

**Construction of a (NNN)Ru-incorporated porous organic polymer with high catalytic activity for  $\beta$ -alkylation of secondary alcohols with primary alcohols**

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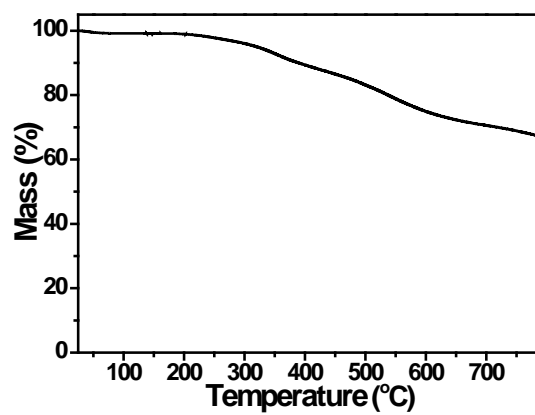
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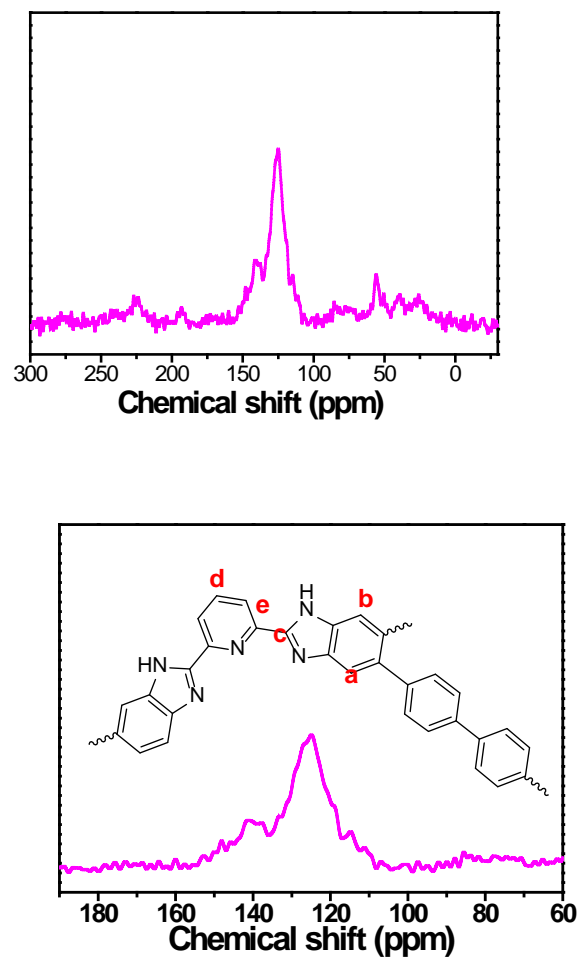
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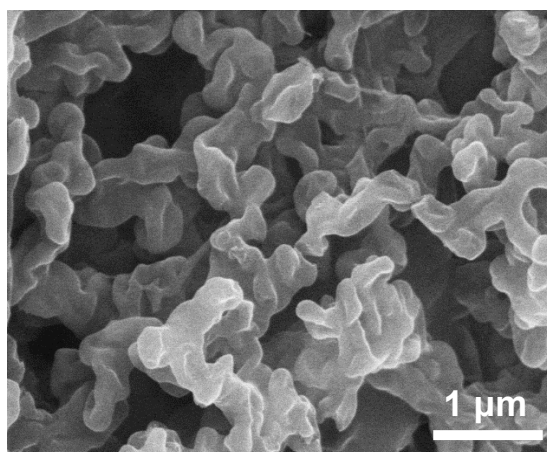
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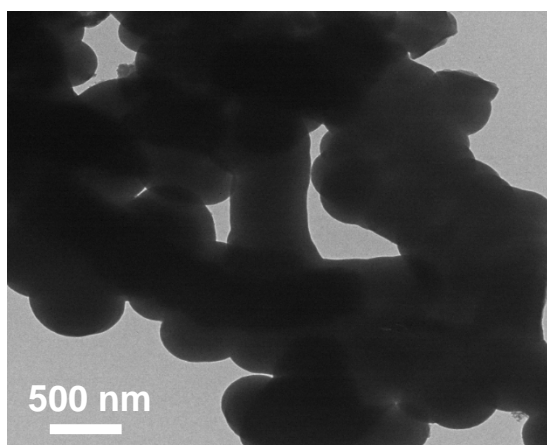
**Figure S1.** TGA plot of POP-bp/bbp.



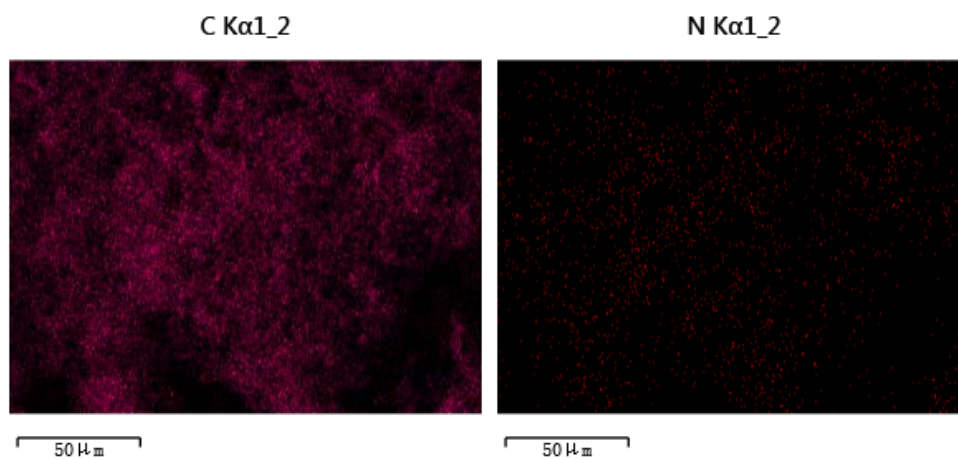
**Figure S2.** <sup>13</sup>C CP-MAS NMR spectrum of POP-bp/bbp.



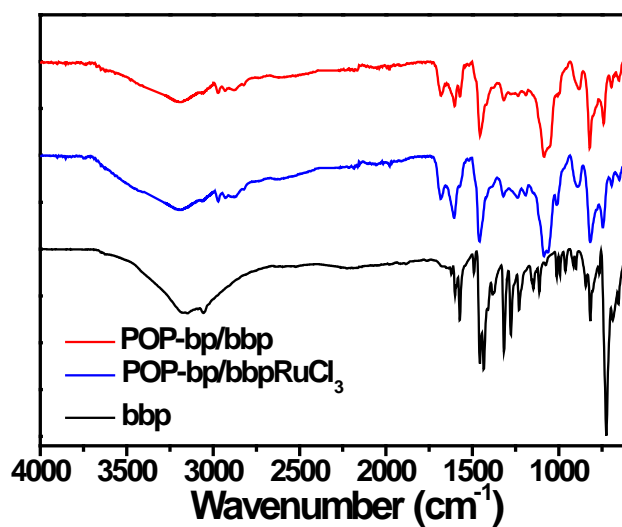
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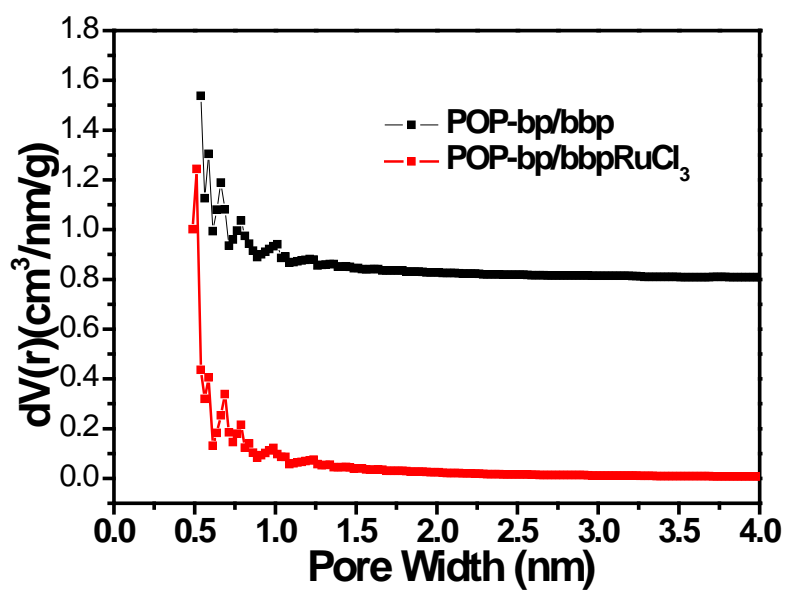
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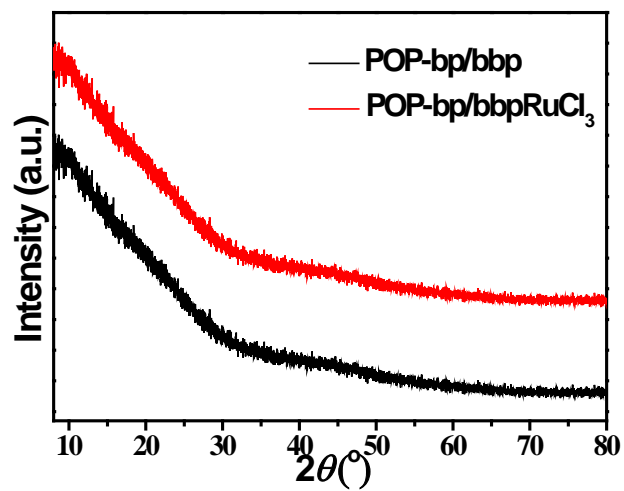
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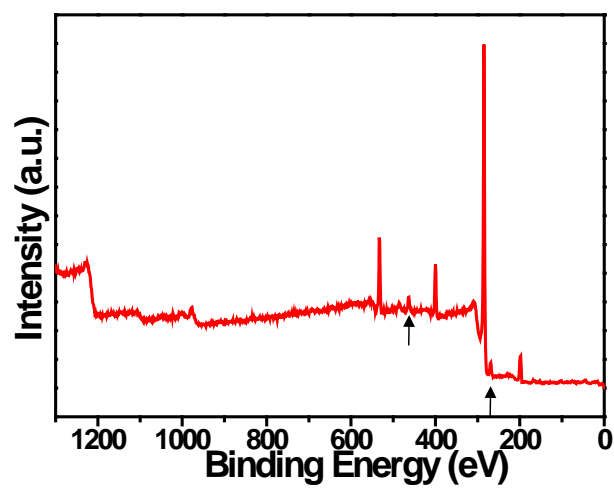
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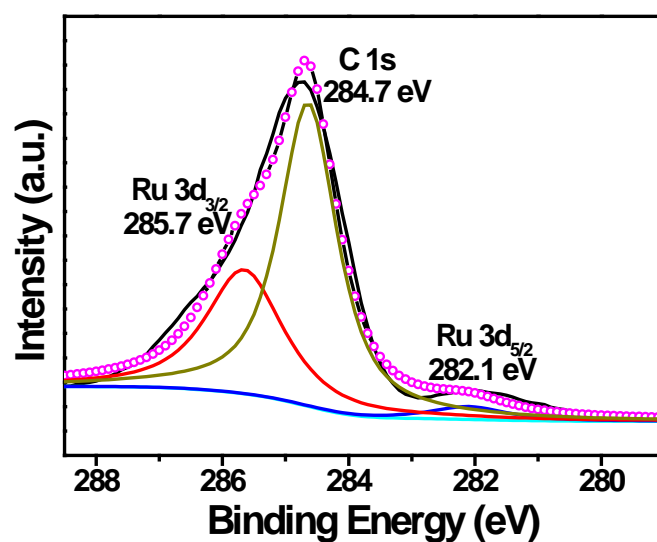
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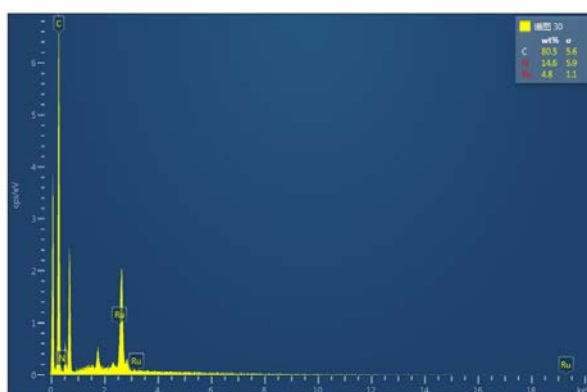
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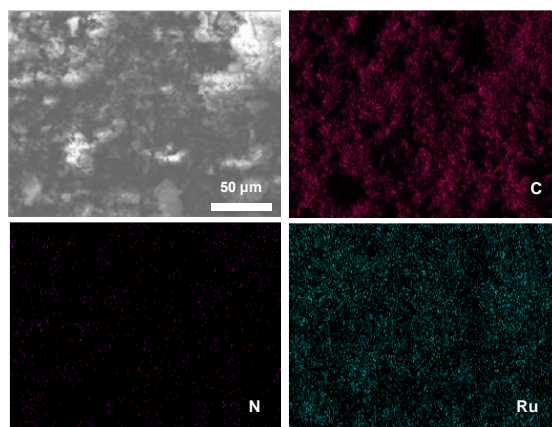
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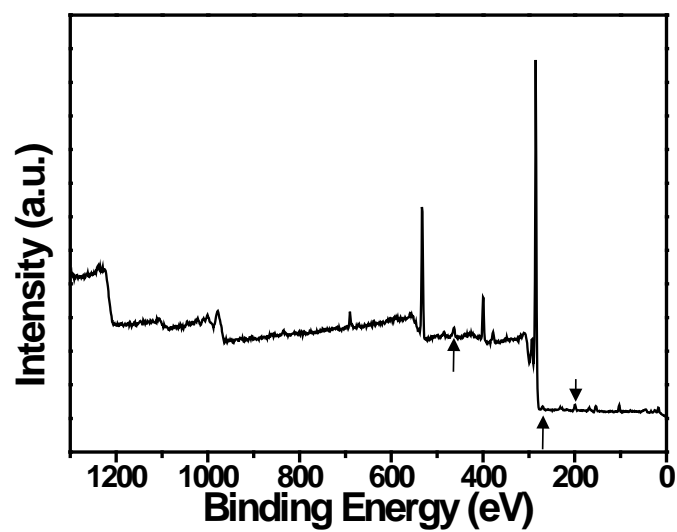
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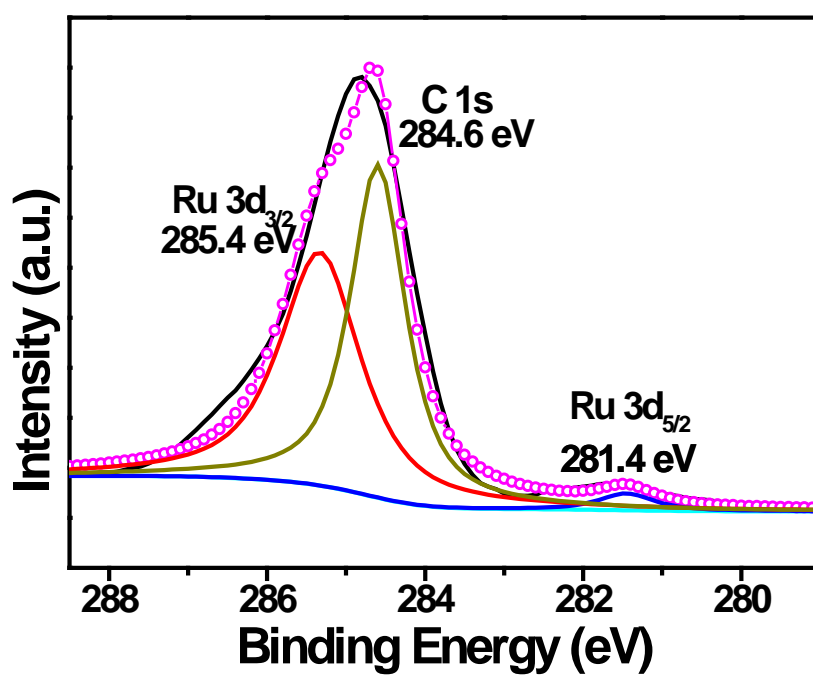
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**Figure S12.** EDX spectroscopy elemental mapping of the reused POP-bp/bbpRuCl<sub>3</sub>.



**Figure S13.** XPS survey scan spectrum of the reused POP-bp/bbpRuCl<sub>3</sub>.

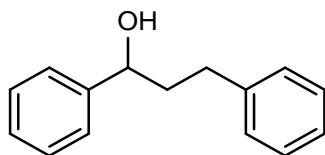


**Figure S14.** Ru 3d XPS spectra of the reused POP-bp/bbpRuCl<sub>3</sub>.



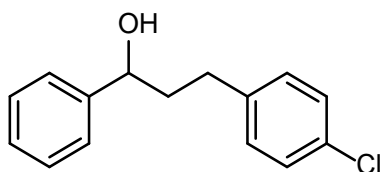
## Analytical data of the products

### 1,3-diphenylpropan-1-ol (3aa) [S1].



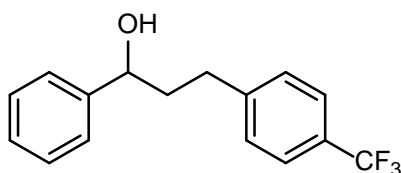
186 mg, 88% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.34–7.26 (m, 4H), 7.26–7.20 (m, 3H), 7.15 (t,  $J$  = 6.2 Hz, 3H), 4.59 (dd,  $J$  = 7.4, 5.7 Hz, 1H), 2.65 (m, 2H), 2.23 (s, 1H), 2.14–1.86 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.7, 141.9, 128.54, 128.51, 128.45, 127.7, 126.0, 125.9, 73.9, 40.5, 32.1.

### 3-(4-chlorophenyl)-1-phenylpropan-1-ol (3ab) [S1].



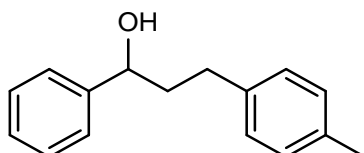
209 mg, 85% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.34 (q,  $J$  = 6.2 Hz, 4H), 7.25 (dd,  $J$  = 16.2, 9.5 Hz, 3H), 7.11 (d,  $J$  = 8.3 Hz, 2H), 4.65 (t,  $J$  = 4.7 Hz, 1H), 2.82–2.54 (m, 2H), 2.19–1.88 (m, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.6, 140.4, 131.7, 130.0, 128.7, 128.6, 127.9, 126.1, 73.9, 40.5, 31.5.

### 1-phenyl-3-(4-(trifluoromethyl)phenyl)propan-1-ol (3ac) [S2].



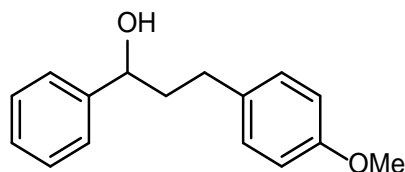
204 mg, 73% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.49 (d,  $J$  = 8.1 Hz, 2H), 7.31 (s, 1H), 7.28 (dd,  $J$  = 8.6, 2.1 Hz, 3H), 7.23 (t,  $J$  = 5.8 Hz, 3H), 4.59 (dd,  $J$  = 7.7, 5.5 Hz, 1H), 2.83–2.56 (m, 2H), 2.48 (s, 1H), 2.17–1.85 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  146.1, 144.4, 128.8, 128.7, 127.9, 126.0, 125.4, 125.4, 125.3, 125.3, 73.7, 40.1, 31.9.  $^{19}\text{F}$  NMR (377 MHz,  $\text{CDCl}_3$ )  $\delta$  -62.15.

### 1-phenyl-3-(p-tolyl)propan-1-ol (3ad) [S1].



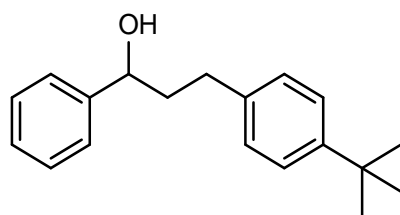
192 mg, 85% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.29 (s, 4H), 7.24 (d,  $J = 5.7$  Hz, 1H), 7.05 (s, 4H), 4.66–4.53 (m, 1H), 2.79–2.49 (m, 2H), 2.29 (s, 3H), 2.21 (s, 1H), 2.01 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.7, 138.8, 135.3, 129.1, 128.5, 128.4, 127.6, 126.0, 73.9, 40.6, 31.6, 21.1.

**3-(4-methoxyphenyl)-1-phenylpropan-1-ol (3ae) [S1].**



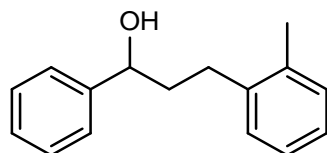
210 mg, 87% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.34 (d,  $J = 2.3$  Hz, 4H), 7.31–7.25 (m, 1H), 7.10 (dd,  $J = 8.1, 3.8$  Hz, 2H), 6.83 (dd,  $J = 8.1, 5.8$  Hz, 2H), 4.74–4.61 (m, 1H), 3.78 (s, 3H), 2.78–2.54 (m, 2H), 2.23–1.83 (m, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  157.9, 144.8, 134.0, 129.5, 128.6, 127.7, 126.1, 114.0, 74.0, 55.4, 40.9, 31.3.

**3-(4-(tert-butyl)phenyl)-1-phenylpropan-1-ol (3af) [S3].**



233 mg, 87% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.33–7.25 (m, 6H), 7.25–7.19 (m, 1H), 7.09 (d,  $J = 8.3$  Hz, 2H), 4.60 (t,  $J = 6.5$  Hz, 1H), 2.78–2.48 (m, 2H), 2.27 (s, 1H), 2.03 (m, 2H), 1.29 (s, 9H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  148.7, 144.7, 138.8, 128.5, 128.2, 127.6, 126.1, 125.3, 73.9, 40.5, 34.4, 31.5, 31.5.

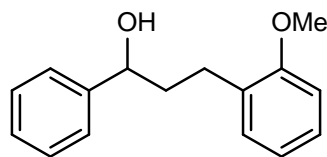
**1-phenyl-3-(o-tolyl)propan-1-ol (3ag) [S1].**



201 mg, 89% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.27 (d,  $J = 4.4$  Hz, 4H), 7.23–7.19 (m, 1H), 7.07 (dd,  $J = 5.9, 3.2$  Hz, 4H), 4.60 (dd,  $J = 7.6, 5.5$  Hz, 1H), 2.72–2.63 (m, 1H), 2.58–2.49 (m, 1H), 2.41 (s, 1H), 2.20 (s, 3H), 2.02–1.87 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.6, 140.1, 136.0, 130.2, 128.8, 128.5, 127.6,

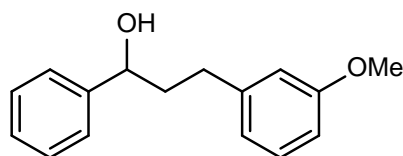
125.99, 125.98, 74.1, 39.2, 29.4, 19.2.

**3-(2-methoxyphenyl)-1-phenylpropan-1-ol (3ah) [S4].**



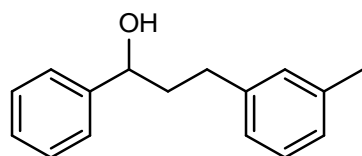
191 mg, 79% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.28 (dd,  $J = 9.1, 5.2$  Hz, 4H), 7.22–7.08 (m, 3H), 6.89–6.77 (m, 2H), 4.56 (dd,  $J = 8.3, 5.0$  Hz, 1H), 3.74 (s, 3H), 2.70 (m, 2H), 2.65 (s, 1H), 2.07–1.91 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  157.4, 144.7, 130.1, 130.1, 128.3, 127.3, 127.2, 126.0, 120.7, 110.4, 73.6, 55.3, 39.3, 26.5.

**3-(3-methoxyphenyl)-1-phenylpropan-1-ol (3ai) [S1].**



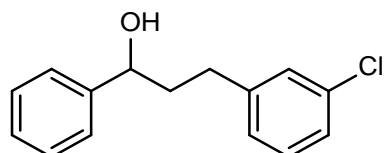
208 mg, 86% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.38–7.19 (m, 5H), 7.20–7.12 (m, 1H), 6.72 (dd,  $J = 19.4, 7.1$  Hz, 3H), 4.65–4.52 (m, 1H), 3.72 (s, 3H), 2.78–2.50 (m, 2H), 2.35 (s, 1H), 2.16–1.89 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  159.7, 144.7, 143.5, 129.4, 128.5, 127.60, 126.0, 120.9, 114.3, 111.2, 73.8, 55.1, 40.4, 32.1.

**1-phenyl-3-(m-tolyl)propan-1-ol (3aj) [S1].**



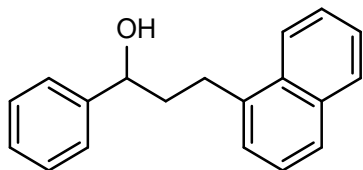
183 mg, 81% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.28 (s, 4H), 7.24 (d,  $J = 5.8$  Hz, 1H), 7.13 (t,  $J = 7.7$  Hz, 1H), 7.02–6.87 (m, 3H), 4.71–4.45 (m, 1H), 2.72–2.51 (m, 2H), 2.29 (s, 4H), 2.00 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.7, 141.8, 137.9, 129.3, 128.5, 128.3, 127.6, 126.6, 126.0, 125.5, 73.9, 40.5, 32.0, 21.5.

**3-(3-chlorophenyl)-1-phenylpropan-1-ol (3ak) [S1].**



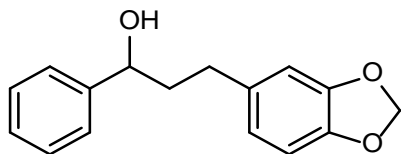
209 mg, 85% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.33–7.30 (m, 1H), 7.29 (s, 1H), 7.26 (dd,  $J$  = 11.3, 4.8 Hz, 2H), 7.17–7.10 (m, 3H), 7.00 (dt,  $J$  = 6.5, 1.7 Hz, 1H), 4.57 (t,  $J$  = 6.5 Hz, 1H), 2.60 (m, 2H), 2.41 (s, 1H), 2.10–1.86 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.4, 144.0, 134.1, 129.7, 128.6, 128.6, 127.8, 126.7, 126.1, 126.0, 73.7, 40.2, 31.7.

**3-(naphthalen-1-yl)-1-phenylpropan-1-ol (3al) [S1].**



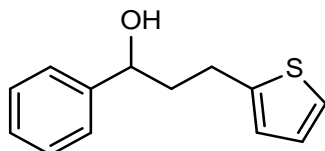
230 mg, 88% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.97–7.88 (m, 1H), 7.80 (dd,  $J$  = 7.5, 2.0 Hz, 1H), 7.66 (d,  $J$  = 8.1 Hz, 1H), 7.47–7.39 (m, 2H), 7.37–7.26 (m, 6H), 7.26–7.19 (m, 1H), 4.69 (dd,  $J$  = 7.2, 5.6 Hz, 1H), 3.18 (m, 1H), 3.04 (m, 1H), 2.24–2.04 (m, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.6, 138.1, 134.0, 131.9, 128.8, 128.6, 127.7, 126.8, 126.0, 125.9, 125.6, 125.5, 123.9, 74.2, 39.9, 29.2.

**3-(benzo[d][1,3]dioxol-5-yl)-1-phenylpropan-1-ol (3am) [S1].**



205mg, 80% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.34–7.27 (m, 4H), 7.26–7.20 (m, 1H), 7.07 (dd,  $J$  = 5.1, 1.1 Hz, 1H), 6.88 (dd,  $J$  = 5.1, 3.4 Hz, 1H), 6.76 (dd,  $J$  = 3.4, 0.9 Hz, 1H), 4.63 (dd,  $J$  = 7.8, 5.4 Hz, 1H), 2.87 (m, 2H), 2.32 (s, 1H), 2.06 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.7, 144.4, 128.6, 127.7, 126.8, 126.0, 124.4, 123.1, 73.5, 40.7, 26.2.

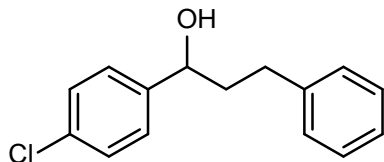
**1-phenyl-3-(thiophen-2-yl)propan-1-ol (3an) [S2].**



129 mg, 59% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.37–7.28 (m, 4H), 7.28–7.22 (m, 1H), 6.67 (dd,  $J$  = 16.4, 4.7 Hz, 2H), 6.60 (dd,  $J$  = 7.9, 1.6 Hz, 1H), 5.86 (s, 2H), 4.61 (dd,  $J$  = 7.8, 5.4 Hz, 1H), 2.70–2.48 (m, 2H), 2.16 (s, 1H), 2.08–

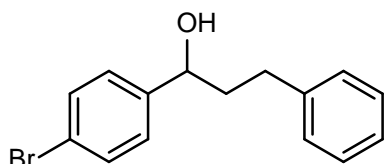
1.85 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  147.6, 145.7, 144.7, 135.7, 128.6, 127.7, 126.0, 121.2, 109.0, 108.2, 100.8, 73.7, 40.8, 31.8.

**1-(4-chlorophenyl)-3-phenylpropan-1-ol (3ba) [S1].**



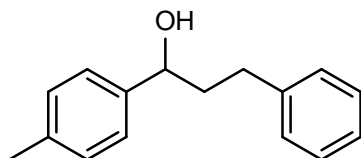
197 mg, 80% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.31 (d,  $J$  = 8.3 Hz, 2H), 7.28 (t,  $J$  = 7.7 Hz, 4H), 7.18 (t,  $J$  = 8.6 Hz, 3H), 4.69–4.62 (m, 1H), 2.77–2.61 (m, 2H), 2.09 (m, 1H), 1.98 (m, 1H), 1.81 (s, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  143.2, 141.6, 133.4, 128.8, 128.6, 128.5, 127.4, 126.1, 73.3, 40.6, 32.1.

**1-(4-bromophenyl)-3-phenylpropan-1-ol (3ca) [S1].**



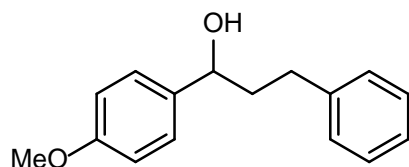
259 mg, 895% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.47 (d,  $J$  = 8.3 Hz, 2H), 7.28 (t,  $J$  = 7.5 Hz, 2H), 7.22 (d,  $J$  = 8.3 Hz, 2H), 7.18 (t,  $J$  = 8.3 Hz, 3H), 4.65 (dd,  $J$  = 7.6, 5.5 Hz, 1H), 2.78–2.61 (m, 2H), 2.16–2.05 (m, 1H), 2.03–1.93 (m, 1H), 1.77 (s, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  142.7, 140.6, 130.7, 127.7, 127.6, 127.6, 126.8, 125.1, 125.1, 120.5, 72.3, 39.6, 31.0.

**3-phenyl-1-(p-tolyl)propan-1-ol (3da) [S1].**



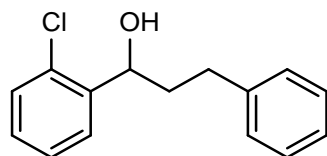
183 mg, 81% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.27–7.21 (m, 2H), 7.19 (s, 1H), 7.18–7.08 (m, 6H), 4.63–4.51 (m, 1H), 2.76–2.54 (m, 2H), 2.31 (s, 3H), 2.19 (s, 1H), 2.12–2.01 (m, 1H), 2.01–1.90 (m, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  142.0, 141.7, 137.3, 129.2, 128.5, 128.4, 126.0, 125.9, 73.7, 40.4, 32.1, 21.2.

**1-(4-methoxyphenyl)-3-phenylpropan-1-ol (3ea) [S4].**



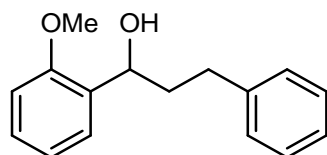
213 mg, 88% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.29–7.21 (m, 3H), 7.20 (d,  $J$  = 1.9 Hz, 1H), 7.15 (dd,  $J$  = 7.1, 5.3 Hz, 3H), 6.90–6.77 (m, 2H), 4.61–4.50 (m, 1H), 3.74 (s, 3H), 2.80–2.50 (m, 2H), 2.29 (s, 1H), 2.14–2.02 (m, 1H), 1.95 (m, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  159.1, 141.9, 136.8, 128.5, 128.4, 127.3, 125.9, 113.9, 73.4, 55.3, 40.4, 32.1.

**1-(2-chlorophenyl)-3-phenylpropan-1-ol (3fa) [S5].**



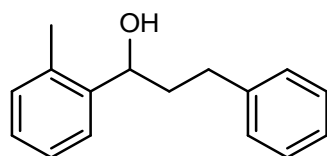
130 mg, 53% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.57 (dd,  $J$  = 7.7, 1.6 Hz, 1H), 7.34–7.30 (m, 1H), 7.29–7.25 (m, 3H), 7.23–7.19 (m, 3H), 7.17 (d,  $J$  = 7.3 Hz, 2H), 5.13 (dd,  $J$  = 8.4, 4.1 Hz, 1H), 2.93–2.81 (m, 1H), 2.74 (m, 1H), 2.15–1.99 (m, 2H), 1.85 (s, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  142.1, 141.8, 132.0, 129.6, 129.2, 128.6, 128.5, 128.4, 127.3, 127.2, 126.0, 125.4, 70.4, 39.1, 32.3.

**1-(2-methoxyphenyl)-3-phenylpropan-1-ol (3ga) [S1].**



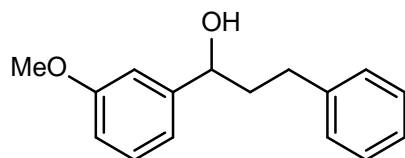
184 mg, 76% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.45 (dd,  $J$  = 7.5, 1.4 Hz, 1H), 7.42–7.37 (m, 2H), 7.37–7.22 (m, 4H), 7.07 (t,  $J$  = 7.3 Hz, 1H), 6.96 (d,  $J$  = 8.2 Hz, 1H), 5.03 (s, 1H), 3.89 (s, 3H), 3.03 (s, 1H), 3.00–2.90 (m, 1H), 2.81 (m, 1H), 2.32–2.14 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  156.5, 142.2, 132.4, 128.5, 128.3, 126.9, 125.7, 120.7, 110.5, 70.1, 55.2, 38.8, 32.3.

**3-phenyl-1-(o-tolyl)propan-1-ol (3ha) [S1].**



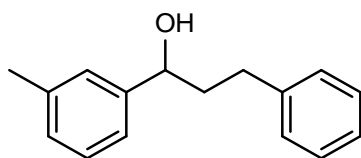
179 mg, 79% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.43 (d,  $J$  = 7.5 Hz, 1H), 7.28–7.21 (m, 2H), 7.20–7.09 (m, 5H), 7.07 (d,  $J$  = 7.2 Hz, 1H), 4.83 (dd,  $J$  = 8.0, 4.5 Hz, 1H), 2.79 (m, 1H), 2.67 (m, 1H), 2.17 (s, 3H), 2.10 (s, 1H), 2.05–1.87 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  142.8, 141.9, 134.5, 130.5, 128.5, 128.4, 127.2, 126.3, 125.9, 125.2, 69.9, 39.5, 32.3, 18.9.

**1-(3-methoxyphenyl)-3-phenylpropan-1-ol (3ia) [S6].**



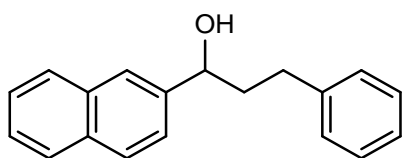
213 mg, 88% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.23 (dd,  $J$  = 14.1, 7.0 Hz, 3H), 7.16 (t,  $J$  = 9.4 Hz, 3H), 6.87 (d,  $J$  = 2.0 Hz, 2H), 6.77 (dd,  $J$  = 8.1, 1.8 Hz, 1H), 4.57 (dd,  $J$  = 7.1, 5.9 Hz, 1H), 3.73 (s, 3H), 2.75–2.53 (m, 2H), 2.42 (s, 1H), 2.14–1.88 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  159.8, 146.4, 141.9, 129.5, 128.5, 128.4, 125.9, 118.3, 113.0, 111.5, 73.7, 55.2, 40.4, 32.1.

**3-phenyl-1-(m-tolyl)propan-1-ol (3ja) [S1].**



192 mg, 85% yield. Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.29–7.20 (m, 2H), 7.19 (d,  $J$  = 7.5 Hz, 1H), 7.14 (dd,  $J$  = 8.4, 4.0 Hz, 3H), 7.12–7.00 (m, 3H), 4.54 (m, 1H), 2.77–2.54 (m, 2H), 2.33 (s, 1H), 2.30 (s, 3H), 2.01 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  144.6, 141.9, 138.1, 128.5, 128.4, 128.4, 126.7, 125.9, 123.1, 73.8, 40.4, 32.1, 21.5.

**1-(naphthalen-2-yl)-3-phenylpropan-1-ol (3ka) [S1].**



236 mg, 90% yield. White solid.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.80–7.68 (m, 3H), 7.65 (s, 1H), 7.44–7.33 (m, 3H), 7.22 (t,  $J$  = 7.3 Hz, 2H), 7.17–7.09 (m, 3H), 4.69 (dd,  $J$  = 7.4, 5.7 Hz, 1H), 2.74 – 2.53 (m, 2H), 2.49 (s, 1H), 2.20–1.93 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  141.9, 141.8, 133.3, 133.0, 128.5, 128.5, 128.4, 128.0, 127.8,

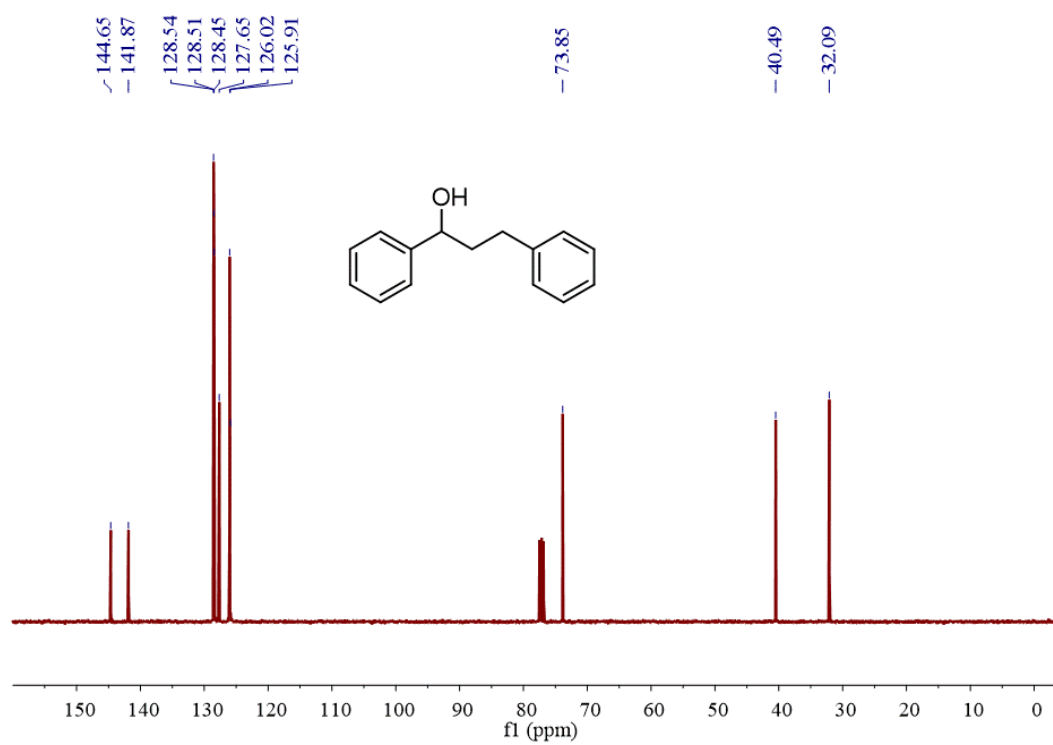
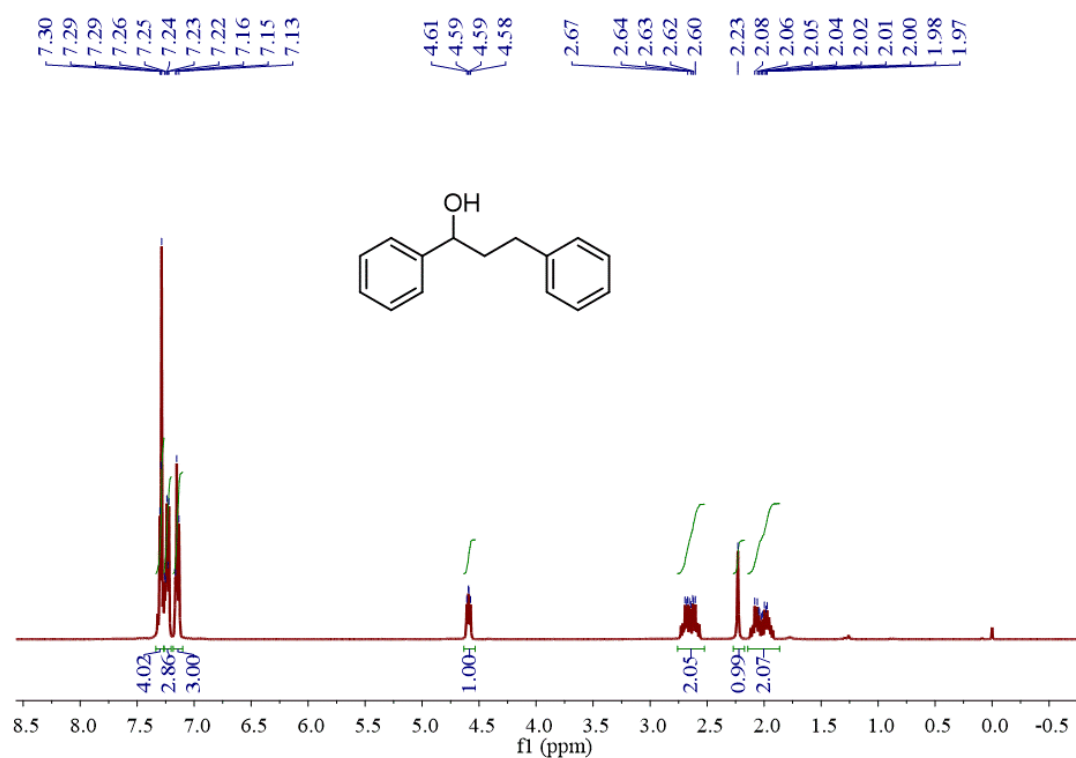
126.2, 125.9, 125.9, 124.7, 124.1, 73.9, 40.3, 32.1.



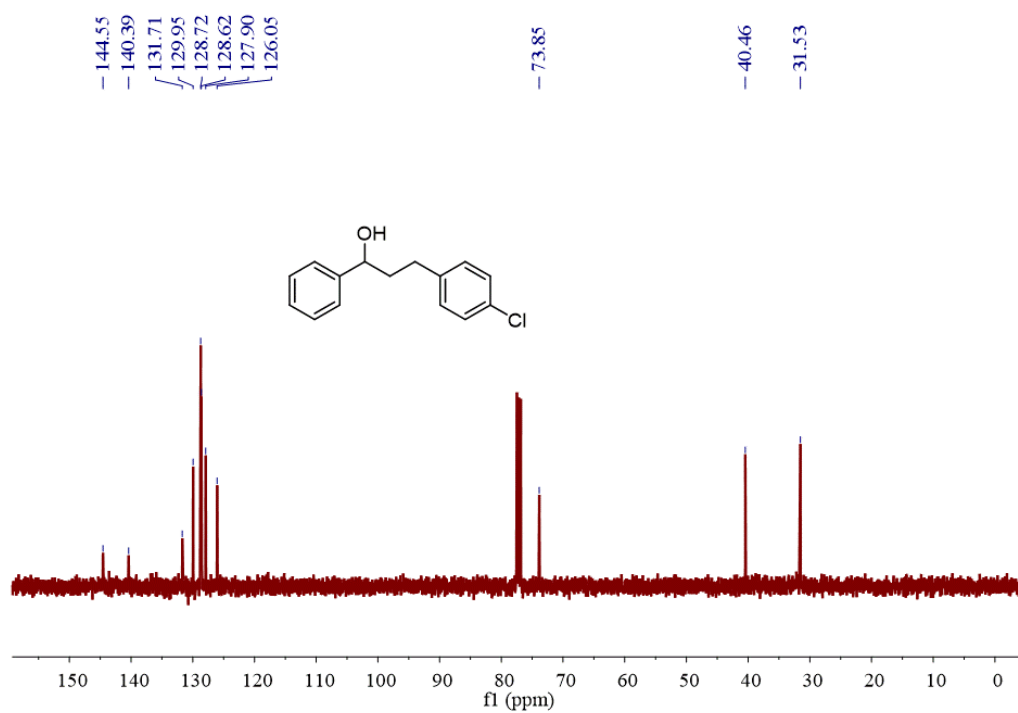
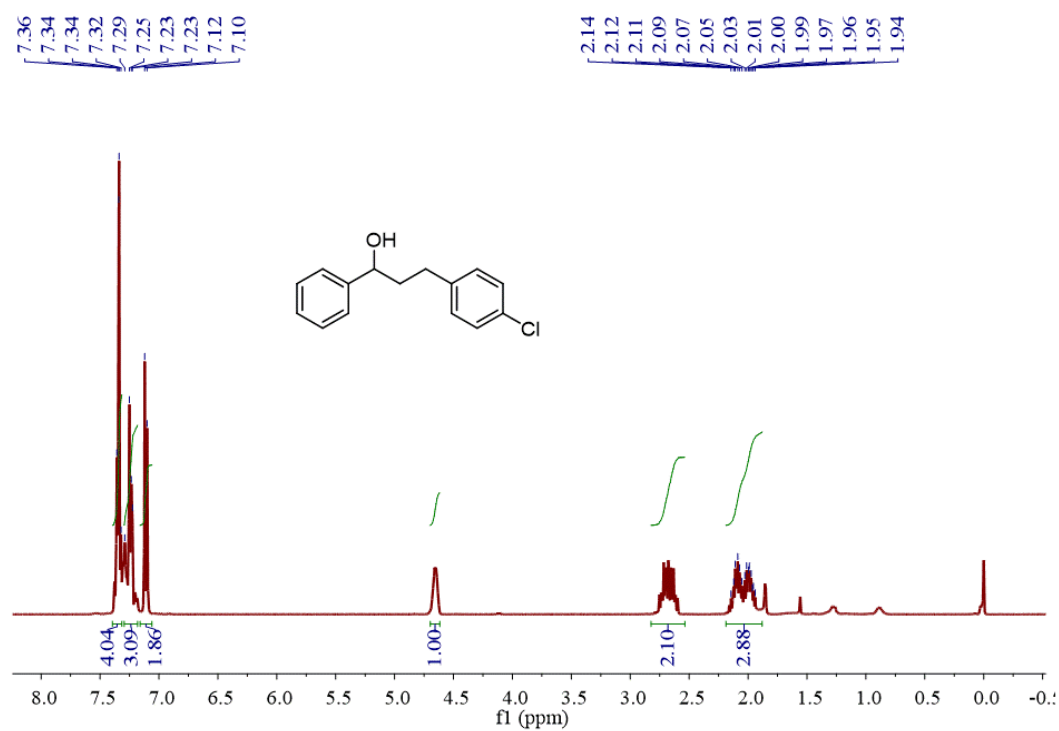
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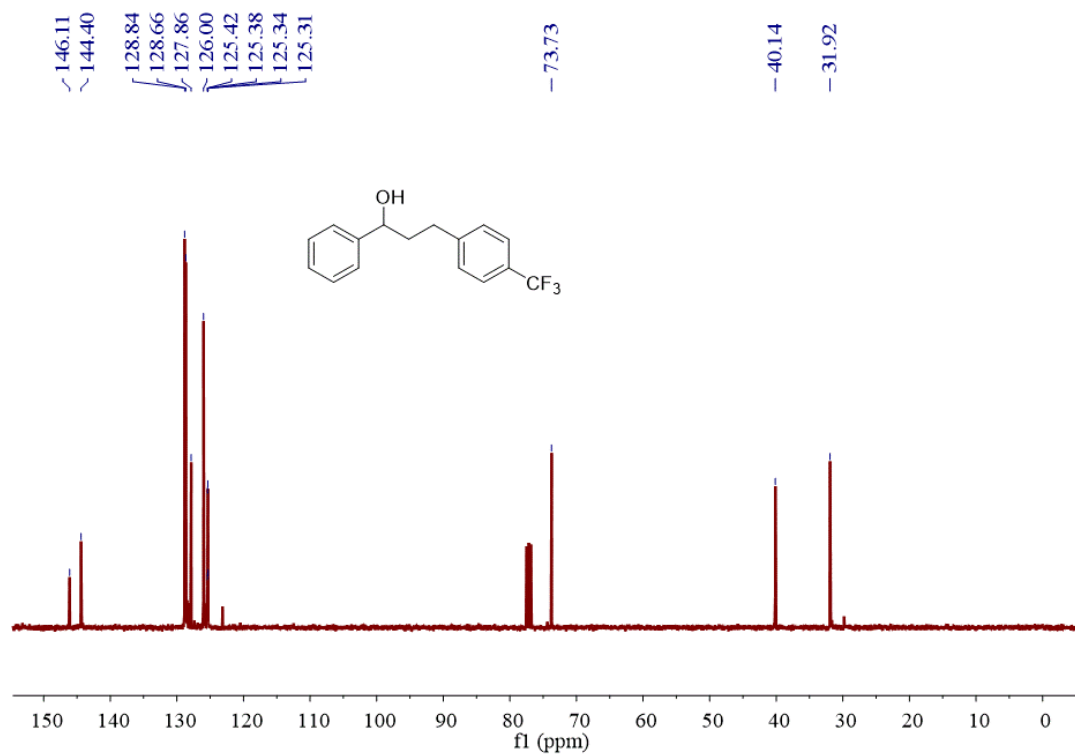
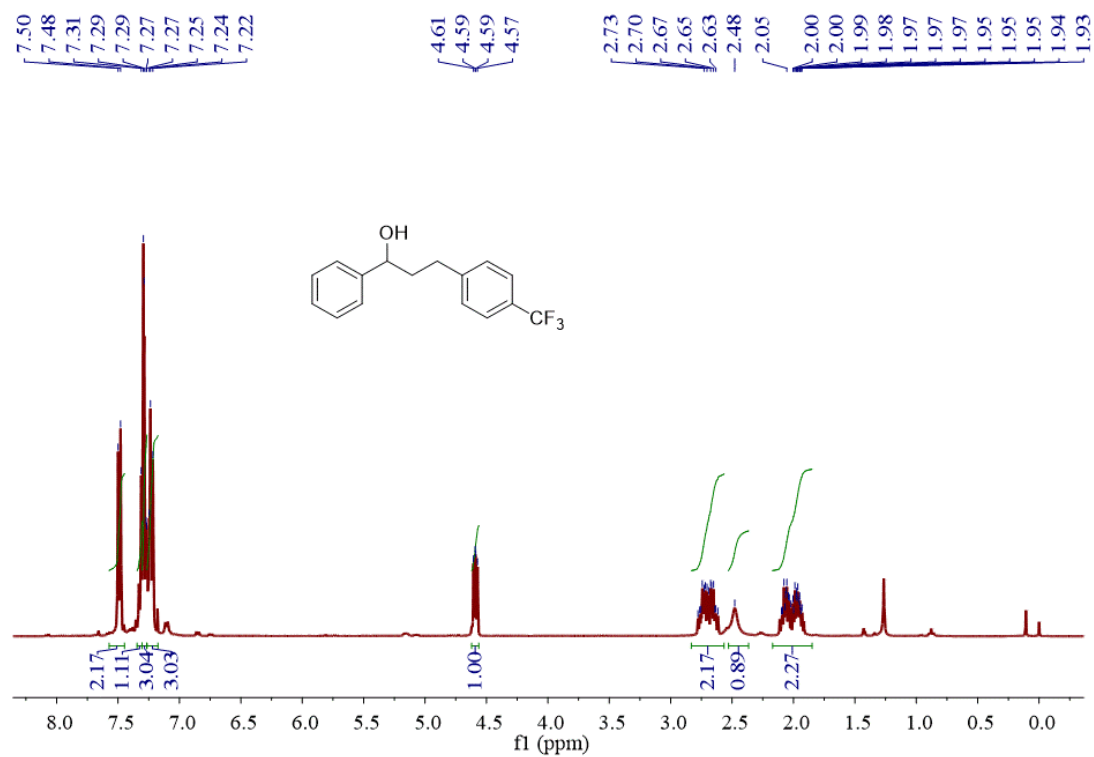
**Figure S15.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3aa**

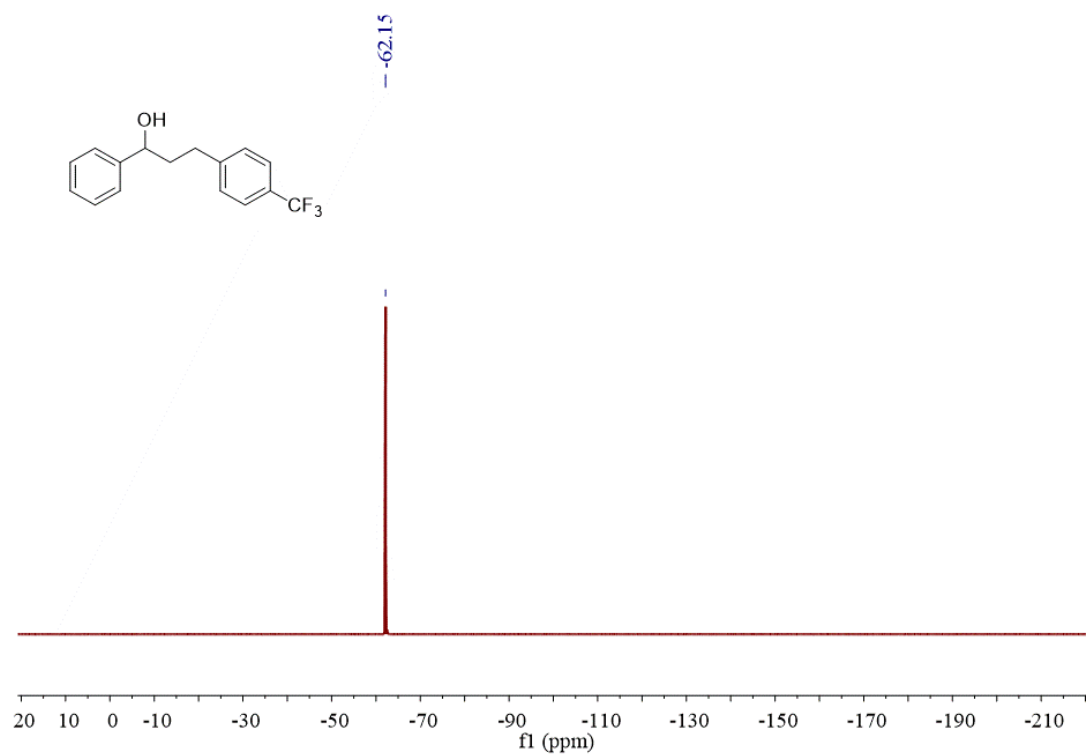


**Figure S16.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ab**

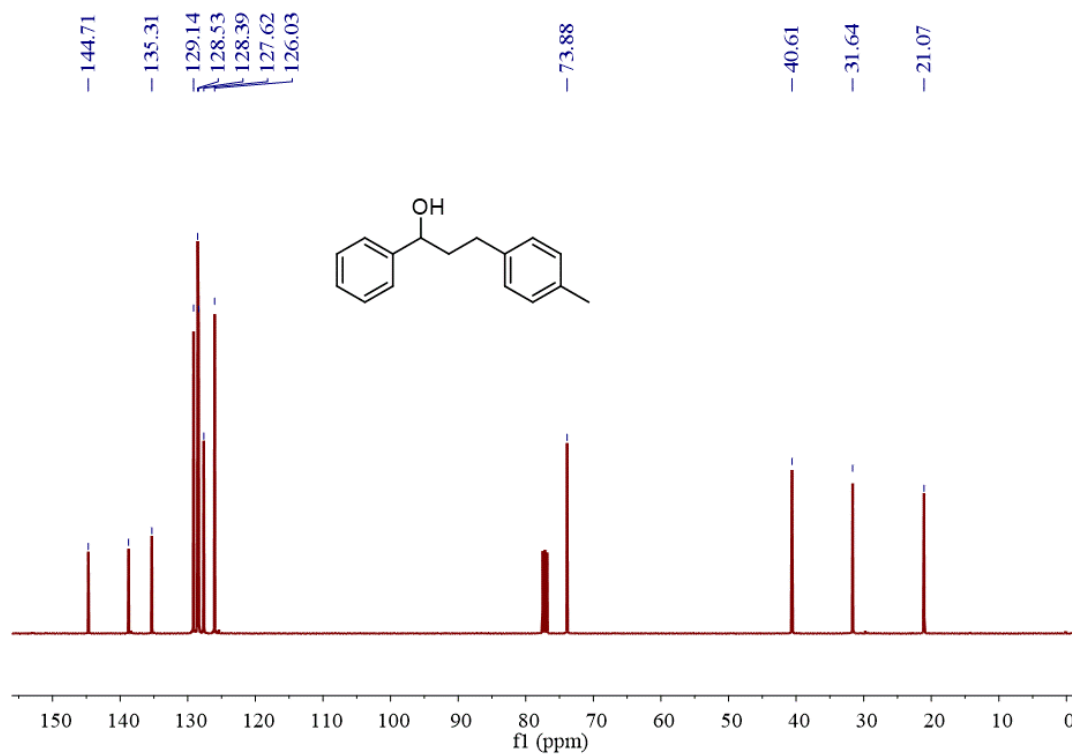
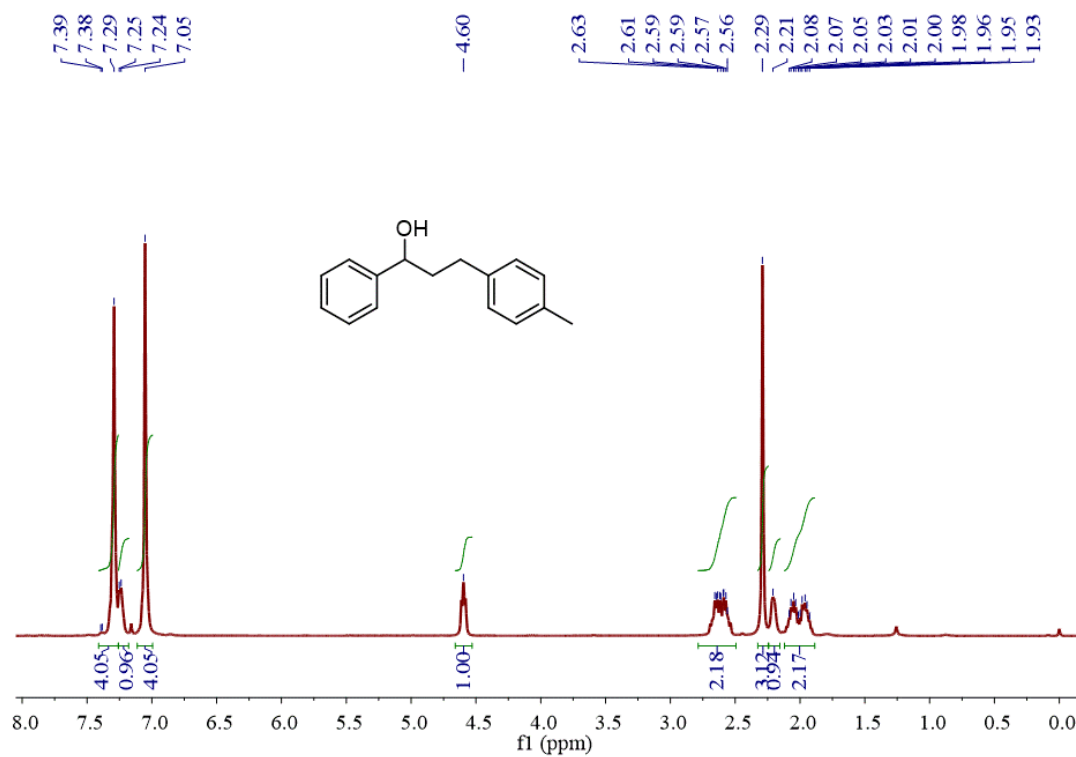


**Figure S17.**  $^1\text{H}$ ,  $^{13}\text{C}$  and  $^{19}\text{F}$  NMR spectra of **3ac**

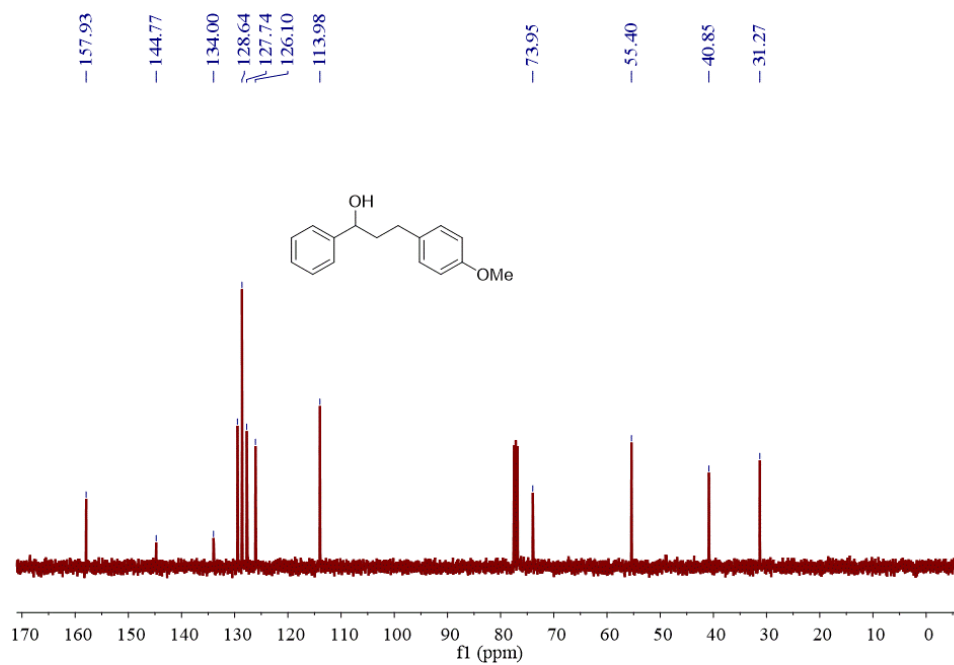
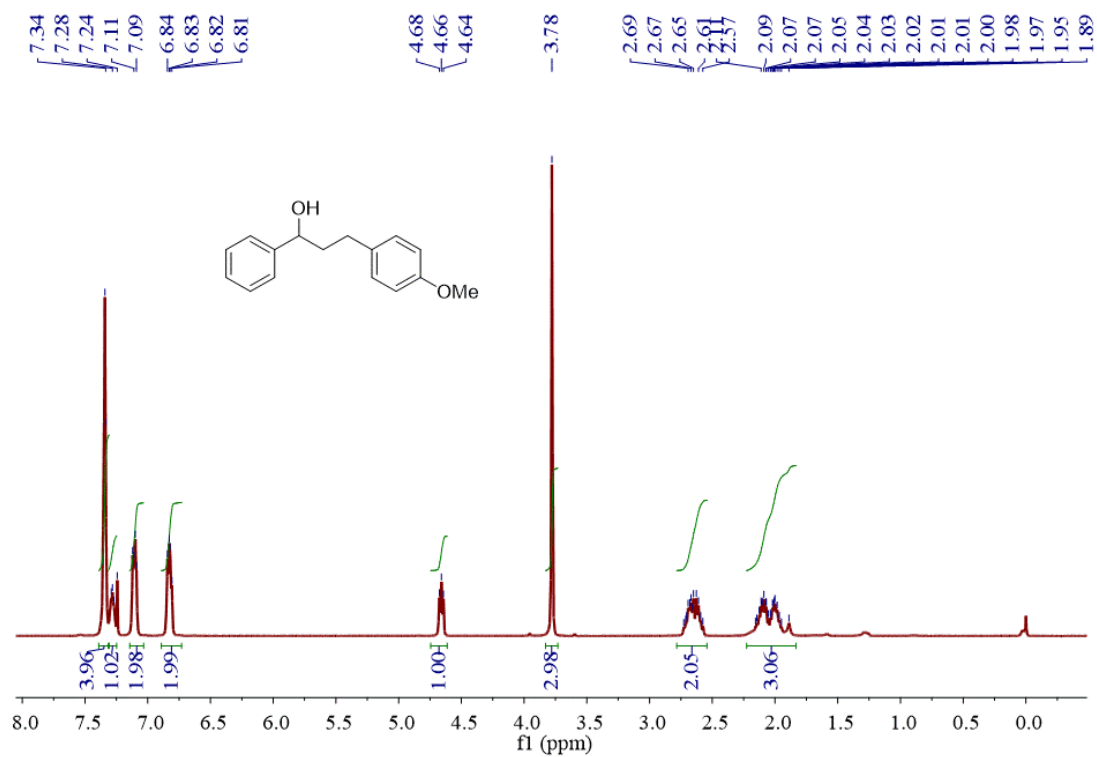




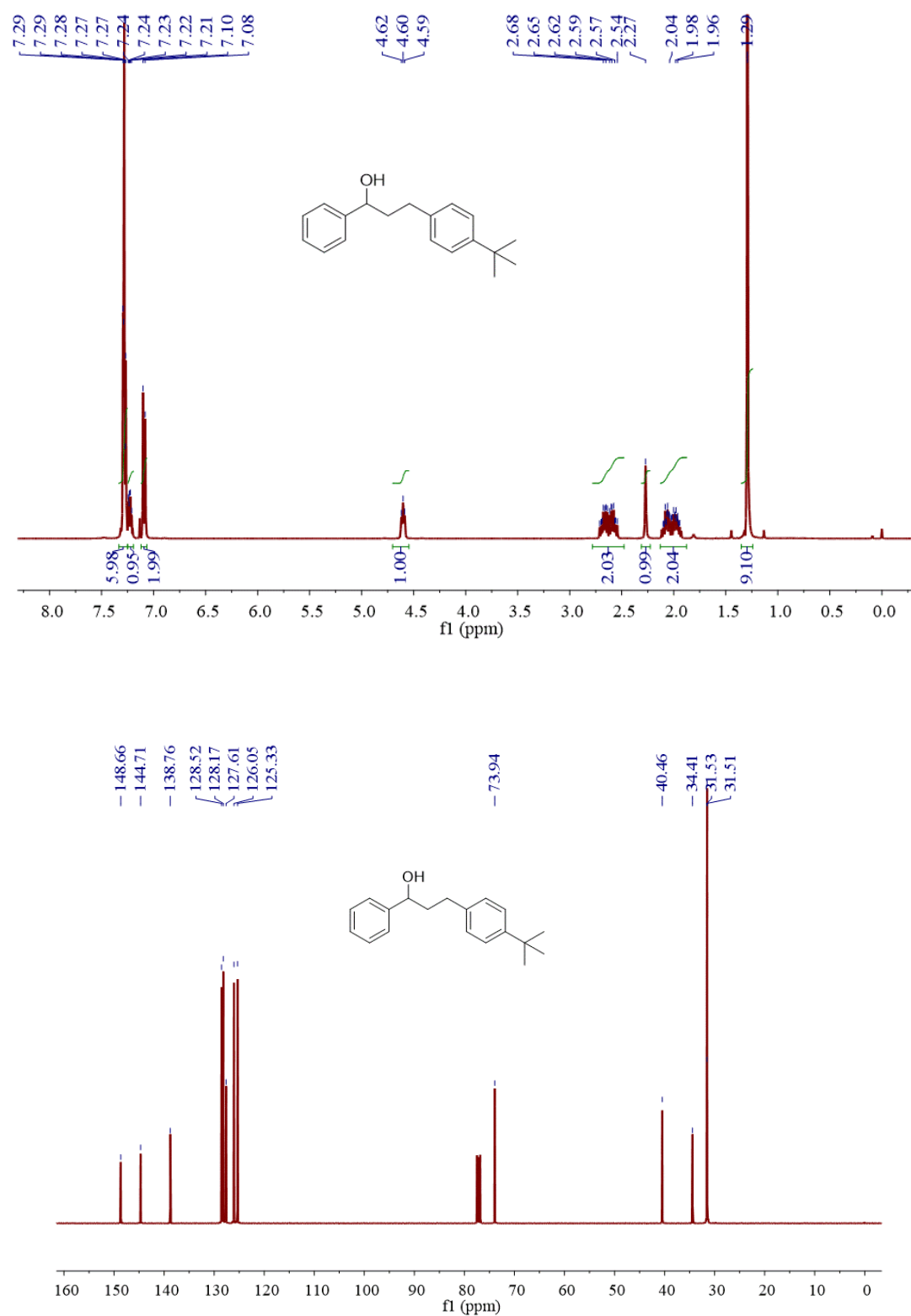
**Figure S18.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ad**



**Figure S19.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ae**

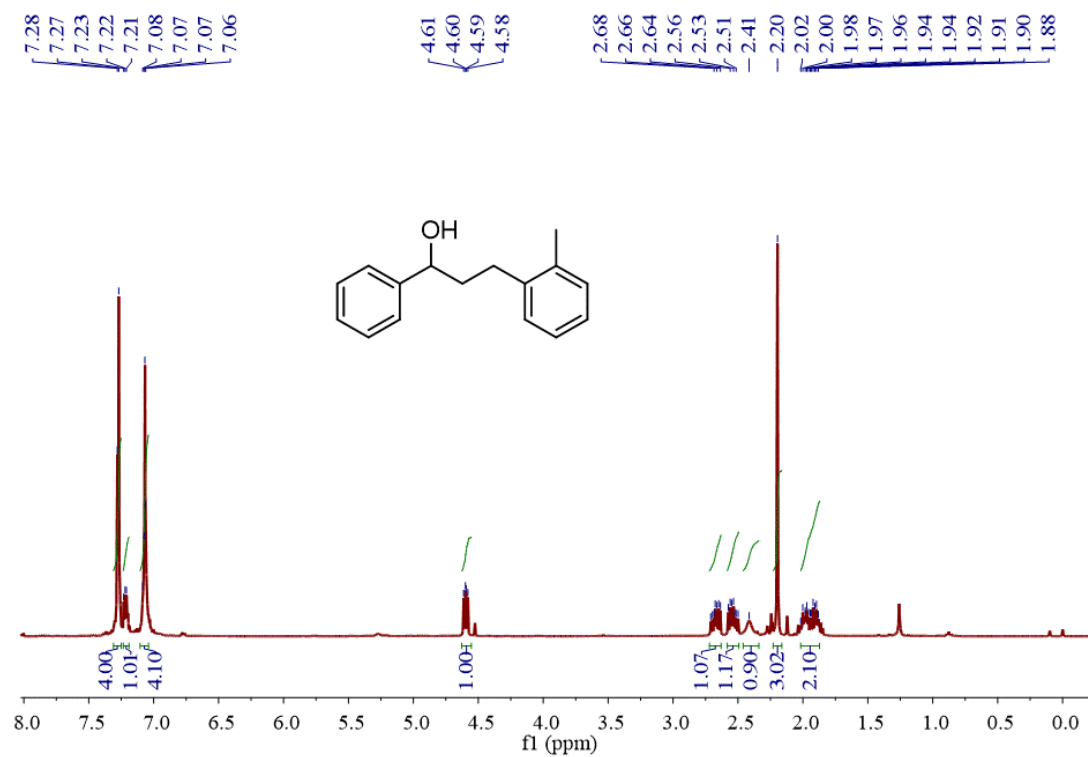


**Figure S20.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3af**

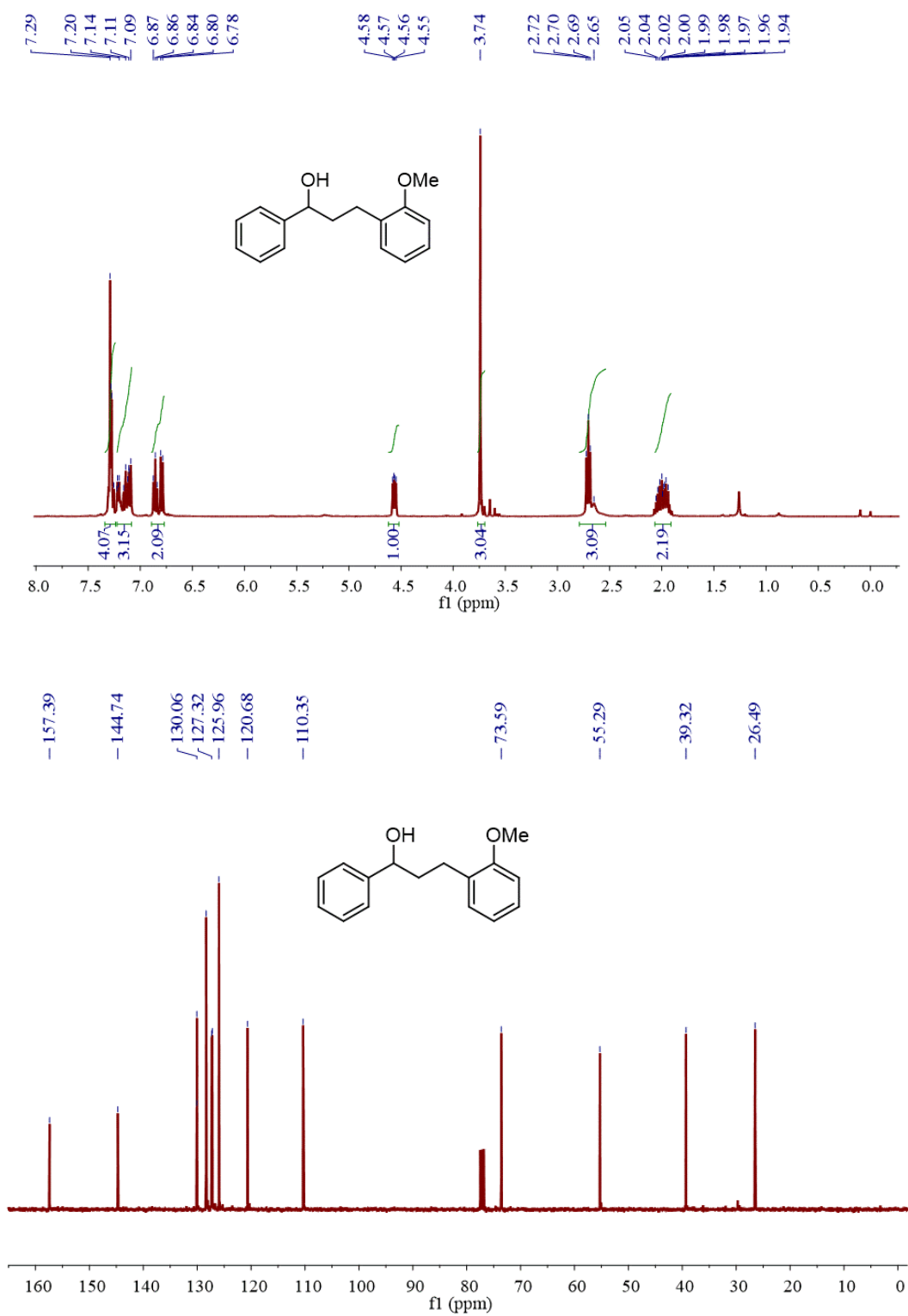




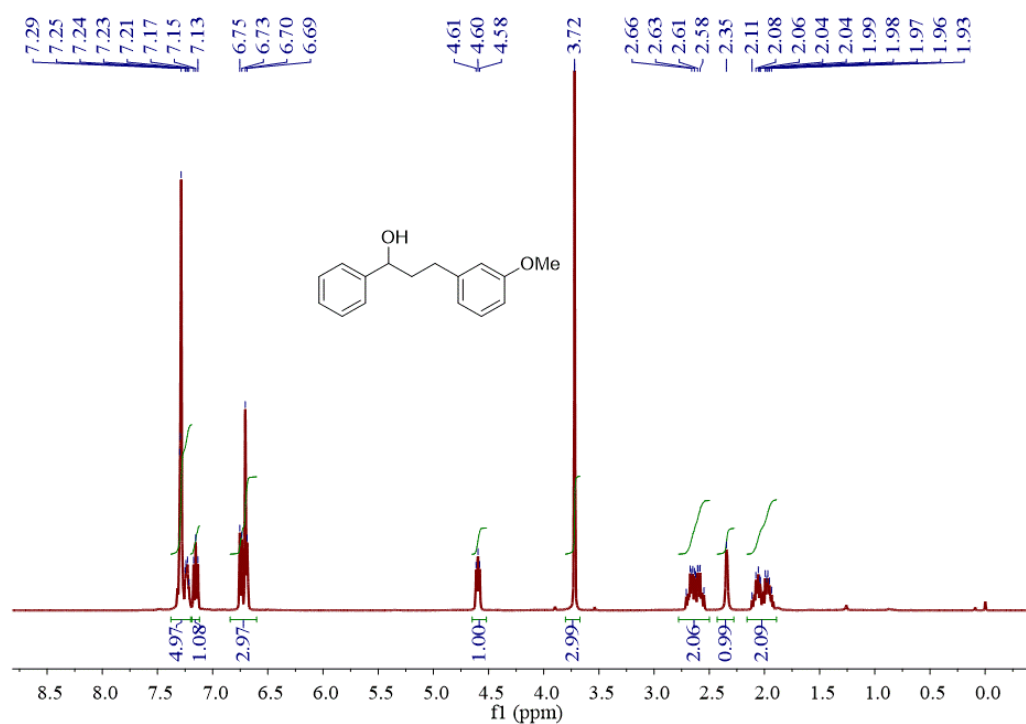
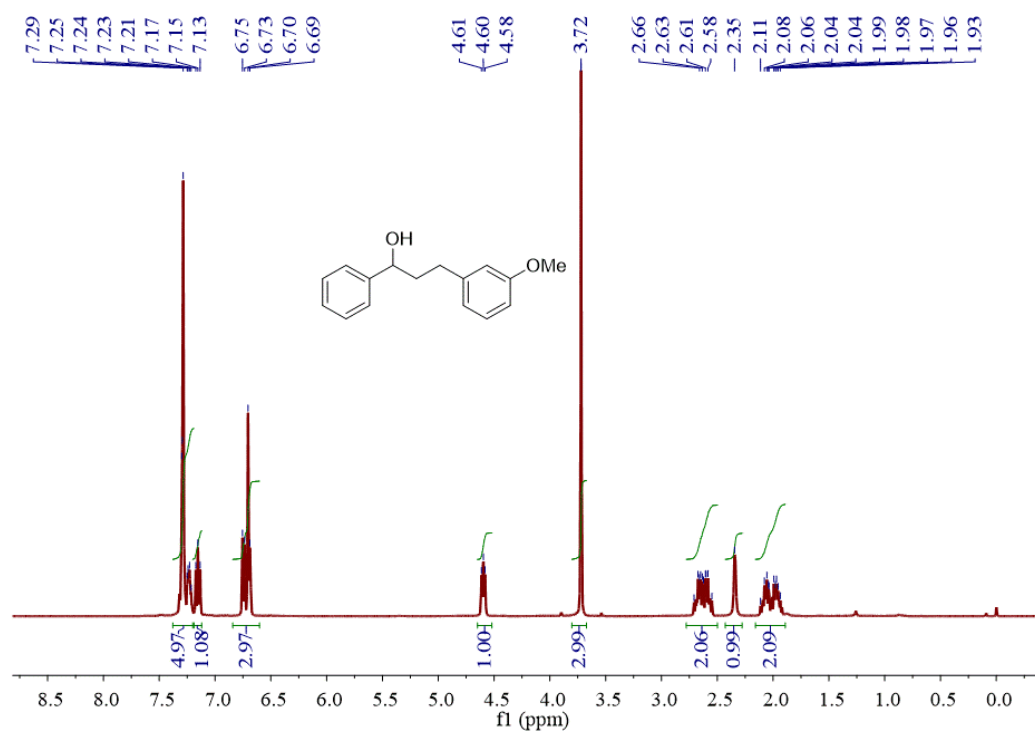
**Figure S21.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ag**



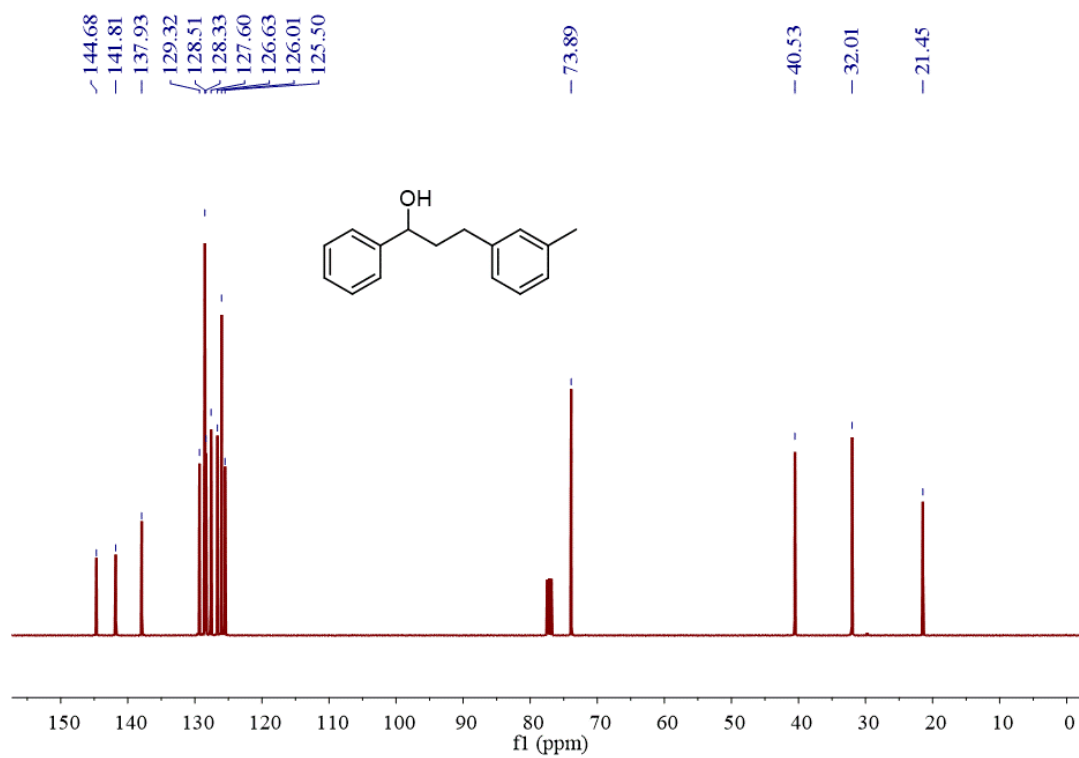
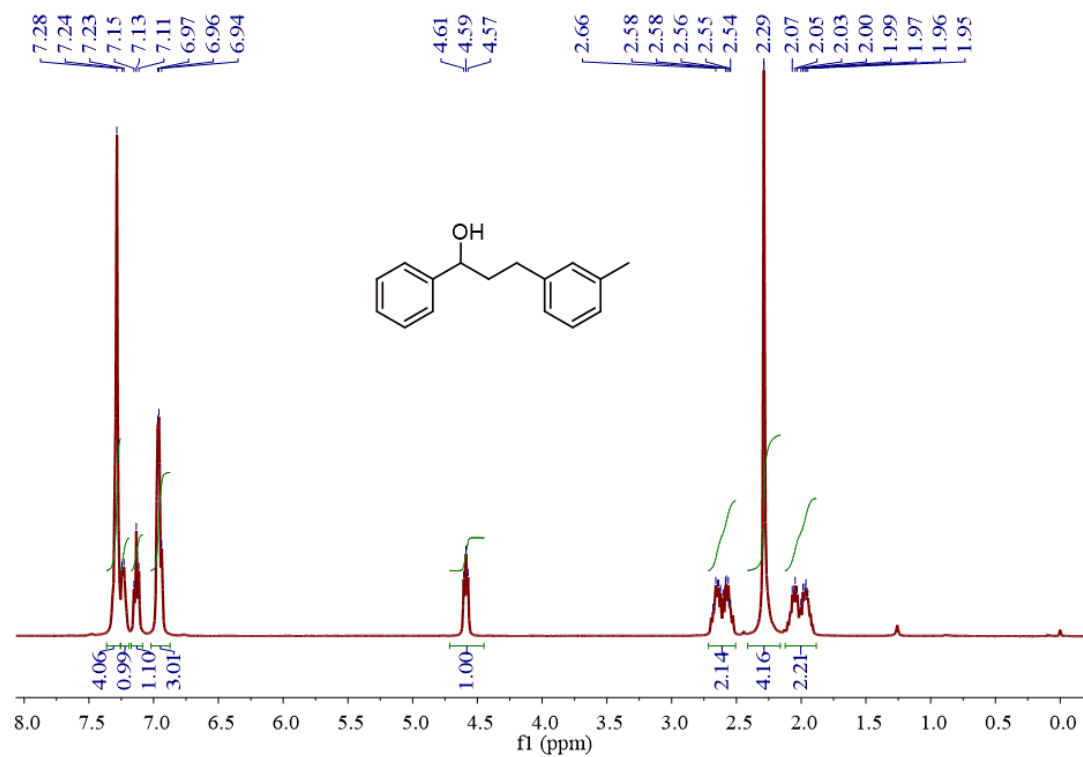
**Figure S22.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ah**



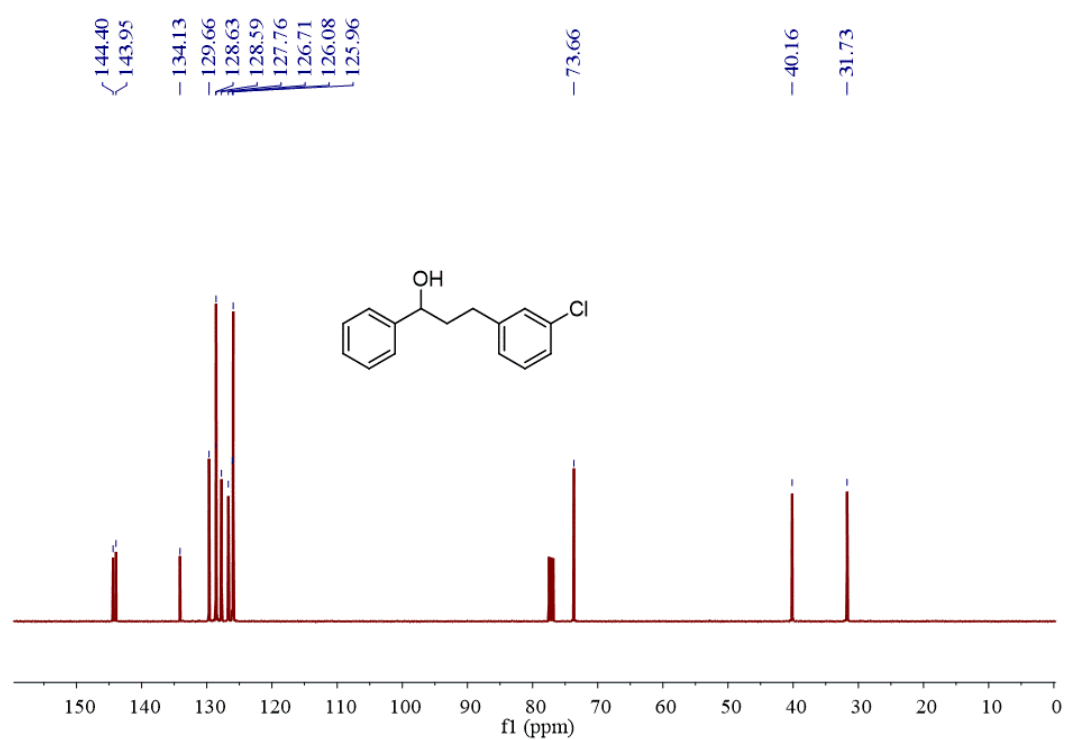
**Figure S23.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ai**



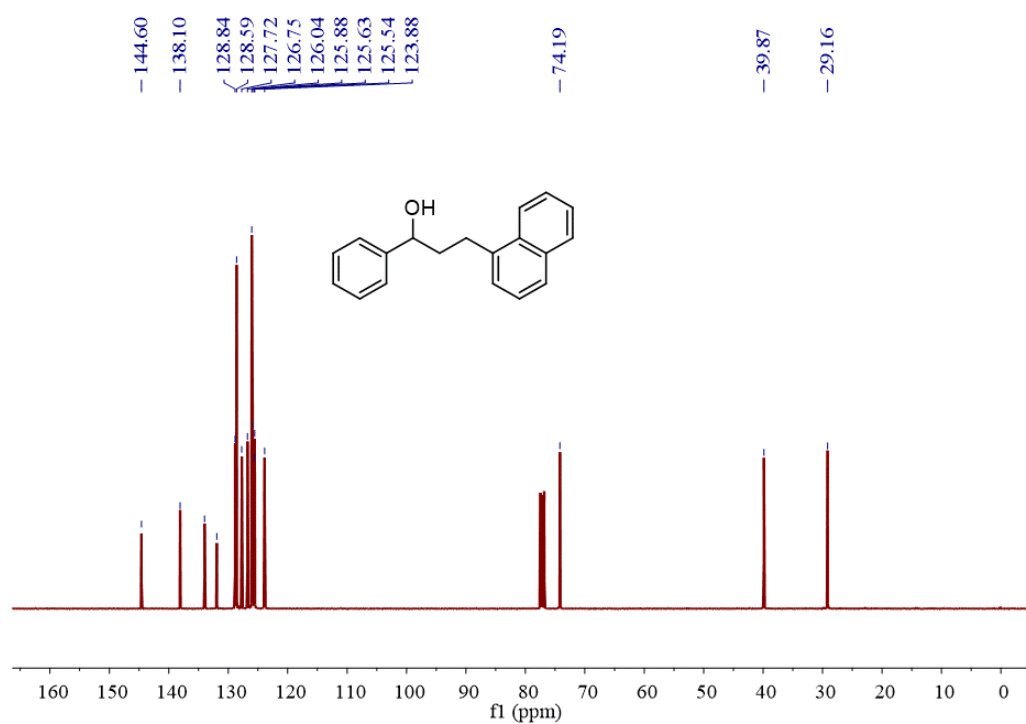
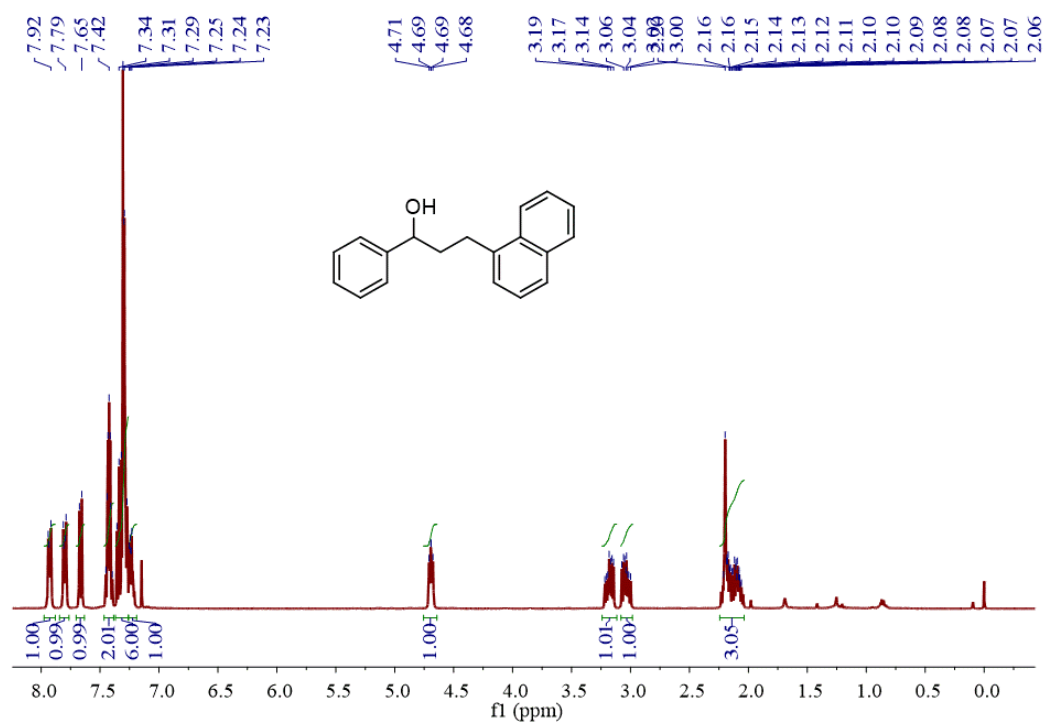
**Figure S24.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3aj**



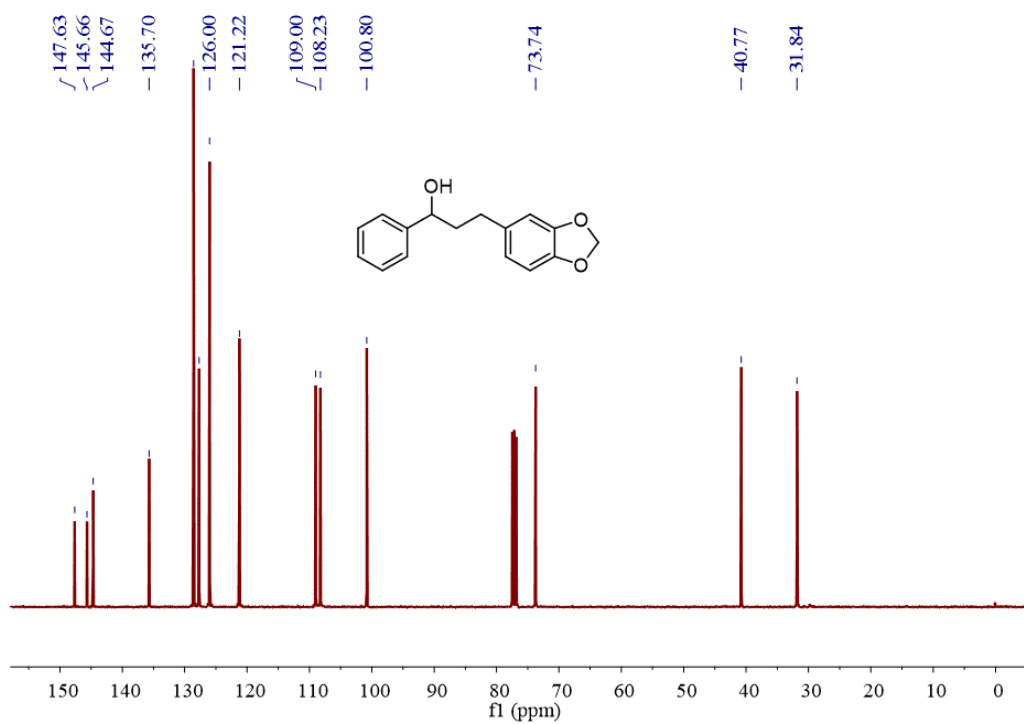
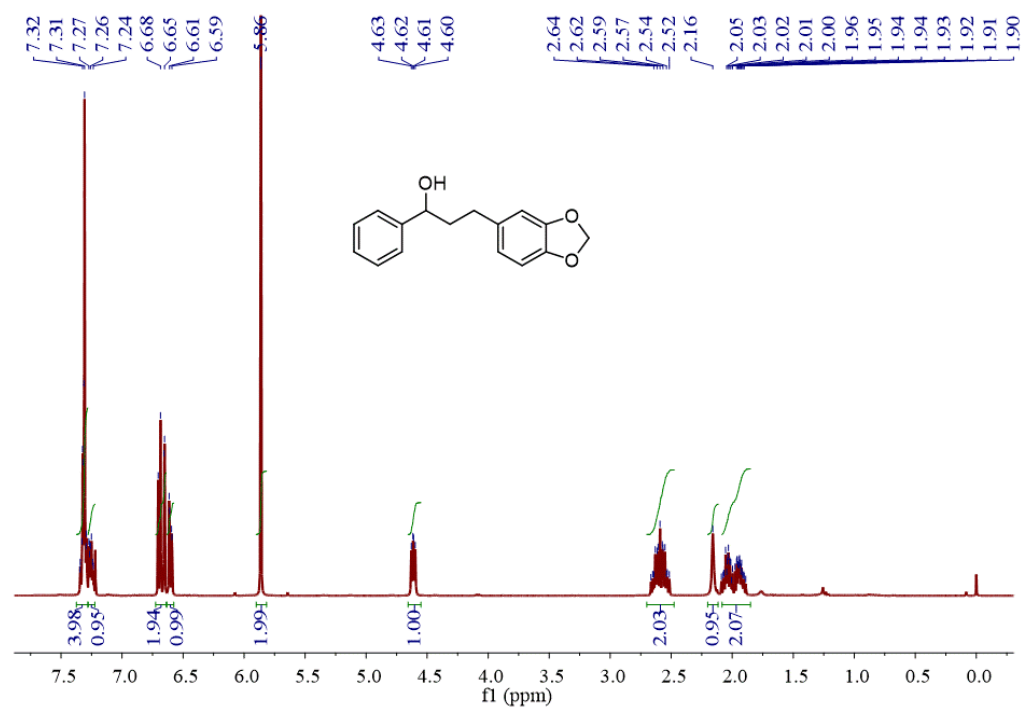
**Figure S25.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ak**



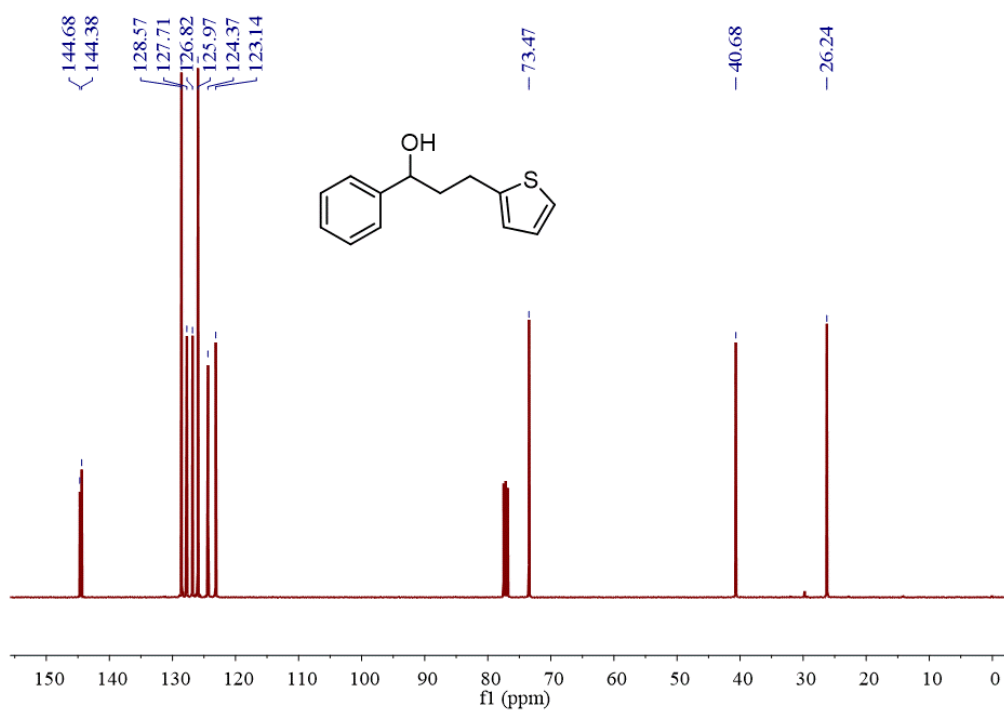
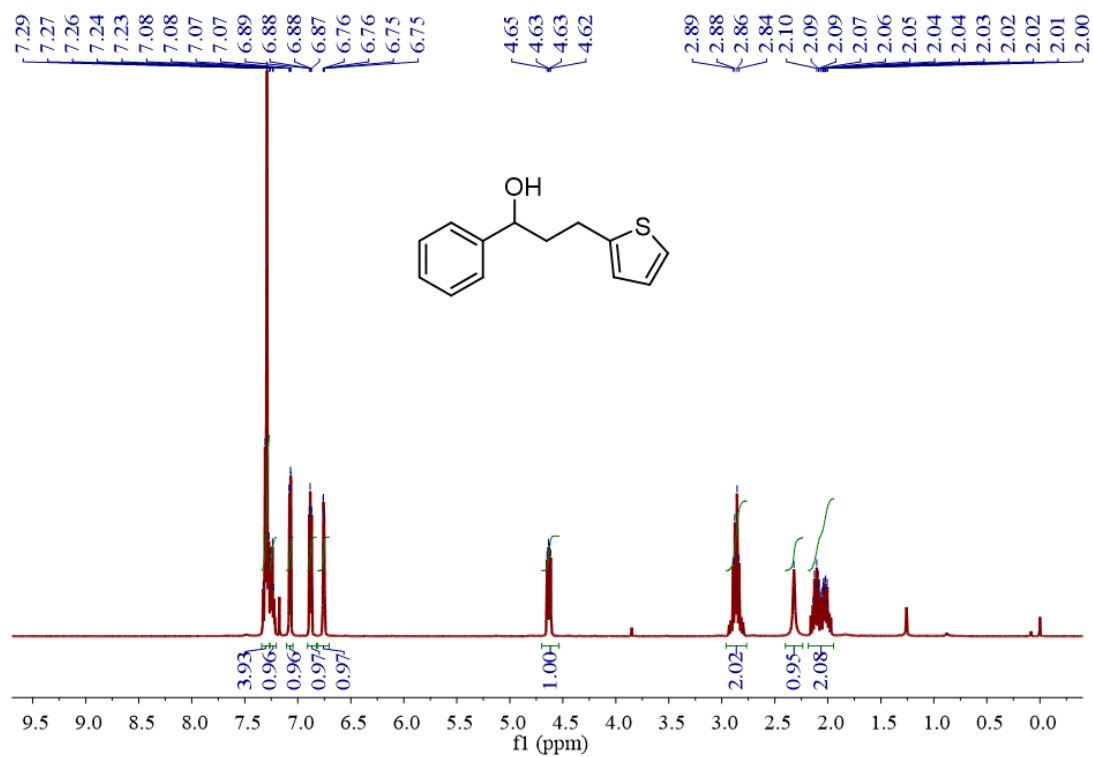
**Figure S26.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3al**



**Figure S27.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3am**

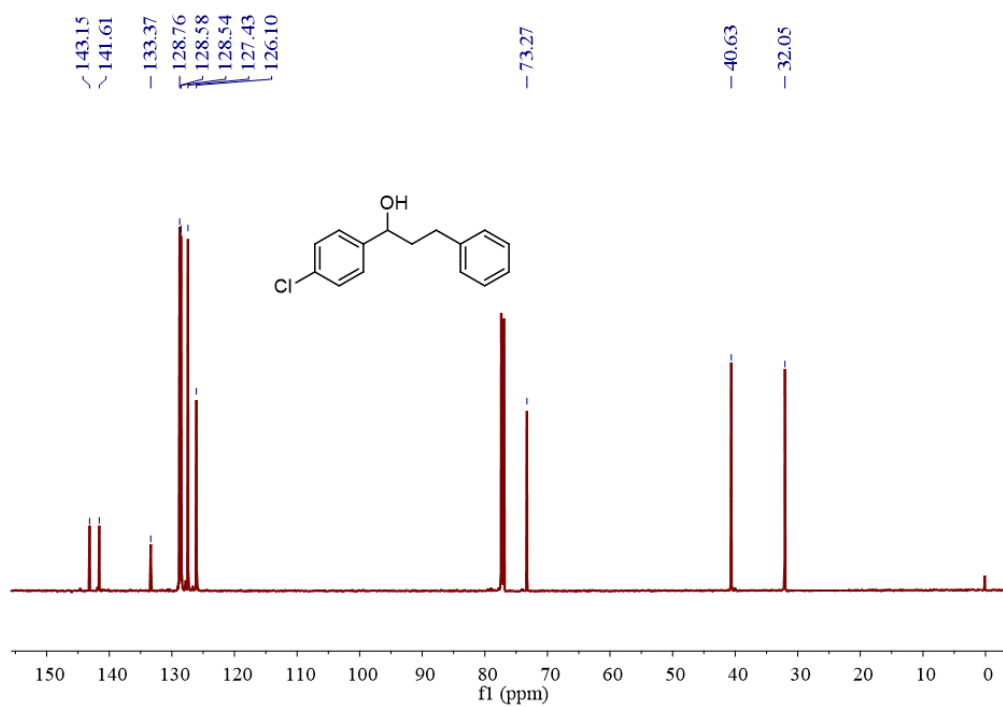
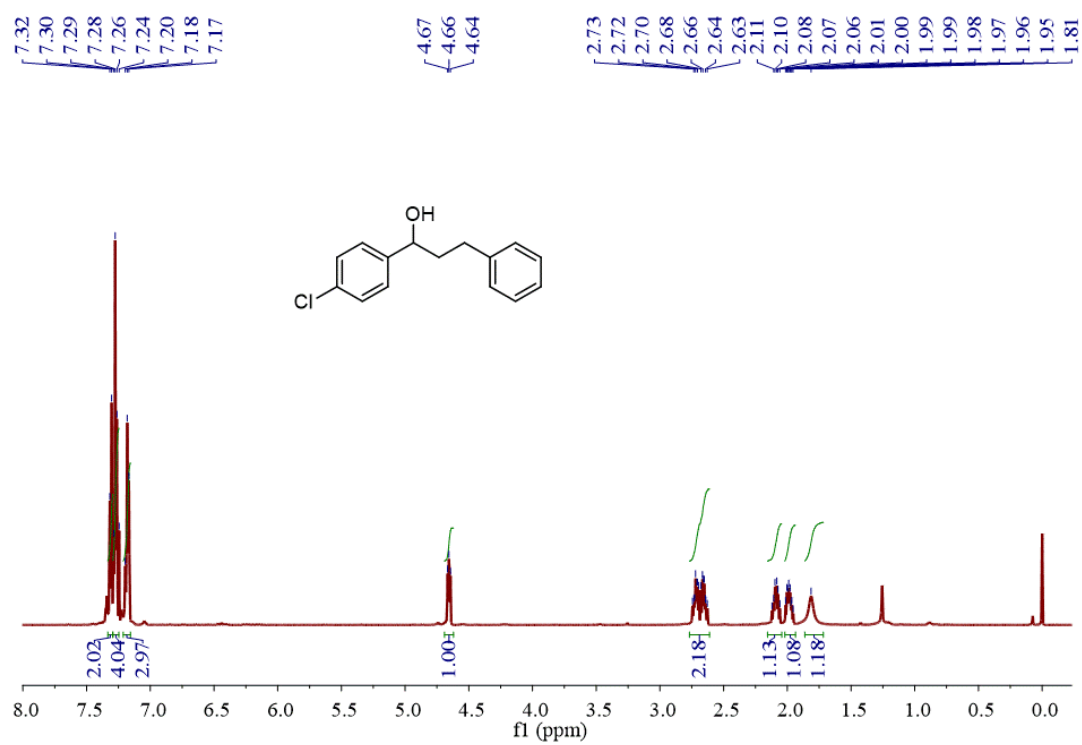


**Figure S28.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3an**

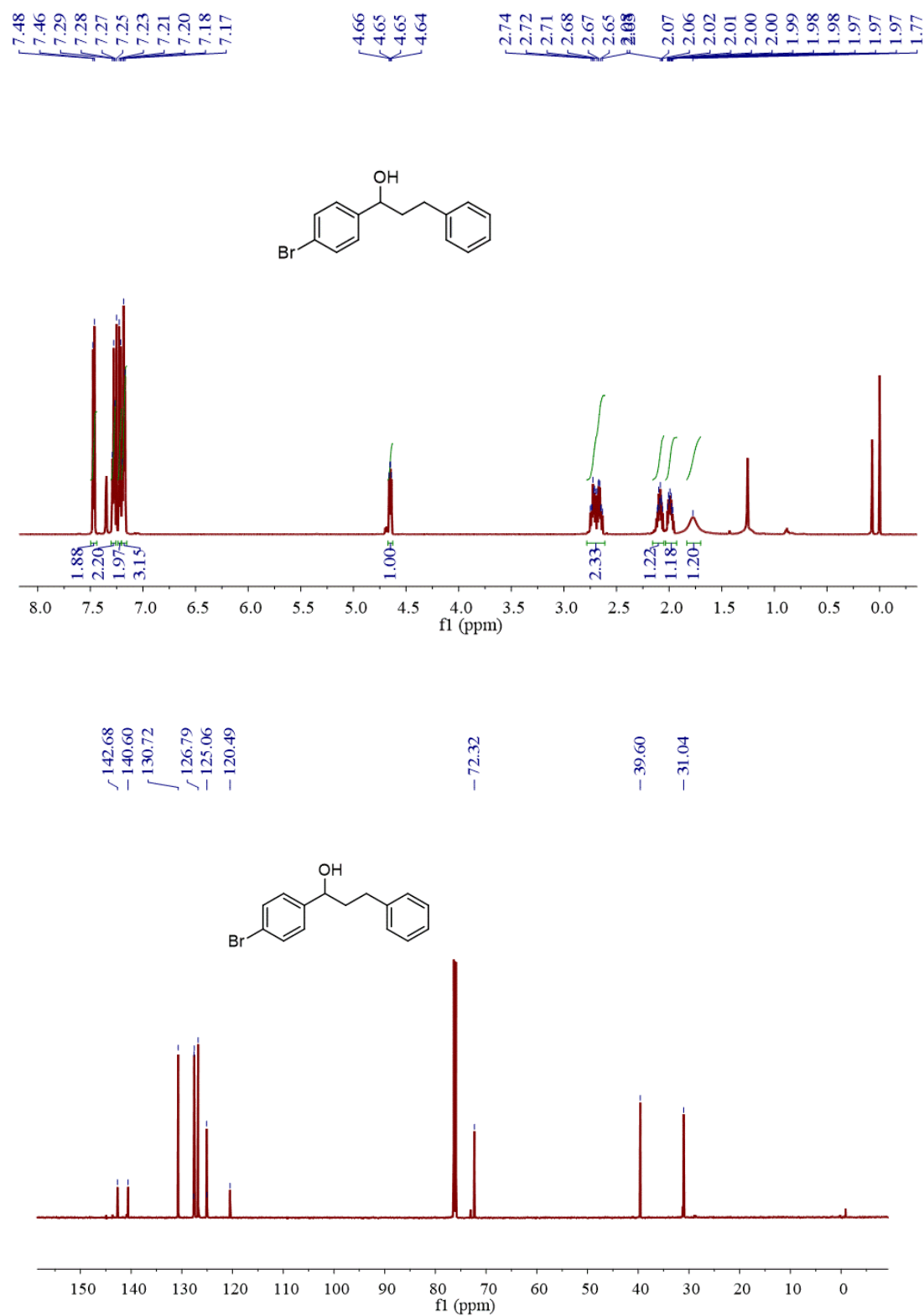




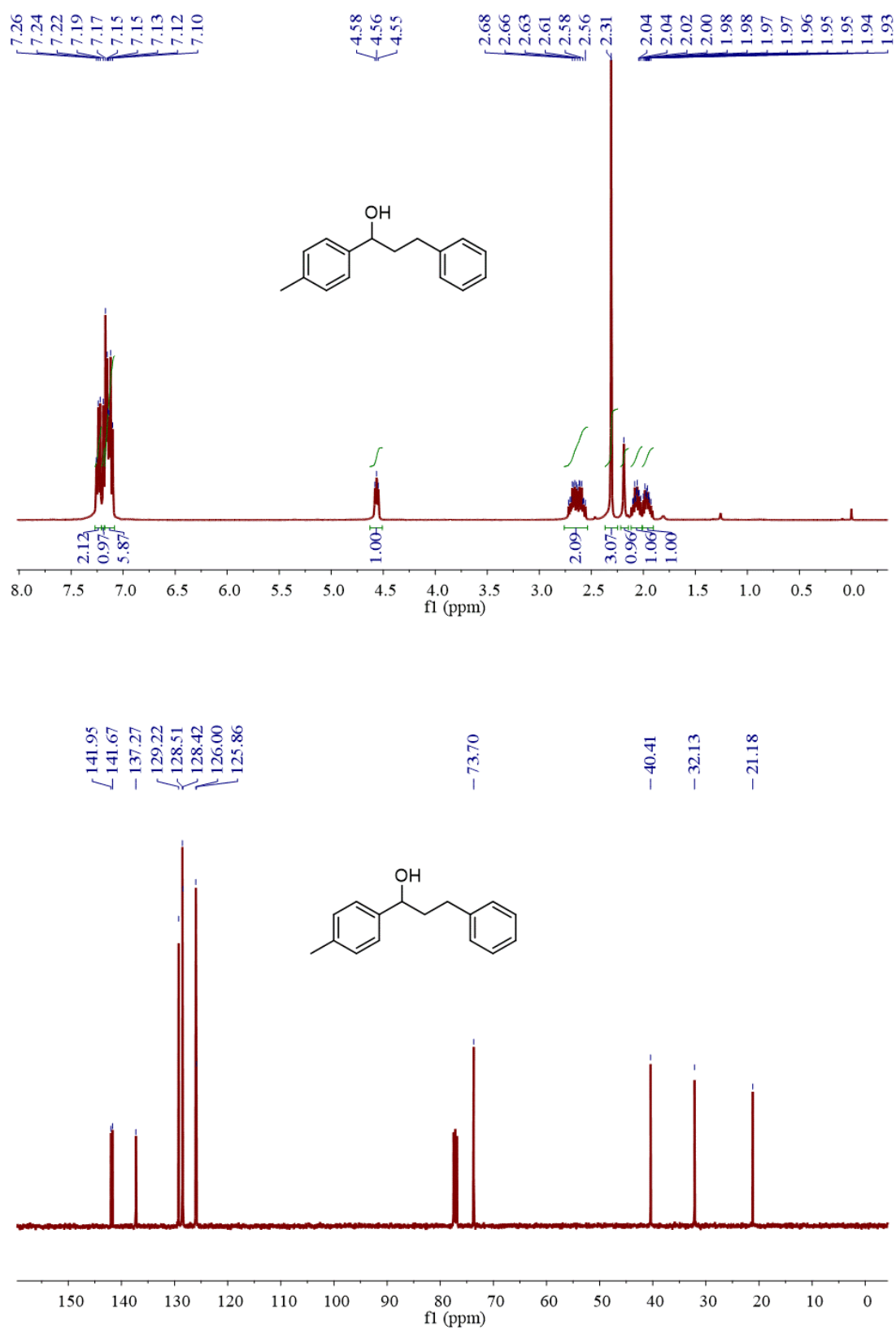
**Figure S29.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ba**



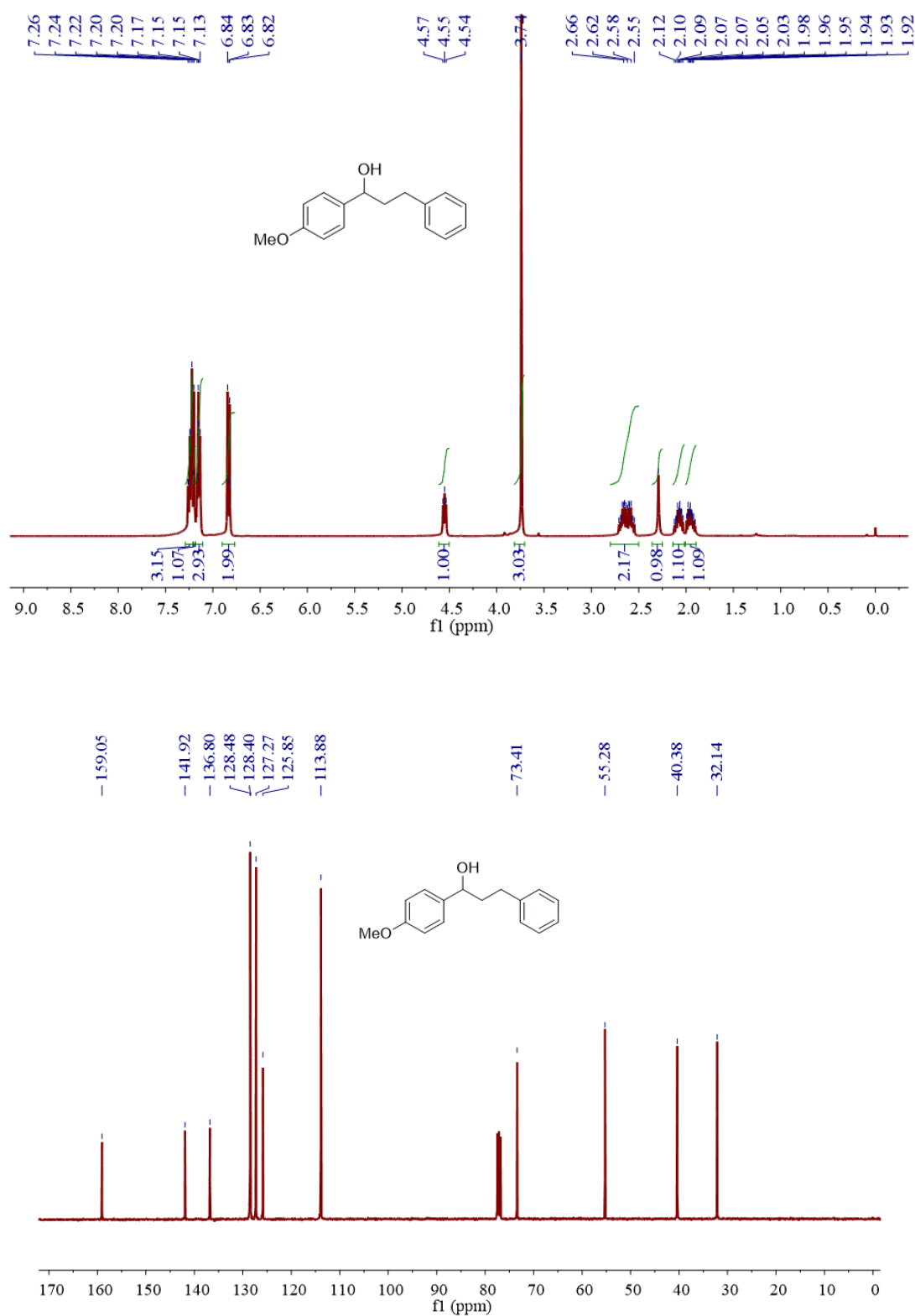
**Figure S30.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ca**



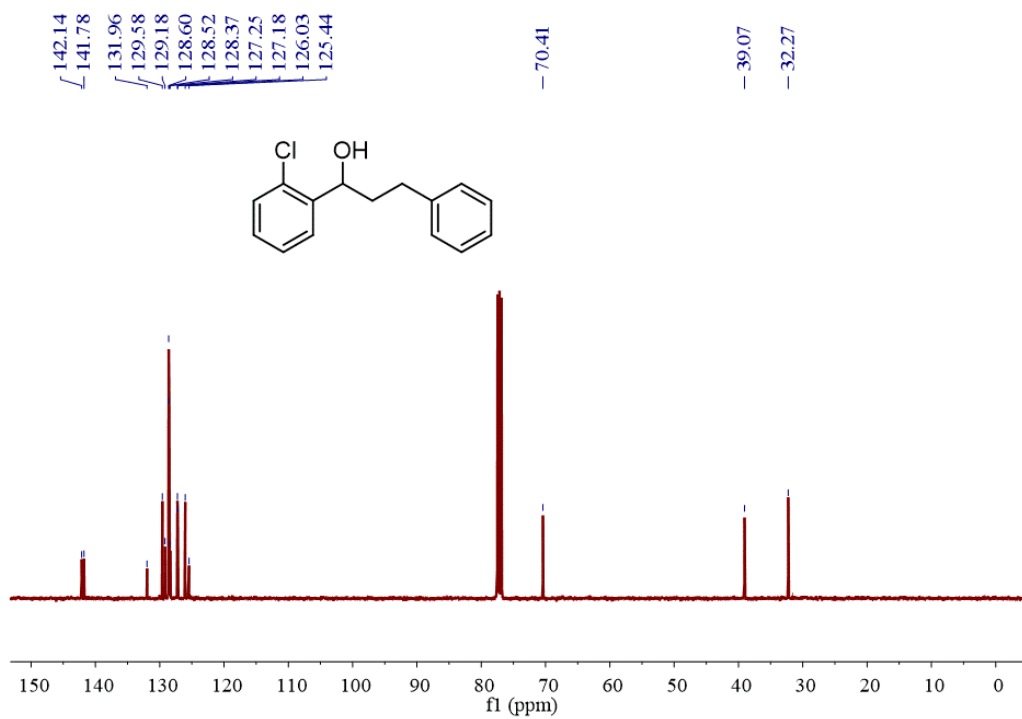
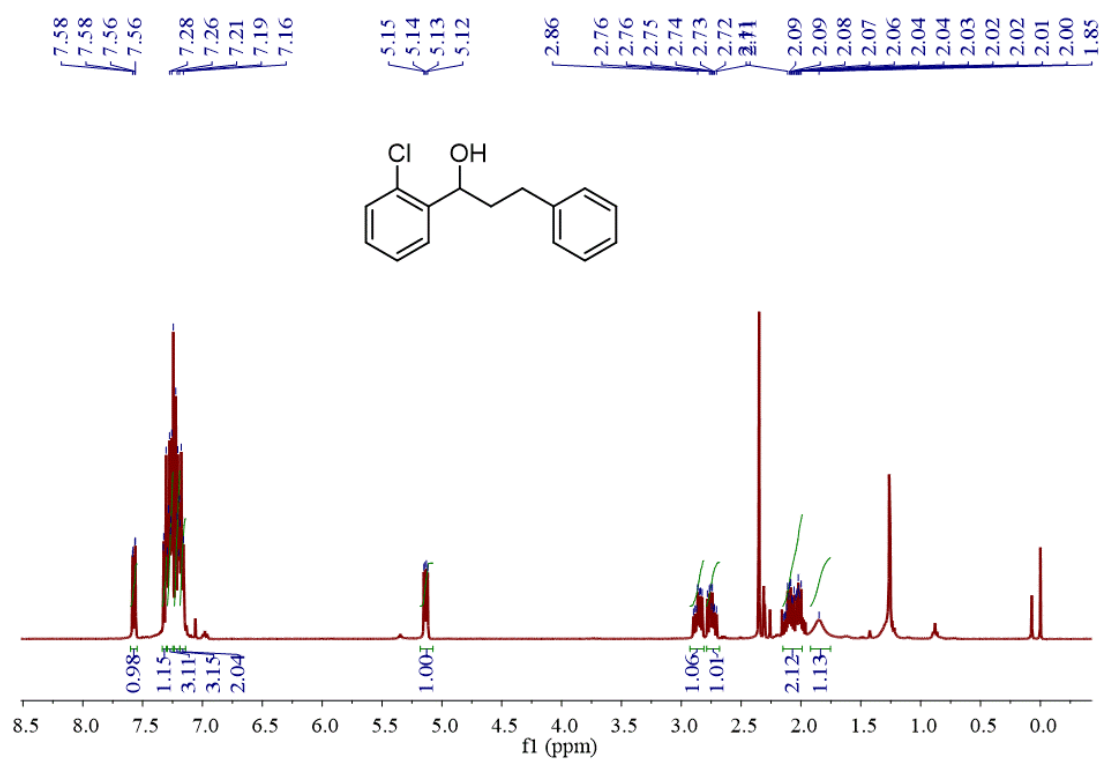
**Figure S31.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3da**



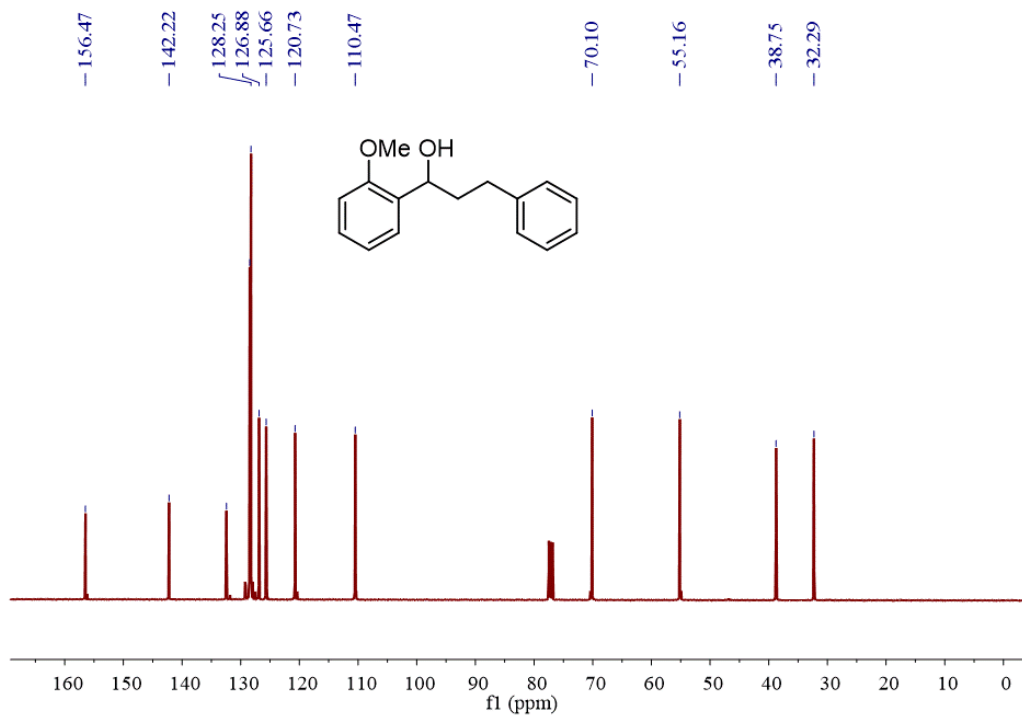
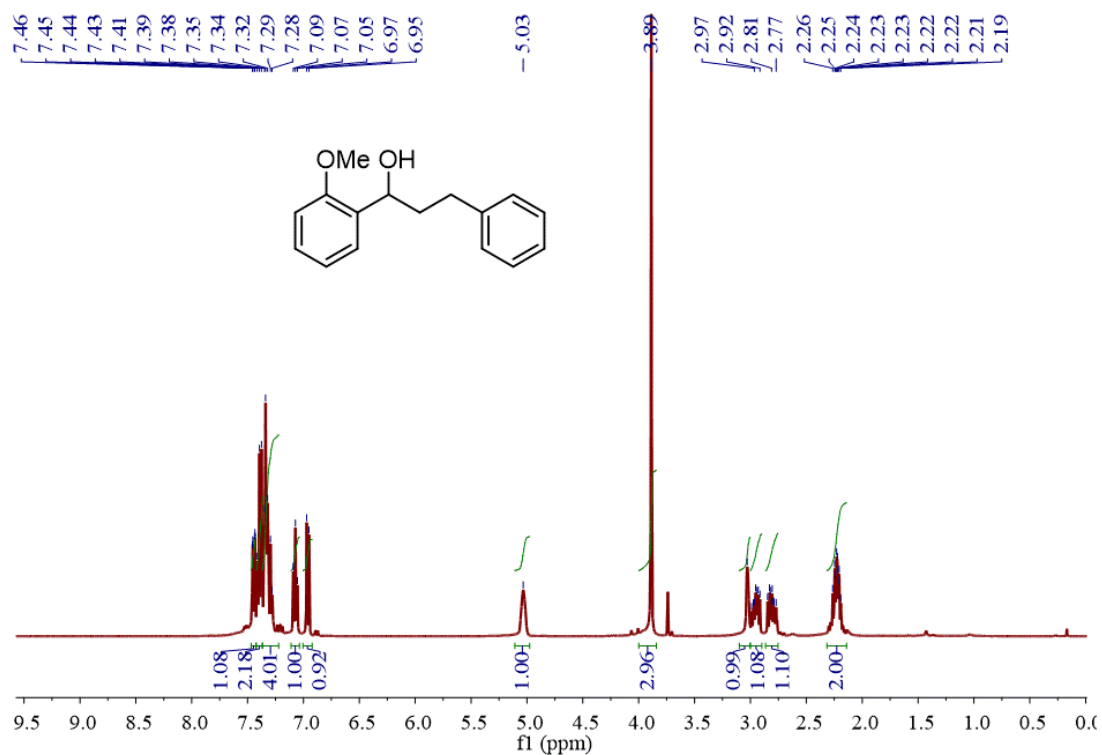
**Figure S32.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ea**



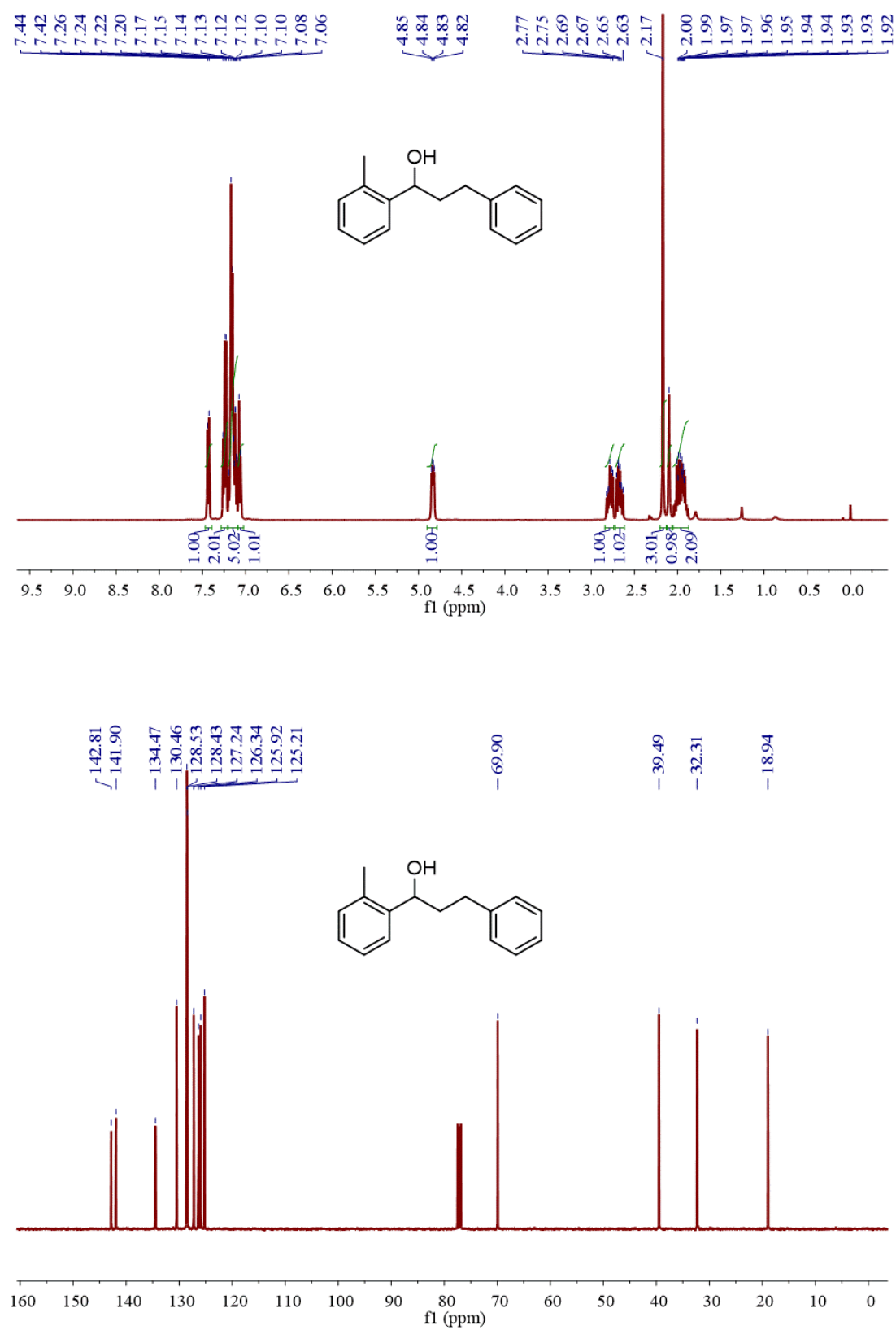
**Figure S33.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3fa**



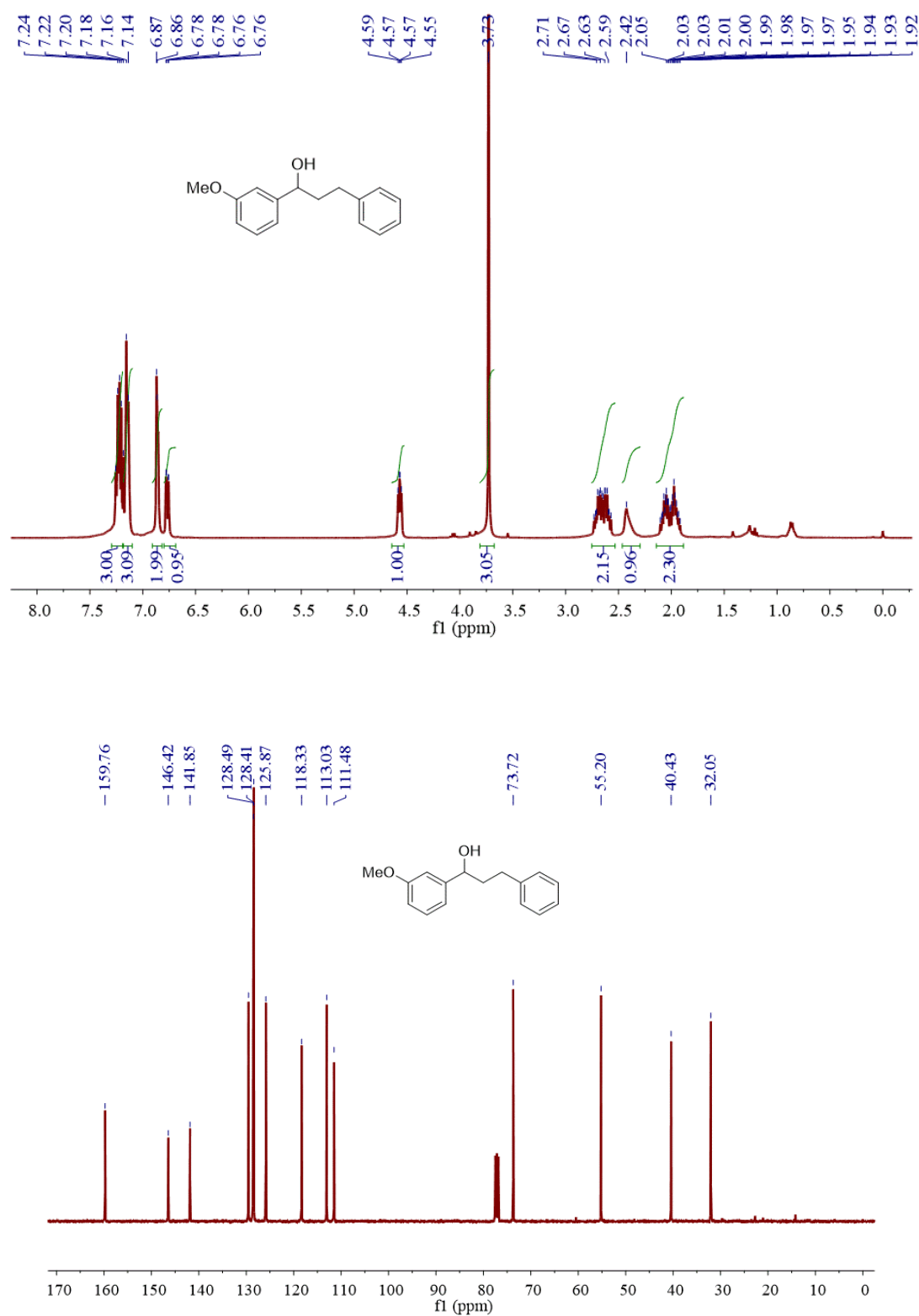
**Figure S34**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ga**



**Figure S35.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ha**

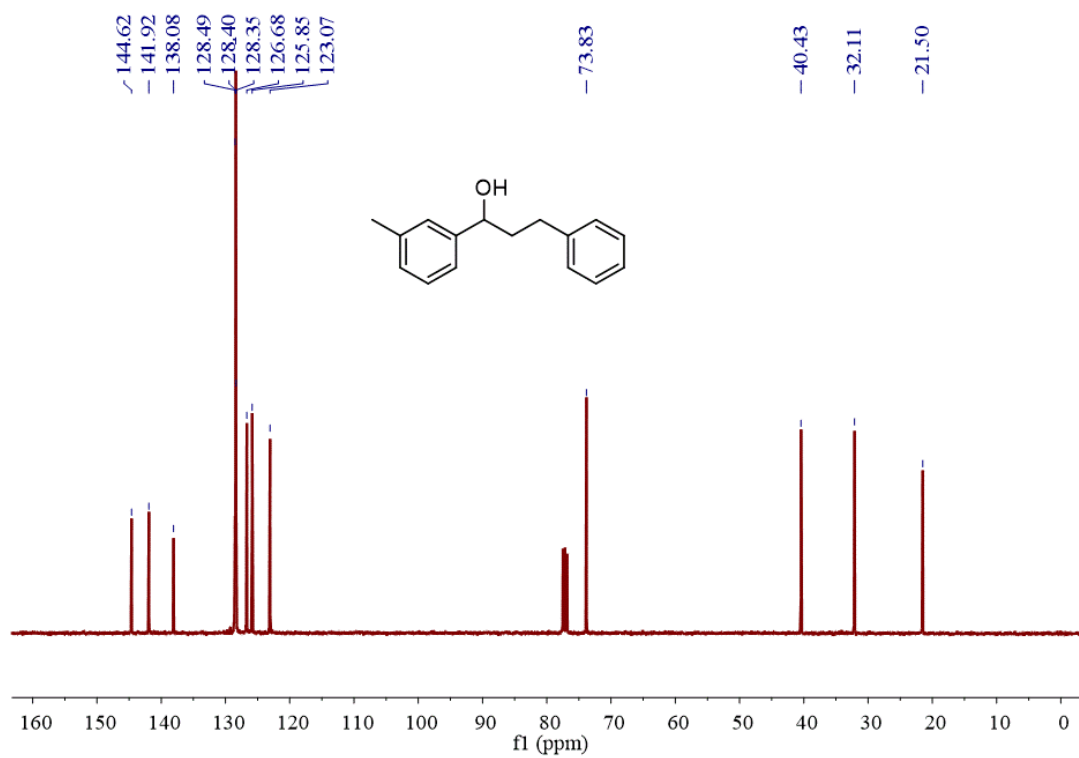
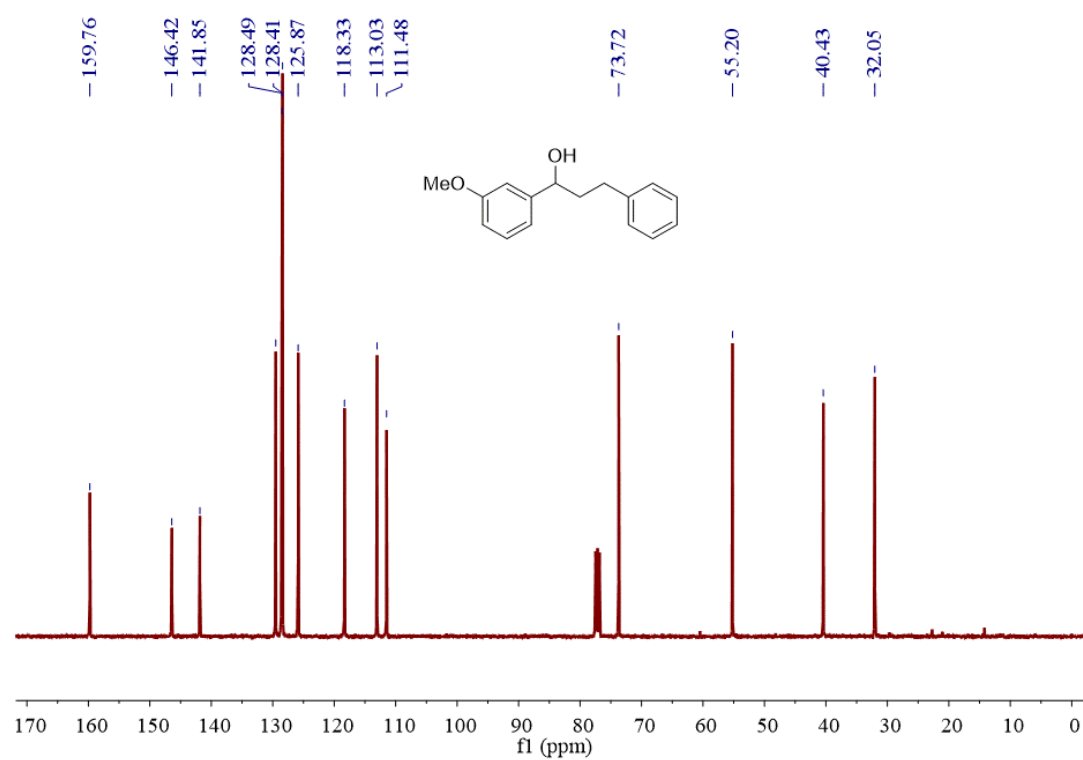


**Figure S36.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ia**





**Figure S37.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ja**



**Figure S38.**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **3ka**

