

**Supporting information for**

**Total Syntheses of (*R*)-Strongyloidiols C and D**

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## 1. General Experimental Procedures

Melting points were obtained on a STUART-SMP3 Melt-Temp apparatus without correction. Optical rotations were measured on a PERKIN ELEMER 341 Polarimeter. NMR spectra were collected on a Bruker DP-X300 MHz spectrometer. Chemical shifts were reported in ppm relative to internal tetramethylsilane (TMS) for  $^1\text{H}$  NMR (TMS  $\delta$  = 0.00 ppm) and to  $\text{CDCl}_3$  for  $^{13}\text{C}$  NMR ( $\text{CDCl}_3$   $\delta$  = 77.00 ppm). High resolution mass spectra (HRMS) were recorded on an Agilent instrument using the TOF MS technique or a Waters LCT Premier with an ESI mass spectrometer. Enantiomeric excesses (ee) were determined on an Agilent 1200 HPLC system using an R&C OD, a Daicel Chiralcel OD-H, or a Phenomenex Lux Cellulose-1 chiral-phase column and elution with *n*-hexane and 2-propanol. All reactions were carried out under a dry argon atmosphere. Solvents were dried according to standard procedures and distilled before use. Unless otherwise stated, all chemicals were commercially available and used without further purification.

## 2. Experiment Procedures and Spectroscopic Data of the Products

**7-Bromoheptan-1-ol (4) (CAS 10160-24-4).**<sup>1</sup> To a mixture of heptane-1,7-diol (**3**) (26.4 g, 200 mmol) and toluene (600 mL) was added slowly concentrated hydrobromic acid (30.1 mL, 47% aqueous solution, 260 mmol). The resulting heterogeneous mixture was stirred and refluxed until complete consumption of  $\alpha,\omega$ -diol **3** monitored by TLC. The reaction mixture was cooled to room temperature and diluted with diethyl ether (400 mL). The organic phase was separated and washed with NaOH (120 mL, 1M). The aqueous phase was extracted with diethyl ether ( $3 \times 200$  mL). The combined organic phases were washed with brine (300 mL), dried over anhydrous  $\text{Na}_2\text{SO}_4$ , and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to furnish **4** (33.4 g, 86% yield) as a colorless oil.

<sup>1</sup> $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  3.64–3.63 (m, 2H), 3.41 (t,  $J$  = 6.8 Hz, 2H), 1.91–1.82 (m, 2H), 1.63–1.53 (m, 3H), 1.47–1.35 (m, 6H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  62.8, 33.9, 32.7, 32.6,

28.5, 28.0, 25.5; HRMS(APCI-TOF)  $m/z$  195.0382 [M+H]<sup>+</sup> (calcd for C<sub>7</sub>H<sub>16</sub>BrO, 195.0385).

These data match the literature data.<sup>2</sup>

**7-Bromoheptanoic acid (5) (CAS 30515-28-7).**<sup>3</sup> To a stirred solution of concentrated nitric acid (69 mL, 63%, 980 mmol),  $\omega$ -bromo alcohol **4** (31.2 g, 160 mmol) was added at room temperature over 1 h. After stirring for an additional 4 h at the same temperature, the reaction mixture was heated to 60 °C and maintained for 45 min. The reaction solution was cooled to room temperature and diluted with water (200 mL). The organic phase was separated and the aqueous phase was extracted with diethyl ether (3 × 300 mL). The combined organic layers were washed with brine (200 mL), dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 1:1) to afford **5** (31.7 g, 95% yield) as a white solid. mp 33–34 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 11.4 (br s, 1H), 3.44 (t, *J* = 6.8 Hz, 2H), 2.37 (t, *J* = 7.4 Hz, 2H), 1.91–1.82 (m, 2H), 1.71–1.61 (m, 2H), 1.52–1.32 (m, 4H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 180.3, 33.8, 33.6, 32.4, 28.0, 27.6, 24.3; HRMS(APCI-TOF)  $m/z$  209.0183 [M+H]<sup>+</sup> (calcd for C<sub>7</sub>H<sub>14</sub>BrO<sub>2</sub>, 209.0177). These data match the literature data.<sup>4</sup>

**Methyl 7-bromoheptanoate (6) (CAS 54049-24-0).**<sup>5</sup> To a stirred solution of  $\omega$ -bromo acid **5** (31.4 g, 150 mmol) and Et<sub>2</sub>O (450 mL) was added DCC (37.2 g, 180 mmol), DMAP (1.1 g, 9 mmol) and methanol (9.6 g, 300 mmol) in Et<sub>2</sub>O (30 mL) sequentially at room temperature. The resulting mixture was stirring for 12 h at the same temperature. The reaction mixture was filtered through a celite pad, and the filtrate was concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 40:1) to give **6** (30.5 g, 91% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 3.67 (s, 3H), 3.41 (t, *J* = 6.8 Hz, 2H), 2.32 (t, *J* = 7.4 Hz, 2H), 1.91–1.82 (m, 2H), 1.69–1.59 (m, 2H), 1.51–1.32 (m, 4H); <sup>13</sup>C NMR (75 MHz,

$\text{CDCl}_3$ )  $\delta_{\text{C}}$  173.7, 51.2, 33.7, 33.5, 32.3, 28.0, 27.6, 24.5. The NMR spectra of ester **6** match the literature data.<sup>6</sup>

**8-Bromo-2-methyloctan-2-ol (7) (CAS 1801676-32-3).**<sup>7</sup> To a solution of  $\omega$ -bromo ester **6** (26.7 g, 120 mmol) in anhydrous THF (240 mL),  $\text{MeMgBr}$  (120 mL, 3.0 M in diethyl ether, 360 mmol) was added at  $-20$  °C under argon. The reaction mixture was then warmed to room temperature, and stirred for 4 h. The reaction was quenched with saturated aqueous  $\text{NH}_4\text{Cl}$  (60 mL). The resulting mixture was diluted with diethyl ether (120 mL), and the layers were separated. The aqueous phase was extracted with diethyl ether ( $3 \times 200$  mL). The combined organic layers were dried over anhydrous  $\text{Na}_2\text{SO}_4$ , and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to furnish **7** (24.6 g, 92% yield) as a colorless oil.  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  3.41 (t,  $J = 6.9$  Hz, 2H), 1.91–1.80 (m, 2H), 1.50–1.45 (m, 4H), 1.44–1.32 (m, 5H), 1.21(s, 6H);  $^{13}\text{C}$  NMR (75 MHZ,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  70.7, 43.6, 33.8, 32.6, 29.13, 29.07, 28.0, 24.0; HRMS(APCI-TOF)  $m/z$  205.0588 [MH $^+$ - $\text{H}_2\text{O}]^+$  (calcd for  $\text{C}_9\text{H}_{18}\text{Br}$ , 205.0592).

**1-Bromo-7-methyloctane (8) (CAS 54088-99-2).**<sup>8,9a</sup> To a stirred solution of  $\omega$ -bromo alkohol **7** (24.5 g, 110 mmol) and toluene (300 mL) equipped with a Dean-Stark trap, was added *p*-toluenesulfonic acid monohydrate (1.14 g, 6.0 mmol) slowly. The reaction mixture was refluxed overnight and diluted with ethyl acetate (400 mL). The organic phase was washed with water (100 mL), dried over anhydrous  $\text{Na}_2\text{SO}_4$ , and concentrated under reduced pressure to afford the crude bromo alkene.

To a mixture of Pd/C (1.05 g, 10% dry, 1mmol) in ethanol (200 mL), the crude bromo alkene was added under hydrogen. The resulting mixture was stirring vigorously for 4 h at room temperature under hydrogen. The reaction mixture was filtered through a celite pad and the filtrate was concentrated under reduced pressure. The residue was purified by silica gel

chromatography (*n*-hexane) to afford **8** (19.6 g, 86% yield over two steps) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 3.41 (*t*, *J* = 6.9 Hz, 2H), 1.90–1.81 (m, 2H), 1.56–1.38 (m, 3H), 1.33–1.24 (m, 4H), 1.19–1.13 (m, 2H), 0.86 (d, *J* = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) δ<sub>C</sub> 38.9, 33.9, 32.8, 29.0, 28.2, 27.9, 27.2, 22.6. The NMR spectra of alkyl bromide **8** match the literature data.<sup>9b</sup>

**1-Iodo-7-methyloctane (9) (CAS 10266-06-5).**<sup>10</sup> To a solution of alkyl bromide **8** (20.7 g, 100 mmol) in acetone (300 mL) was added NaI (45.0 g, 300 mmol) partially. The reaction mixture was heated to reflux for 36 h. The reaction mixture was cooled to room temperature and filtered through a celite pad. The filtrate was concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane) to give **9** (24.9 g, 98% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 3.19 (*t*, *J* = 7.0 Hz, 2H), 1.87–1.77 (m, 2H), 1.56–1.47 (m, 1H), 1.41–1.34 (m, 2H), 1.32–1.19 (m, 4H), 1.16–1.12 (m, 2H), 0.86 (d, *J* = 6.7 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) δ<sub>C</sub> 38.9, 33.6, 30.5, 28.8, 27.9, 27.1, 22.6, 7.2.

**Dodec-2-yn-1-ol (11) (CAS 69064-46-6).**<sup>11</sup> To a stirred solution of HMPA (42 mL) in THF (150 mL), propargyl alcohol **10** (5.61 g, 100 mmol) was added at room temperature. The mixture solution was cooled to -78 °C under argon, *n*-butyllithium (80 mL, 2.5 M in *n*-hexane, 200 mmol) was added slowly. The resulting mixture was then warmed to -30 °C and stirred for 90 min. 1-Bromononane (22.8 g, 110 mmol) was added dropwise via syringe at the same temperature, and the reaction mixture was warmed to 25 °C. After stirring 12 h, the reaction was quenched with water (10 mL). The organic phase was separated, and the aqueous phase was extracted with ethyl acetate (3 × 40 mL). The combined organic phases were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to generate **11** (17.1 g, 94% yield) as a white solid. mp 32–33 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 4.27–4.23 (m, 2H), 2.24–2.18 (m, 2H), 1.96

(t,  $J = 6.0$  Hz, 1H), 1.55–1.46 (m, 2H), 1.39–1.27 (m, 12H), 0.88 (t,  $J = 6.6$  Hz, 3H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  86.5, 78.2, 51.2, 31.8, 29.4, 29.2, 29.1, 28.8, 28.6, 22.6, 18.7, 14.0; HRMS (APCI-TOF)  $m/z$  183.1756 [M+H] $^+$  (calcd for  $\text{C}_{12}\text{H}_{23}\text{O}$ , 183.1749). These data match the literature data.<sup>12</sup>

**2-(Dodec-11-yn-1-yloxy)tetrahydro-2H-pyran (12) (CAS 71084-07-6).**<sup>13,14</sup> To a solution of 1,3-diaminopropane (125 mL) was added sodium hydride (10.0 g, 60% in mineral oil, 250 mmol) at 0 °C. The resulting mixture was stirred for 30 min under argon, and was warmed to 70 °C. After stirring for additional 1 h, the mixture was cooled to room temperature, and alkynol **11** (9.1 g, 50 mmol) was added. The reaction mixture was maintained at 55 °C overnight and quenched with water (3 mL). The reaction mixture was extracted with ethyl acetate (3 × 50 mL). The combined organic phases were dried over anhydrous  $\text{Na}_2\text{SO}_4$  and concentrated under reduced pressure to afford the crude dodec-11-yn-1-ol, which was used in the next step without further purification.

To a solution of crude dodec-11-yn-1-ol (5.5 g, 30 mmol) and dihydropyran (3.0 g, 36 mmol) in  $\text{CH}_2\text{Cl}_2$  (90 mL) was added *p*-toluenesulfonic acid monohydrate (285 mg, 1.5 mmol). The resulting mixture was cooled to 0 °C and stirred for 12 h. The reaction solution was washed with saturated aqueous  $\text{Na}_2\text{CO}_3$  (90 mL) and the aqueous phase was extracted with  $\text{Et}_2\text{O}$  (3 × 120 mL). The combined organic layers were dried over anhydrous  $\text{Na}_2\text{SO}_4$ , and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 20:1) to furnish **12** (6.7 g, 84% yield) as a colorless oil.  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  4.58 (t,  $J = 3.6$  Hz, 1H), 3.87–3.84 (m, 1H), 3.77–3.69 (m, 1H), 3.52–3.48 (m, 1H), 3.42–3.34 (m, 1H), 2.21–2.15 (m, 2H), 1.94 (t,  $J = 2.6$  Hz, 1H), 1.84–1.82 (m, 1H), 1.75–1.70 (m, 1H), 1.62–1.52 (m, 8H), 1.50–1.29 (m, 12H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  98.8, 84.7, 68.0, 67.6, 62.2, 30.7, 29.7,

29.4, 29.38, 29.37, 29.0, 28.7, 28.4, 26.2, 25.5, 19.6, 18.3; HRMS (APCI-TOF)  $m/z$  267.2336 [M+H]<sup>+</sup> (calcd for C<sub>17</sub>H<sub>30</sub>O<sub>2</sub>, 267.2324). These data match the literature data.<sup>15</sup>

**2-((19-Methylicos-11-yn-1-yl)oxy)tetrahydro-2H-pyran (13) (CAS 1801676-22-1).<sup>16</sup>**

According to the similar procedure described above for alkynol **11**, the alkylation of terminal alkyne **12** (1.3 g, 5 mmol) with alkyl iodide **9** (1.9 g, 7.5 mmol) afforded **13** (1.78 g, 91% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 4.58 (t,  $J$  = 3.6 Hz, 1H), 3.88–3.84 (m, 1H), 3.77–3.69 (m, 1H), 3.52–3.48 (m, 1H), 3.42–3.34 (m, 1H), 2.16–2.11 (m, 4H), 1.83–1.70 (m, 2H), 1.60–1.41 (m, 11H), 1.37–1.26 (m, 18H), 1.19–1.14 (m, 2H), 0.86 (d,  $J$  = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 98.8, 80.2, 67.6, 62.3, 39.0, 30.8, 29.7, 29.53, 29.47, 29.45, 29.40, 29.2, 29.1, 28.9, 28.8, 27.9, 27.3, 26.2, 25.5, 22.6, 19.7, 18.7; HRMS (APCI-TOF)  $m/z$  393.3724 [M+H]<sup>+</sup> (calcd for C<sub>26</sub>H<sub>49</sub>O<sub>2</sub>, 393.3733).

**19-Methylicos-11-yn-1-ol (14) (CAS 1801676-23-2).<sup>17</sup>** To a solution of THP ether **13** (7.8 g, 20 mmol) in methanol (60 mL) was added *p*-toluenesulfonic acid monohydrate (380 mg, 2 mmol). After stirring for 4 h at room temperature, the reaction solution was concentrated under reduced pressure. The residue was purified by flash chromatography on silica gel (*n*-hexane/ethyl acetate 5:1) to obtain **14** (6.1 g, 98% yield) as a white solid. mp 29–30 °C; <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 3.64 (t,  $J$  = 6.3 Hz, 2H), 2.16–2.11 (m, 4H), 1.69–1.26 (m, 26H), 1.19–1.14 (m, 2H), 0.86 (d,  $J$  = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 80.24, 80.19, 63.0, 39.0, 32.8, 29.6, 29.46, 29.41, 29.2, 29.1, 28.9, 28.8, 27.9, 27.3, 25.7, 22.6, 18.7; HRMS (ESI)  $m/z$  309.3148 [M+H]<sup>+</sup> (calcd for C<sub>21</sub>H<sub>41</sub>O, 309.3157).

**(Z)-19-Methylicos-11-en-1-ol (15) (CAS 1801676-24-3).<sup>18</sup>** To a stirred mixture of Ni(OAc)<sub>2</sub>·4H<sub>2</sub>O (3.76 g, 15 mmol) in ethanol (30 mL) was added NaBH<sub>4</sub> (0.58 g, 15 mmol) in ethanol (15 mL) at room temperature under hydrogen. The mixture was stirred for 60 min and ethylenediamine (3.61 g, 60 mmol) and alkynol **14** (4.62 g, 15 mmol) were added sequentially.

After stirring for 4 h at the same temperature, the reaction mixture was concentrated and diluted with 10% ethyl acetate in *n*-hexane (15 mL). The resulting mixture was filtered through a celite pad, and the filtrate was concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to furnish **15** (4.56 g, 98% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 5.40–5.33 (m, 2H), 3.62–3.61 (m, 2H), 2.02–1.98 (m, 4H), 1.58–1.45 (m, 3H), 1.28–1.12 (m, 25H), 0.86 (d, *J* = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) δ<sub>C</sub> 129.84, 129.80, 62.9, 39.0, 32.7, 29.8, 29.7, 29.6, 29.5, 29.4, 29.31, 29.27, 27.9, 27.4, 27.2, 25.7, 22.6; HRMS (APCI-TOF) *m/z* 311.3302 [M+H]<sup>+</sup> (calcd for C<sub>21</sub>H<sub>43</sub>O, 311.3314).

**(Z)-19-Methylicos-11-enal (16) (CAS 1801676-25-4).**<sup>19</sup> To a stirred solution of enol **15** (3.10 g, 10 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (30 mL) was added iodobenzene diacetate (3.54 g, 11 mmol). The resulting mixture was cooled to 0 °C, and the solution of 2,2,6,6-tetramethyl-1-piperidinyloxy (TEMPO) (172 mg, 1.1 mmol) in CH<sub>2</sub>Cl<sub>2</sub> (2 mL) was added slowly. The reaction mixture was warmed to room temperature and stirred until complete consumption of enol **15** was monitored by TLC. The reaction was quenched with saturated aqueous Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> (20 mL). The organic phase was separated, and the aqueous phase was extracted with CH<sub>2</sub>Cl<sub>2</sub> (3 × 40 mL). The combined organic phases were washed with water (30 mL) and brine (30 mL), dried over anhydrous MgSO<sub>4</sub> and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 10:1) to afford **16** (3.02 g, 98% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 9.77 (t, *J* = 1.8 Hz, 1H), 5.41–5.30 (m, 2H), 2.45–2.40 (m, 2H), 2.05–1.99 (m, 4H), 1.66–1.46 (m, 3H), 1.29–1.06 (m, 22H), 0.87 (d, *J* = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) δ<sub>C</sub> 202.6, 129.8, 129.7, 43.8, 39.0, 29.8, 29.71, 29.69, 29.4, 29.3, 29.29, 29.2, 29.1, 27.9, 27.3, 27.15, 27.13, 22.6, 22.0; HRMS (APCI-TOF) *m/z* 309.3172 [M+H]<sup>+</sup> (calcd for C<sub>21</sub>H<sub>41</sub>O, 309.3157).

**(R,Z)-21-Methyl-1-(trimethylsilyl)docos-13-en-1-yn-3-ol (17) (CAS 1801676-26-5).**<sup>20</sup> To a solution of the (S,S)-ProPhenol ligand (63.9 mg, 0.10 mmol, 0.20 equiv) and P(O)Ph<sub>3</sub> (55.6 mg, 0.20 mmol, 0.40 equiv) in toluene (3 mL), trimethylsilylacetylene (148 mg, 1.50 mmol, 3 equiv) was added slowly at 0 °C under argon. A solution of Me<sub>2</sub>Zn (1.3 mL, 1.2 M in toluene, 1.5 mmol, 3 equiv) was then added via syringe. After stirring for 2 h at 25 °C, the mixture was cooled to 0 °C and olefinic aldehyde **16** (154 mg, 0.50 mmol, 1 equiv) was added. The reaction mixture was stirring for additional 48 h at the same temperature, and quenched with saturated aqueous NH<sub>4</sub>Cl solution (5 mL). The organic phase was separated, and the aqueous phase was extracted with diethyl ether (3 × 10 mL). The combined organic layers were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to give **17** (151 mg, 74% yield, 84% ee, measured on chiral-phase HPLC analysis of its 3,5-dinitrobenzoate **18**) as a colorless oil.  $[\alpha]_D^{20} +1.0$  (*c* 1.1, CHCl<sub>3</sub>); <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 5.43–5.33 (m, 2H), 4.38 (dd, *J* = 12.2, 6.5 Hz, 1H), 2.20–2.01 (m, 4H), 1.86–1.83 (m, 1H), 1.76–1.65 (m, 2H), 1.59–1.45 (m, 3H), 1.32–1.15 (m, 22H), 0.89 (d, *J* = 6.6 Hz, 6H), 0.20 (s, 9H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 129.87, 129.83, 107.0, 89.2, 62.8, 39.0, 37.7, 29.79, 29.75, 29.5, 29.49, 29.48, 29.32, 29.29, 29.2, 27.9, 27.4, 27.2, 25.1, 22.6, –0.14; HRMS (APCI-TOF) *m/z* 407.3701 [M+H]<sup>+</sup> (calcd for C<sub>26</sub>H<sub>51</sub>OSi, 407.3709).

**(R,Z)-21-Methyl-1-(trimethylsilyl)docos-13-en-1-yn-3-yl 3,5-dinitrobenzoate (18) (CAS 1801676-28-7).**<sup>21</sup> To a stirred solution of chiral propargyl alcohol **17** (203 mg, 0.50 mmol) and Et<sub>3</sub>N (152 mg, 1.50 mmol) in dry CH<sub>2</sub>Cl<sub>2</sub> (5 mL), 3,5-dinitrobenzoyl chloride (138 mg, 0.60 mmol) was added slowly at 0 °C. The reaction mixture was warmed to room temperature and stirred until complete consumption of **17** monitored by TLC. The reaction was quenched with water (5 mL), and the organic phase was separated. The aqueous phase was extracted with CH<sub>2</sub>Cl<sub>2</sub> (3 × 15 mL). The combined organic phases were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-

hexane/ethyl acetate 40:1) to furnish **18** (288 mg, 96% yield, 84% ee) as a white solid. Slow recrystallization of **18** from *n*-hexane-diethyl ether (5:1) improved optical purity to 99% and afforded **18** (158 mg, 55% yield) as white crystals. mp 73–74 °C. Enantiomeric excess was determined by HPLC with a Daicel Chiralcel OD-H column (10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm); major (*R*)-enantiomer  $t_r$  = 6.46 min, minor (*S*)-enantiomer  $t_r$  = 7.72 min.  $[\alpha]_D^{20} +10.7$  (*c* 1.3,  $\text{CHCl}_3$ );  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  9.23 (d,  $J$  = 2.0 Hz, 1H), 9.18 (d,  $J$  = 2.0 Hz, 2H), 5.70 (t,  $J$  = 6.6 Hz, 1H), 5.36–5.33 (m, 2H), 2.02–1.92 (m, 6H), 1.55–1.16 (m, 25H), 0.86 (d,  $J$  = 6.6 Hz, 6H), 0.19 (s, 9H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  161.5, 148.7, 133.8, 129.9, 129.8, 129.6, 122.4, 101.2, 92.2, 67.3, 39.0, 34.8, 29.79, 29.74, 29.67, 29.5, 29.4, 29.37, 29.32, 29.3, 29.0, 27.9, 27.3, 27.2, 25.0, 22.6, 1.0; HRMS (APCI-TOF)  $m/z$  600.3578 [M]<sup>−</sup> (calcd for  $\text{C}_{33}\text{H}_{52}\text{N}_2\text{O}_6\text{Si}$ , 600.3595).

**(*R,Z*)-21-Methyldocos-13-en-1-yn-3-ol (19) (CAS 1801676-30-1).**<sup>22</sup> To a stirred solution of **18** (300 mg, 0.50 mmol) in methanol (5 mL),  $\text{K}_2\text{CO}_3$  (346 mg, 2.50 mmol) was added at room temperature. The reaction mixture was maintained at the same temperature until complete consumption of **18** monitored by TLC. The reaction mixture was diluted with water (5 mL), and extracted with  $\text{Et}_2\text{O}$  (3 × 10 mL). The combined organic phases were washed with brine (30 mL), dried over anhydrous  $\text{Na}_2\text{SO}_4$ , and concentrated under reduced pressure. The residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 5:1) to obtain **19** (164 mg, 98% yield) as a colorless oil.  $[\alpha]_D^{20} +1.6$  (*c* 1.0,  $\text{CHCl}_3$ );  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  5.40–5.30 (m, 2H), 4.40–4.33 (m, 1H), 2.46 (d,  $J$  = 2.1 Hz, 1H), 2.05–1.98 (m, 4H), 1.78–1.67 (m, 3H), 1.57–1.41 (m, 3H), 1.29–1.12 (m, 22H), 0.86 (d,  $J$  = 6.6 Hz, 6H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  129.89, 129.83, 85.1, 72.7, 62.3, 39.0, 37.6, 29.79, 29.75, 29.53, 29.50, 29.3, 29.27, 29.22, 27.9, 27.4, 27.2, 25.0, 22.6; HRMS (APCI-TOF)  $m/z$  335.3313 [M+H]<sup>+</sup> (calcd for  $\text{C}_{23}\text{H}_{43}\text{O}$ , 335.3314).

**(R,Z)-Methyl 4-hydroxy-22-methyltricos-14-en-2-ynoate (17') (new compound).**<sup>23</sup> To a solution of the (S,S)-ProPhenol ligand (127.6 mg, 0.20 mmol, 0.20 equiv) and P(O)Ph<sub>3</sub> (111.2 mg, 0.40 mmol, 0.40 equiv) in toluene (1 mL) was added methyl propiolate (84 mg, 1.0 mmol, 1 equiv) at 0 °C under argon. A solution of Me<sub>2</sub>Zn (2.5 mL, 1.2 M in toluene, 3 mmol, 3 equiv) was then added via syringe. After stirred for 1.5 h at 0 °C, the mixture was cooled to –10 °C and a solution of aldehyde **16** (308 mg, 1.0 mmol, 1 equiv) in toluene (2 mL) was added slowly via auto-syringe over 15 h. The reaction mixture was stirring for additional 30 min at the same temperature, and quenched with saturated NH<sub>4</sub>Cl aqueous solution (3 mL). The organic phase was separated, and the aqueous phase was extracted with diethyl ether (3 × 5 mL). The combined organic layers were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, concentrated under reduced pressure. The residue was purified by silica gel chromatography (petroleum ether/ethyl acetate 10:1) to furnish **17'** (0.278 g, 71% yield, 99% ee) as a colorless oil. Enantiomeric excess were determined by HPLC with a Phenomenex Lux Cellulose-1 column (1% 2-propanol in *n*-hexane, 1 mL/min, 220 nm) analysis; major (*R*)-enantiomer *t*<sub>r</sub> = 25.62 min, minor (*S*)-enantiomer *t*<sub>r</sub> = 29.22 min. [α]<sub>D</sub><sup>20</sup> – 1.32 (*c* 0.84, CHCl<sub>3</sub>). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ<sub>H</sub> 5.39–5.34 (m, 2H), δ 4.49 (dd, *J* = 11.8, 6.3 Hz, 1H), 3.79 (s, 3H), 2.24 (d, *J* = 5.3 Hz, 1H), 2.04–1.99 (m, 4H), 1.79–1.73 (m, 2H), 1.55–1.23 (m, 23 H), 1.16–1.13 (m, 2H), 0.86 (d, *J* = 6.7 Hz, 6H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ<sub>C</sub> 153.8, 129.9, 129.8, 88.3, 76.2, 62.1, 52.8, 39.0, 36.8, 29.79, 29.74, 29.5, 29.4, 29.3 29.27, 29.1, 27.9, 27.4, 27.2, 24.9, 22.6. HRMS (ESI) *m/z* 393.3356 [M+H]<sup>+</sup> (calcd for C<sub>25</sub>H<sub>45</sub>O<sub>3</sub>, 393.3369).

**Decarboxylation of 17' to (R,Z)-21-Methyldocos-13-en-1-yn-3-ol (19).**<sup>24</sup> To a solution of **17'** (196 mg, 0.50 mmol) in THF (4 mL) was added LiOH aqueous solution (1.5 mL, 1.0 M, 1.5 mmol). The reaction solution was stirred for 12 h at room temperature, and diluted with ethyl acetate (8 mL) and water (4 mL). Sodium bisulfate aqueous solution (2 mL, 1.0 M, 2 mmol) was then added to quench the reaction. The organic phase was separated, and the aqueous phase was

extracted with ethyl acetate ( $3 \times 10\text{mL}$ ). The combined organic phases were dried over anhydrous  $\text{Na}_2\text{SO}_4$ , concentrated under reduced pressure to afford the crude acid as a brown oil.

To a solution of crude acid in acetonitrile (8 mL) was added  $\text{CuCl}$  (119 mg, 1.2 mmol) in one portion. The reaction mixture was stirred at room temperature until starting material disappeared monitored by TLC. The reaction mixture was diluted with ethyl acetate (10 mL) and water (4 mL). The resulting mixture was acidified to  $\text{pH}=1$  with  $\text{HCl}$  aqueous solution (1.0 M). The organic phase was separated and the aqueous layer was extracted with ethyl acetate ( $3 \times 10\text{mL}$ ). The combined organic phases were dried over anhydrous  $\text{Na}_2\text{SO}_4$ , concentrated under reduced pressure. The residue was purified by silica gel chromatography (petroleum ether/ethyl acetate 6:1) to furnish chiral enynic alcohol **19** as a colorless oil (122 mg, 73% yield over two steps). The spectroscopic data and specific rotation were consistent with those of **19** derived from 3,5-dinitrobenzoate **18**.

**(R,Z)-24-methylpentacosa-16-en-2,4-diyne-1,6-diyyl bis(4-bromobenzoate) (1') (new compound).** To a stirred solution of (*R*)-strongyloidiol C (**1**) (78 mg, 0.20 mmol), 4-bromobenzoyl chloride (131 mg, 0.60 mmol) and a solution of  $\text{Et}_3\text{N}$  (121 mg, 1.20 mmol) in dry  $\text{CH}_2\text{Cl}_2$  (3 mL) were added at 0 °C. The resulting mixture was stirred at room temperature until complete consumption of **1** monitored by TLC. The reaction mixture was concentrated and the residue was purified by silica gel chromatography (*n*-hexane/ethyl acetate 40:1) to afford **1'** (148 mg, 98% yield, 99% ee) as a colorless oil. Enantiomeric excess were determined by HPLC with a R&C OD column (5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm) analysis; minor (*S*)-enantiomer  $t_r = 11.77$  min, major (*R*)-enantiomer  $t_r = 13.03$  min.  $[\alpha]_D^{20} -26.1$  ( $c$  0.51,  $\text{CHCl}_3$ );  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  7.92–7.88 (m, 4H), 7.59 (d,  $J = 8.6$  Hz, 4H), 5.62 (t,  $J = 6.6$  Hz, 1H), 5.36–5.33 (m, 2H), 4.97 (s, 2H), 2.02–1.98 (m, 4H), 1.95–1.87 (m, 2H), 1.56–1.45 (m, 3H), 1.28–1.14 (m, 22H), 0.86 (d,  $J = 6.6$  Hz, 6H);  $^{13}\text{C}$  NMR (75 MHZ,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  164.9, 164.6,

131.82, 131.76, 131.29, 131.26, 129.91, 129.80, 128.7, 128.5, 128.1, 77.1, 73.4, 70.8, 69.4, 64.9, 53.0, 39.0, 34.5, 29.78, 29.74, 29.73, 29.5, 29.4, 29.3, 29.2, 29.0, 27.9, 27.3, 27.19, 27.17, 24.9, 22.6; HRMS (APCI-TOF)  $m/z$  755.2276 [M+2+H]<sup>+</sup> (calcd for C<sub>40</sub>H<sub>51</sub>Br<sub>2</sub>O<sub>4</sub>, 755.2311).

**19-Methylicos-11-ynal (20) (CAS 1808293-42-6).**<sup>19</sup> According to the similar procedure described above for olefinic aldehyde **16**, alkynol **14** (3.08 g, 10 mmol) was converted to acetylenic aldehyde **20** (3.00 g, 98% yield) as a colorless oil. <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$  9.76 (t, *J* = 1.7 Hz, 1H), 2.45–2.39 (m, 2H), 2.16–2.11 (m, 4H), 1.68–1.47 (m, 2H), 1.45–1.26 (m, 21H), 1.19–1.12 (m, 2H), 0.86 (d, *J* = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 202.7, 80.2, 80.1, 43.9, 39.0, 29.4, 29.3, 29.14, 29.10, 29.06, 29.04, 28.9, 28.8, 27.9, 27.3, 22.6, 22.1, 18.7; HRMS (APCI-TOF)  $m/z$  307.2955 [M+H]<sup>+</sup> (calcd for C<sub>21</sub>H<sub>39</sub>O, 307.3001).

**(R)-21-Methyl-1-(trimethylsilyl)docosa-1,13-diyn-3-ol (21) (CAS 1808293-43-7).**<sup>20</sup> According to the similar procedure described above for chiral propargyl alcohol **17**, the asymmetric addition of trimethylsilylacetylene (148 mg, 1.50 mmol, 3 equiv) to acetylenic aldehyde **20** (153 mg, 0.50 mmol, 1 equiv) gave chiral propargyl alcohol **21** (0.158 g, 78% yield, 85% ee, measured on chiral-phase HPLC analysis of its 3,5-dinitrobenzoate **22**) as a colorless oil.  $[\alpha]_D^{20}$  +0.67 (c 1.0, CHCl<sub>3</sub>); <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 4.35 (dd, *J* = 12.1, 6.5 Hz, 1H), 2.19–2.11 (m, 4H), 1.81 (d, *J* = 5.5 Hz, 1H), 1.73–1.65 (m, 2H), 1.56–1.26 (m, 23H), 1.19–1.12 (m, 2H), 0.86 (d, *J* = 6.6 Hz, 6H), 0.18 (s, 9H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 107.0, 89.3, 80.23, 80.2, 62.9, 39.0, 37.7, 29.45, 29.41, 29.19, 29.17, 29.13, 28.9, 28.8, 27.9, 27.3, 22.63, 22.61, 18.7, –0.13; HRMS (APCI-TOF)  $m/z$  405.3544 [M+H]<sup>+</sup> (calcd for C<sub>26</sub>H<sub>49</sub>OSi, 405.3553).

**(R)-21-Methyl-1-(trimethylsilyl)docosa-1,13-diyn-3-yl 3,5-dinitrobenzoate (22) (CAS 1808293-44-8).**<sup>21</sup> According to the similar procedure described above for 3,5-dinitrobenzoate **18**, chiral propargyl alcohol **21** (202 mg, 0.50 mmol) was converted to 3,5-dinitrobenzoate **22** (287 mg, 96% yield, 85% ee) as a white solid. Slow recrystallization of **22** from *n*-hexane-diethyl

ether (5:1) improved optical purity to 99% and afforded **22** (166 mg, 58% yield) as white crystals. mp 83–84 °C. Enantiomeric excess was determined by HPLC with a Daicel Chiralcel OD-H column (10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm) analysis; major (*R*)-enantiomer  $t_r$  = 7.28 min, minor (*S*)-enantiomer  $t_r$  = 8.65 min.  $[\alpha]_D^{20} +8.6$  (*c* 1.3,  $\text{CHCl}_3$ );  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  9.25–9.23 (m, 1H), 9.19 (d,  $J$  = 2.1 Hz, 2H), 5.69 (t,  $J$  = 6.8 Hz, 1H), 2.13 (t,  $J$  = 6.9 Hz, 4H), 1.96–1.91 (m, 2H), 1.54–1.43 (m, 6H), 1.37–1.25 (m, 17H), 1.18–1.14 (m, 2H), 0.86 (d,  $J$  = 6.6 Hz, 6H), 0.19 (s, 9H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  161.5, 148.7, 133.8, 129.5, 122.4, 101.1, 92.1, 80.2, 80.1, 67.2, 38.9, 34.8, 29.38, 29.34, 29.31, 29.13, 29.12, 29.1, 29.0, 28.85, 28.79, 27.9, 27.2, 25.0, 22.6, 18.7, –0.34; HRMS (APCI-TOF) *m/z* 599.3513 [M+H]<sup>+</sup> (calcd for  $\text{C}_{33}\text{H}_{51}\text{N}_2\text{O}_6\text{Si}$ , 599.3516).

**(*R*)-21-Methyldocosa-1,13-diyn-3-ol (23) (CAS 1808293-45-9).**<sup>22</sup> According to the similar procedure described above for enynic alcohol **19**, *in situ* desilylation and methanolysis of 3,5-dinitrobenzoate **22** (299 mg, 0.50 mmol) furnished chiral propargyl alcohol **23** (163 mg, 98% yield) as a colorless oil.  $[\alpha]_D^{20} +1.2$  (*c* 1.1,  $\text{CHCl}_3$ );  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{H}}$  4.40–4.33 (m, 1H), 2.46 (d,  $J$  = 2.1 Hz, 1H), 2.16–2.11 (m, 4H), 1.76 (d,  $J$  = 5.7 Hz, 1H), 1.74–1.67 (m, 2H), 1.56–1.26 (m, 23H), 1.19–1.12 (m, 2H), 0.86 (d,  $J$  = 6.6 Hz, 6H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta_{\text{C}}$  85.1, 80.2, 80.16, 72.7, 62.2, 38.9, 37.6, 29.41, 29.38, 29.2, 29.12, 29.1, 29.07, 28.8, 28.78, 27.9, 27.2, 25.0, 22.6, 18.7; HRMS (APCI-TOF) *m/z* 333.3161 [M+H]<sup>+</sup> (calcd for  $\text{C}_{23}\text{H}_{41}\text{O}$ , 333.3157).

**(*R*)-Methyl 4-hydroxy-22-methyltricos-2,14-dynoate (21') (new compound).**<sup>23</sup> To a solution of the (*S,S*)-ProPhenol ligand (127.6 mg, 0.20 mmol, 0.20 equiv) and  $\text{P}(\text{O})\text{Ph}_3$  (111.2 mg, 0.40 mmol, 0.40 equiv) in toluene (1 mL) was added methyl propiolate (84 mg, 1.0 mmol, 1 equiv) at 0 °C under argon. A solution of  $\text{Me}_2\text{Zn}$  (2.5 mL, 1.2 M in toluene, 3 mmol, 3 equiv) was then added via syringe. After stirred for 1.5 h at 0 °C, the mixture was cooled to –10 °C and

a solution of aldehyde **20** (306 mg, 1.0 mmol, 1 equiv) in toluene (2 mL) was added slowly via auto-syringe over 15 h. The reaction mixture was stirring for additional 30 min at the same temperature, and quenched with saturated NH<sub>4</sub>Cl aqueous solution (3 mL). The organic phase was separated, and the aqueous phase was extracted with diethyl ether (3 × 5 mL). The combined organic layers were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, concentrated under reduced pressure. The residue was purified by silica gel chromatography (petroleum ether/ethyl acetate 10:1) to furnish **21'** (0.269 g, 69% yield, 97% ee) as a colorless oil. Enantiomeric excess were determined by HPLC with a Phenomenex Lux Cellulose-1 column (4% 2-propanol in *n*-hexane, 1 mL/min, 210 nm) analysis; major (*R*)-enantiomer *t*<sub>r</sub> = 10.48 min, minor (*S*)-enantiomer *t*<sub>r</sub> = 13.32 min.  $[\alpha]_D^{20}$  = 2.35 (*c* 1.07, CHCl<sub>3</sub>). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  4.49 (dd, *J* = 12.6, 6.5 Hz, 1H), 3.79 (s, 3H),  $\delta$ <sub>H</sub> 2.16–2.12 (m, 4H), 1.94 (d, *J* = 5.9 Hz, 1H), 1.79–1.73 (m, 2H), 1.55–1.44 (m, 6H), 1.37–1.27 (m, 17H), 1.20–1.13 (m, 2H), 0.87 (d, *J* = 6.7 Hz, 6H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 153.8, 88.1, 80.3, 80.2, 76.3, 62.2, 52.8, 39.0, 36.9, 29.41, 29.39, 29.16, 29.15, 29.12, 29.11, 28.9, 28.8, 27.9, 27.3, 24.9, 22.6, 18.8. HRMS (ESI) *m/z* 391.3200 [M+H]<sup>+</sup> (calcd for C<sub>25</sub>H<sub>43</sub>O<sub>3</sub>, 391.3207).

**Decarboxylation of **21'** to (*R*)-21-methyldocosa-1,13-diyn-3-ol (**23**).<sup>24</sup>** To a solution of **21'** (195 mg, 0.50 mmol) in THF (4 mL) was added LiOH aqueous solution (1.5 mL, 1.0 M, 1.5 mmol). The reaction solution was stirred for 12 h at room temperature, and diluted with ethyl acetate (8 mL) and water (4 mL). Sodium bisulfate aqueous solution (2 mL, 1.0 M, 2 mmol) was then added to quench the reaction. The organic phase was separated, and the aqueous phase was extracted with ethyl acetate (3 × 10mL). The combined organic phases were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, concentrated under reduced pressure to yield the crude acid as a brown oil.

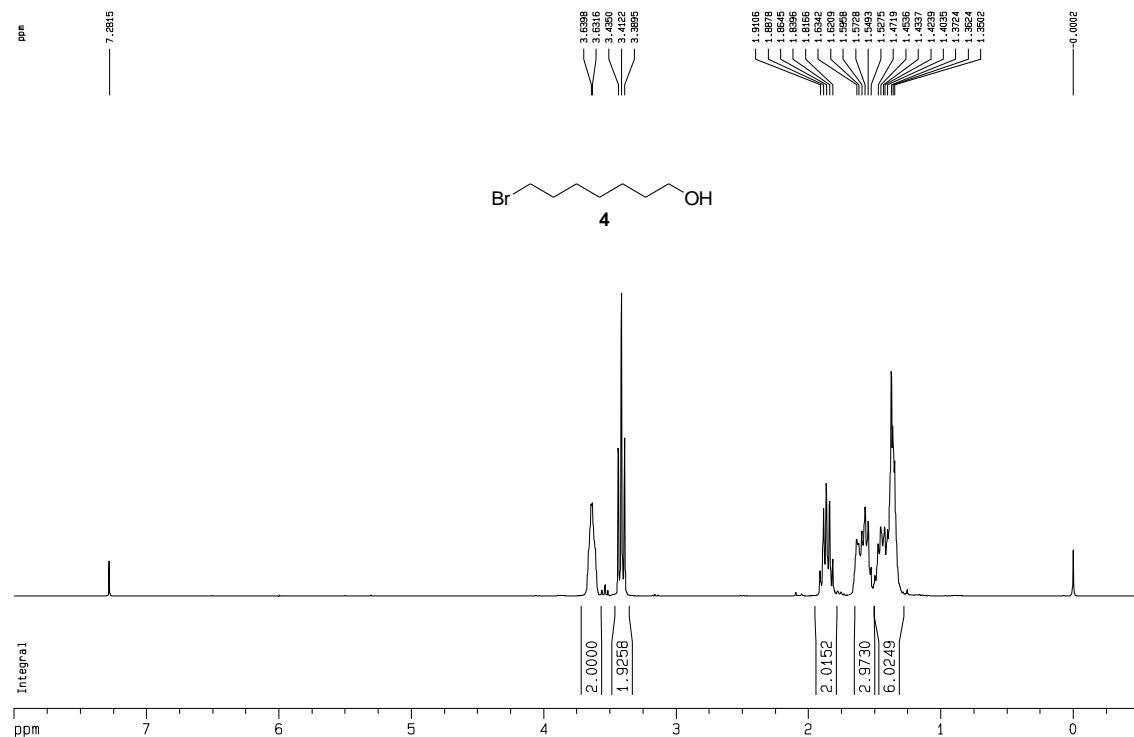
To a solution of crude acid in acetonitrile (8 mL) was added CuCl (119 mg, 1.2 mmol) in one portion. The reaction mixture was stirred at room temperature until starting material disappeared

monitored by TLC. The reaction mixture was diluted with ethyl acetate (10 mL) and water (4 mL). The resulting mixture was acidified to pH=1 with HCl aqueous solution (1.0 M). The organic phase was separated and the aqueous layer was extracted with ethyl acetate (3 × 10 mL). The combined organic phases were dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, concentrated under reduced pressure. The residue was purified by silica gel chromatography (petroleum ether/ethyl acetate 6:1) to furnish chiral propargyl alcohol **23** as a colorless oil (122 mg, 73% yield over two steps). The spectroscopic data and specific rotation were agreement with those of **23** derived from 3,5-dinitrobenzoate **22**.

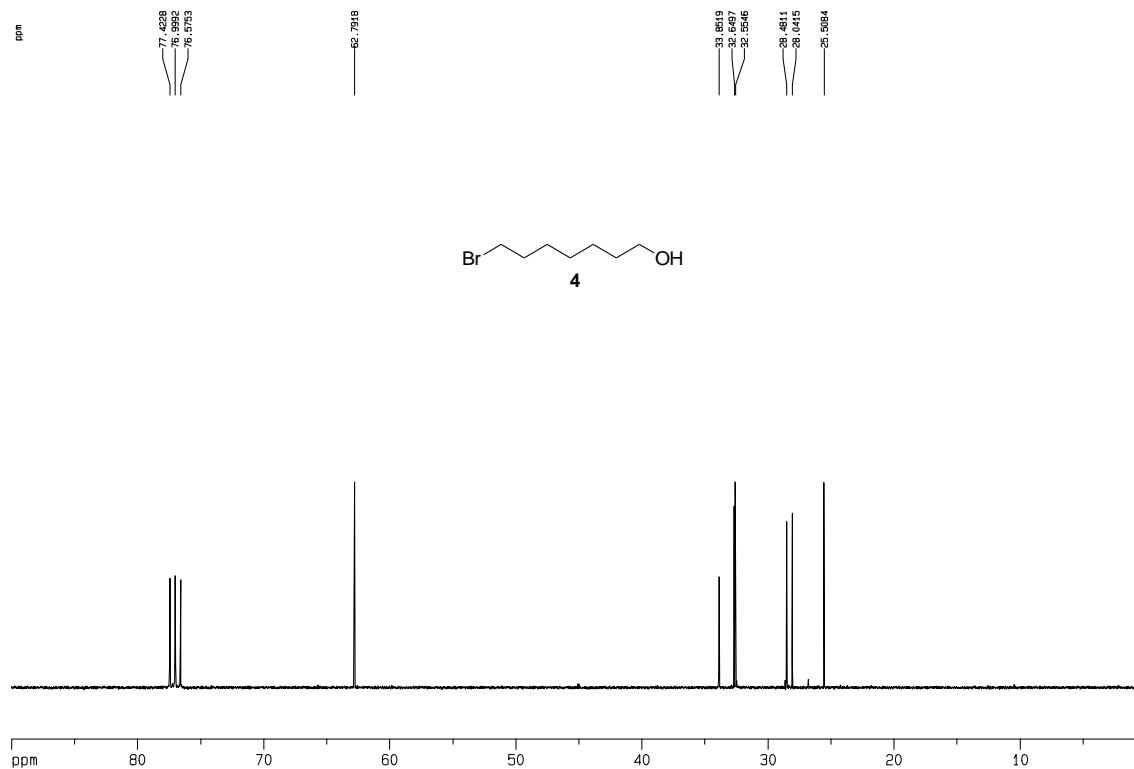
**(R)-24-methylpentacosa-2,4,16-triyne-1,6-diyl bis(4-bromobenzoate) (2')** (new compound). According to the similar procedure described above for bis(4-bromobenzoate) **1'**, (*R*)-strongyliodiol D (**2**) (77 mg, 0.20 mmol) was converted to bis(4-bromobenzoate) **2'** (144 mg, 96% yield, 99% ee) as a colorless oil. Enantiomeric excess were determined by HPLC with a R&C OD column (5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm) analysis; minor (*S*)-enantiomer *t*<sub>r</sub> = 7.50 min, major (*R*)-enantiomer *t*<sub>r</sub> = 9.19 min.  $[\alpha]_D^{20} -21.0$  (*c* 1.4, CHCl<sub>3</sub>); <sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>)  $\delta$ <sub>H</sub> 7.92–7.88 (m, 4H), 7.60–7.58 (m, 4H), 5.62 (t, *J* = 6.6 Hz, 1H), 4.97 (s, 2H), 2.16–2.11 (m, 4H), 1.92–1.87 (m, 2H), 1.56–1.14 (m, 25H), 0.86 (d, *J* = 6.6 Hz, 6H); <sup>13</sup>C NMR (75 MHZ, CDCl<sub>3</sub>)  $\delta$ <sub>C</sub> 164.7, 164.4, 131.6, 131.55, 131.1, 131.0, 128.5, 128.3, 127.9, 80.0, 79.9, 77.2, 73.2, 70.5, 69.2, 64.7, 52.7, 38.7, 34.2, 29.2, 29.1, 29.09, 28.93, 28.91, 28.83, 28.81, 28.7, 28.6, 27.7, 27.0, 24.7, 22.4, 18.5; HRMS (APCI-TOF) *m/z* 753.2149 [M+2+H]<sup>+</sup> (calcd for C<sub>40</sub>H<sub>49</sub>Br<sub>2</sub>O<sub>4</sub>, 753.2154).

### 3. $^1\text{H}$ and $^{13}\text{C}$ NMR Spectra of the Products

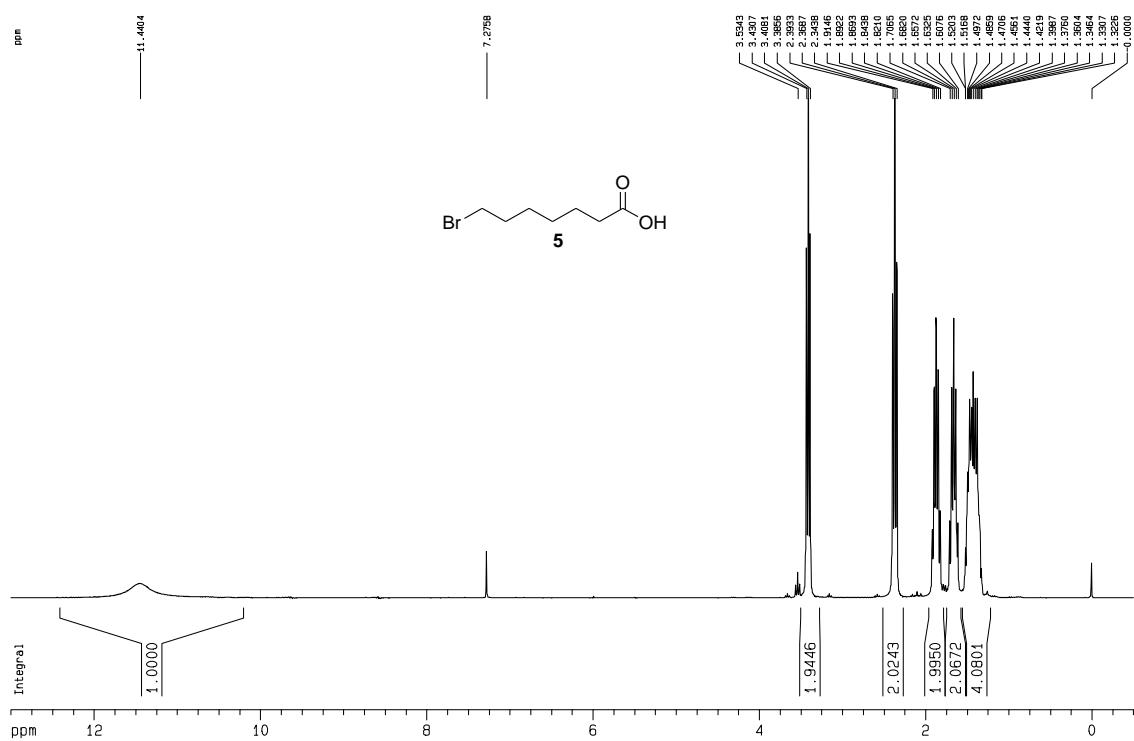
**Figure S1.**  $^1\text{H}$  NMR Spectrum of compound **4** (300 MHz,  $\text{CDCl}_3$ )



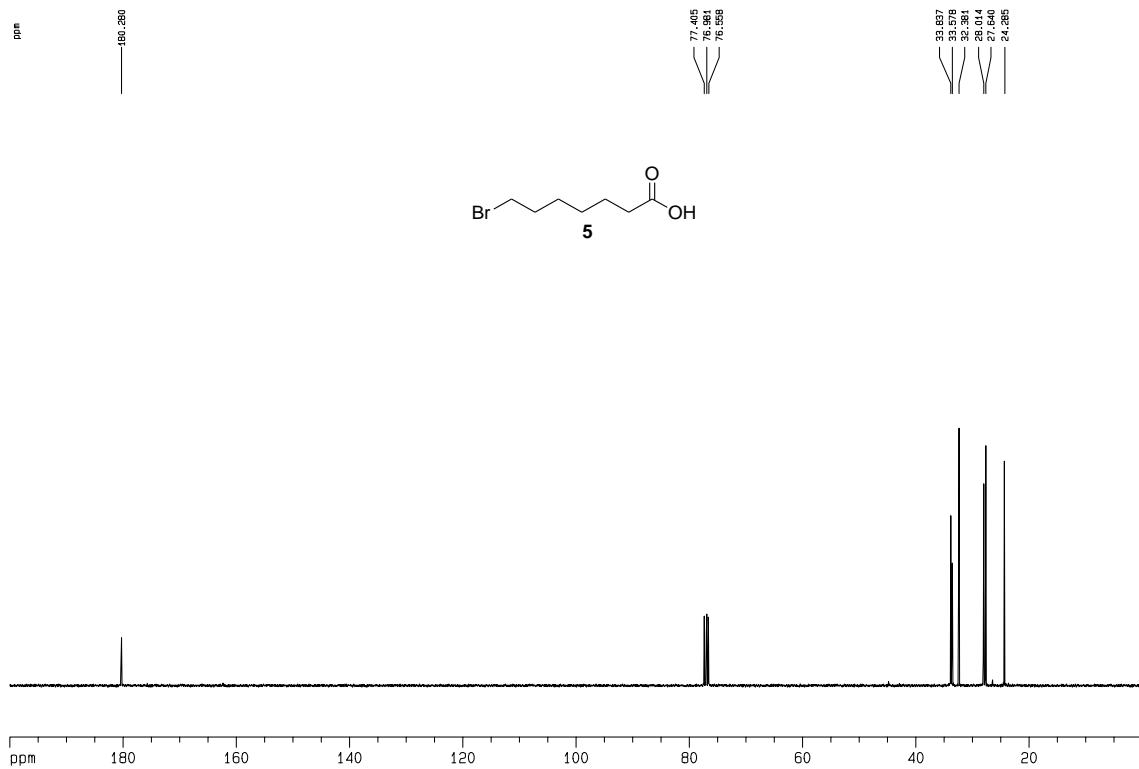
**Figure S2.**  $^{13}\text{C}$  NMR Spectrum of compound **4** (75 MHz,  $\text{CDCl}_3$ )



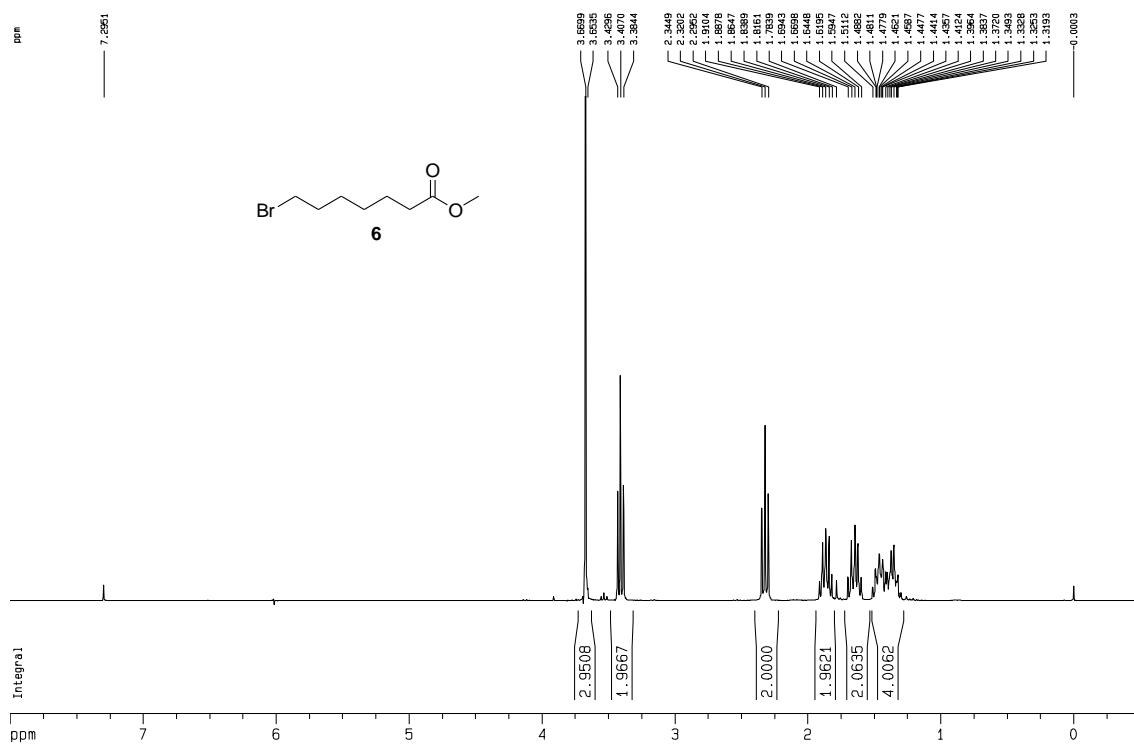
**Figure S3.**  $^1\text{H}$  NMR Spectrum of compound **5** (300 MHz,  $\text{CDCl}_3$ )



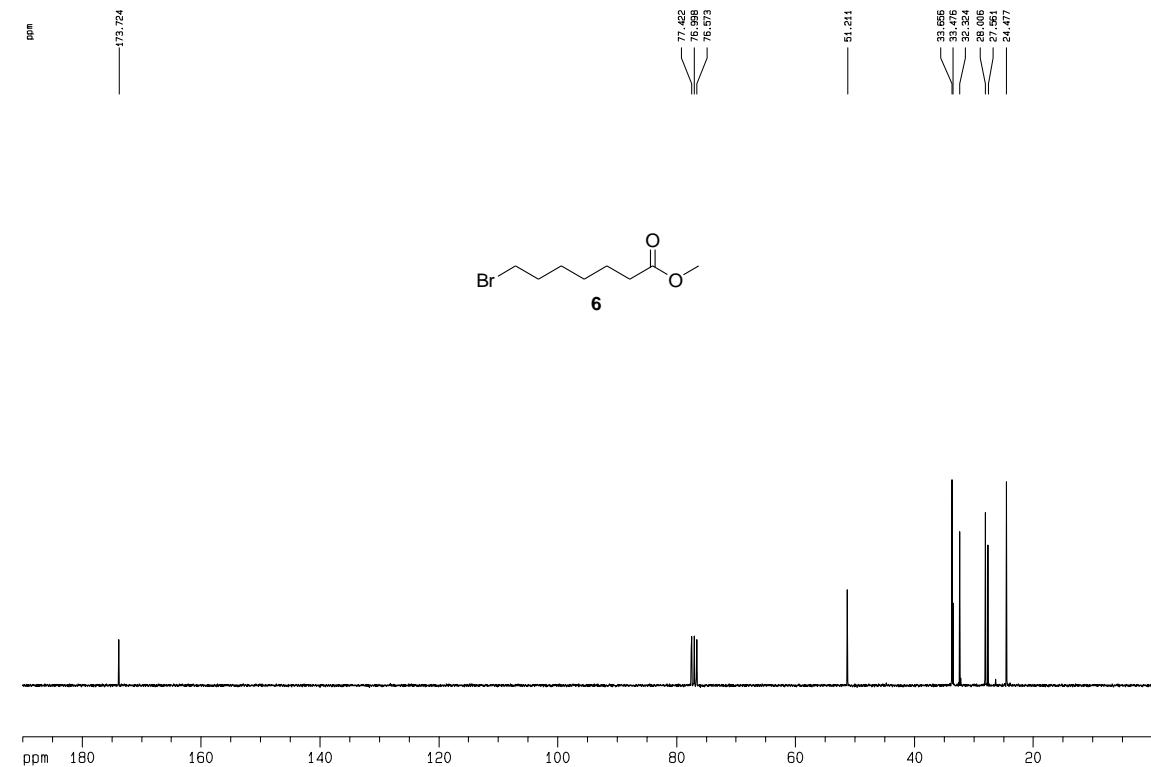
**Figure S4.**  $^{13}\text{C}$  NMR Spectrum of compound **5** (75 MHz,  $\text{CDCl}_3$ )



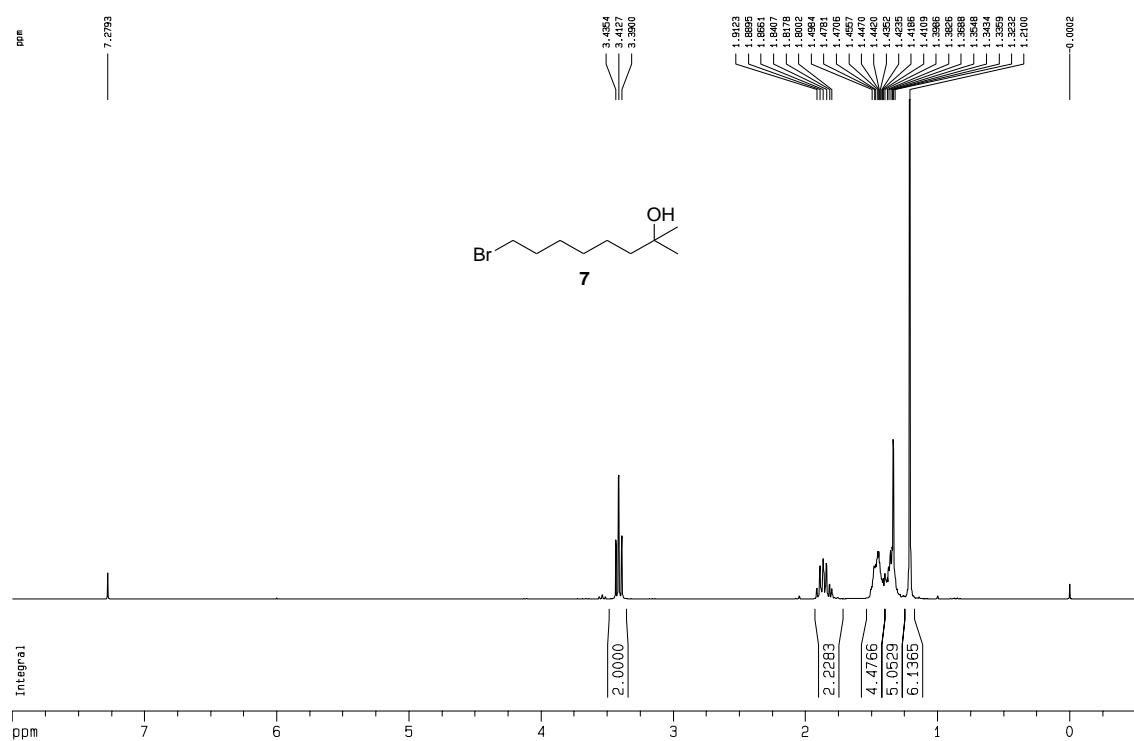
**Figure S5.**  $^1\text{H}$  NMR Spectrum of compound **6** (300 MHz,  $\text{CDCl}_3$ )



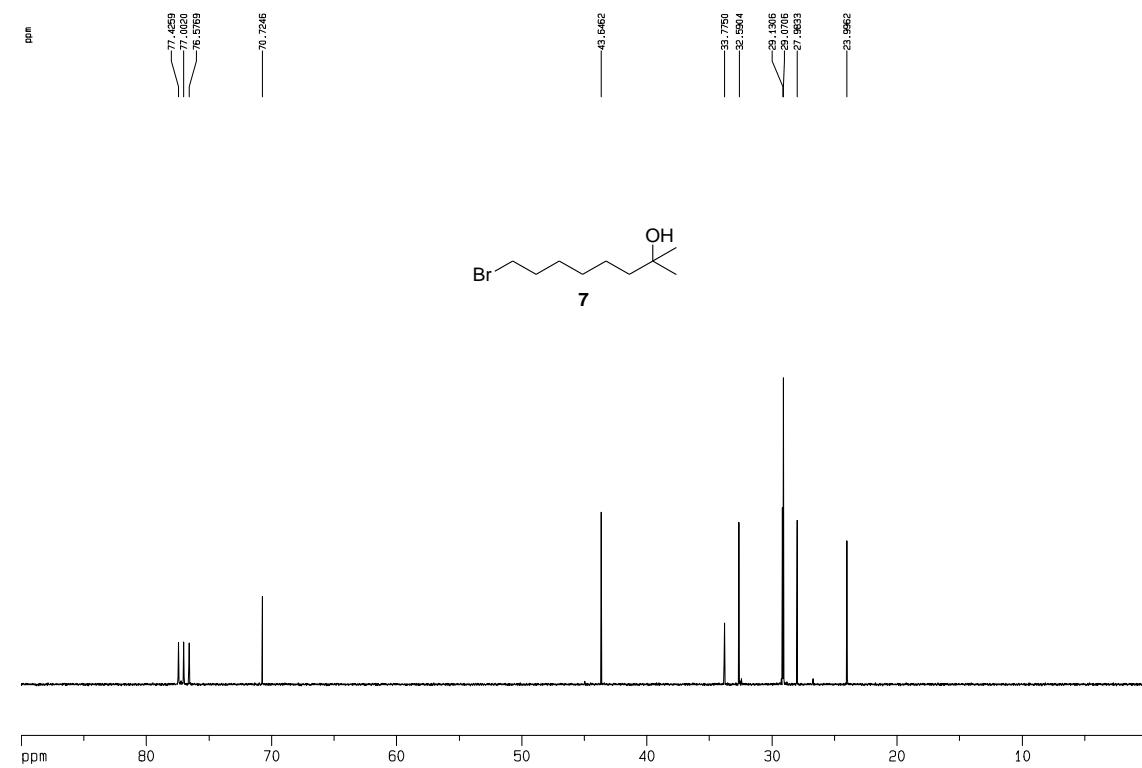
**Figure S6.**  $^{13}\text{C}$  NMR Spectrum of compound **6** (75 MHz,  $\text{CDCl}_3$ )



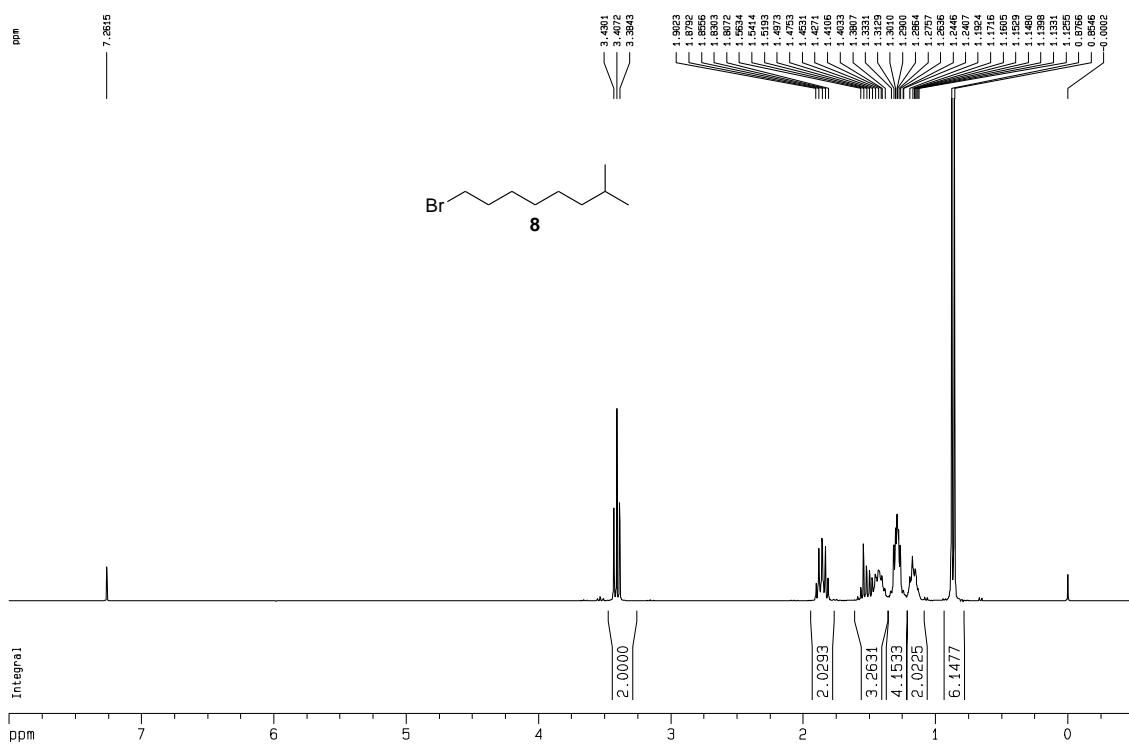
**Figure S7.**  $^1\text{H}$  NMR Spectrum of compound **7** (300 MHz,  $\text{CDCl}_3$ )



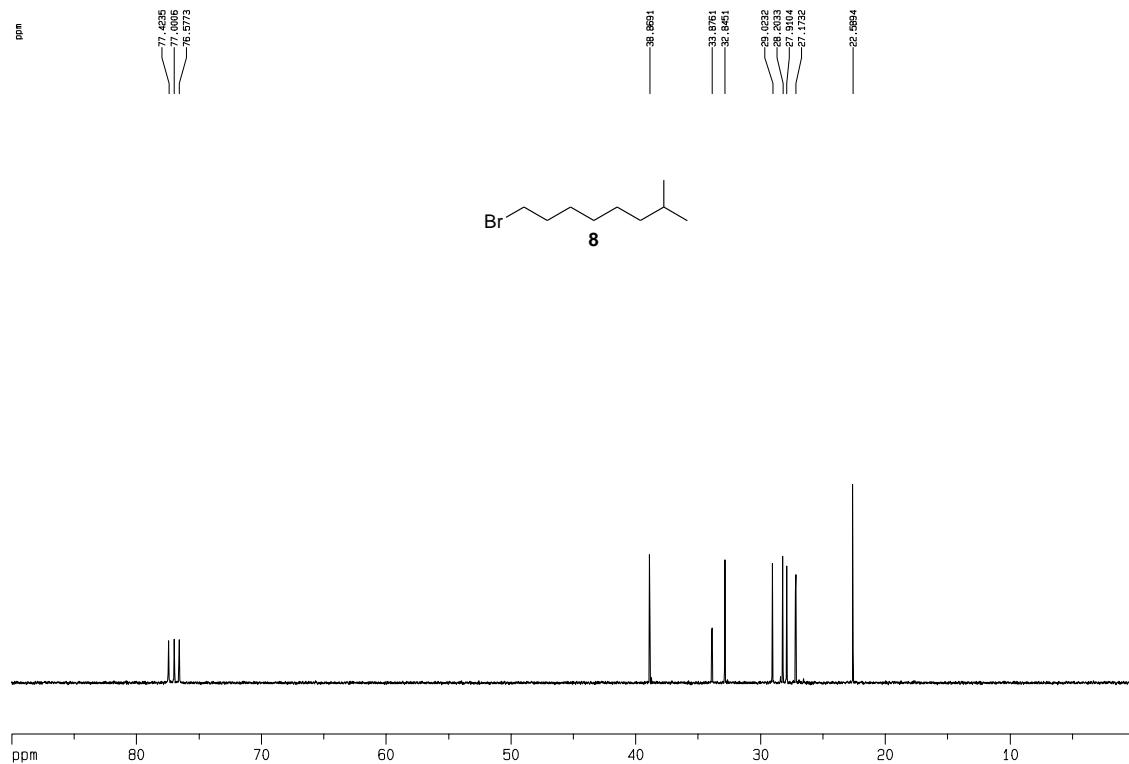
**Figure S8.**  $^{13}\text{C}$  NMR Spectrum of compound **7** (75 MHz,  $\text{CDCl}_3$ )



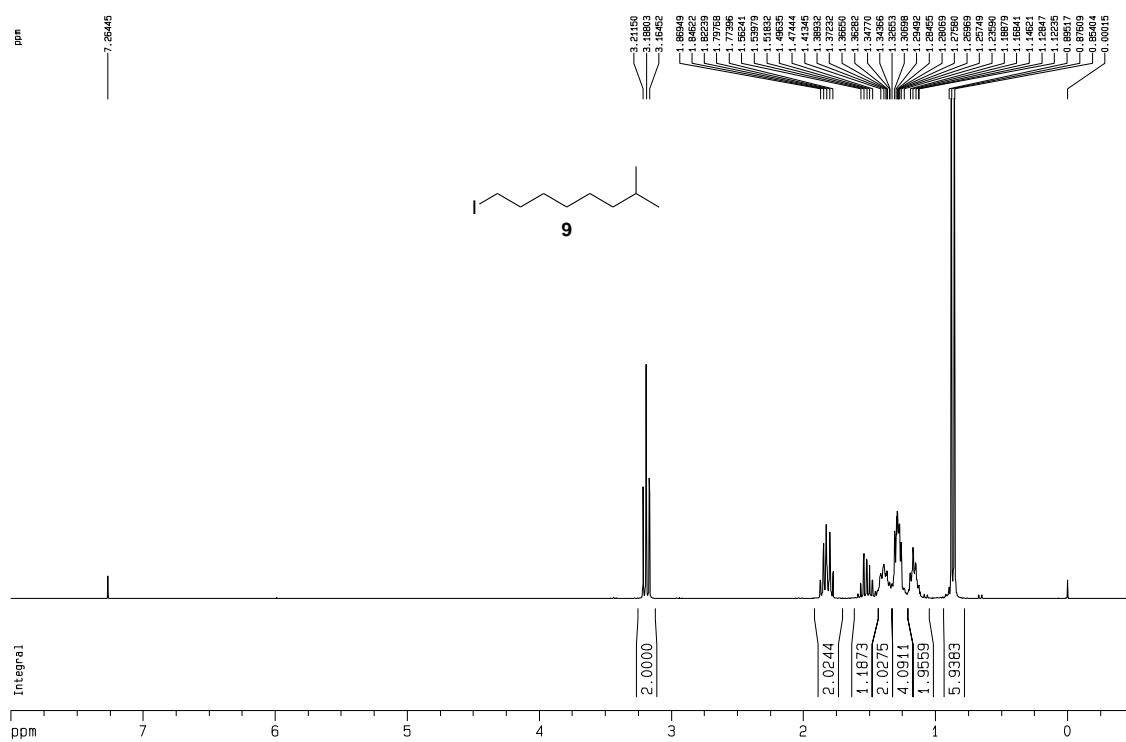
**Figure S9.**  $^1\text{H}$  NMR Spectrum of compound **8** (300 MHz,  $\text{CDCl}_3$ )



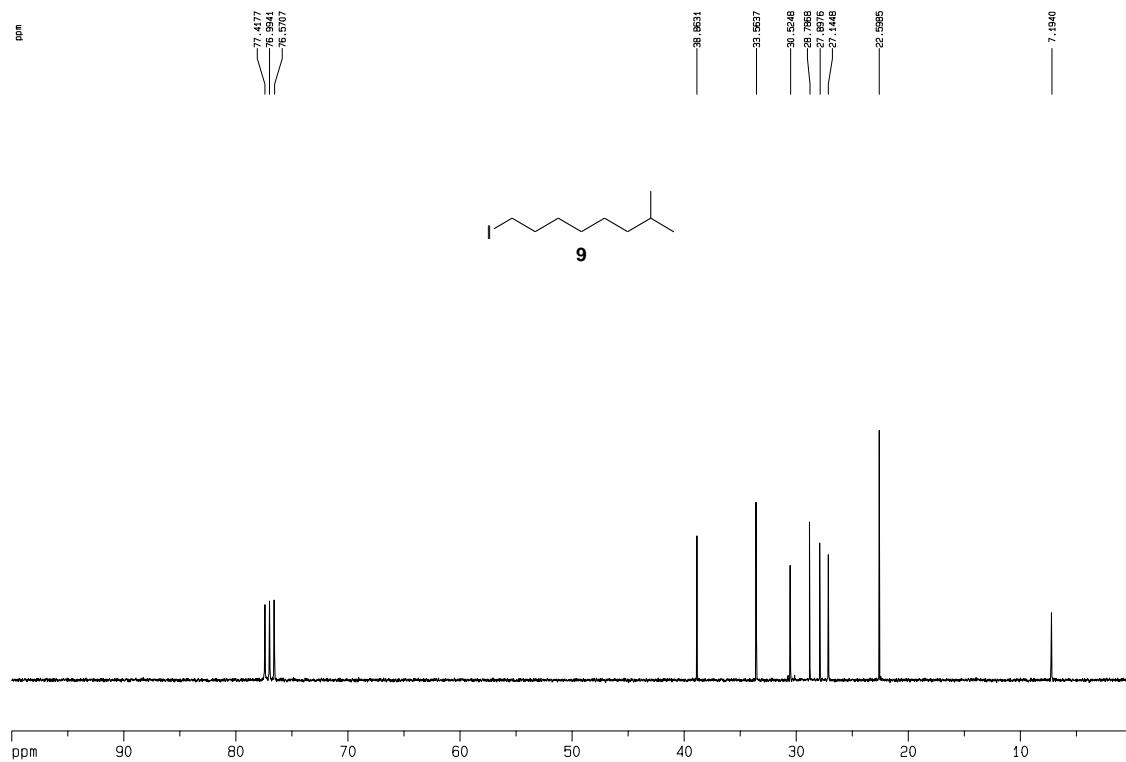
**Figure S10.**  $^{13}\text{C}$  NMR Spectrum of compound **8** (75 MHz,  $\text{CDCl}_3$ )



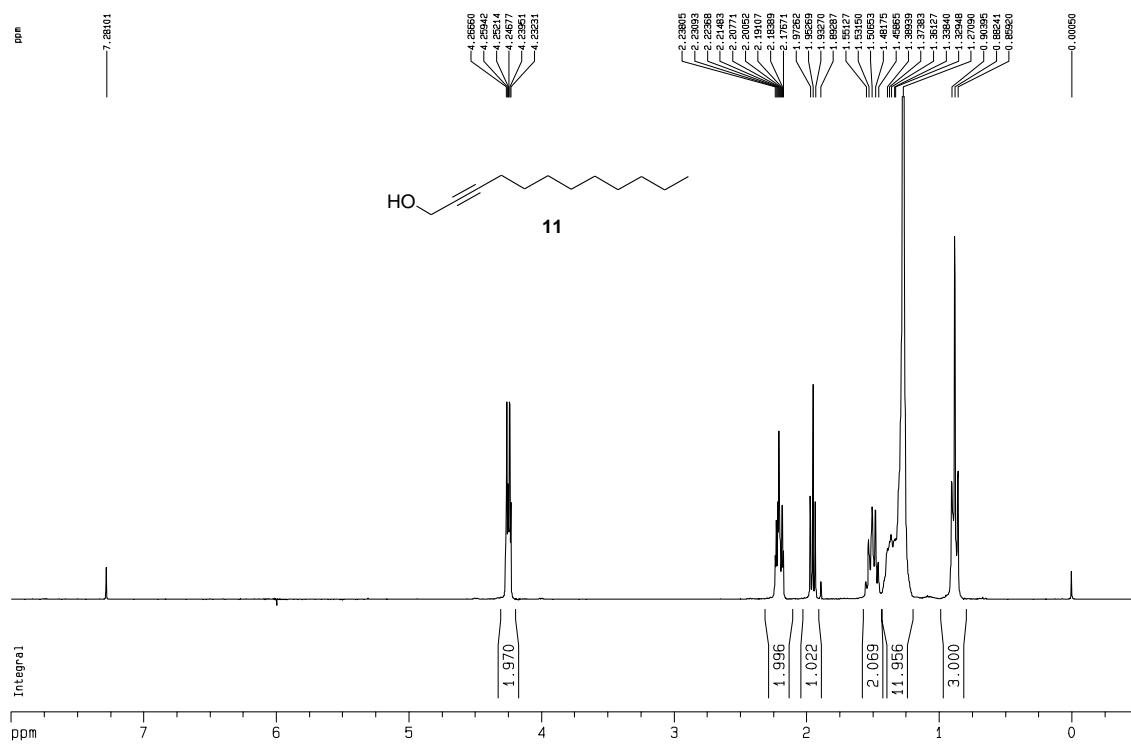
**Figure S11.**  $^1\text{H}$  NMR Spectrum of compound **9** (300 MHz,  $\text{CDCl}_3$ )



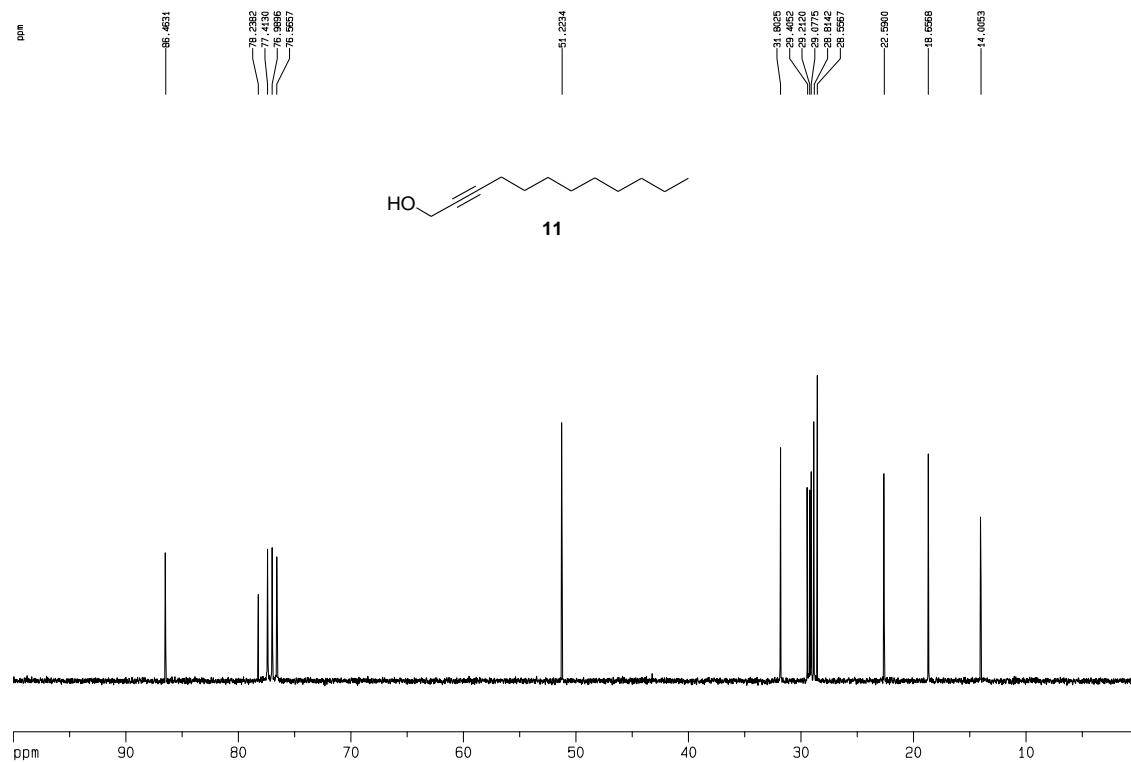
**Figure S12.**  $^{13}\text{C}$  NMR Spectrum of compound **9** (75 MHz,  $\text{CDCl}_3$ )



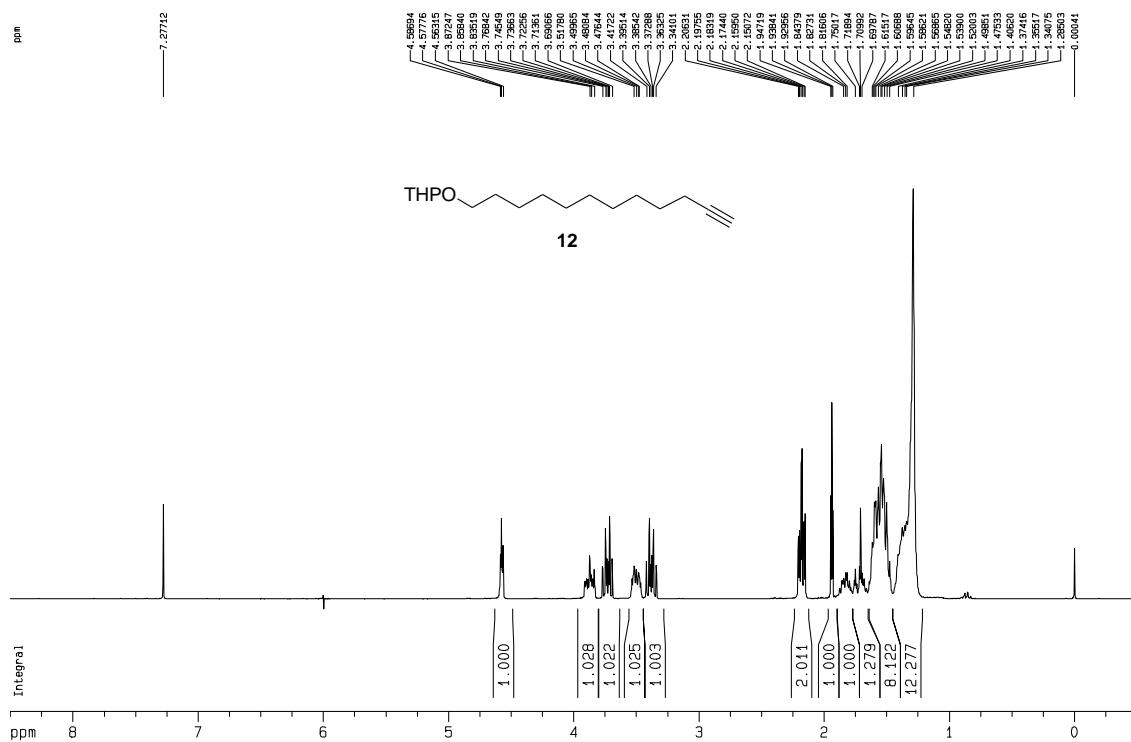
**Figure S13.**  $^1\text{H}$  NMR Spectrum of compound **11** (300 MHz,  $\text{CDCl}_3$ )



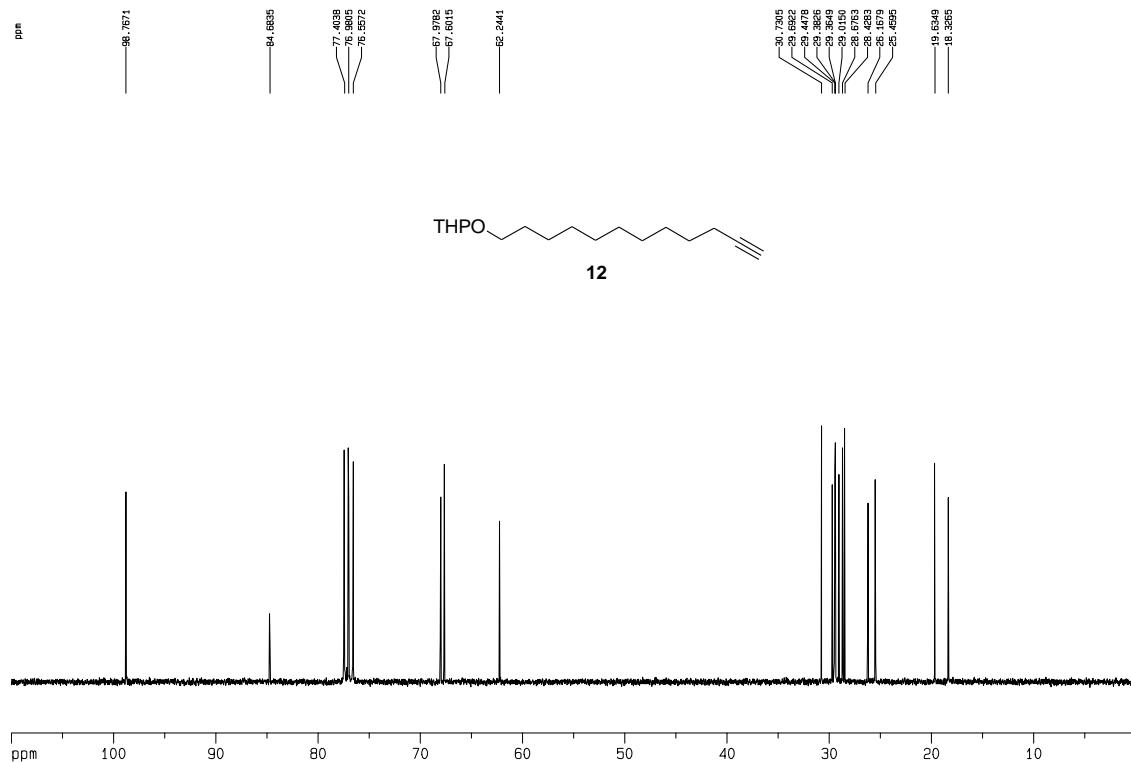
**Figure S14.**  $^{13}\text{C}$  NMR Spectrum of compound **11** (75 MHz,  $\text{CDCl}_3$ )



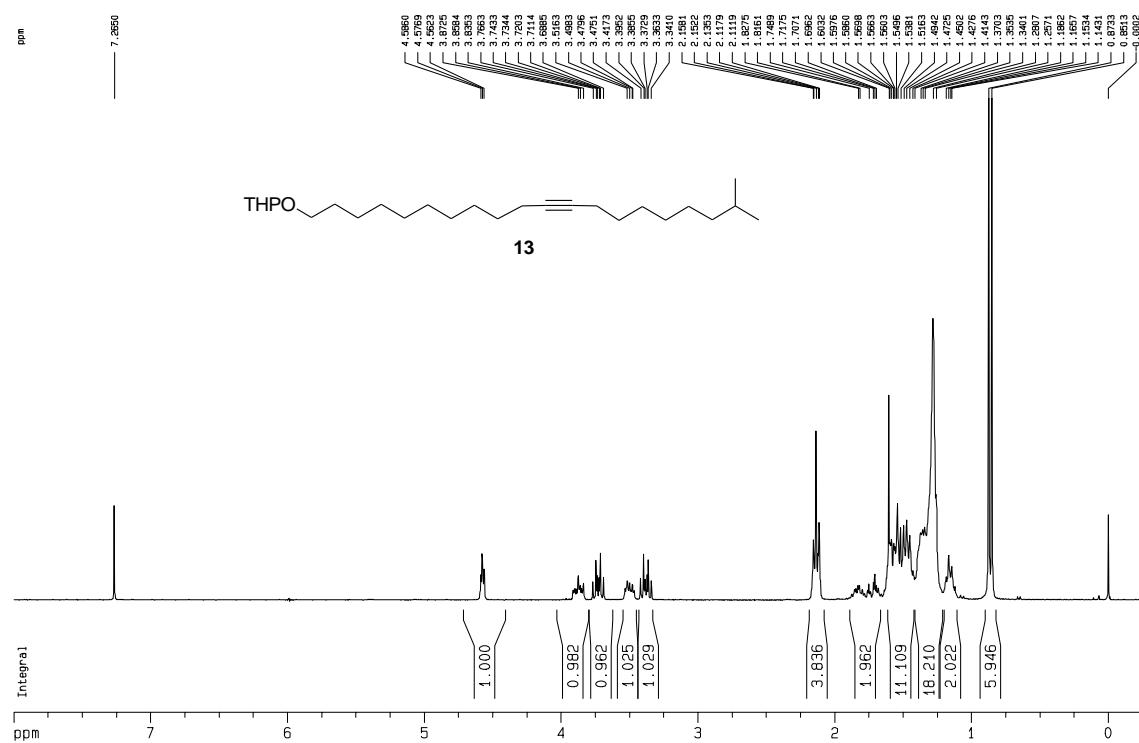
**Figure S15.**  $^1\text{H}$  NMR Spectrum of compound **12** (300 MHz,  $\text{CDCl}_3$ )



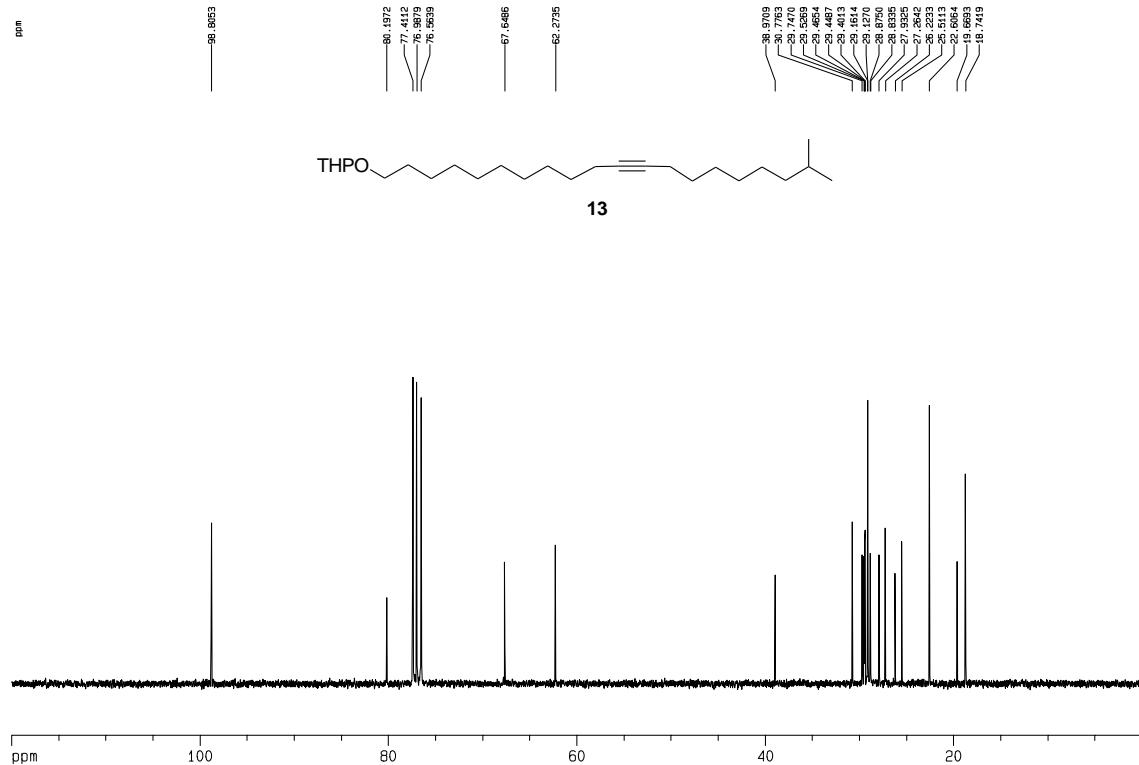
**Figure S16.**  $^{13}\text{C}$  NMR Spectrum of compound **12** (75 MHz,  $\text{CDCl}_3$ )



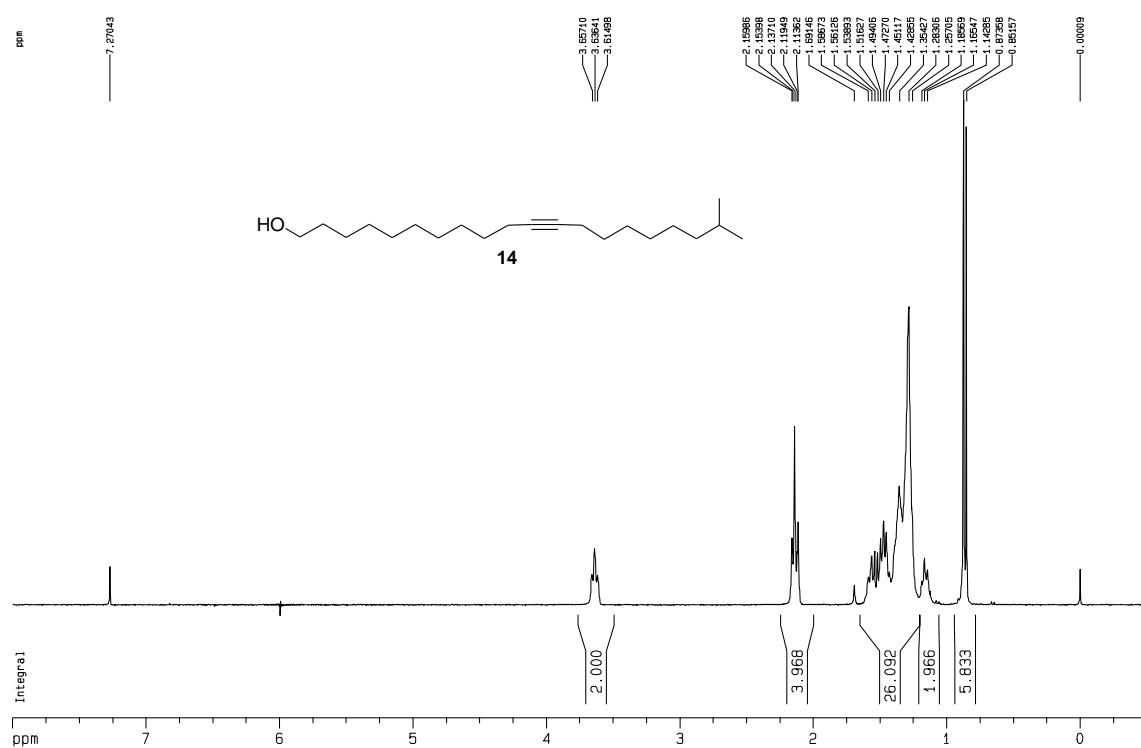
**Figure S17.**  $^1\text{H}$  NMR Spectrum of compound **13** (300 MHz,  $\text{CDCl}_3$ )



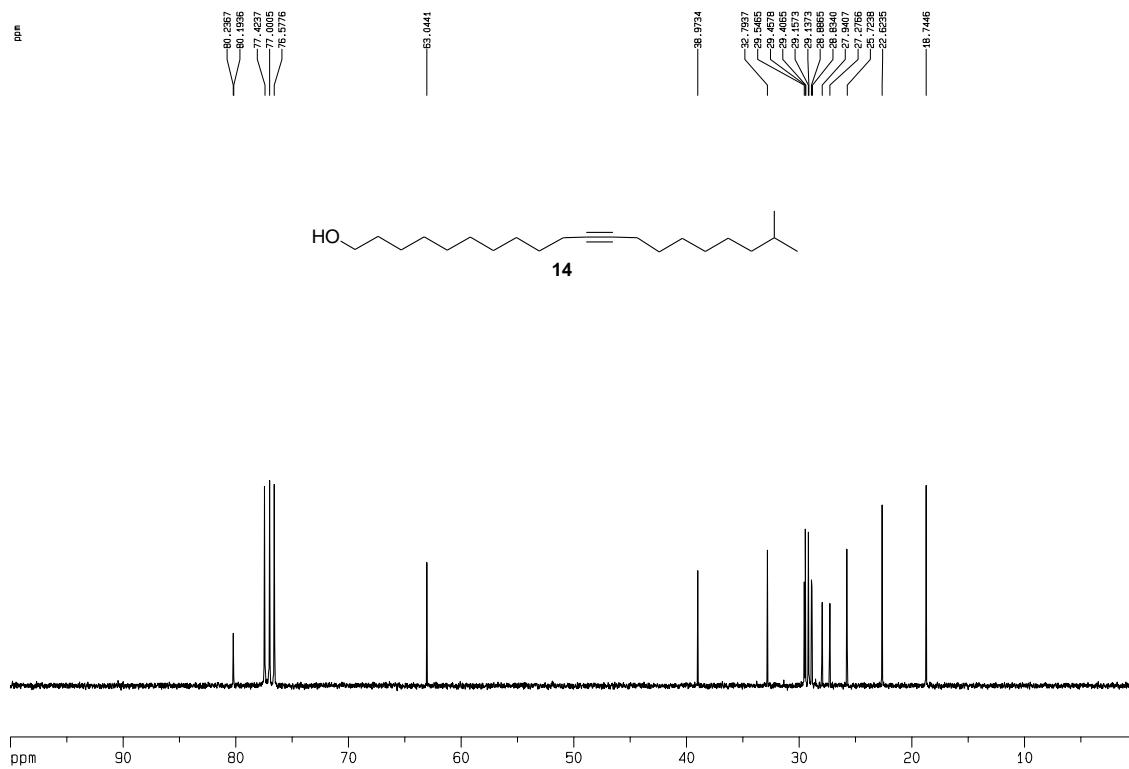
**Figure S18.**  $^{13}\text{C}$  NMR Spectrum of compound **13** (75 MHz,  $\text{CDCl}_3$ )



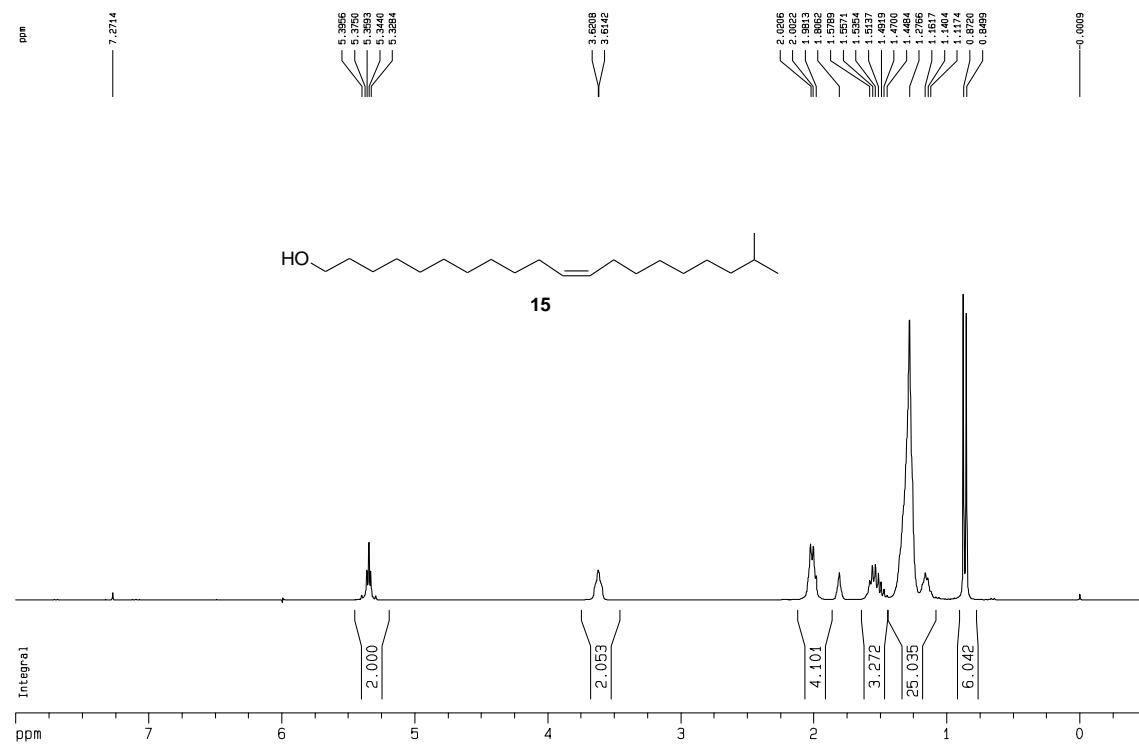
**Figure S19.**  $^1\text{H}$  NMR Spectrum of compound **14** (300 MHz,  $\text{CDCl}_3$ )



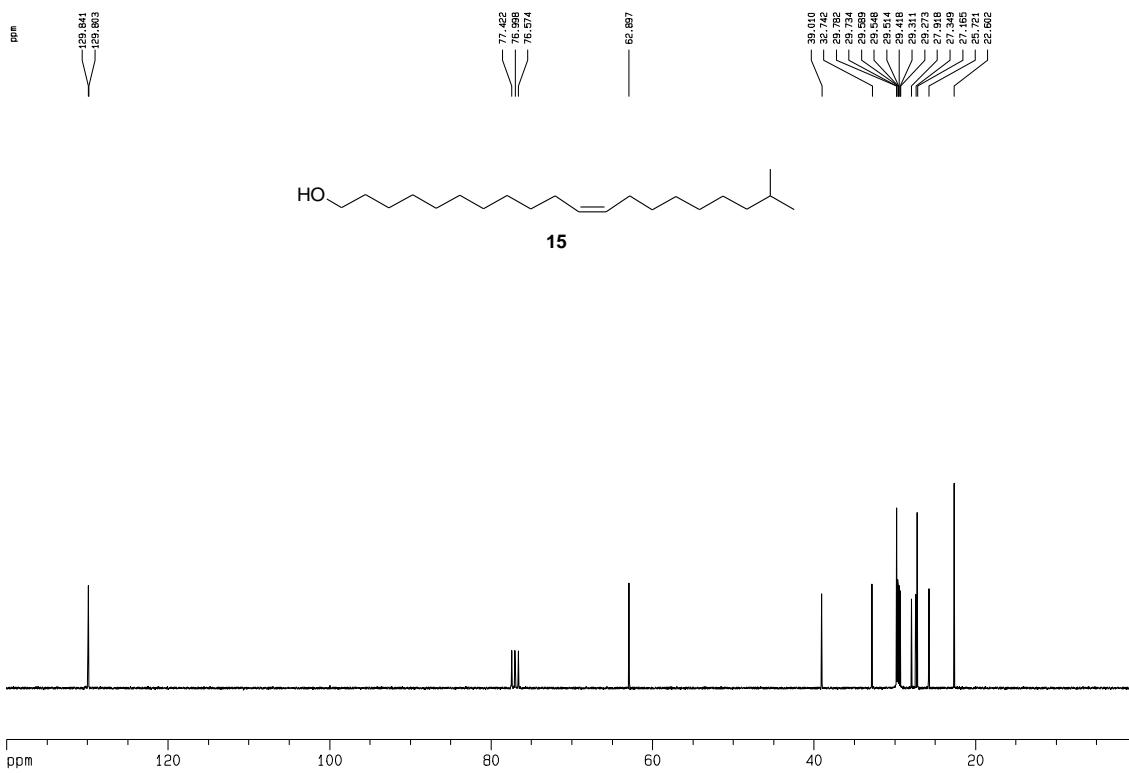
**Figure S20.**  $^{13}\text{C}$  NMR Spectrum of compound **14** (75 MHz,  $\text{CDCl}_3$ )



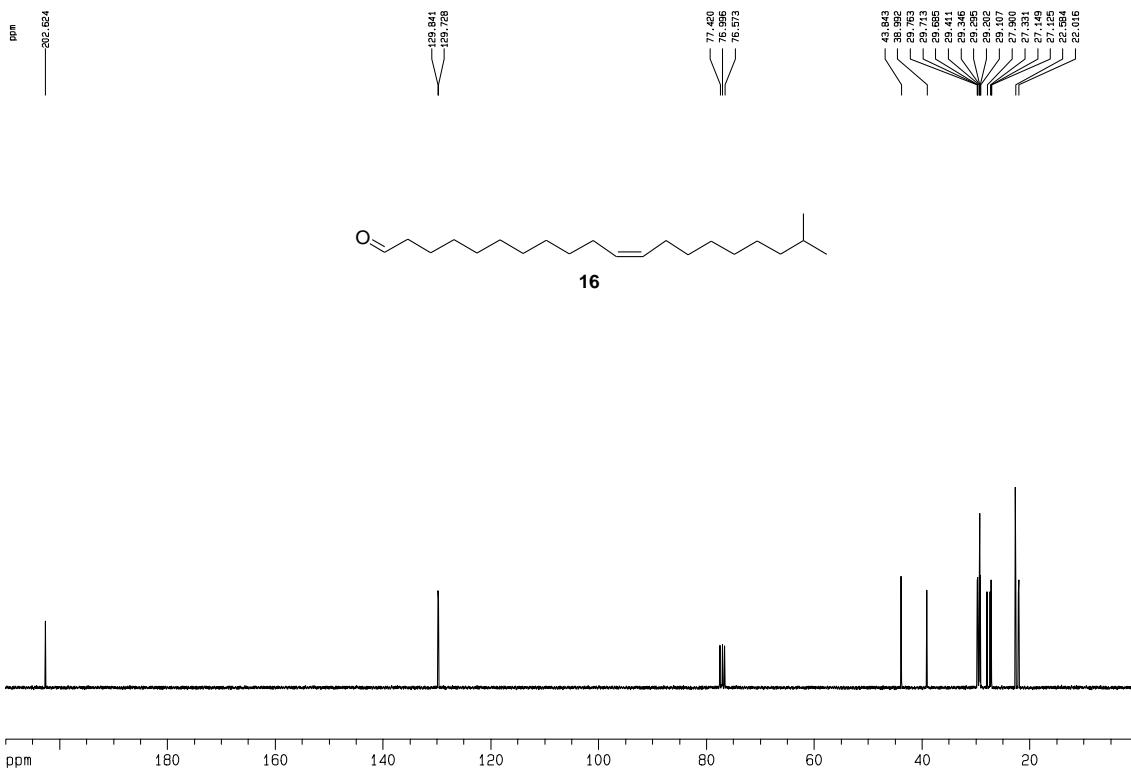
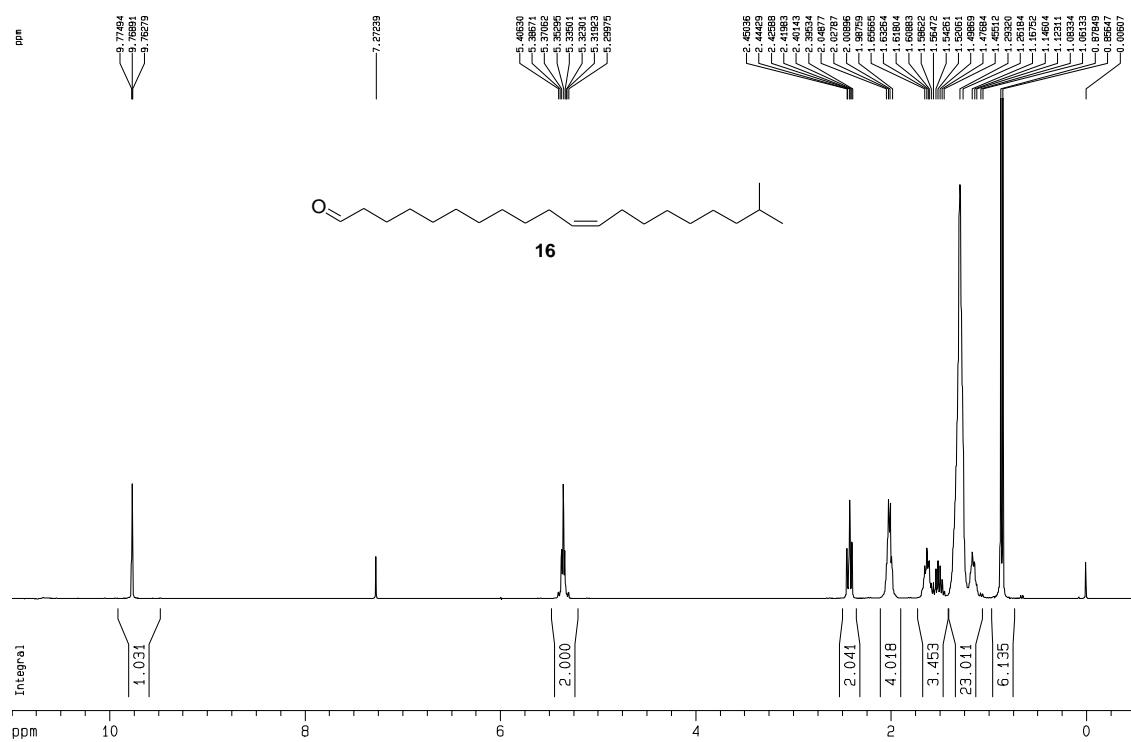
**Figure S21.**  $^1\text{H}$  NMR Spectrum of compound **15** (300 MHz,  $\text{CDCl}_3$ )



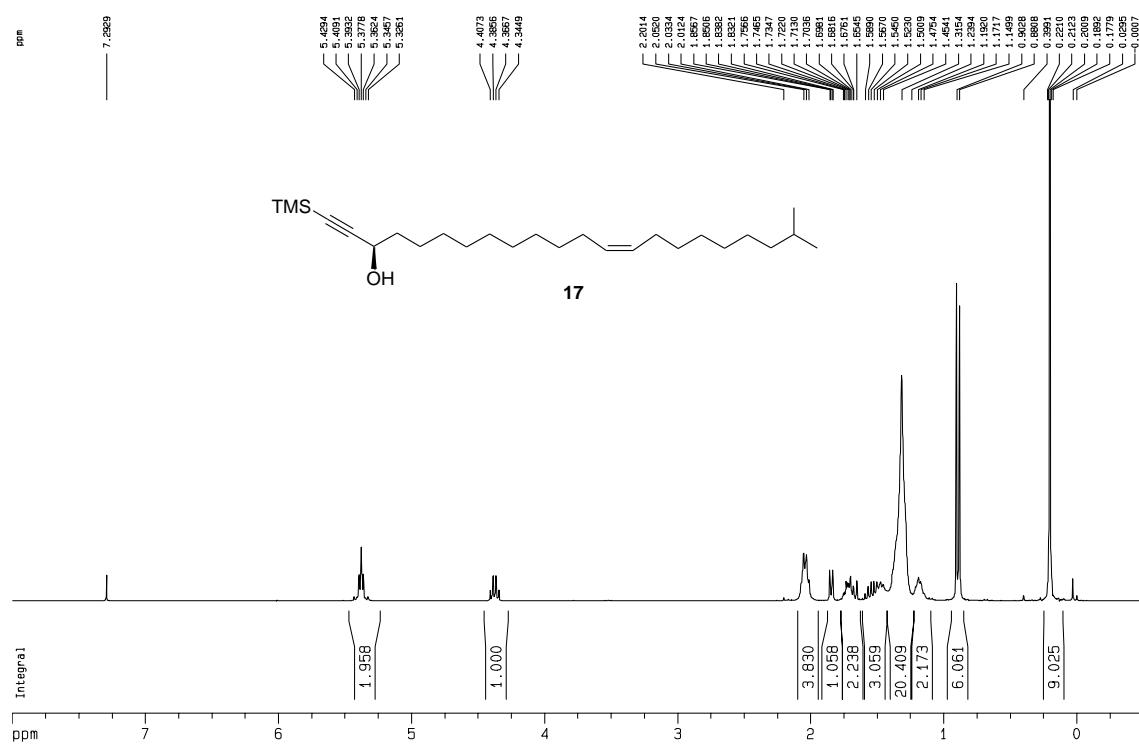
**Figure S22.**  $^{13}\text{C}$  NMR Spectrum of compound **15** (75 MHz,  $\text{CDCl}_3$ )



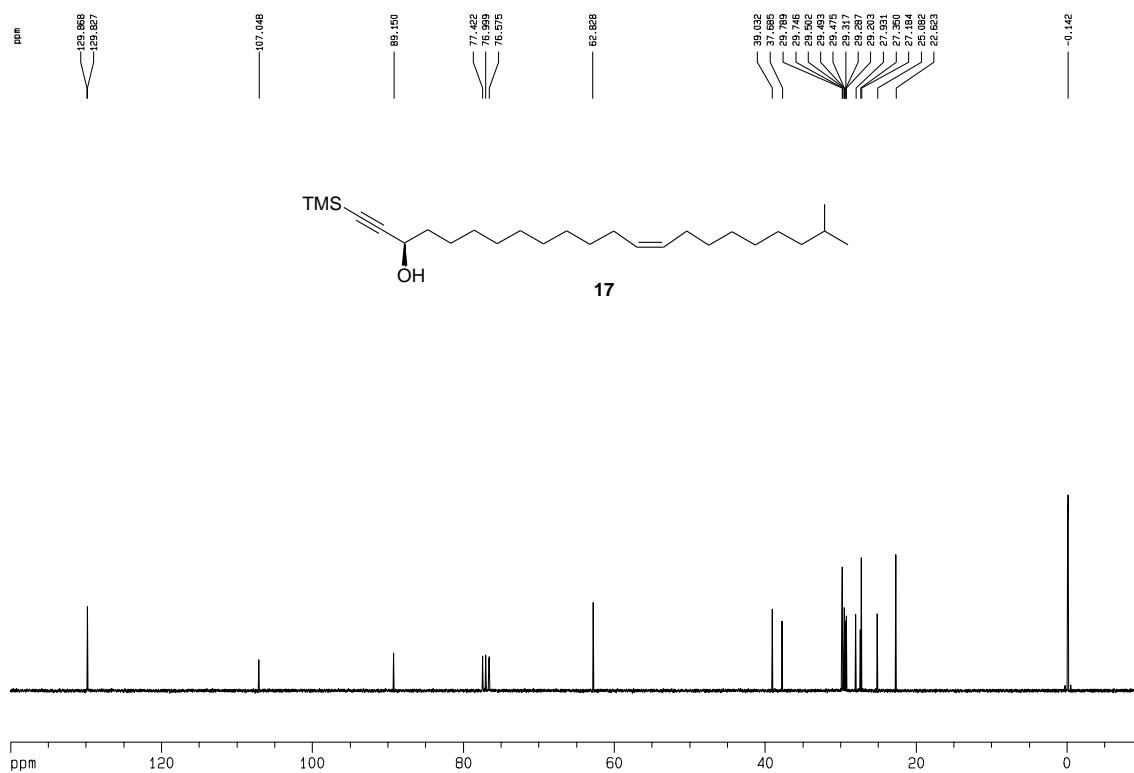
**Figure S23.**  $^1\text{H}$  NMR Spectrum of compound **16** (300 MHz,  $\text{CDCl}_3$ )



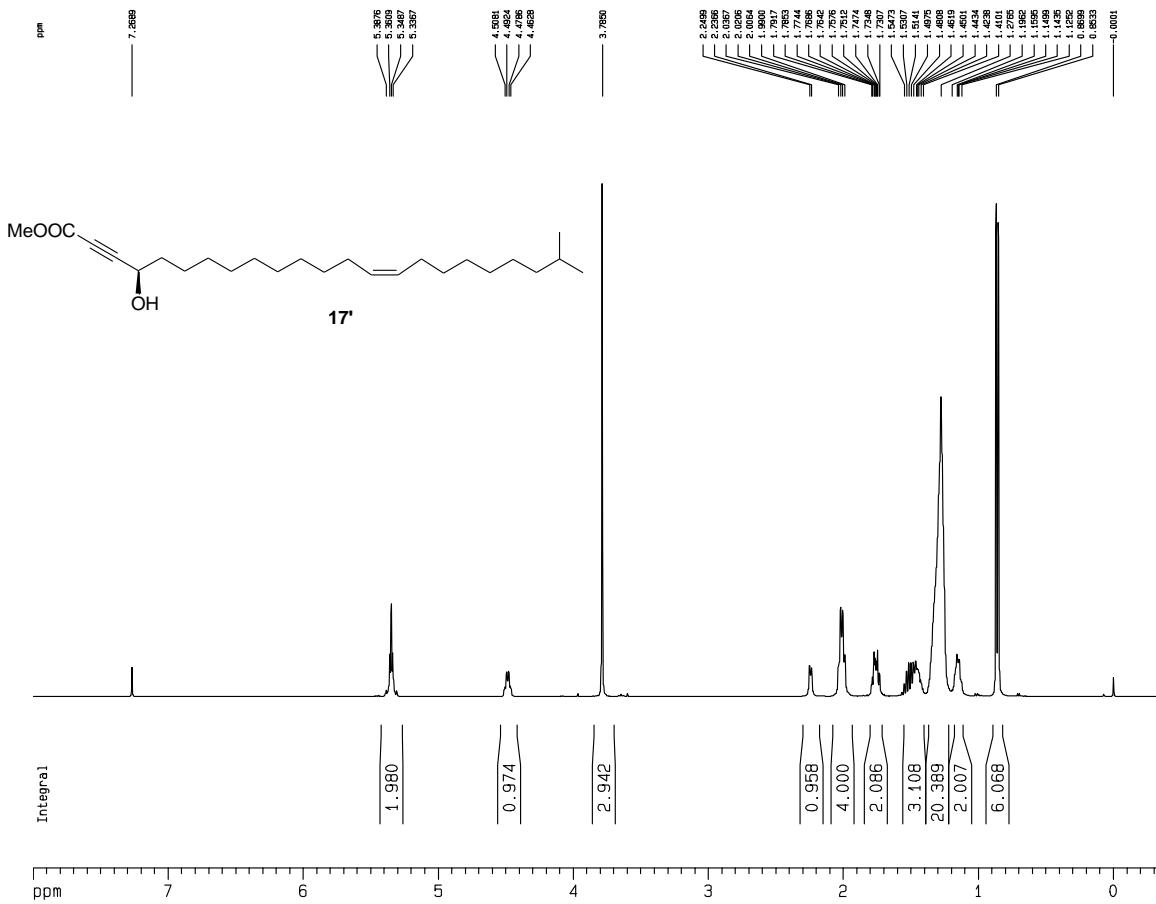
**Figure S25.**  $^1\text{H}$  NMR Spectrum of compound **17** (300 MHz,  $\text{CDCl}_3$ )



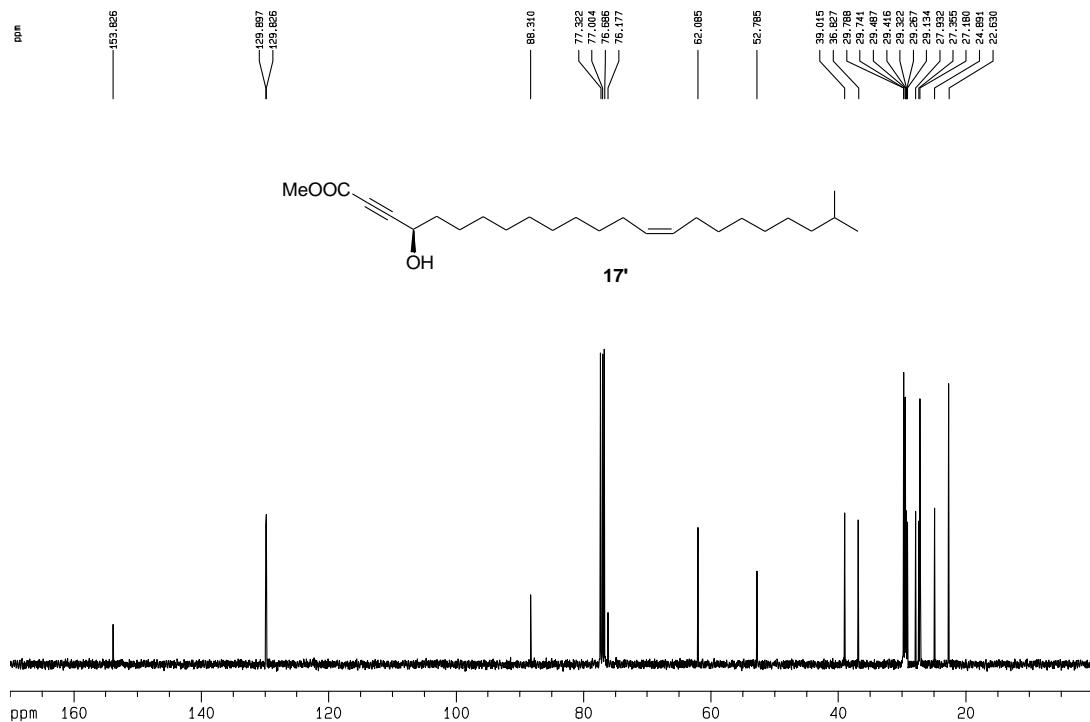
**Figure S26.**  $^{13}\text{C}$  NMR Spectrum of compound **17** (75 MHz,  $\text{CDCl}_3$ )



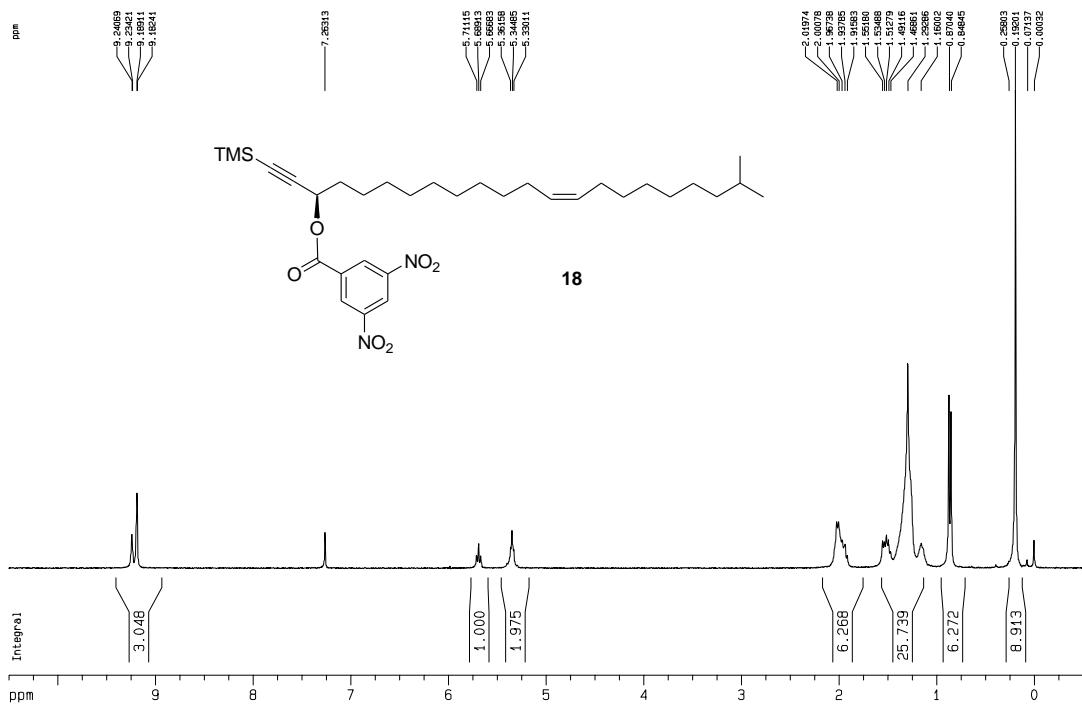
**Figure S27.**  $^1\text{H}$  NMR Spectrum of compound **17'** (400 MHz,  $\text{CDCl}_3$ )



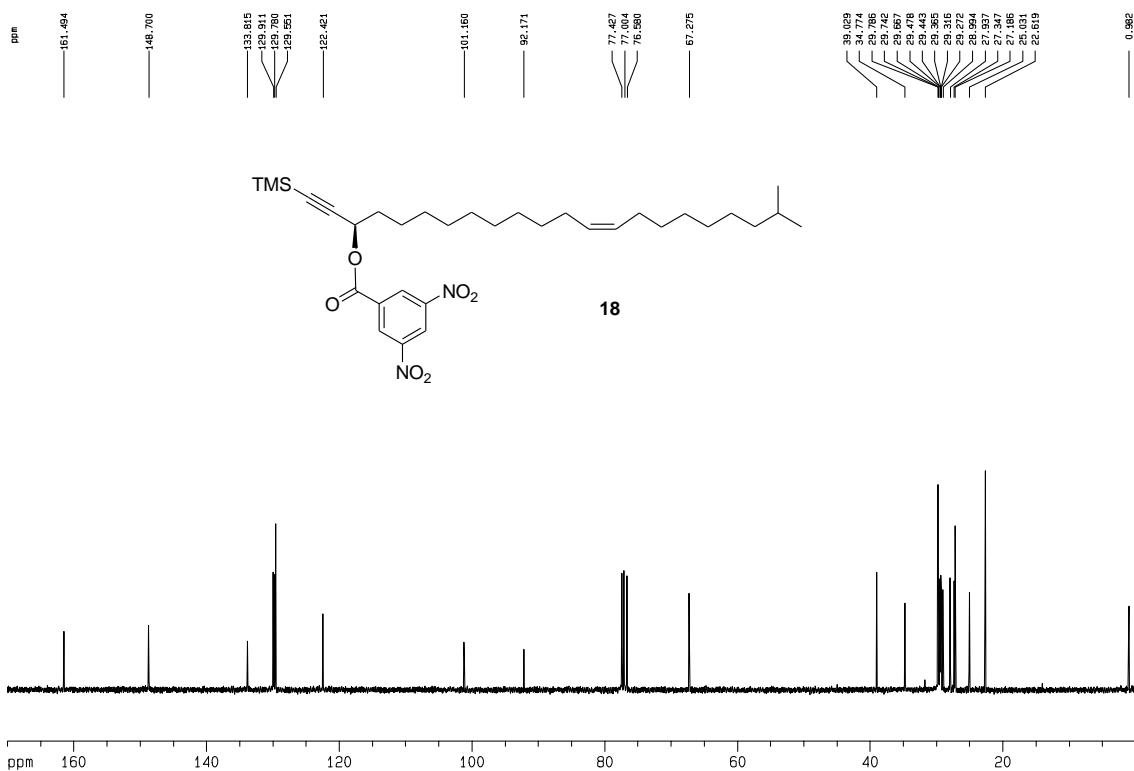
**Figure S28.**  $^{13}\text{C}$  NMR Spectrum of compound **17'** (101 MHz,  $\text{CDCl}_3$ )



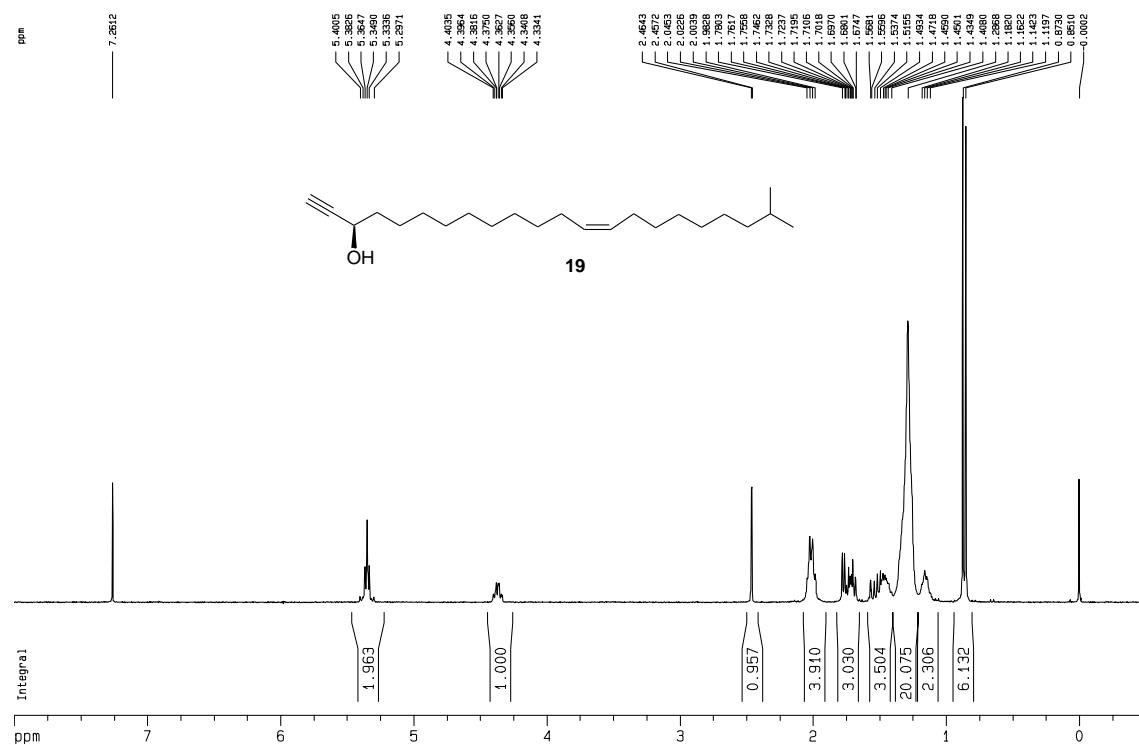
**Figure S29.**  $^1\text{H}$  NMR Spectrum of compound **18** (300 MHz,  $\text{CDCl}_3$ )



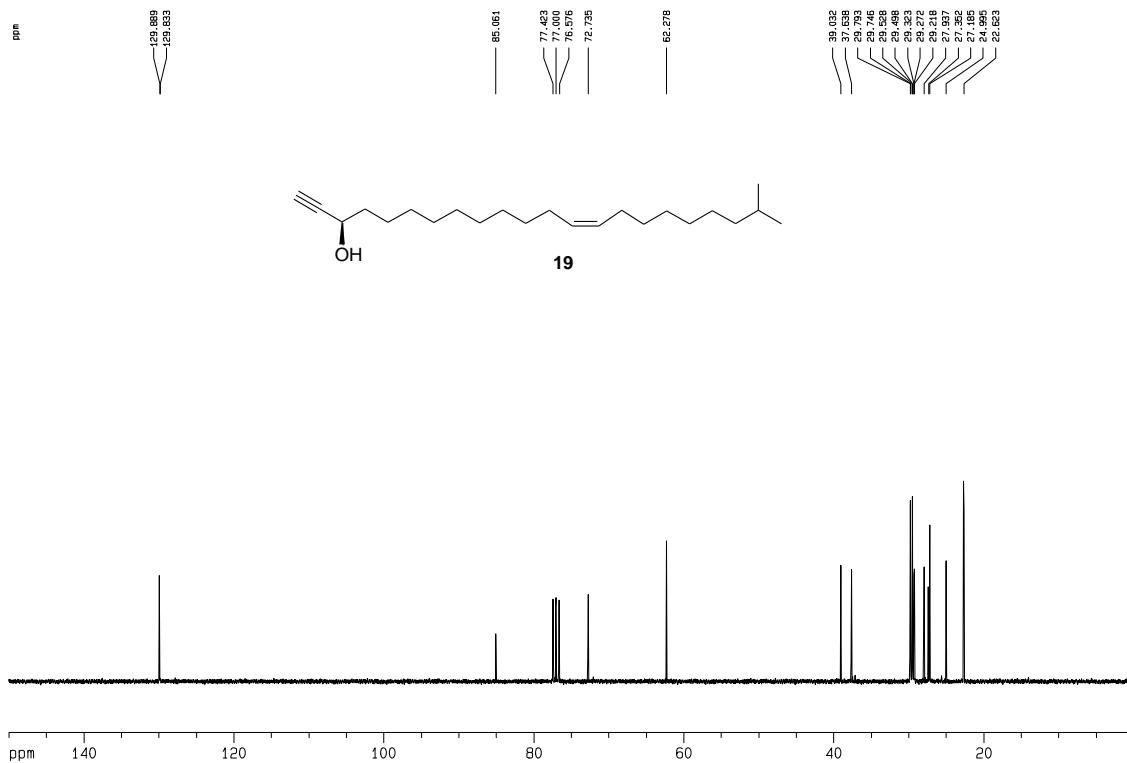
**Figure S30.**  $^{13}\text{C}$  NMR Spectrum of compound **18** (75 MHz,  $\text{CDCl}_3$ )



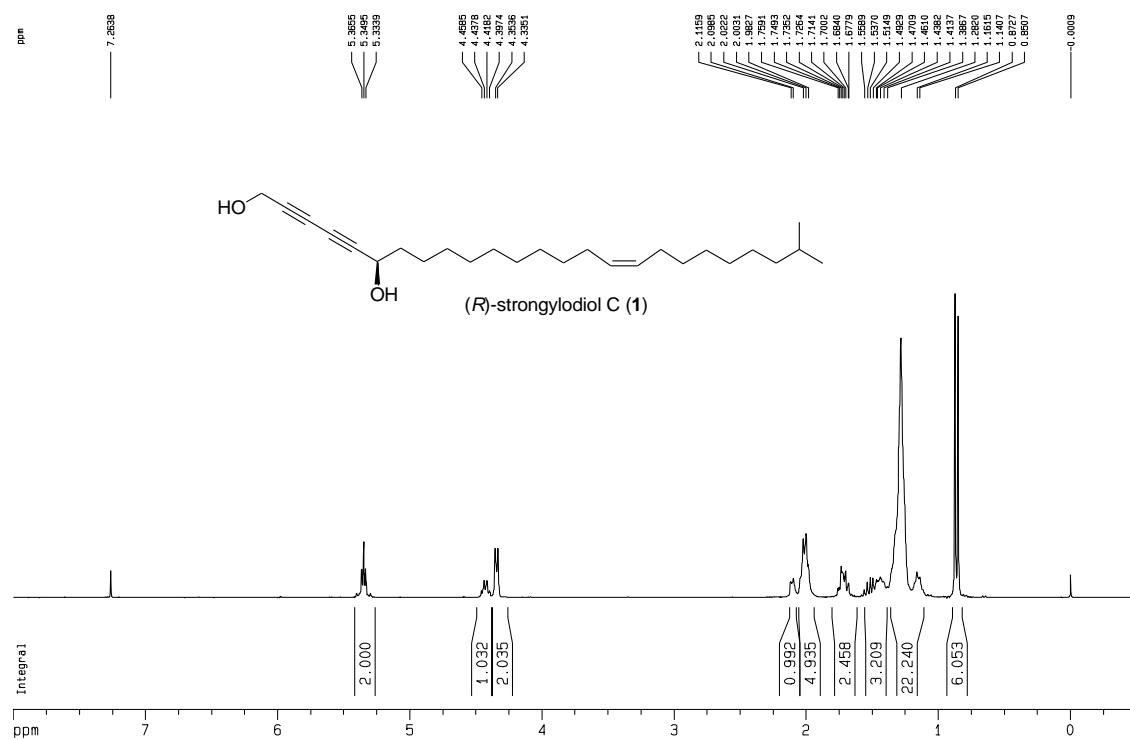
**Figure S31.**  $^1\text{H}$  NMR Spectrum of compound **19** (300 MHz,  $\text{CDCl}_3$ )



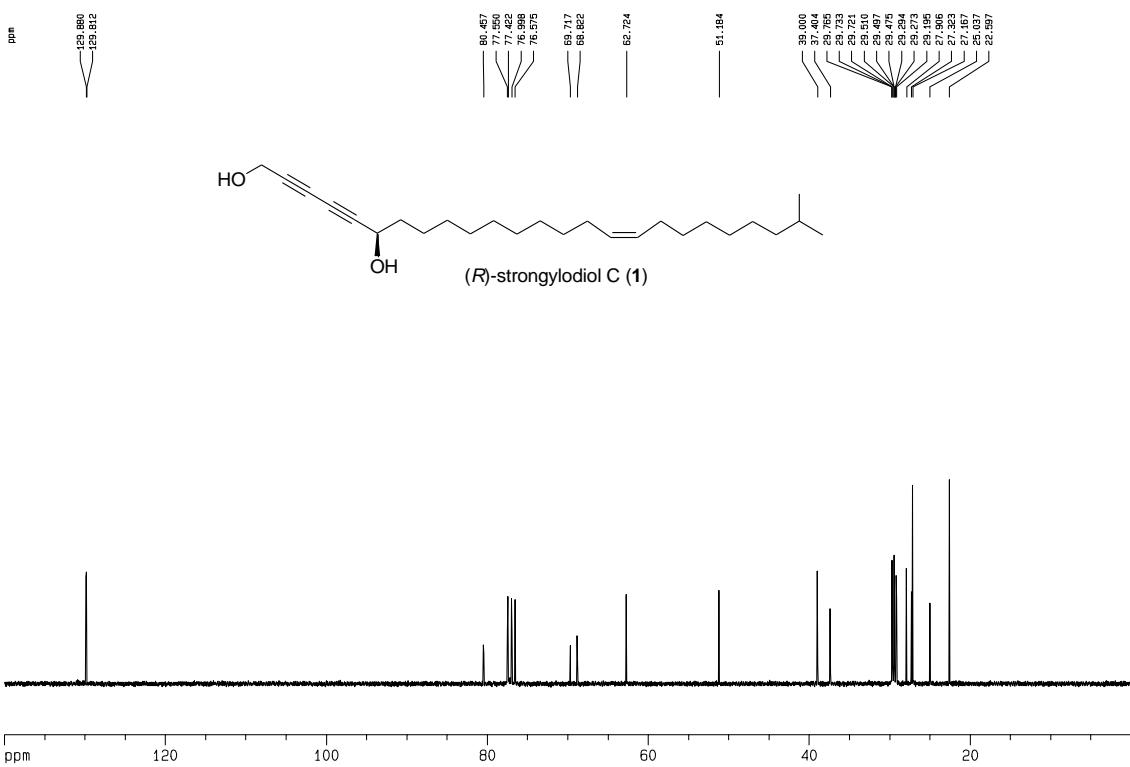
**Figure S32.**  $^{13}\text{C}$  NMR Spectrum of compound **19** (75 MHz,  $\text{CDCl}_3$ )



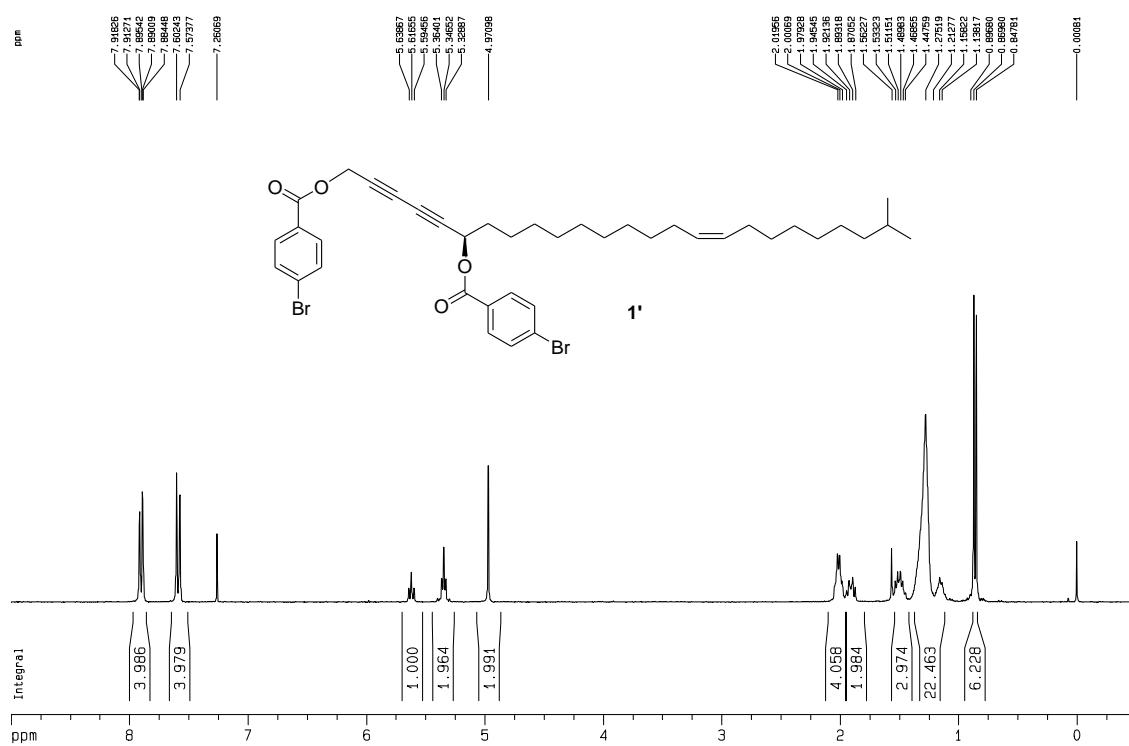
**Figure S33.**  $^1\text{H}$  NMR Spectrum of (*R*)-strongylodiol C (**1**) (300 MHz,  $\text{CDCl}_3$ )



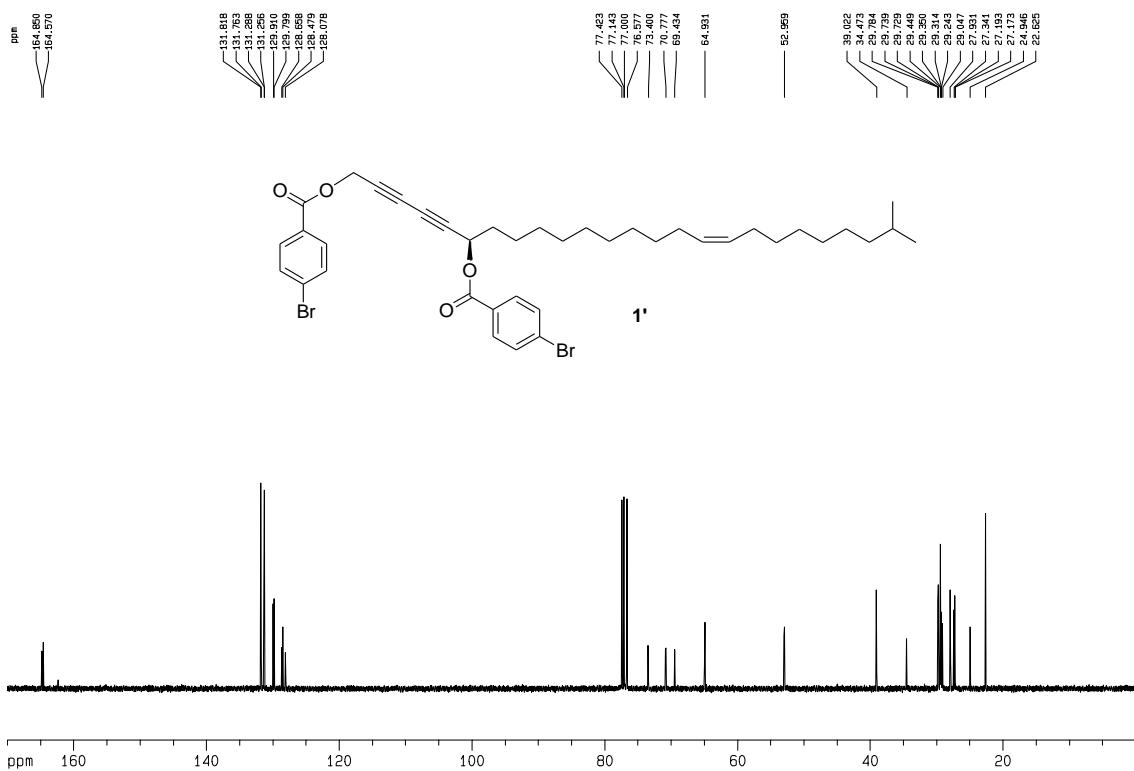
**Figure S34.**  $^{13}\text{C}$  NMR Spectrum of (*R*)-strongylodiol C (**1**) (75 MHz,  $\text{CDCl}_3$ )



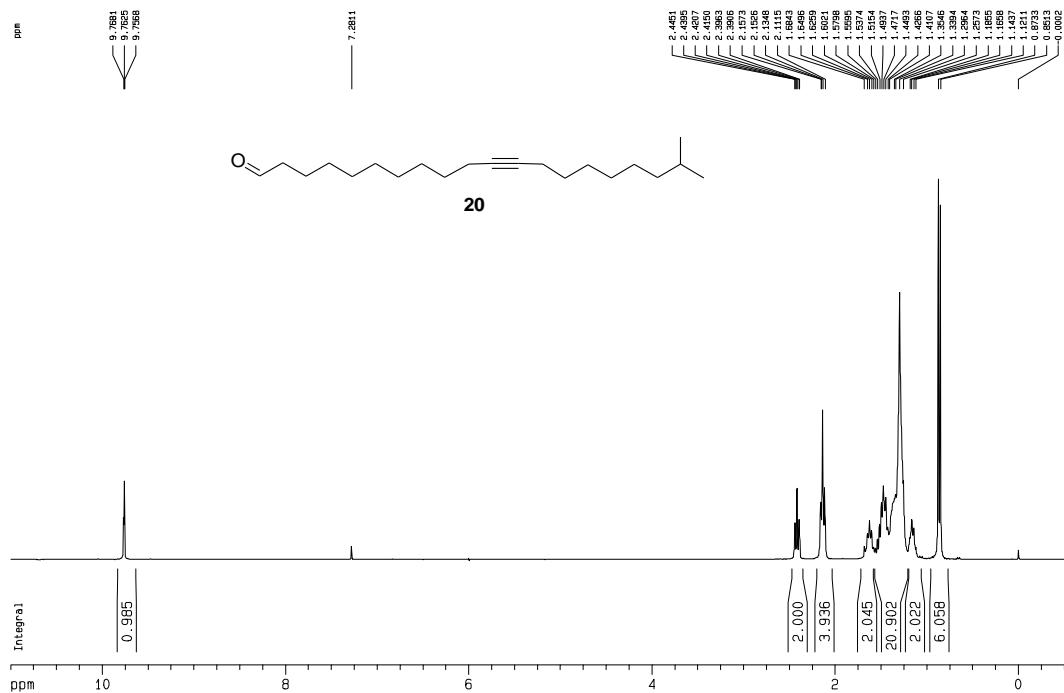
**Figure S35.**  $^1\text{H}$  NMR Spectrum of compound **1'** (300 MHz,  $\text{CDCl}_3$ )



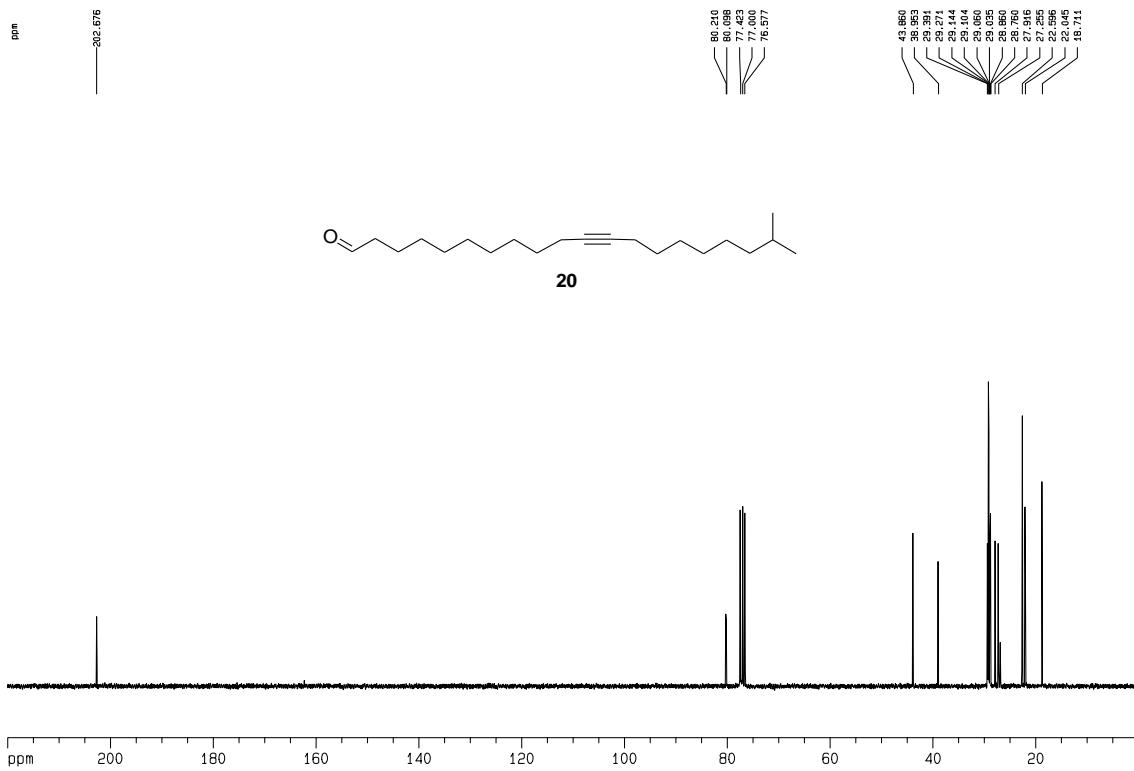
**Figure S36.**  $^{13}\text{C}$  NMR Spectrum of compound **1'** (75 MHz,  $\text{CDCl}_3$ )



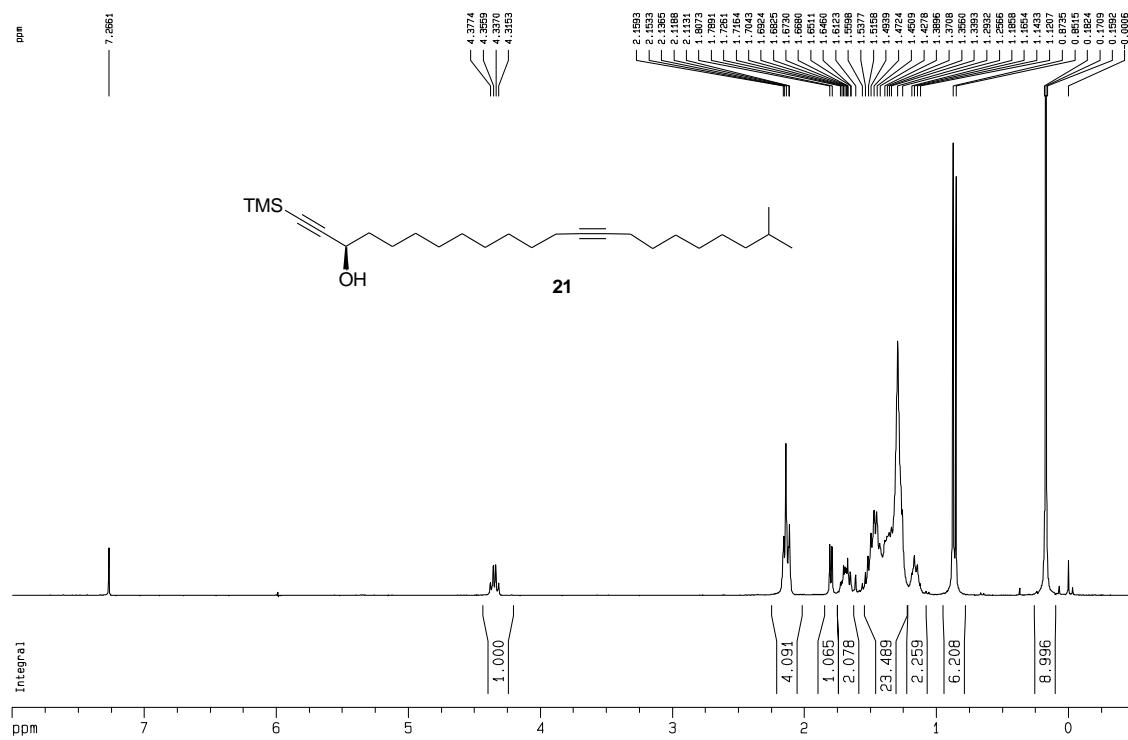
**Figure S37.**  $^1\text{H}$  NMR Spectrum of compound **20** (300 MHz,  $\text{CDCl}_3$ )



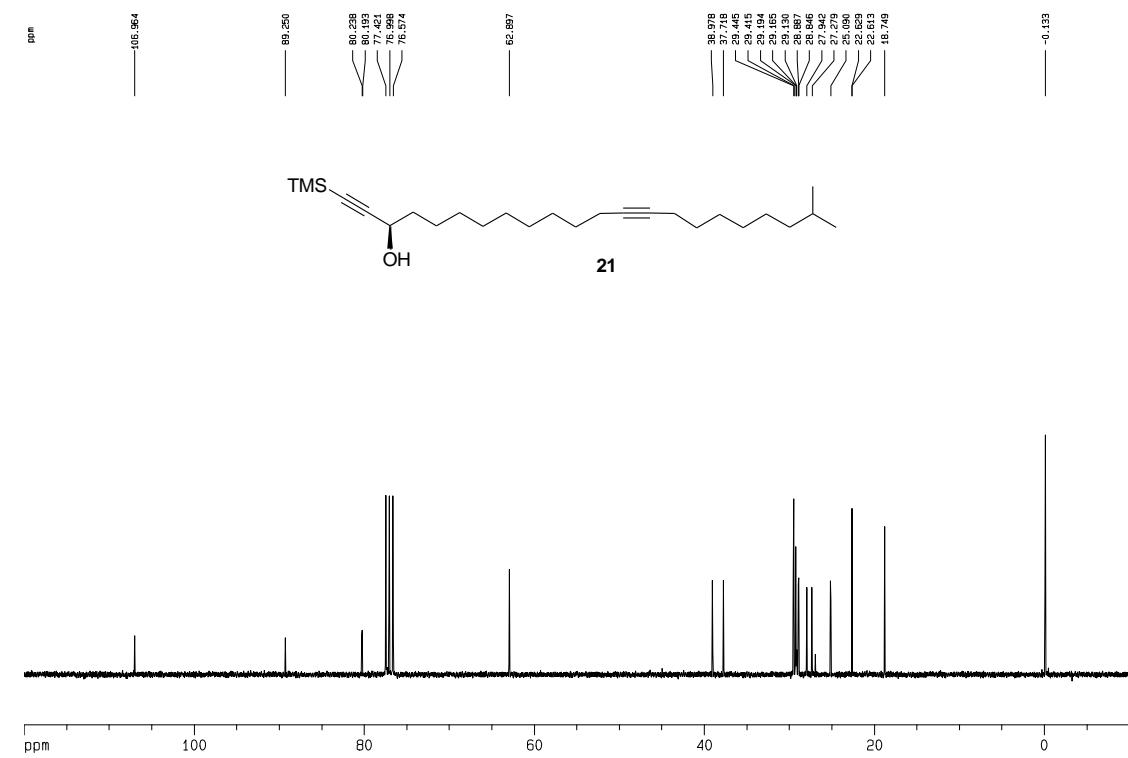
**Figure S38.**  $^{13}\text{C}$  NMR Spectrum of compound **20** (75 MHz,  $\text{CDCl}_3$ )



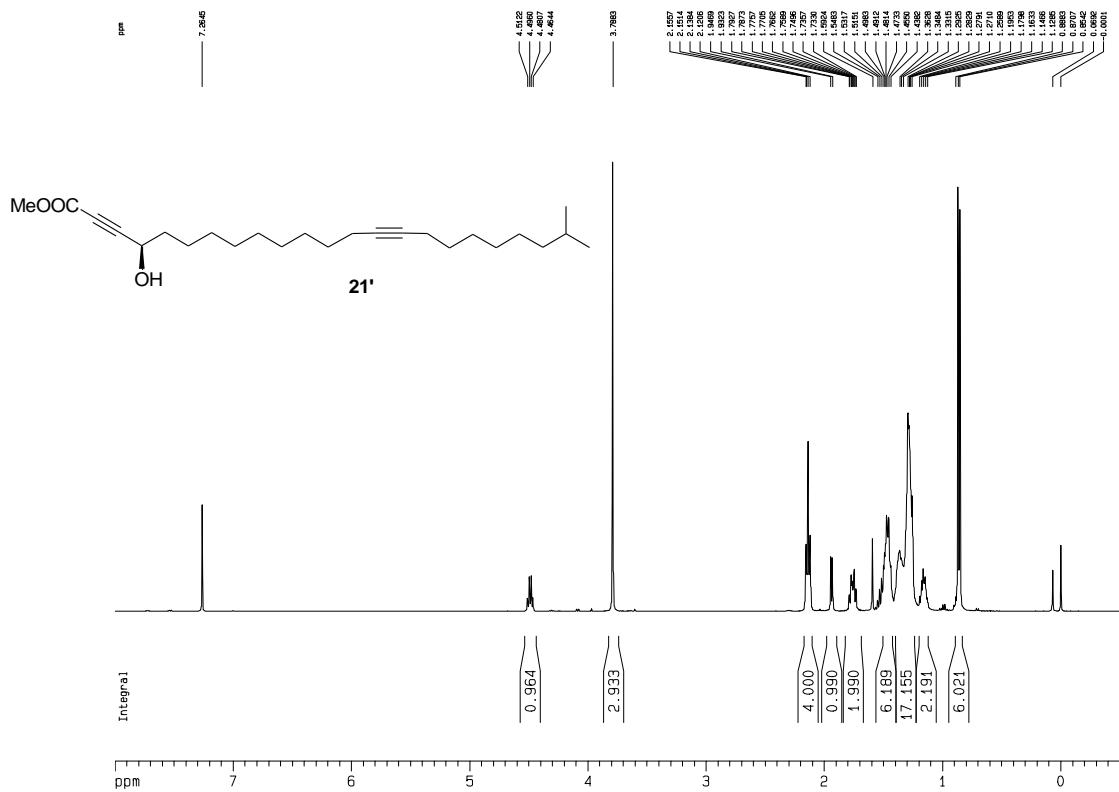
**Figure S39.**  $^1\text{H}$  NMR Spectrum of compound **21** (300 MHz,  $\text{CDCl}_3$ )



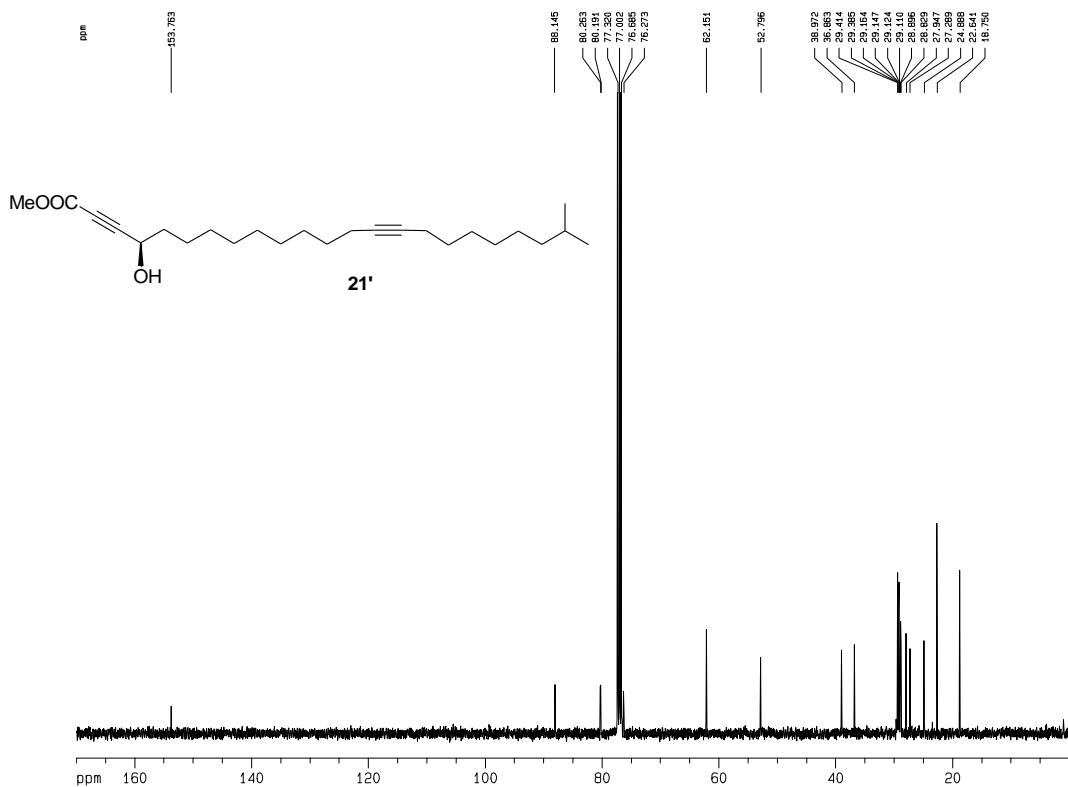
**Figure S40.**  $^{13}\text{C}$  NMR Spectrum of compound **21** (75 MHz,  $\text{CDCl}_3$ )



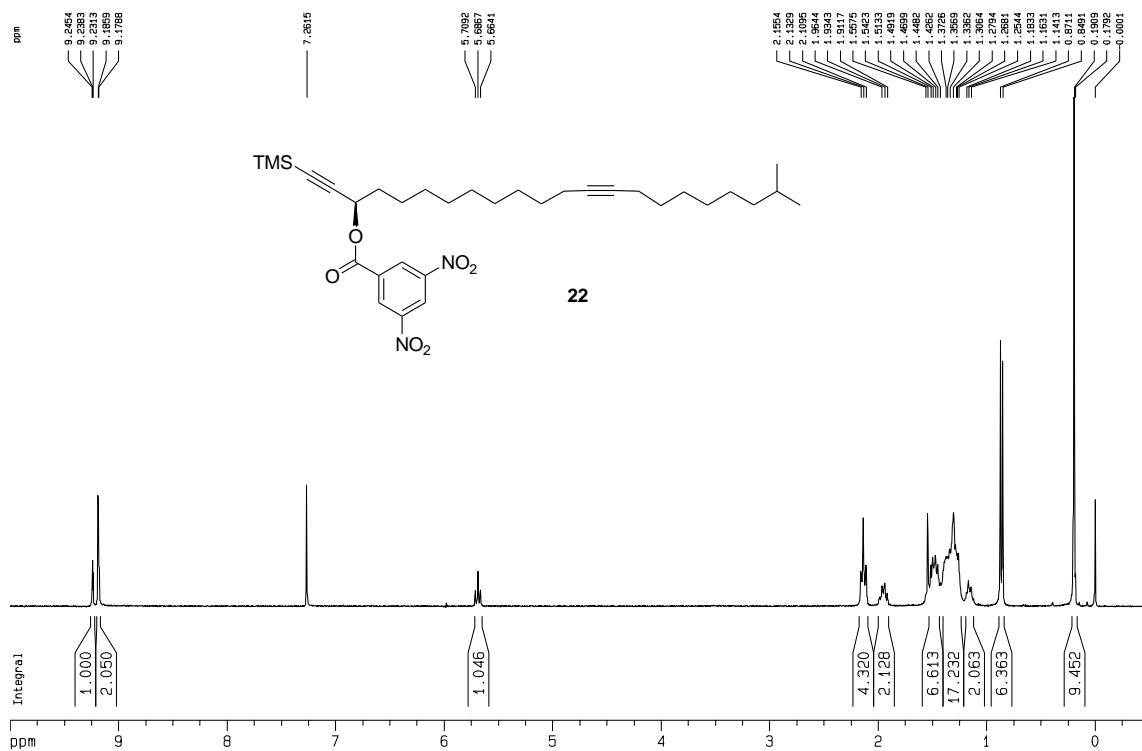
**Figure S41.**  $^1\text{H}$  NMR Spectrum of compound **21'** (400 MHz,  $\text{CDCl}_3$ )



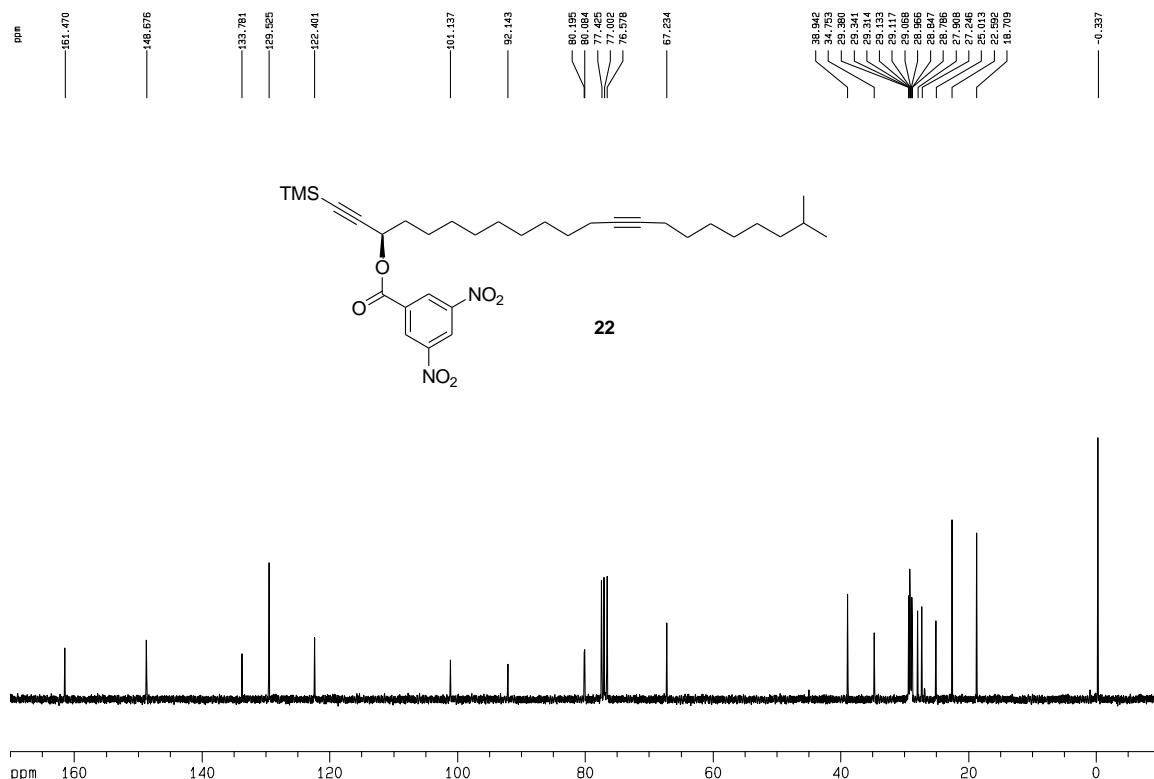
**Figure S42.**  $^{13}\text{C}$  NMR Spectrum of compound **21'** (101 MHz,  $\text{CDCl}_3$ )



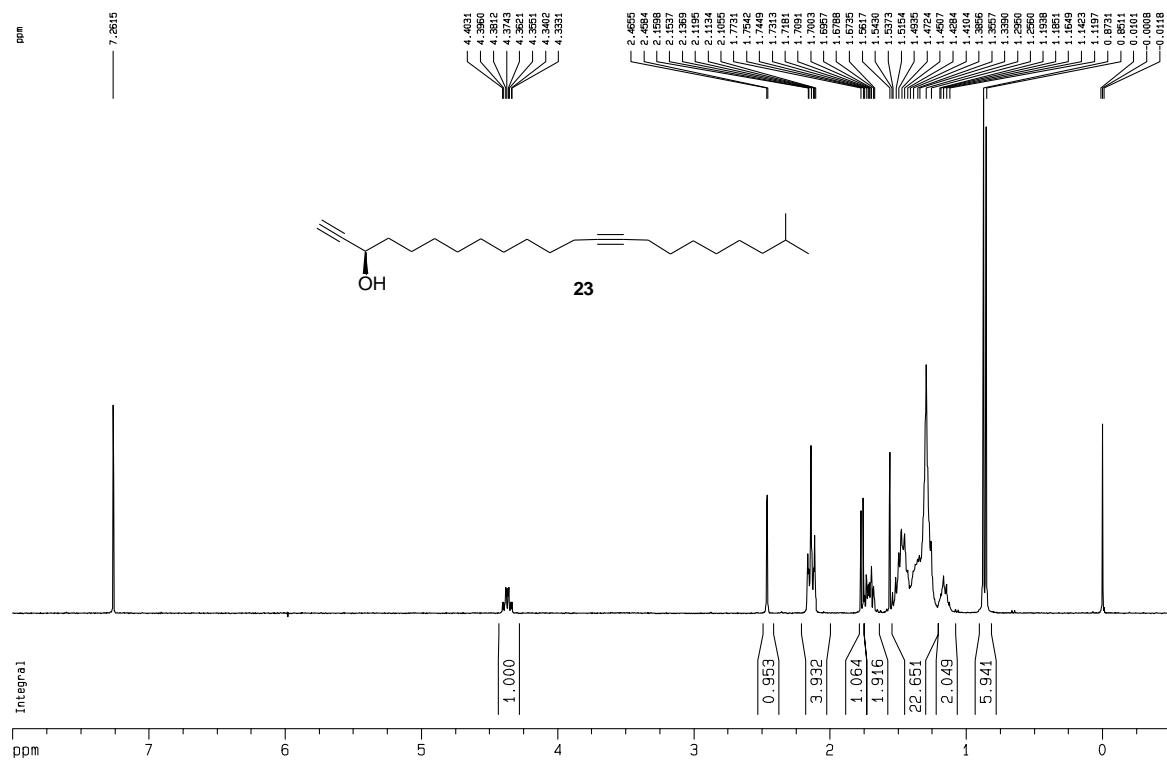
**Figure S43.**  $^1\text{H}$  NMR Spectrum of compound **22** (300 MHz,  $\text{CDCl}_3$ )



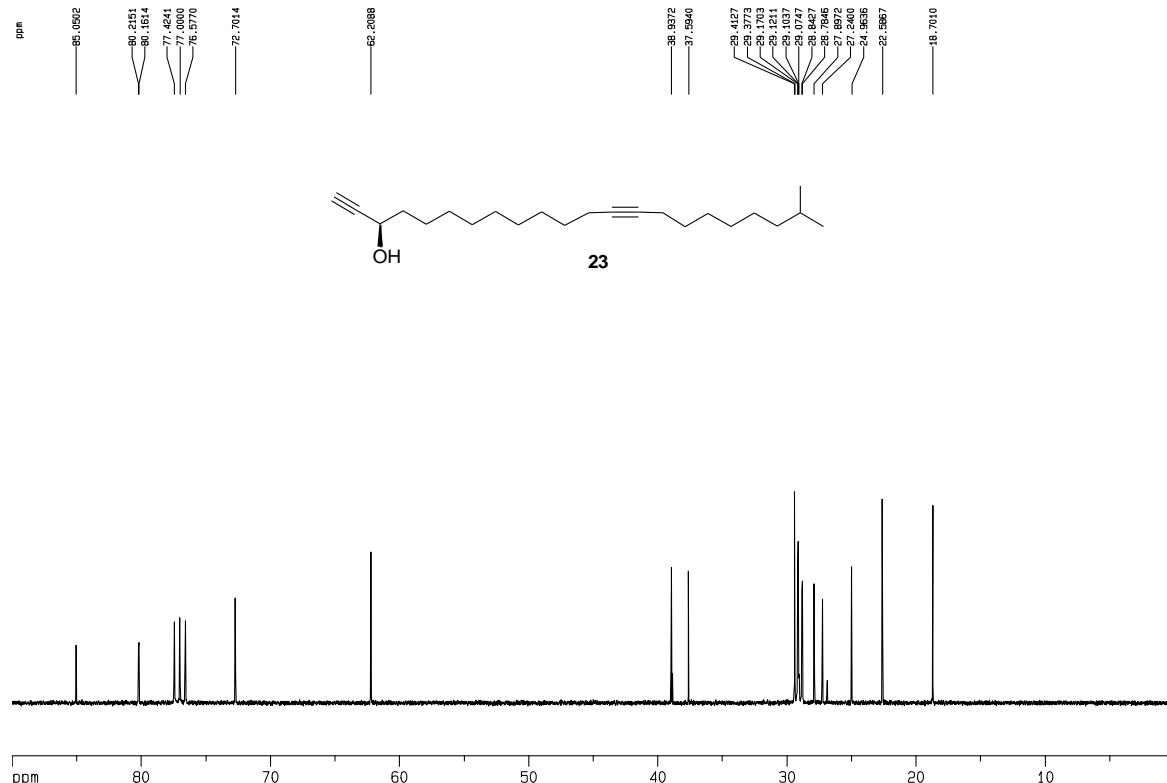
**Figure S44.**  $^{13}\text{C}$  NMR Spectrum of compound **22** (75 MHz,  $\text{CDCl}_3$ )



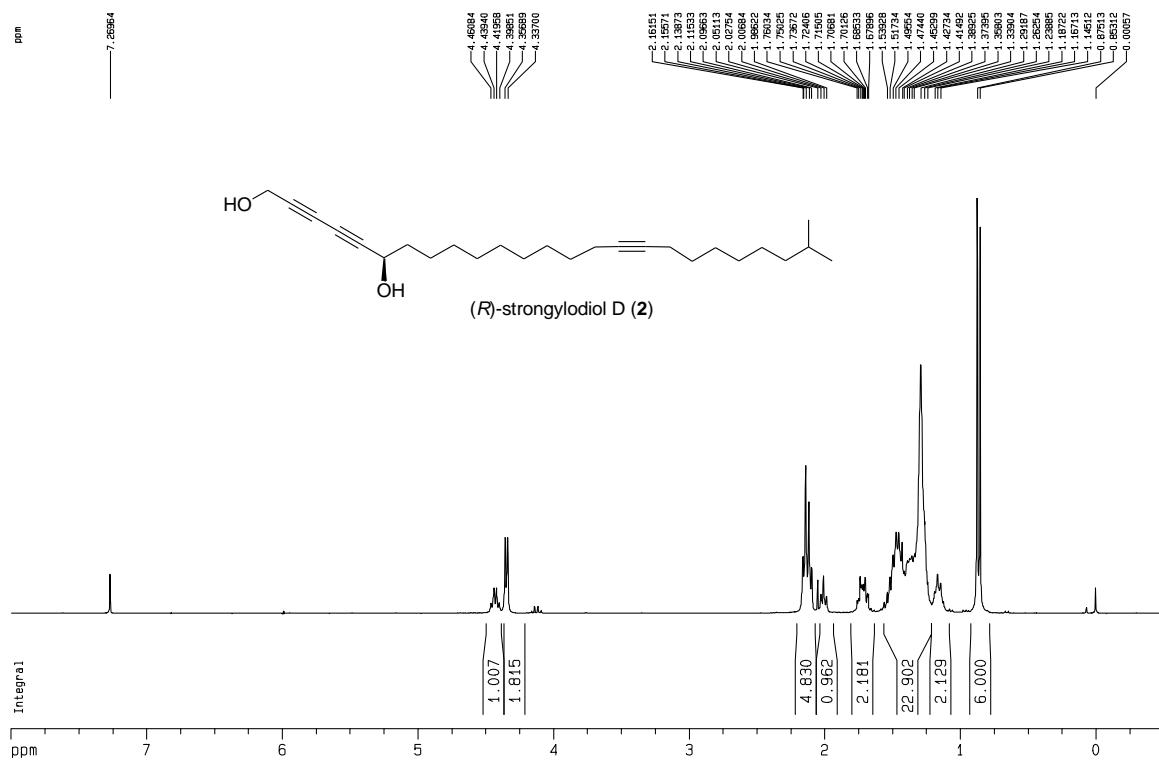
**Figure S45.**  $^1\text{H}$  NMR Spectrum of compound **23** (300 MHz,  $\text{CDCl}_3$ )



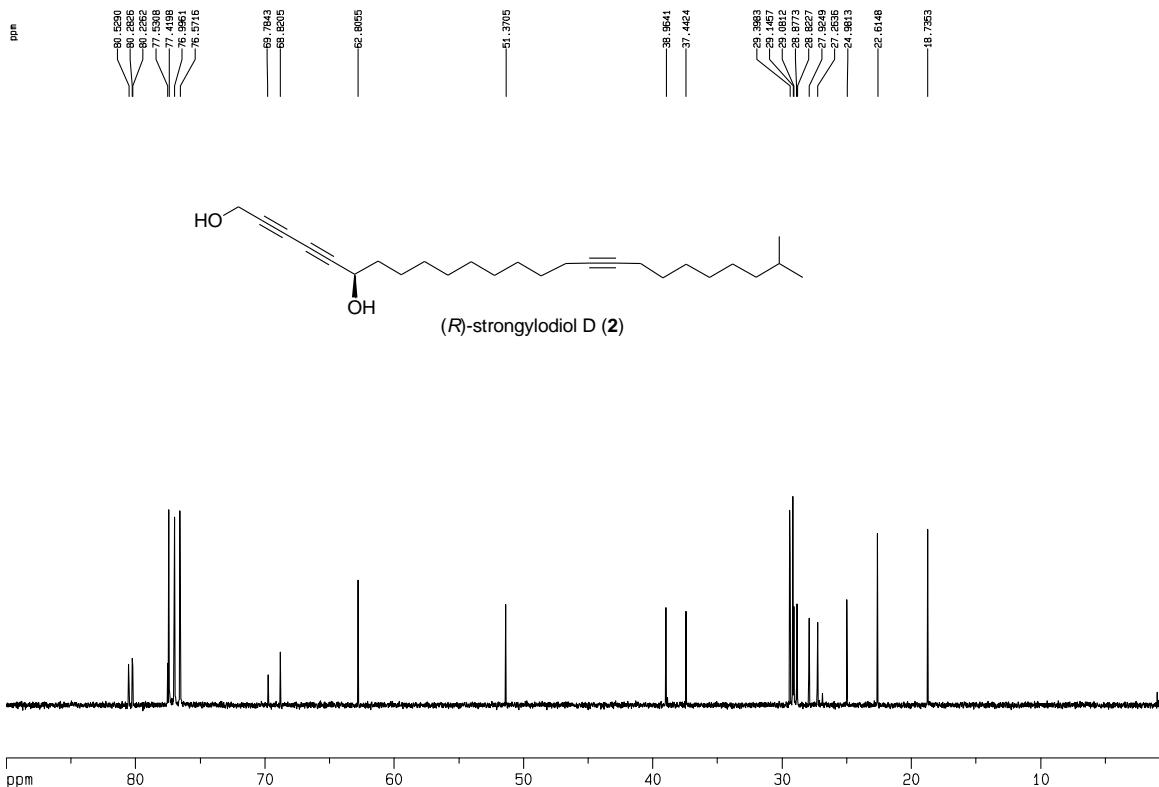
**Figure S46.**  $^{13}\text{C}$  NMR Spectrum of compound **23** (75 MHz,  $\text{CDCl}_3$ )



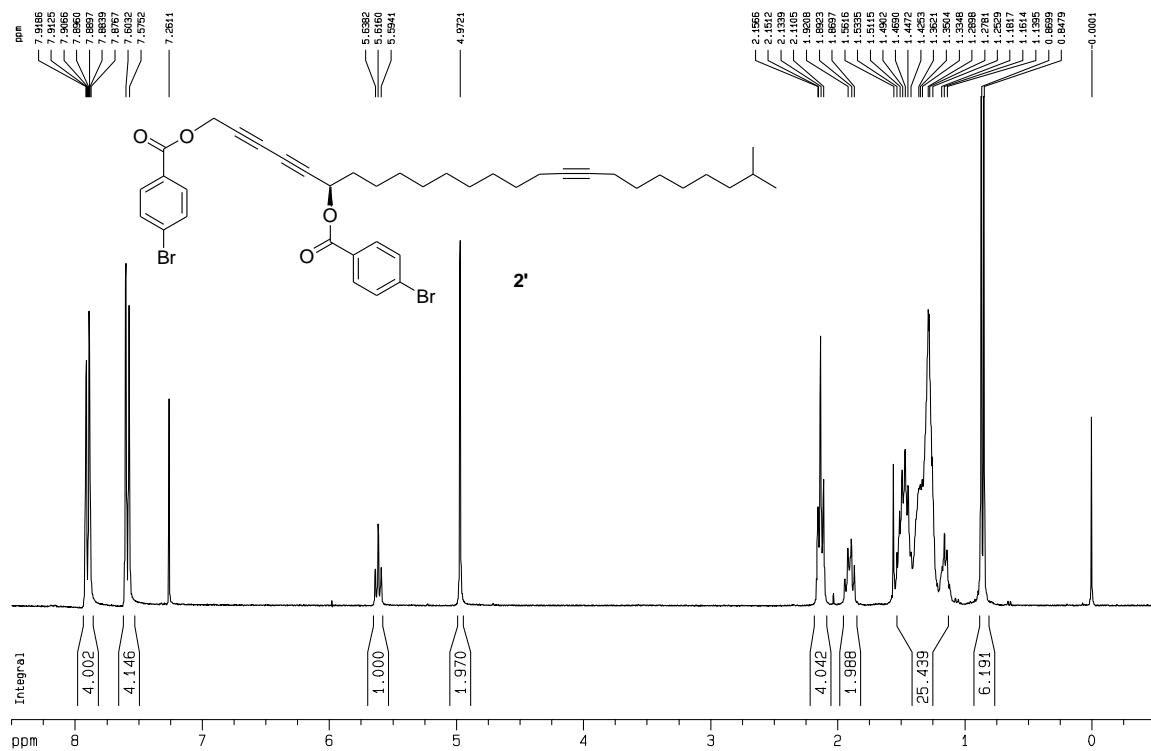
**Figure S47.**  $^1\text{H}$  NMR Spectrum of (*R*)-strongylodiol D (**2**) (300 MHz,  $\text{CDCl}_3$ )



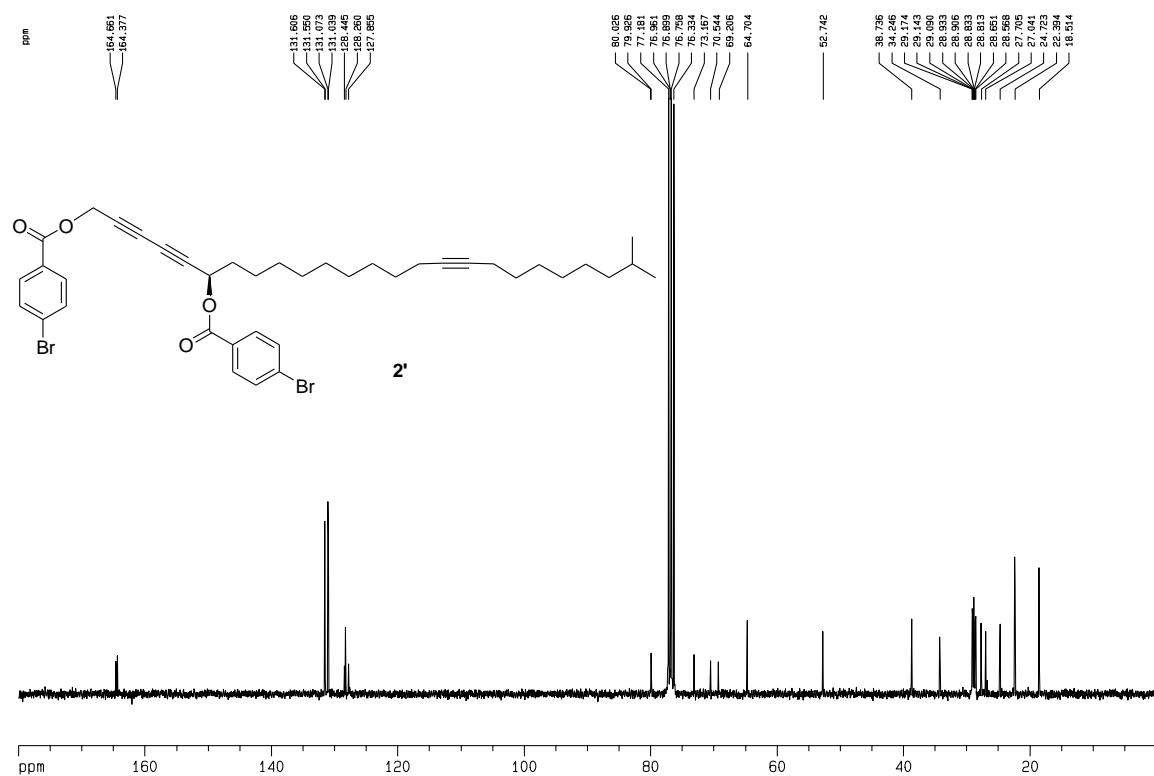
**Figure S48.**  $^{13}\text{C}$  NMR Spectrum of (*R*)-strongylodiol D (**2**) (75 MHz,  $\text{CDCl}_3$ )



**Figure S49.**  $^1\text{H}$  NMR Spectrum of compound **2'** (300 MHz,  $\text{CDCl}_3$ )

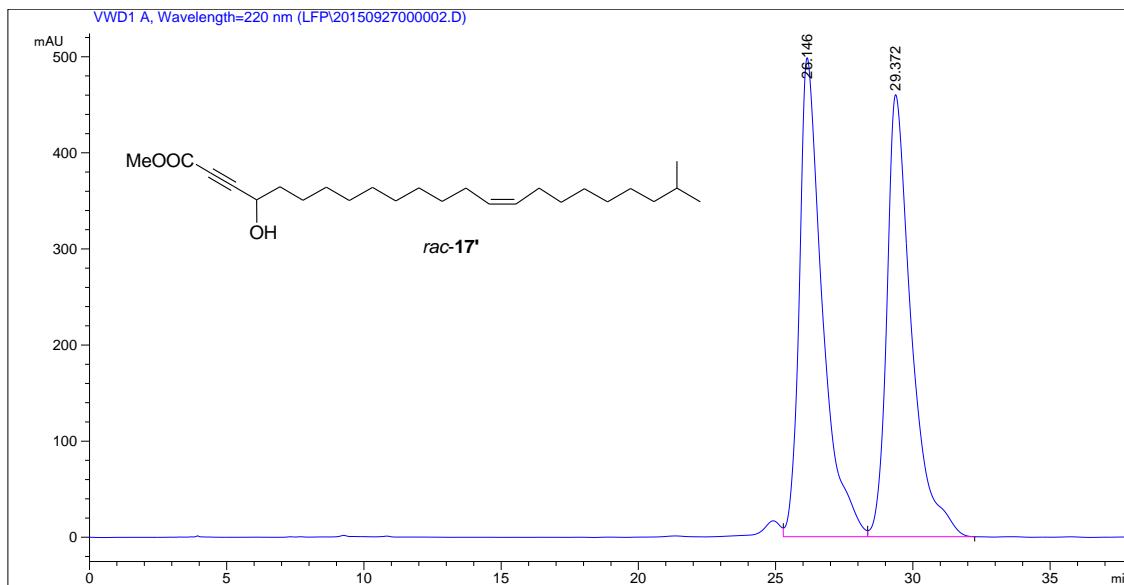


**Figure S50.**  $^{13}\text{C}$  NMR Spectrum of compound **2'** (75 MHz,  $\text{CDCl}_3$ )



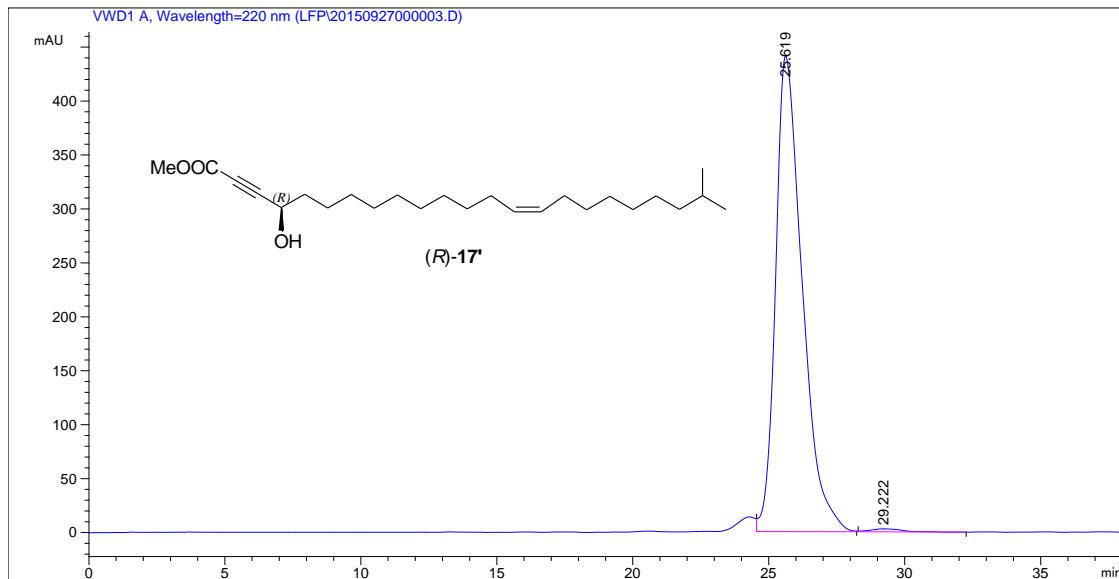
## 4. HPLC Chromatography of the Products

Figure S51. HPLC Chromatography of racemic **17'** (Phenomenex Lux Cellulose-1 column, 1% 2-propanol in *n*-hexane, 1 mL/min, 220 nm)



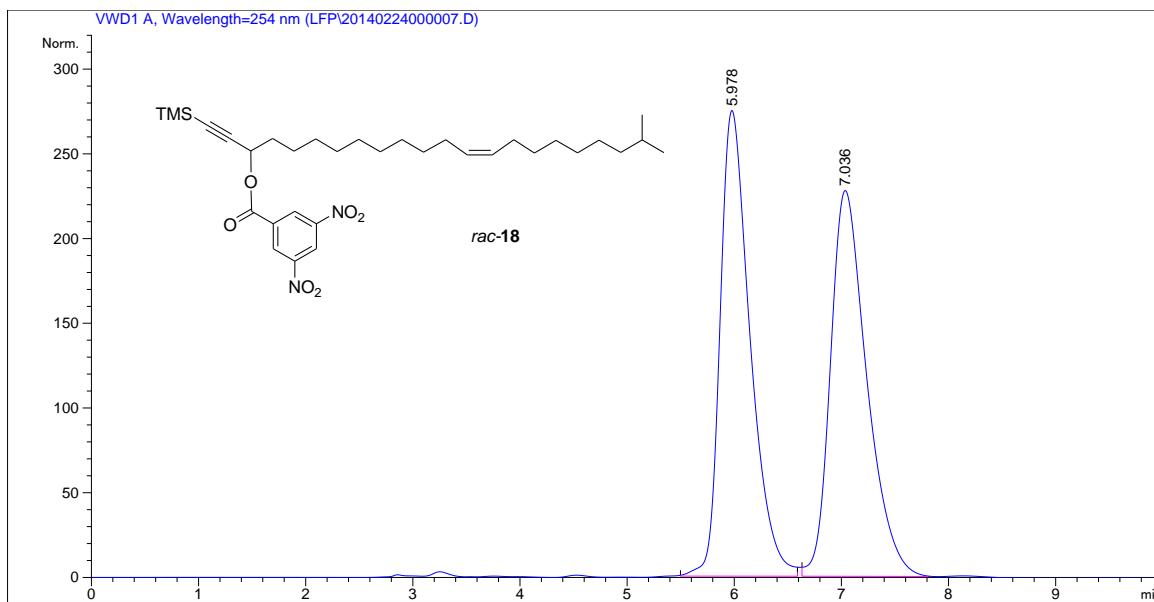
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	26.146	VV	0.8488	2.91655e4	498.32272	50.5310
2	29.372	VB	0.9005	2.85526e4	459.89874	49.4690
Totals :						5.77181e4 958.22147

Figure S52. HPLC Chromatography of (*R*)-**17'** (Phenomenex Lux Cellulose-1 column, 1% 2-propanol in *n*-hexane, 1 mL/min, 220 nm)

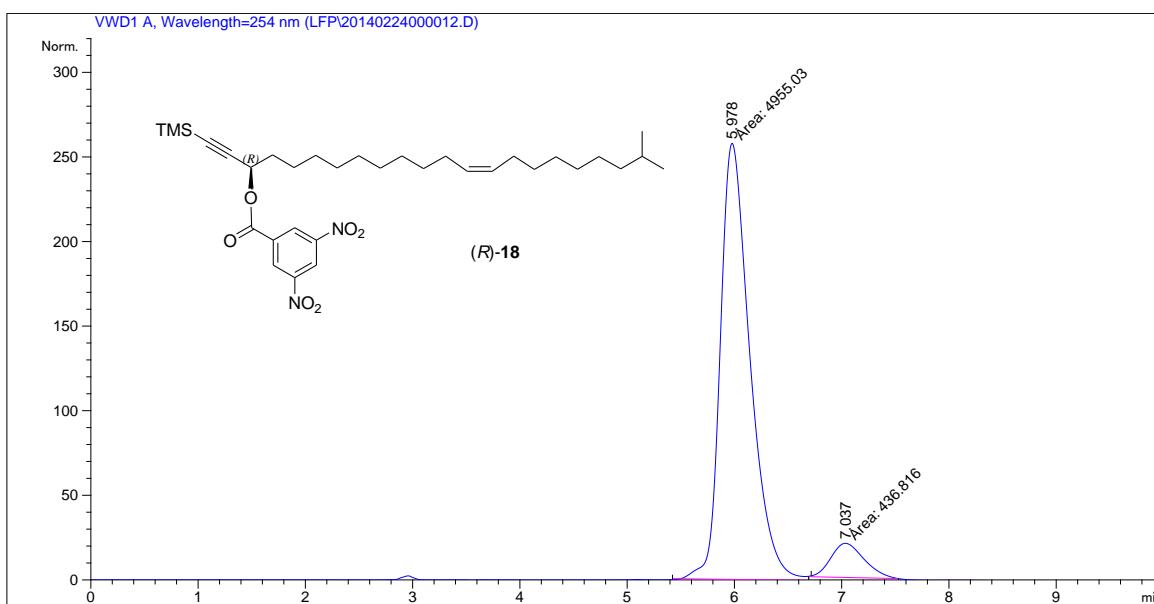


Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	25.619	VB	1.0071	3.00145e4	440.72470	99.2408
2	29.222	BB	0.9697	229.60719	2.80871	0.7592
Totals :						3.02441e4 443.53341

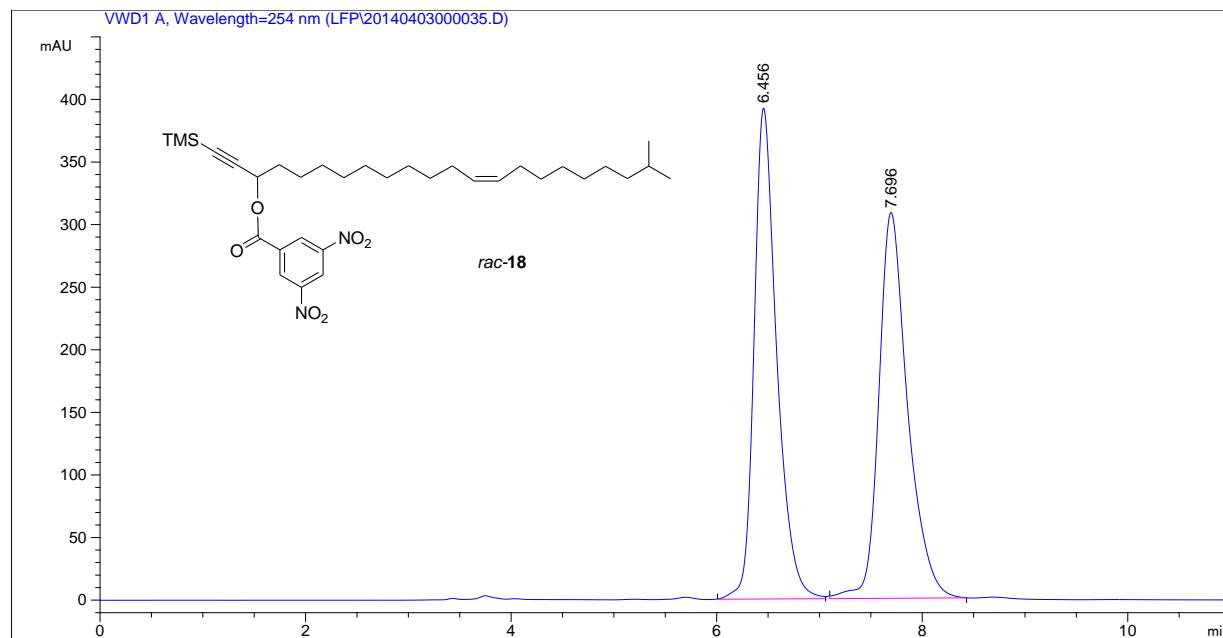
**Figure S53.** HPLC Chromatography of racemic **18** (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)



**Figure S54.** HPLC Chromatography of (*R*)-**18** before recrystallization (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)

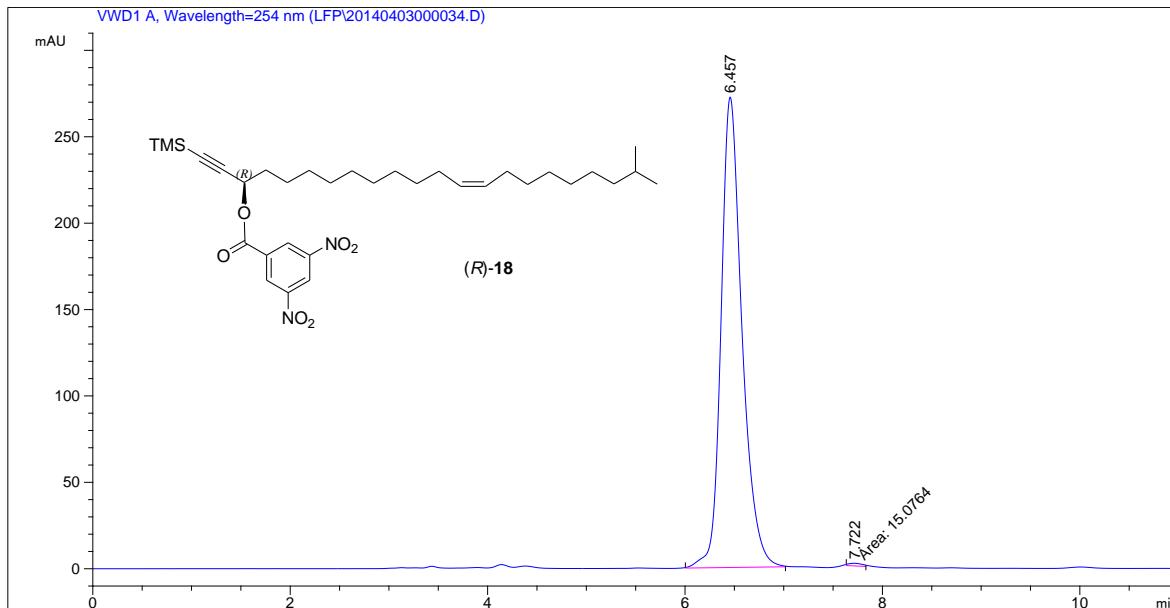


**Figure S55.** HPLC Chromatography of racemic **18** (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)



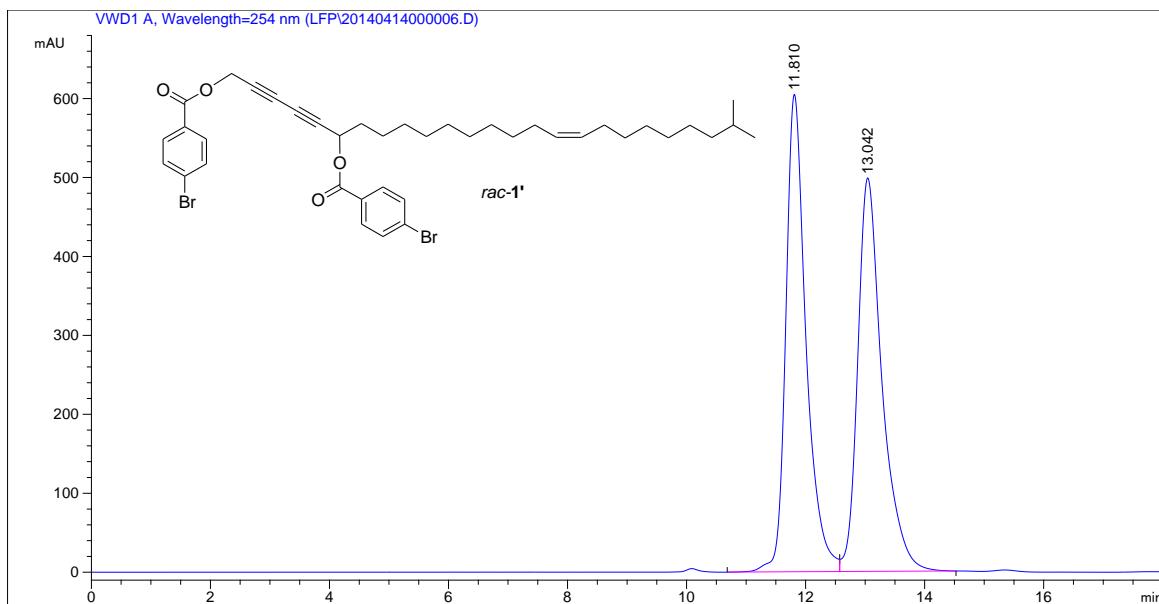
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height [mAU]	Area %
1	6.456	BB	0.2297	6010.04590	392.24280	49.9510
2	7.696	BB	0.2905	6021.83154	308.24399	50.0490

**Figure S56.** HPLC Chromatography of (*R*)-**18** after recrystallization (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)

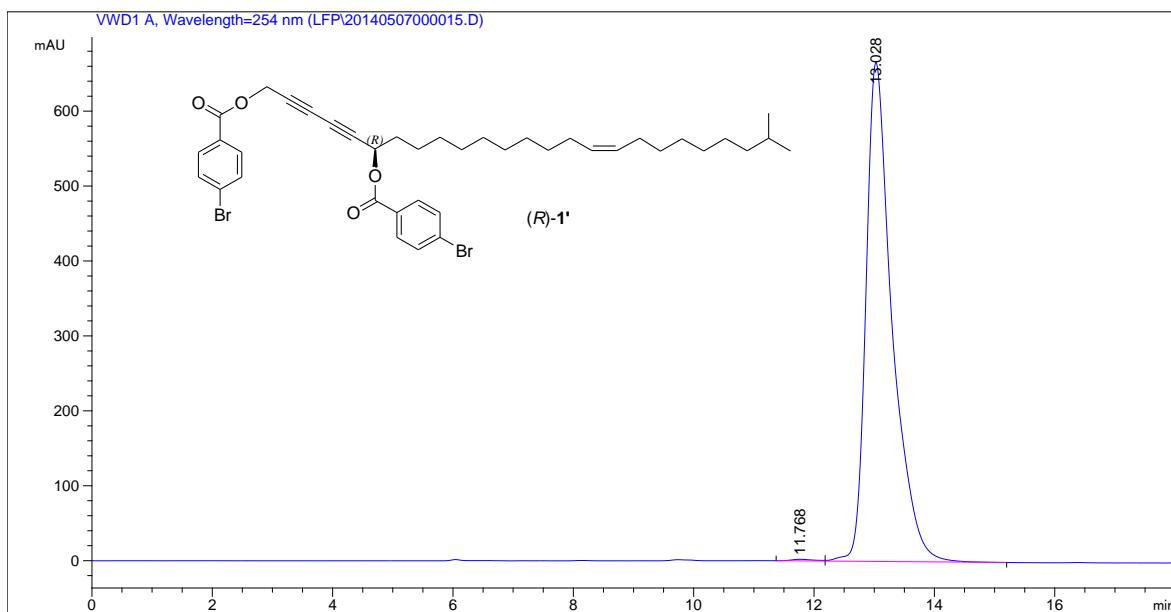


Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height [mAU]	Area %
1	6.457	BB	0.2217	4019.05444	272.32620	99.6263
2	7.722	MM	0.1596	15.07639	1.57461	0.3737

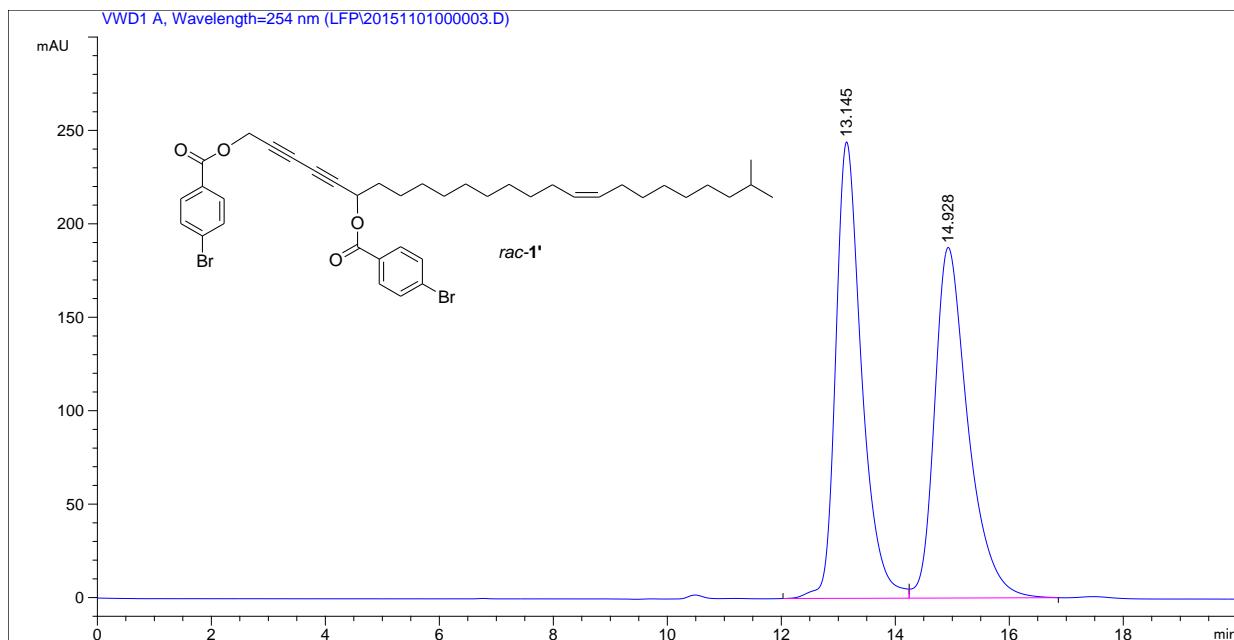
**Figure S57.** HPLC Chromatography of racemic **1'** (R&C OD column, 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



**Figure S58.** HPLC Chromatography of (*R*)-**1'** derived from **17** (R&C OD column, 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)

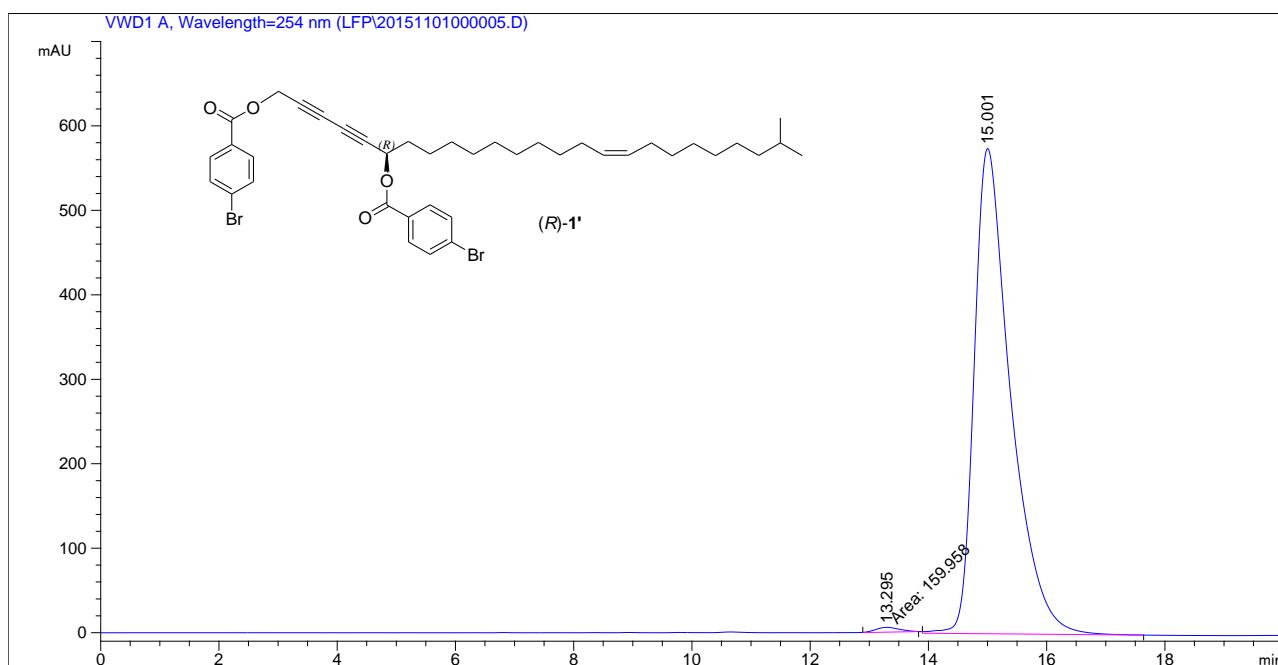


**Figure S59.** HPLC Chromatography of racemic **1'** (R&C OD column, 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



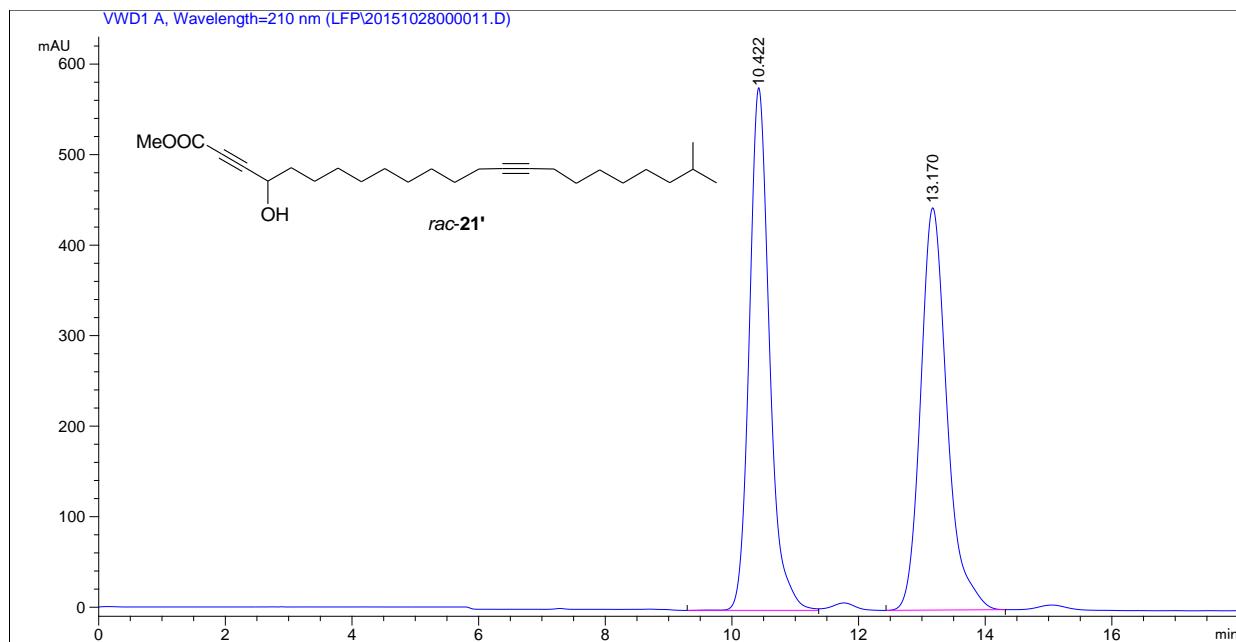
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.145	BV	0.4758	7738.90479	244.32750	50.2933
2	14.928	VB	0.6123	7648.62842	187.69089	49.7067
Totals :						1.53875e4 432.01839

**Figure S60.** HPLC Chromatography of *(R)*-**1'** derived from **17'** (R&C OD column, 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



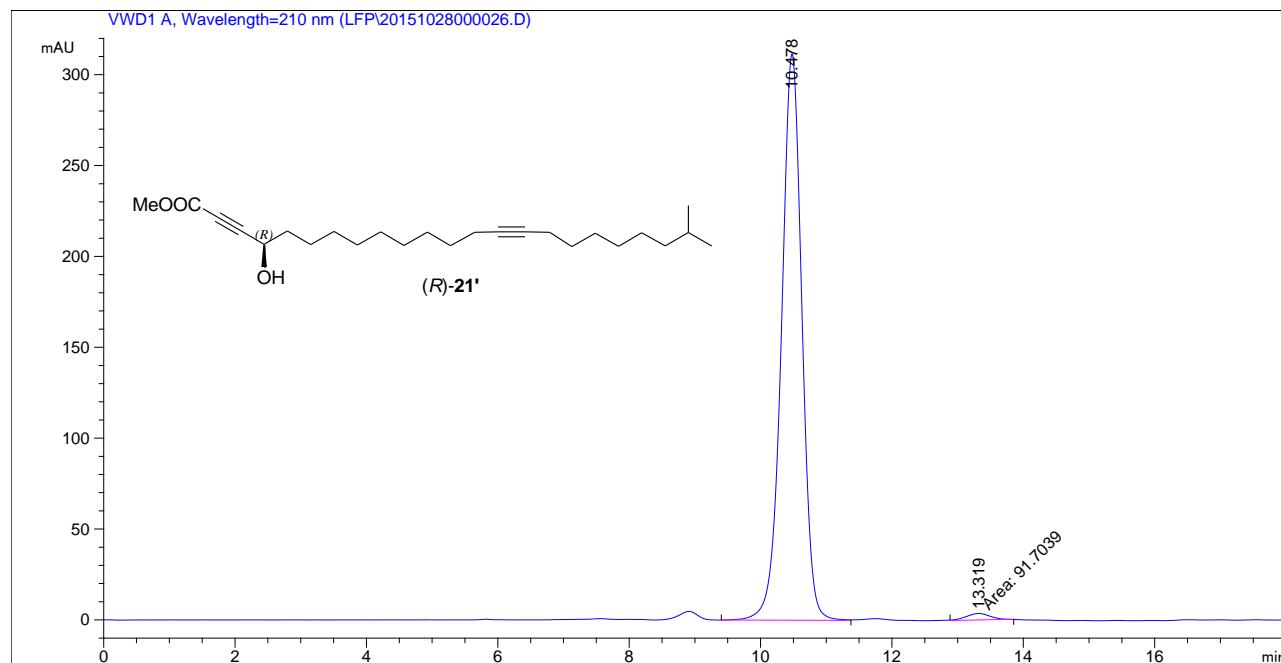
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.295	MM	0.4693	159.95828	5.68022	0.6463
2	15.001	VB	0.6304	2.45900e4	574.45239	99.3537
Totals :						2.47500e4 580.13262

**Figure S61.** HPLC Chromatography of racemic **21'** (Phenomenex Lux Cellulose-1 column, 4% 2-propanol in *n*-hexane, 1 mL/min, 210 nm)



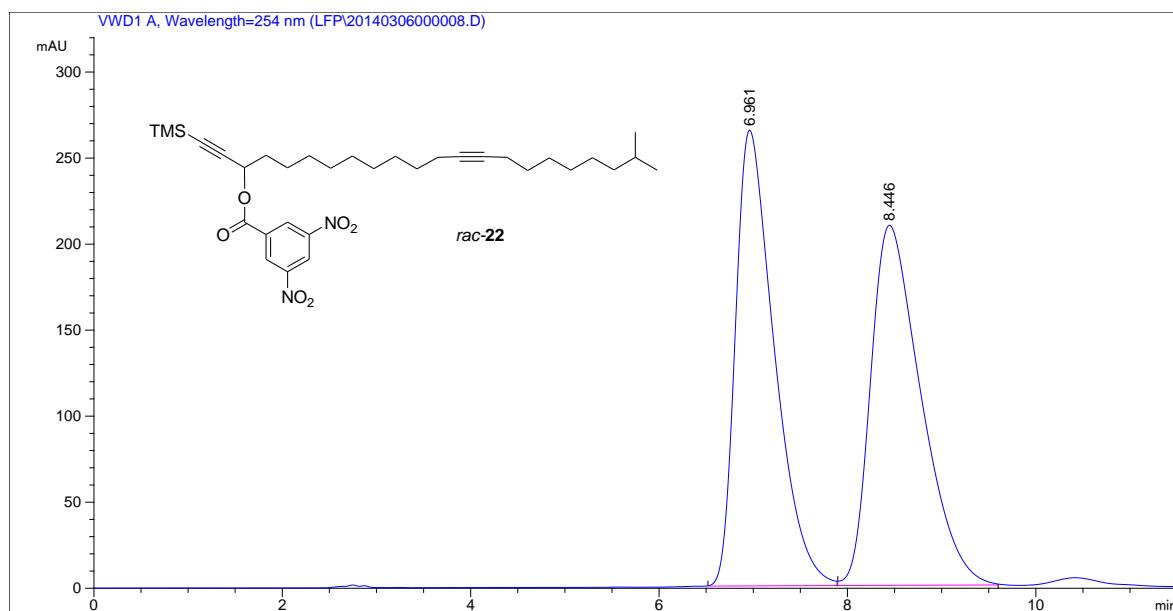
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	10.422	VV	0.3368	1.27828e4	577.60651	49.8869
2	13.170	BB	0.4419	1.28408e4	444.50201	50.1131
Totals :						2.56236e4 1022.10852

**Figure S62.** HPLC Chromatography of (*R*)-**21'** (Phenomenex Lux Cellulose-1 column, 4% 2-propanol in *n*-hexane, 1 mL/min, 210 nm)



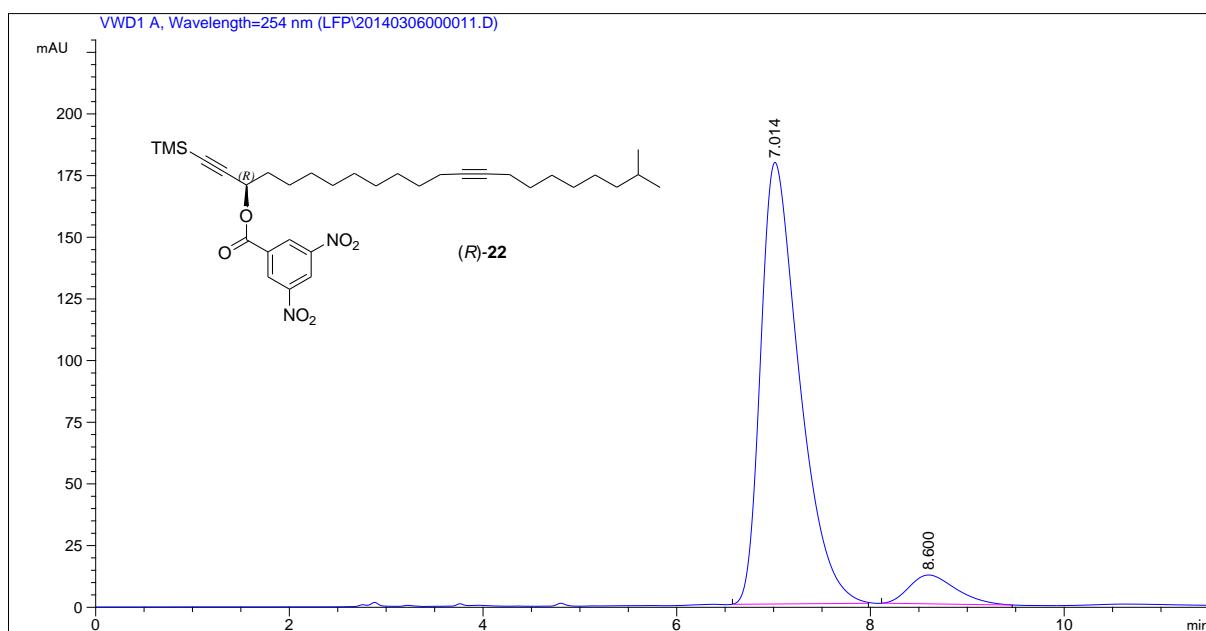
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	10.478	VB	0.3324	6739.55322	311.59113	98.6576
2	13.319	MM	0.4250	91.70388	3.59615	1.3424
Totals :						6831.25710 315.18728

**Figure S63.** HPLC Chromatography of racemic **22** (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)



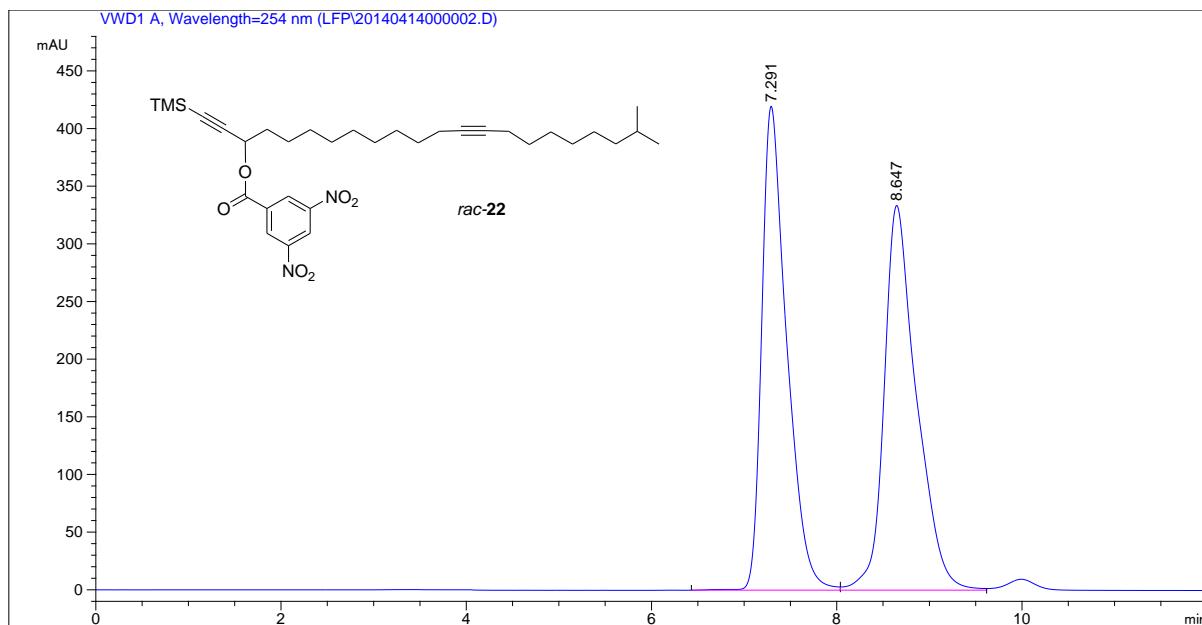
Peak	RetTime	Type	Width	Area	Height	Area
#	[min]		[min]	mAU*s	[mAU]	%
1	6.961	BB	0.4296	7574.94336	264.96817	49.4009
2	8.446	BB	0.5591	7758.67676	209.33194	50.5991

**Figure S64.** HPLC Chromatography of *(R)*-22 before recrystallization (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)

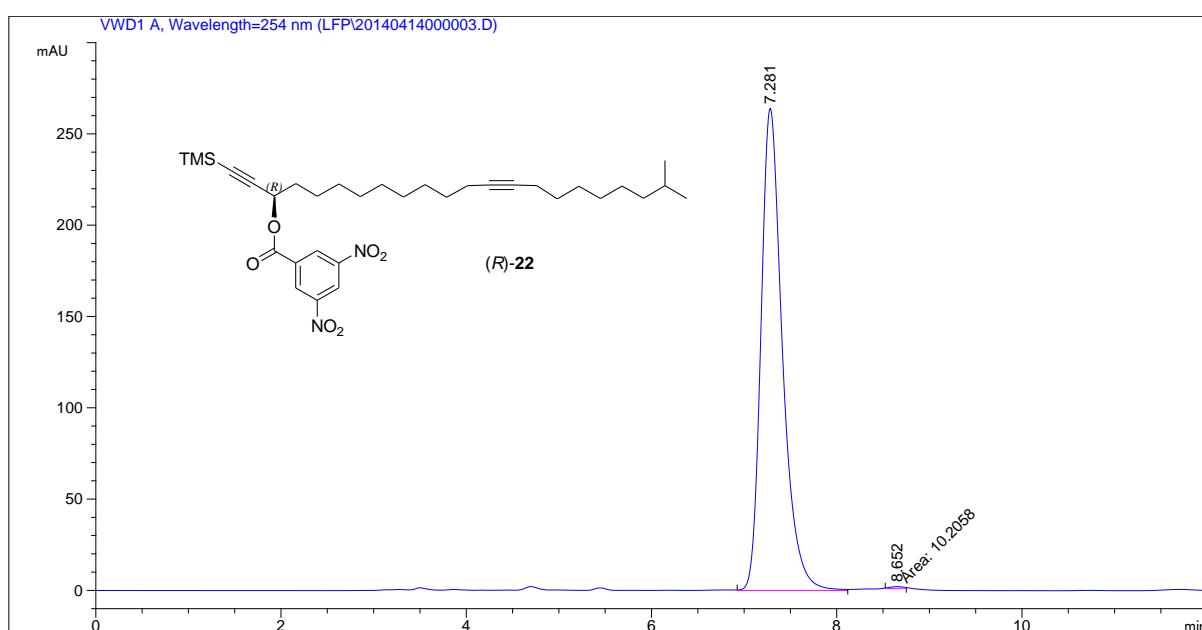


Peak	RetTime	Type	Width	Area	Height	Area
#	[min]		[min]	mAU*s	[mAU]	%
1	7.014	BB	0.4164	4961.23779	179.07372	92.6317
2	8.600	BB	0.5148	394.63675	11.73104	7.3683

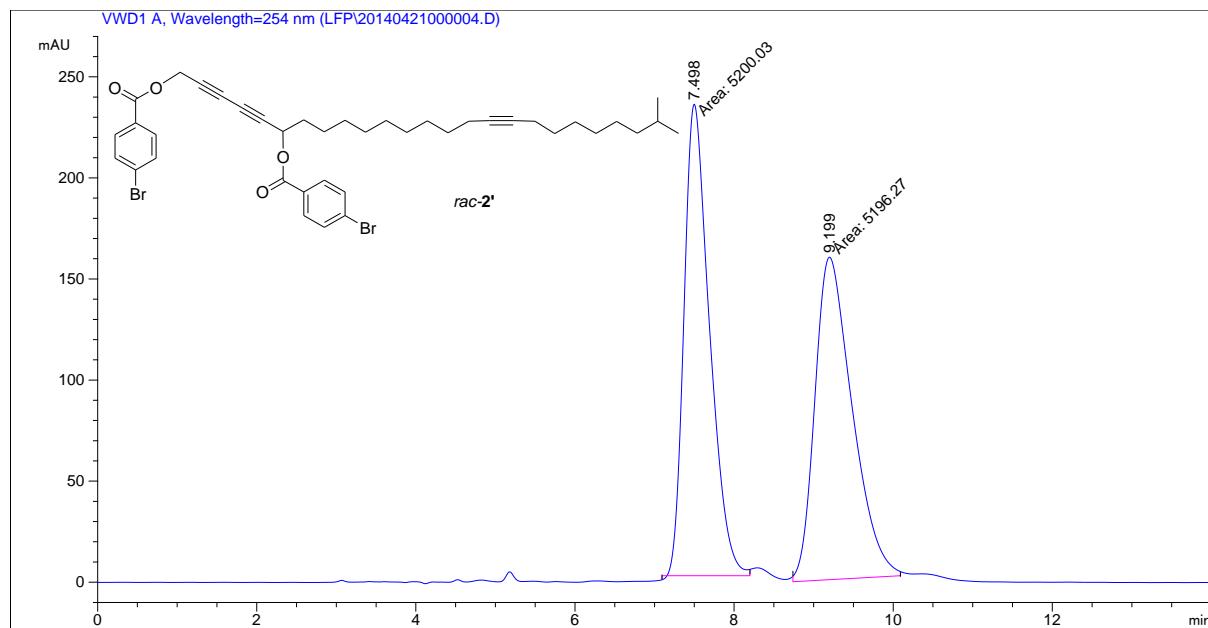
**Figure S65.** HPLC Chromatography of racemic **22** (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)



**Figure S66.** HPLC Chromatography of (*R*)-**22** after recrystallization (Daicel Chiralcel OD-H column, 10% 2-propanol in *n*-hexane, 1 mL/min, 254 nm)

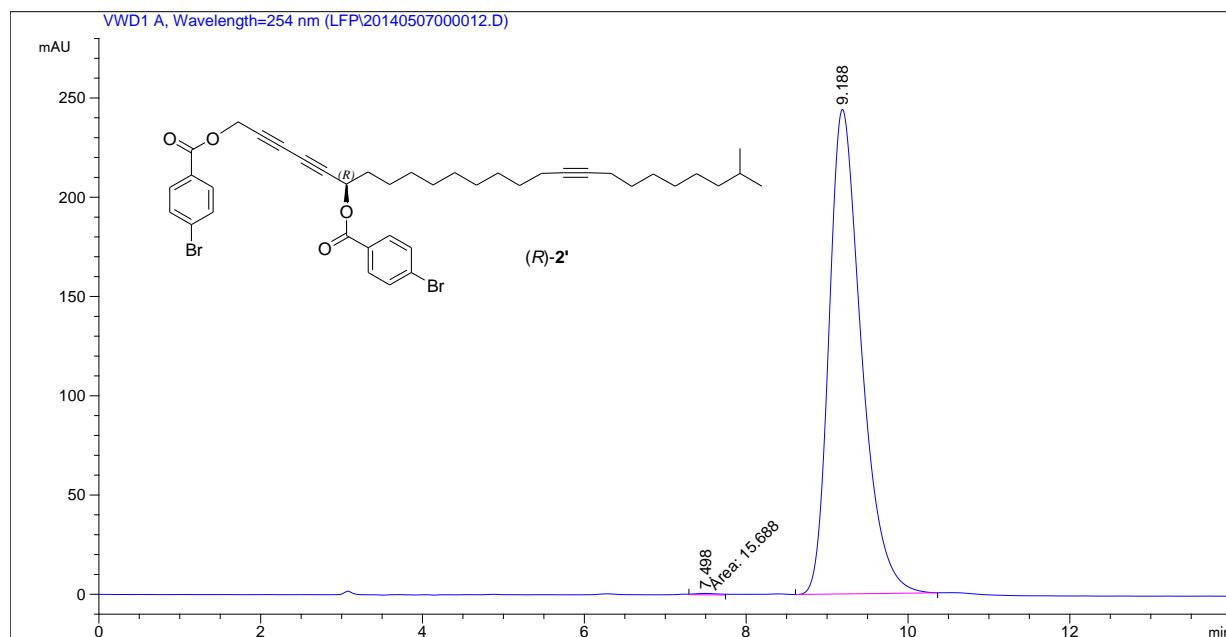


**Figure S67.** HPLC Chromatography of racemic **2'** (R&C OD column 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



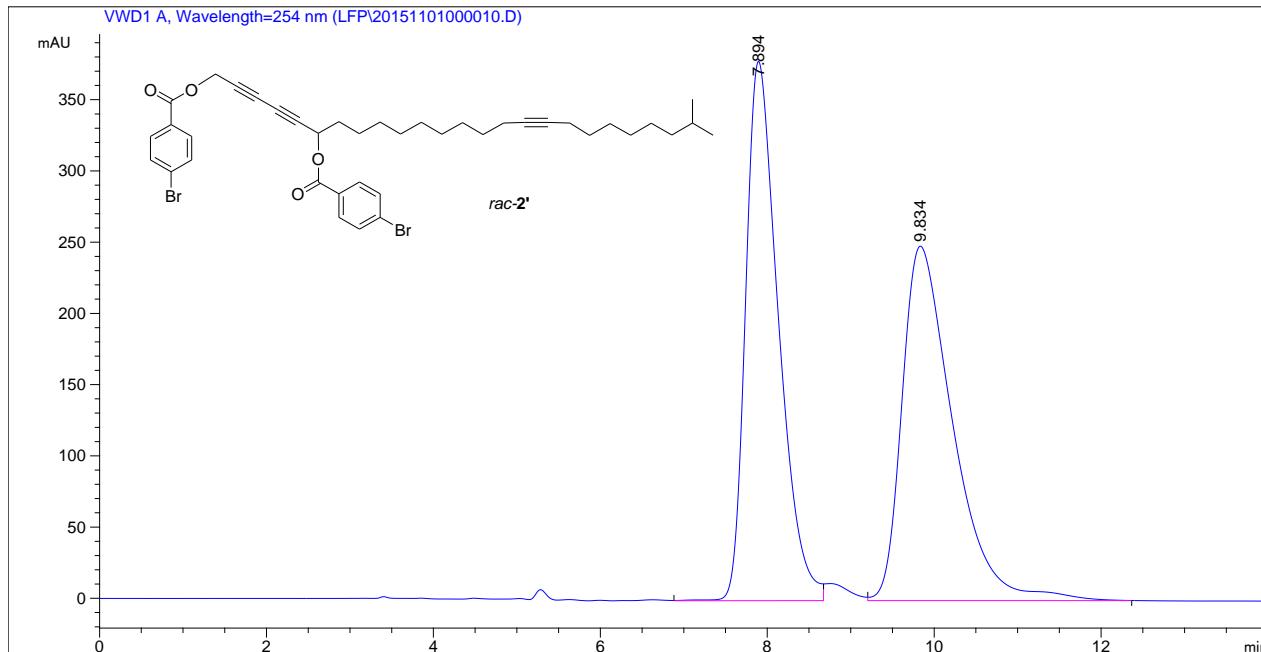
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	7.498	MM	0.3715	5200.03271	233.27486	50.0181
2	9.199	MM	0.5428	5196.27344	159.56412	49.9819

**Figure S68.** HPLC Chromatography of (*R*)-**2'** derived from **21** (R&C OD column 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



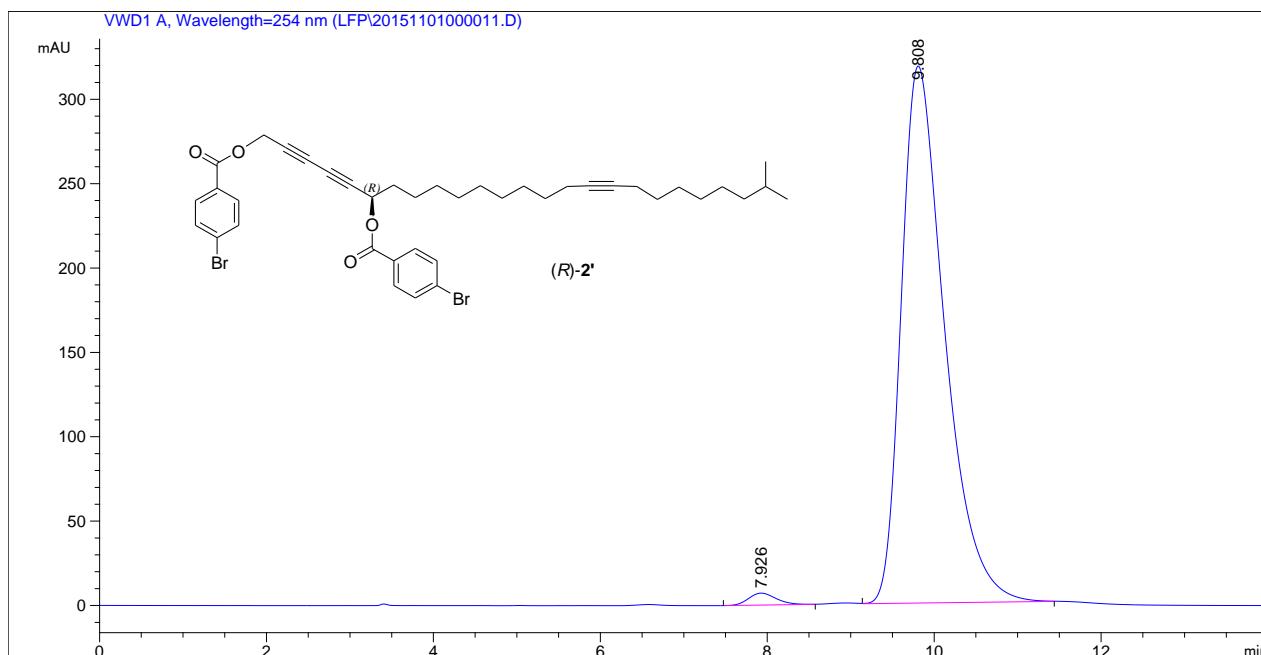
Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	7.498	MM	0.3541	15.68802	0.738403	0.2318
2	9.188	VB	0.4202	6751.94189	244.12053	99.7682

**Figure S69.** HPLC Chromatography of racemic **2'** (R&C OD column 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	7.894	VV	0.4115	1.03298e4	378.60864	49.5300
2	9.834	VB	0.6391	1.05259e4	248.85391	50.4700
Totals :						2.08557e4 627.46255

**Figure S70.** HPLC Chromatography of (*R*)-**2'** derived from **21'** (R&C OD column 5% 2-propanol in *n*-hexane, 0.5 mL/min, 254 nm)



Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	7.926	BB	0.3622	164.77654	7.10630	1.4121
2	9.808	VB	0.5483	1.15045e4	318.32898	98.5879
Totals :						1.16693e4 325.43528

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