

# Synthesis of 1,4-Dialkoxynaphthalene-Based Imidazolium Salts and Their Cytotoxicity in Cancer Cell Lines

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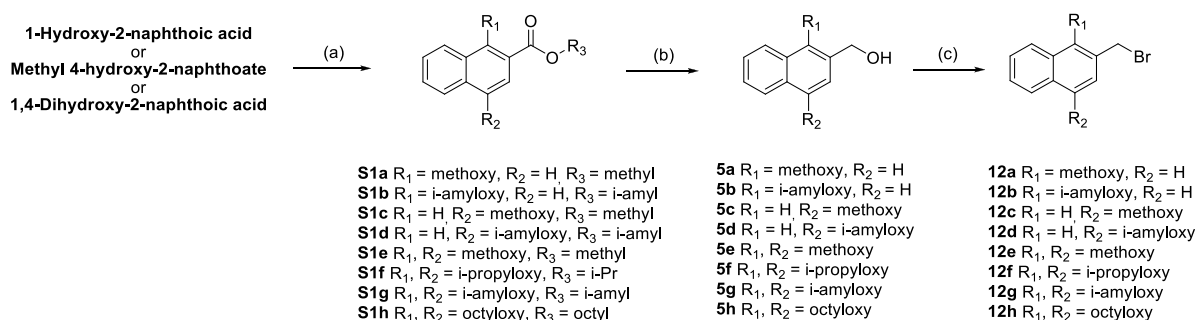
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## Supporting information

### I. Synthetic procedures and characterization Data

#### 1. Synthesis of bromide intermediate 12a-12h



**Reagents and conditions.** (a) R-X or (MeO)<sub>2</sub>SO<sub>2</sub>, K<sub>2</sub>CO<sub>3</sub> or Cs<sub>2</sub>CO<sub>3</sub>, acetone or DMF, reflux; (b) LiAlH<sub>4</sub>, anhydrous THF, rt; (c) PBr<sub>3</sub>, anhydrous DCM, 0 °C.

**Scheme S1.** Synthesis of bromide intermediate 12a-12h

##### 1.1. General synthetic procedure for 1- or 4-alkoxy-2-naphthoate or 1,4-dialkoxo-2-naphthoate (S1a-S1h)

The starting material was dissolved in acetone or DMF and K<sub>2</sub>CO<sub>3</sub> or Cs<sub>2</sub>CO<sub>3</sub> was added in two portions. After 30 minutes, dimethyl sulfate or the corresponding alkyl halide was added dropwise and refluxed at 55 - 80 °C until the starting material disappeared. After the reaction was completed, the solution was filtered and concentrated in vacuo, and water was added, followed by extraction with ethyl acetate three times. The combined organic layer was washed with brine, dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, filtered, and then concentrated under reduced pressure. The crude was purified by column chromatography to give a naphthoate derivatives (S1) [24, 25].

##### Methyl 1-methoxy-2-naphthoate (S1a)

1-Hydroxy-2-naphthoic acid (1.0 g, 5.31 mmol) in acetone (15 ml) was reacted with dimethyl sulfate (1.5 ml, 15.94 mmol) in the presence of K<sub>2</sub>CO<sub>3</sub> (4.4 g, 32.0 mmol) as described above to give compound **S1a** as a yellow oil (81%). R<sub>f</sub> = 0.41 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 3.99 (s, 3H), 4.07 (s, 3H), 7.56 - 7.63 (m, 3H), 7.84 - 7.87 (m, 2H), 8.27 - 8.30 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 52.26, 63.39, 119.14, 123.60, 126.50, 126.63, 127.85, 128.31, 128.52, 136.74, 158.26, 166.67.

#### **Isoamyl 1-(isoamyloxy)-2-naphthoate (S1b)**

1-Hydroxy-2-naphthoic acid (0.5 g, 2.66 mmol) in DMF (10 ml) was reacted with 1-bromo-3-methyl butane (1.0 ml, 8.0 mmol) in the presence of  $K_2CO_3$  (2.2 g, 16.0 mmol) as described above to give compound **S1b** as a colorless oil (98%).  $R_f$  = 0.35 (20% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 0.98 - 1.01 (m, 12H), 1.68 - 1.73 (m, 2H), 1.77 - 1.96 (m, 4H), 4.14 (t,  $J$  = 6.8 Hz, 2H), 4.41 (t,  $J$  = 7.0 Hz, 2H), 7.52 - 7.60 (m, 3H), 7.82 - 7.85 (m, 2H), 8.26 - 8.28 (m, 1H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 22.52, 22.75, 25.07, 25.14, 37.46, 39.13, 63.80, 75.00, 119.63, 123.26, 123.66, 126.33, 126.71, 127.77, 128.13, 128.84, 136.59, 157.27, 166.55.

#### **Methyl 4-methoxy-2-naphthoate (S1c)**

Methyl 4-hydroxy-2-naphthoate (0.8 g, 4.0 mmol) in acetone (11 ml) was reacted with dimethyl sulfate (1.14 ml, 12.0 mmol) in the presence of  $K_2CO_3$  (1.64 g, 12.0 mmol) as described above to give compound **S1c** as a colorless oil (99%).  $R_f$  = 0.19 (5% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 3.98 (s, 3H), 4.07 (s, 3H), 7.39 (s, 1H), 7.53 - 7.61 (m, 2H), 7.89 - 7.92 (m, 1H), 8.22 (s, 1H), 8.26 - 8.29 (m, 1H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 52.27, 55.74, 102.81, 122.09, 123.64, 127.12, 127.51, 127.59, 127.80, 128.99, 133.38, 155.51, 167.44.

#### **Methyl 4-(isoamyloxy)-2-naphthoate (S1d)**

Methyl 4-hydroxy-2-naphthoate (0.8 g, 4.0 mmol) in DMF (12 ml) was reacted with 1-bromo-3-methyl butane (0.75 ml, 12.0 mmol) in the presence of  $K_2CO_3$  (1.64 g, 12.0 mmol) as described above to give compound **S1d** as a yellow oil (96%).  $R_f$  = 0.38 (5% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 1.03 (d,  $J$  = 6.4 Hz, 6H), 1.83 - 1.88 (m, 2H), 1.95 - 2.01 (m, 1H), 3.98 (s, 3H), 4.24 (t,  $J$  = 6.4 Hz, 2H), 7.39 (s, 1H), 7.52 - 7.60 (m, 2H), 7.89 - 7.91 (m, 1H), 8.20 (s, 1H), 8.28 - 8.31 (m, 1H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 22.65, 25.27, 37.94, 52.25, 66.76, 103.42, 122.22, 123.33, 127.04, 127.46, 127.54, 127.95, 128.97, 133.39, 154.98, 167.51.

#### **Methyl 1,4-dimethoxy-2-naphthoate (S1e)**

1,4-Dihydroxy-2-naphthoic acid (1.0 g, 4.9 mmol) in acetone (10 ml) was reacted with dimethyl sulfate (3.2 ml, 24.5 mmol) in the presence of  $K_2CO_3$  (6.1 g, 44.1 mmol) as described above to give compound **S1e** as a pale red solid (90%).  $R_f$  = 0.59 (10% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 4.00 (s, 3H), 4.01 (s, 3H), 4.02 (s, 3H), 7.16 (s, 1H), 7.58 - 7.62 (m, 2H), 8.21 - 8.27 (m, 2H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 52.33, 55.75, 63.35, 103.49, 118.63, 122.28, 123.48, 127.06, 127.76, 128.76, 129.17, 151.35, 152.03, 166.83.

#### **Isopropyl 1,4-diisopropoxy-2-naphthoate (S1f)**

1,4-Dihydroxy-2-naphthoic acid (0.8 g, 3.9 mmol) in DMF (12 ml) was reacted with 2-bromopropane (1.46 ml, 15.6 mmol) in the presence of  $Cs_2CO_3$  (6.4 g, 19.6 mmol) as described above to give compound **S1f** as a dark yellow oil (85%).  $R_f$  = 0.59 (20% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 1.31 (d,  $J$  = 6.0 Hz, 6H), 1.42 (d,  $J$  = 6.0 Hz, 6H), 1.44 (d,  $J$  = 6.0 Hz, 6H), 4.37 - 4.43 (m, 1H), 4.72 - 4.78 (m, 1H), 5.26 - 5.36 (m, 1H), 7.14 (s, 1H), 7.48 - 7.55 (m, 2H), 8.20 - 8.25 (m, 2H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 21.93, 22.11, 22.46, 68.61, 70.71, 78.03, 106.43, 120.32, 122.25, 124.22, 126.34, 127.18, 129.31, 130.76, 148.32, 149.12, 167.06.

#### **Isoamyl 1,4-bis(isoamyloxy)-2-naphthoate (S1g)**

1,4-Dihydroxy-2-naphthoic acid (2.04 g, 10.0 mmol) in DMF (30 ml) was reacted with 1-bromo-3-methyl butane (4.8 ml, 40.0 mmol) in the presence of  $K_2CO_3$  (5.53 g, 40.0 mmol) as described above to give compound **S1g** as a yellow oil (81%).  $R_f$  = 0.37 (5% EtOAc/hexane);  $^1H$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 0.99 - 1.02 (m, 18H), 1.70 - 1.75 (m, 2H), 1.79 - 1.88 (m, 5H), 1.90 - 1.99 (m, 2H), 4.06 (t,  $J$  = 7.0 Hz, 2H), 4.18 (t,  $J$  = 6.4 Hz, 2H), 4.41 (t,  $J$  = 7.0 Hz, 2H), 7.14 (s, 1H), 7.56 - 7.58 (m, 2H), 8.18 - 8.21 (m, 1H), 8.25 - 8.27 (m, 1H);  $^{13}C$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 22.56, 22.65, 22.78, 25.10, 25.22, 25.27, 37.49, 37.96, 39.12, 63.93, 66.71, 74.88, 104.30, 119.25, 122.32, 123.45, 126.82, 127.46, 128.80, 129.48, 150.63, 150.66, 166.86.

#### **Octyl 1,4-bis(octyloxy)-2-naphthoate (S1h)**

1,4-Dihydroxy-2-naphthoic acid (0.5 g, 2.5 mmol) in DMF (25 ml) was reacted with 1-bromooctane (1.7 ml, 9.8 mmol) in the presence of Cs<sub>2</sub>CO<sub>3</sub> (4.8 g, 14.7 mmol) as described above to give compound **S1h** as a yellow oil (95%). *R*<sub>f</sub> = 0.83 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 0.86 - 0.91 (m, 9H), 1.29 - 1.45 (m, 30H), 1.78 - 1.85 (m, 2H), 1.88 - 1.97 (m, 4H), 4.03 (t, *J* = 6.8 Hz, 2H), 4.14 (t, *J* = 6.4 Hz, 2H), 4.37 (t, *J* = 6.8 Hz, 2H), 7.13 (s, 1H), 7.54 - 7.59 (m, 2H), 8.18 - 8.22 (m, 1H), 8.25 - 8.29 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 14.10, 22.67, 25.69, 26.11, 26.26, 28.67, 28.81, 29.14, 29.24, 29.32, 29.38, 29.59, 30.40, 31.75, 31.81, 31.83, 31.86, 65.41, 68.03, 68.38, 76.34, 104.40, 119.31, 122.30, 123.51, 126.78, 127.43, 128.81, 129.49, 150.60, 150.65, 166.89.

## 1.2. General synthetic procedure for 1- or 4-alkoxynaphthalene-2-methanol or 1,4-dialkoxynaphthalene-2-methanol (**5a-5h**)

To the corresponding starting naphthoate (**S1**) in anhydrous THF, LiAlH<sub>4</sub> (1.0 M in THF) was slowly added dropwise at 0 °C. At room temperature, the solution was stirred until the starting material disappeared. After the reaction was completed, water (1.5 eq) was slowly added at 0 °C. After 10 minutes, 10 wt% NaOH solution (3 eq) was slowly added dropwise, followed by adding water (1.5 eq) slowly dropwise additional 10 minutes later. The reaction mixture was dried over Na<sub>2</sub>SO<sub>4</sub> and concentrated under reduced pressure. The residue was purified by column chromatography to give methanol derivatives (**5**).

### (1-Methoxynaphthalen-2-yl)methanol (**5a**)

**S1a** (0.3 g, 1.39 mmol) in anhydrous THF (7 ml) was reacted with LiAlH<sub>4</sub> (1.0 M in THF, 2.1 ml, 2.1 mmol) as described above to give compound **5a** as a white solid (86%). *R*<sub>f</sub> = 0.20 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 4.00 (s, 3H), 4.92 (s, 2H), 7.48 - 7.55 (m, 3H), 7.64 - 7.66 (m, 1H), 7.84 - 7.86 (m, 1H), 8.10-8.13 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 60.97, 62.65, 122.02, 124.43, 126.10, 126.18, 126.62, 127.79, 128.08, 128.94, 134.72, 153.78.

### (1-(Isoamyloxy)naphthalen-2-yl)methanol (**5b**)

**S1b** (0.7 g, 1.22 mmol) in anhydrous THF (12.2 ml) was reacted with LiAlH<sub>4</sub> (1.0 M in THF, 3.05 ml, 3.05 mmol) as described above to give compound **5b** as a clear oil (83%). *R*<sub>f</sub> = 0.34 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.02 (d, *J* = 6.8 Hz, 6H), 1.83 - 1.88 (m, 2H), 1.90 - 1.98 (m, 1H), 2.18 (t, *J* = 5.6 Hz, 1H), 4.07 (t, *J* = 6.6 Hz, 2H), 4.90 (d, *J* = 5.2 Hz, 2H), 7.46 - 7.54 (m, 3H), 7.62 - 7.64 (m, 1H), 7.83 - 7.85 (m, 1H), 8.08 - 8.10 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.72, 25.07, 39.30, 61.22, 74.07, 122.13, 124.22, 126.00, 126.12, 126.61, 128.06, 128.12, 129.07, 134.68, 153.02.

### (4-Methoxynaphthalen-2-yl)methanol (**5c**)

**S1c** (0.3 g, 0.46 mmol) in anhydrous THF (2.3 ml) was reacted with LiAlH<sub>4</sub> (1.0 M in THF, 0.69 ml, 0.69 mmol) as described above to give compound **5c** as a yellow oil (97%). *R*<sub>f</sub> = 0.28 (10% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 4.02 (s, 3H), 4.83 (s, 2H), 6.85 (s, 1H), 7.38 (s, 1H), 7.44 - 7.51 (m, 2H), 7.76 - 7.78 (m, 1H), 8.22 - 8.24 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 55.54, 65.91, 102.91, 117.70, 121.94, 125.18, 125.26, 126.75, 127.44, 134.25, 138.59, 155.81.

### (4-(Isoamyloxy)naphthalen-2-yl)methanol (**5d**)

**S1d** (0.2 g, 0.73 mmol) in anhydrous THF (3.65 ml) was reacted with LiAlH<sub>4</sub> (1.0 M in THF, 1.1 ml, 1.1 mmol) as described above to give compound **5d** as a yellow oil (98%). *R*<sub>f</sub> = 0.39 (20 % EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.03 (d, *J* = 6.8 Hz, 6H), 1.81 - 1.86 (m, 2H), 1.94 - 2.01 (m, 1H), 4.18 (t, *J* = 6.4 Hz, 2H), 4.81 (s, 2H), 6.84 (s, 1H), 7.36 (s, 1H), 7.43 - 7.51 (m, 2H), 7.75 - 7.78 (m, 1H), 8.24 - 8.26 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.65, 25.26, 38.00, 65.90, 66.53, 103.55, 117.39, 122.07, 125.11, 125.32, 126.66, 127.41, 134.25, 138.64, 155.27.

### (1,4-Dimethoxynaphthalen-2-yl)methanol (**5e**)

**S1e** (0.2 g, 0.81 mmol) in anhydrous THF (0.1 ml) was reacted with LiAlH<sub>4</sub> (1.0 M in THF, 0.97 ml, 0.97 mmol) as

described above to give compound **5e** as a white solid (94%).  $R_f = 0.22$  (20% EtOAc/hexane);  $^1\text{H}$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 3.93 (s, 3H), 4.00 (s, 3H), 4.90 (s, 2H), 6.82 (s, 1H), 7.47 - 7.57 (m, 2H), 8.03 - 8.06 (m, 1H), 8.23 - 8.25 (m, 1H);  $^{13}\text{C}$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 55.67, 61.01, 62.63, 103.75, 121.74, 122.39, 125.51, 126.24, 126.70, 128.39, 128.46, 146.94, 152.14.

#### (1,4-Diisopropoxynaphthalen-2-yl)methanol (**5f**)

**S1f** (0.2 g, 0.61 mmol) in anhydrous THF (3.05 ml) was reacted with  $\text{LiAlH}_4$  (1.0 M in THF, 0.91 ml, 0.91 mmol) as described above to give compound **5f** as a white solid (90%).  $R_f = 0.32$  (20% EtOAc/hexane);  $^1\text{H}$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 1.37 (d,  $J = 6.0$  Hz, 6H), 1.45 (d,  $J = 5.6$  Hz, 6H), 4.34 - 4.40 (m, 1H), 4.70 - 4.76 (m, 1H), 4.88 (s, 2H), 6.86 (s, 1H), 7.42 - 7.51 (m, 2H), 8.00 - 8.02 (m, 1H), 8.23 - 8.25 (m, 1H);  $^{13}\text{C}$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 22.18, 22.57, 61.70, 70.58, 76.91, 106.41, 122.53, 122.60, 125.13, 126.12, 127.20, 129.28, 129.63, 144.13, 150.01.

#### (1,4-Bis(isoamyloxy)naphthalen-2-yl)methanol (**5g**)

**S1g** (0.7 g, 1.22 mmol) in anhydrous THF (12.2 ml) was reacted with  $\text{LiAlH}_4$  (1.0 M in THF, 3.05 ml, 3.05 mmol) as described above to give compound **5g** as a white solid (83%).  $R_f = 0.27$  (5% EtOAc/hexane);  $^1\text{H}$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 1.01 - 1.02 (m, 12H), 1.79 - 1.85 (m, 4H), 1.90 - 2.00 (m, 2H), 2.14 (t,  $J = 6.0$  Hz, 1H), 3.99 (t,  $J = 6.8$  Hz, 2H), 4.16 (t,  $J = 6.4$  Hz, 2H), 4.88 (d,  $J = 6.0$  Hz, 2H), 6.81 (s, 1H), 7.45 - 7.55 (m, 2H), 8.00 - 8.02 (m, 1H), 8.24 - 8.26 (m, 1H);  $^{13}\text{C}$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 22.66, 22.73, 25.07, 25.27, 38.07, 39.28, 61.35, 66.67, 73.97, 104.46, 121.80, 122.49, 125.34, 126.38, 126.52, 128.61, 128.74, 145.97, 151.53.

#### (1,4-Bis(octyloxy)naphthalen-2-yl)methanol (**5h**)

**S1h** (0.26 g, 0.48 mmol) in anhydrous THF (2.4ml) was reacted with  $\text{LiAlH}_4$  (1.0 M in THF, 0.72 ml, 0.72 mmol) as described above to give compound **5h** as a yellow oil (91%).  $R_f = 0.50$  (20% EtOAc/hexane);  $^1\text{H}$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 0.88 - 0.92 (m, 6H), 1.26 - 1.44 (m, 16H), 1.51 - 1.60 (m, 4H), 1.87 - 1.95 (m, 4H), 3.95 (t,  $J = 6.8$  Hz, 2H), 4.11 (t,  $J = 6.6$  Hz, 2H), 4.87 (s, 2H), 6.79 (s, 1H), 7.45 - 7.54 (m, 2H), 8.00 - 8.03 (m, 1H), 8.25 - 8.27 (m, 1H);  $^{13}\text{C}$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 14.10, 22.66, 26.16, 26.26, 29.27, 29.30, 29.37, 29.53, 30.48, 31.83, 61.29, 68.32, 75.52, 104.50, 121.82, 122.45, 125.30, 126.36, 126.48, 128.64, 128.72, 145.84, 151.51.

### 1.3. General synthetic procedure for 1- or 4-alkoxynaphthalene-2-methylbromide or 1,4-dialkoxynaphthalene-2-methylbromide (**12a-12h**)

**Method A:** Starting material (**5**),  $\text{PPh}_3$ , and TBAI (tetrabutyl ammonium iodide) were dissolved in 1,2-dibromoethane and refluxed until the starting material disappeared. After the reaction was completed, the reaction solution was concentrated under reduced pressure and purified by column chromatography to give the corresponding product (**12**).

**Method B:** To the starting material (**5**) in anhydrous dichloromethane,  $\text{PBr}_3$  was slowly added dropwise at 0 °C. The reaction solution was warmed to room temperature and then stirred until the starting material disappeared. When the starting material disappeared as monitored by TLC, the reaction solution was diluted with dichloromethane, poured into water, and extracted with dichloromethane three times. The combined organic layer was washed with an aqueous saturated  $\text{NaHCO}_3$  solution, dried over  $\text{Na}_2\text{SO}_4$ , filtered, and concentrated under reduced pressure. The residue was purified by column chromatography to give the corresponding product (**12**).

#### 2-(Bromomethyl)-1-methoxynaphthalene (**12a**)

**5a** (0.17 g, 0.92 mmol),  $\text{PPh}_3$  (0.29 g, 1.1 mmol) and TBAI (0.41 g, 1.1 mmol) in 1,2-dibromoethane (9 ml) were reacted as **method A** to give compound **12a** as a white solid (74%).  $R_f = 0.68$  (20% EtOAc/hexane);  $^1\text{H}$  NMR (400MHz, Chloroform-*d*)  $\delta$  (ppm) : 4.08 (s, 3H), 4.78 (s, 2H), 7.45 - 7.56 (m, 3H), 7.61 - 7.64 (m, 1H), 7.82 - 7.84 (m, 1H), 8.10 - 8.13 (m, 1H);  $^{13}\text{C}$  NMR (100MHz, Chloroform-*d*)  $\delta$  (ppm) : 28.40, 62.47, 122.46, 124.76, 126.37, 126.80, 127.82, 127.88, 128.15, 135.08, 154.33.

#### 2-(Bromomethyl)-1-(isoamyloxy)naphthalene (**12b**)



**5b** (0.25 g, 1.02 mmol), PPh<sub>3</sub> (0.32 g, 1.23 mmol) and TBAI (0.45 g, 1.23 mmol) in 1,2-dibromoethane (10 ml) were reacted as **method A** to give compound **12b** as a yellow oil (81%). *R*<sub>f</sub> = 0.67 (10% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.04 – 1.06 (m, 6H), 1.88 – 2.00 (m, 3H), 4.17 (t, *J* = 6.8 Hz, 2H), 4.77 (s, 2H), 7.46 – 7.53 (m, 3H), 7.60 – 7.62 (m, 1H), 7.81 – 7.83 (m, 1H), 8.08 – 8.11 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.77, 25.09, 28.67, 39.23, 73.80, 122.59, 124.54, 126.25, 126.34, 126.74, 127.96, 128.10, 128.19, 135.01, 153.63.

### 3-(Bromomethyl)-1-methoxynaphthalene (12c)

**5c** (0.36 g, 1.9 mmol), PPh<sub>3</sub> (0.6 g, 2.3 mmol) and TBAI (0.85 g, 2.3 mmol) in 1,2-dibromoethane (19 ml) were reacted as **method A** to give compound **12c** as a white solid (90%). *R*<sub>f</sub> = 0.41 (5% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 4.03 (s, 3H), 4.65 (s, 2H), 6.82 (s, 1H), 7.43 (s, 1H), 7.45 – 7.52 (m, 2H), 7.75 – 7.77 (m, 1H), 8.21 – 8.23 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 34.87, 55.59, 104.43, 120.25, 121.99, 125.93, 127.02, 127.58, 134.02, 135.20, 155.91.

### 3-(Bromomethyl)-1-(isoamyloxy)naphthalene (12d)

**5d** (0.48 g, 1.96 mmol), PPh<sub>3</sub> (0.62 g, 2.36 mmol) and TBAI (0.87 g, 2.36 mmol) in 1,2-dibromoethane (20 ml) were reacted as **method A** to give compound **12d** as a white solid (94%). *R*<sub>f</sub> = 0.91 (10% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.03 (d, *J* = 6.4 Hz, 6H), 1.82 – 1.87 (m, 2H), 1.93 – 2.02 (m, 1H), 4.19 (t, *J* = 6.6 Hz, 2H), 4.65 (s, 2H), 6.82 (s, 1H), 7.41 (s, 1H), 7.45–7.52 (m, 2H), 7.74 – 7.76 (m, 1H), 8.23 – 8.25 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.67, 25.28, 34.94, 37.97, 66.61, 105.08, 119.97, 122.14, 125.66, 125.81, 126.95, 127.55, 134.05, 135.24, 155.40.

### 2-(Bromomethyl)-1,4-dimethoxynaphthalene (12e)

**5e** (0.1 g, 0.46 mmol) and PBr<sub>3</sub> (0.05ml, 0.55 mmol) in anhydrous dichloromethane (4.6 ml) were reacted as **method B** to give compound **12e** as a light brown solid (76%). *R*<sub>f</sub> = 0.67 (10% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 4.00 (s, 3H), 4.01 (s, 3H), 4.77 (s, 2H), 6.73 (s, 1H), 7.48 – 7.58 (m, 2H), 8.04 – 8.06 (m, 1H), 8.21 – 8.24 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 29.05, 55.68, 62.39, 104.69, 122.23, 122.48, 125.68, 126.19, 126.96, 128.37, 147.82, 152.15.

### 2-(Bromomethyl)-1,4-diisopropoxynaphthalene (12f)

**5f** (0.17 g, 0.61 mmol) and PBr<sub>3</sub> (0.06ml, 0.68 mmol) in anhydrous dichloromethane (6 ml) were reacted as **method B** to give compound **12f** as a yellow solid (85%). *R*<sub>f</sub> = 0.75 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.40 (d, *J* = 6.0 Hz, 6H), 1.46 (d, *J* = 6.4 Hz, 6H), 4.44 – 4.51 (m, 1H), 4.70 – 4.77 (m, 3H), 6.80 (s, 1H), 7.44 – 7.52 (m, 2H), 8.02 – 8.04 (m, 1H), 8.21 – 8.23 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.06, 22.74, 30.28, 70.49, 76.89, 107.55, 122.59, 123.11, 125.84, 125.98, 126.37, 127.77, 129.72, 144.93, 149.89.

### 2-(Bromomethyl)-1,4-bis(isoamyloxy)naphthalene (12g)

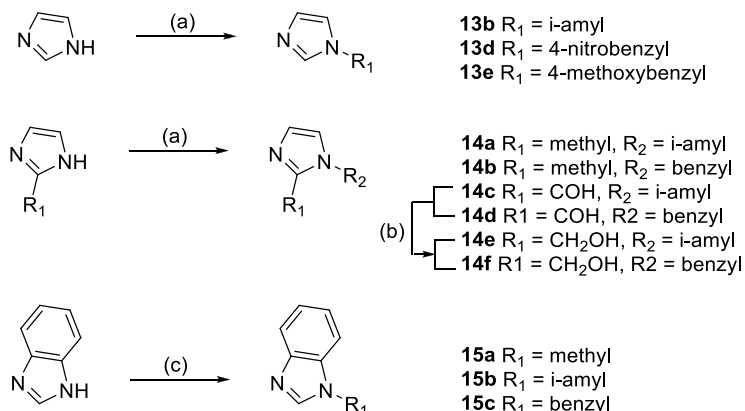
**5g** (1.65 g, 5.0 mmol) and PBr<sub>3</sub> (0.57 ml, 6.0 mmol) in anhydrous dichloromethane (50 ml) were reacted as **method B** to give compound **12g** as a yellow solid (90%). *R*<sub>f</sub> = 0.68 (10% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 1.01 – 1.03 (m, 12H), 1.80 – 1.89 (m, 4H), 1.93 – 2.00 (m, 2H), 4.09 (t, *J* = 6.8 Hz, 2H), 4.15 (t, *J* = 6.4 Hz, 2H), 4.76 (s, 2H), 6.72 (s, 1H), 7.47 – 7.56 (m, 2H), 8.01 – 8.03 (m, 1H), 8.22 – 8.25 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.68, 22.78, 25.10, 25.27, 29.40, 38.02, 39.24, 66.69, 73.65, 105.42, 122.32, 122.55, 125.69, 126.04, 126.77, 127.10, 128.75, 146.89, 151.50.

### 2-(Bromomethyl)-1,4-bis(octyloxy)naphthalene (12h)

**5h** (0.1 g, 0.24 mmol) and PBr<sub>3</sub> (0.03 ml, 0.29 mmol) in anhydrous dichloromethane (2.4ml) were reacted as **method B** to give compound **12h** as a brown solid (80%). *R*<sub>f</sub> = 0.79 (20% EtOAc/hexane); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 0.85 – 0.92 (m, 6H), 1.29 – 1.43 (m, 16H), 1.52 – 1.63 (m, 4H), 1.88 – 1.99 (m, 4H), 4.06 (t, *J* = 6.8 Hz, 2H), 4.12 (t, *J* = 6.4 Hz, 2H), 4.75 (s, 2H), 6.71 (s, 1H), 7.47 – 7.55 (m, 2H), 8.01 – 8.04 (m, 1H), 8.23 – 8.25 (m, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 14.12, 22.68, 26.13, 26.27, 29.27, 29.30, 29.39, 29.42, 29.52, 30.45, 31.84, 68.35, 75.19,

105.49, 122.36, 122.53, 125.70, 126.02, 126.74, 127.09, 128.74, 146.80, 151.50.

## 2. Synthesis of *N*-substituted imidazoles



**Reagents and conditions.** (a) R-X, KOH, anhydrous DMSO, rt or R-X, K<sub>2</sub>CO<sub>3</sub>, anhydrous ACN, reflux; (b) LiAlH<sub>4</sub>, anhydrous THF, rt; (c) TMEDA, dimethyl carbonate, DMF, reflux or R-X, KOH, anhydrous DMSO, rt.

**Scheme S2.** Synthesis of *N*-substituted imidazoles

**Method C :** To an imidazole in anhydrous acetonitrile, K<sub>2</sub>CO<sub>3</sub> was added in two portions. After 30 minutes, alkyl or benzylic halide was added dropwise and then the reaction was refluxed at 80 °C until the starting material disappeared. After the completion of the reaction, the mixture was filtered and poured into water, followed by extraction with ethyl acetate three times. The combined organic layer was washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, filtered, and then concentrated under reduced pressure. The residue was purified by column chromatography to give the corresponding product.

**Method D :** Imidazole and KOH were dissolved in anhydrous DMSO and it was stirred at room temperature. After 2 hours, alkyl halide was added dropwise and the reaction mixture was stirred at room temperature until the starting material disappeared. After the completion of the reaction, it was poured into water and extracted with dichloromethane three times. The combined organic layer was washed with brine, dried over Na<sub>2</sub>SO<sub>4</sub>, filtered and concentrated under reduced pressure. The residue was purified by column chromatography to give the corresponding product [26].

### 1-Isoamyl-1*H*-imidazole (13b)

Imidazole (1.0 g, 14.7 mmol) and 1-bromo-3-methyl butane (1.93 ml, 14.69 mmol) in DMSO (29.4 ml) were reacted in the presence of KOH (1.23 g, 22.03 mmol) as **method D** to give compound **13b** as a yellow oil (84%). *R*<sub>f</sub> = 0.38 (10% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 0.93 (d, *J* = 6.8 Hz, 6H), 1.52 - 1.59 (m, 1H), 1.63 - 1.69 (m, 2H), 3.93 (t, *J* = 7.4 Hz, 2H), 6.89 (s, 1H), 7.04 (s, 1H), 7.45 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.20, 25.34, 39.86, 45.20, 118.69, 129.31, 136.95.

### 1-(4-Nitrobenzyl)-1*H*-imidazole (13d)

Imidazole (0.68 g, 10.0 mmol) and 4-nitrobenzyl bromide (1.08 g, 5.0 mmol) in anhydrous acetonitrile (33.3 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (2.07 g, 15.0 mmol) as **method C** to give compound **13d** as a brown solid (77%). *R*<sub>f</sub> = 0.36 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 5.37 (s, 2H), 6.96 (s, 1H), 7.23 (s, 1H), 7.43 - 7.46 (m, 2H), 7.82 (s, 1H), 8.20 - 8.23 (m, 2H); <sup>13</sup>C NMR (100MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 48.69, 119.78, 123.89, 128.44, 128.87, 137.67, 145.46, 146.97.

#### 1-(4-Methoxybenzyl)-1H-imidazole (13e)

Imidazole (0.68 g, 10.0 mmol) and 4-methoxybenzyl bromide (0.68 ml, 5.0 mmol) in anhydrous acetonitrile (33.3 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (2.07 g, 15.0 mmol) as **method C** to give compound **13e** as an ivory solid (86%). R<sub>f</sub> = 0.36 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 3.79 (s, 3H), 5.04 (s, 2H), 6.86 – 6.89 (m, 3H), 7.06 – 7.11 (m, 3H), 7.51 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 50.27, 55.27, 114.26, 119.03, 128.05, 128.78, 129.64, 137.17, 159.48.

#### 1-Isoamyl-2-methyl-1H-imidazole (14a)

2-Methylimidazole (0.82 g, 10.0 mmol) and 1-bromo-3-methyl butane (0.62 ml, 5.0 mmol) in anhydrous acetonitrile (17 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (2.07 g, 15.0 mmol) as **method C** to give compound **14a** as a yellow oil (66%). R<sub>f</sub> = 0.33 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 0.89 (d, *J* = 6.4 Hz, 6H), 1.49 – 1.53 (m, 3H), 2.25 (s, 3H), 3.83 (t, *J* = 7.4 Hz, 2H), 6.68 (d, *J* = 1.2 Hz, 1H), 7.01 (d, *J* = 1.2 Hz, 1H); <sup>13</sup>C NMR (100MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 12.60, 22.23, 25.09, 39.14, 43.50, 119.43, 126.14, 143.38.

#### 1-Benzyl-2-methyl-1H-imidazole (14b)

2-Methylimidazole (0.41 g, 5.0 mmol) and benzyl bromide (0.3 ml, 2.5 mmol) in anhydrous acetonitrile (17 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (1.04 g, 7.5 mmol) as **method C** to give **14b** as a yellow oil (73%). R<sub>f</sub> = 0.64 (12% MeOH/DCM); <sup>1</sup>H NMR (400MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 2.20 (s, 3H), 5.13 (s, 2H), 6.75 (d, *J* = 1.2 Hz, 1H), 7.11 – 7.13 (m, 3H), 7.27 – 7.29 (m, 1H), 7.32 – 7.36 (m, 2H); <sup>13</sup>C NMR (100MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 12.73, 48.60, 120.35, 126.40, 126.94, 127.51, 128.72, 137.53, 143.90.

#### 1-Isoamyl-1H-imidazole-2-carbaldehyde (14c)

2-Imidazolecarboxaldehyde (0.2 g, 2.1 mmol) and 1-bromo-3-methyl butane (0.17 ml, 1.39 mmol) in anhydrous acetonitrile (6.9 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (0.57 g, 4.16 mmol) as **method C** to give compound **14c** as a green oil (80%). R<sub>f</sub> = 0.45 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 0.96 (d, *J* = 6.4 Hz, 6H), 1.63 – 1.69 (m, 3H), 4.40 (t, *J* = 7.6 Hz, 2H), 7.15 (s, 1H), 7.27 (s, 1H), 9.81 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.30, 25.58, 39.90, 46.19, 126.07, 131.56, 143.27, 181.98.

#### 1-Benzyl-1H-imidazole-2-carbaldehyde (14d)

2-Imidazolecarboxaldehyde (0.96 g, 10.0 mmol) and benzyl bromide (0.59 ml, 5.0 mmol) in anhydrous acetonitrile (33 ml) were reacted in the presence of K<sub>2</sub>CO<sub>3</sub> (2.07 g, 15.0 mmol) as **method C** to give compound **14d** as a green oil (98%). R<sub>f</sub> = 0.44 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 5.61 (s, 2H), 7.14 (s, 1H), 7.19 – 7.21 (m, 2H), 7.30 – 7.35 (m, 4H), 9.85 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 50.87, 126.22, 127.70, 128.34, 128.95, 131.87, 135.71, 143.25, 182.20.

#### (1-Isoamyl-1H-imidazol-2-yl)methanol (14e)

**S4a** (0.5 g, 3.0 mmol) in anhydrous THF (15 ml) was reacted with LiAlH<sub>4</sub> (3.6 ml, 3.6 mmol) as described [1.2.] to give compound **14e** as a white solid (77%). R<sub>f</sub> = 0.69 (13% MeOH/DCM); <sup>1</sup>H NMR (400MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 0.90 (d, *J* = 6.4 Hz, 6H), 1.50 – 1.62 (m, 3H), 3.97 (t, *J* = 7.6 Hz, 2H), 4.45 (s, 2H), 5.26 (s, 1H), 6.75 (d, *J* = 1.6 Hz, 1H), 7.10 (d, *J* = 1.2 Hz, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.35, 25.68, 39.90, 44.42, 55.76, 119.82, 126.77, 147.52.

#### (1-Benzyl-1H-imidazol-2-yl)methanol (14f)

**S4b** (0.2 g, 1.07 mmol) in anhydrous THF (5.4 ml) was reacted with LiAlH<sub>4</sub> (1.61 ml, 1.61 mmol) as described [1.2.] to give compound **14f** as a light brown solid (86%). R<sub>f</sub> = 0.44 (6% MeOH/DCM); <sup>1</sup>H NMR (400MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 4.45 (s, 2H), 5.23 (s, 2H), 6.82 (d, *J* = 1.6 Hz, 1H), 7.11 (d, *J* = 1.6 Hz, 1H), 7.19 – 7.21 (m, 2H), 7.26 – 7.36 (m, 3H); <sup>13</sup>C NMR (100MHz, DMSO-*d*<sub>6</sub>) δ (ppm) : 48.58, 55.70, 121.05, 126.55, 127.32, 127.55, 128.60, 137.59, 147.13.

#### 1-Methyl-1H-benzo[*d*]imidazole (15a)

A mixture of benzimidazole (0.5 g, 4.23 mmol), TMEDA (50 mg, 0.42 mmol) and dimethyl carbonate (4.2 ml) in DMF (2.1 ml) was stirred under reflux until the starting material disappeared. After the reaction was completed, it was quenched with water and extracted with ethyl acetate three times. The combined organic layer was washed with water, dried over Na<sub>2</sub>SO<sub>4</sub>, filtered, and then concentrated under reduced pressure. The concentrate was purified by column chromatography to give compound **15a** as a brown oil (78%) [27]. *R*<sub>f</sub> = 0.50 (10% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 3.84 (s, 3H), 7.26 - 7.34 (m, 2H), 7.38 - 7.41 (m, 1H), 7.80 - 7.82 (m, 1H), 7.86 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 30.97, 109.28, 120.24, 122.05, 122.89, 134.49, 143.48, 143.67.

#### **1-Isoamyl-1H-benzo[*d*]imidazole (15b)**

Benzimidazole (0.5 g, 4.23 mmol) and 1-bromo-3-methyl butane (0.53 ml, 4.23 mmol) in DMSO (8.5 ml) were reacted in the presence of KOH (0.36 g, 6.35 mmol) as **method D** to give compound **15b** as a brown oil (95%). *R*<sub>f</sub> = 0.51 (10% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 0.99 (d, *J* = 6.4 Hz, 6H), 1.59 - 1.65 (m, 1H), 1.76 - 1.81 (m, 2H), 4.18 (t, *J* = 7.4 Hz, 2H), 7.26 - 7.39 (m, 2H), 7.39 - 7.41 (m, 1H), 7.80 - 7.82 (m, 1H), 7.89 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 22.27, 25.60, 38.57, 43.30, 109.57, 120.38, 121.95, 122.73, 133.76, 142.78, 143.87.

#### **1-Benzyl-1H-benzo[*d*]imidazole (15c)**

Benzimidazole (0.5 g, 4.23 mmol) and benzyl chloride (0.49 ml, 4.23 mmol) in DMSO (8.5 ml) were reacted in the presence of KOH (0.36 g, 6.35 mmol) as **method D** to give compound **14c** as an ivory solid (82%). *R*<sub>f</sub> = 0.48 (10% MeOH/DCM); <sup>1</sup>H NMR (400MHz, Chloroform-*d*) δ (ppm) : 5.36 (s, 2H), 7.17 - 7.20 (m, 2H), 7.23 - 7.37 (m, 6H), 7.82 - 7.84 (m, 1H), 7.95 (s, 1H); <sup>13</sup>C NMR (100MHz, Chloroform-*d*) δ (ppm) : 48.82, 109.98, 120.45, 122.24, 123.06, 127.07, 128.25, 129.03, 133.92, 135.46, 143.20, 143.99.

## II. NMR Data

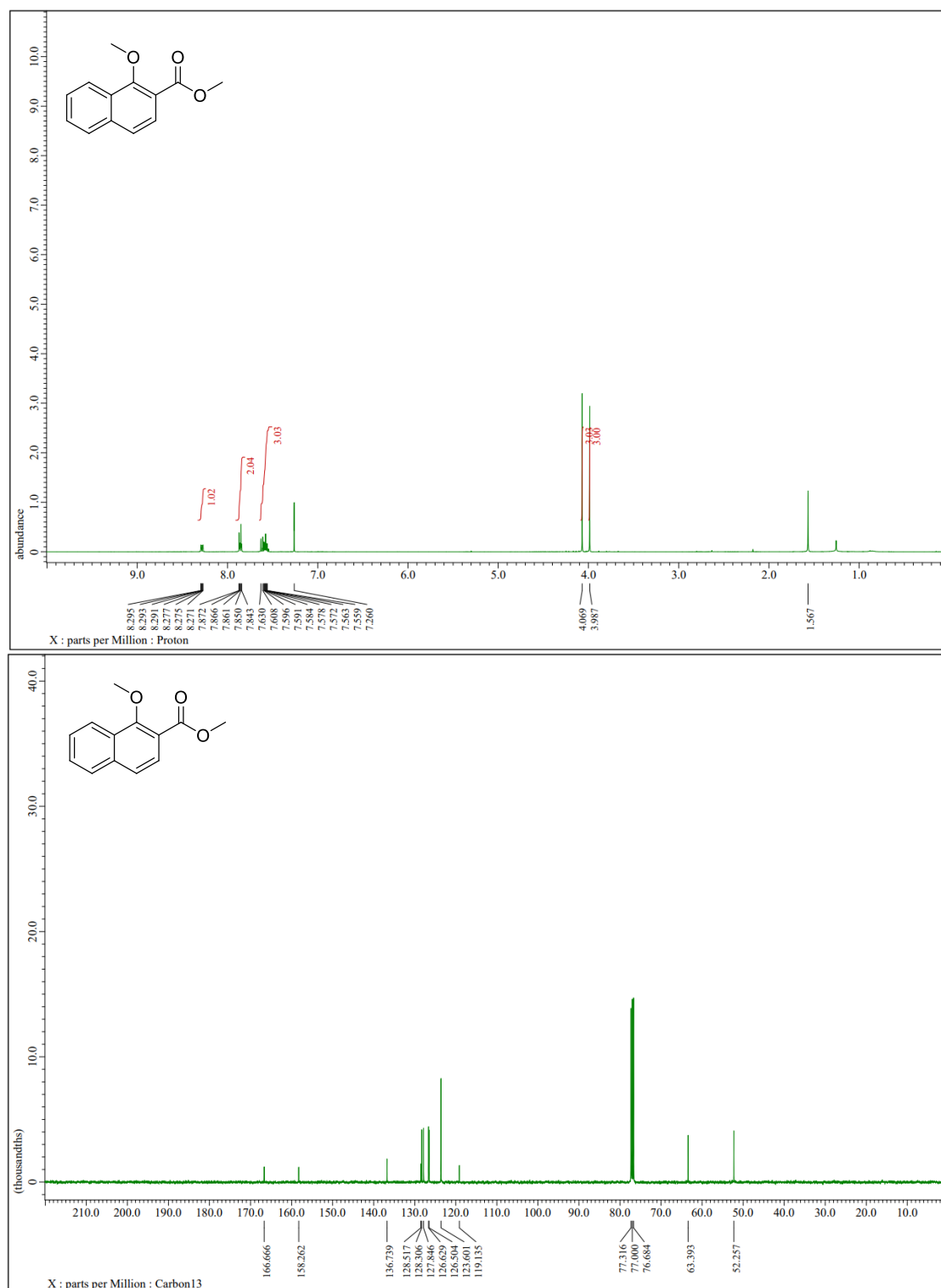
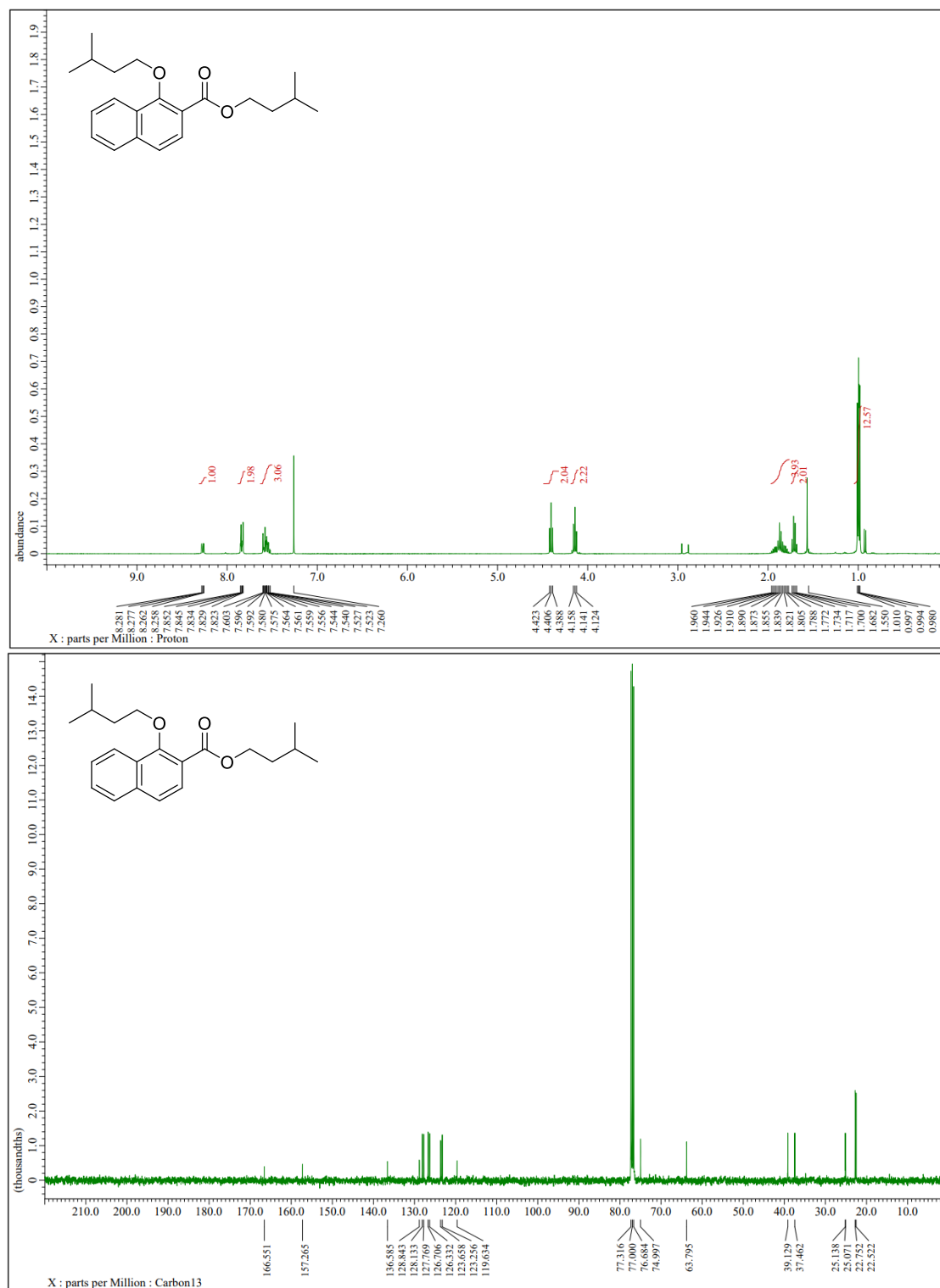
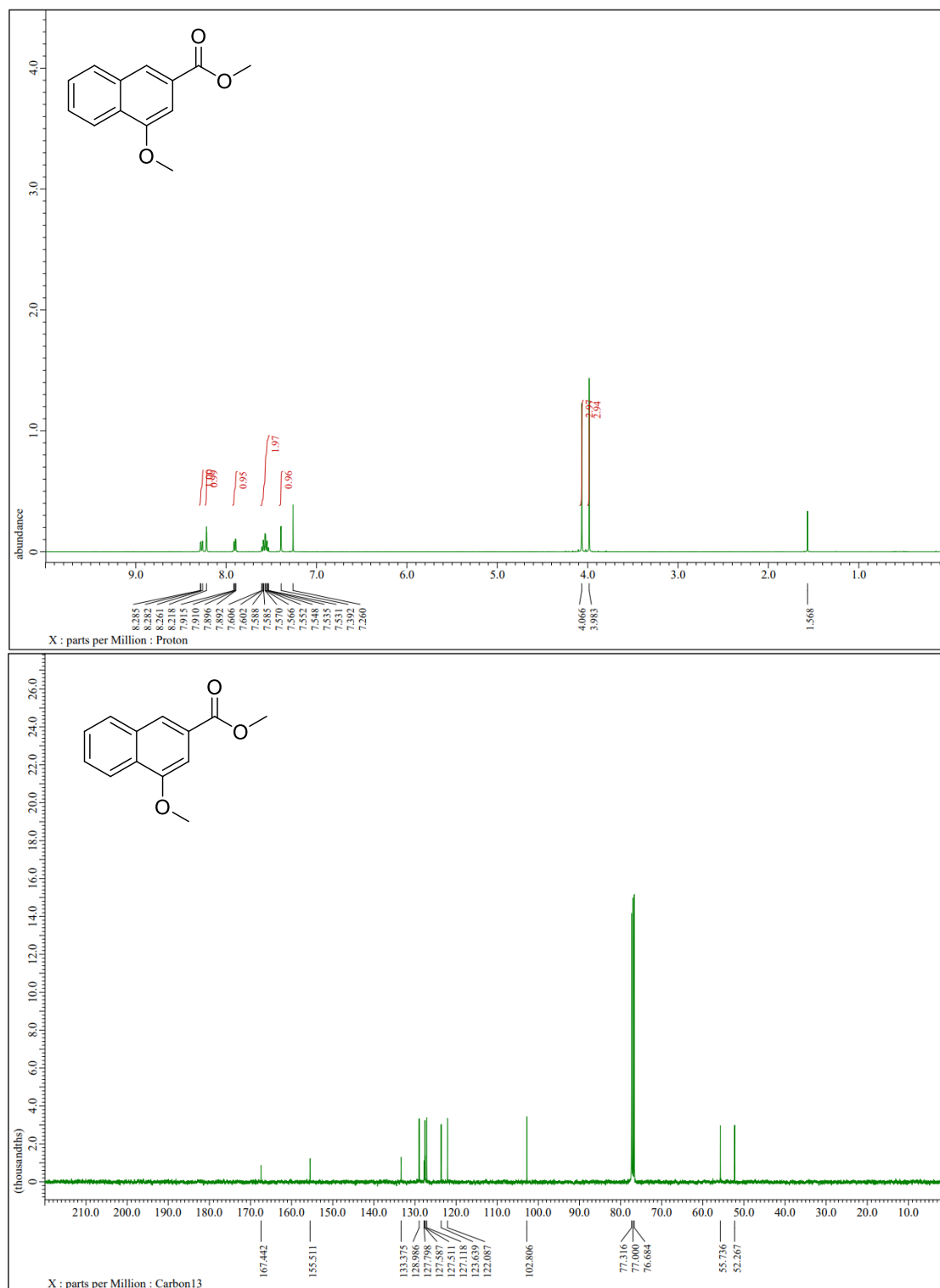


Figure S1. Methyl 1-methoxy-2-naphthoate (S1a)



**Figure S2. Isoamyl 1-(isoamyloxy)-2-naphthoate (S1b)**



**Figure S3. Methyl 4-methoxy-2-naphthoate (S1c)**

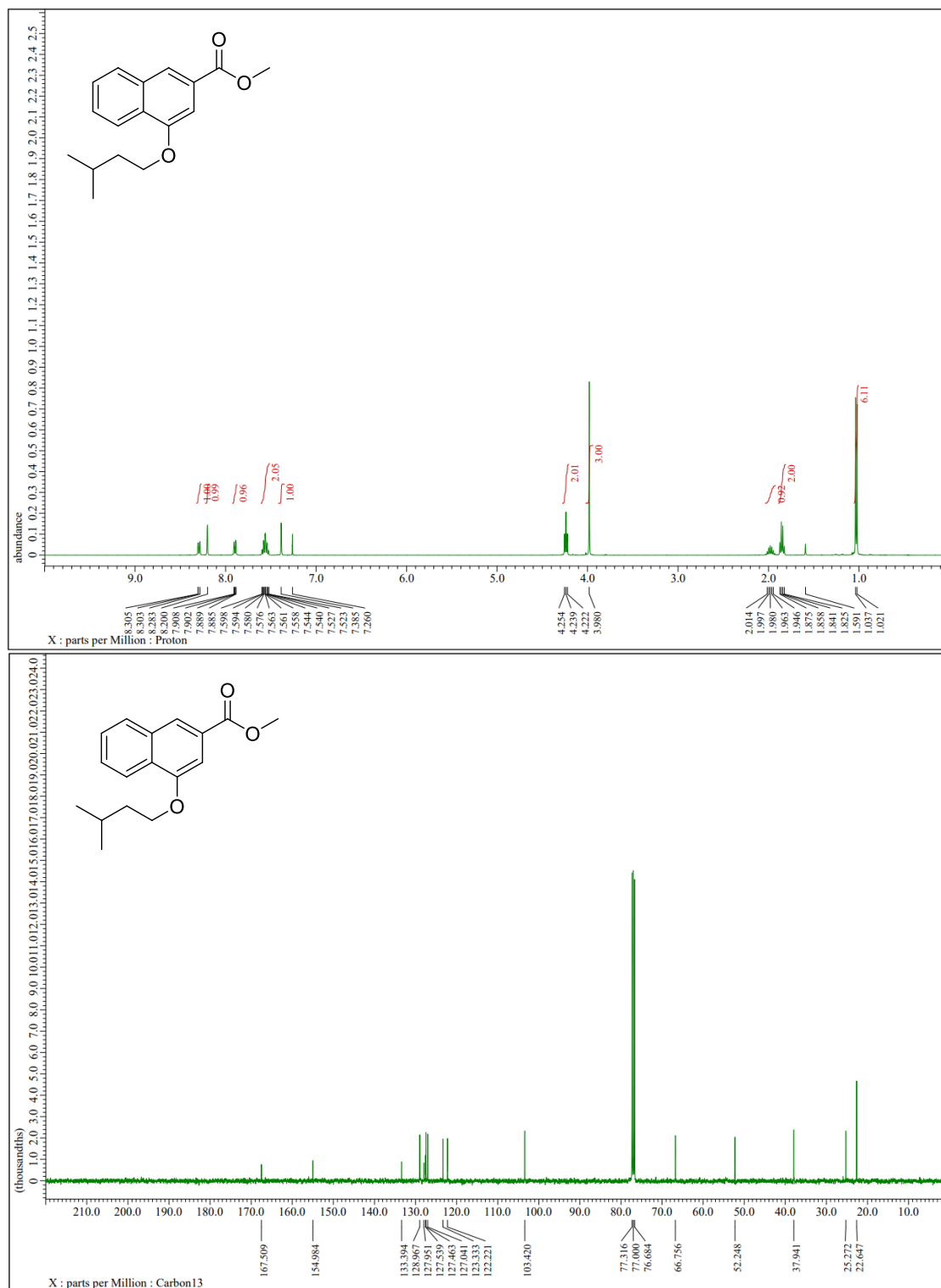
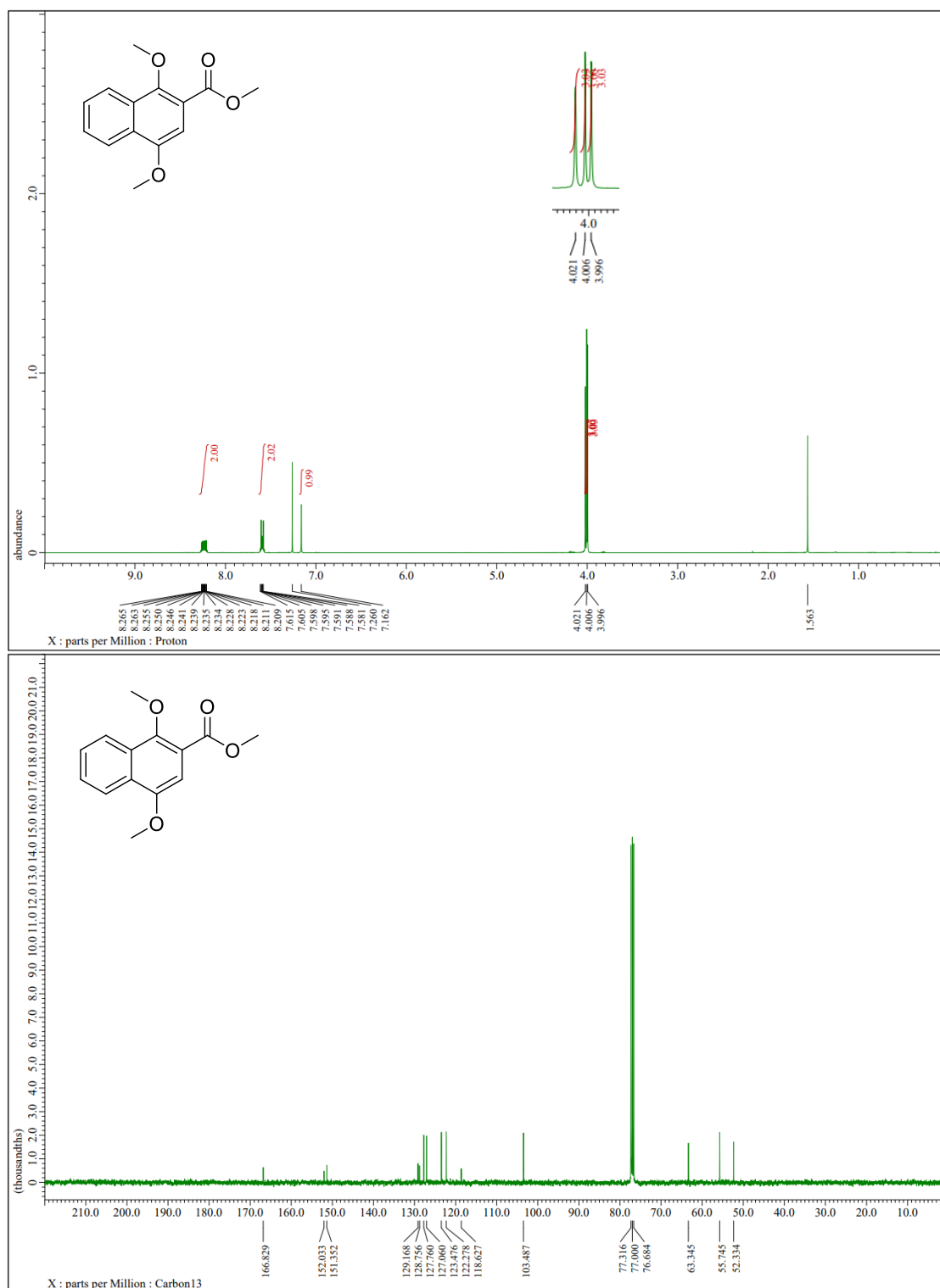
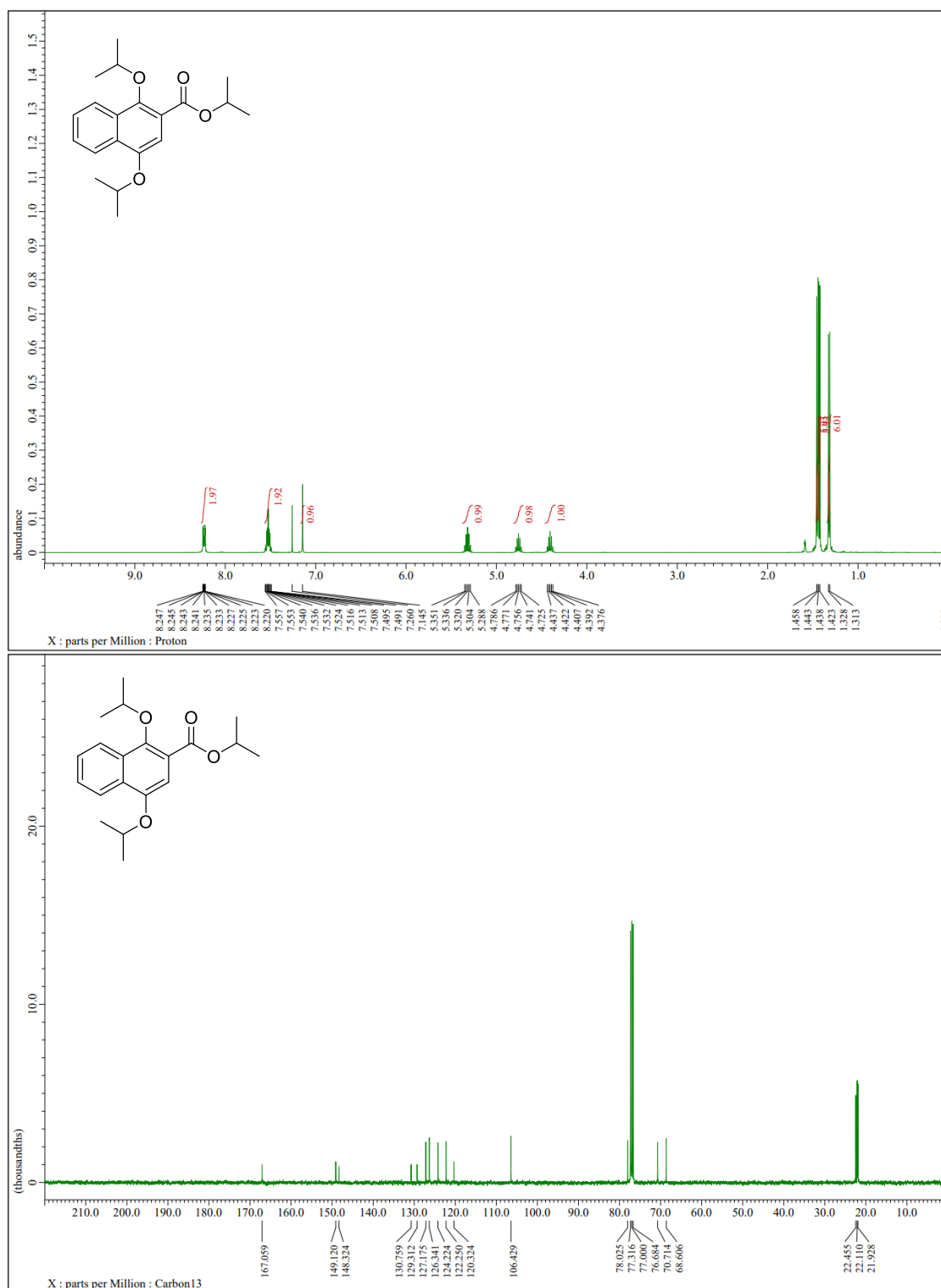


Figure S4. Methyl 4-(isoamyloxy)-2-naphthoate (S1d)

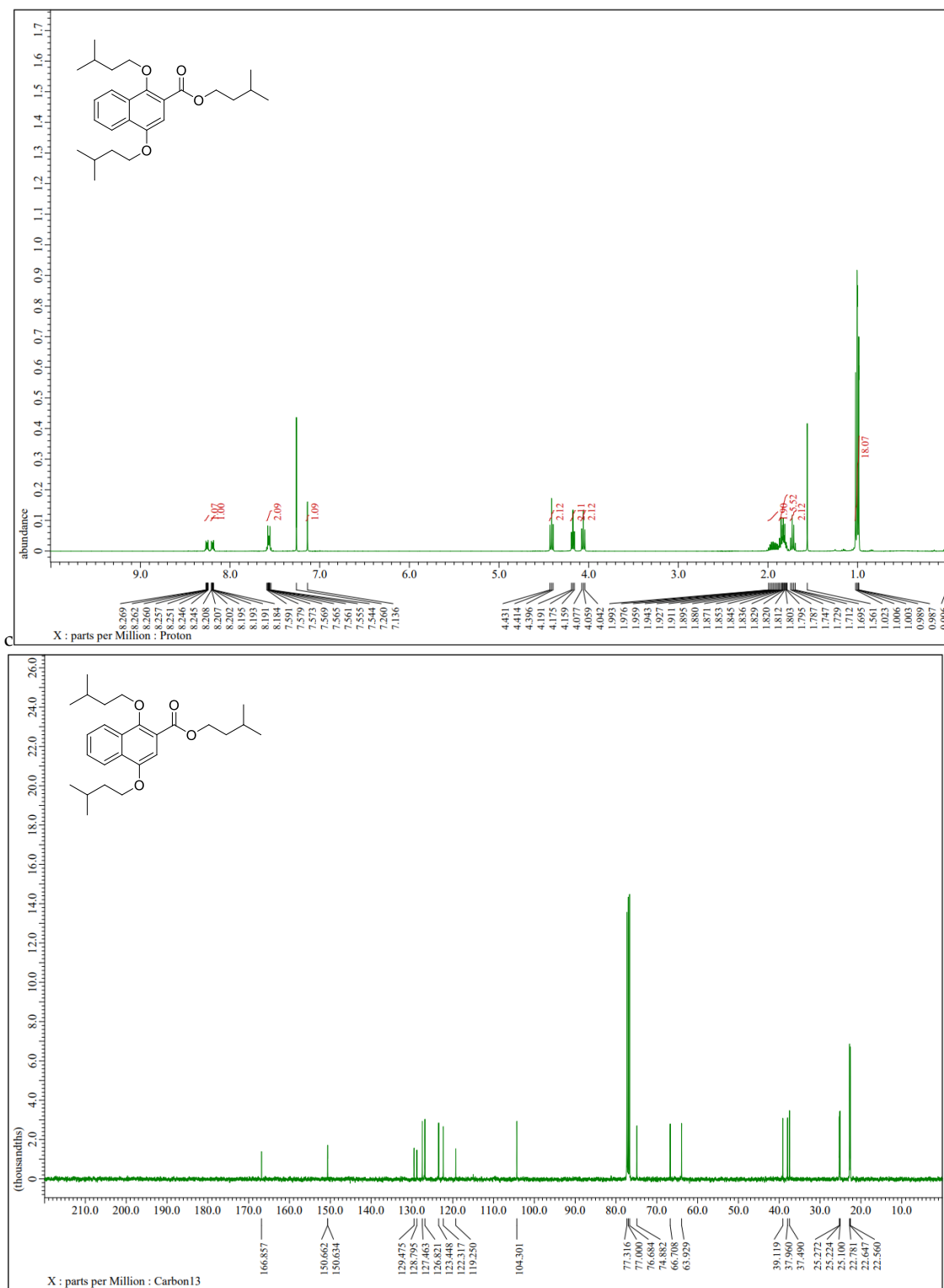




**Figure S5. Methyl 1,4-dimethoxy-2-naphthoate (S1e)**



**Figure S6.** Isopropyl 1,4-diisopropoxy-2-naphthoate (**S1f**)



**Figure S7. Isoamyl 1,4-bis(isoamyloxy)-2-naphthoate (S1g)**

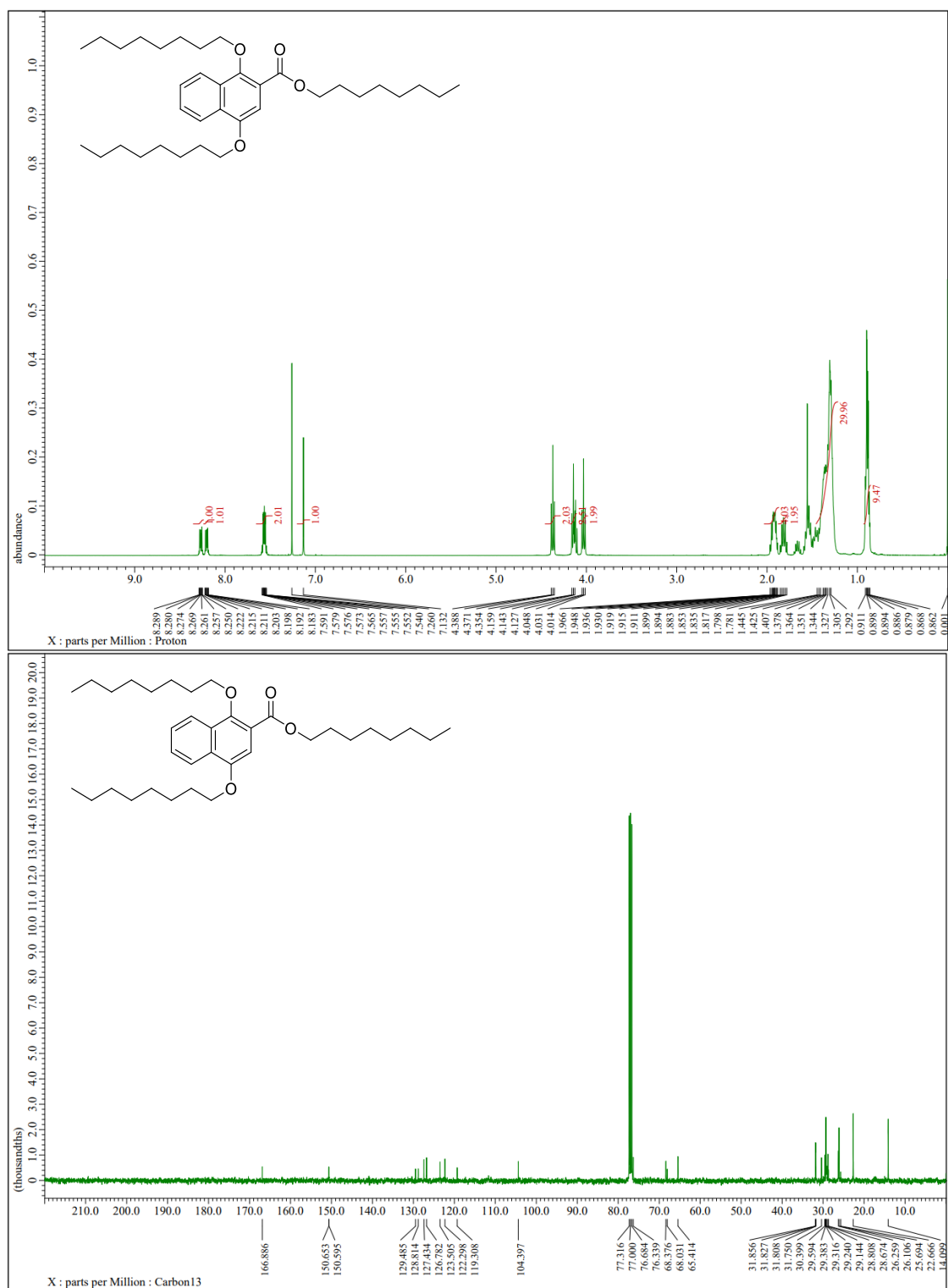
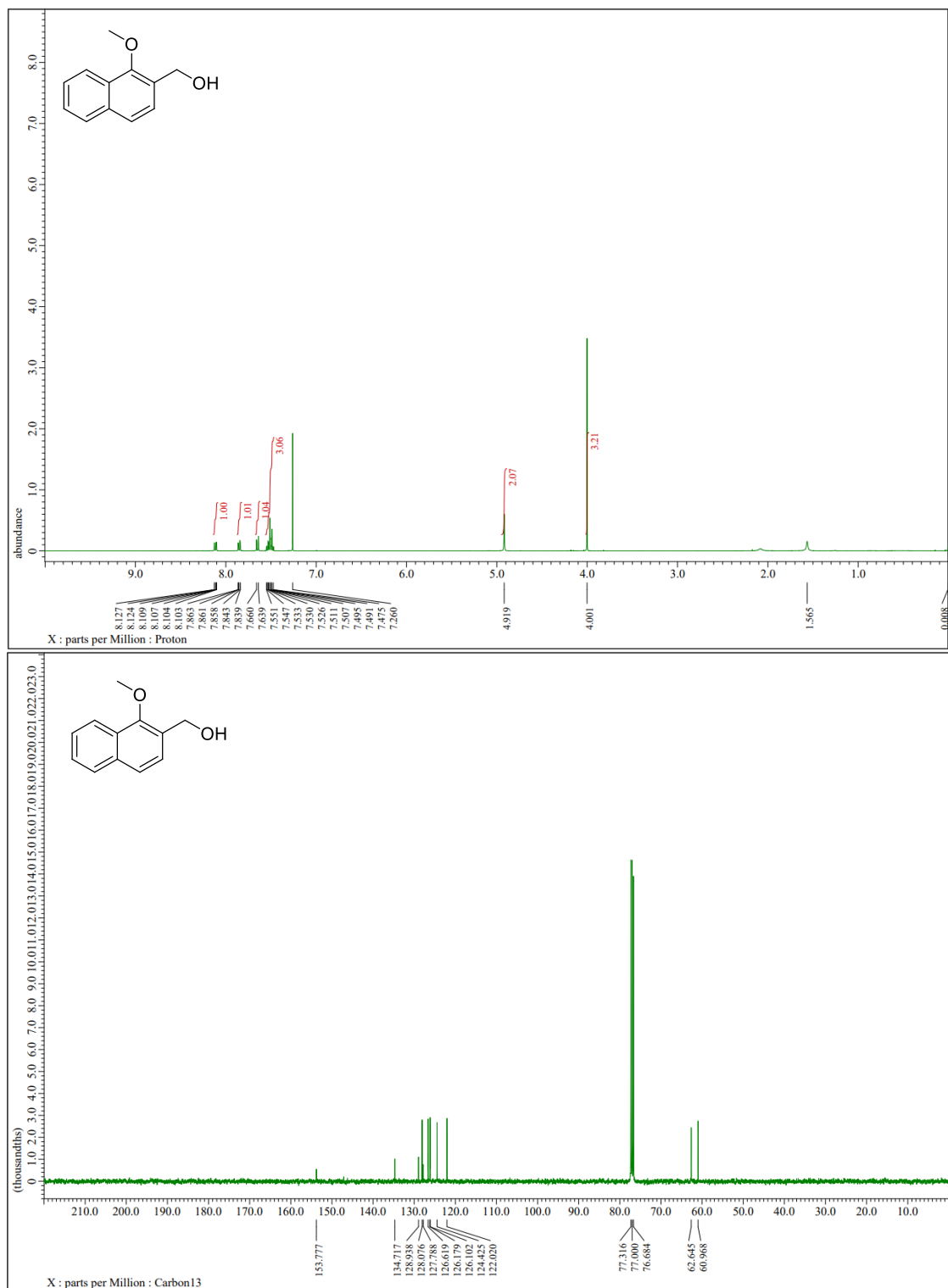
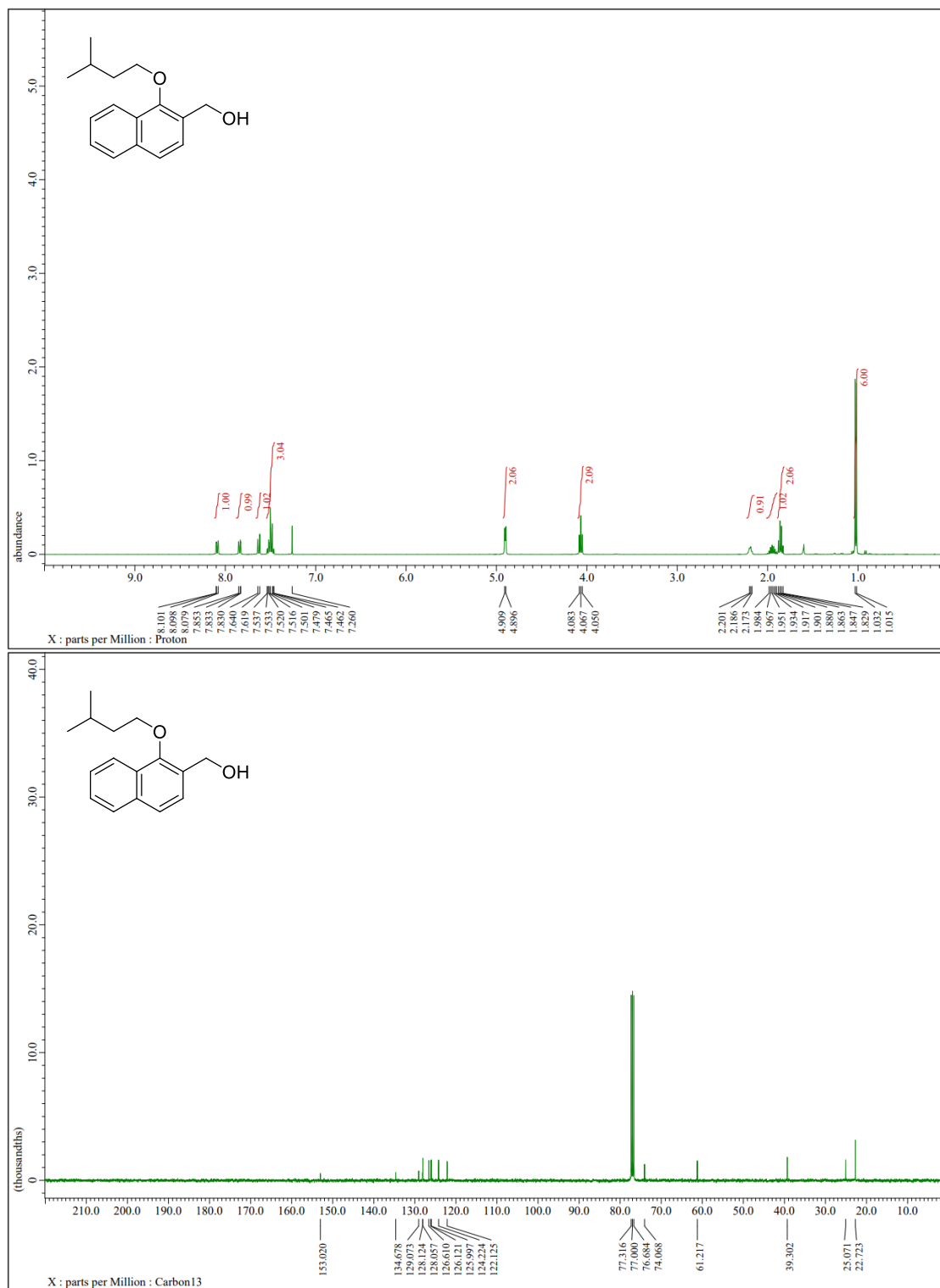


Figure S8. Octyl 1,4-bis(octyloxy)-2-naphthoate (S1h)



**Figure S9.** (1-Methoxynaphthalen-2-yl)methanol (5a)



**Figure S10.** (1-(Isoamyloxy)naphthalen-2-yl)methanol (**5b**)

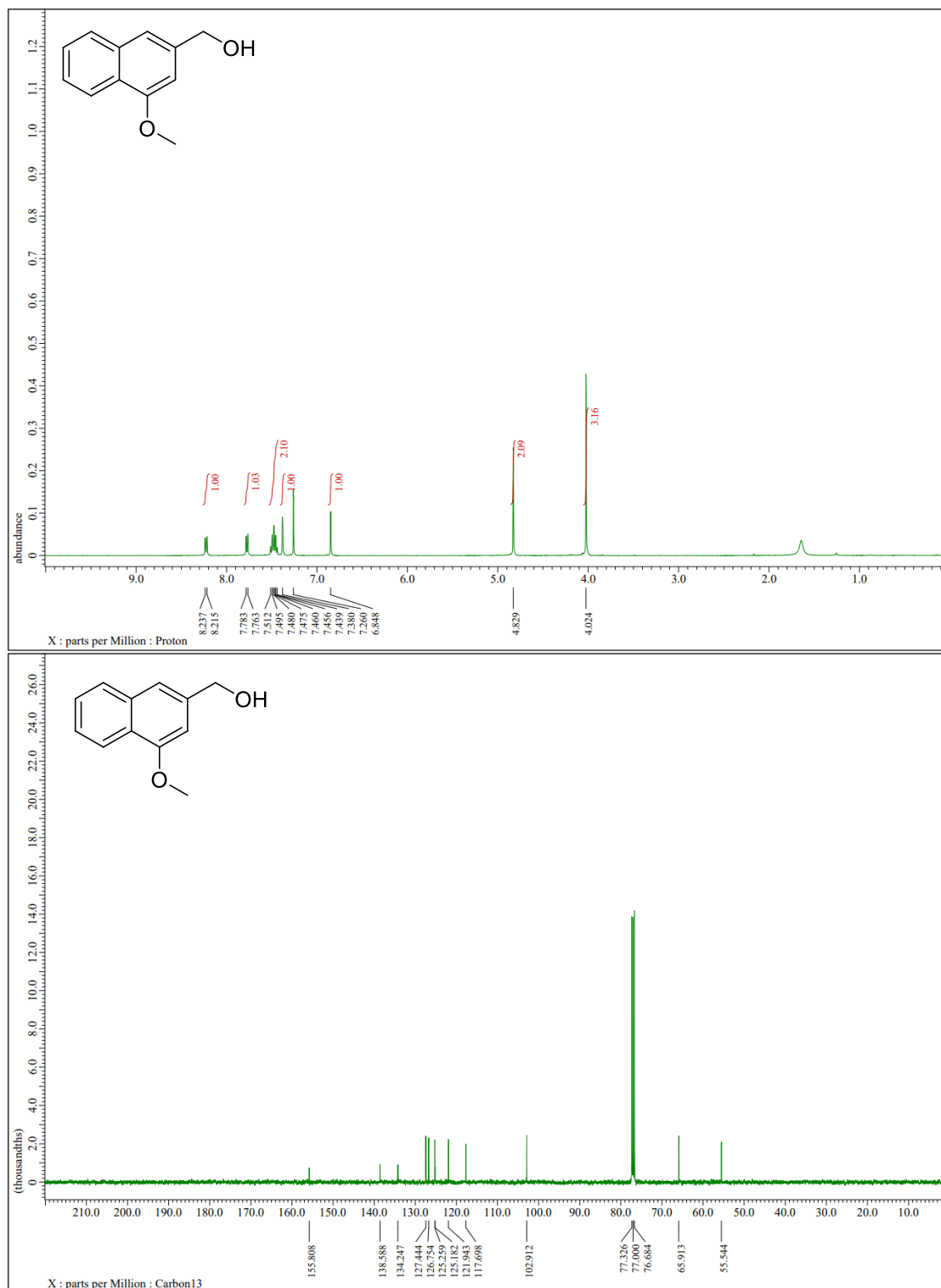
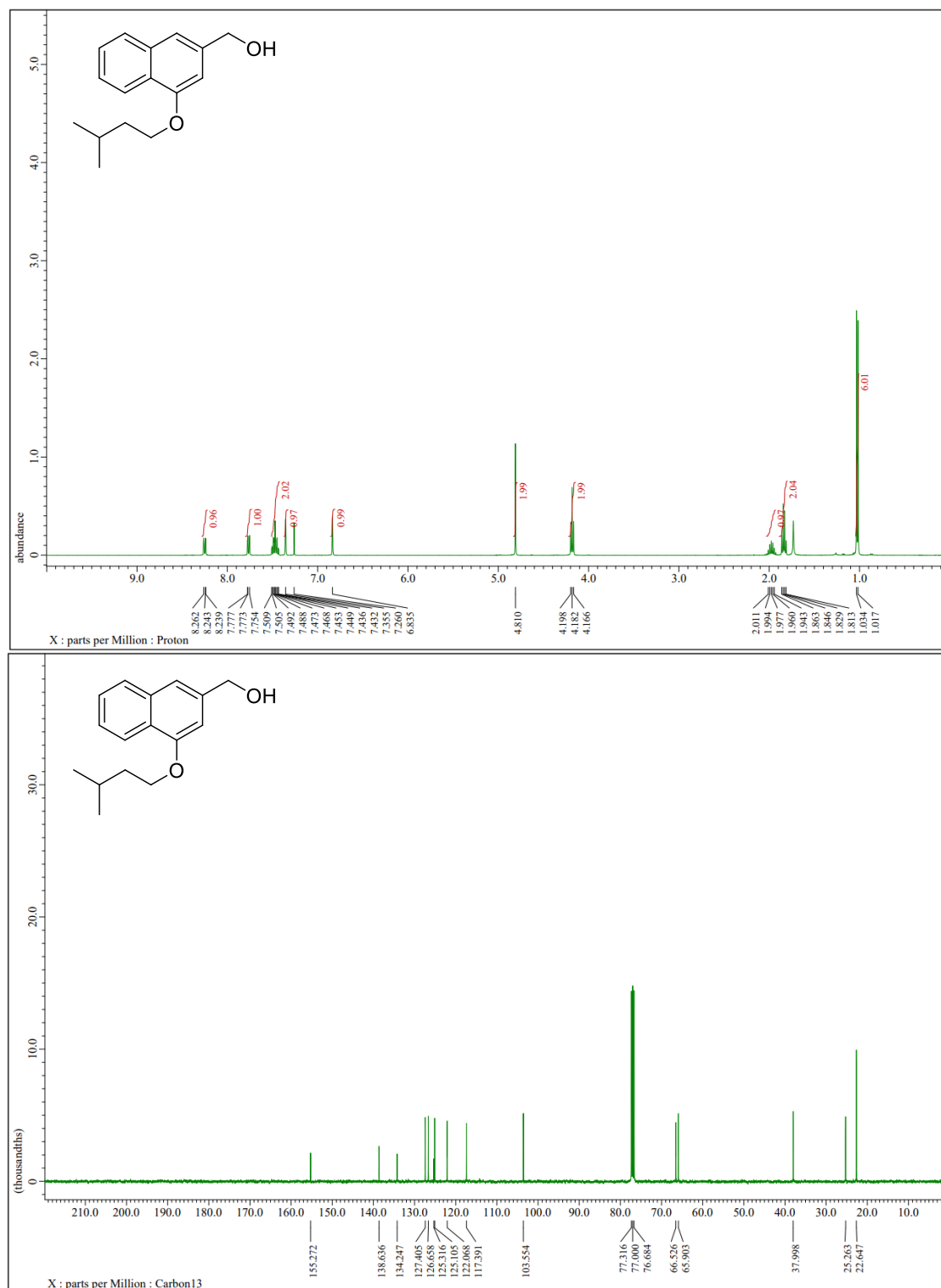
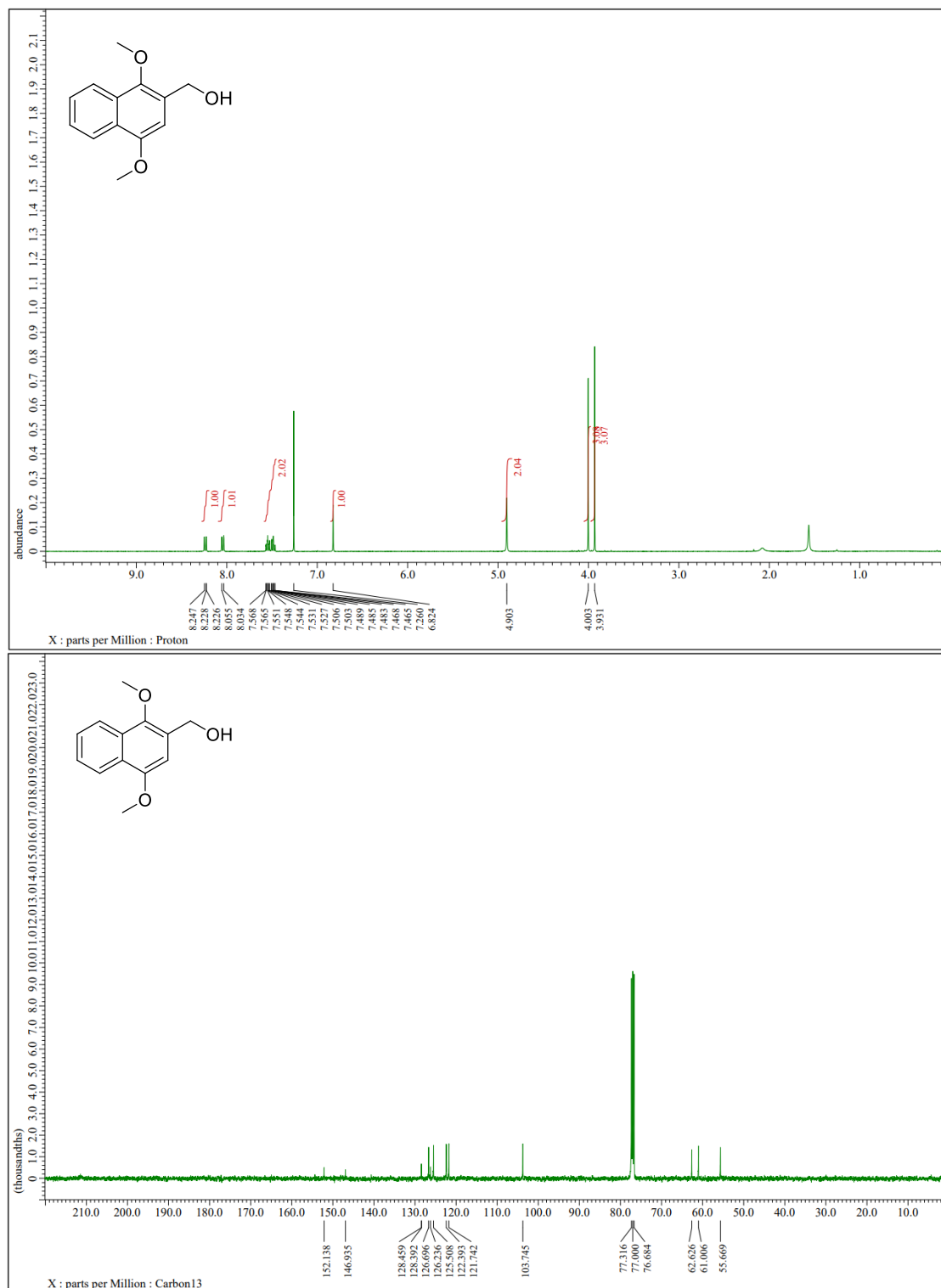


Figure S11. (4-Methoxynaphthalen-2-yl)methanol (5c)

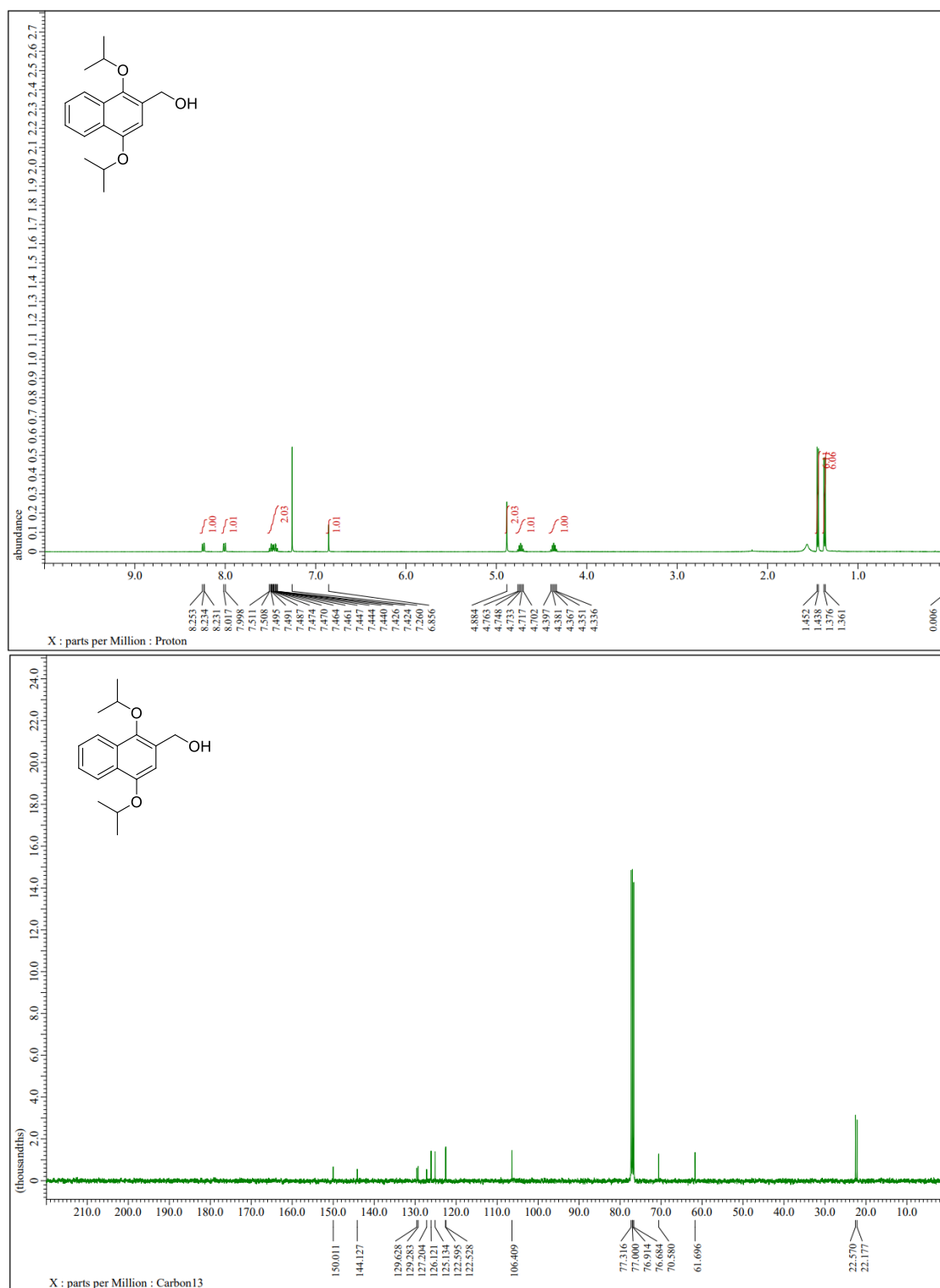


**Figure S12.** (4-(Isoamyloxy)naphthalen-2-yl)methanol (**5d**)

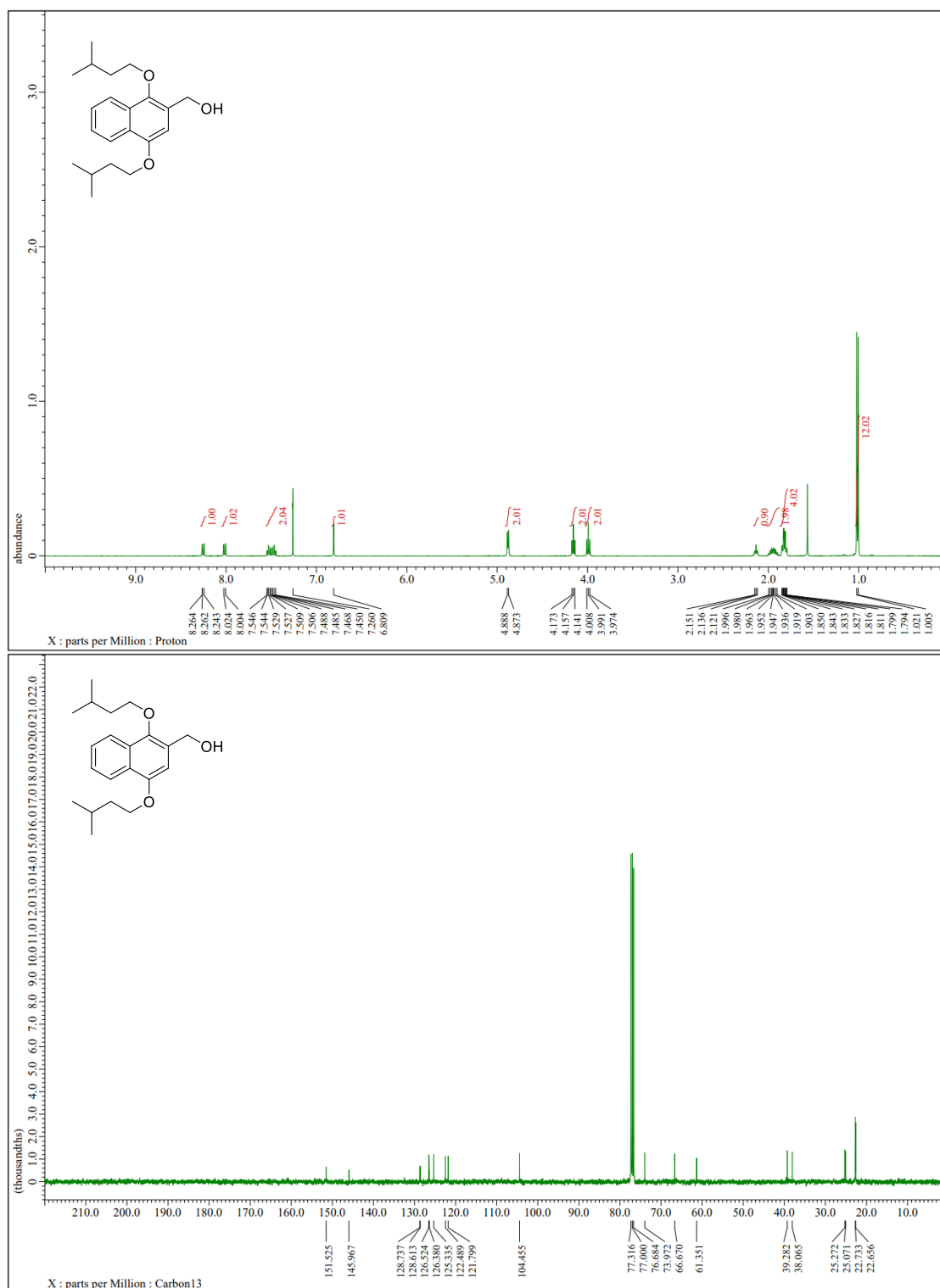




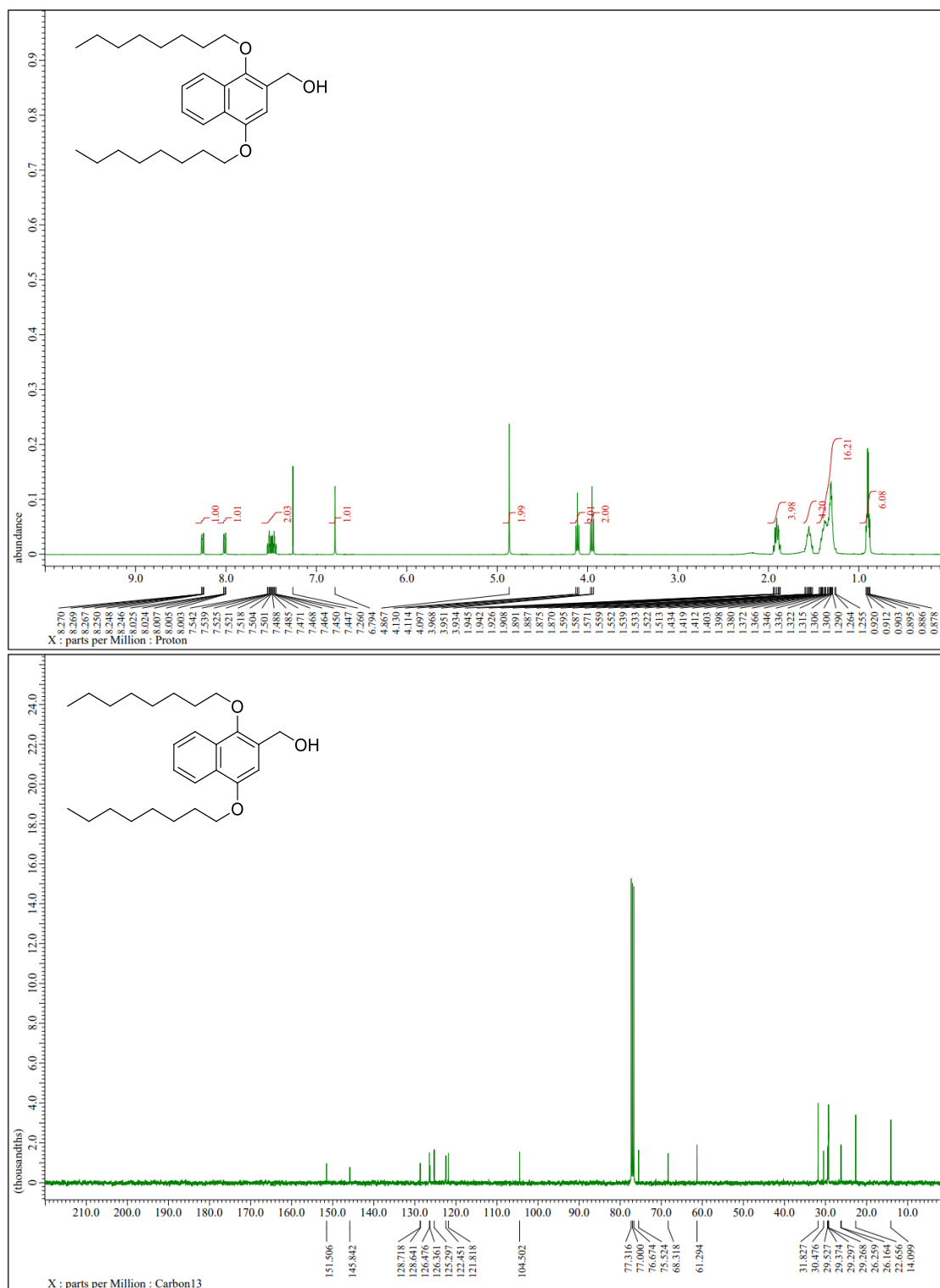
**Figure S13.** (1,4-Dimethoxynaphthalen-2-yl)methanol (5e)



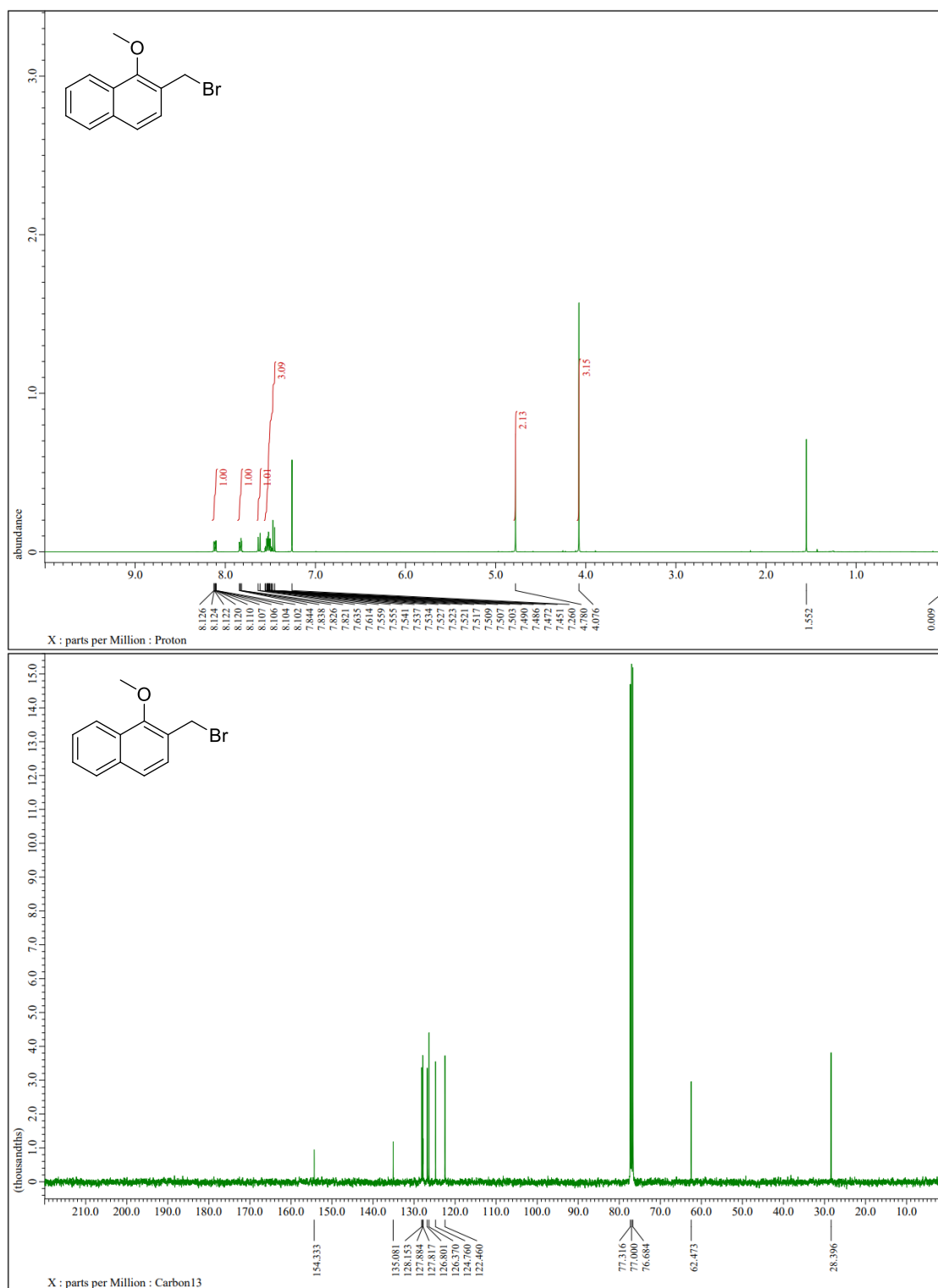
**Figure S14.** (1,4-Diisopropoxynaphthalen-2-yl)methanol (**5f**)



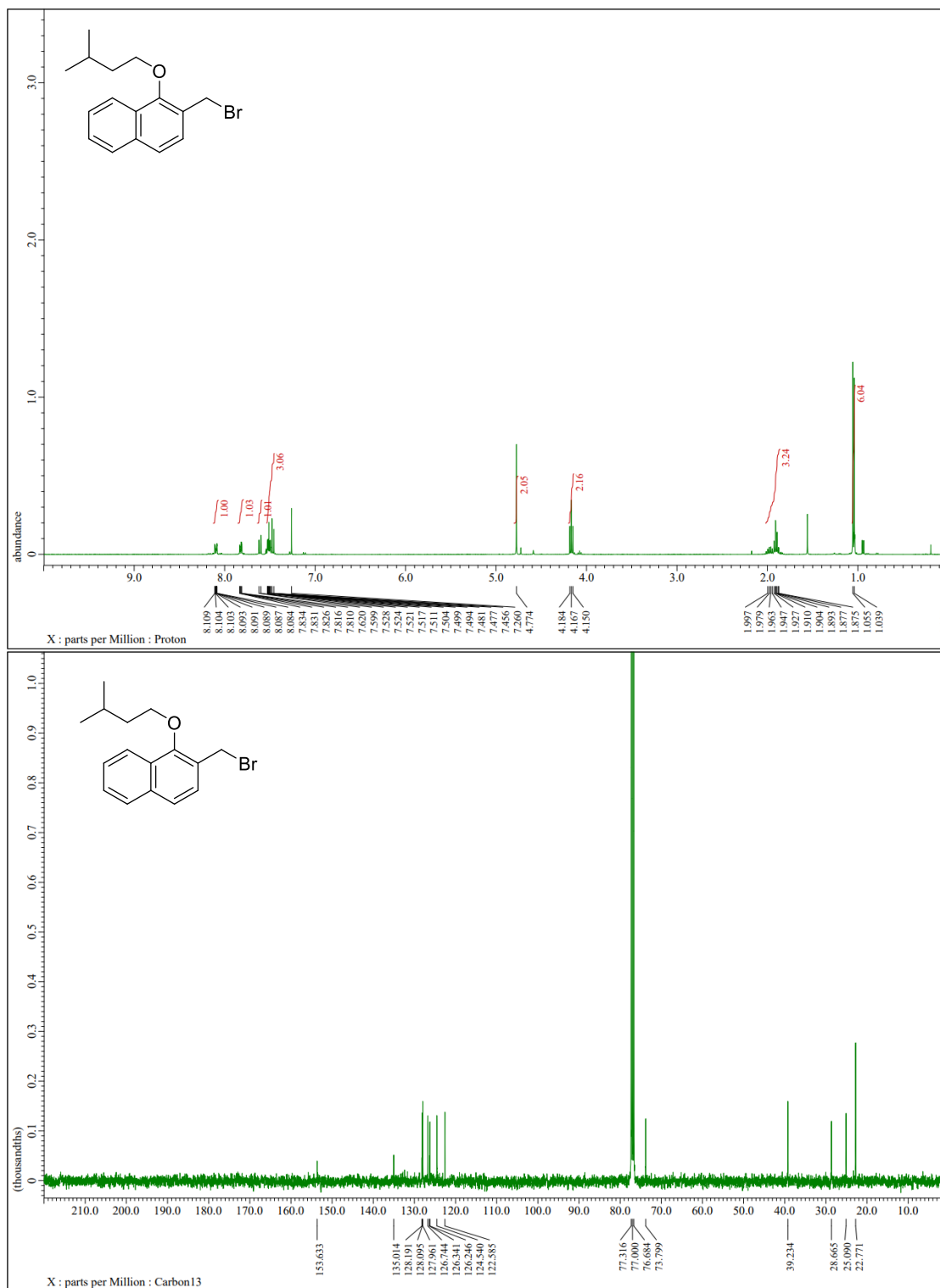
**Figure S15.** (1,4-Bis(isoamyloxy)naphthalen-2-yl)methanol (**5g**)



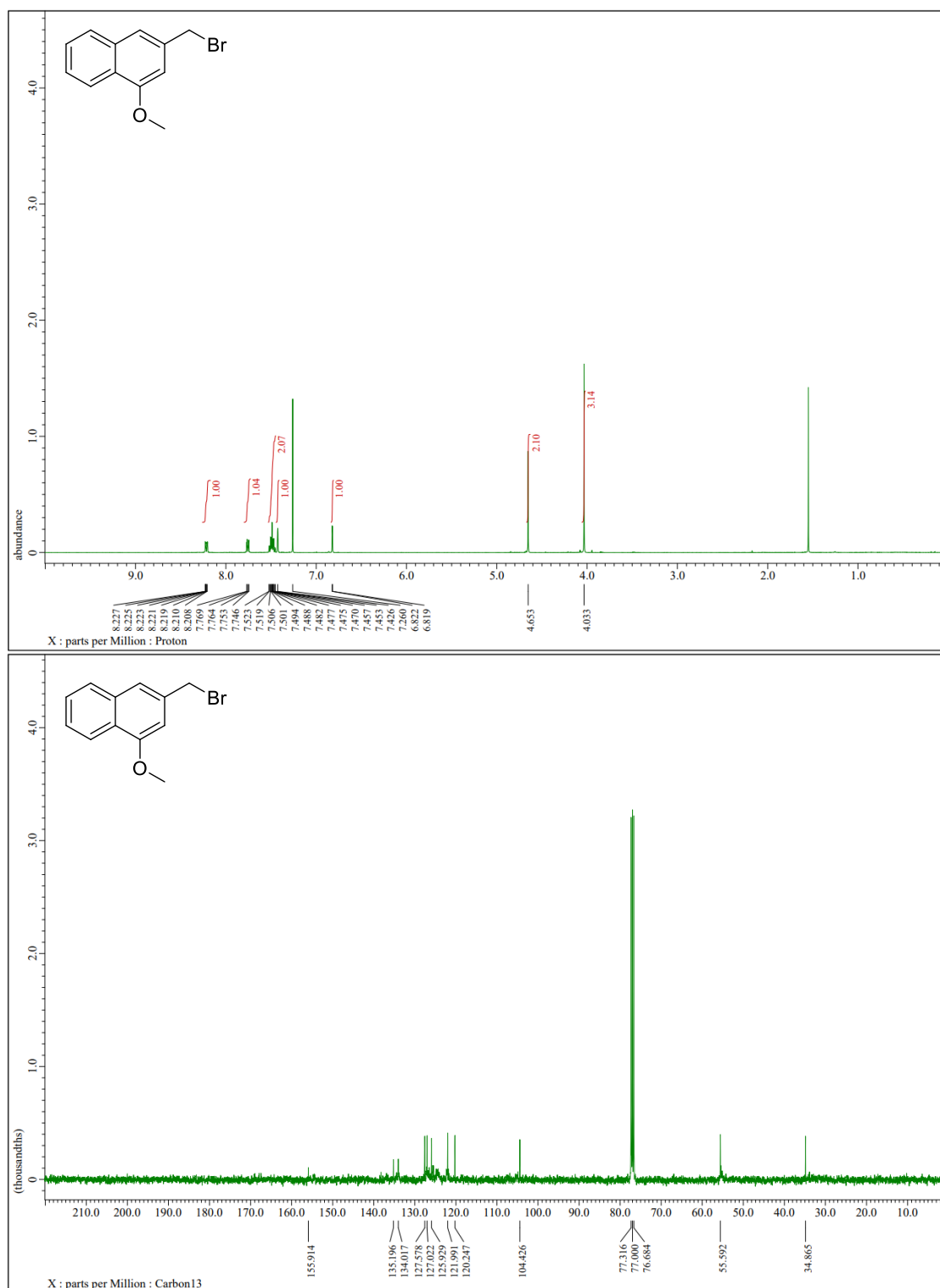
**Figure S16.** (1,4-bis(octyloxy)naphthalen-2-yl)methanol (**5h**)



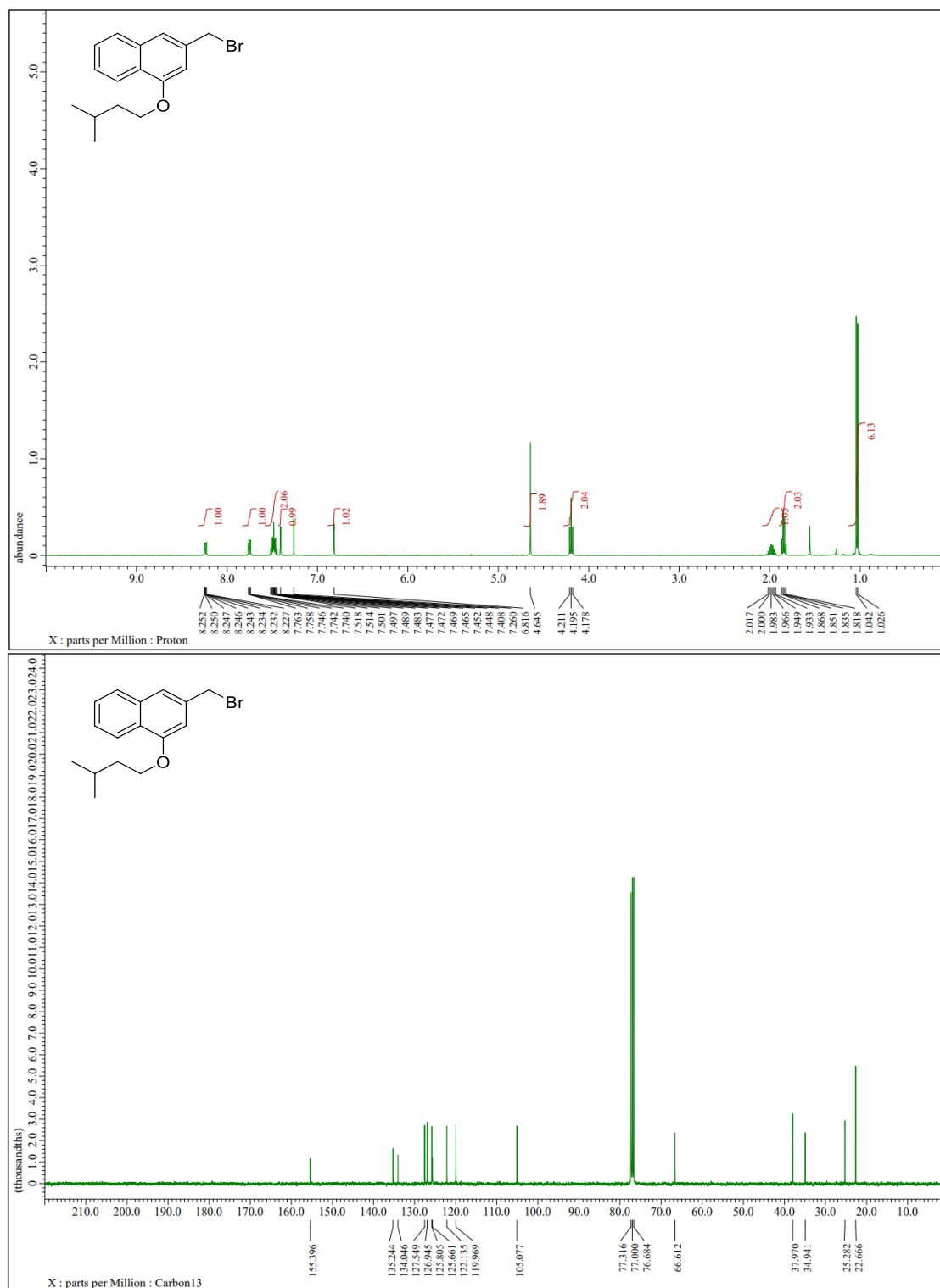
**Figure S17.** 2-(Bromomethyl)-1-methoxynaphthalene (**12a**)



**Figure S18.** 2-(Bromomethyl)-1-(isoamyloxy)naphthalene (12b)



**Figure S19.** 3-(Bromomethyl)-1-methoxynaphthalene (**12c**)



**Figure S20.** 3-(Bromomethyl)-1-(isoamyloxy)naphthalene (**12d**)



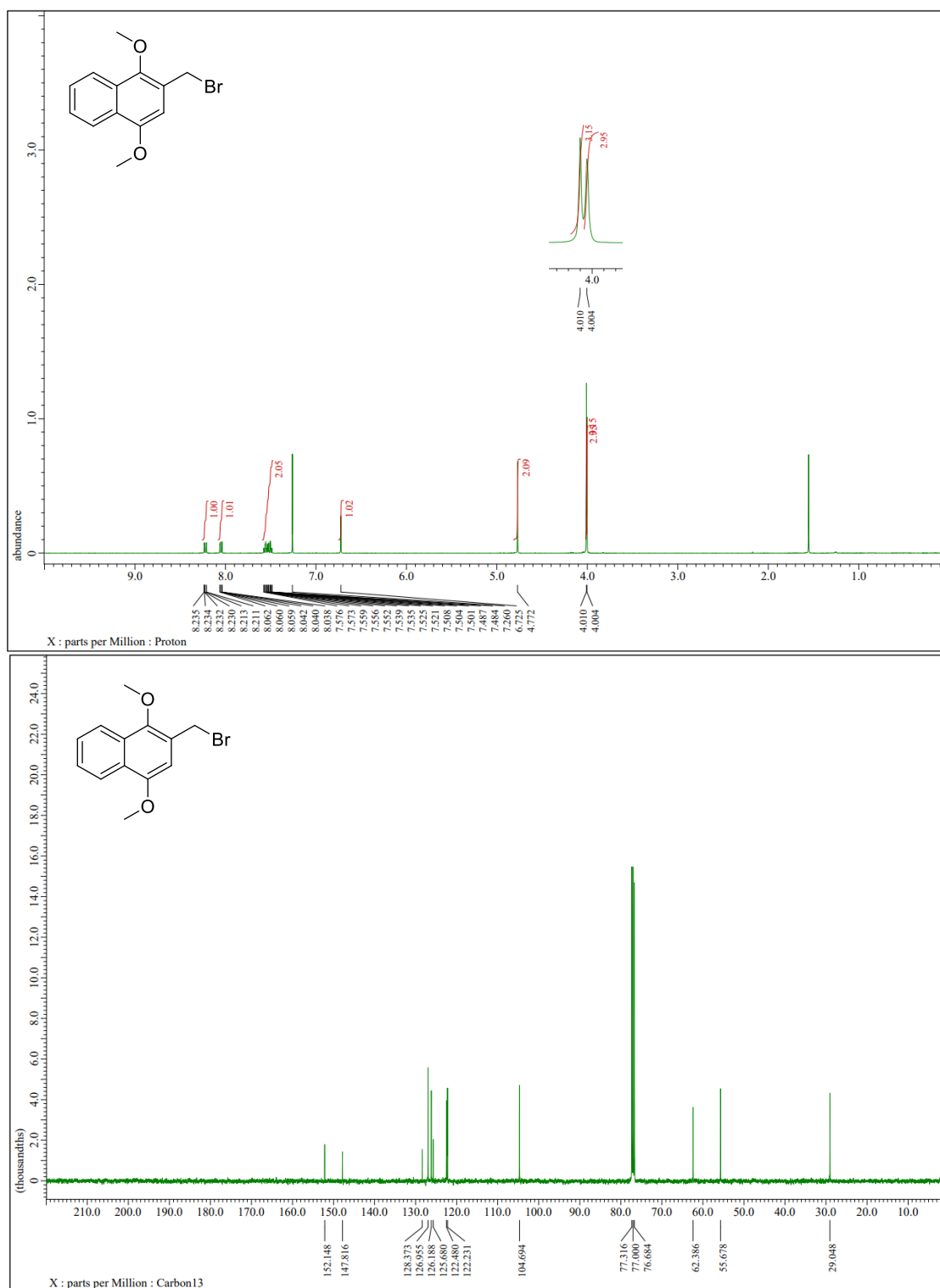


Figure S21. 2-(Bromomethyl)-1,4-dimethoxynaphthalene (12e)

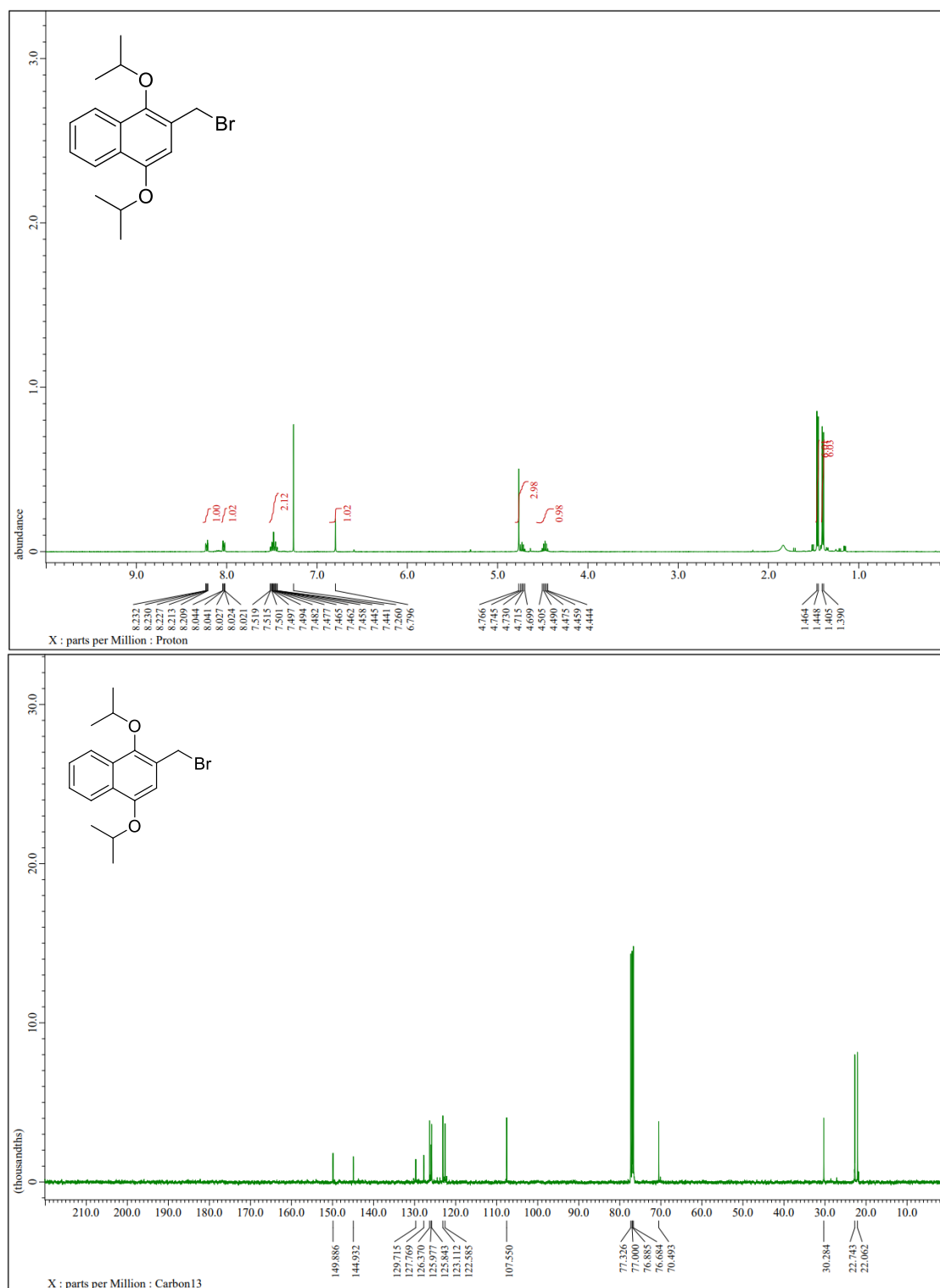
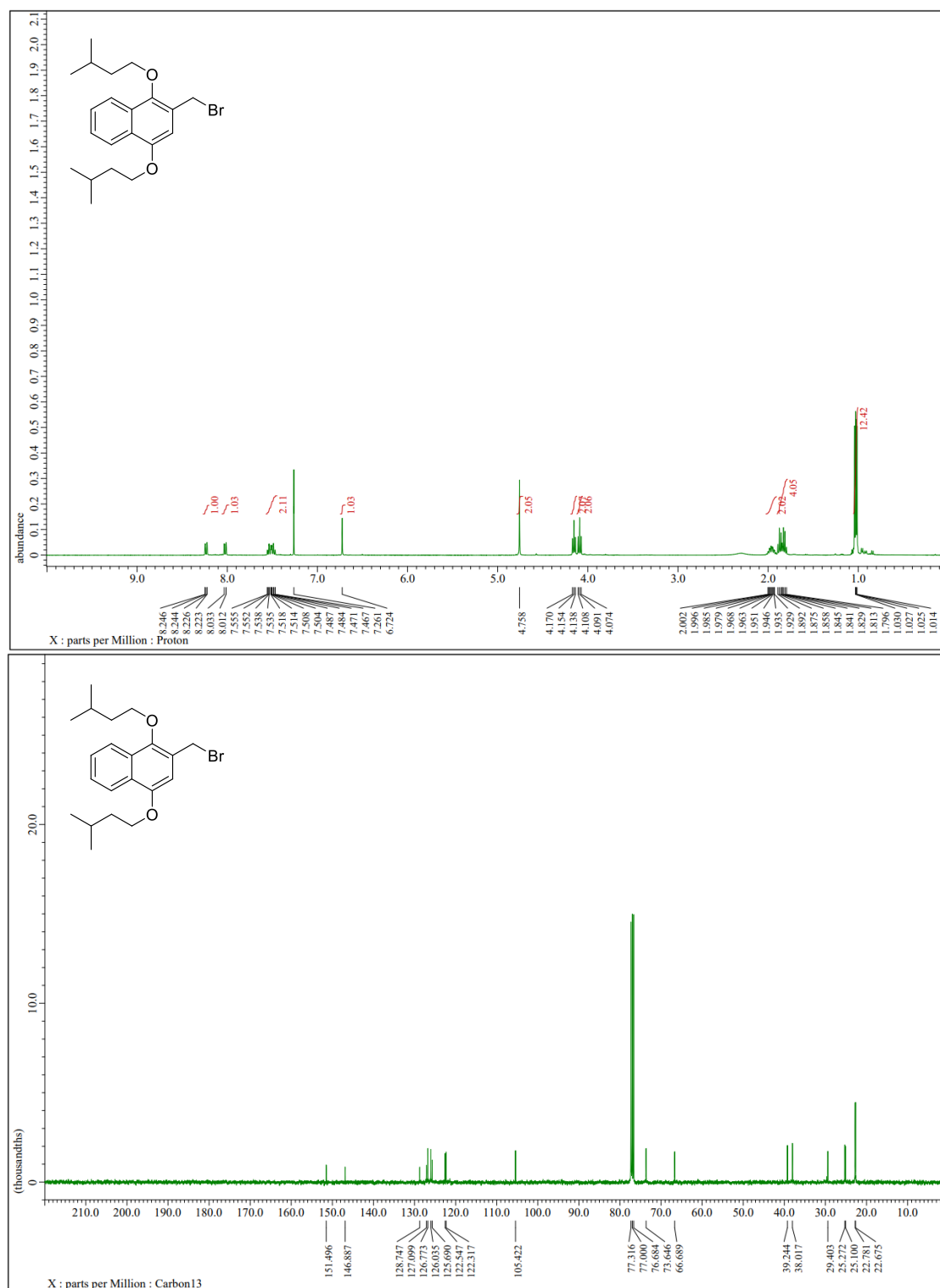


Figure S22. 2-(Bromomethyl)-1,4-diisopoxynaphthalene (12f)



**Figure S23.** 2-(Bromomethyl)-1,4-bis(isoamyloxy)naphthalene (**12g**)



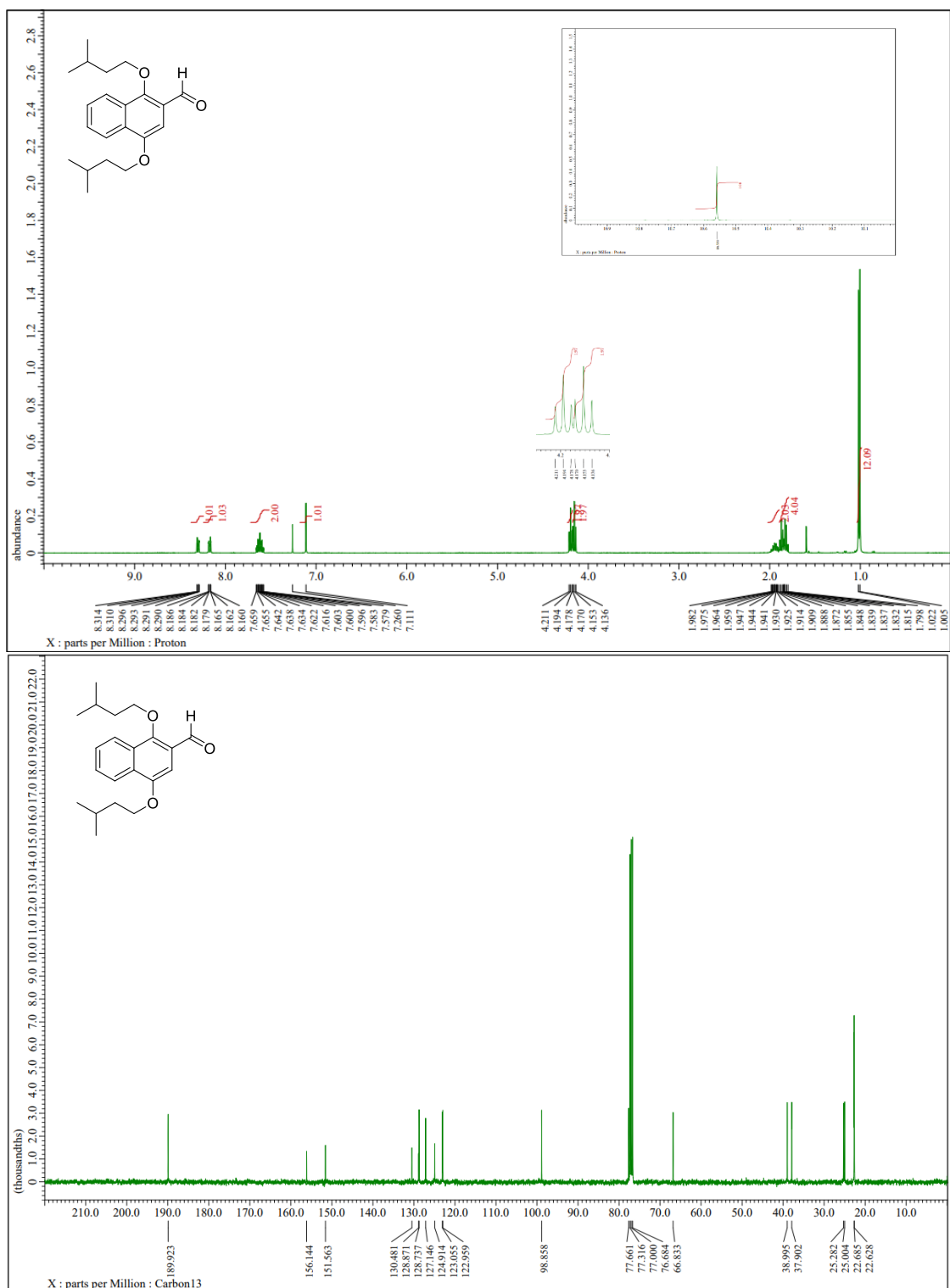
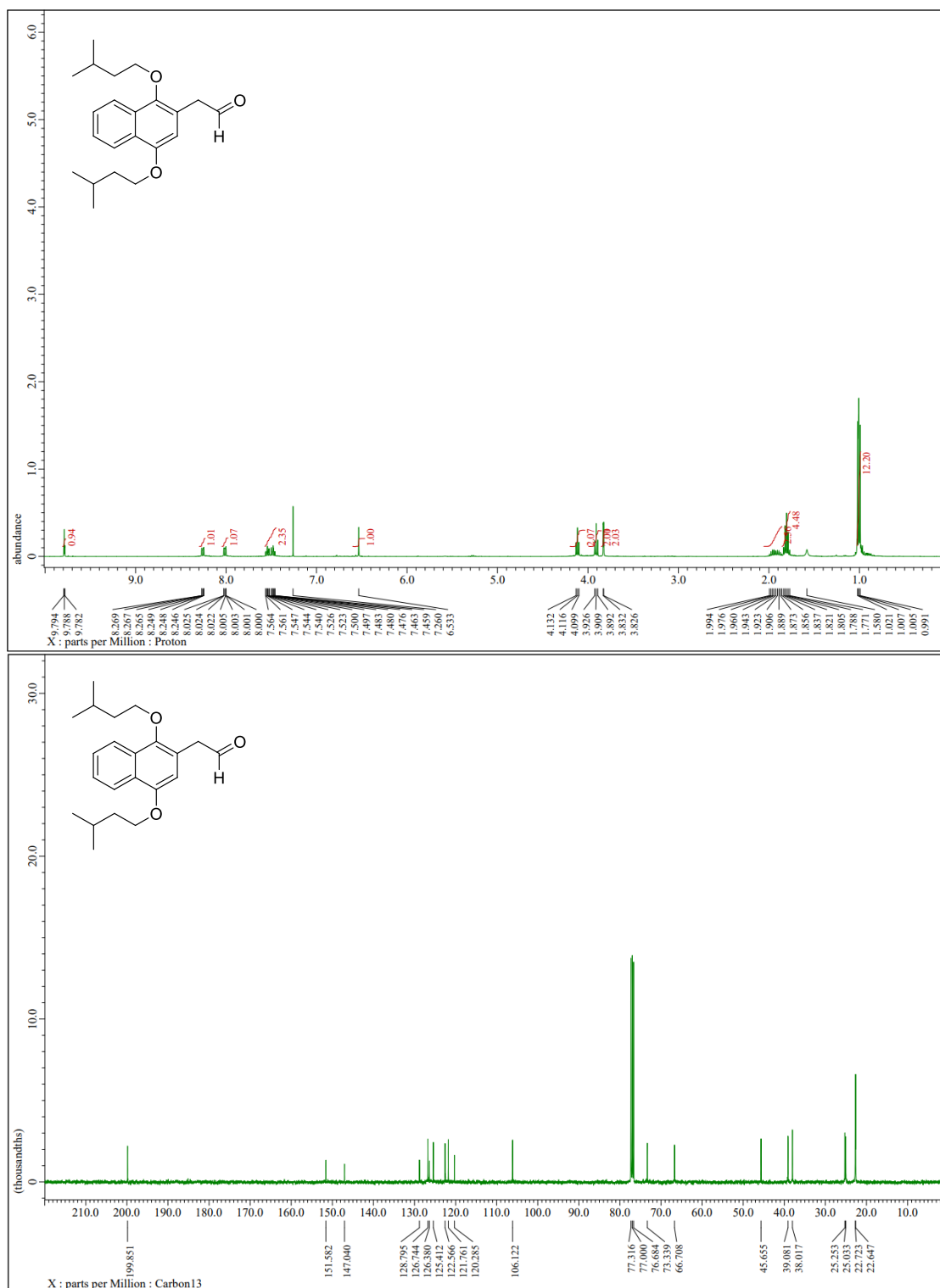


Figure S25. 1,4-Bis(isoamyloxy)-2-naphthaldehyde (6)



**Figure S26.** 2-(1,4-Bis(isoamyloxy)naphthalen-2-yl)acetaldehyde (7)

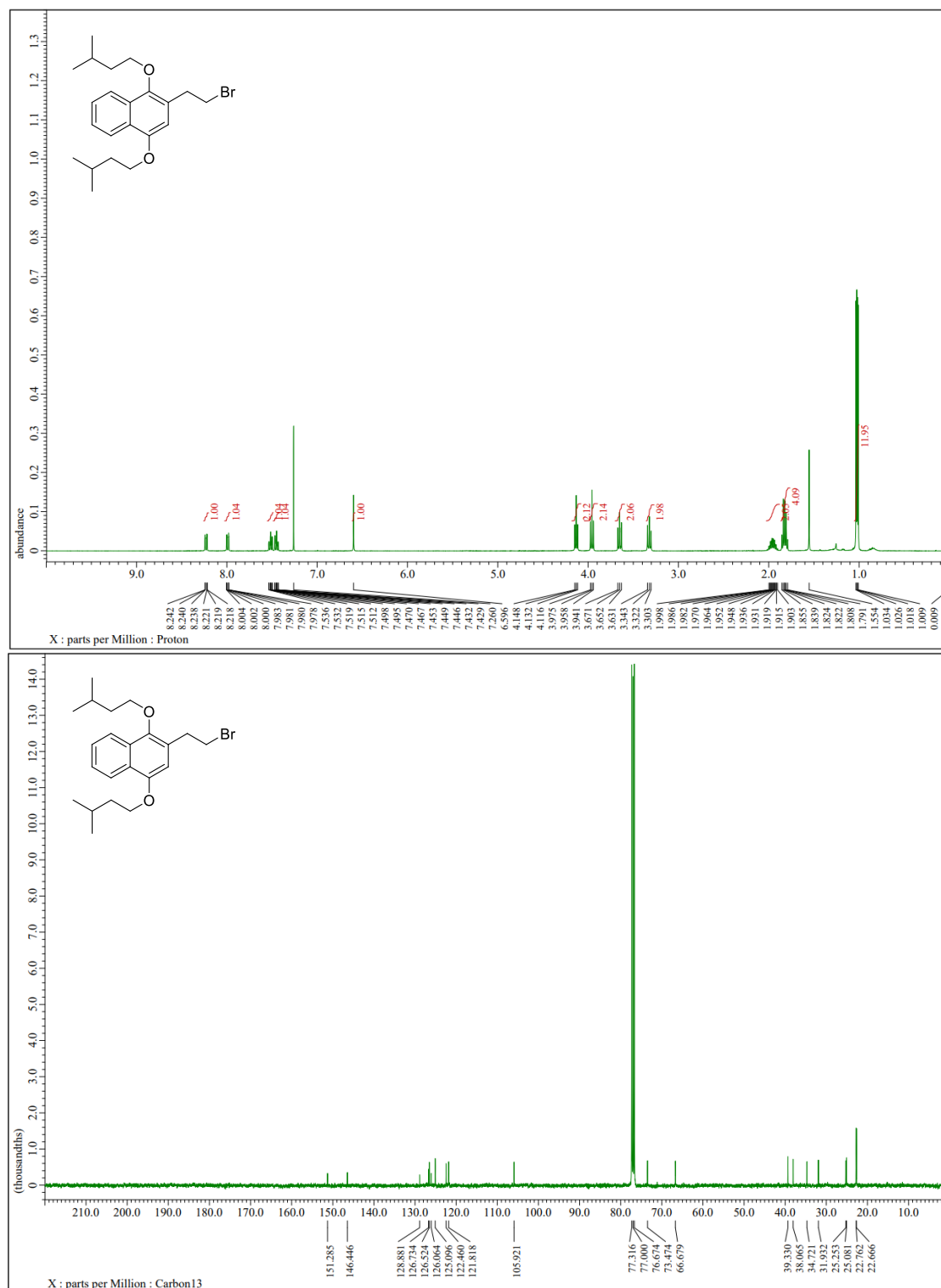
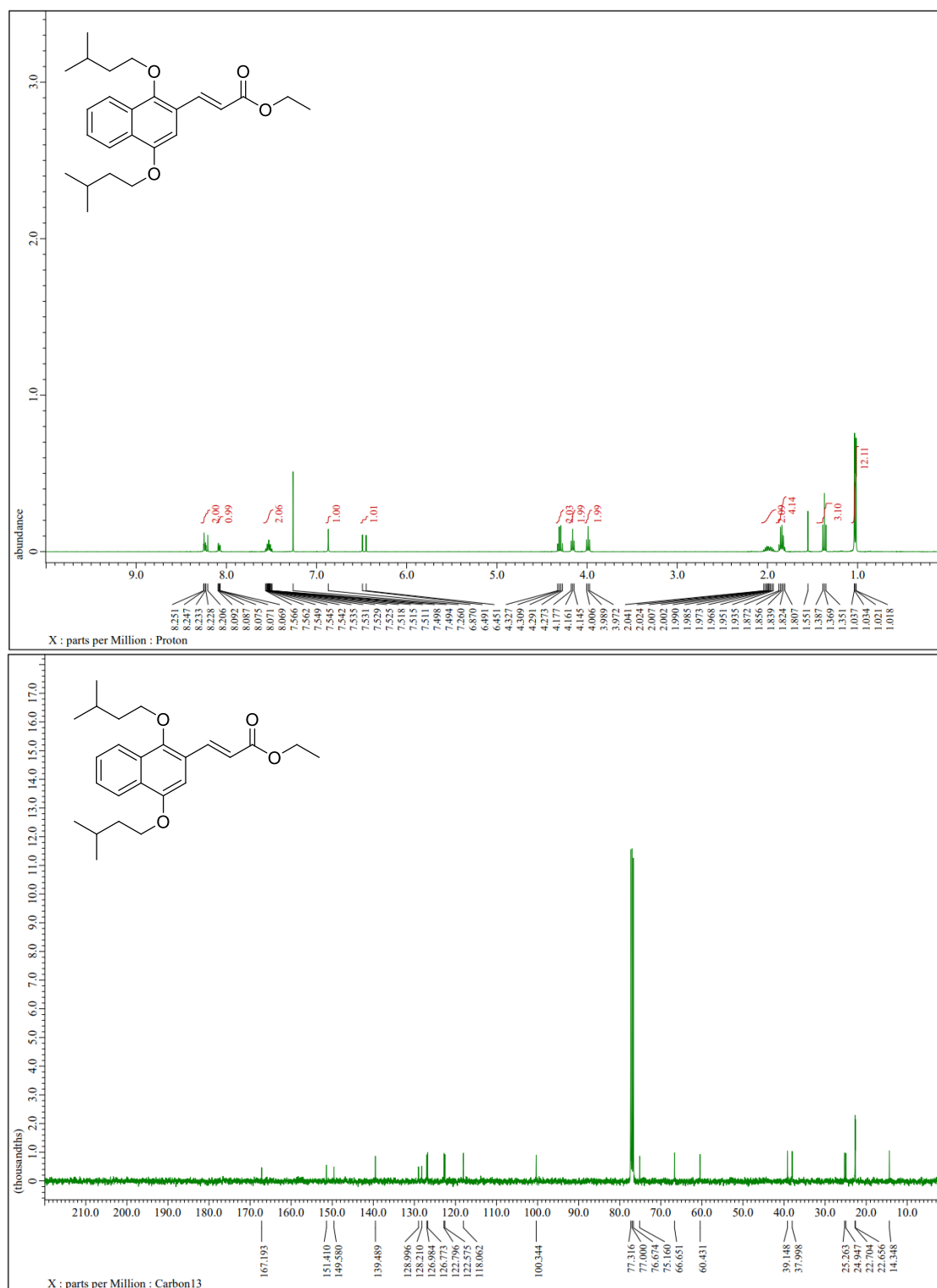


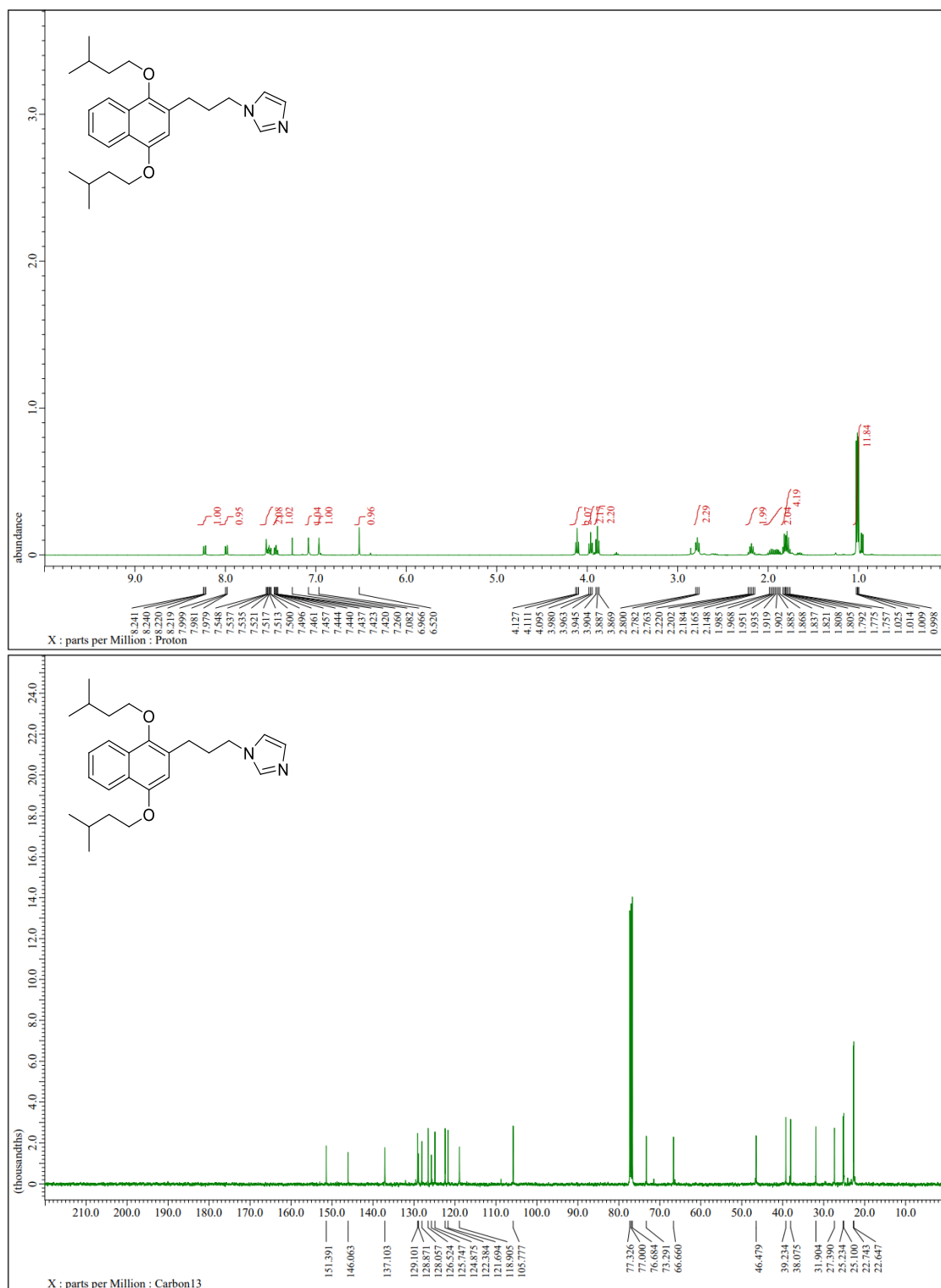
Figure S27. 2-(2-Bromoethyl)-1,4-bis(isoamyloxy)naphthalene (8)



**Figure S28.** Ethyl 3-(1,4-bis(isoamyloxy)naphthalen-2-yl)acrylate (9)







**Figure S30.** 1-(3-(1,4-Bis(isoamyloxy)naphthalen-2-yl)propyl)-1H-imidazole (**11**)

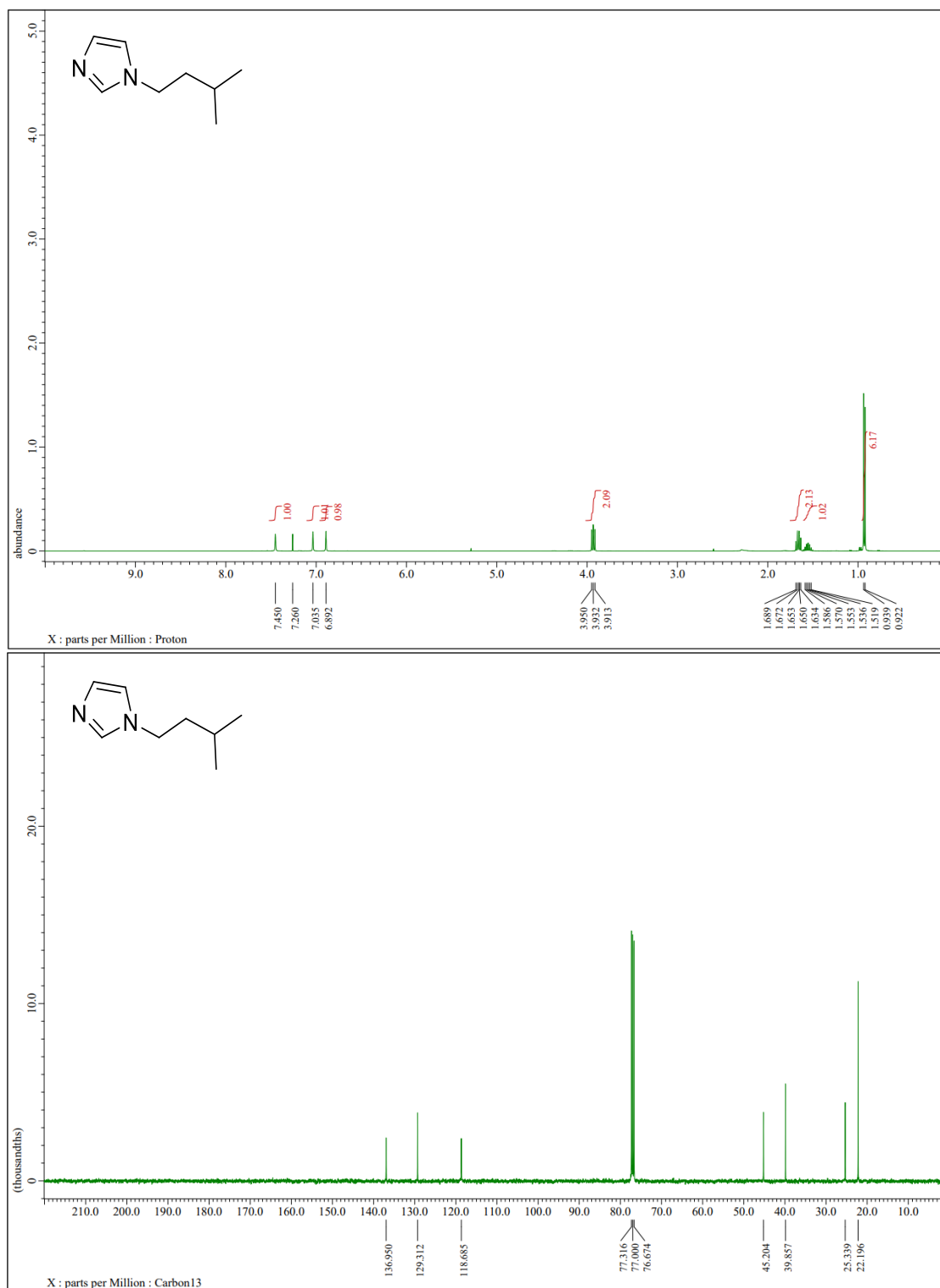
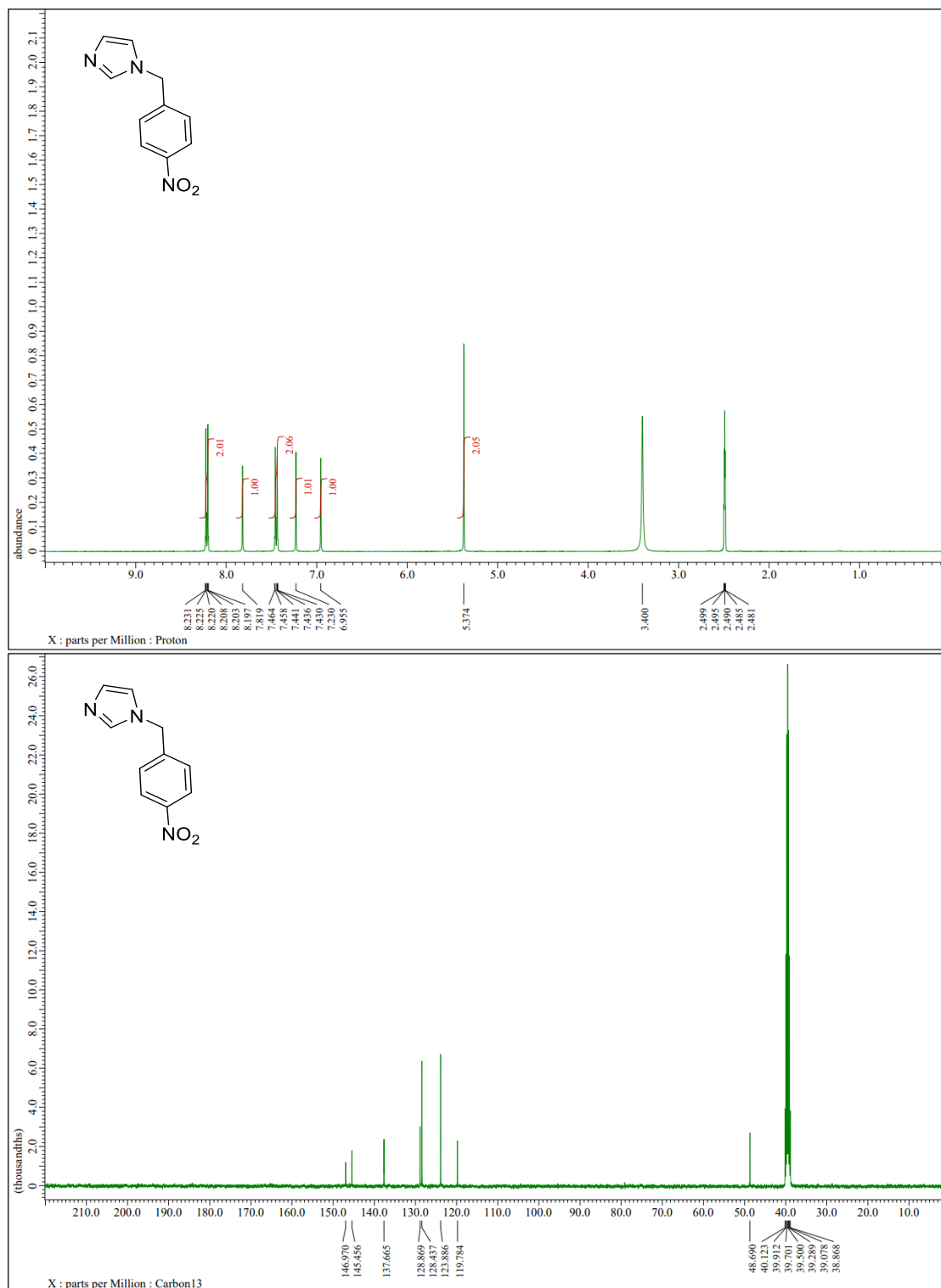
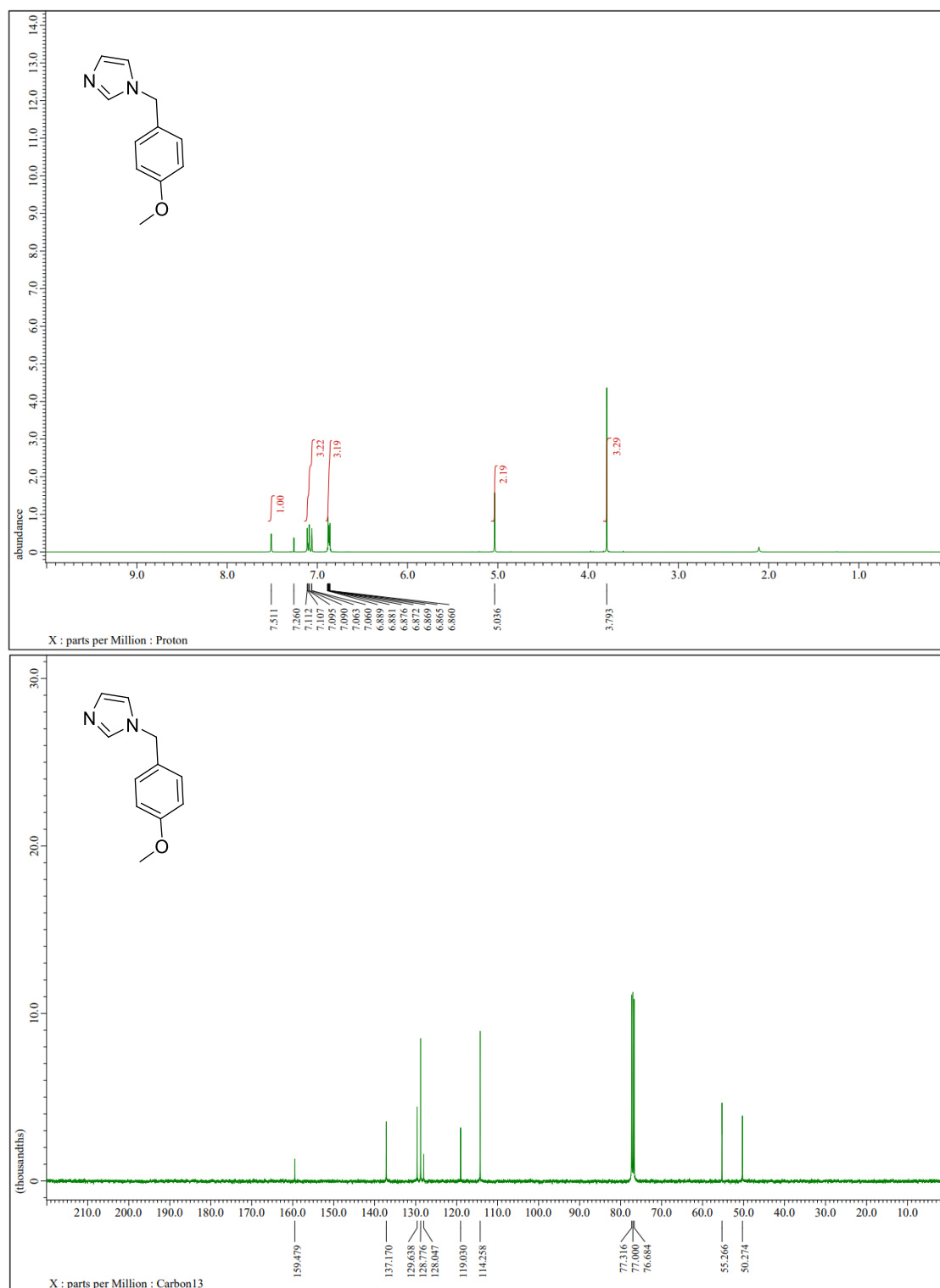


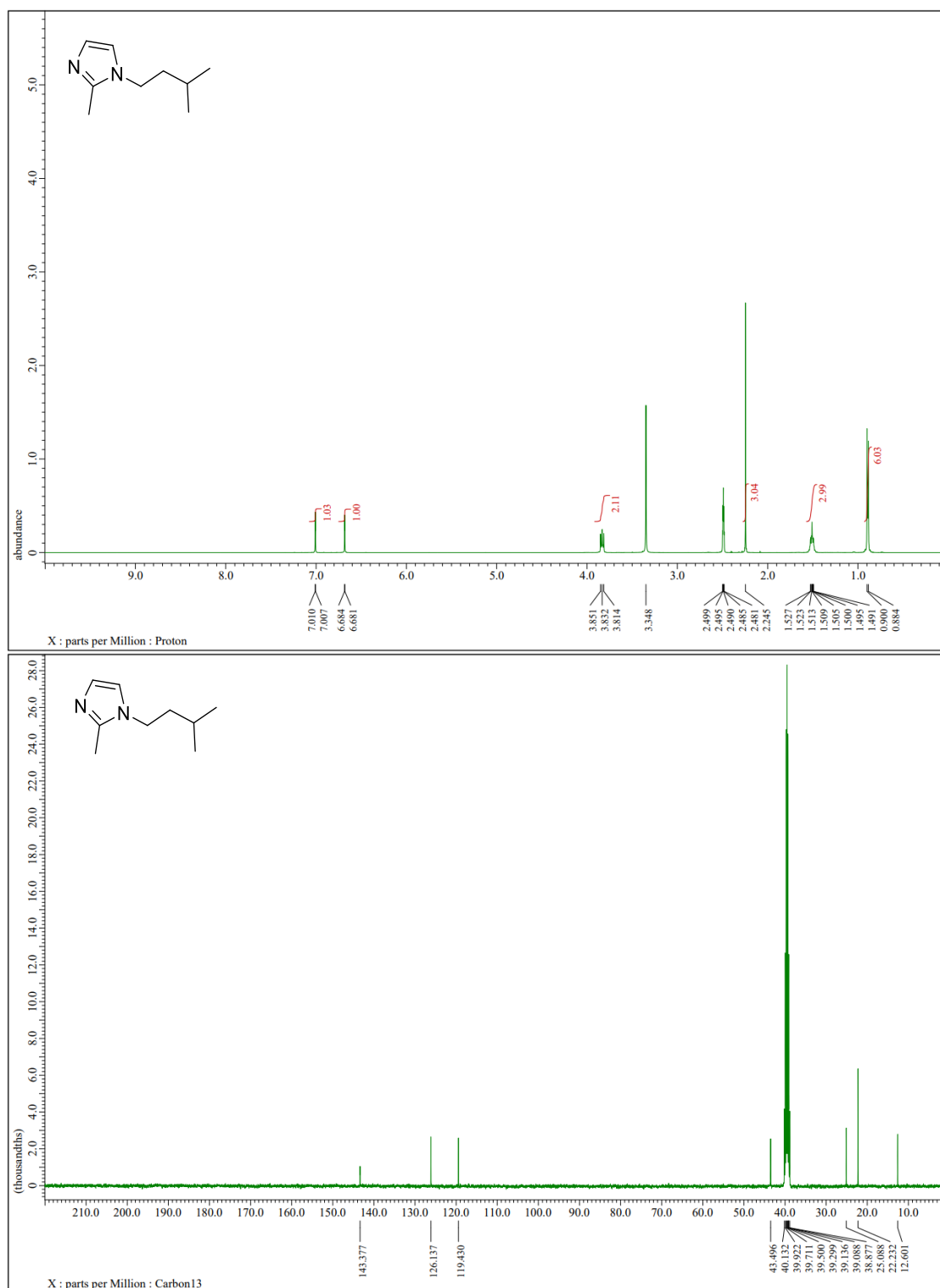
Figure S31. 1-Isoamyl-1H-imidazole (13b)



**Figure S32.** 1-(4-Nitrobenzyl)-1H-imidazole (**13d**)



**Figure S33.** 1-(4-Methoxybenzyl)-1*H*-imidazole (**13e**)



**Figure S34.** 1-Isoamyl-2-methyl-1*H*-imidazole (**14a**)

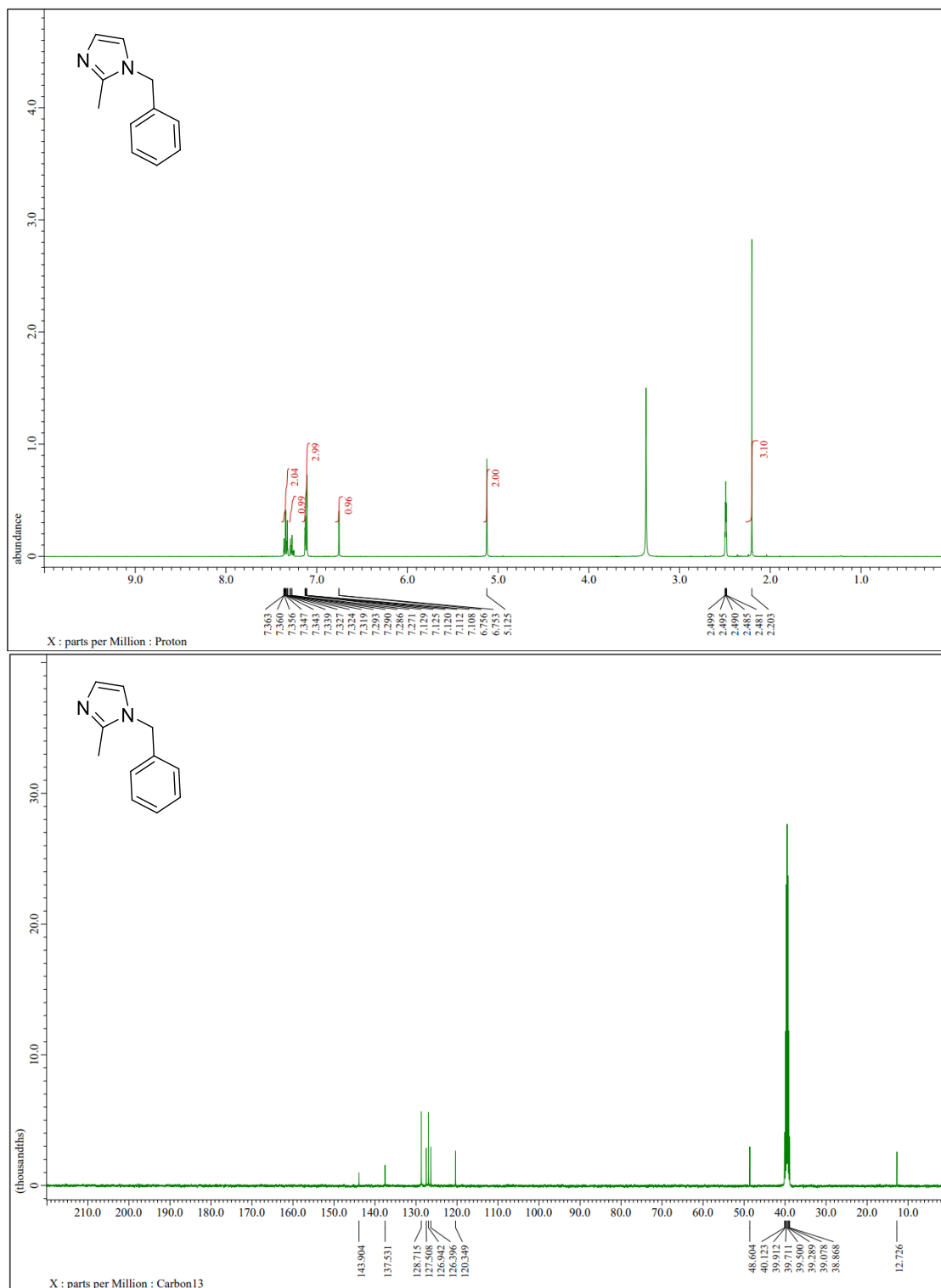


Figure S35. 1-Benzyl-2-methyl-1H-imidazole (**14b**)

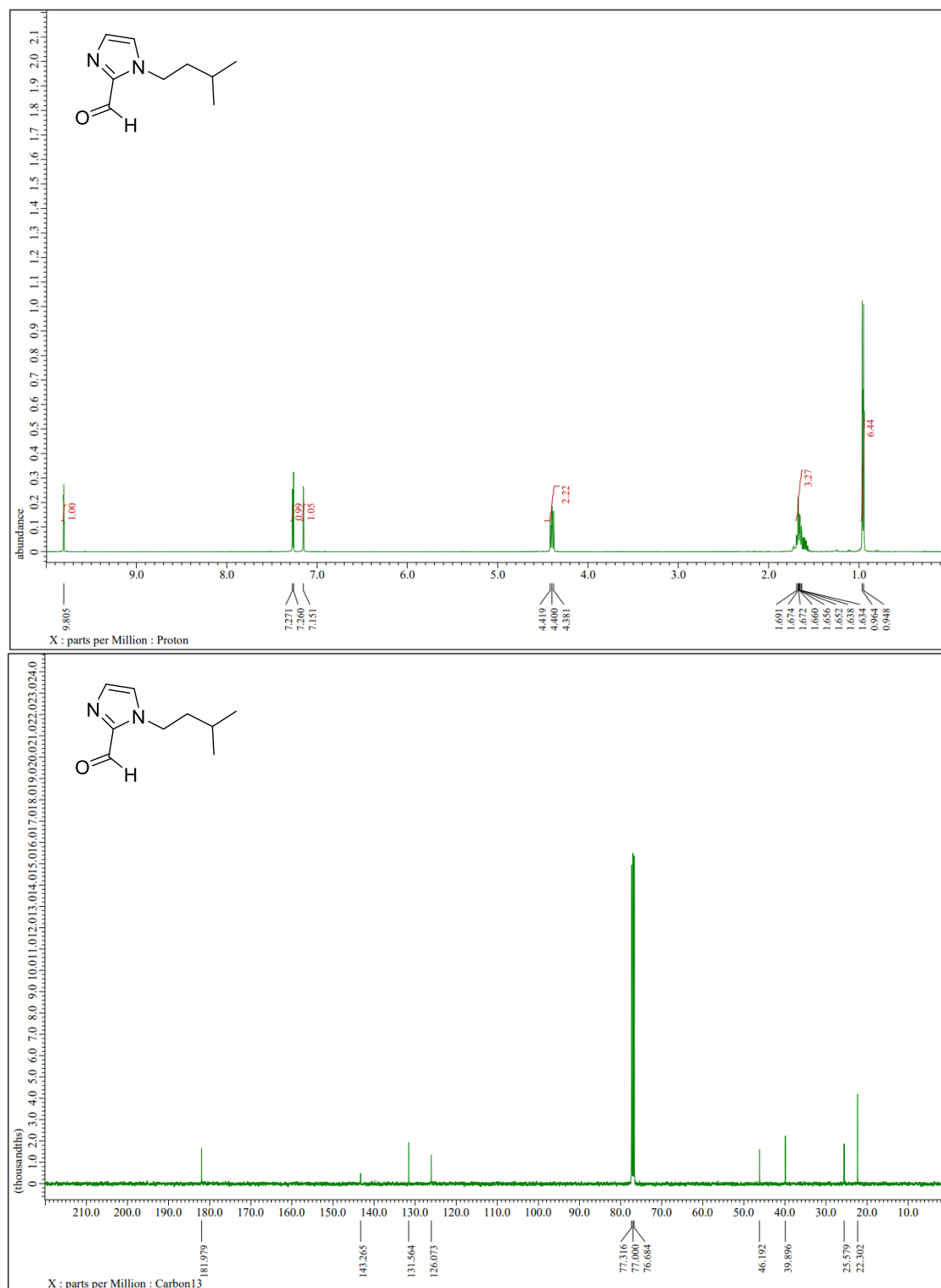


Figure S36. 1-Isoamyl-1H-imidazole-2-carbaldehyde (14c)



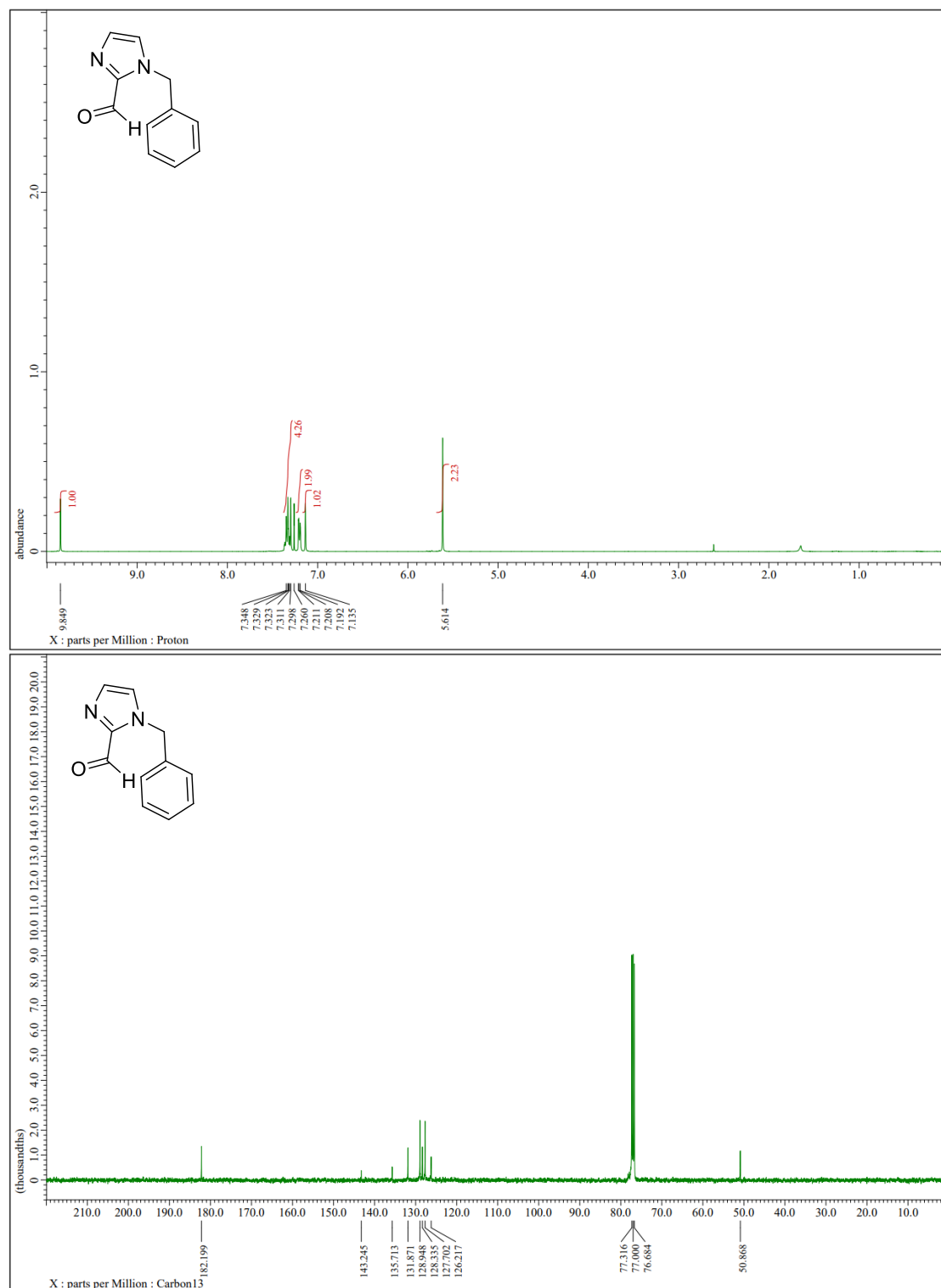
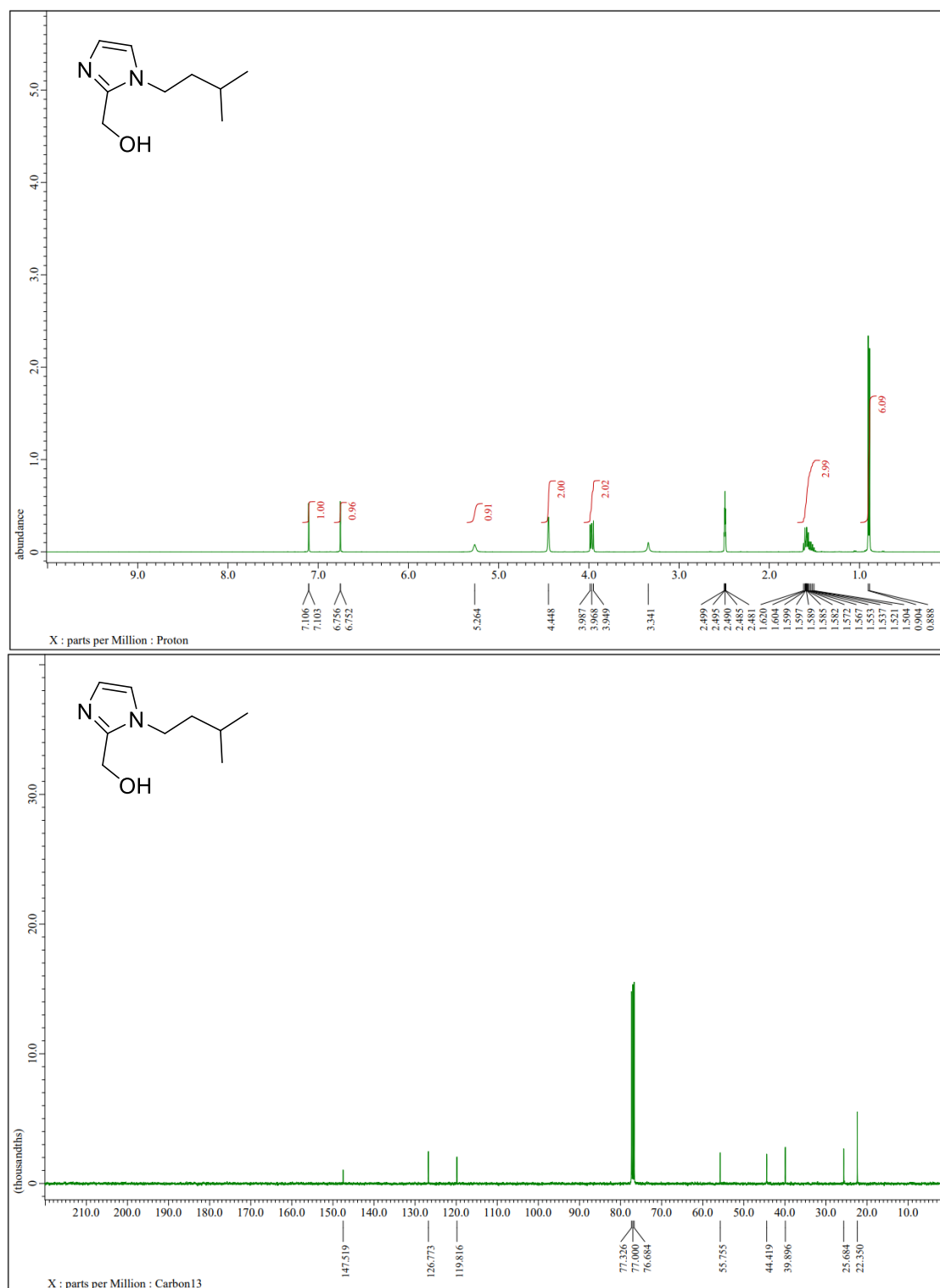
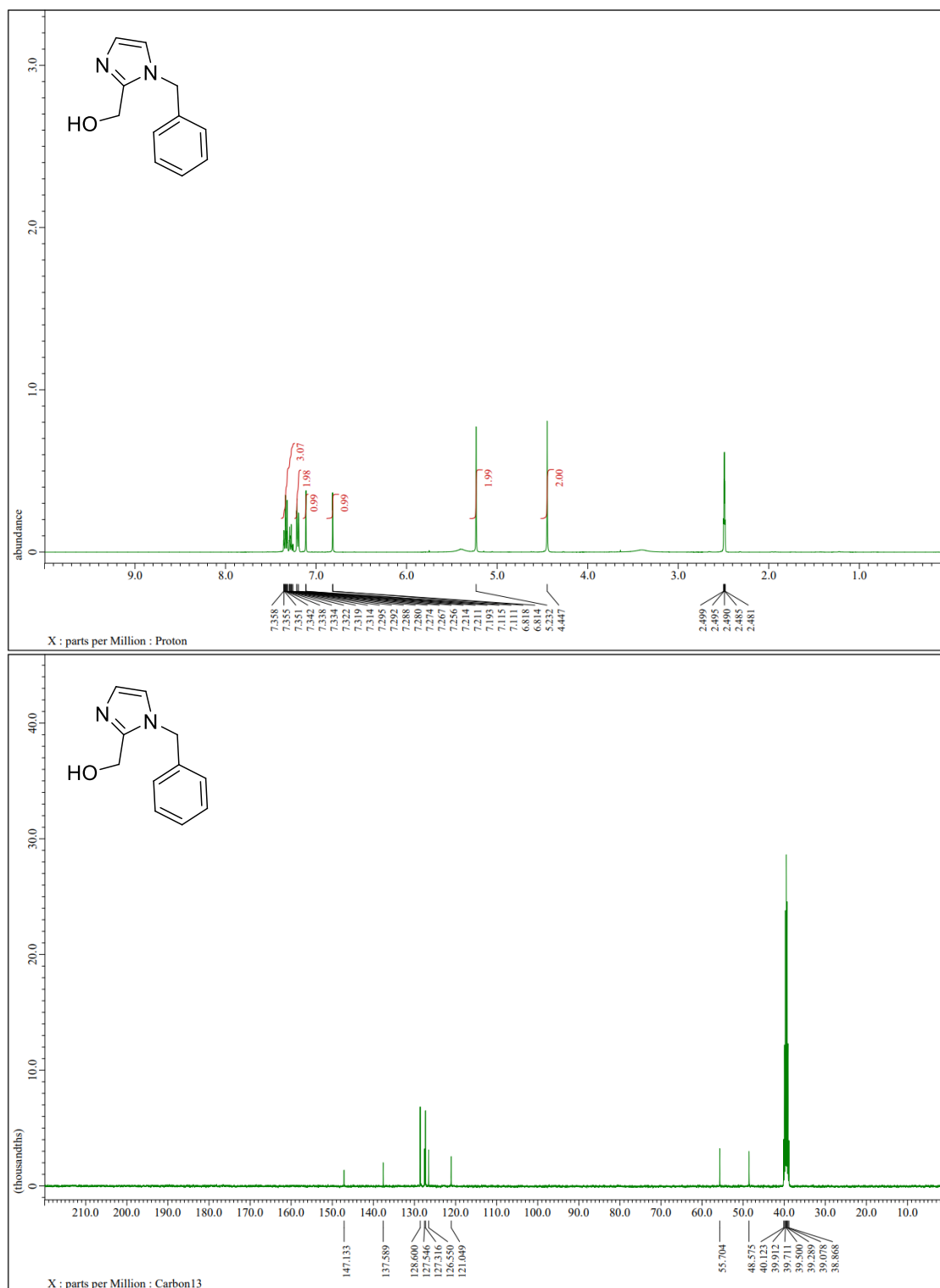


Figure S37. 1-Benzyl-1H-imidazole-2-carbaldehyde (14d)



**Figure S38.** (1-Isoamyl-1H-imidazol-2-yl)methanol (**14e**)



**Figure S39.** (1-Benzyl-1H-imidazol-2-yl)methanol (14f)

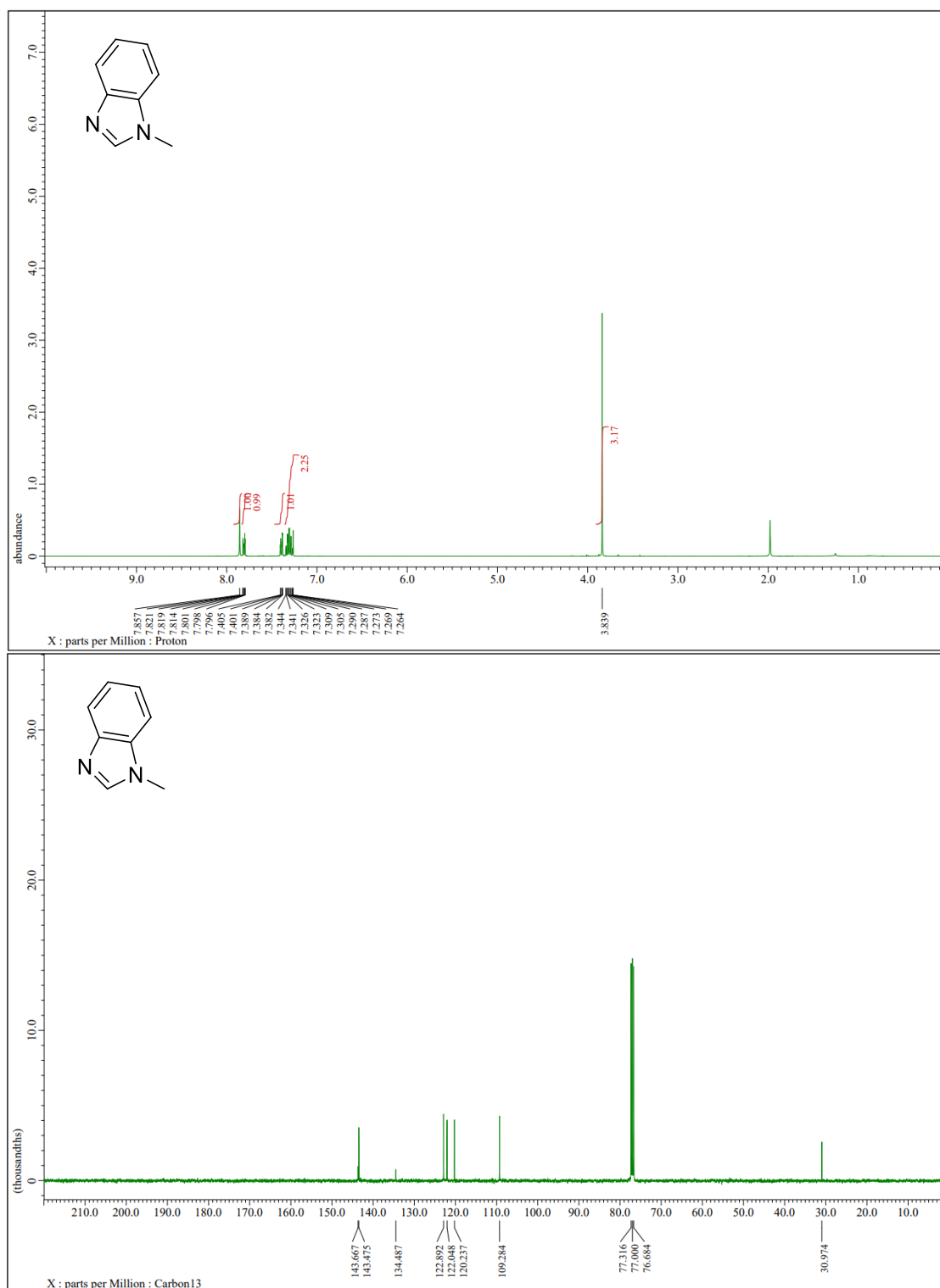


Figure S40. 1-Methyl-1H-benzo[d]imidazole (15a)

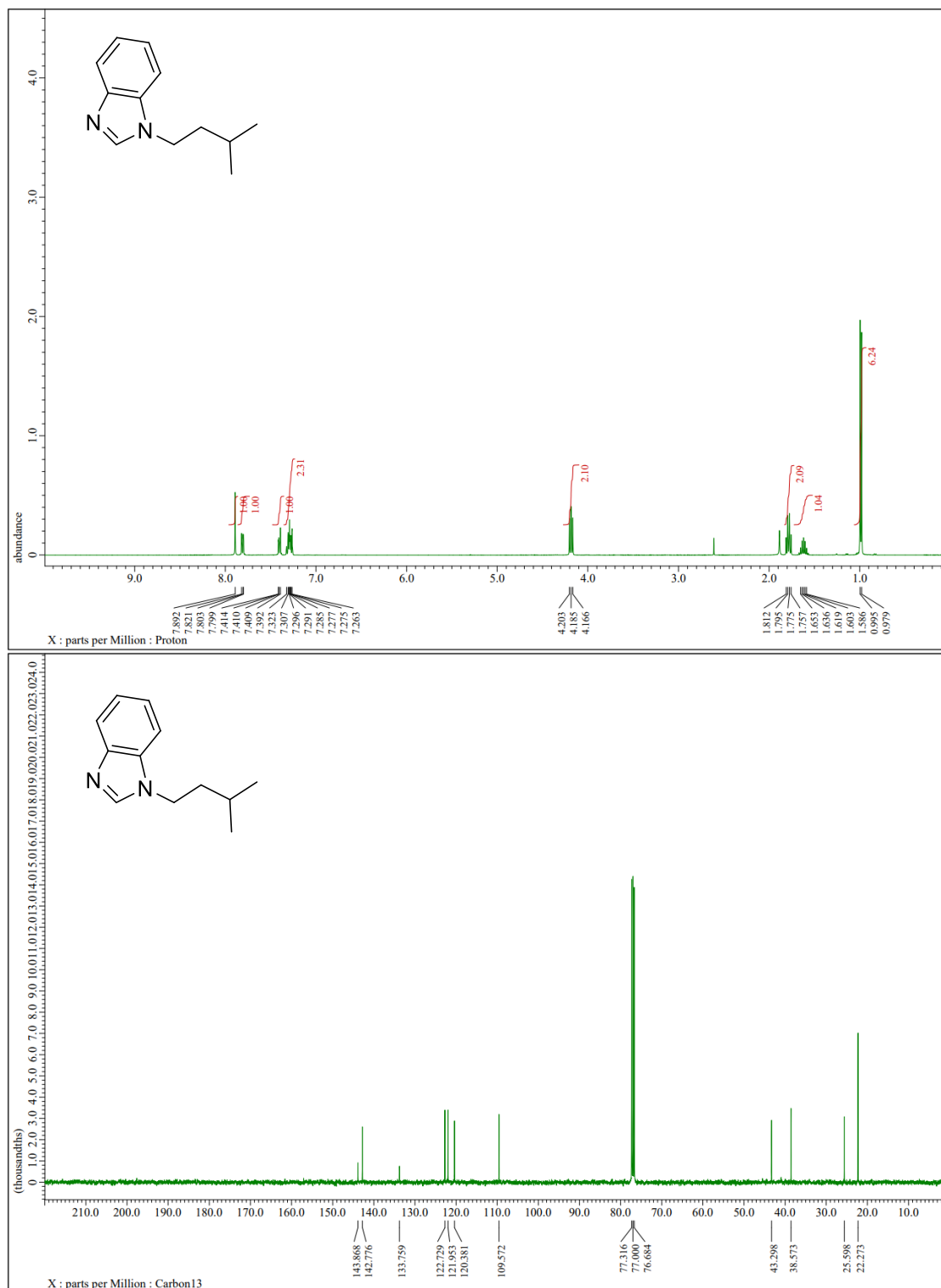


Figure S41. 1-Isoamyl-1H-benzo[d]imidazole (**15b**)

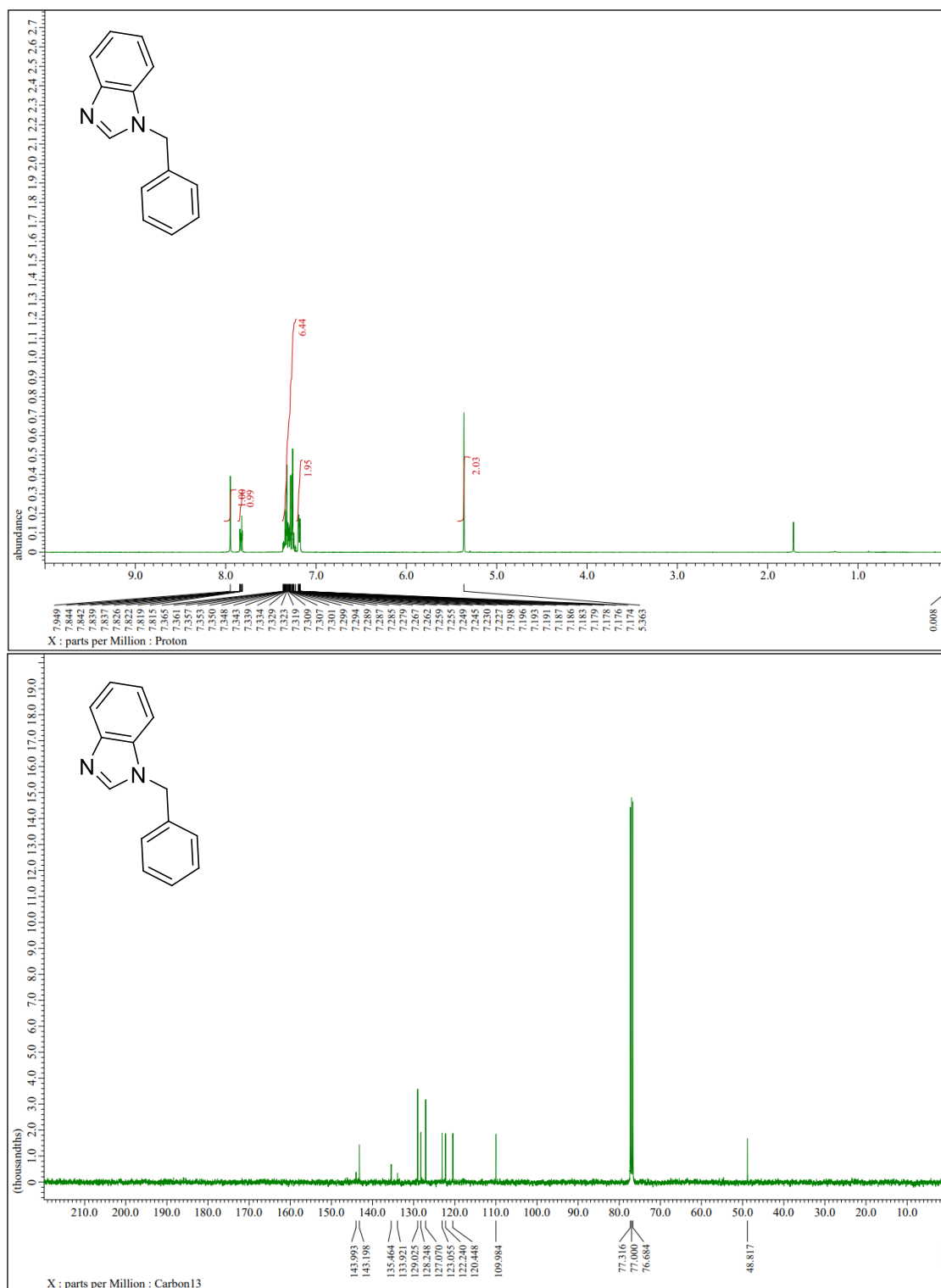


Figure S42. 1-Benzyl-1H-benzo[d]imidazole (15c)

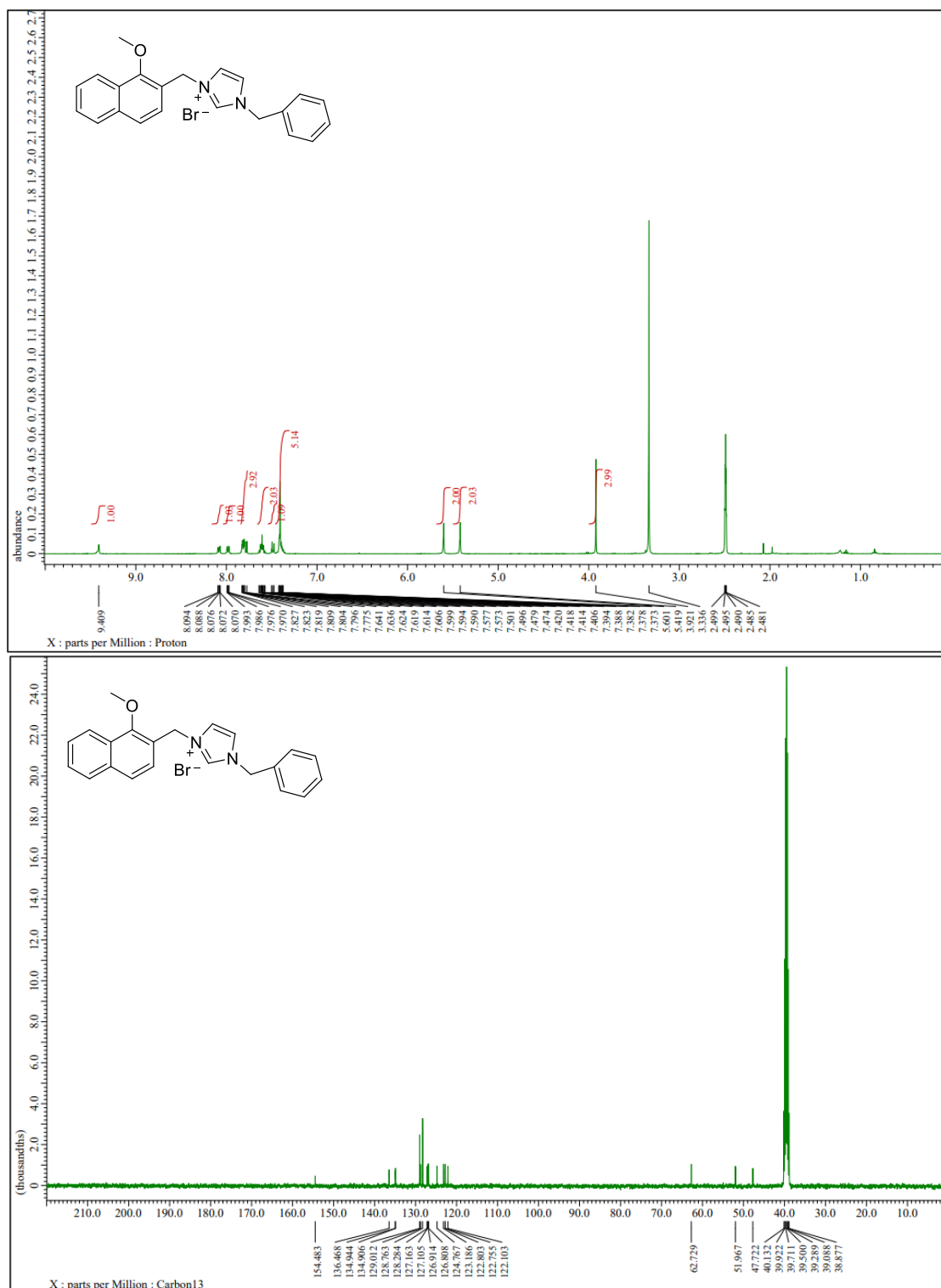
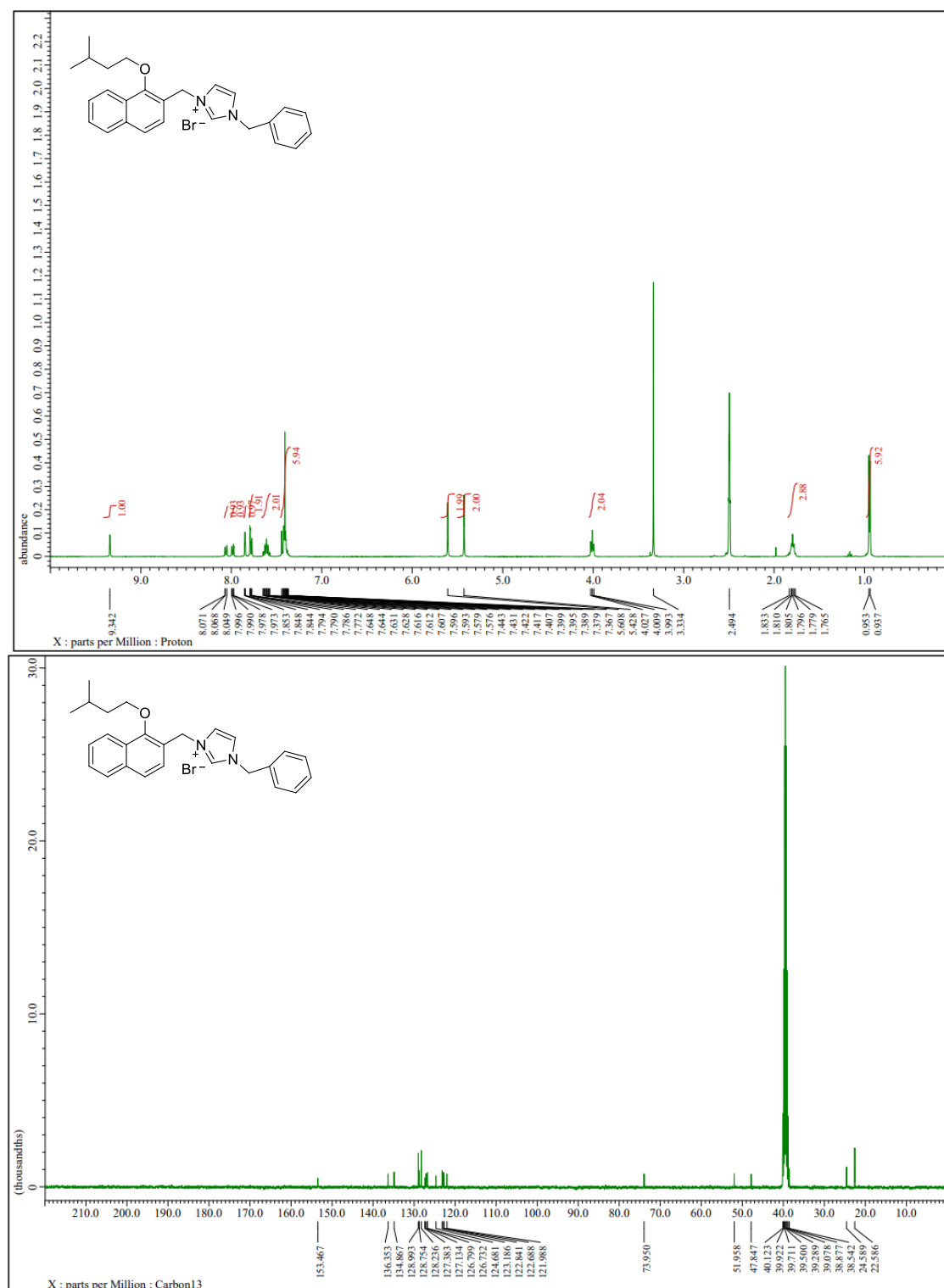
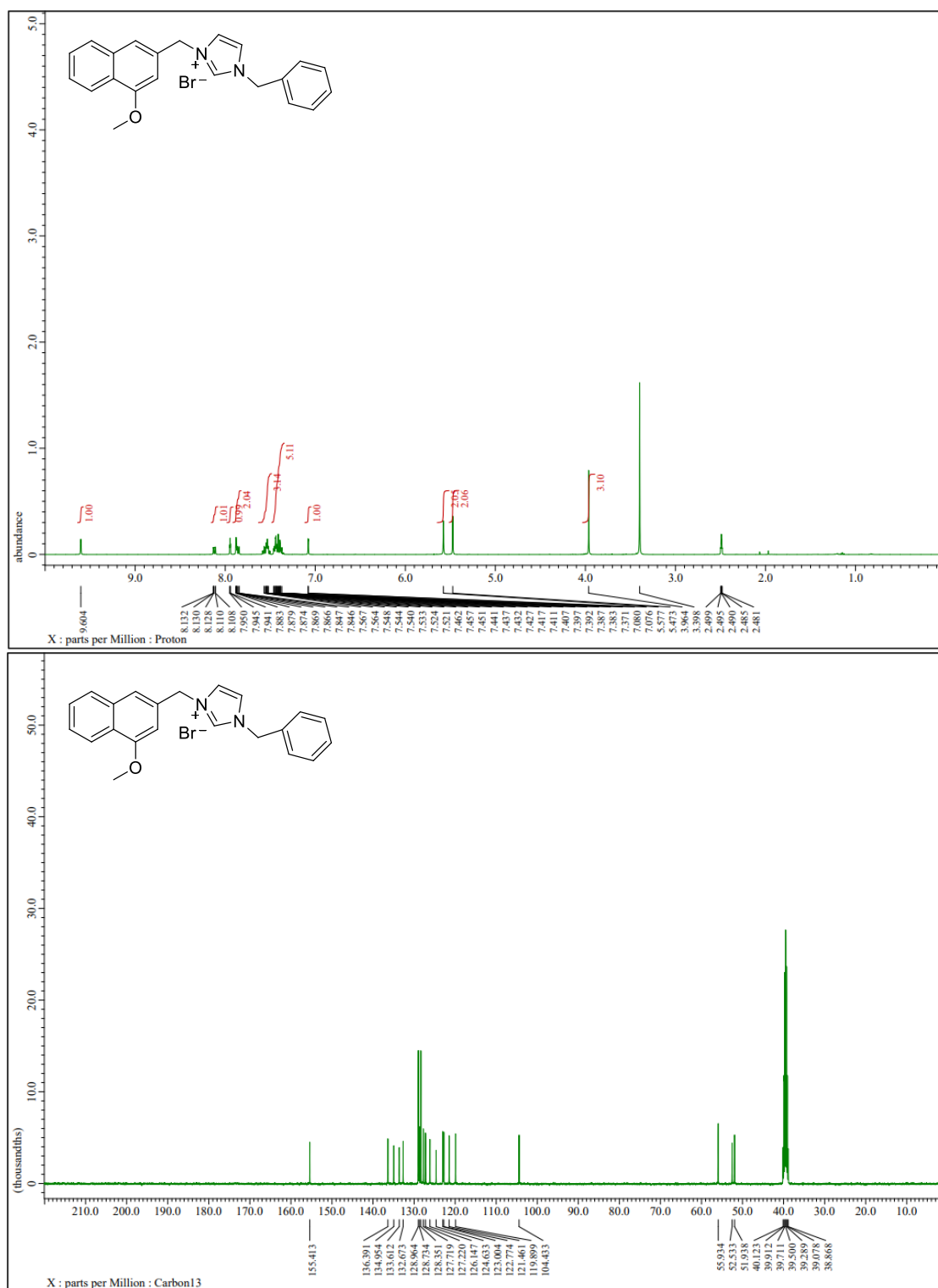


Figure S43. 1-Benzyl-3-((1-methoxynaphthalen-2-yl)methyl)-1H-imidazol-3-ium bromide (IMS-01)

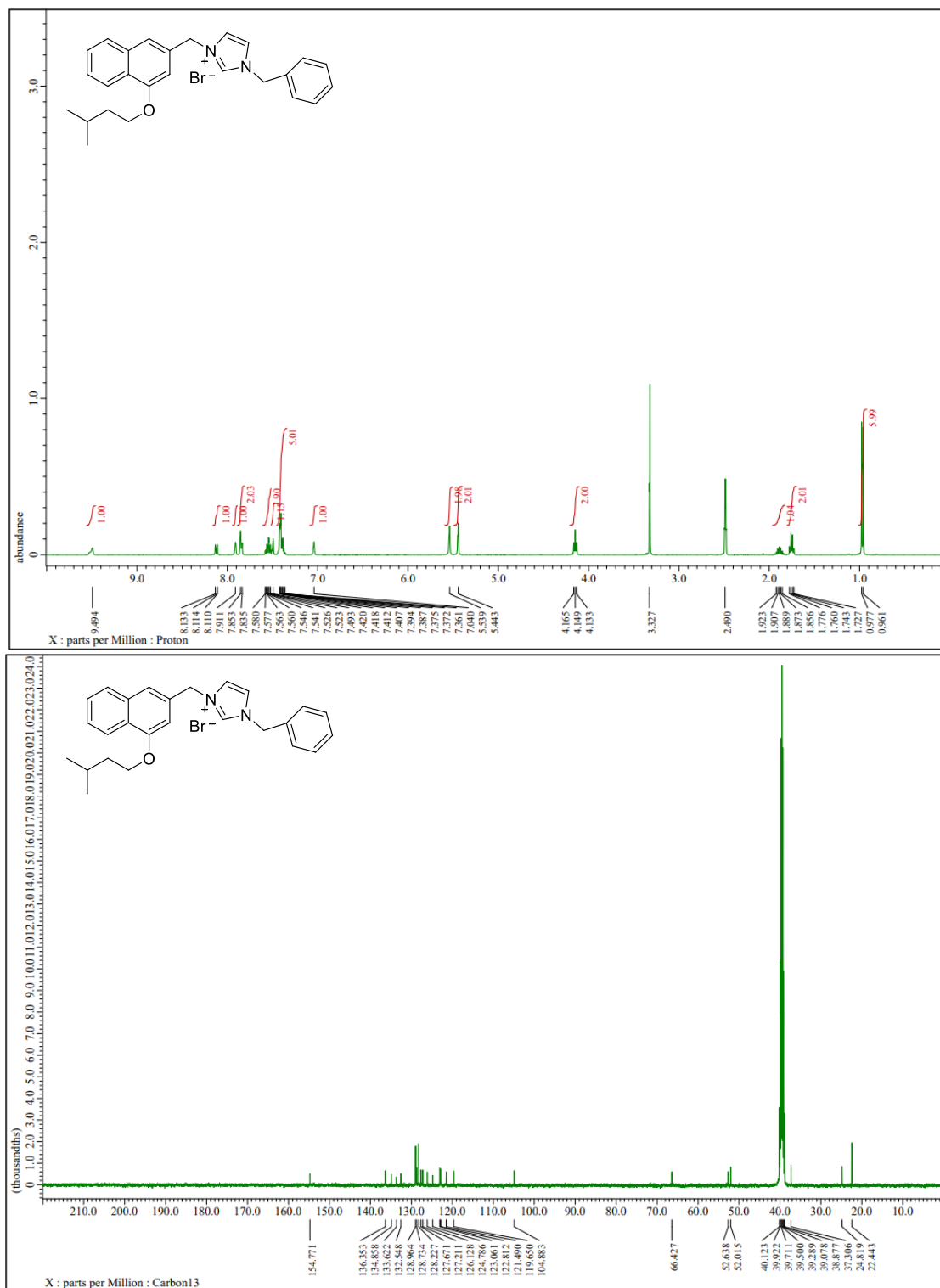


**Figure S44.** 1-Benzyl-3-((1-(isoamyloxy)naphthalen-2-yl)methyl)-1*H*-imidazol-3-ium bromide (IMS-02)





**Figure S45.** 1-Benzyl-3-((4-methoxynaphthalen-2-yl)methyl)-1*H*-imidazol-3-ium bromide (IMS-03)



**Figure S46.** 1-Benzyl-3-((4-(isoamyloxy)naphthalen-2-yl)methyl)-1H-imidazol-3-ium bromide (IMS-04)

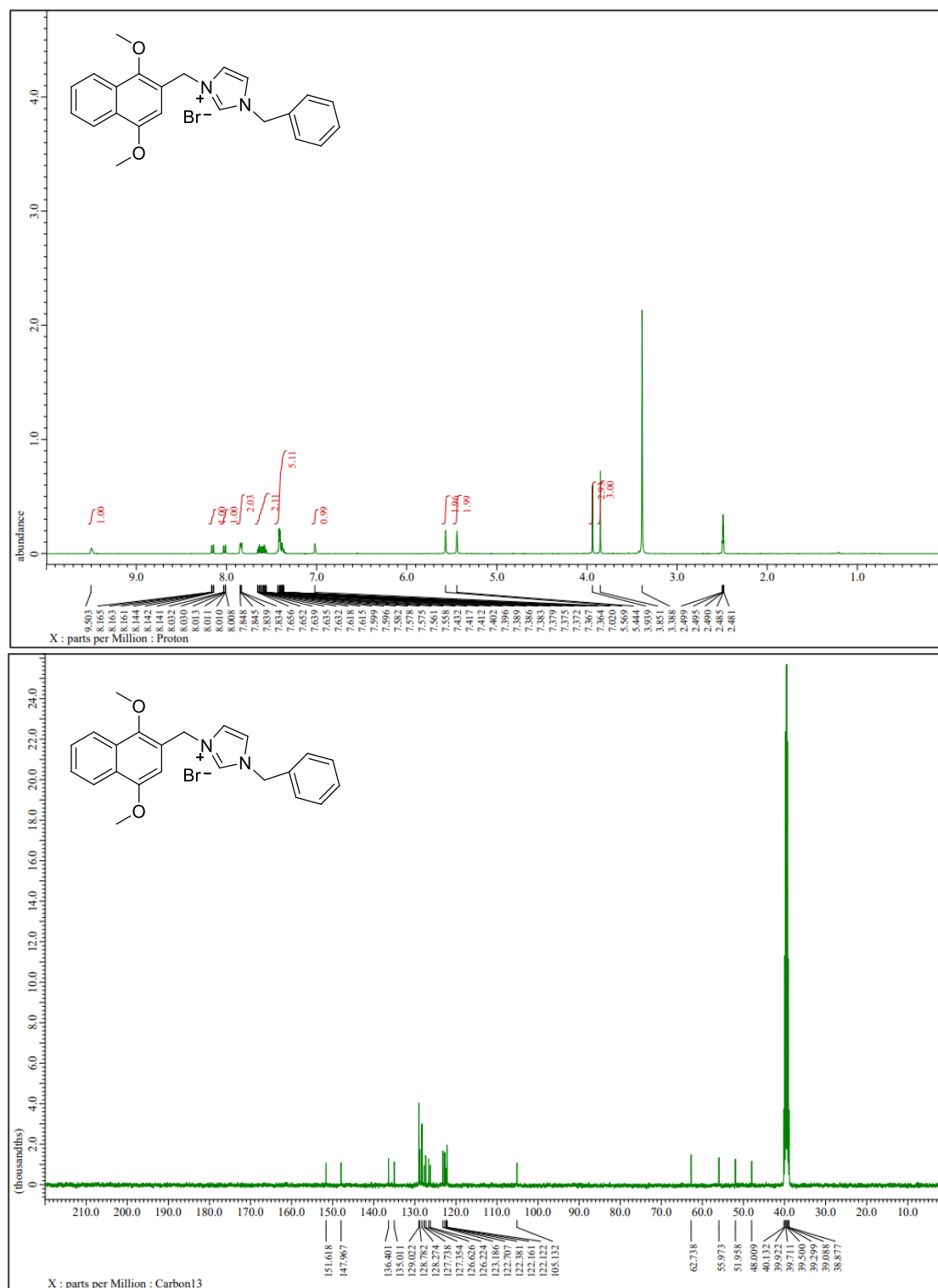


Figure S47. 1-Benzyl-3-((1,4-dimethoxynaphthalen-2-yl)methyl)-1H-imidazol-3-ium bromide (IMS-05)



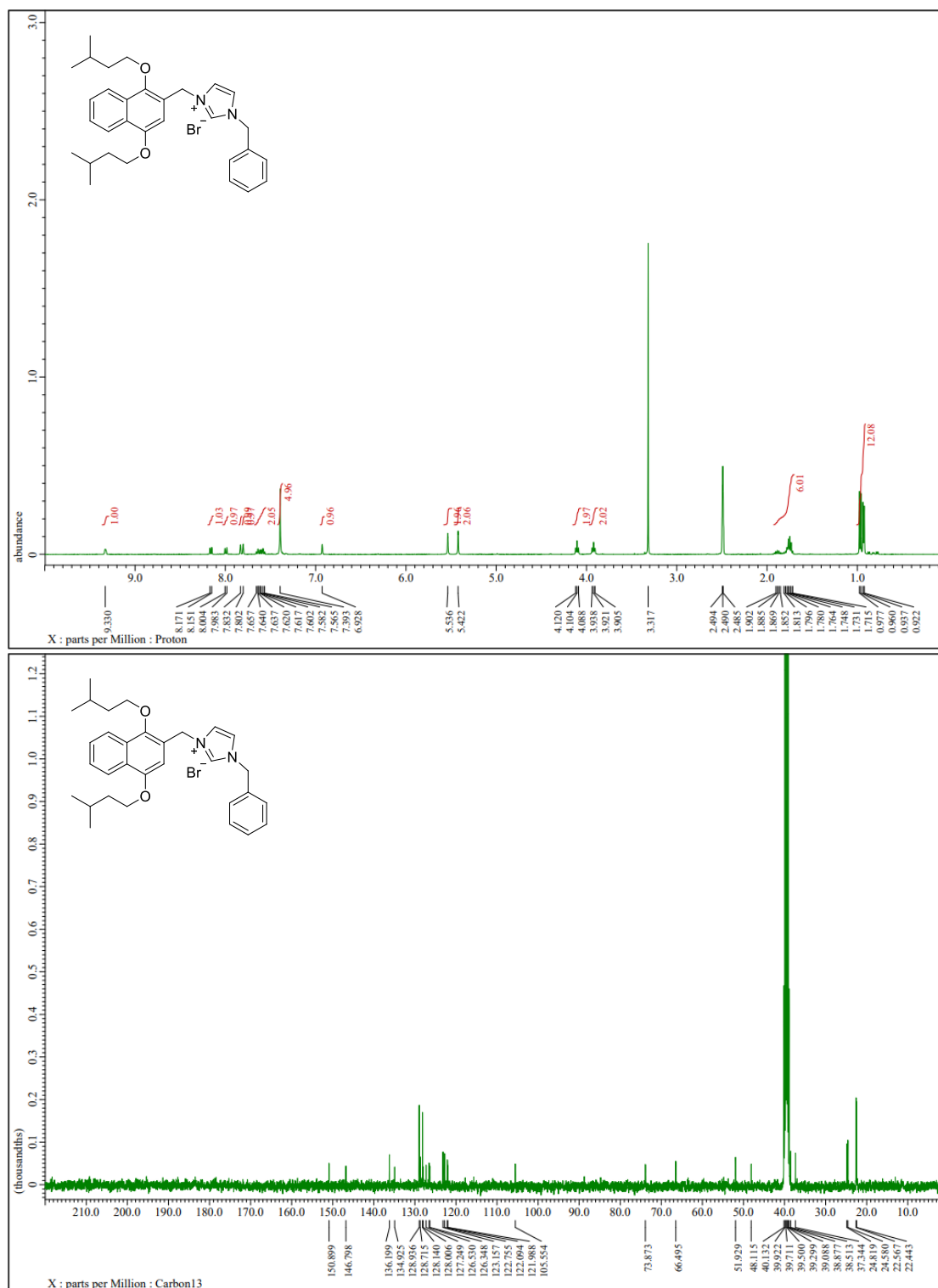
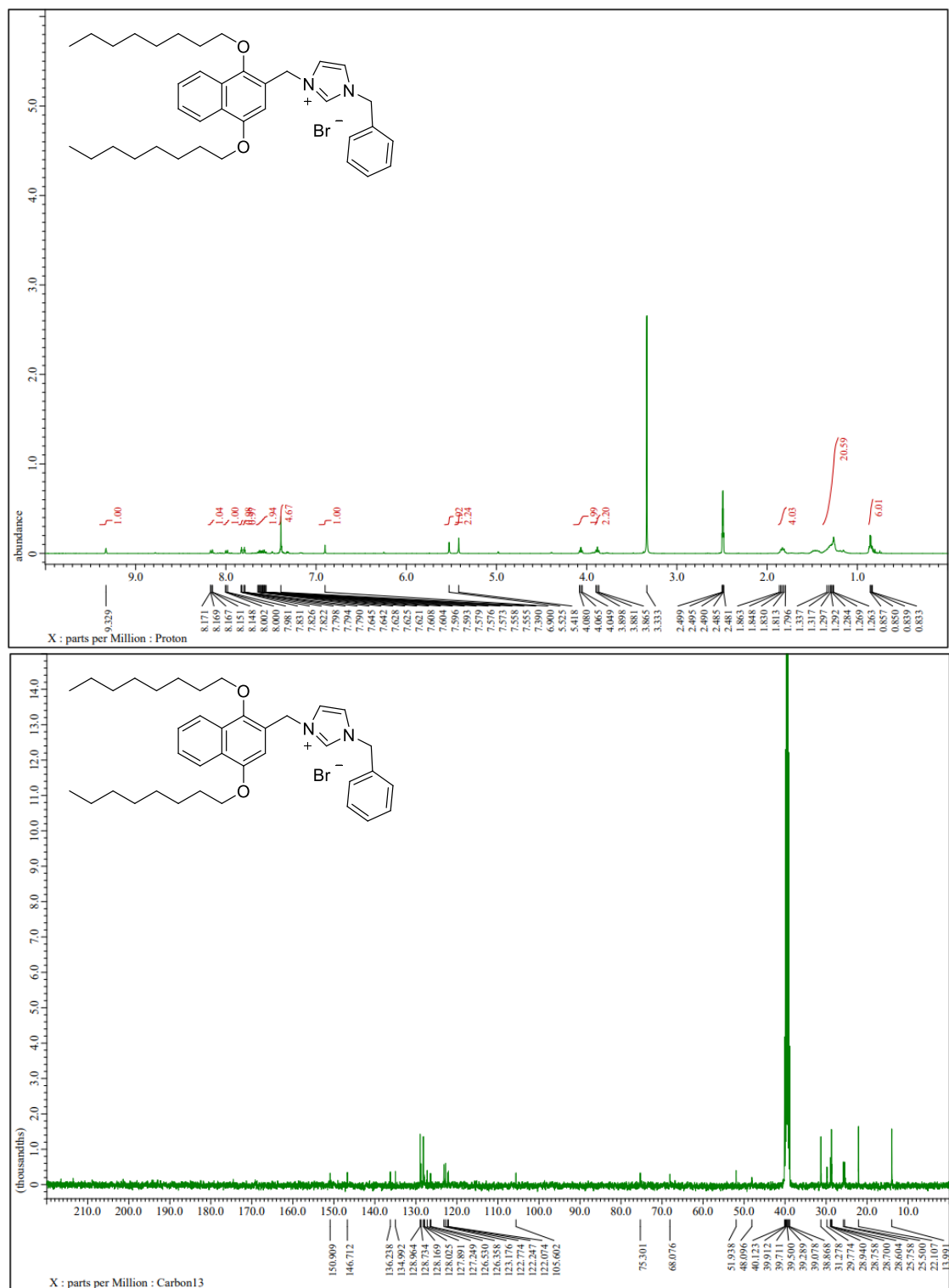
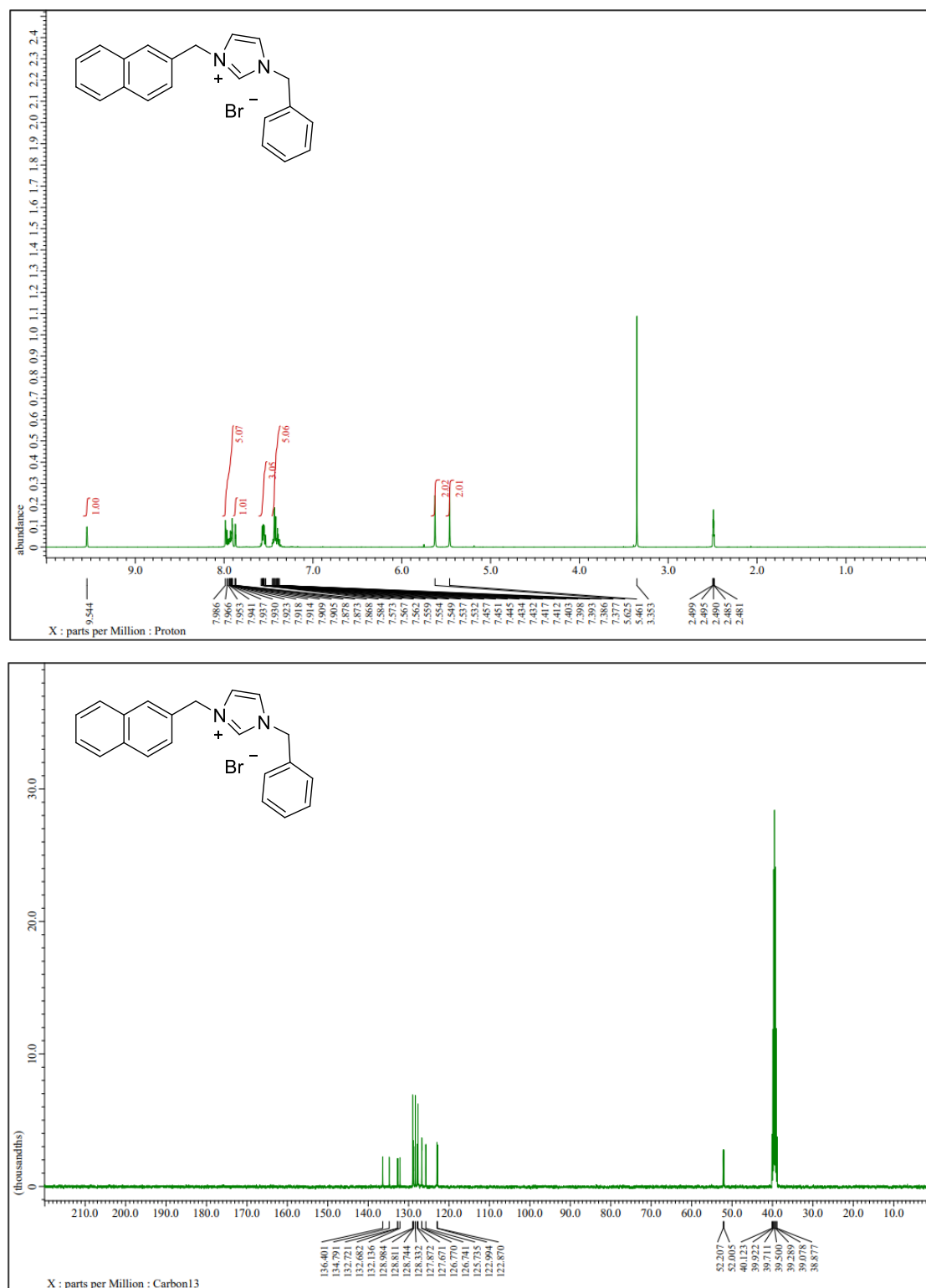


Figure S49. 1-Benzyl-3-((1,4-bis(isoamyloxy)naphthalen-2-yl)methyl)-1H-imidazol-3-ium bromide (IMS-07)



**Figure S50.** 1-Benzyl-3-((1,4-bis(octyloxy)naphthalen-2-yl)methyl)-1H-imidazol-3-ium bromide (IMS-08)



**Figure S51.** 1-Benzyl-3-(naphthalen-2-ylmethyl)-1*H*-imidazol-3-ium bromide (IMS-09)

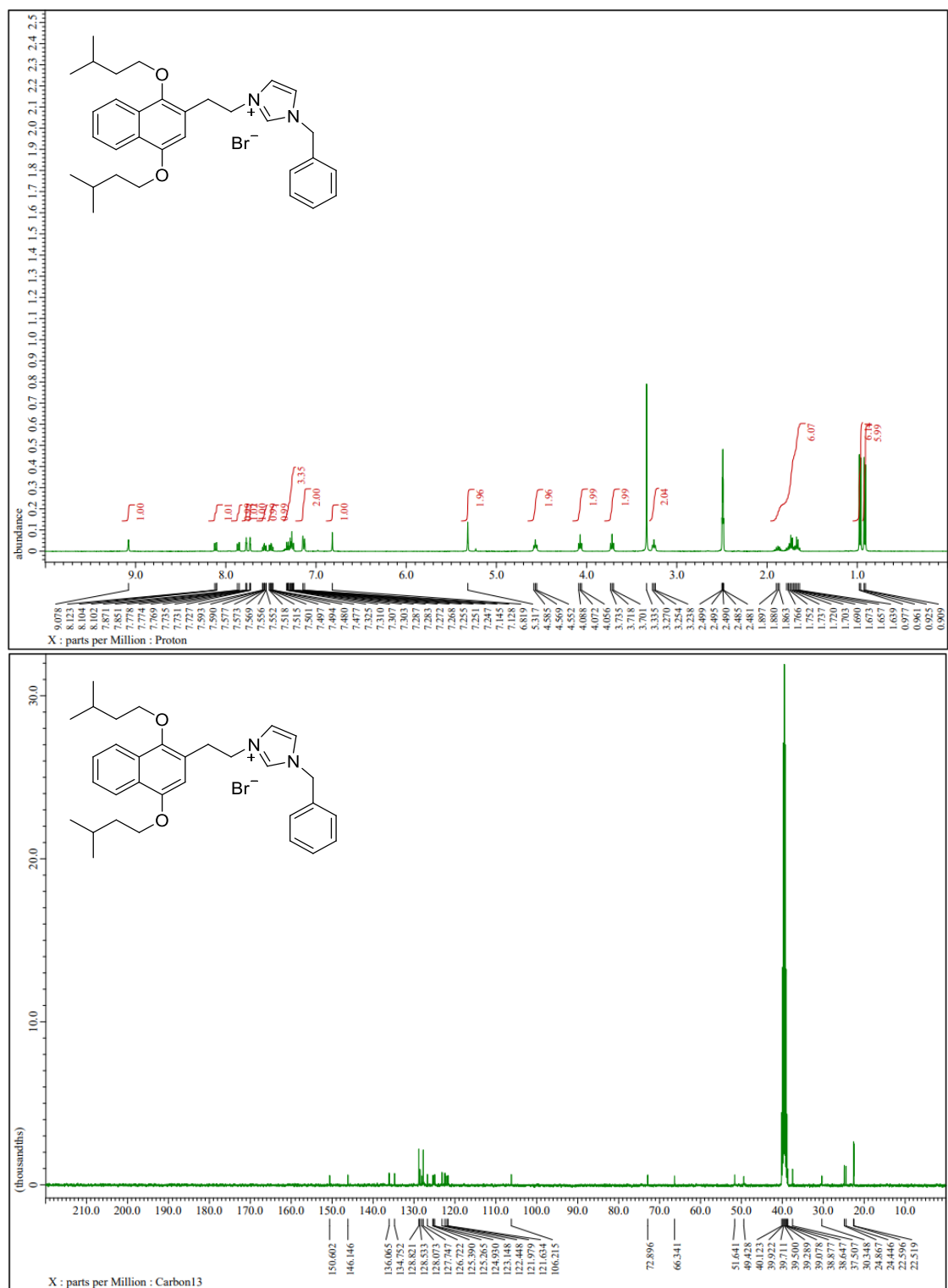
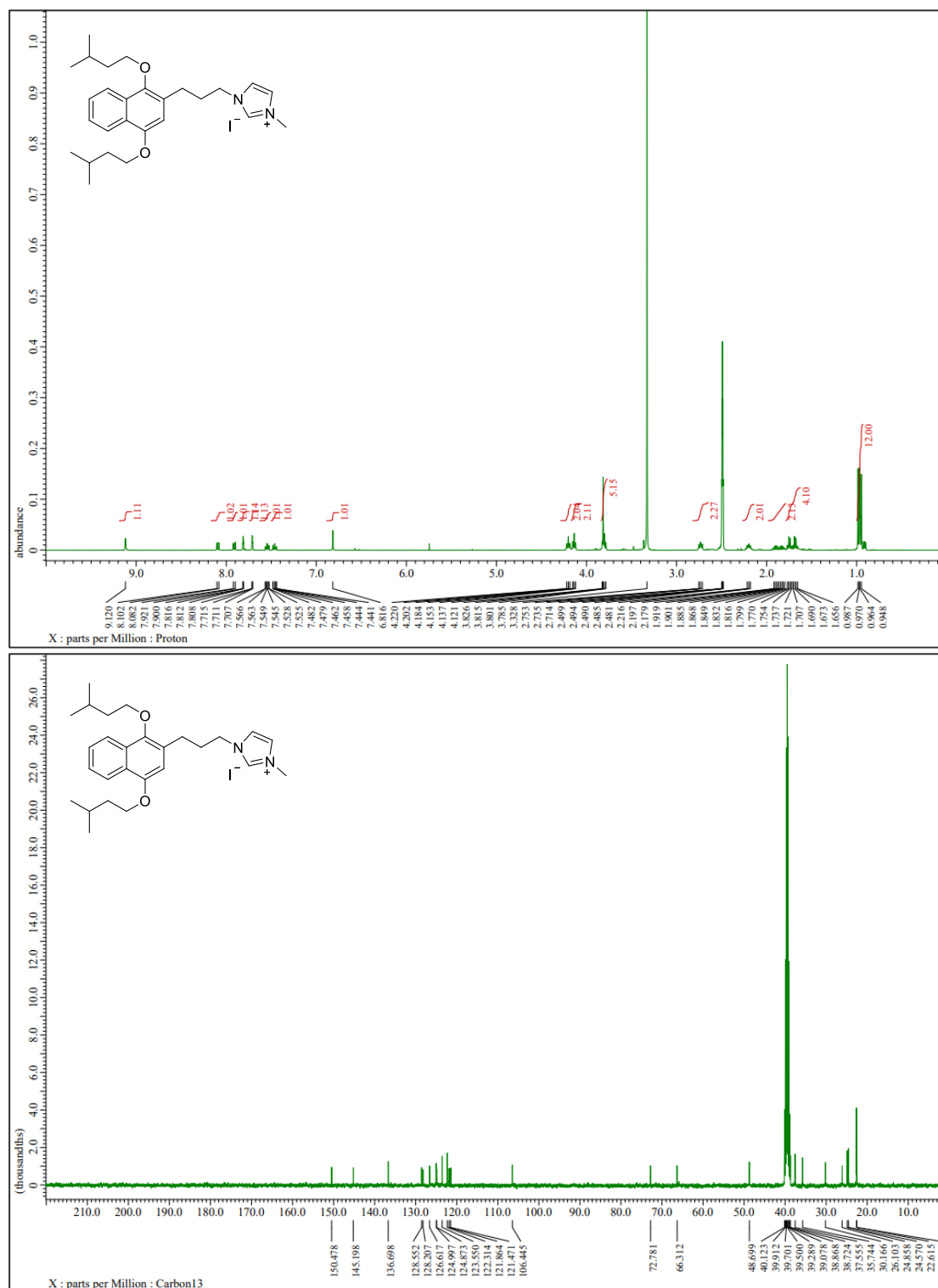


Figure S52. 1-Benzyl-3-(2-(1,4-bis(isoamyloxy)naphthalen-2-yl)ethyl)-1H-imidazol-3-ium bromide (IMS-10)





**Figure S53.** 1-(3-(1,4-Bis(isoamyloxy)naphthalen-2-yl)propyl)-3-methyl-1H-imidazol-3-ium iodide (IMS-11)

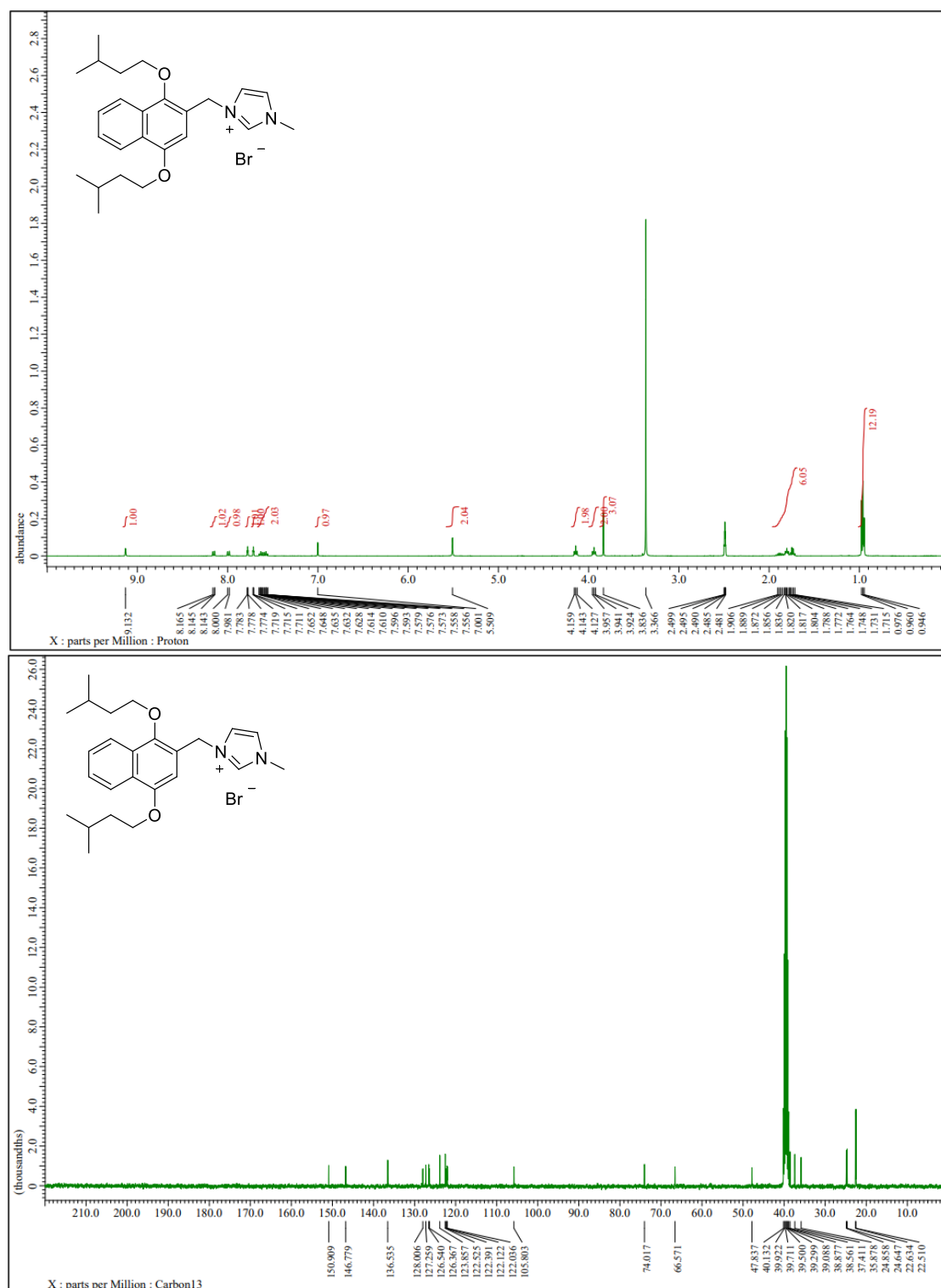


Figure S54. 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-methyl-1*H*-imidazol-3-ium bromide (IMS-12)



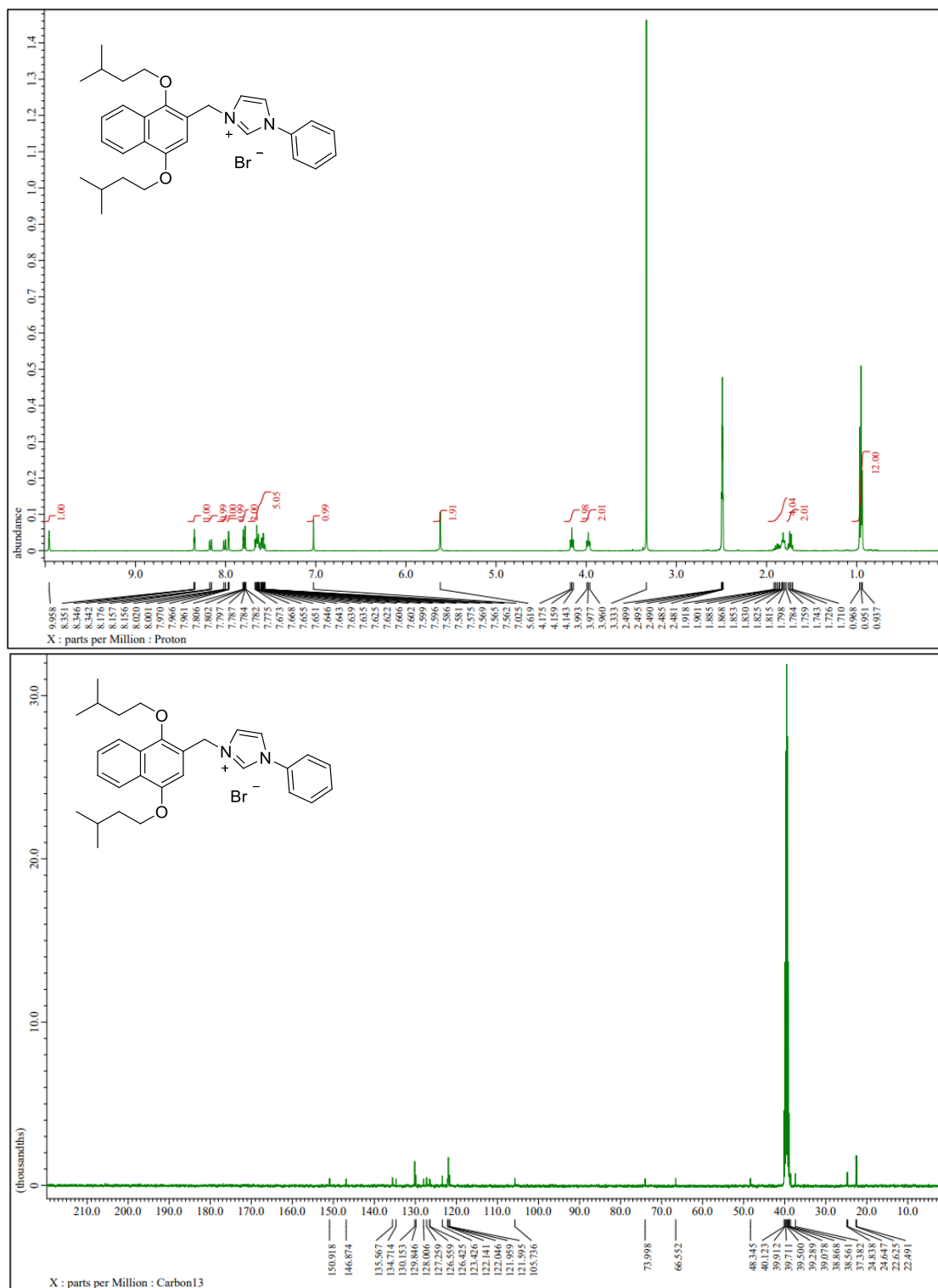
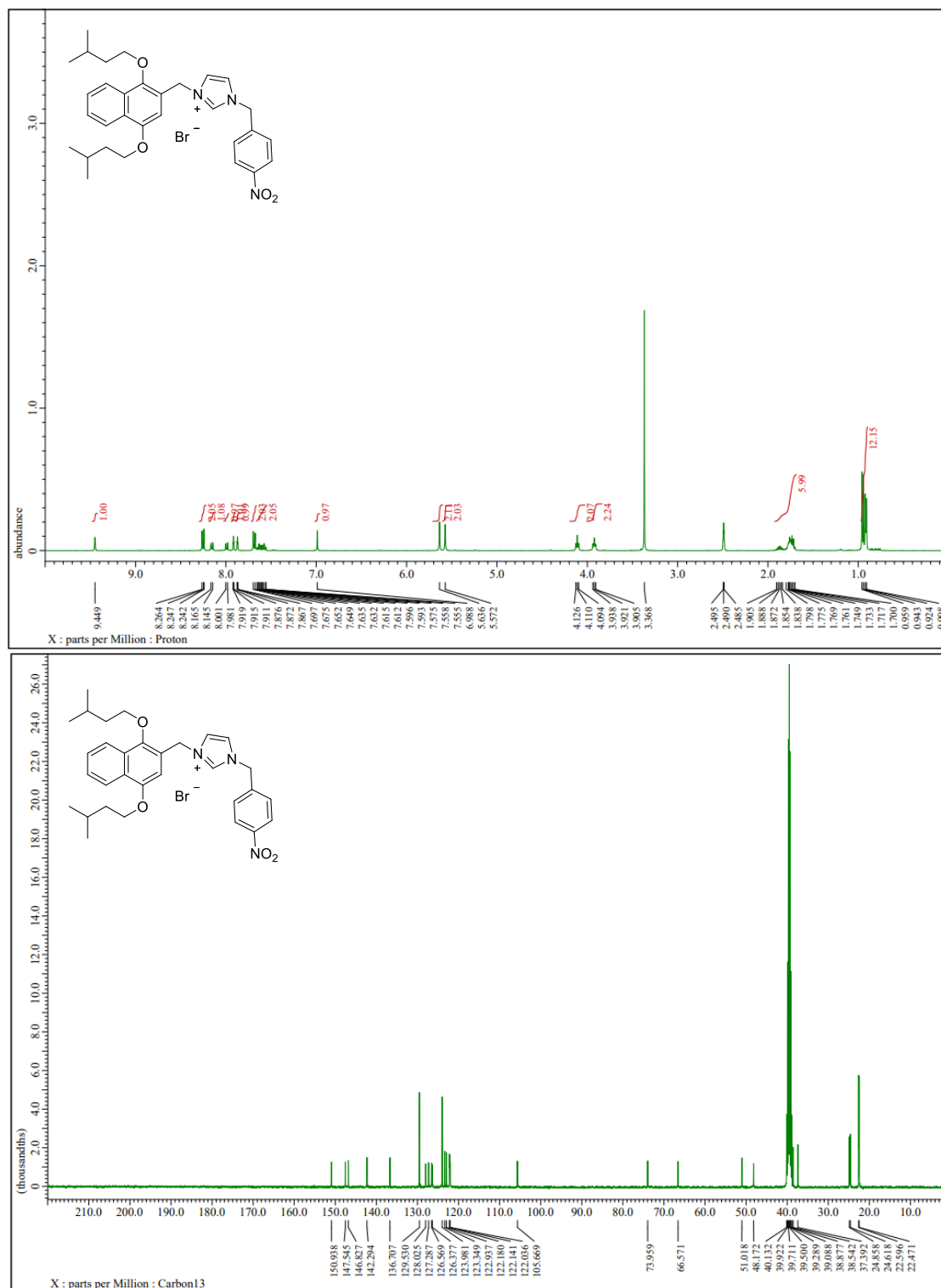
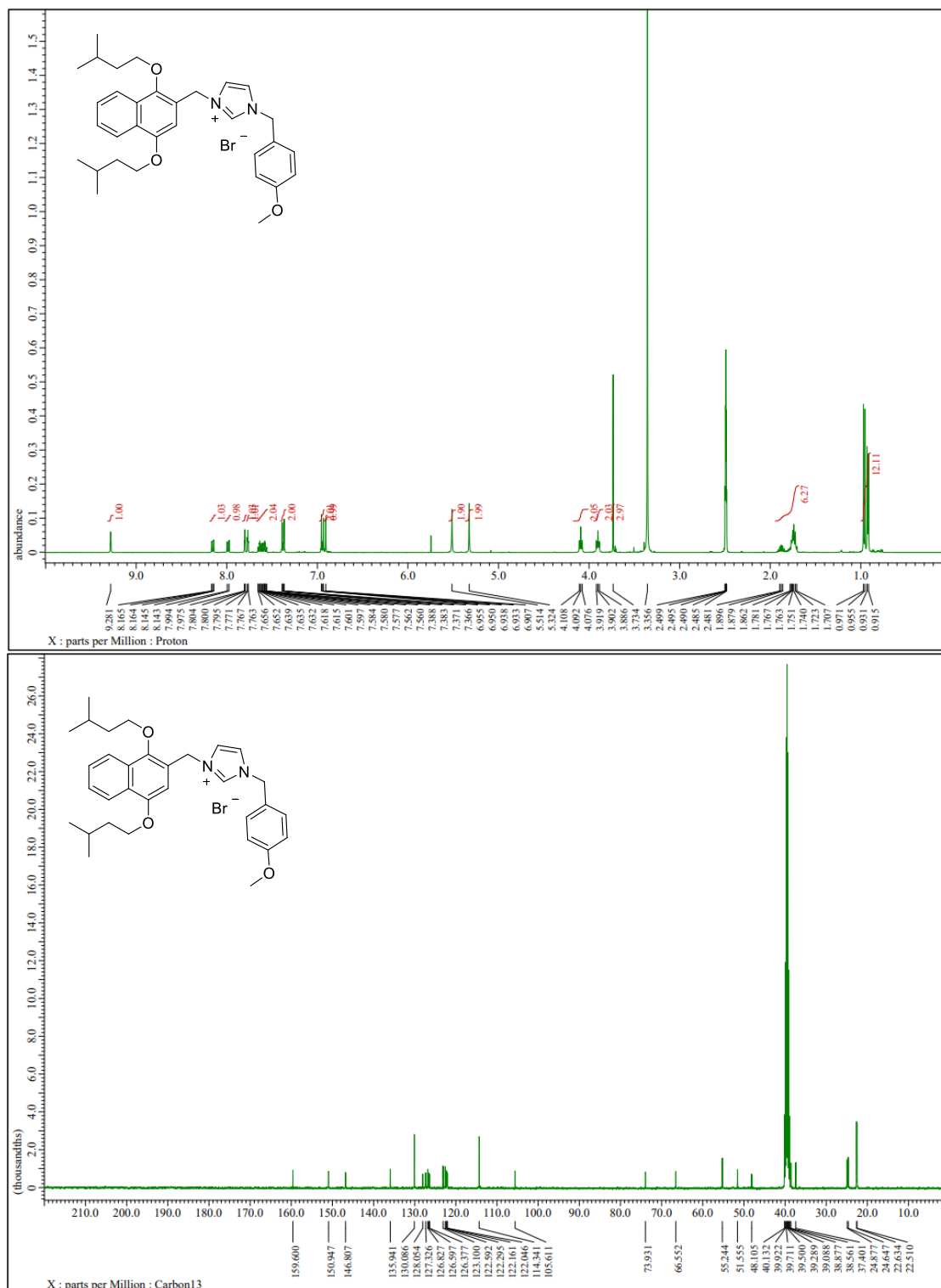


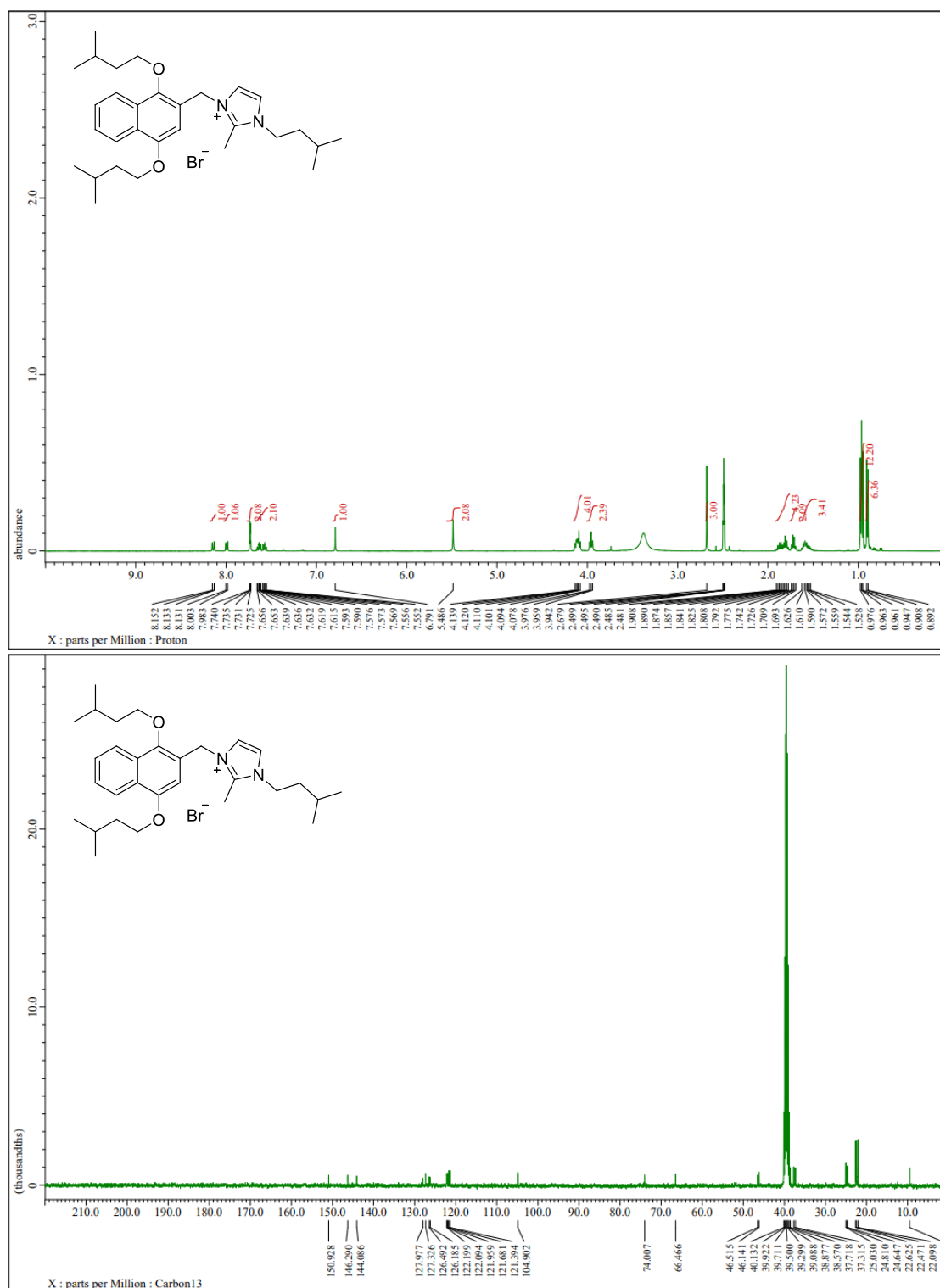
Figure S56. 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-phenyl-1H-imidazol-3-ium bromide (IMS-14)



**Figure S57.** 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-(4-nitrobenzyl)-1H-imidazol-3-ium bromide (IMS-15)



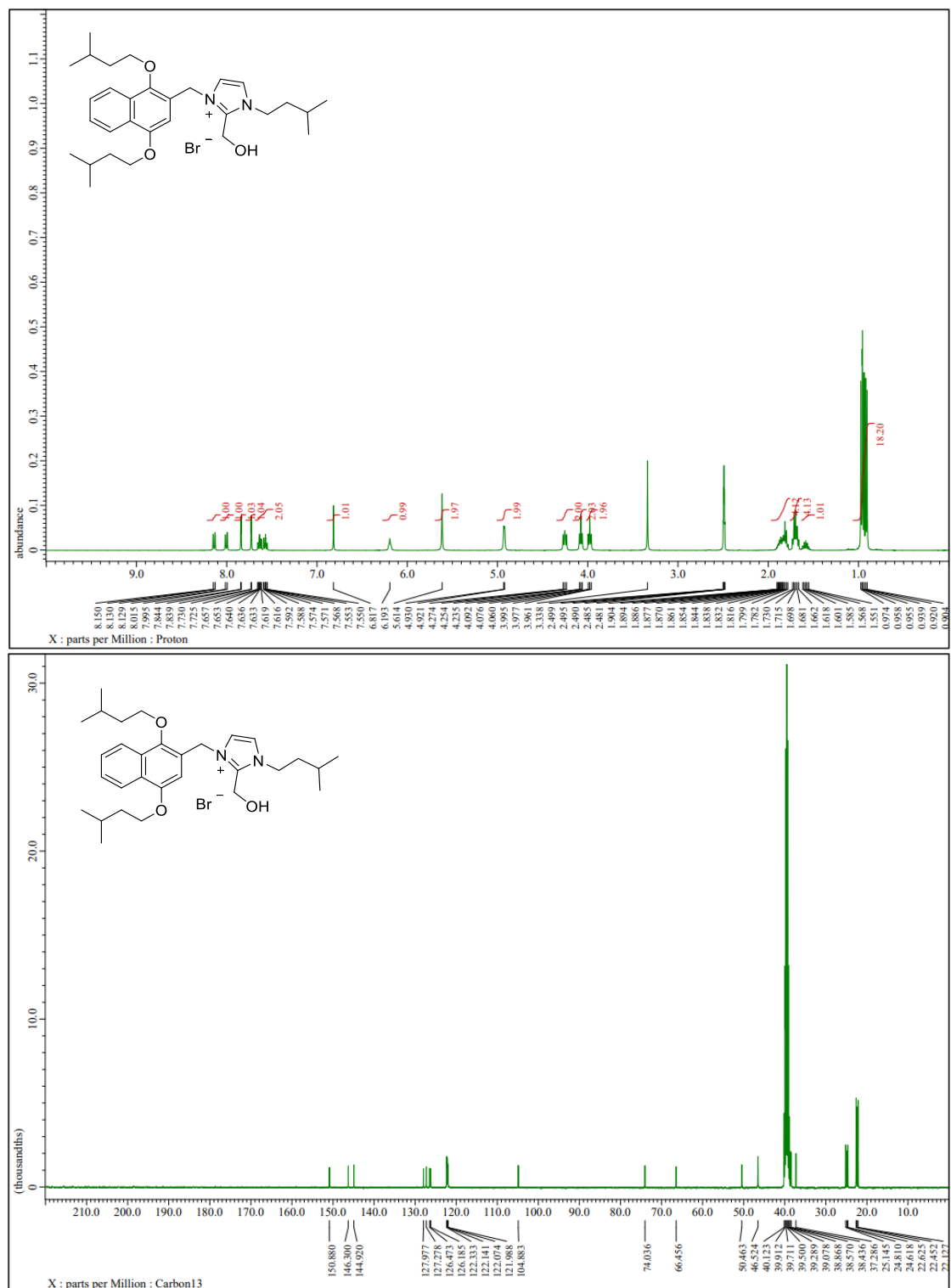
**Figure S58.** 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-(4-methoxybenzyl)-1H-imidazol-3-ium bromide (IMS-16)



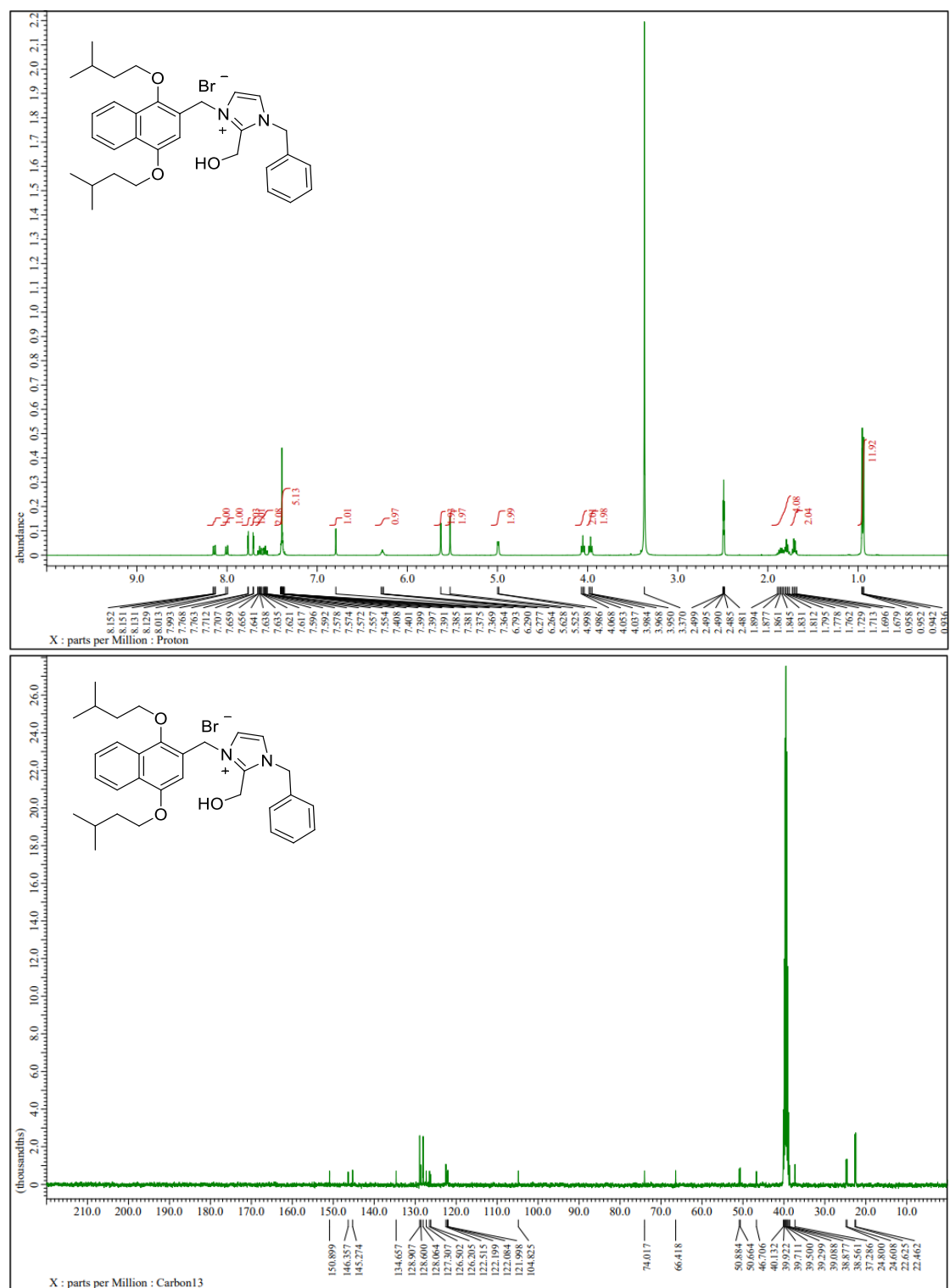
**Figure S59.** 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-isoamyl-2-methyl-1*H*-imidazol-3-ium bromide (IMS-17)







**Figure S61.** 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-2-(hydroxymethyl)-1-isoamyl-1H-imidazol-3-ium bromide (IMS-19)



**Figure S62.** 1-Benzyl-3-((1,4-bis(isoamyloxy)naphthalen-2-yl)methyl)-2-(hydroxymethyl)-1H-imidazol-3-ium bromide (IMS-20)

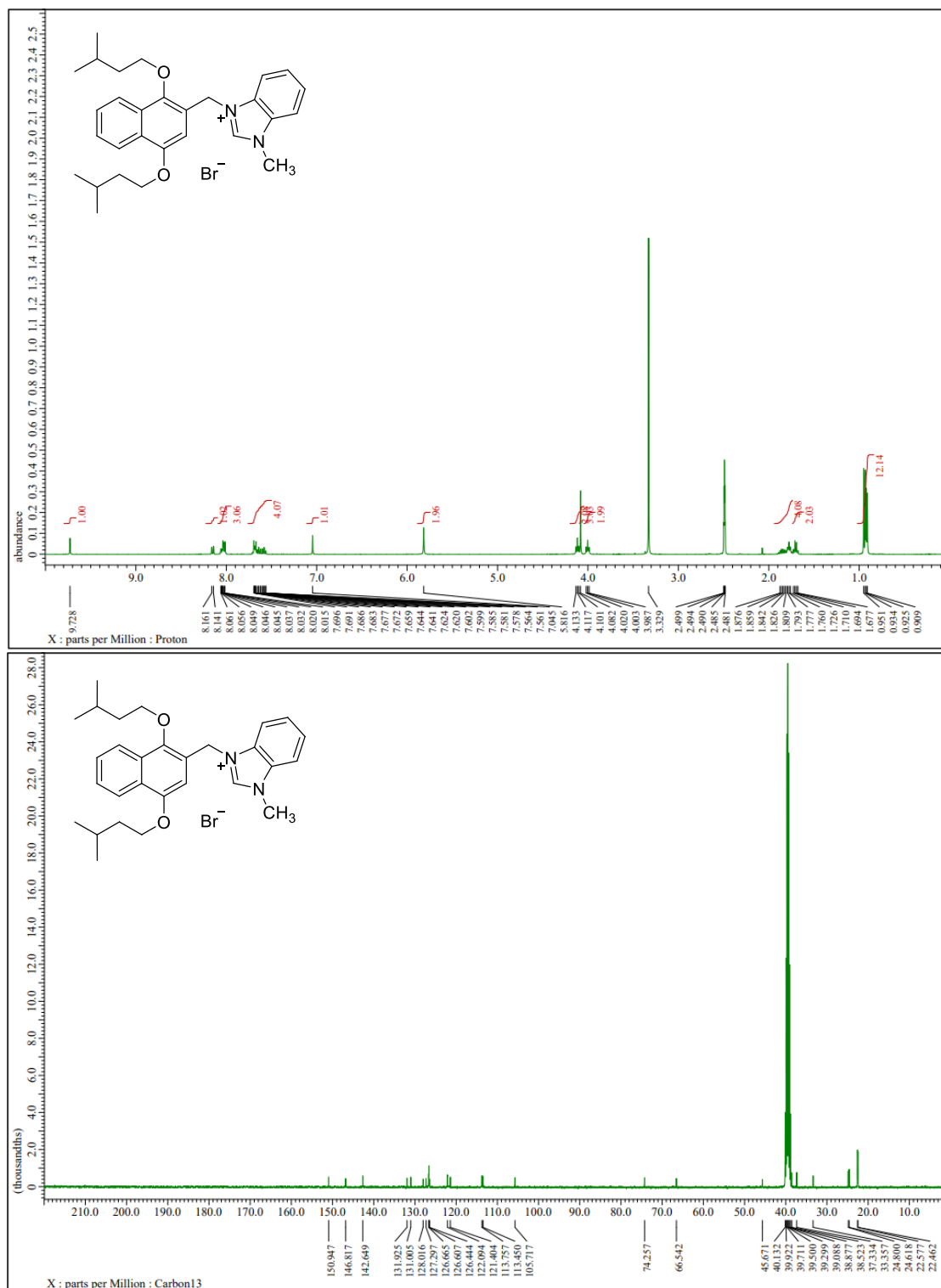
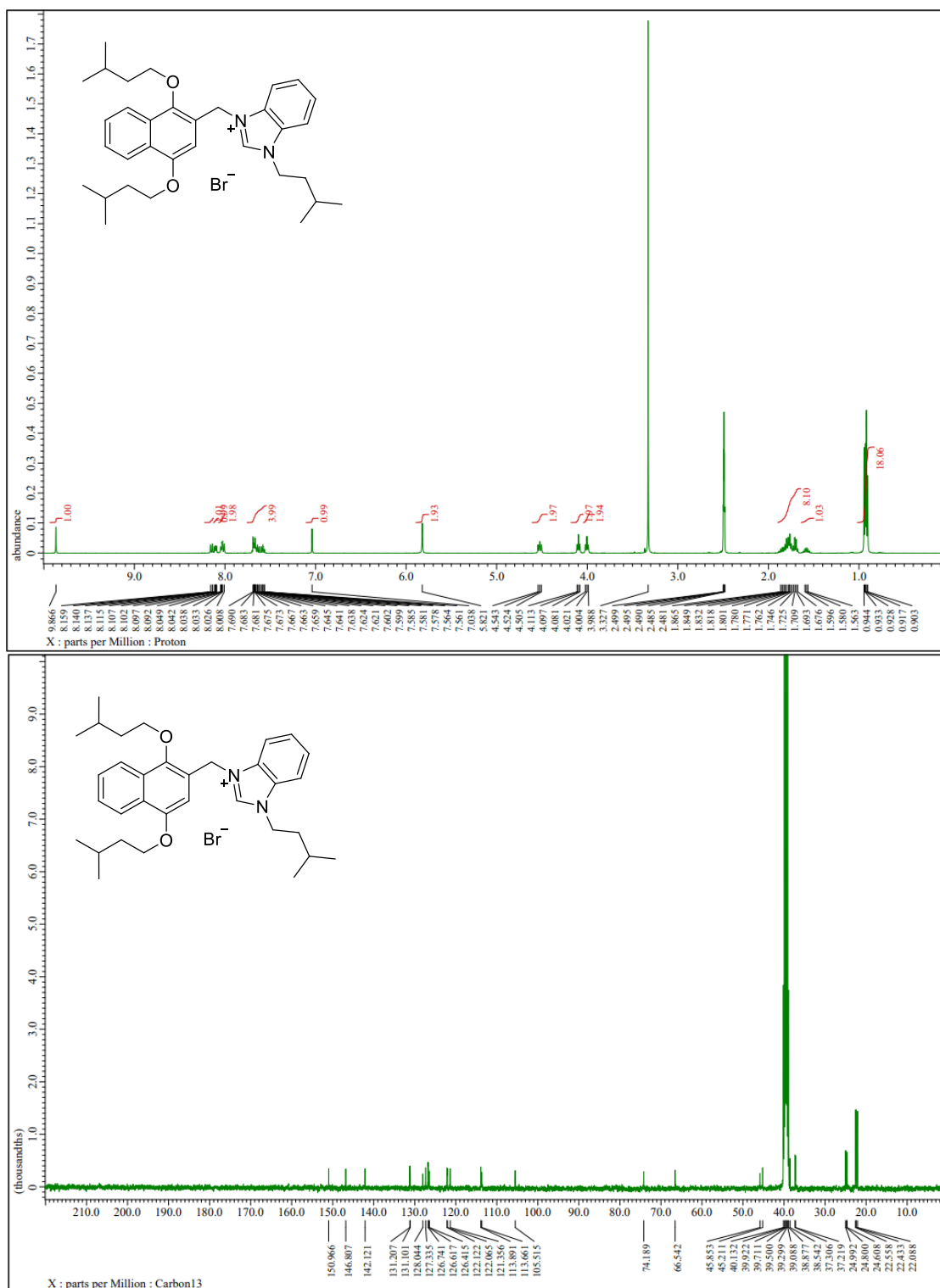
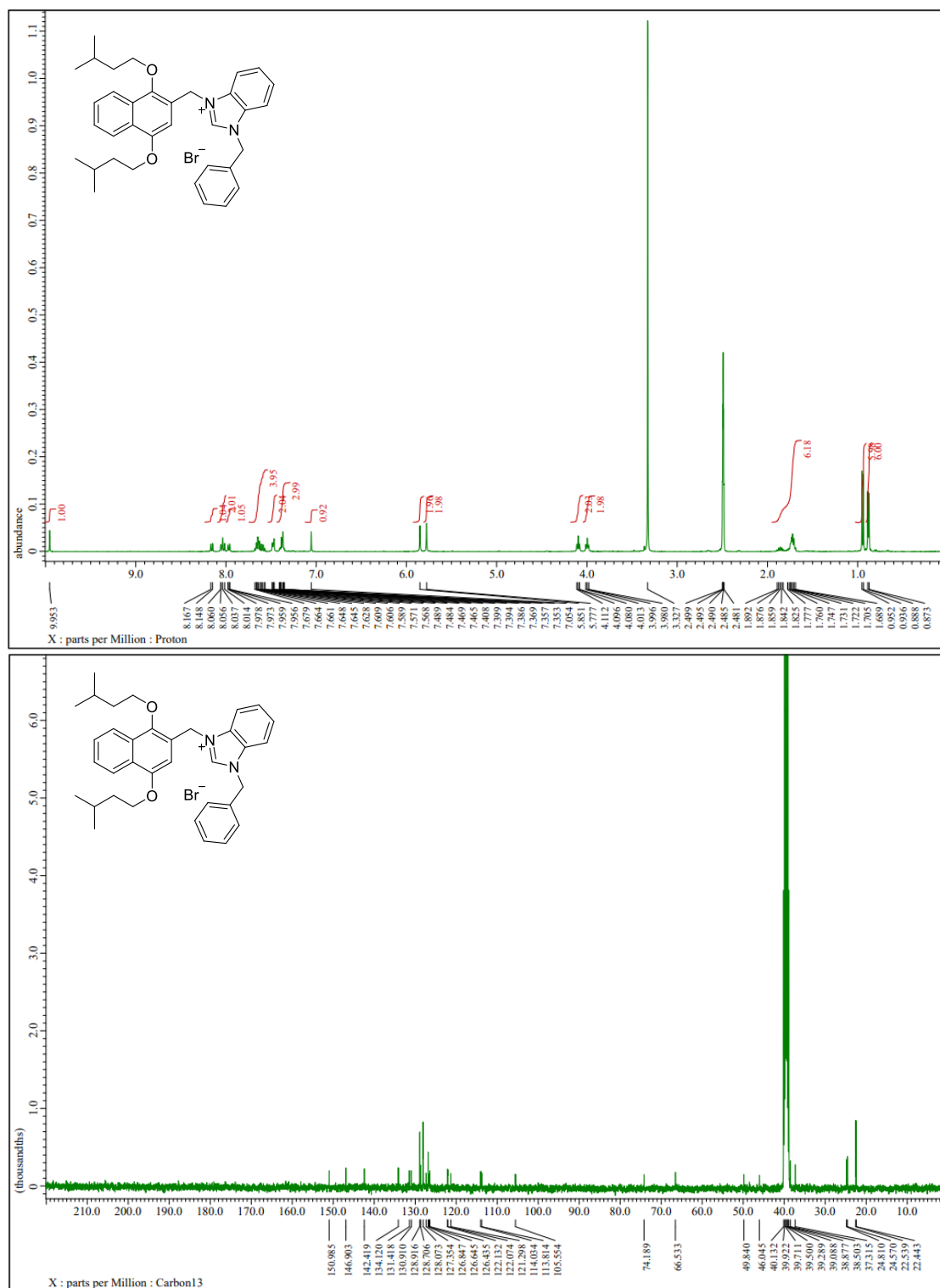


Figure S63. 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-methyl-1H-benzo[d]imidazol-3-ium bromide (IMS-21)

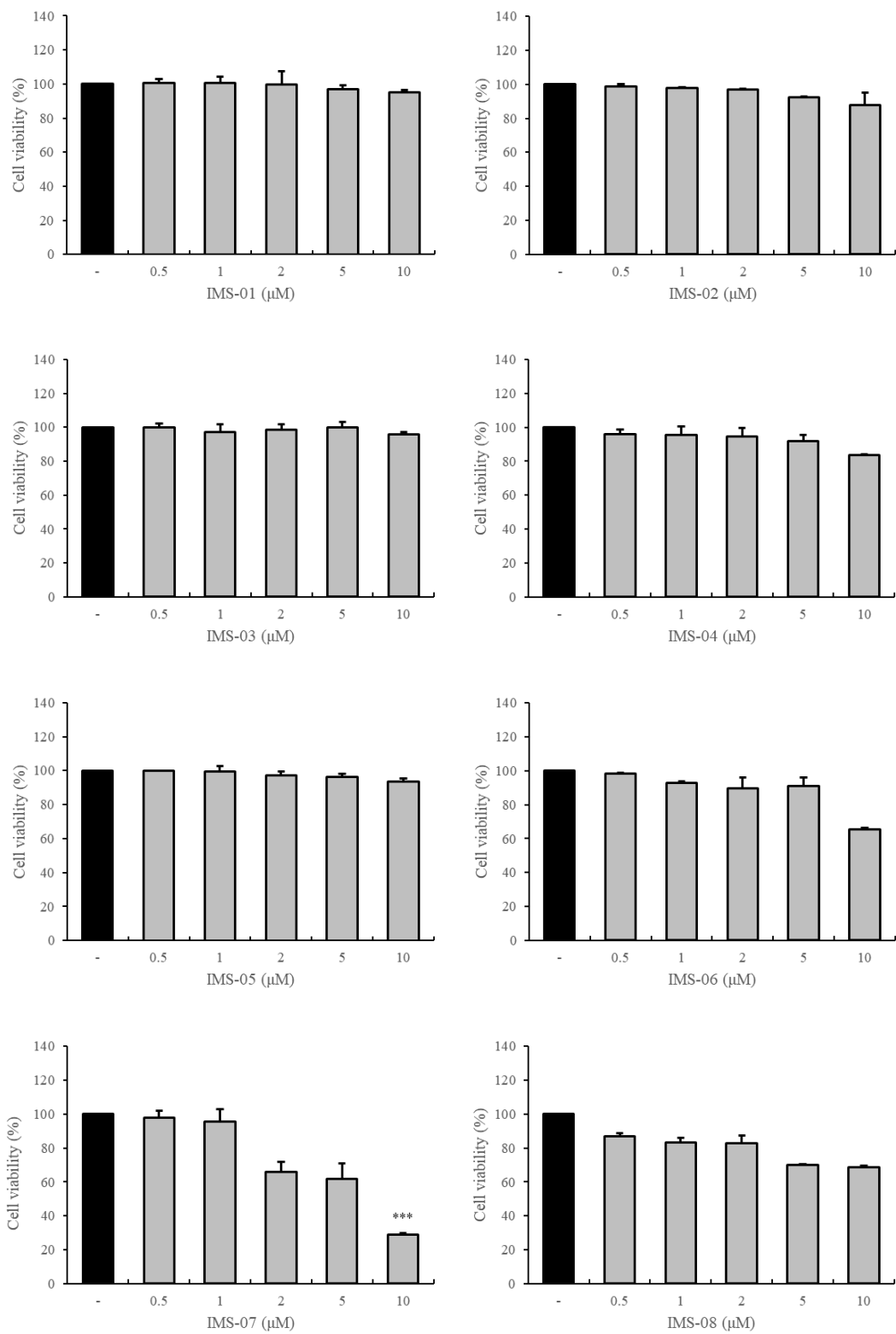


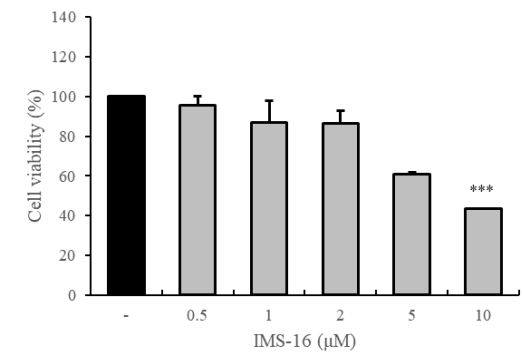
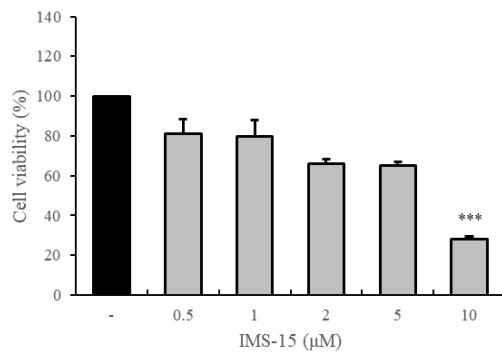
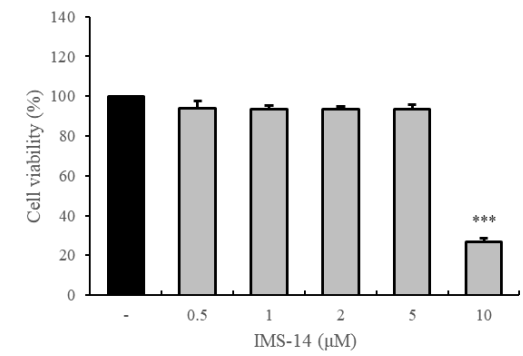
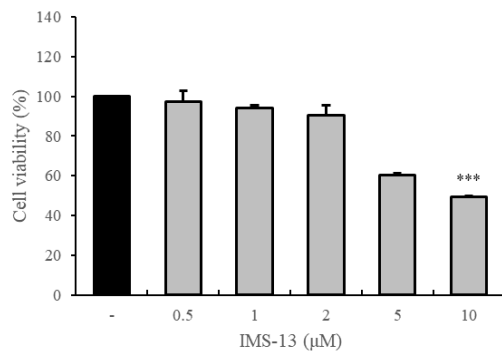
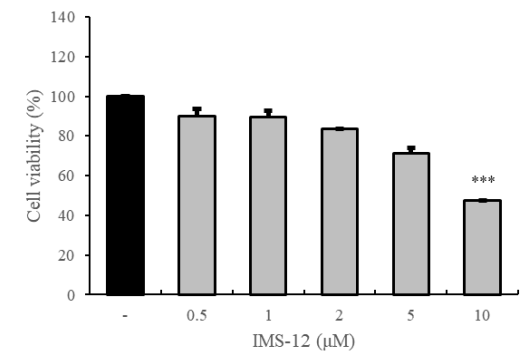
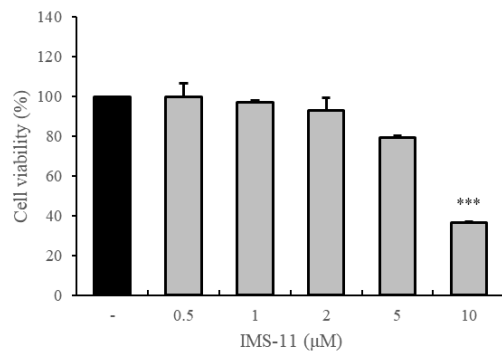
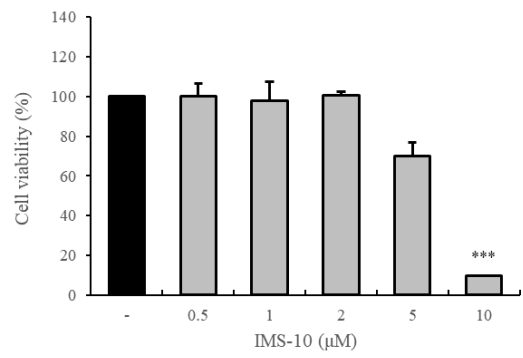
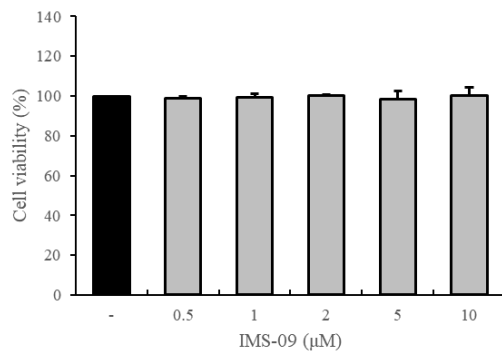
**Figure S64.** 3-((1,4-Bis(isoamyloxy)naphthalen-2-yl)methyl)-1-isoamyl-1*H*-benzo[d]imidazol-3-ium bromide (IMS-22)

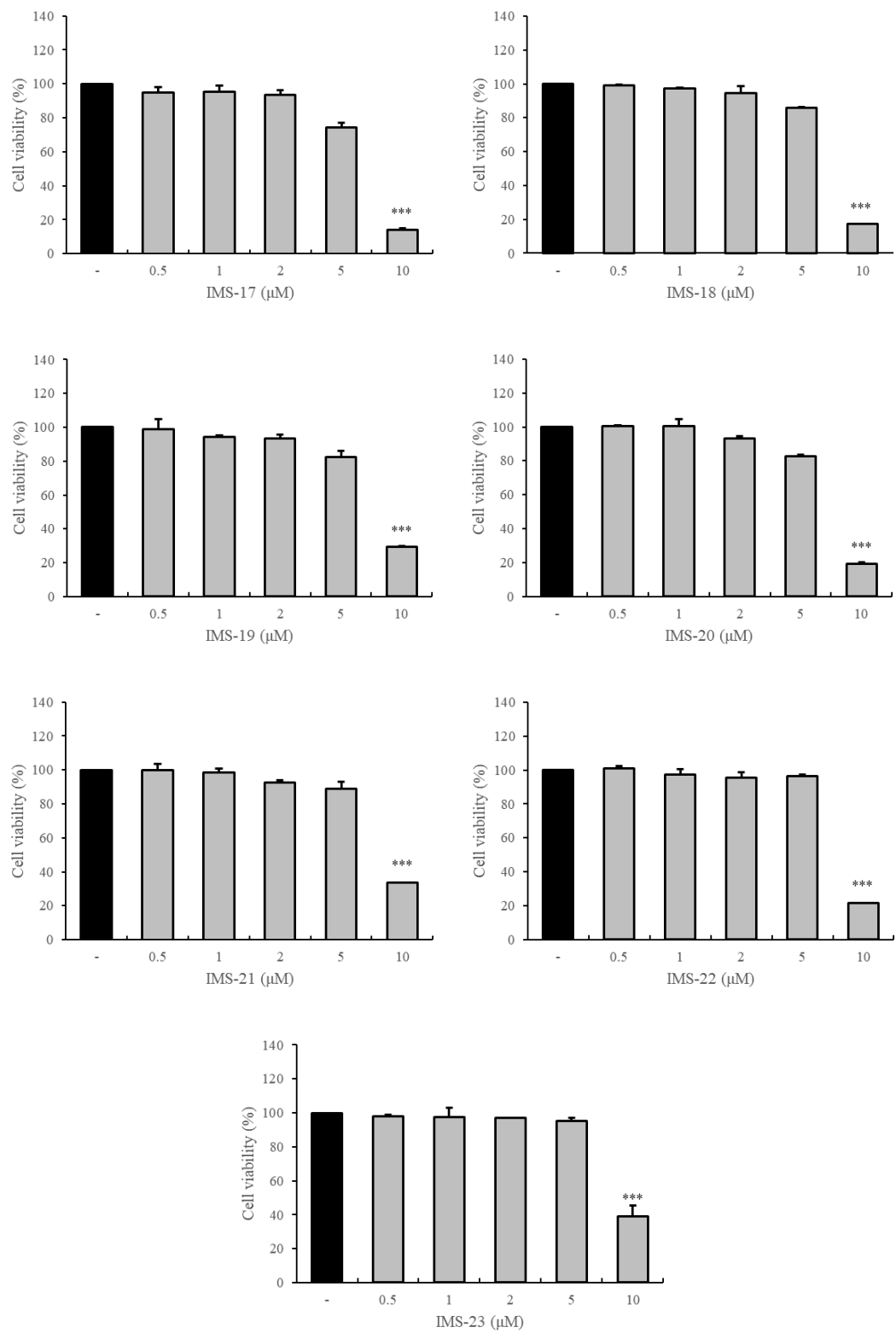


**Figure S65.** 1-benzyl-3-((1,4-bis(isoamyloxy)naphthalen-2-yl)methyl)-1*H*-benzo[*d*]imidazol-3-ium bromide (IMS-23)

### III. Cell viability assay

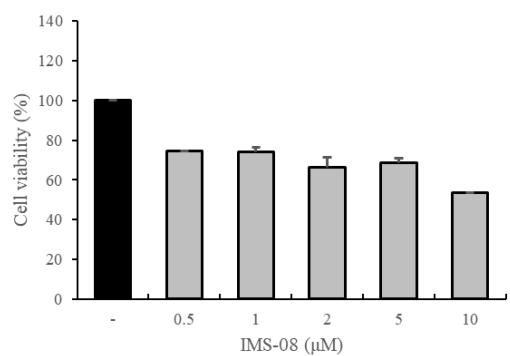
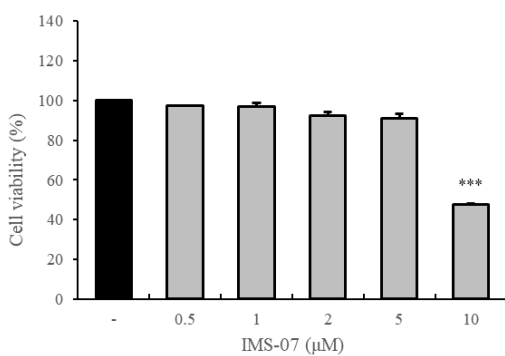
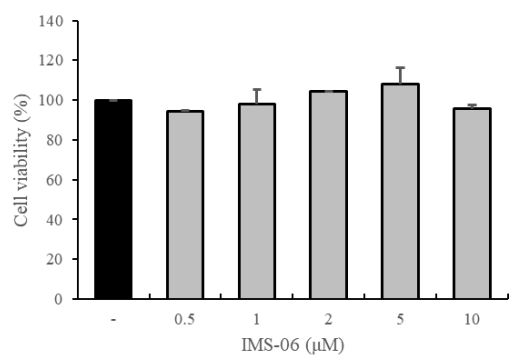
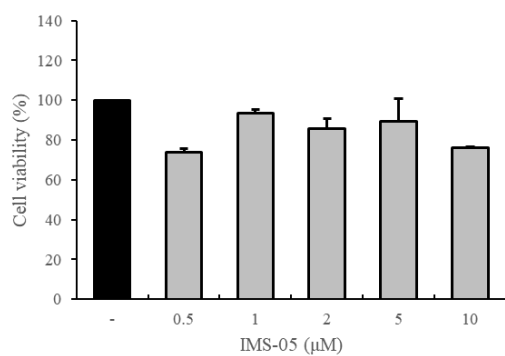
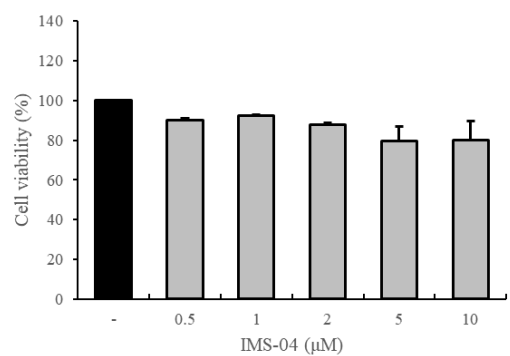
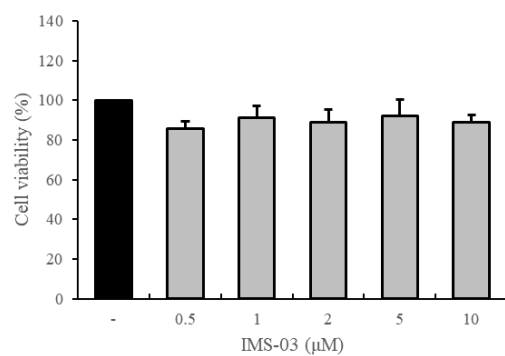
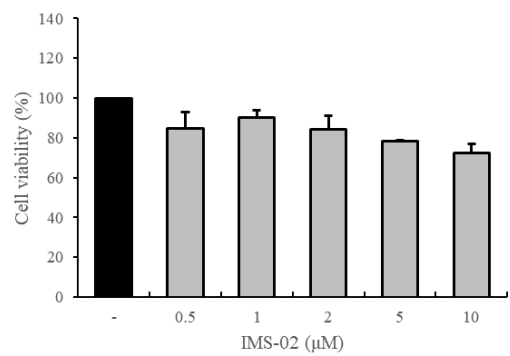
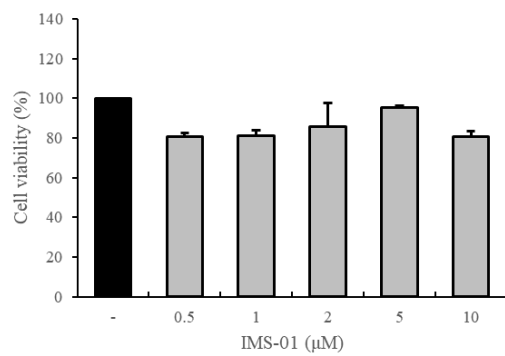


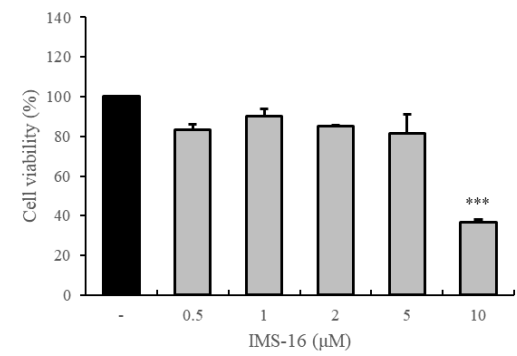
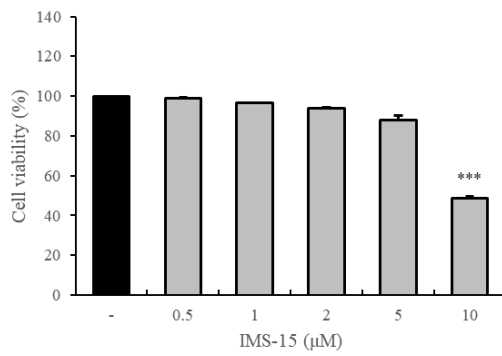
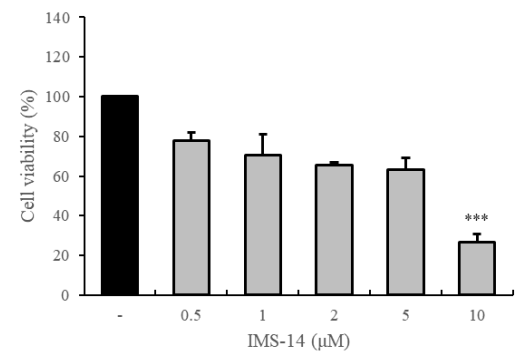
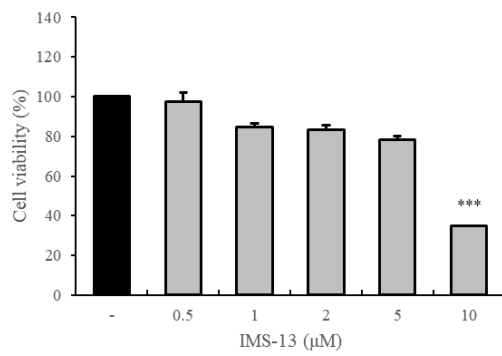
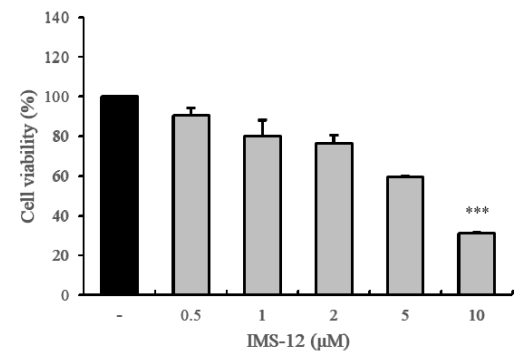
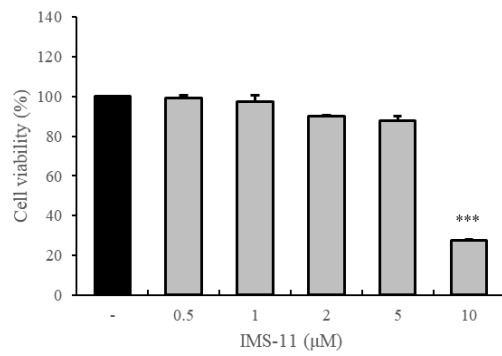
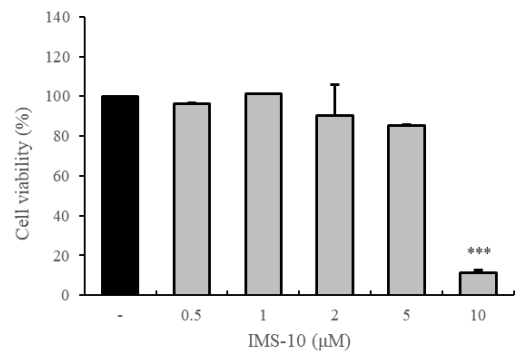
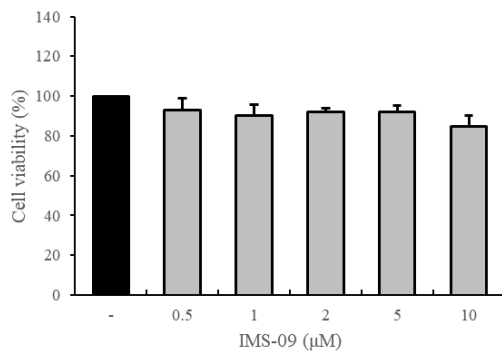


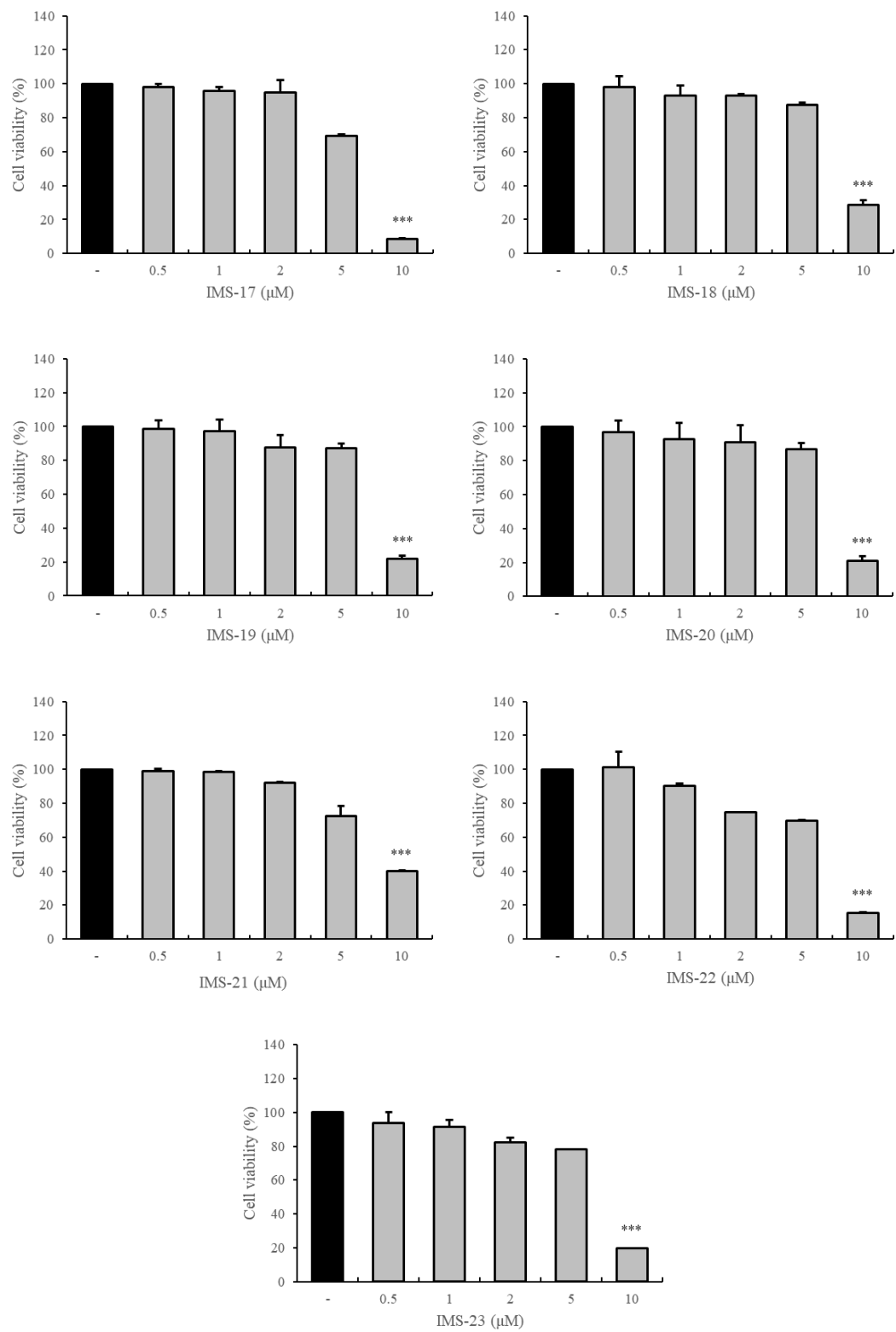


**Figure S66.** Cell viability of HepG2 cells exposed to 5 concentrations of IMS-01-IMS-23. (\*\*\*) $p \leq 0.001$

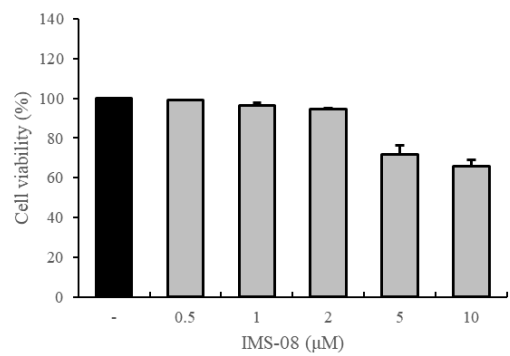
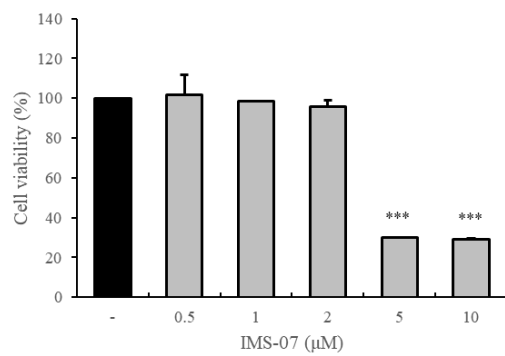
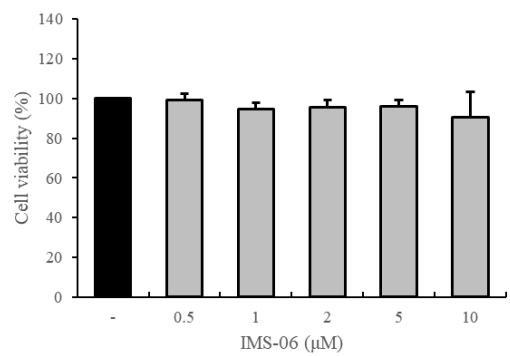
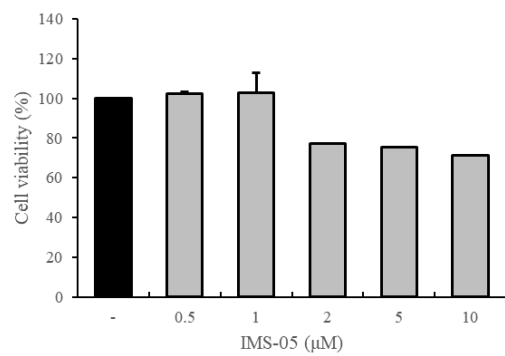
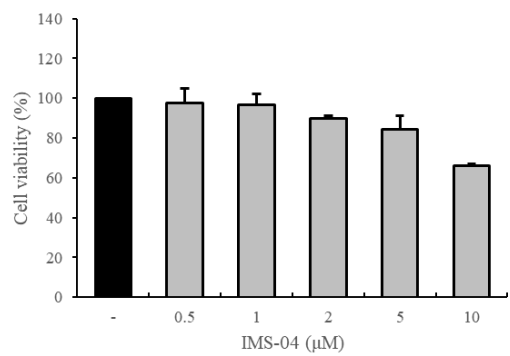
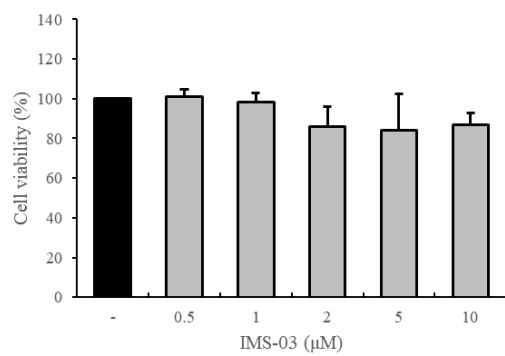
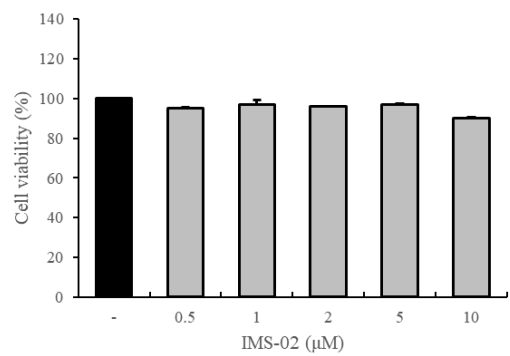
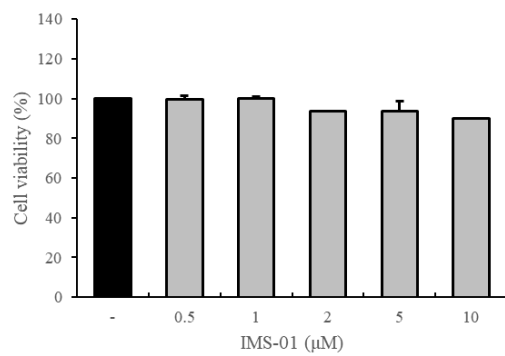


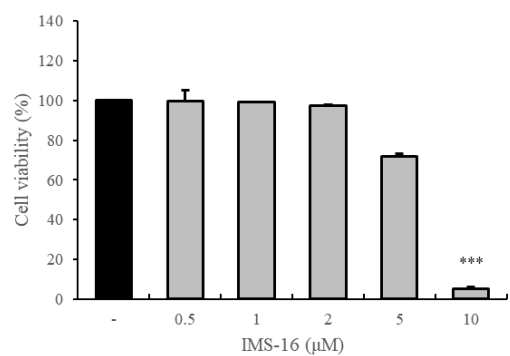
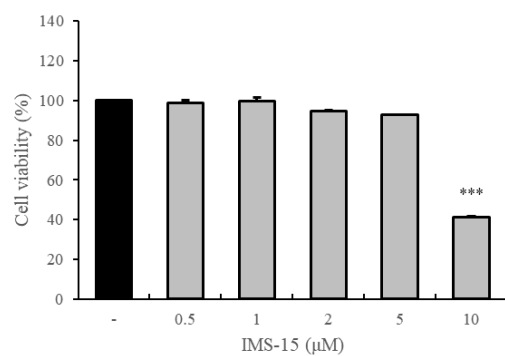
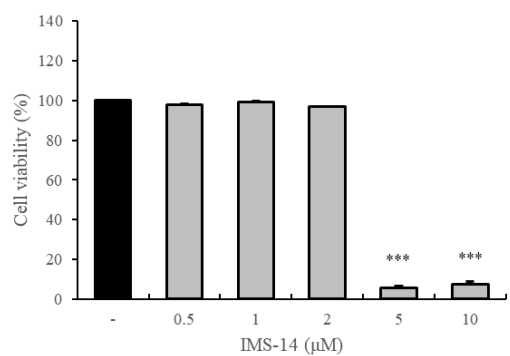
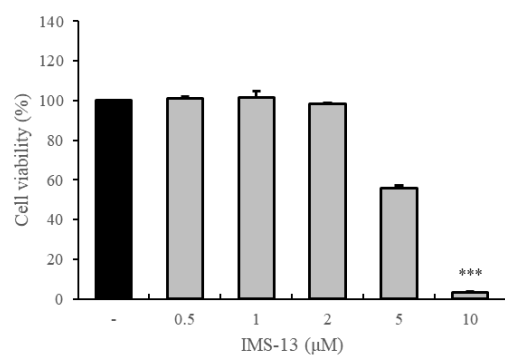
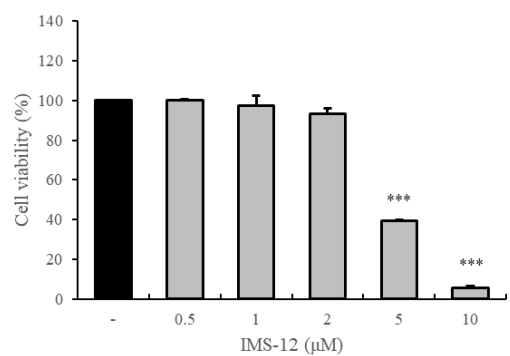
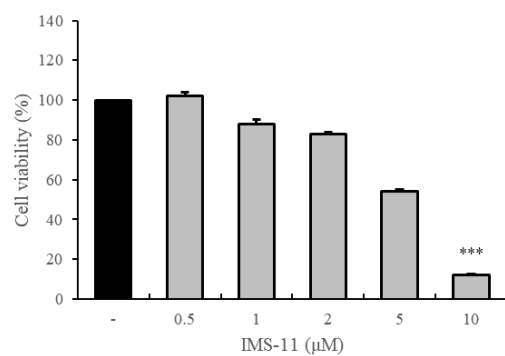
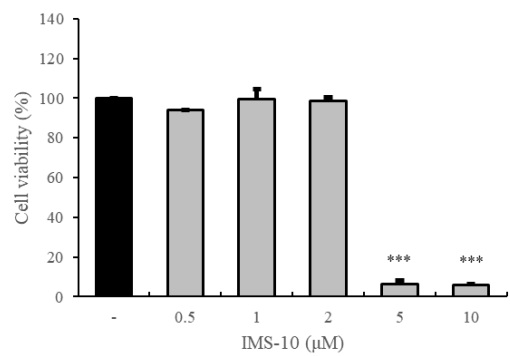
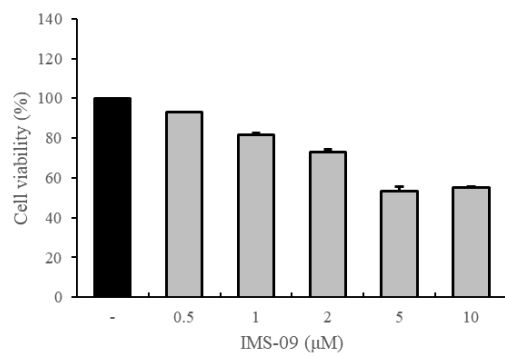


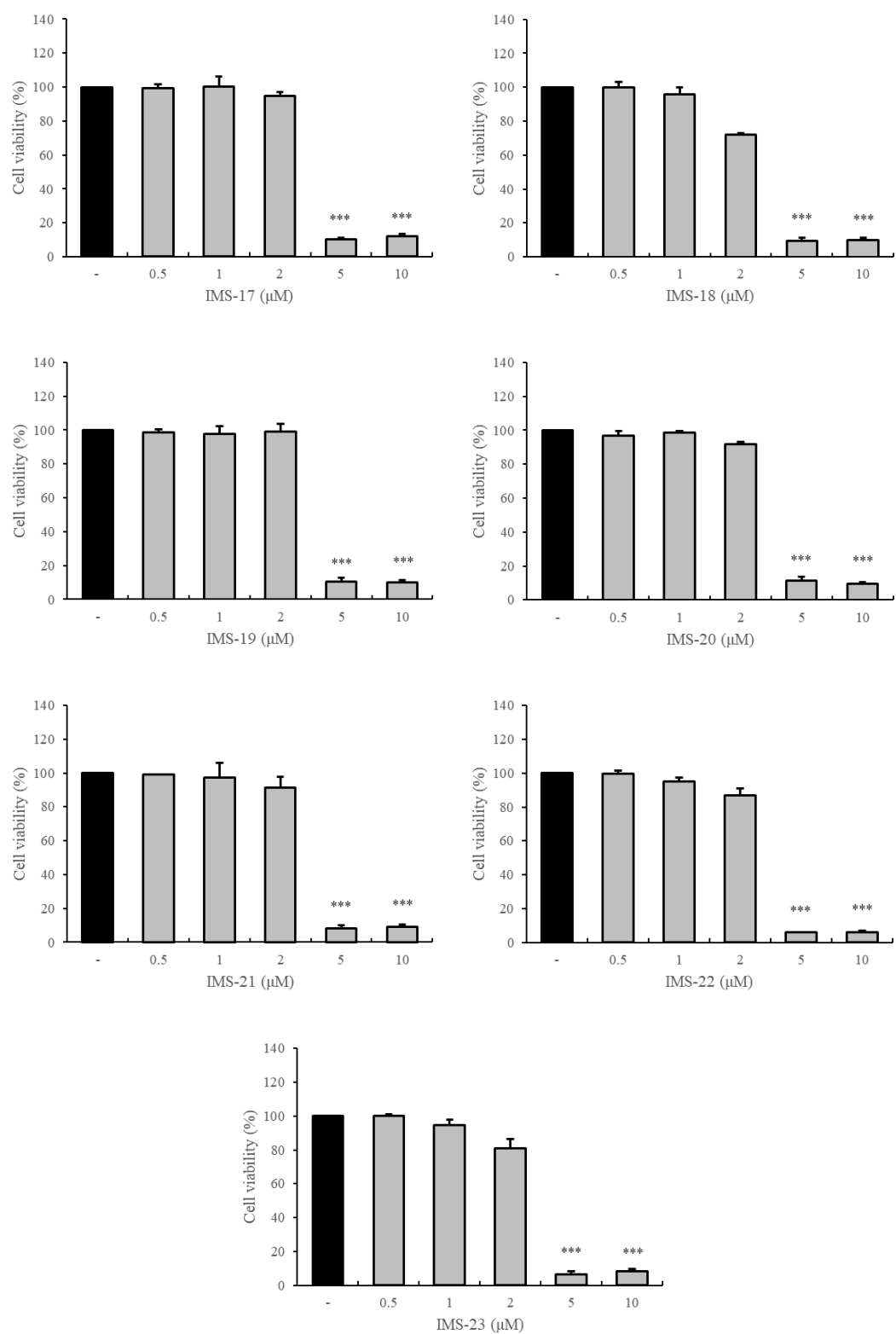




**Figure S67.** Cell viability of HT-29 cells exposed to 5 concentrations of IMS-01-IMS-23 (\*\* $p < 0.001$ )







**Figure S68.** Cell viability of CCD-18Co cells exposed to 5 concentrations of IMS-01-IMS-23. (\*\* $p$ <0.001)