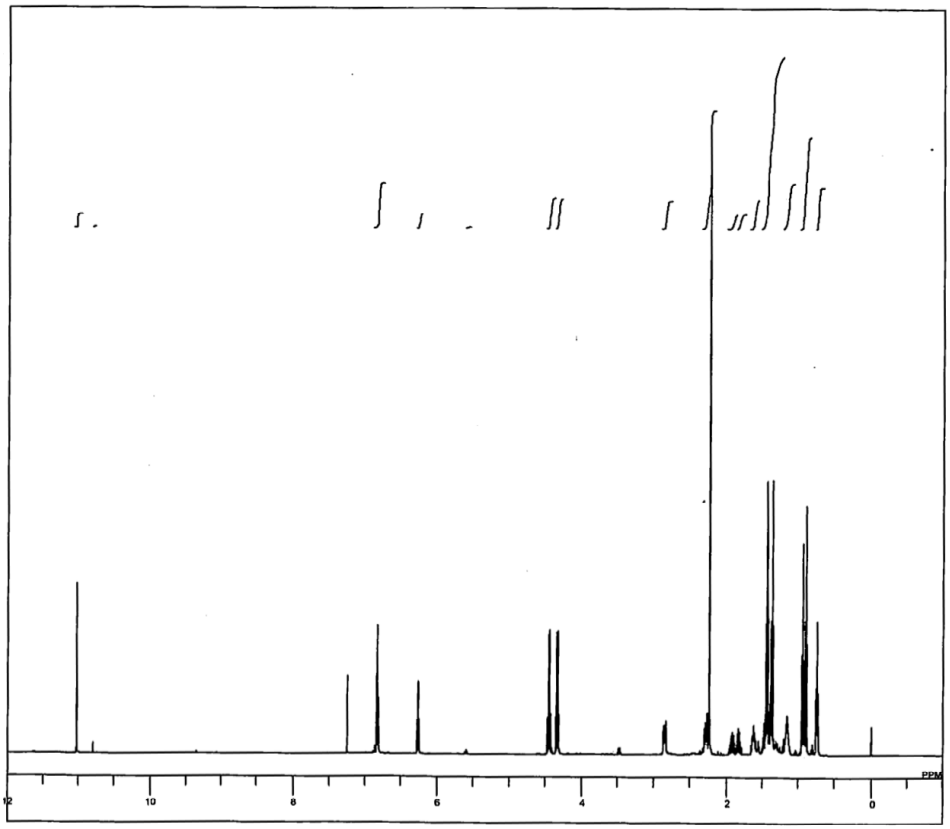
3d-(*Z*)



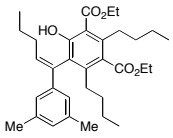
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-24-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	348
LKSIG	930
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon Jul 13 15:21:11 2009



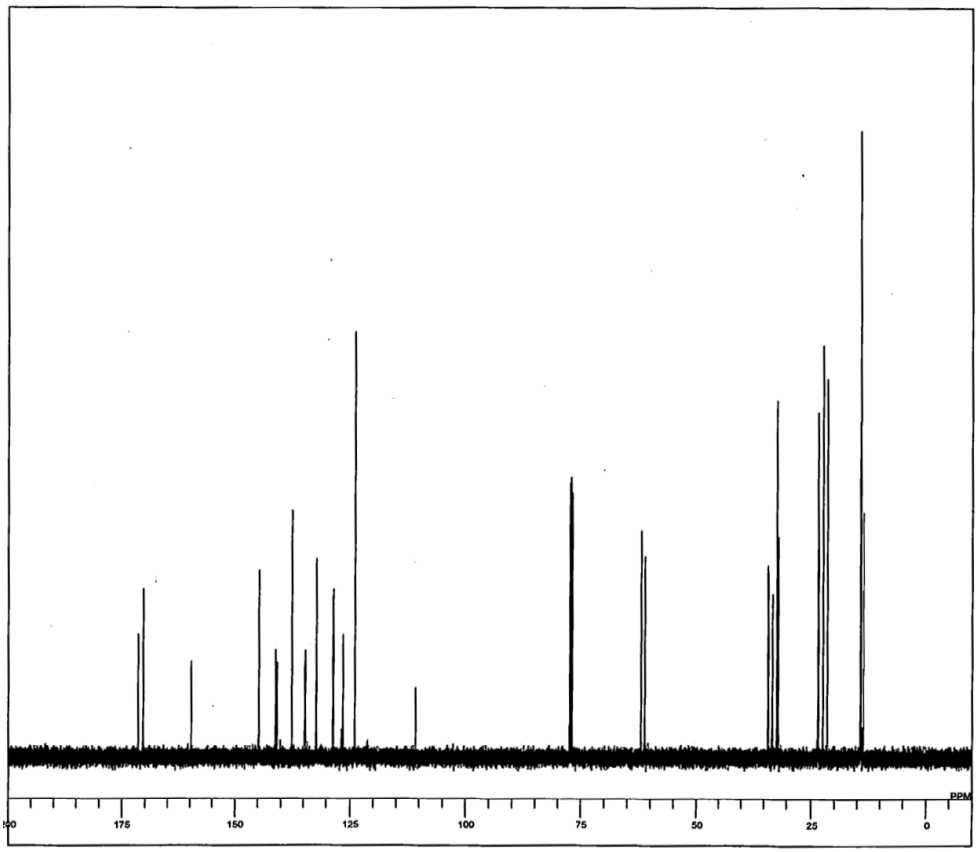
3d-(*Z*)



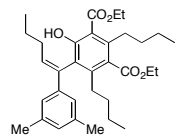

```
MENUF    1H
OBNUC    1H
OFR      499.10 MHz
OBSET    0.00 KHz
OBFIN    128885.00 Hz
PW1      5.50 usec
DEADT    72.30 usec
PREDL    0.01000 msec
IWT      1000.0000 sec
POINT    65536
SPO      65536
TIMES    24
DUMMY    0
FREQU    8000.00 Hz
FLT      4000 Hz
DELAY    50.00 usec
ACQTM    8.1920 sec
PD       1.0000 sec
ADBIT    16
RGAIN    18
BF       0.12 Hz
T1       0.00
T2       0.00
T3       90.00
T4       100.00
EXMOD    non
EXPCM    single pulse nondecoupling & nonpresaturation
IRNUC    1H
IFR      499.10 MHz
IRSET    0.00 KHz
IRFIN    128250.00 Hz
IRRPW    50 usec
IRATN    511
DFILE    yy-19-26-1H.als
SF       th5at
LKSET    0.00 KHz
LKFIN    26934.0 Hz
LKLEV    200
LGAIN    20
LKPHS    346
LKSIG    630
CSPED    10 Hz
FILDC
FILDF
SLVNT    CDCL3
DATIM    Thu Jul 16 00:15:13 2009
```



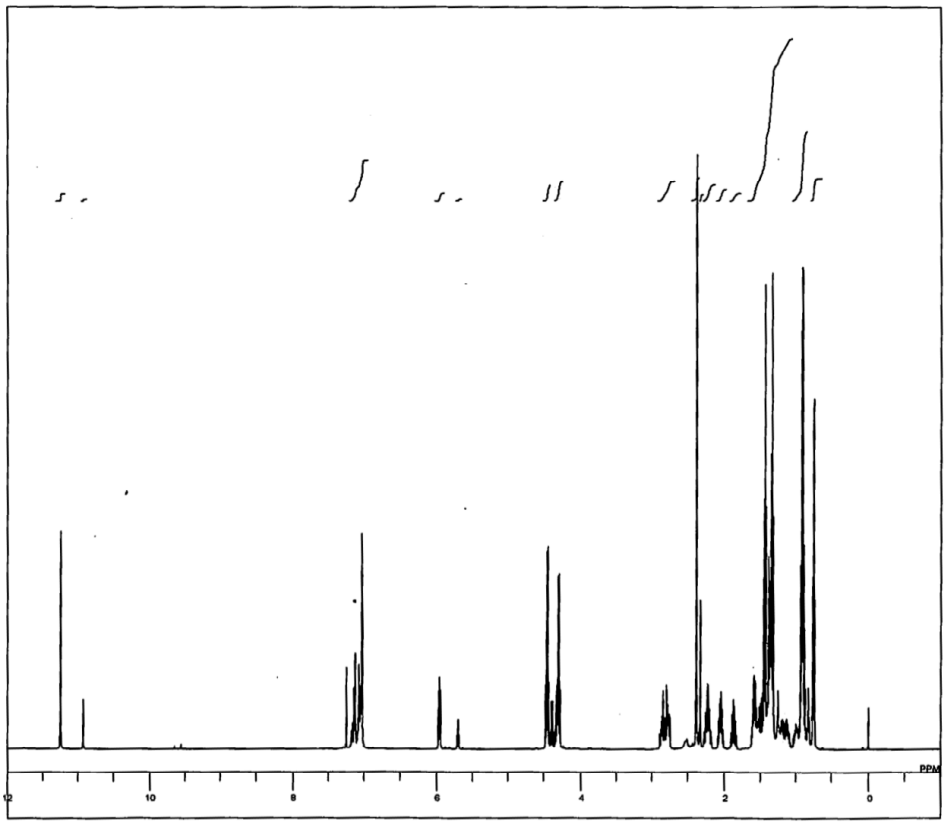
3e-(*Z*)



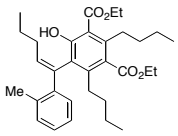

```
MENUF    13C
OBNUC    13C
OFR      125.40 MHz
OBSET    0.00 KHz
OBFIN    143041.00 Hz
PW1      6.25 usec
DEADT    10.00 usec
PREDL    0.01000 msec
IWT      1000.0000 sec
POINT    65536
SPO      65536
TIMES    360
DUMMY    2
FREQU    33898.30 Hz
FLT      16950 Hz
DELAY    11.80 usec
ACQTM    1.9333 sec
PD       1.0670 sec
ADBIT    16
RGAIN    31
BF       0.12 Hz
T1       0.00
T2       0.00
T3       90.00
T4       100.00
EXMOD    bcm
EXPCM    single pulse with bilevel decoupling
IRNUC    1H
IFR      499.10 MHz
IRSET    0.00 KHz
IRFIN    128250.00 Hz
IRRPW    50 usec
IRATN    511
DFILE    yy-19-26-13C.als
SF       th5at
LKSET    0.00 KHz
LKFIN    26934.0 Hz
LKLEV    200
LGAIN    20
LKPHS    346
LKSIG    610
CSPED    12 Hz
FILDC
FILDF
SLVNT    CDCL3
DATIM    Thu Jul 16 00:29:08 2009
```



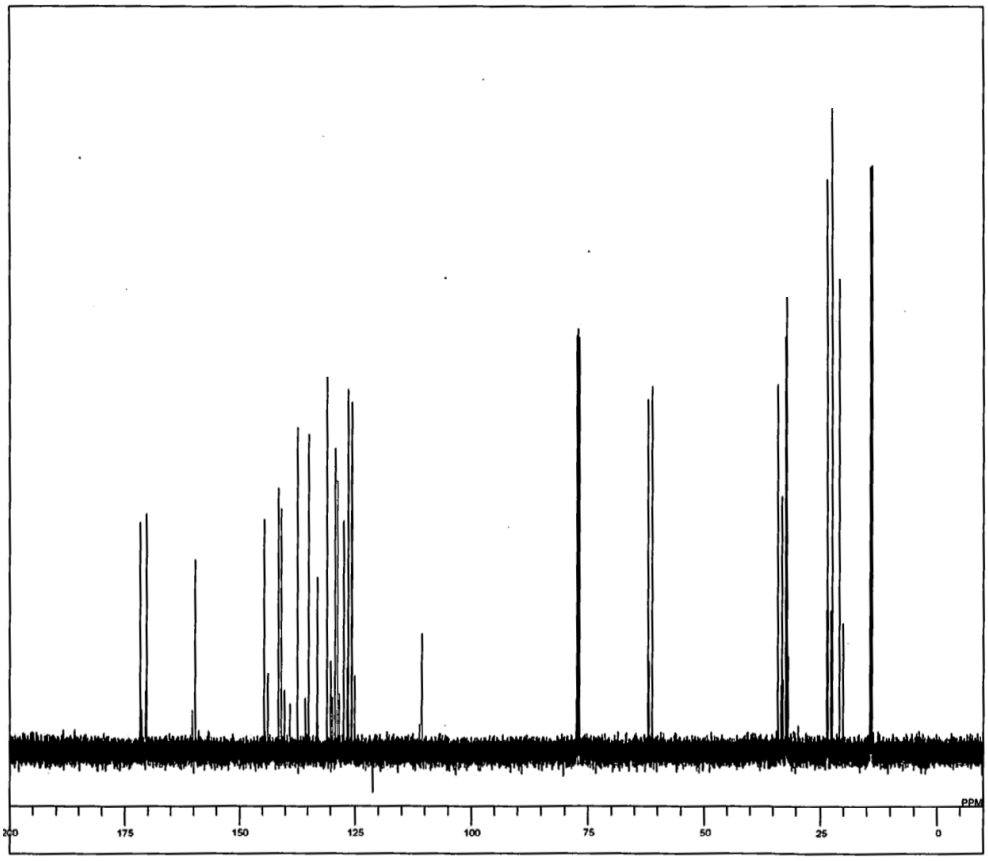
3e-(*Z*)



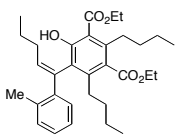
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	32
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-77-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	748
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 14:07:15 2009



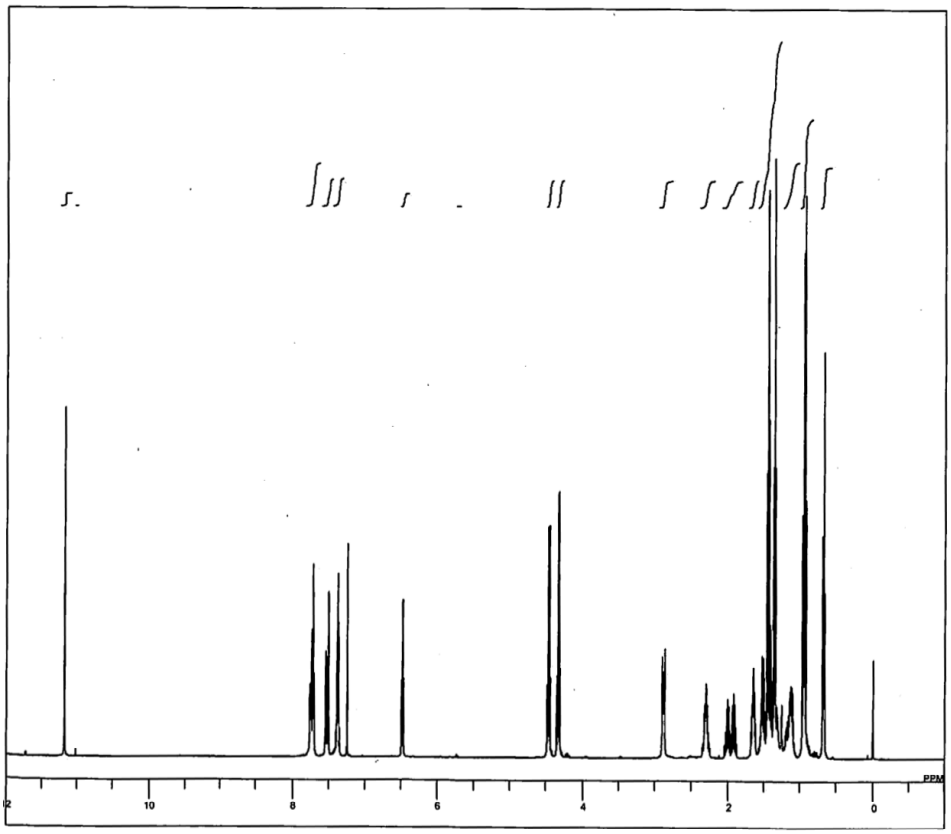
3f-(*Z*)



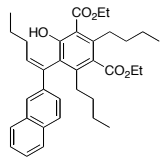
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-77-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	745
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 14:20:59 2009



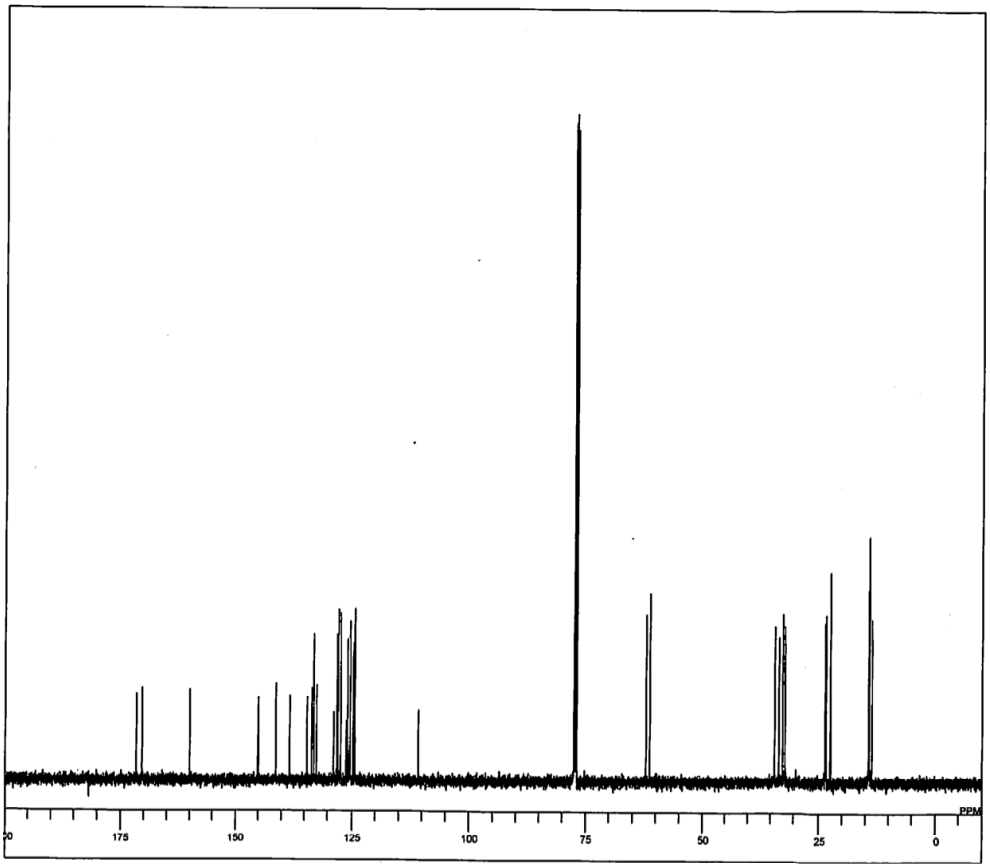
3f-(*Z*)



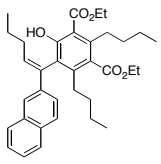
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	48
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-78-rev-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	766
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Aug 21 13:28:45 2009



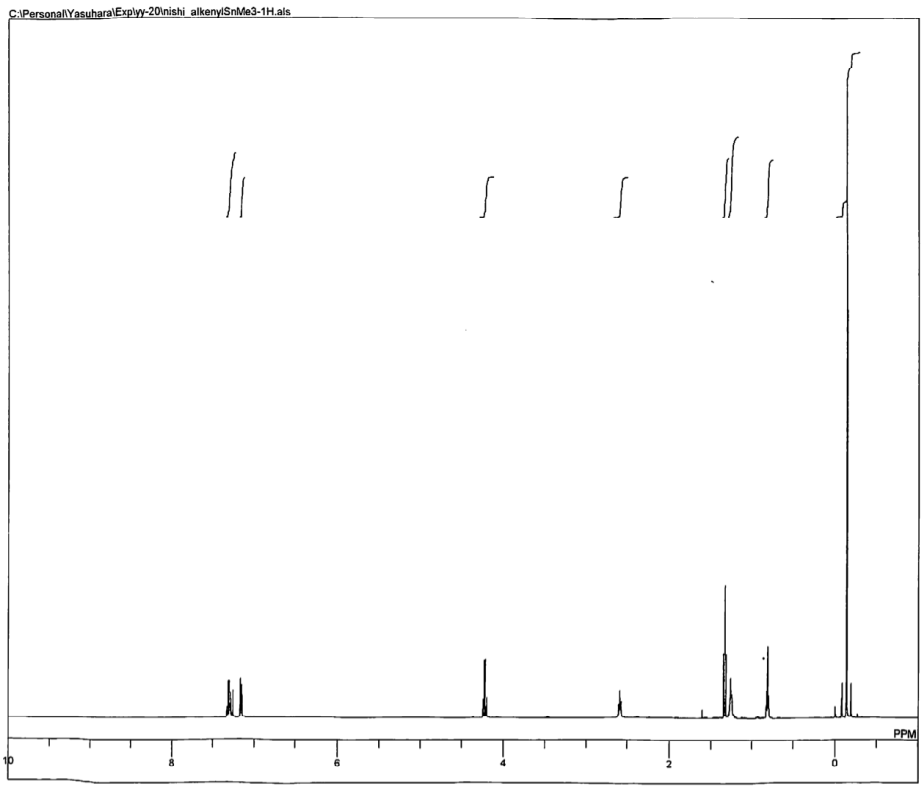
3g-(*Z*)



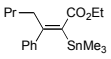
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	720
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-19-78-rev-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	762
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Aug 21 14:05:02 2009



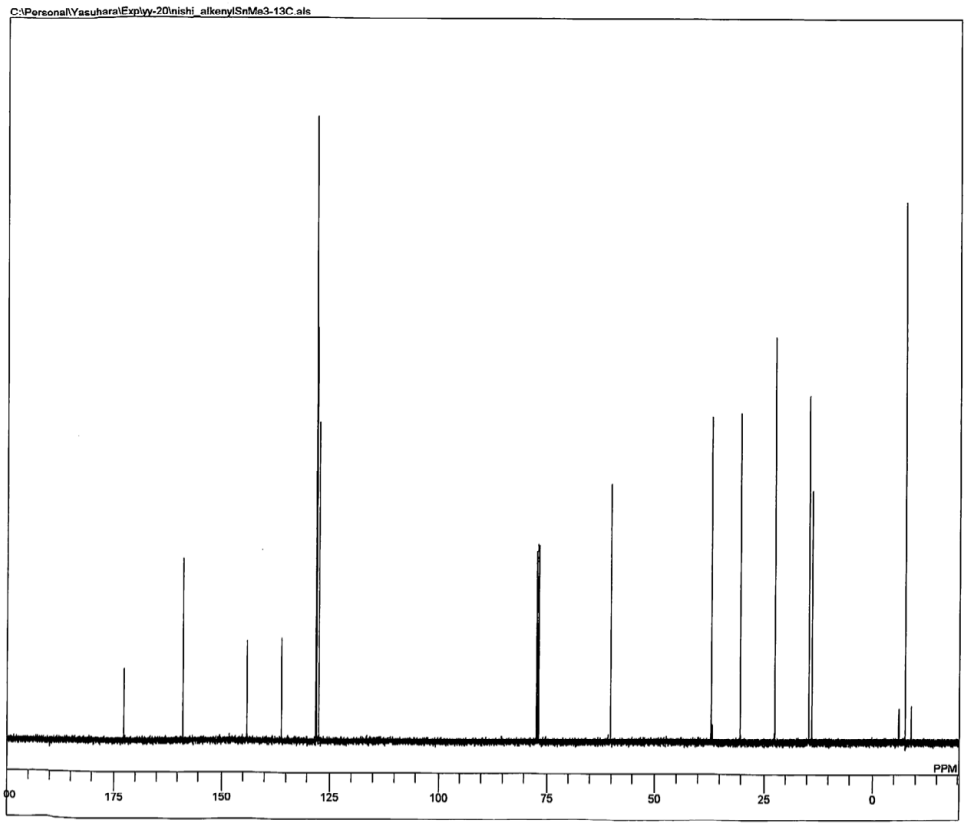
3g-(*Z*)



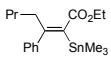
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	nishi_alkenylSnMe3-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	346
LKSIG	605
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Dec 18 00:47:22 2009



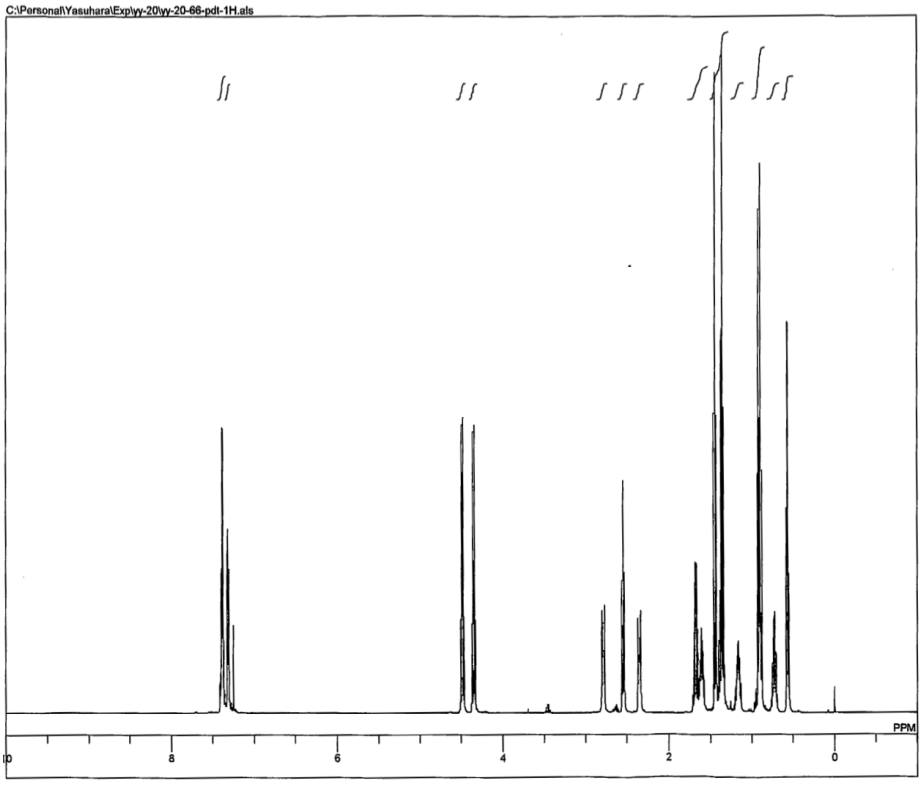
5



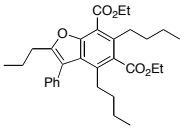
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	23
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	nishi_alkenylSnMe3-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	346
LKSIG	598
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Dec 18 01:08:26 2009



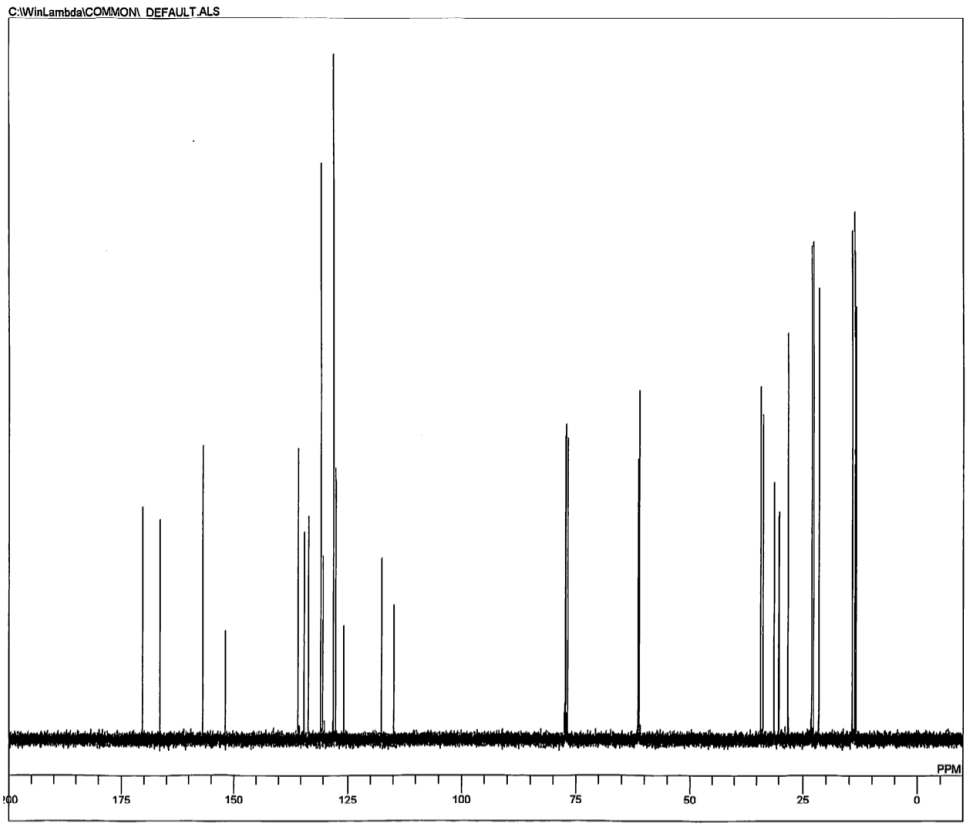
5



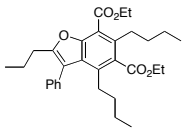
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	24
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-20-66-pdt-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	828
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Dec 22 12:05:11 2009



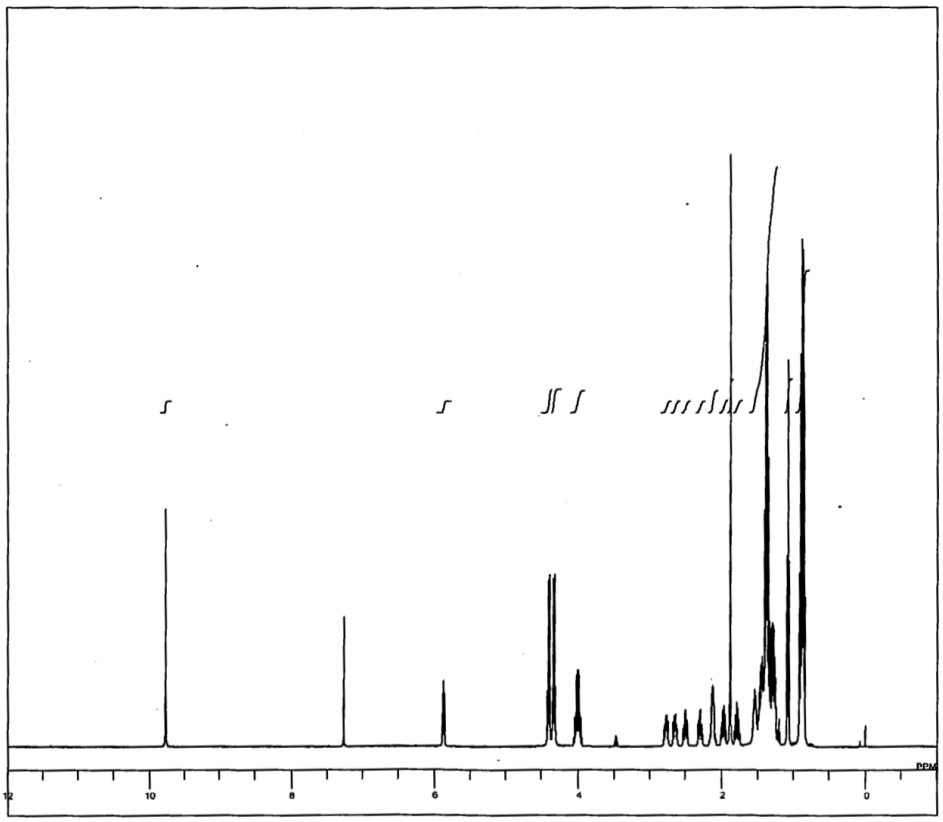
6



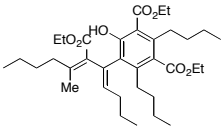
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 msec
POINT	65536
SPO	65536
TIMES	592
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	24
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	_DEFAULT.ALS
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	763
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Dec 22 12:36:48 2009



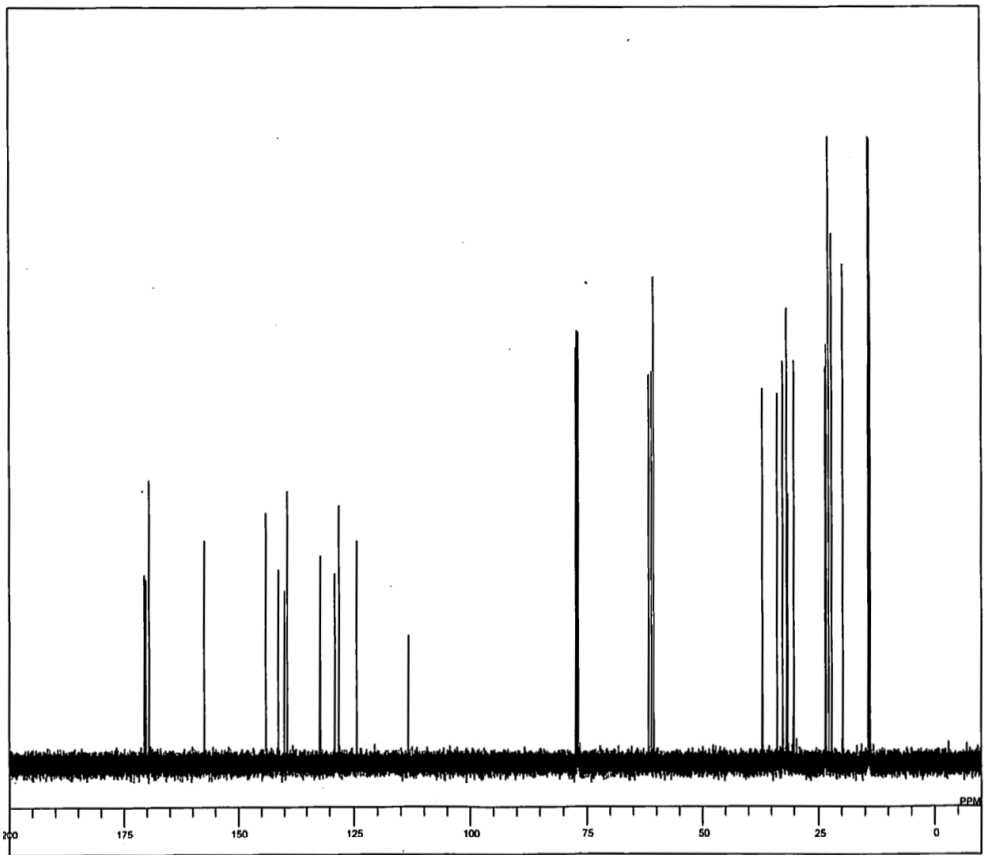
6



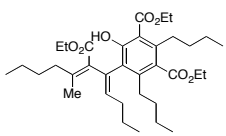
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	16
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-129-3(pure)-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LKGAIN	22
LKPHS	353
LKSIG	862
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 18:36:22 2009



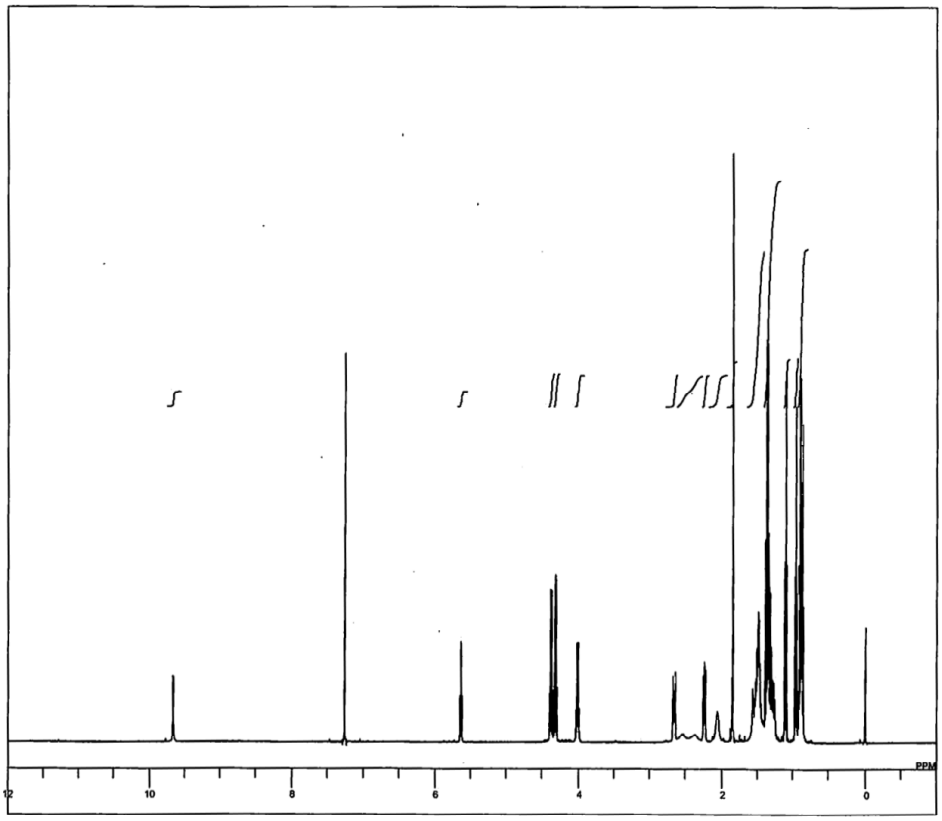
8a-(*E*)



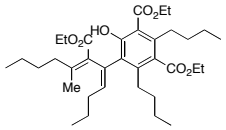
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	400
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-129-3(pure)-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LKGAIN	22
LKPHS	353
LKSIG	879
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 18:57:30 2009



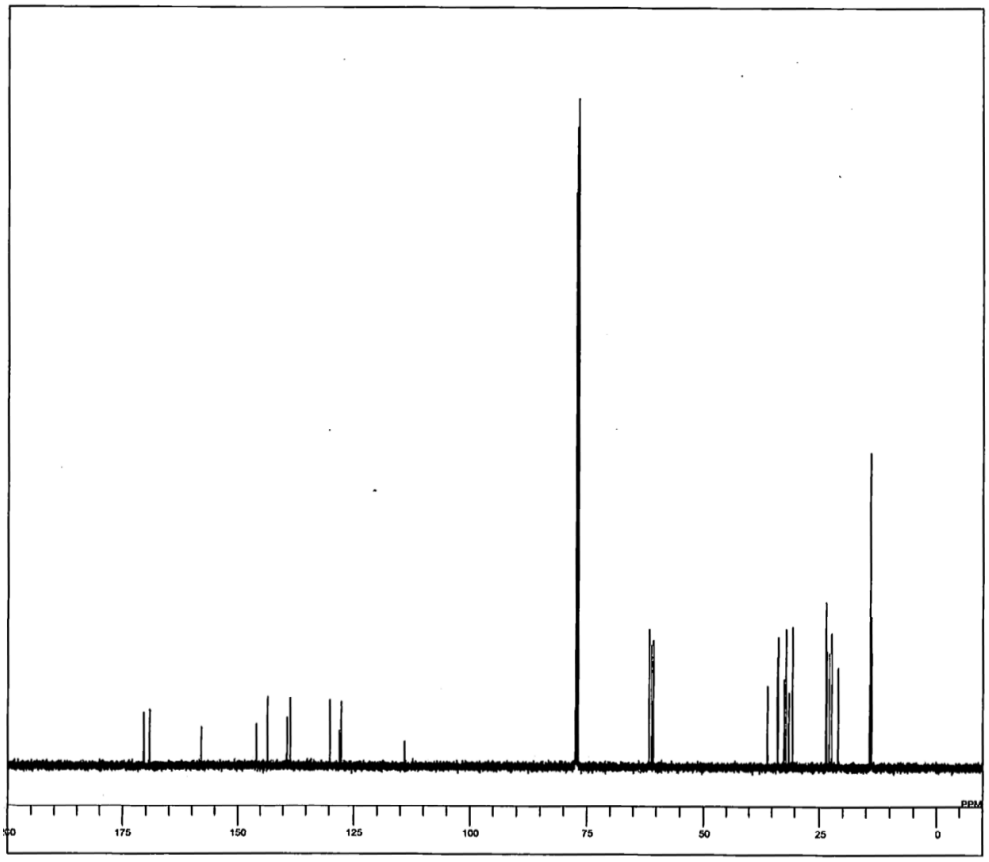
8a-(*E*)



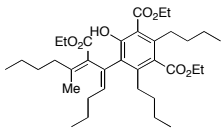
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	16
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-129-2-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	557
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue May 12 00:53:06 2009



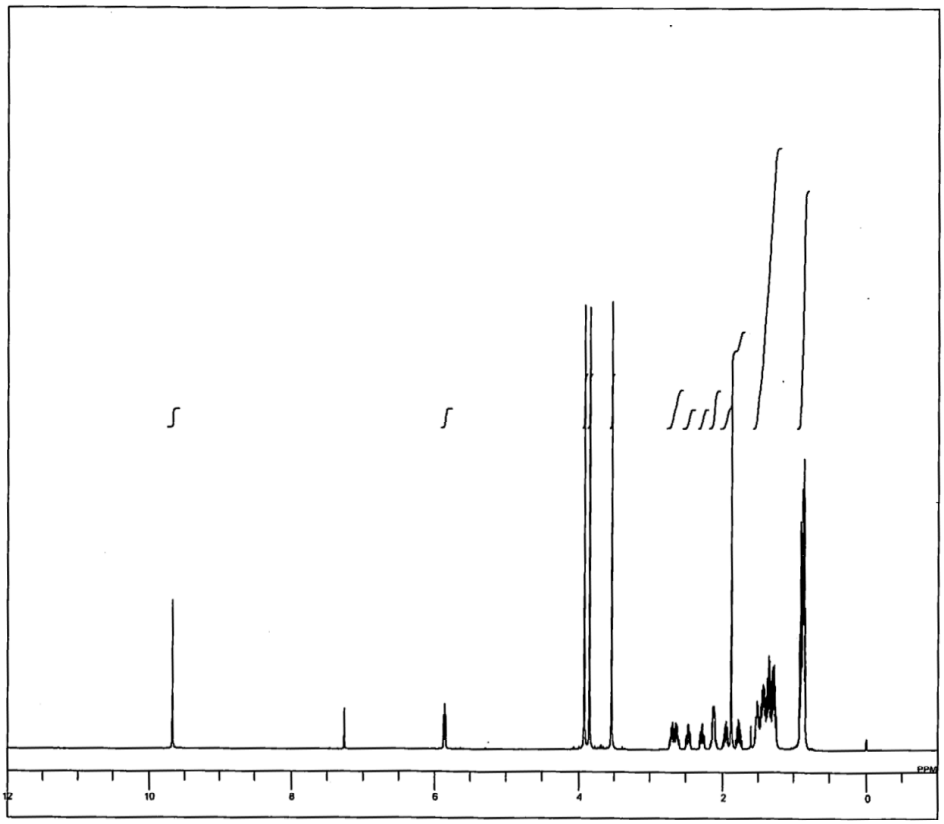
8a-(*Z*)



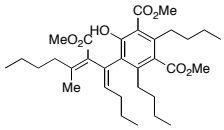
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	3596
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-129-2-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	539
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue May 12 03:53:13 2009



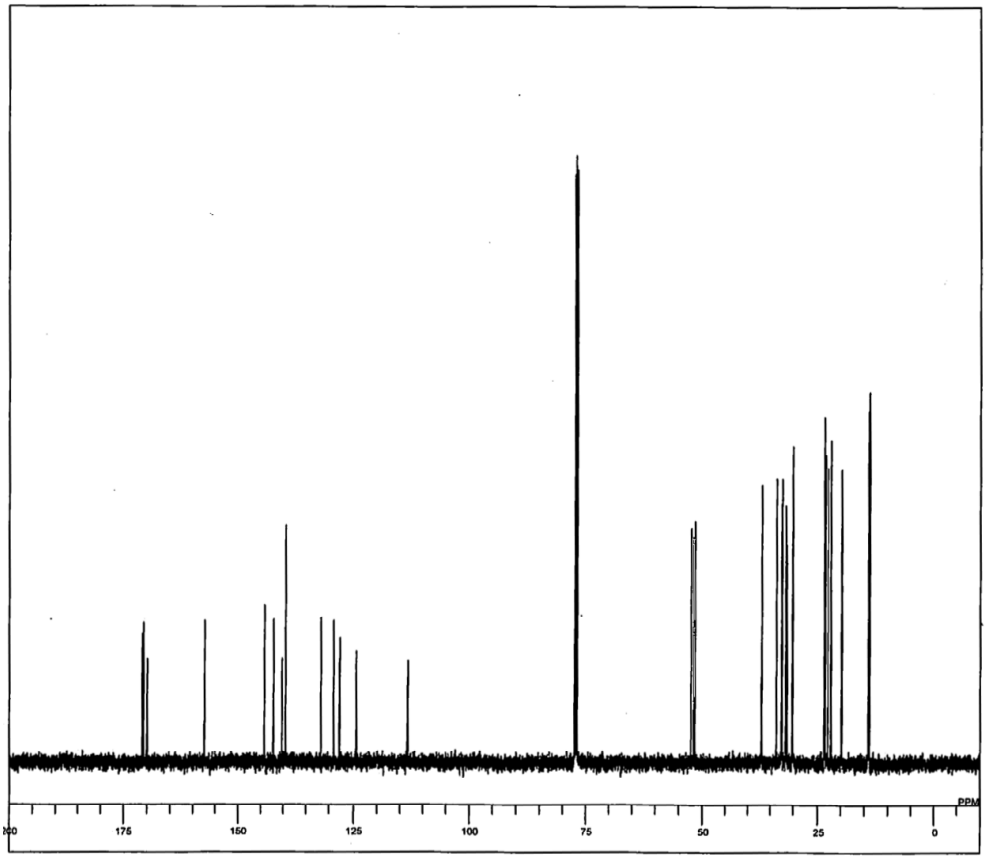
8a-(*Z*)



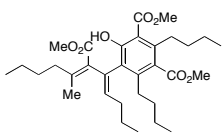
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	16
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2634 sec
PD	3.7166 sec
ADBIT	16
RGAIN	18
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-17-110-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	519
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Nov 14 12:20:31 2008



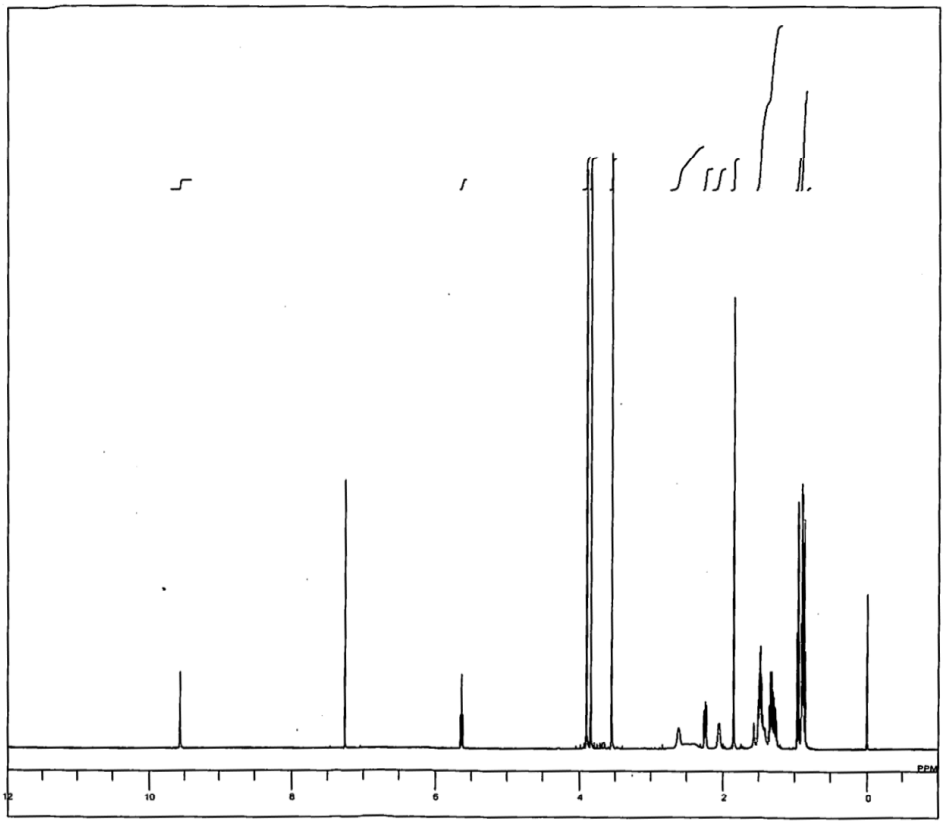
8b-(*E*)



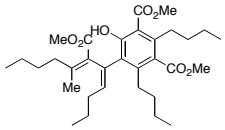
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	360
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-17-110-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	513
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Nov 14 12:38:49 2008



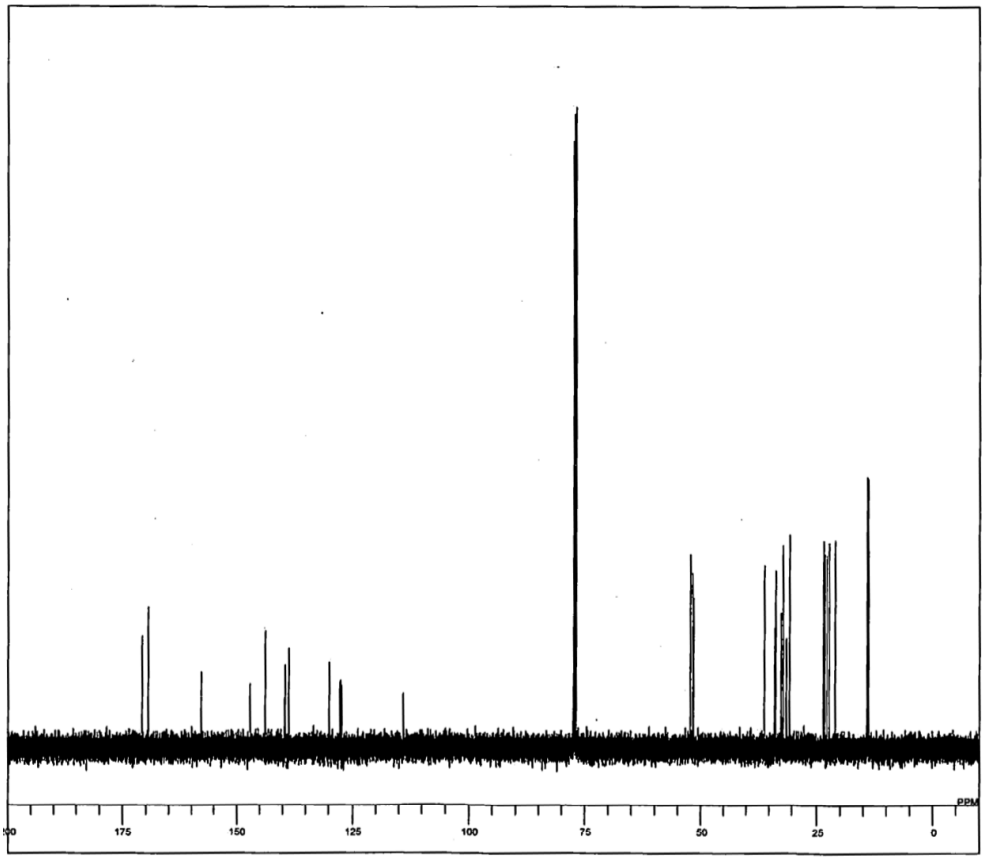
8b-(*E*)



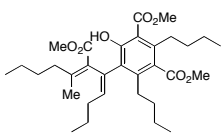
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	32
DUMMY	0
FREQU	6000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-76-fr.1-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	953
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Aug 07 18:12:18 2009



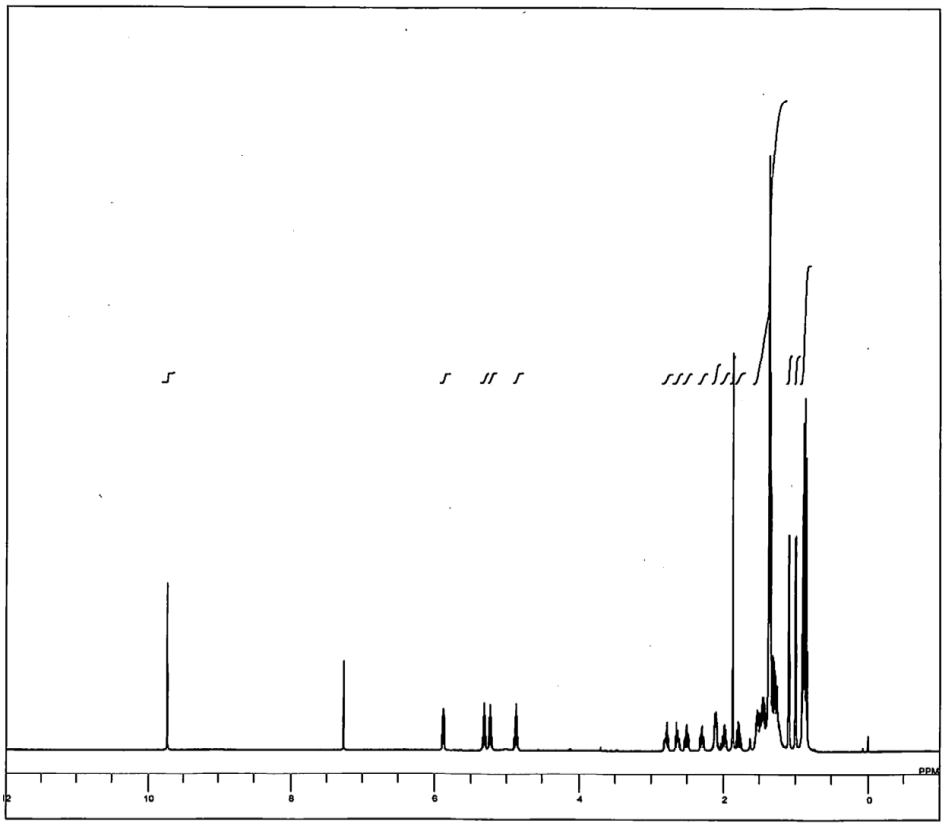
8b-(*Z*)



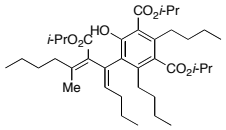
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-76-fr.1-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	925
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri Aug 07 18:38:53 2009



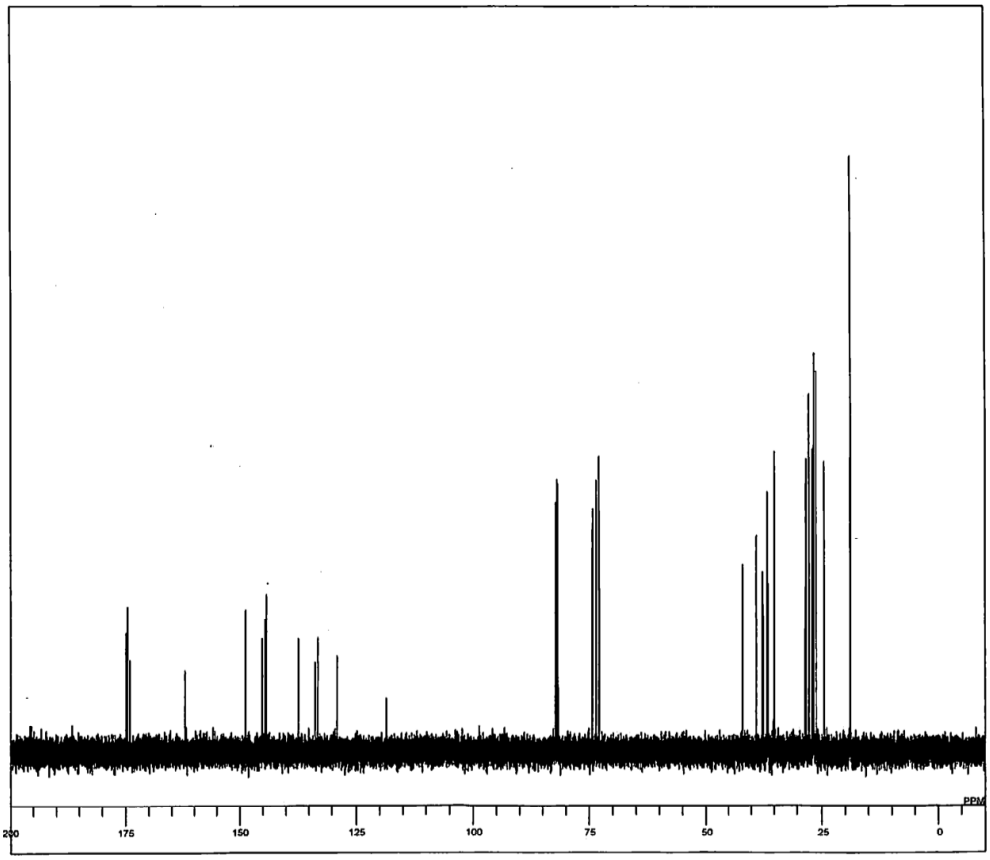
8b-(*Z*)



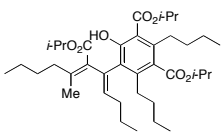
MENUF	1H
ODNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	126885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	126250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-135-4-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	869
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 14 09:50:11 2009



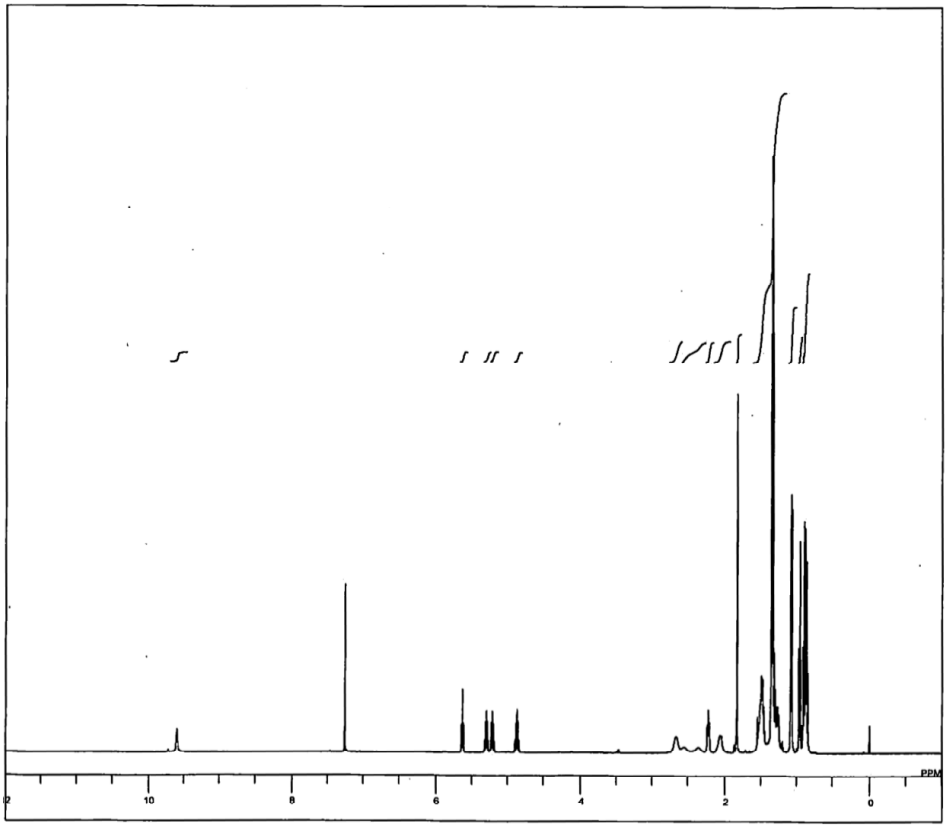
8c-(*E*)



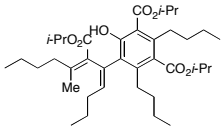
MENUF	13C
ODNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	126250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-135-4-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	869
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 14 09:57:27 2009



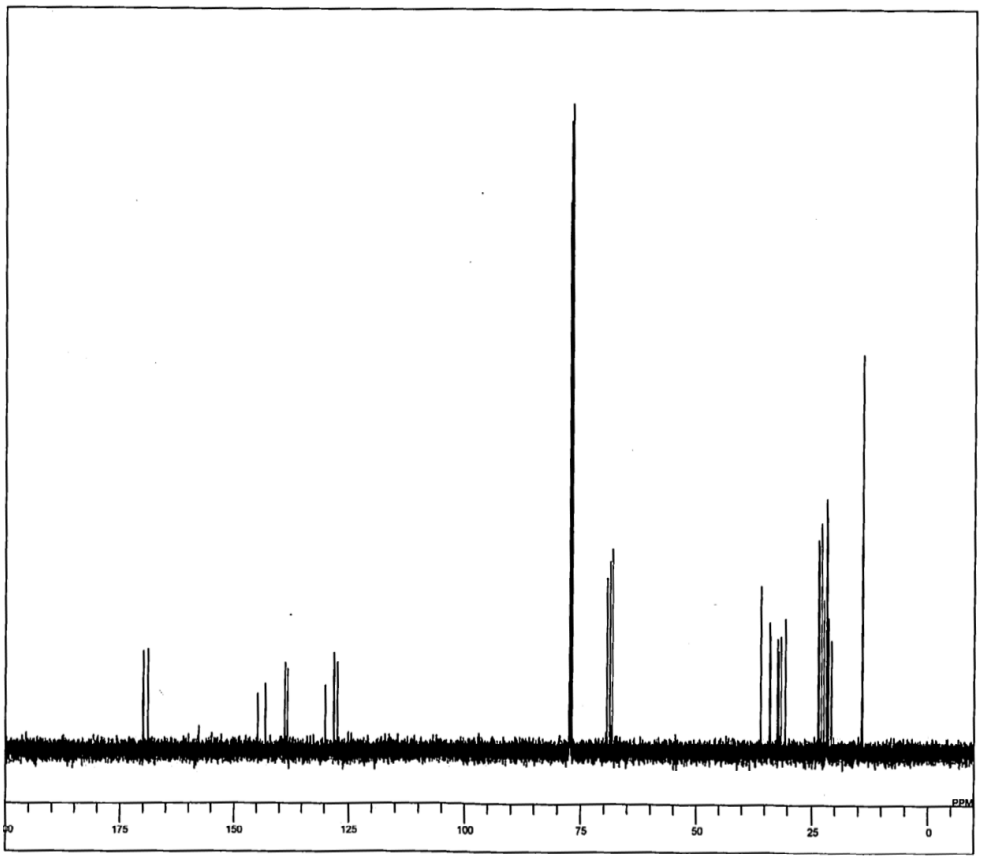
8c-(*E*)



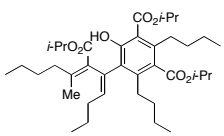
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	32
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-135-3-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	502
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri May 15 01:42:51 2009



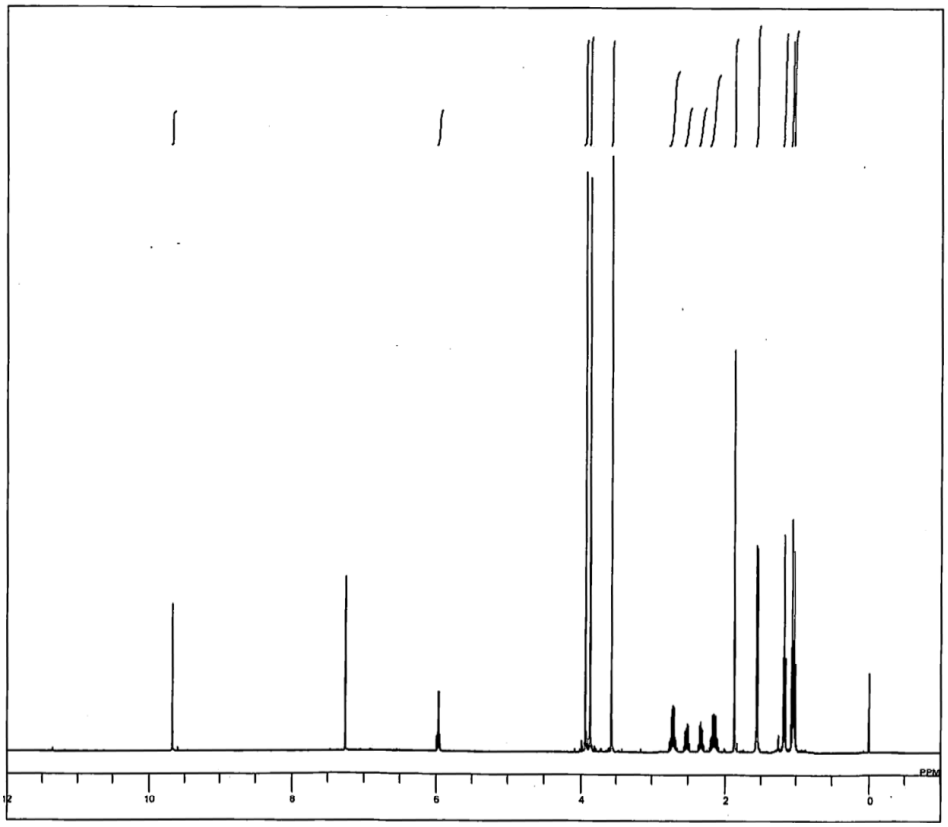
8c-(*Z*)



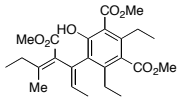
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-135-3-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	496
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Fri May 15 02:34:24 2009



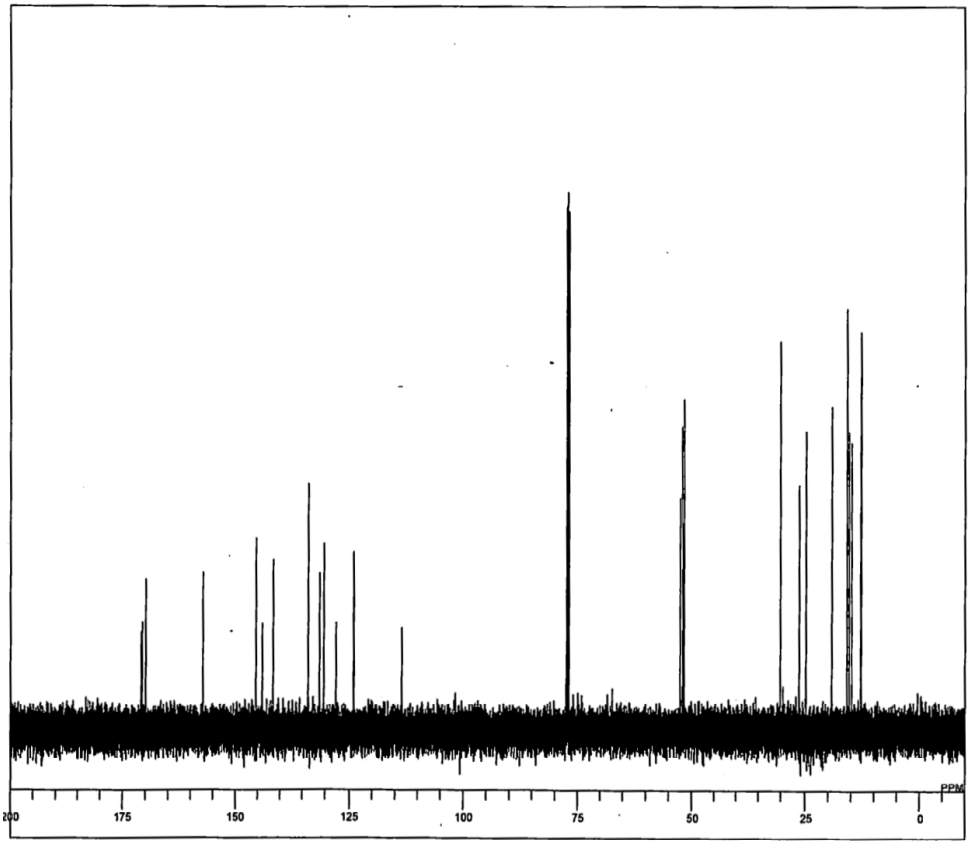
8c-(*Z*)



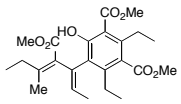
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	40
DUMMY	0
FREQU	6000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-133-fr.2-1H.als
SF	th5et
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	345
LKSIG	575
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 18 20:20:32 2009



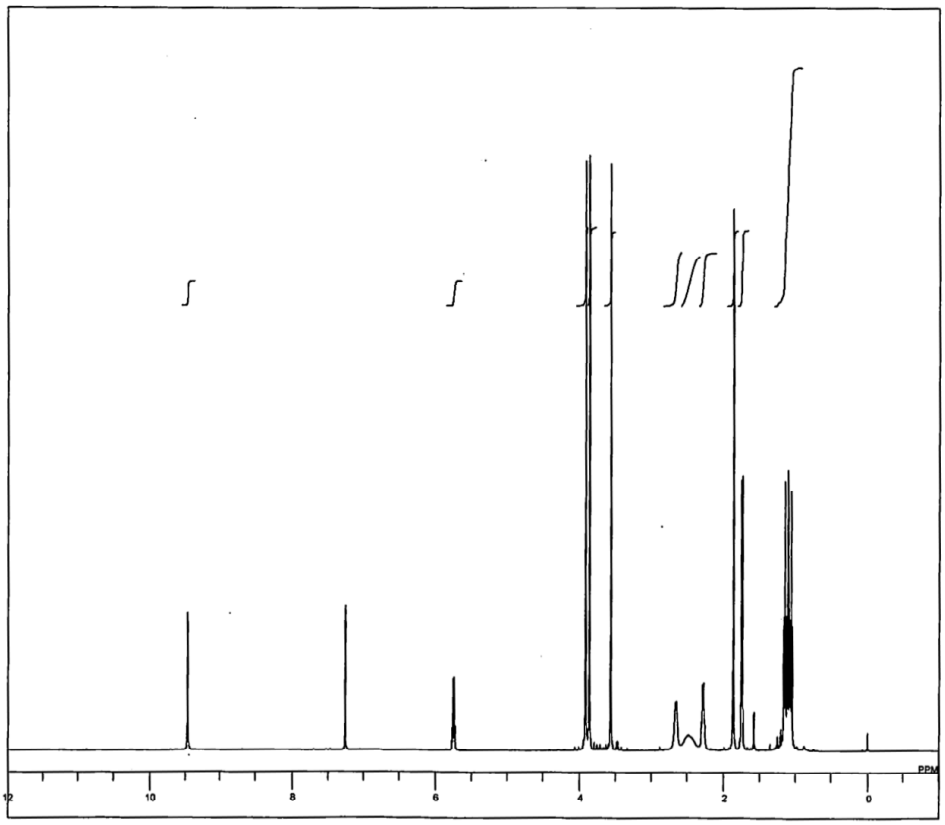
8d-(*E*)



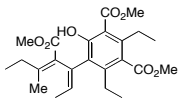
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-133-2-13C.als
SF	th5et
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	689
CSPED	15 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon May 18 22:28:34 2009



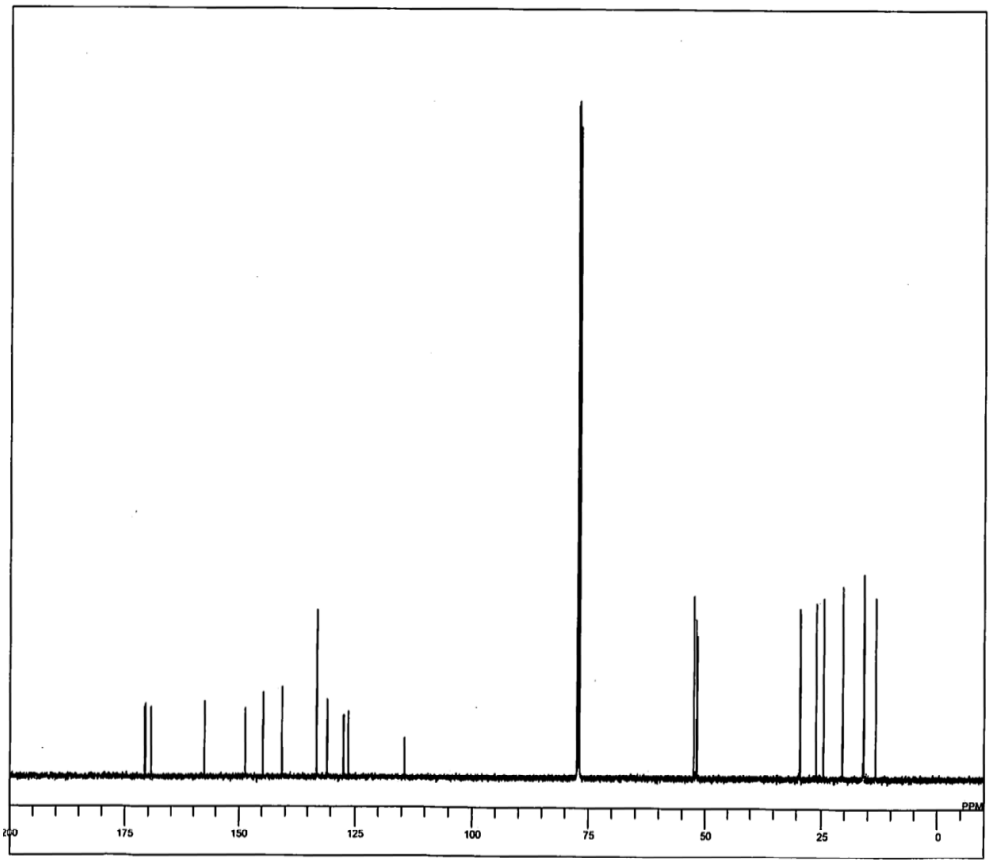
8d-(*E*)



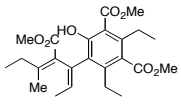
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	32
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2804 sec
PD	3.7166 sec
ADBIT	16
RGAIN	20
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-133-1-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	579
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 20 01:19:44 2009



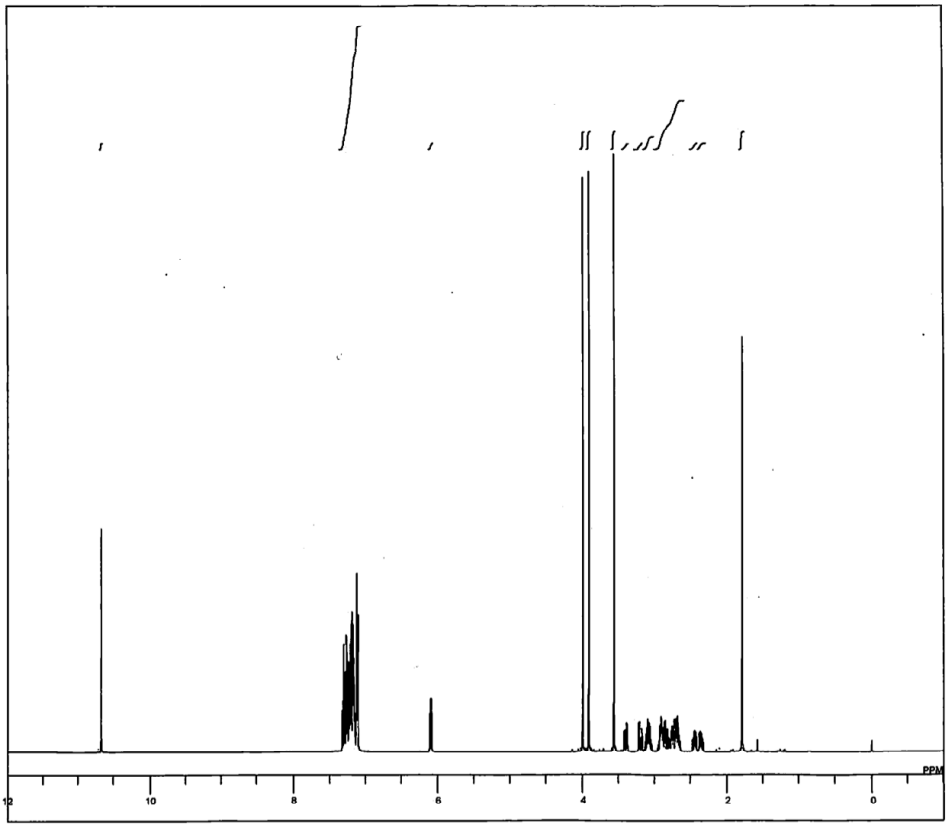
8d-(*Z*)



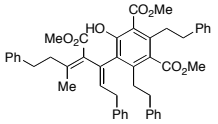
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	1600
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	31
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-133-1-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	562
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 20 02:40:04 2009



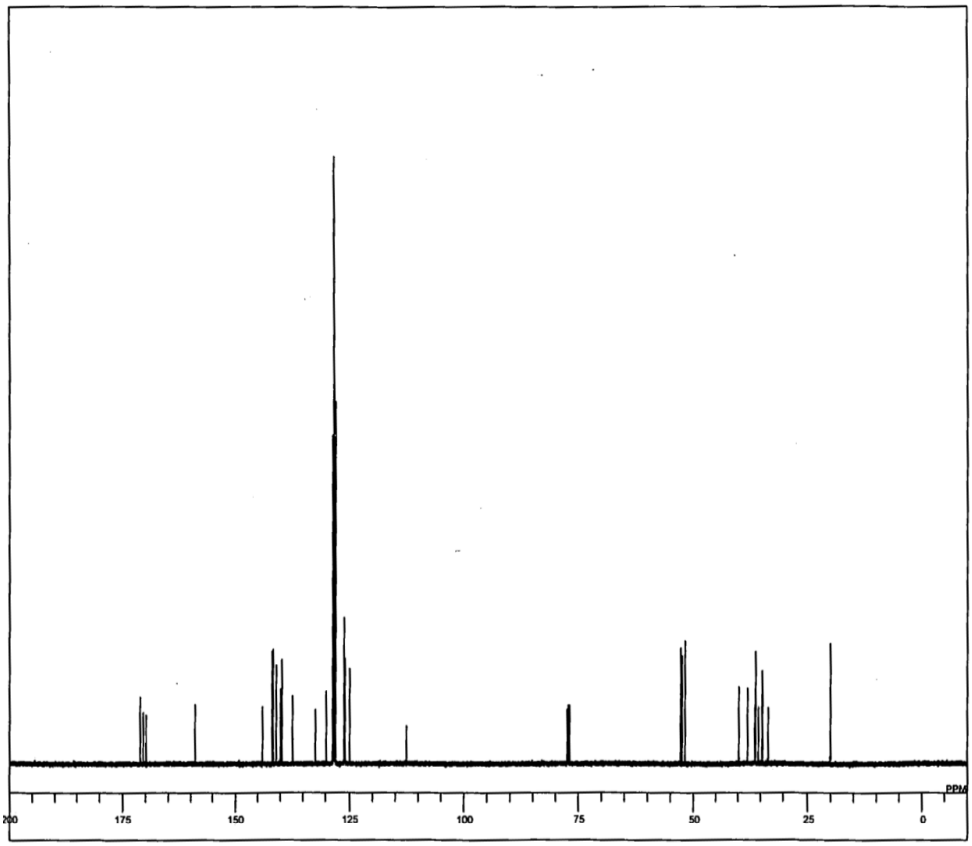
8d-(*Z*)



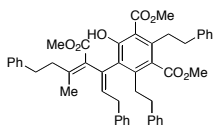
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	15
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	131-after GPC.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	681
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Dec 04 10:37:12 2008



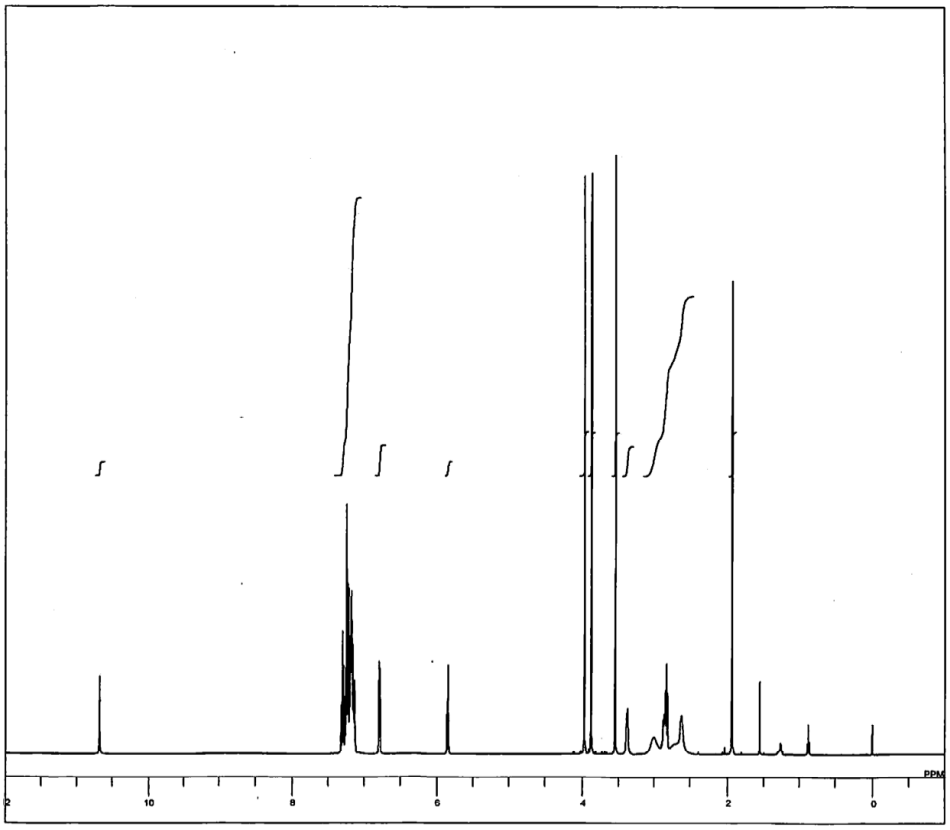
8e-(*E*)



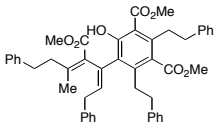
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65535
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	131-after GPC-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	669
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Dec 04 10:50:46 2008



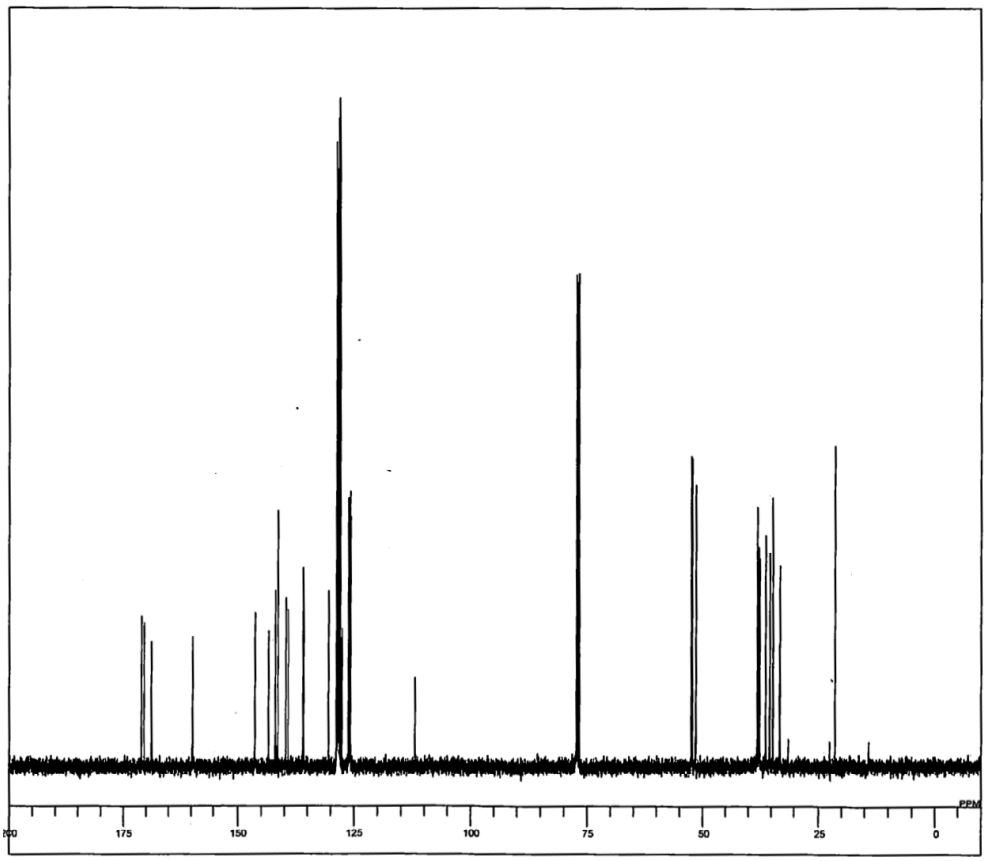
8e-(*E*)



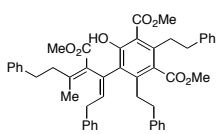
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	19
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	131-fr.1-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	560
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Dec 10 12:11:16 2008



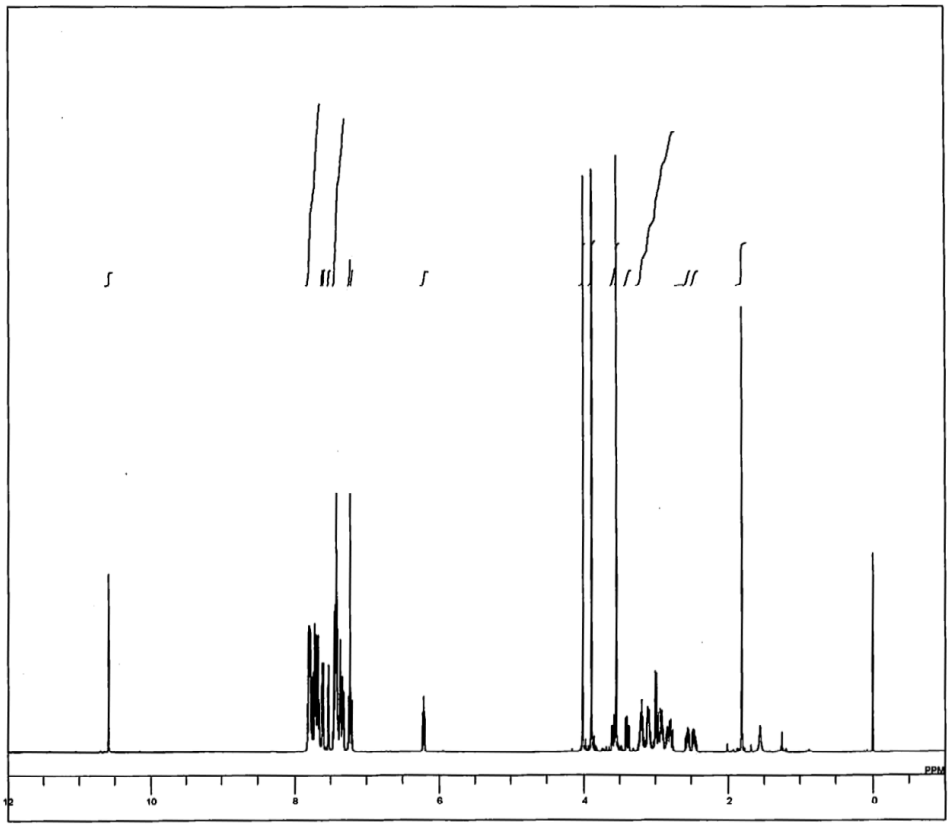
8e-(*Z*)



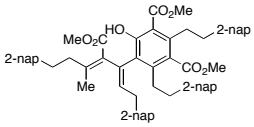
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	512
DUMMY	1
FREQU	33698.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	20
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	17-131-fr.13bcm_E1_FT.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	353
LKSIG	522
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Dec 18 05:09:38 2008



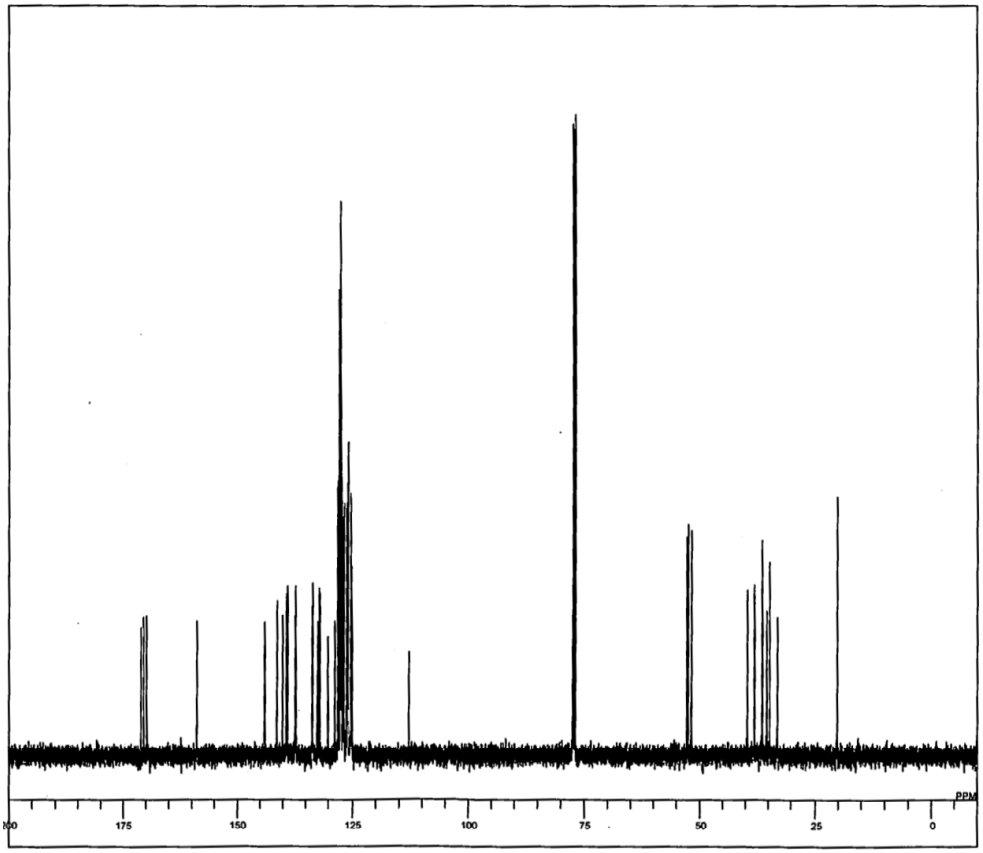
8e-(*Z*)



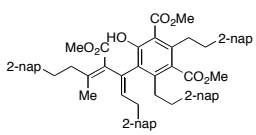
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	32
DUMMY	0
FREQU	6000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-138-fr.2-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	346
LKSIG	557
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 14:36:12 2009



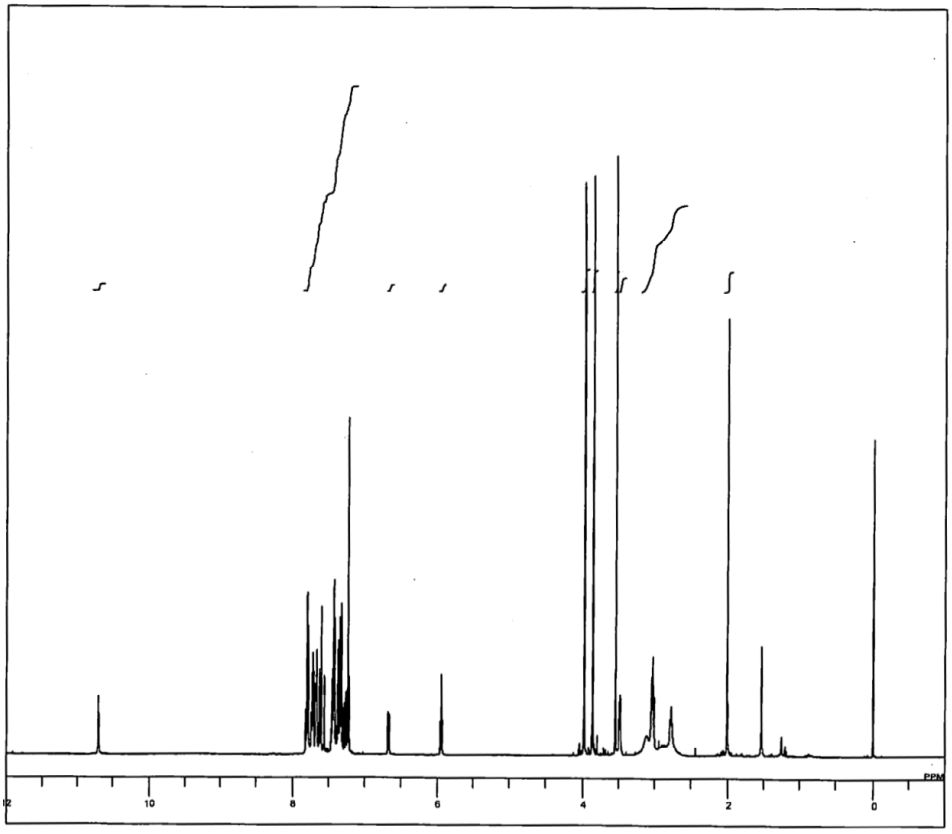
8f-(*E*)



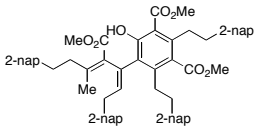
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33698.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-138-fr.2-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	19
LKPHS	346
LKSIG	454
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 21:48:41 2009



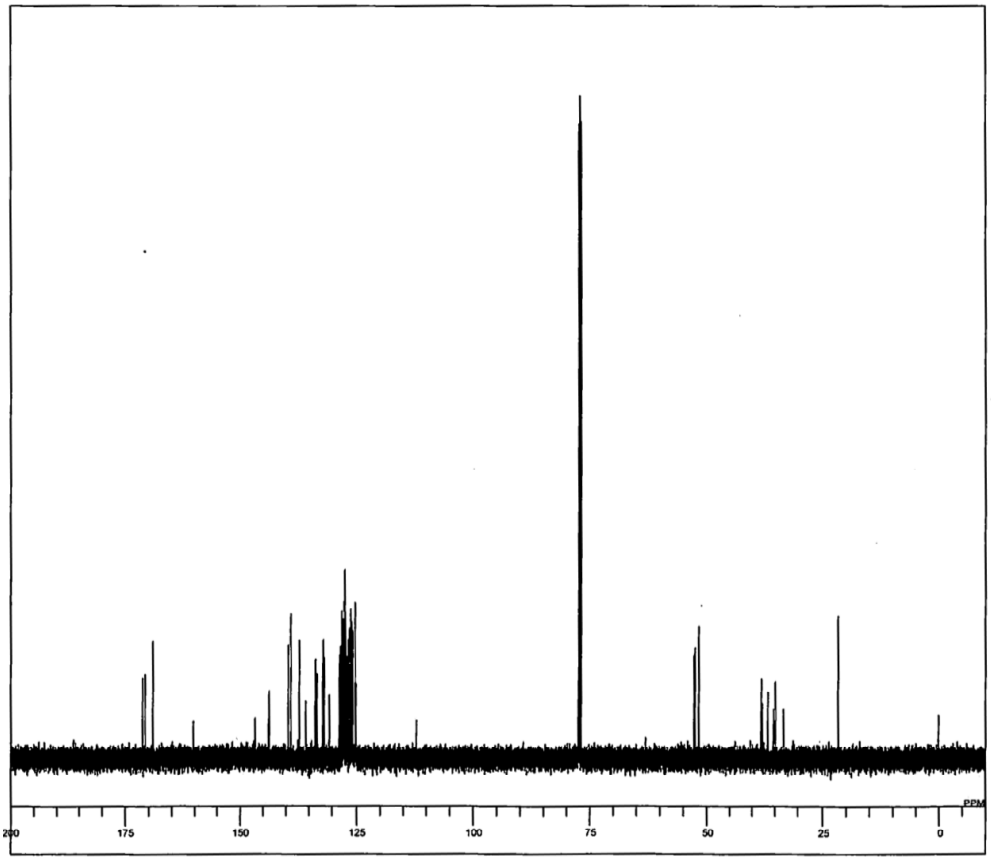
8f-(*E*)



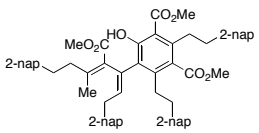
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	32
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	22
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-138-fr.1-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	941
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 19:03:51 2009



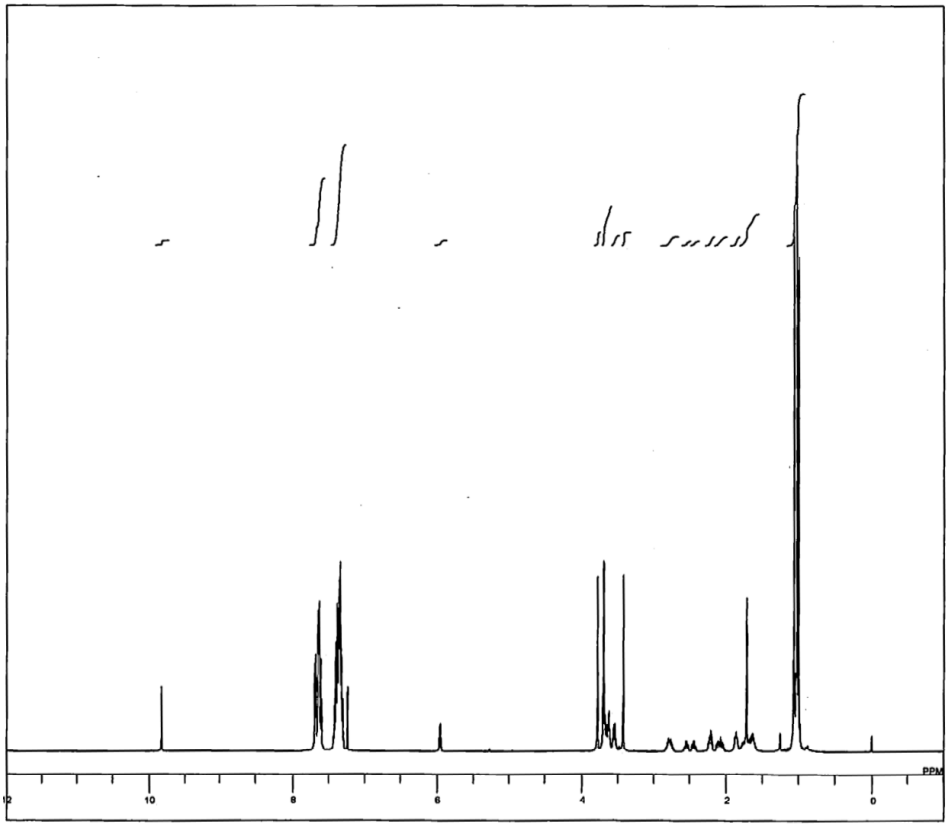
8f-(*Z*)



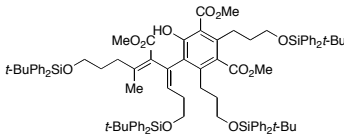
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-138-fr.1-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	924
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Tue Aug 11 19:30:32 2009



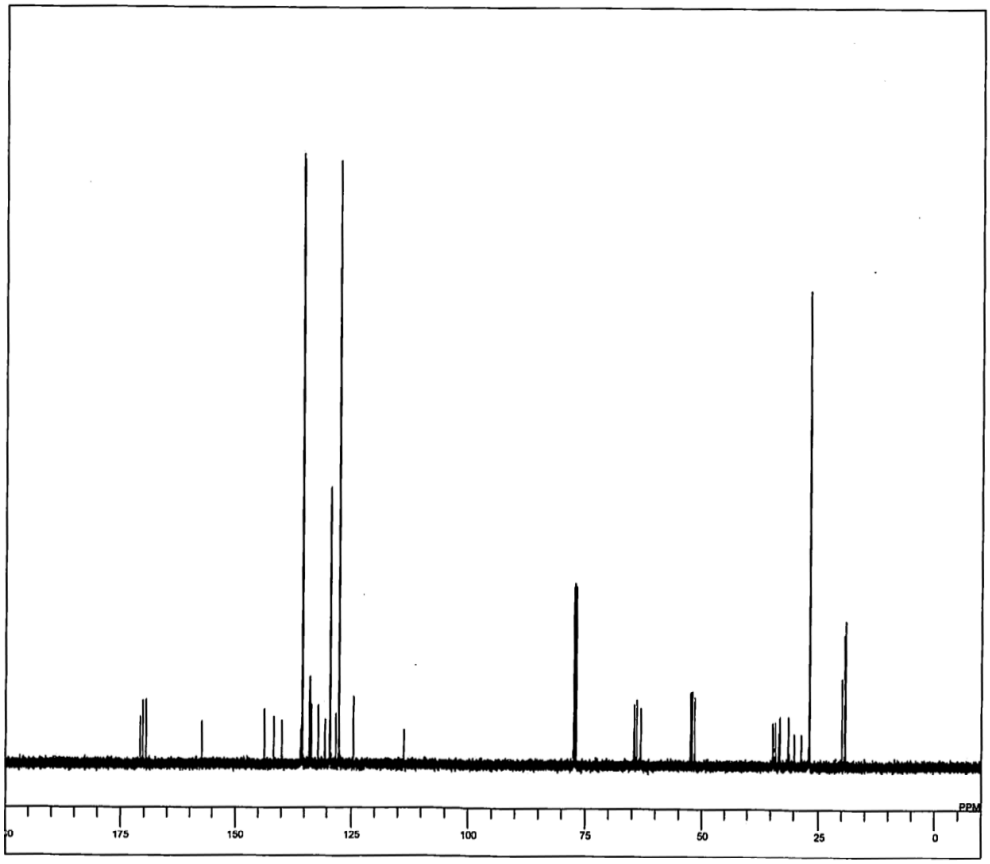
8f-(*Z*)



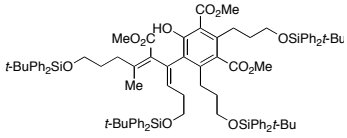
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	18
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-130-3-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	859
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 21:50:24 2009



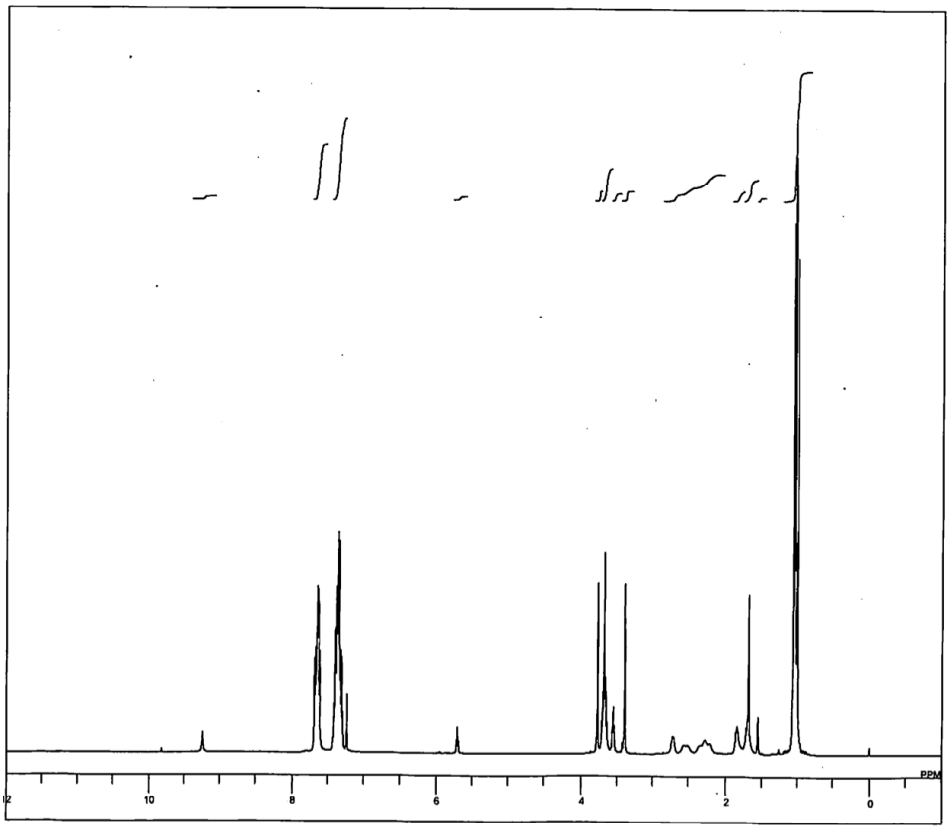
8g-(*E*)



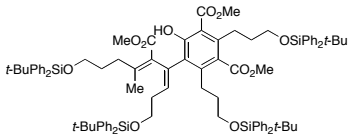
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	360
DUMMY	2
FREQU	33898.30 Hz
FLT	16850 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	28
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-130-3-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	571
CSPED	11 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 12:28:24 2009



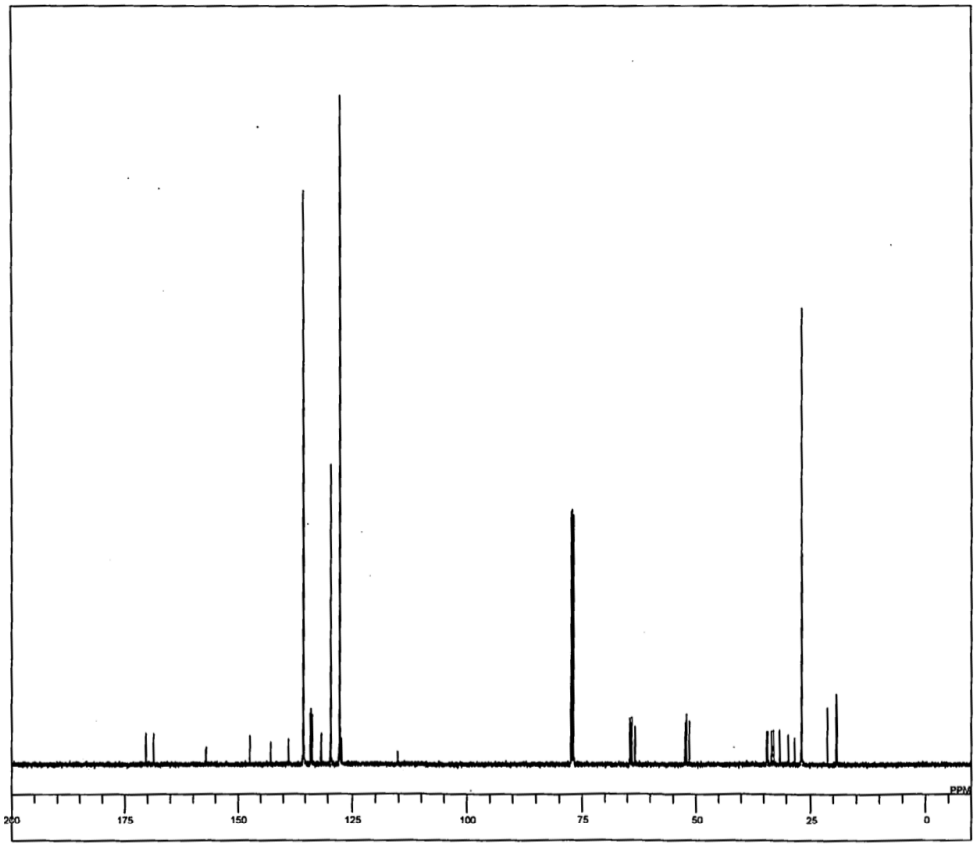
8g-(*E*)



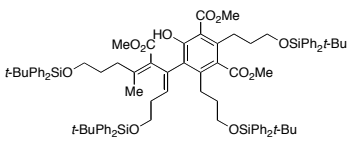
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	16
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	16
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-130-2-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	576
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 00:18:03 2009



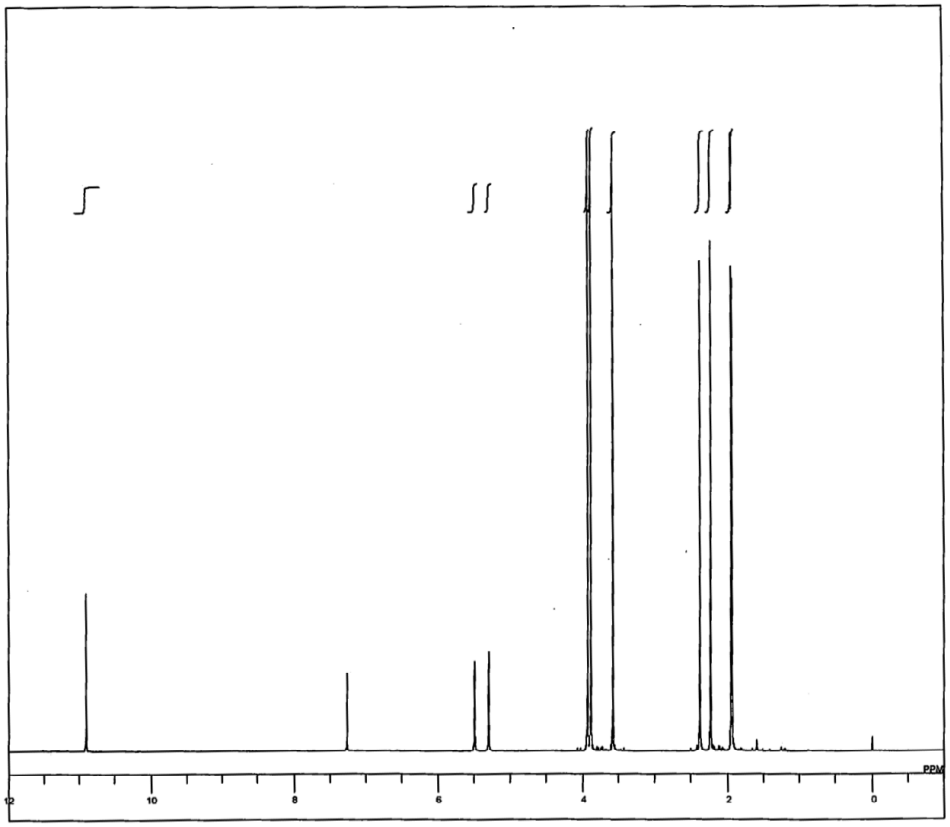
8g-(*Z*)



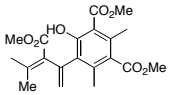
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	1012
DUMMY	1
FREQU	33698.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	29
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-130-2-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	353
LKSIG	559
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed May 13 01:08:56 2009



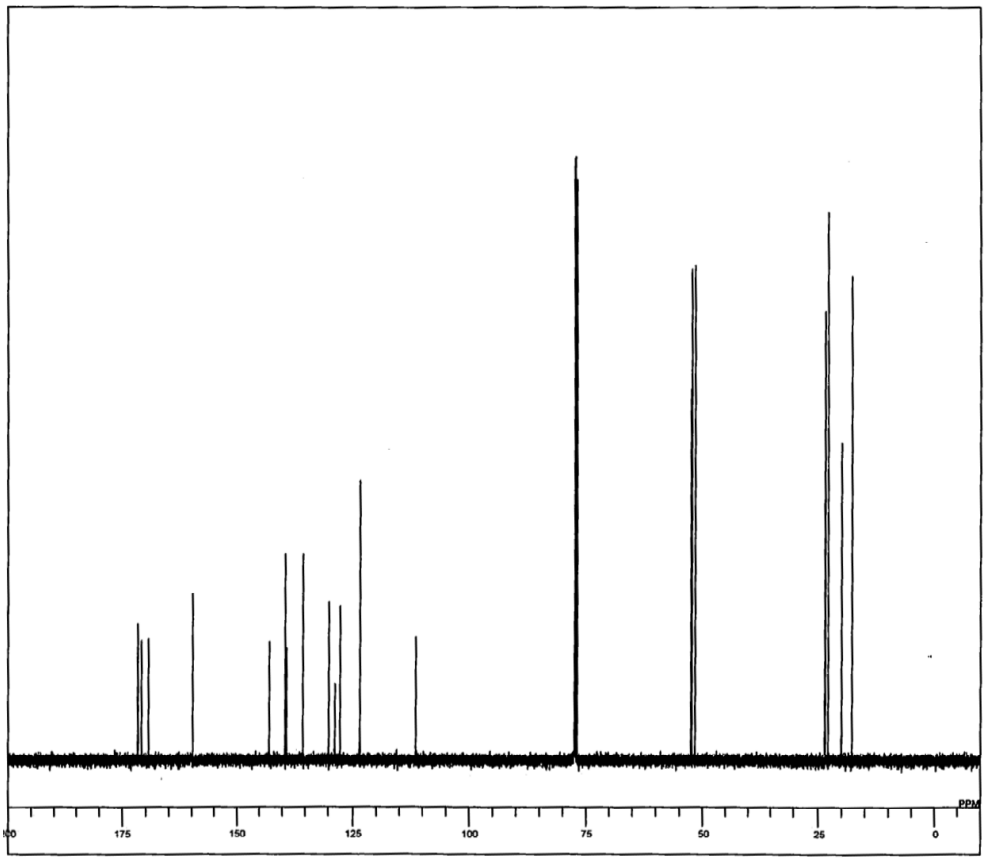
8g-(*Z*)



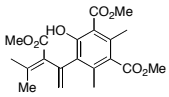
MENUF	non
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128250.00 Hz
PW1	6.10 usec
DEADT	56.95 usec
PREDL	10.00000 msec
IWT	0.5000 sec
POINT	32768
SPO	32768
TIMES	16
DUMMY	0
FREQU	9980.04 Hz
FLT	5000 Hz
DELAY	40.00 usec
ACQTM	3.2834 sec
PD	3.7166 sec
ADBIT	16
RGAIN	20
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-131-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	922
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 02:19:12 2009



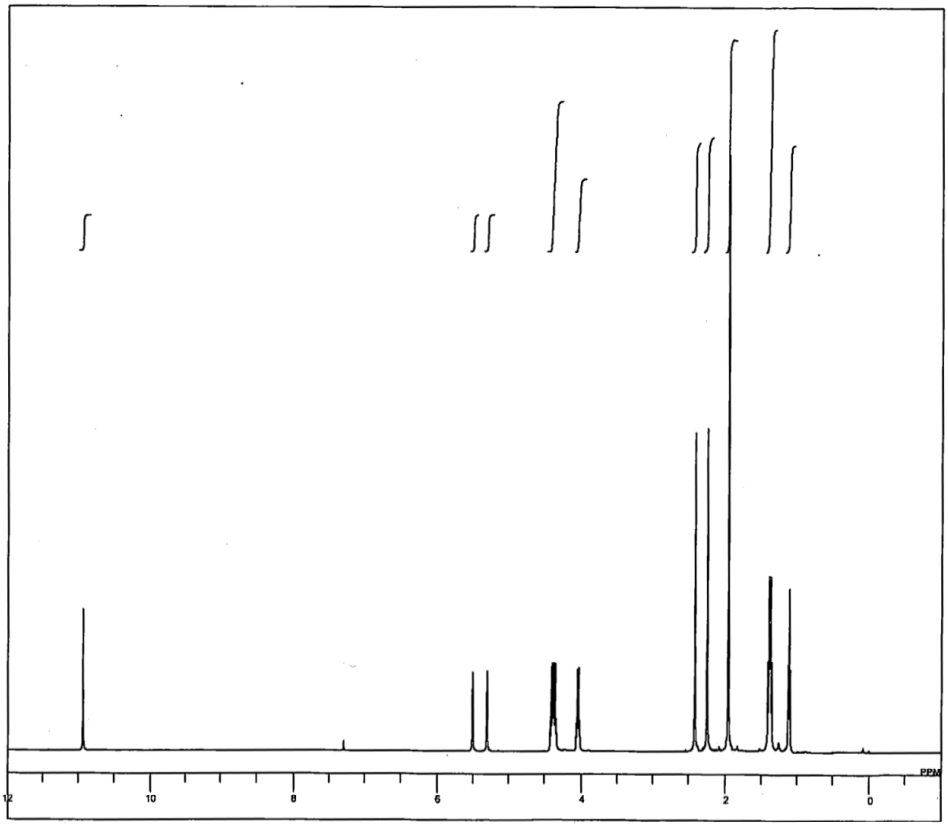
8h



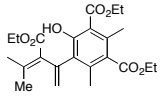
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	1536
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	31
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-131-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	923
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat May 16 03:36:21 2009



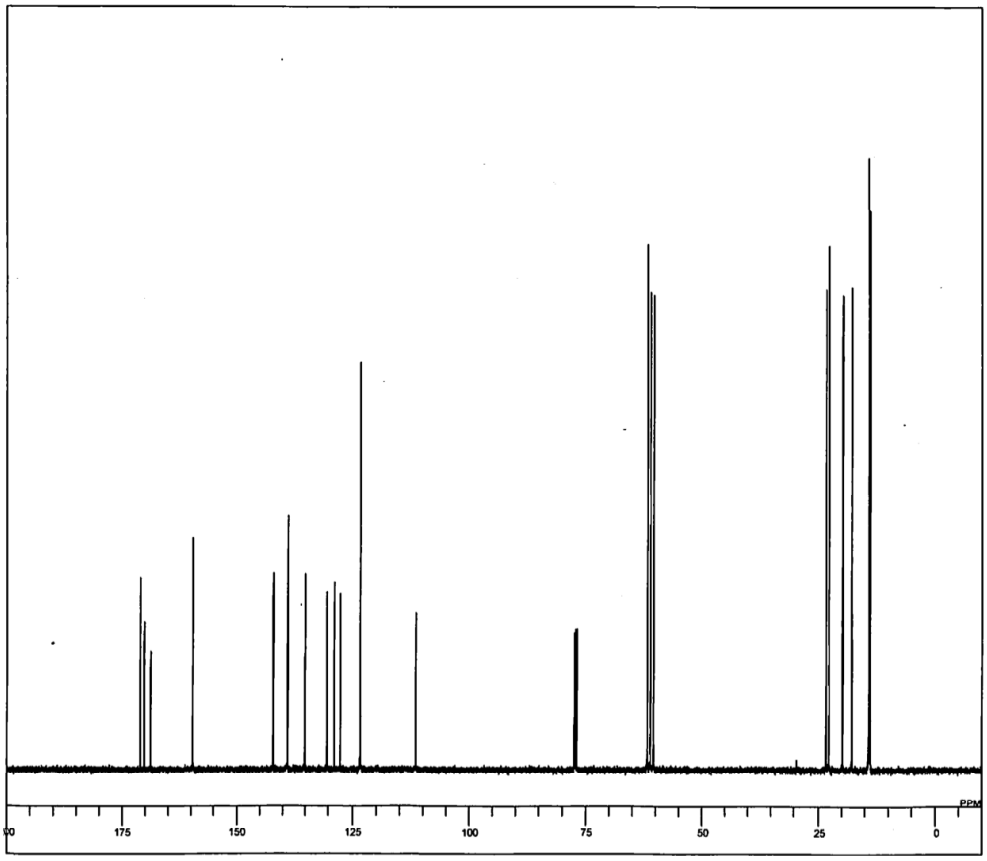
8h



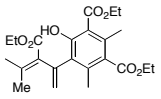
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	126885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	14
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-134-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	741
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon May 18 16:44:14 2009



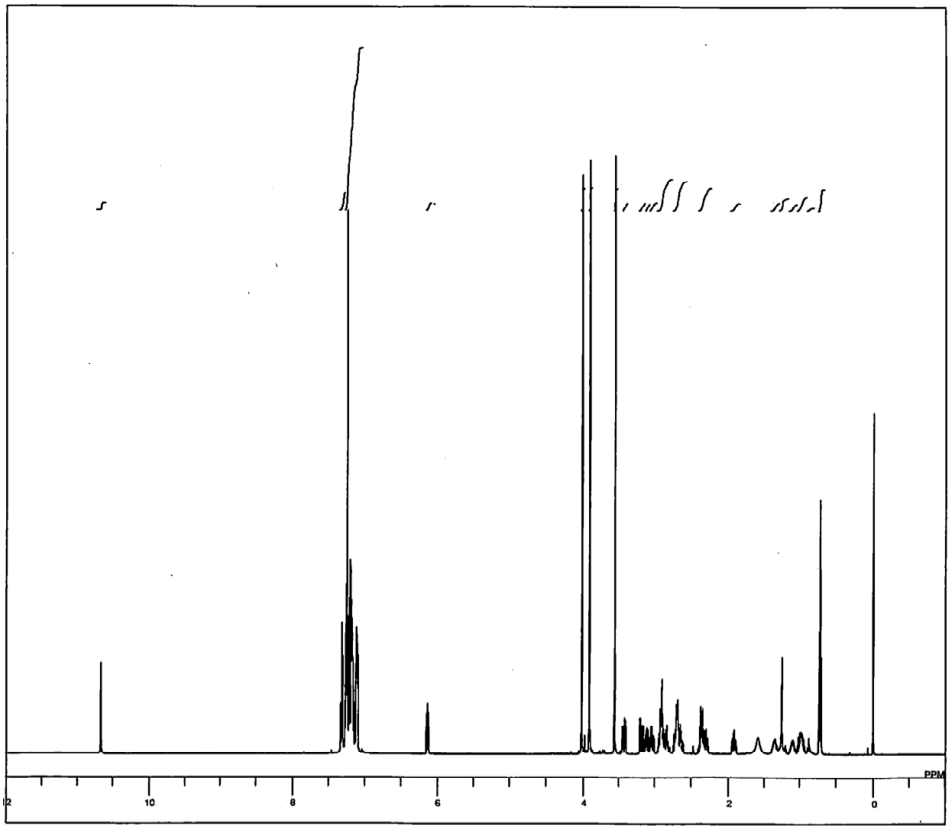
8i



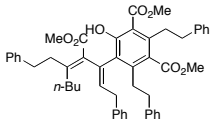
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	256
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	29
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-134-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	725
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Mon May 18 16:58:15 2009



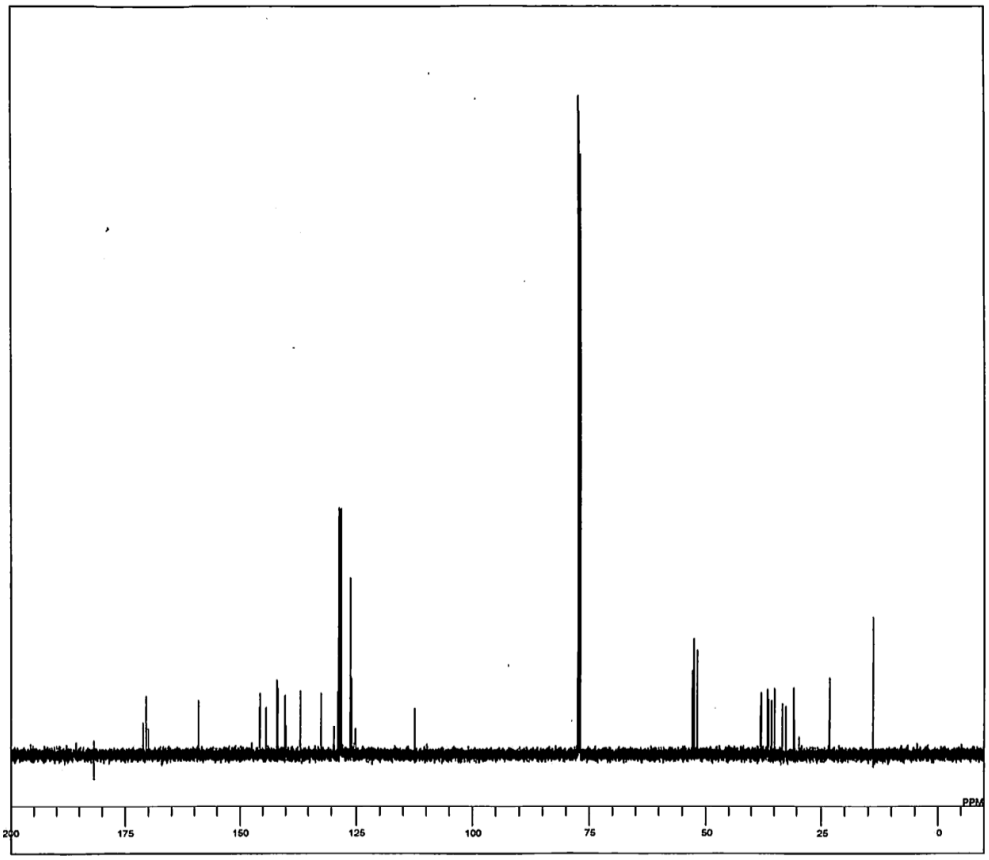
8i



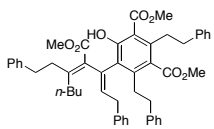
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	40
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	24
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-136-rev-fr.2-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	346
LKSIG	590
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Aug 20 11:11:28 2009



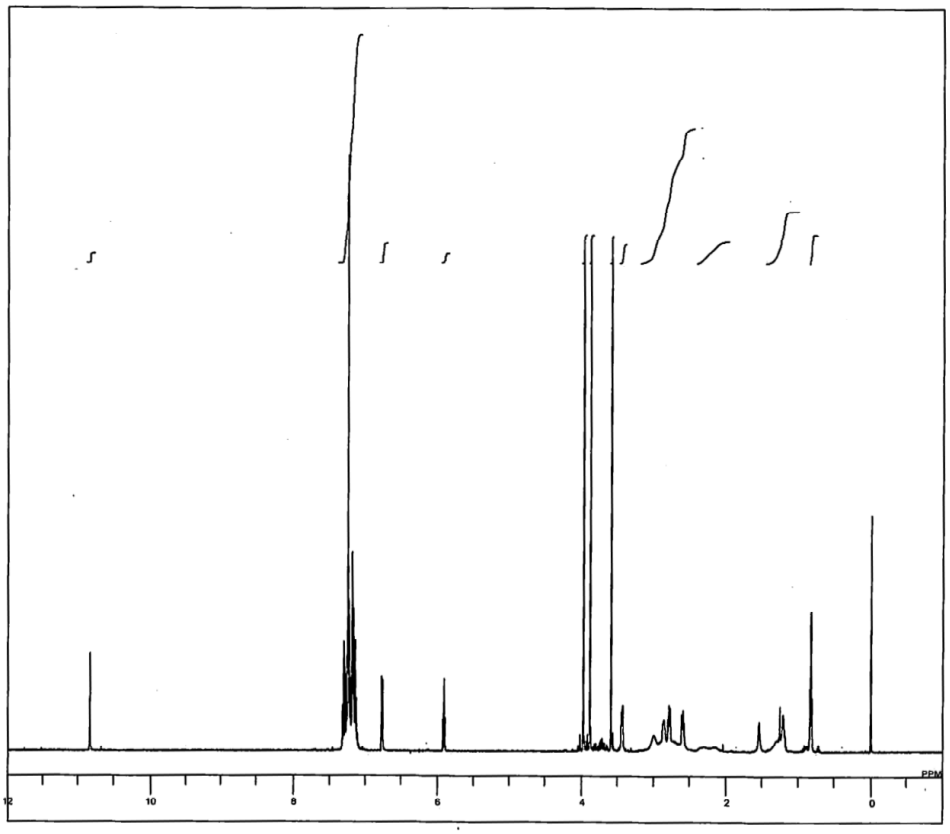
10-(*E*)



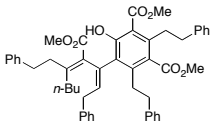
MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	1024
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-136-rev-fr.2-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	20
LKPHS	346
LKSIG	545
CSPED	10 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu Aug 20 12:57:14 2009



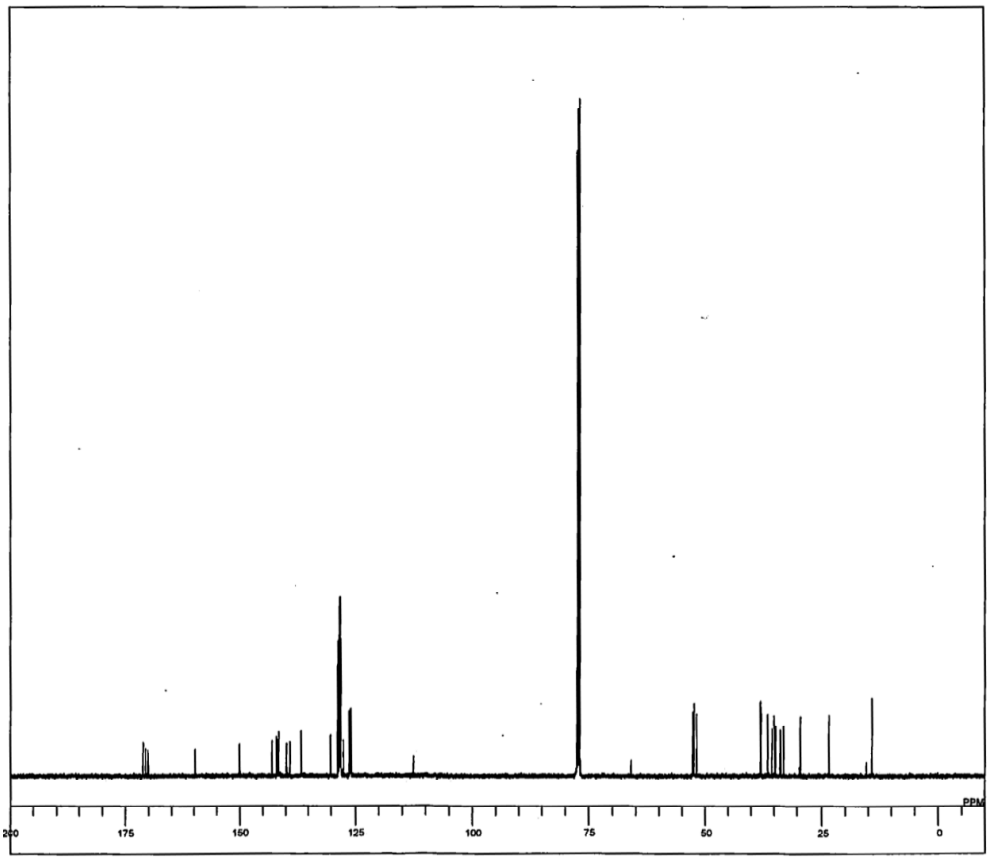
10-(*E*)



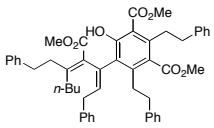
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	24
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-18-136-rev-fr.1-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	962
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Wed Aug 19 20:02:44 2009



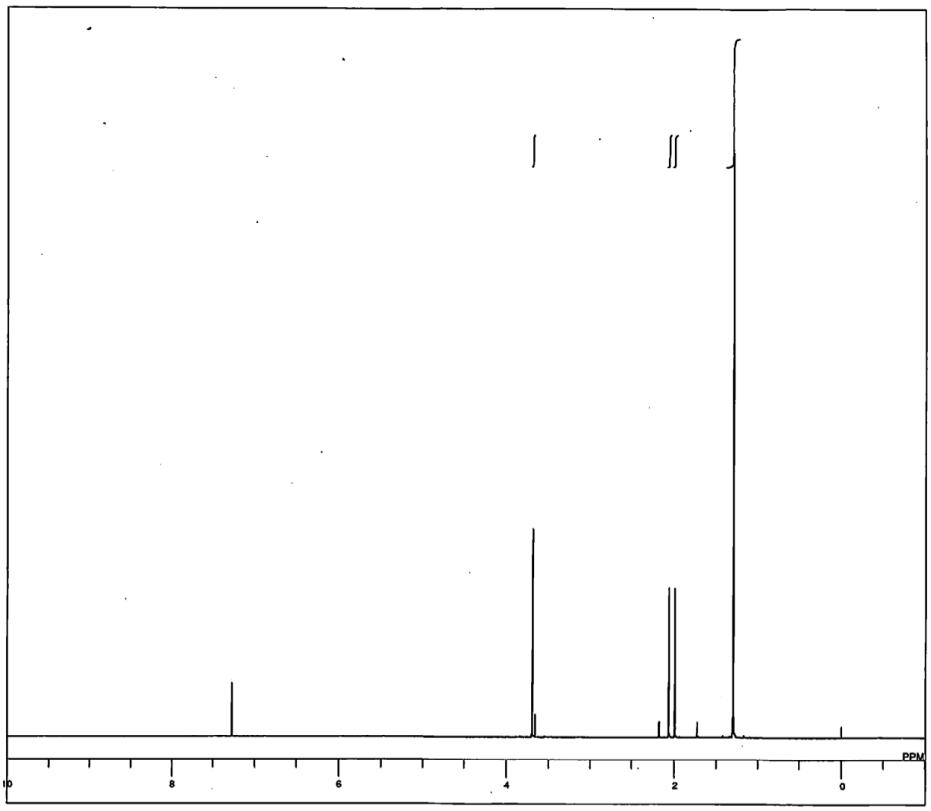
10-(*Z*)



MENUF	bcm
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	5.50 usec
DEADT	10.00 usec
PREDL	10.00000 msec
IWT	10.0000 sec
POINT	32768
SPO	32768
TIMES	6000
DUMMY	1
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	0.9667 sec
PD	2.0333 sec
ADBIT	16
RGAIN	30
BF	1.20 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	65 usec
IRATN	511
DFILE	yy-18-136-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	353
LKSIG	1093
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Thu May 21 06:03:06 2009

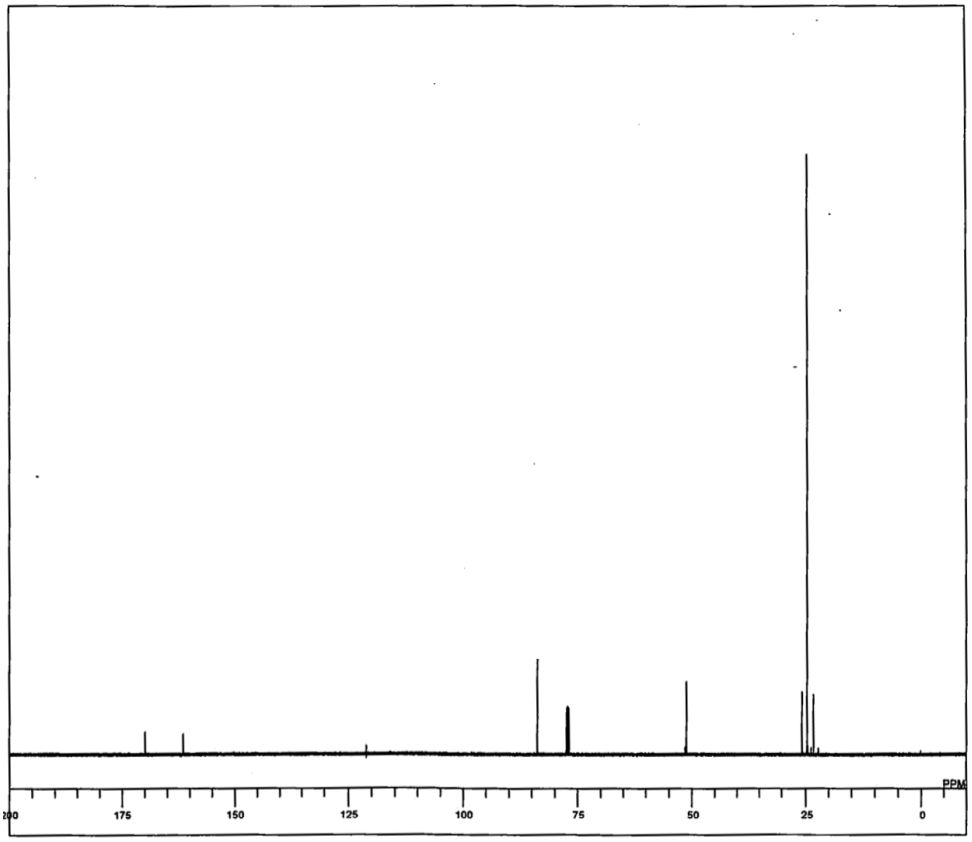


10-(*Z*)



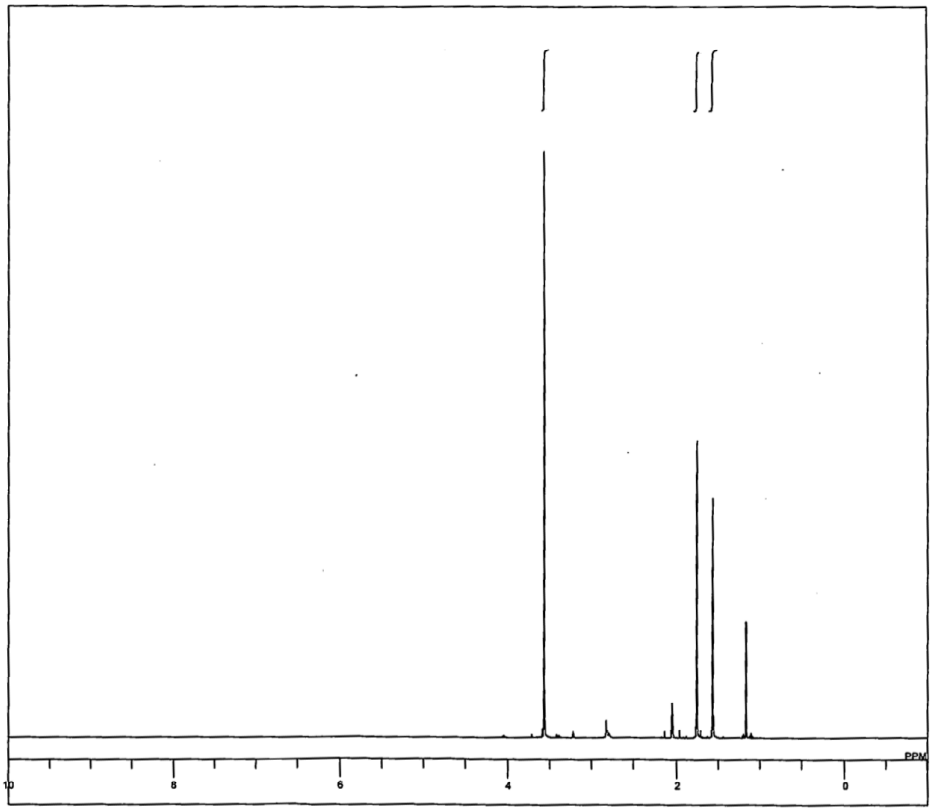
MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	8
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	17
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-70-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	879
CSPED	12 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat Aug 08 15:34:11 2009

S1



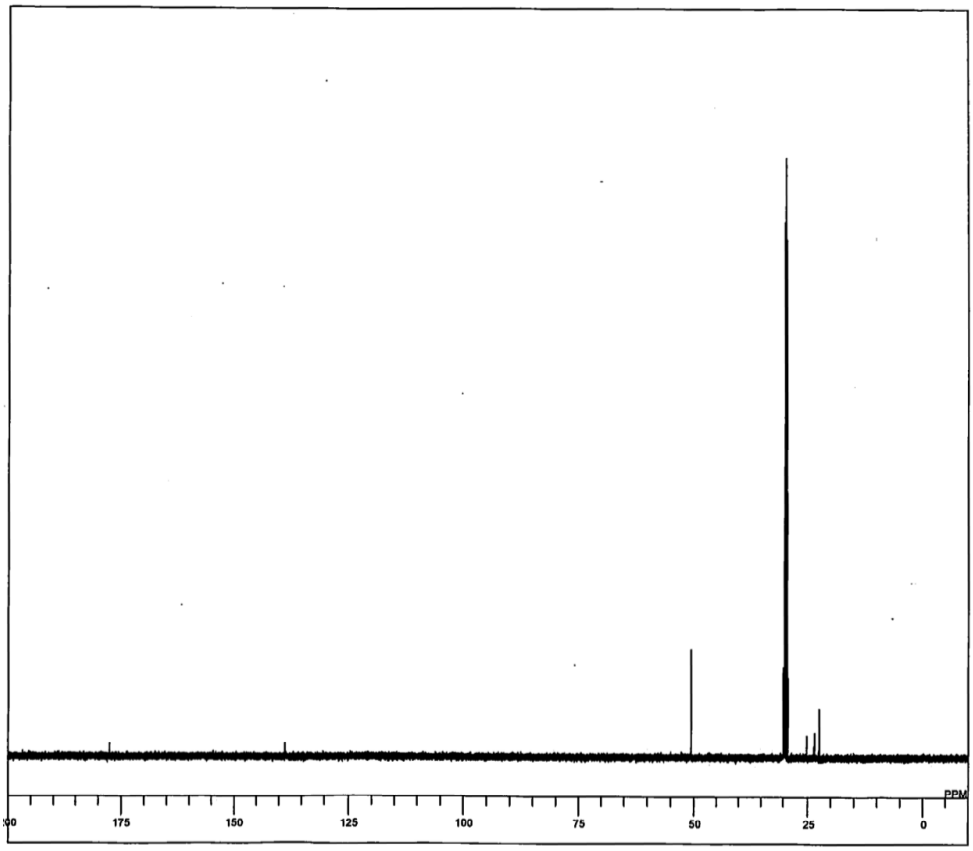
MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	360
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	30
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-70-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26934.0 Hz
LKLEV	200
LGAIN	22
LKPHS	346
LKSIG	879
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	CDCL3
DATIM	Sat Aug 08 15:48:03 2009

S1



MENUF	1H
OBNUC	1H
OFR	499.10 MHz
OBSET	0.00 KHz
OBFIN	128885.00 Hz
PW1	5.50 usec
DEADT	72.30 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	16
DUMMY	0
FREQU	8000.00 Hz
FLT	4000 Hz
DELAY	50.00 usec
ACQTM	8.1920 sec
PD	1.0000 sec
ADBIT	16
RGAIN	21
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	non
EXPCM	single pulse nondecoupling & nonpresaturation
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-82-1H.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26536.0 Hz
LKLEV	140
LGAIN	18
LKPHS	346
LKSIG	787
CSPED	13 Hz
FILDC	
FILDF	
SLVNT	ACETN
DATIM	Thu Aug 13 16:19:51 2009

11



MENUF	13C
OBNUC	13C
OFR	125.40 MHz
OBSET	0.00 KHz
OBFIN	143041.00 Hz
PW1	6.25 usec
DEADT	10.00 usec
PREDL	0.01000 msec
IWT	1000.0000 sec
POINT	65536
SPO	65536
TIMES	512
DUMMY	2
FREQU	33898.30 Hz
FLT	16950 Hz
DELAY	11.80 usec
ACQTM	1.9333 sec
PD	1.0670 sec
ADBIT	16
RGAIN	28
BF	0.12 Hz
T1	0.00
T2	0.00
T3	90.00
T4	100.00
EXMOD	bcm
EXPCM	single pulse with bilevel decoupling
IRNUC	1H
IFR	499.10 MHz
IRSET	0.00 KHz
IRFIN	128250.00 Hz
IRRPW	50 usec
IRATN	511
DFILE	yy-19-82-13C.als
SF	th5at
LKSET	0.00 KHz
LKFIN	26536.0 Hz
LKLEV	140
LGAIN	18
LKPHS	346
LKSIG	859
CSPED	14 Hz
FILDC	
FILDF	
SLVNT	ACETN
DATIM	Thu Aug 13 16:46:54 2009

11