Supplementary Material

Trimethylsilyl azide-promoted acid-amine coupling: A facile one-pot route to amides from carboxylic acids and amines

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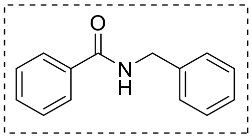
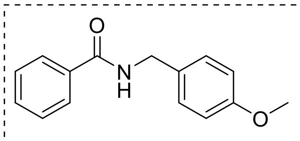
***N*-Benzylbenzamide (3a).**[1]



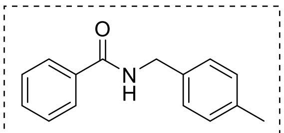
Isolated by filtration, White solid; Yield: 90%; mp: 92–94 °C (lit: 91–93 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.78 (dd, *J* = 5.3, 3.3 Hz, 2H), 7.52 – 7.46 (m, 1H), 7.41 (t, *J* = 7.6 Hz, 2H), 7.35 (d, *J* = 4.4 Hz, 3H), 7.29 (ddd, *J* = 7.4, 6.8, 3.1 Hz, 1H), 6.52 (s, 1H), 4.63 (d, *J* = 5.7 Hz, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 167.4, 138.2, 134.3, 131.5, 128.80, 128.6, 127.9, 127.6, 127.0, 44.1; HRMS (ESI) cald for $C_{14}H_{14}NO$ *m/z* 212.1070 [M + H]$^+$, found 212.1074.

***N*-(4-Methoxybenzyl)benzamide (3b).**[1]



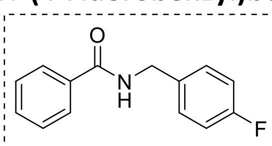
Isolated by filtration, White solid; Yield: 93%; mp: 94–96 °C (lit: 92–95 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.81 – 7.75 (m, 2H), 7.48 (t, *J* = 7.3 Hz, 1H), 7.41 (t, *J* = 7.5 Hz, 2H), 7.31 – 7.24 (m, 2H), 6.87 (d, *J* = 8.6 Hz, 2H), 6.46 (s, 1H), 4.56 (d, *J* = 5.5 Hz, 2H), 3.79 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 167.3, 159.0, 134.4, 131.4, 130.3, 129.2, 128.5, 127.0, 114.1, 55.3, 43.6; HRMS (ESI) cald for $C_{15}H_{16}NO_2$ *m/z* 242.1176 [M + H]$^+$, found 242.1172.

***N*-(4-Methylbenzyl)benzamide (3c).**[1]



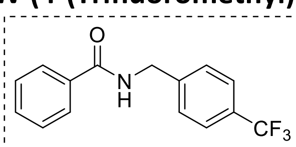
Isolated by filtration, White solid; Yield: 92%; mp: 118–120 °C (lit: 117–119 °C); ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.78 (d, *J* = 7.1 Hz, 2H), 7.54 – 7.38 (m, 3H), 7.25 (d, *J* = 5.7 Hz, 2H), 7.16 (d, *J* = 7.7 Hz, 2H), 6.37 (s, 1H), 4.61 (d, *J* = 5.5 Hz, 2H), 2.35 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 167.2, 137.1, 135.1, 134.3, 131.3, 129.3, 128.4, 127.8, 126.9, 43.7, 21.0; HRMS (ESI) cald for $C_{15}H_{16}NO$ *m/z* 226.1227 [M + H]$^+$, found 226.1221.

***N*-(4-Fluorobenzyl)benzamide (3d).**[1]



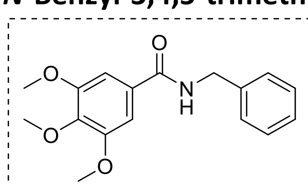
Isolated by filtration, White solid; Yield: 89%; mp: 110–113 °C (lit: 110–112 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.79 (d, *J* = 7.1 Hz, 2H), 7.51(tt, *J* = 1.2, 6.2, 8.2 Hz, 1H), 7.43 (t, *J* = 7.7 Hz, 2H), 7.32 (dd, *J* = 5.3, 8.5 Hz, 2H), 7.03 (t, *J* = 8.6 Hz, 2H), 6.46 (s, 1H), 4.61 (d, *J* = 5.7 Hz, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 167.3, 163.1 and 161.1 (d, *J* = 246.1 Hz), 134.1, 134.0, 131.5, 129.4 (d, *J* = 7.2 Hz), 128.5, 126.9, 115.5 (d, *J* = 20.1 Hz), 43.2; HRMS (ESI) cald for $C_{14}H_{13}FNO$ *m/z* 230.0976 [M + H]$^+$, found 230.0982.

***N*-(4-(Trifluoromethyl)benzyl)benzamide (3e).**[2]



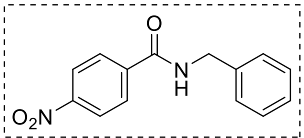
Isolated by filtration, Off white solid; Yield: 88%; mp: 142–144 °C (lit: 140–141 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80 (d, *J* = 7.3 Hz, 2H), 7.59 (d, *J* = 7.9 Hz, 2H), 7.52 (t, J = 7.9 Hz, 1H), 7.48 – 7.40 (m, 4H), 6.65 (s, 1H), 4.69 (d, *J* = 5.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 167.5, 142.3, 133.9, 131.7, 129.6 (q, *J* = 32.2 Hz), 128.5, 127.8, 126.9, 125.5 (d, *J* = 3.6 Hz), 122.6, 43.4; HRMS (ESI) cald for $C_{15}H_{13}F_3NO$ *m/z* 280.0944 [M + H]$^+$, found 280.0942.

***N*-Benzyl-3,4,5-trimethoxybenzamide (3f).**[4]



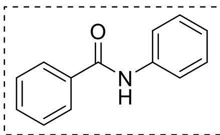
Isolated by filtration, White solid; Yield: 94%; mp: 141–143 °C (lit: 139–140 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.38 – 7.35 (m, 4H), 7.34 – 7.29 (m, 1H), 7.02 (s, 2H), 6.38 (s, 1H), 4.64 (d, *J* = 5.6 Hz, 2H), 3.89 (s, 6H), 3.88 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 167.0, 153.0, 140.8, 138.1, 129.6, 128.6, 127.8, 127.5, 104.3, 60.8, 56.2, 44.1; HRMS (ESI) cald for $C_{17}H_{20}NO_4$ *m/z* 302.1387 $[M + H]^+$, found 302.1389.

***N*-Benzyl-4-nitrobenzamide (3g).[4]**



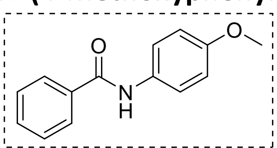
Isolated by filtration, Off white solid; Yield: 82%; mp: 133–135 °C (lit: 134–137°C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 8.27 (d, *J* = 8.8 Hz, 2H), 7.94 (d *J* = 8.8 Hz, 2H), 7.40 – 7.30 (m, 5H), 6.57 (s, 1H), 4.66 (d, *J* = 5.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$ + DMSO-d_6) δ: 165.1, 149.1, 139.8, 138.0, 128.4, 128.3, 127.5, 127.1, 123.1, 43.7; HRMS (ESI) cald for $C_{14}H_{13}N_2O_3$ *m/z* 257.0921 $[M + H]^+$, found 257.0925.

***N*-Phenylbenzamide (3h).[3]**



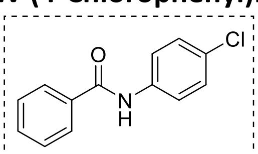
Isolated by filtration, White solid; Yield: 80%; mp: 162–164 °C (lit: 162–164 °C); ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.87 (d, *J* = 7.3 Hz, 2H), 7.83 (bs, 1H), 7.64 (d, *J* = 7.9 Hz, 2H), 7.55 (t, *J* = 7.3 Hz, 1H), 7.49 (t, *J* = 7.6Hz, 2H), 7.38 (t, *J* = 7.7 Hz, 2H), 7.16 (t, *J* = 7.4 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) δ: 164.9, 137.9, 134.1, 130.1, 127.3, 127.0, 126.5, 122.5, 119.4; HRMS (ESI) cald for $C_{13}H_{12}NO$ *m/z* 198.0914 $[M + H]^+$, found 198.0910.

***N*-(4-Methoxyphenyl)benzamide (3i).[3]**



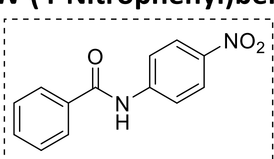
Isolated by filtration, White solid; Yield: 84%; mp: 150–152 °C (lit: 152–155 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.86 (d, *J* = 7.3 Hz, 2H), 7.78 (bs, 1H), 7.56– 7.51 (m, 3H), 7.47 (t, *J* = 7.7 Hz, 2H), 6.90 (d, *J* = 9.0 Hz, 2H), 3.81(s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) δ: 164.1, 154.3, 133.8, 130.8, 129.7, 126.6, 126.1, 120.7, 112.1, 53.7; HRMS (ESI) cald for $C_{14}H_{14}NO_2$ *m/z* 228.1020 $[M + H]^+$, found 228.1022.

***N*-(4-Chlorophenyl)benzamide (3j).[3]**



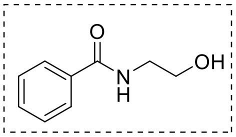
Isolated by filtration, White solid; Yield: 78%; mp: 204–207 °C (lit: 202–204 °C); ^{1}H NMR (300 MHz, DMSO–d_6) δ: 10.23 (s, 1H), 7.96 (dd, *J* = 1.7, 8.5 Hz, 2H), 7.82 (d, *J* = 9.0 Hz, 2H), 7.59 – 7.45 (m, 3H), 7.30 (d, *J* = 8.8 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) δ: 165.4, 137.6, 134.5, 131.0, 127.9, 127.8, 127.3, 121.4; HRMS (ESI) cald for $C_{13}H_{11}ClNO$ *m/z* 232.0524 $[M + H]^+$, found 232.0520.

***N*-(4-Nitrophenyl)benzamide (3k).[3]**



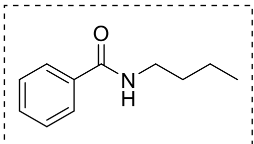
Isolated by filtration, Off white solid; Yield: 75%; mp: 201–203 °C (lit: 200–202 °C); ^{1}H NMR (500 MHz, $CDCl_3$ + DMSO–d_6) δ: 10.25 (s, 1H), 8.21 (dd, *J* = 1.9, 9.1 Hz, 2H), 8.05 (dd, *J* = 1.9, 9.3 Hz, 2H), 7.98 (dd, *J* = 1.3, 7.1 Hz, 2H), 7.61 – 7.55 (m, 1H), 7.50 (t, *J* = 7.7 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$ + DMSO–d_6) δ: 166.6, 144.9, 142.5, 134.2, 131.5, 127.9, 127.5, 124.1, 119.3; HRMS (ESI) cald for $C_{13}H_{11}N_2O_3$ *m/z* 243.0765 $[M + H]^+$, found 243.0769.

N-(2-hydroxyethyl)benzamide (3l).[5]



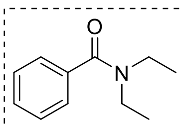
Eluted in 2% MeOH/DCM, White solid; Yield: 55%; mp: 59–62 °C; ^{1}H NMR (500 MHz, DMSO–d_6) δ 8.43 (s, 1H), 7.88 – 7.81 (m, 2H), 7.52 (t, *J* = 7.3 Hz, 1H), 7.46 (t, *J* = 7.4 Hz, 2H), 4.74 (t, *J* = 5.6 Hz, 1H), 3.52 (q, *J* = 6.1 Hz, 2H), 3.38 – 3.29 (m, 2H). ^{13}C NMR (125 MHz, DMSO–d_6) δ: 166.7, 135.0, 131.5, 128.6, 127.6, 60.2, 42.6; HRMS (ESI) cald for $C_9H_{12}NO_2$ *m/z* 166.0863 [M + H]$^+$, found 166.0861.

N-Butylbenzamide (3m).[5]



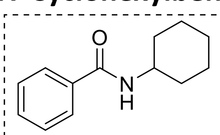
Eluted in 30% EtOAc/n-hexane, White solid; Yield: 93%; mp: 40–42 °C (lit: 41–43 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.76 (d, *J* = 8.0 Hz, 2H), 7.51 – 7.46 (m, 1H), 7.42 (t, *J* = 7.6 Hz, 2H), 7.45 – 7.39 (m, 2H), 6.18 (s, 1H), 3.46 (td, *J* = 7.1, 5.7 Hz, 2H), 1.64 – 1.56 (m, 2H), 1.46 – 1.37 (m, 2H), 0.96 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 167.5, 134.6, 131.0, 128.2, 126.7, 39.6, 31.5, 20.0, 13.6; HRMS (ESI) cald for $C_{11}H_{16}NO$ *m/z* 178.1227 [M + H]$^+$, found 178.1231.

N,N-Diethylbenzamide (3n).[6]



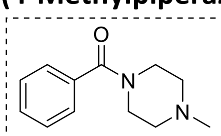
Eluted in 25% EtOAc/n-hexane, White solid; Yield: 91%; mp: 30–33 °C (lit: 29–31 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.45 – 7.38 (m, 5H), 4.00 – 3.35 (m, 10H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 170.2, 135.2, 129.7, 128.4, 126.9, 66.7, 48.0, 42.3; HRMS (ESI) cald for $C_{11}H_{16}NO$ *m/z* 178.1227 [M + H]$^+$, found 178.1229.

N-Cyclohexylbenzamide (3o).[7]



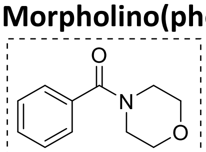
Isolated by filtration, White solid; Yield: 92%; mp: 145–146 °C (lit:146–147 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.78 – 7.73 (m, 2H), 7.51 – 7.45 (m, 1H), 7.45 – 7.39 (m, 2H), 5.99 (s, 1H), 4.04 – 3.93 (m, 1H), 2.08 – 1.99 (m, 2H), 1.80 – 1.72 (m, 2H), 1.70 – 1.61 (m, 2H), 1.50 – 1.37 (m, 2H), 1.30 – 1.21 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 166.5, 135.0, 131.1, 128.4, 126.7, 48.6, 33.1, 25.5, 24.8; HRMS (ESI) cald for $C_{13}H_{18}NO$ *m/z* 204.1383 [M + H]$^+$, found 204.1389.

(4-Methylpiperazin-1-yl)(phenyl)methanone (3p).[8]



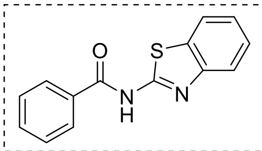
Eluted in 5% MeOH/DCM, Colorless liquid; Yield: 87%; ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.41 (s, 5H), 3.81 (s, 2H), 3.46 (s, 2H), 2.55 – 2.34 (m, 4H), 2.33 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 170.2, 135.6, 129.6, 128.3, 126.9, 55.1, 54.5, 47.3, 45.8, 41.8; HRMS (ESI) cald for $C_{12}H_{17}N_2O$ *m/z* 205.1336 [M + H]$^+$, found 205.1334.

Morpholino(phenyl)methanone (3q).[8,9]



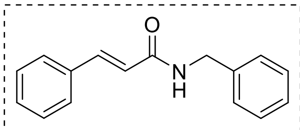
Eluted in 50% EtOAc/n-hexane, Colorless liquid; Yield: 91%; mp: 69–70 °C (lit: 66–68 °C); ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.42 – 7.34 (m, 5H), 3.54 (s, 2H), 3.25 (s, 2H), 1.24 (s, 2H), 1.11 (s, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 171.1, 137.1, 128.9, 128.2, 126.1, 43.1, 39.1, 14.1, 12.8; MS (ESI): *m/z* 192 [M + H]$^+$. HRMS (ESI) cald for $C_{11}H_{14}NO_2$ *m/z* 192.1020 [M + H]$^+$, found 192.1026.

***N*-(Benzo[*d*]thiazol-2-yl)benzamide (3r).**[10]



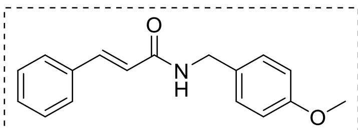
Isolated by filtration, White solid; Yield: 73%; mp: 69–70 °C (lit: 66–68 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 11.34 (bs, 1H), 8.00 (dd, *J* = 1.0, 8.1 Hz, 2H), 7.89 – 7.81 (m, 1H), 7.57 (t, *J* = 7.5 Hz, 1H), 7.44 (t, *J* = 7.5 Hz, 2H), 7.39 – 7.27 (m, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 166.0, 159.7, 147.7, 133.0, 132.0, 131.8, 128.9, 127.9, 126.0, 123.9, 121.3, 120.6; HRMS (ESI) cald for $C_{14}H_{11}N_2OS$ *m/z* 255.0587 $[M + H]^+$, found 255.0581.

***N*-Benzylcinnamamide (5a).**[11]



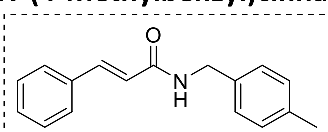
Isolated by filtration, White solid; Yield: 91%; mp: 98–100 °C (lit: 99–100°C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.68 (d, *J* = 15.7 Hz, 1H), 7.51 – 7.47 (m, 2H), 7.39 – 7.31 (m, 7H), 7.31 – 7.27 (m, 1H), 6.41 (d, *J* = 15.6 Hz, 1H), 5.93 (s, 1H), 4.58 (d, *J* = 5.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 165.7, 141.3, 138.1, 134.7, 129.6, 128.7, 128.6, 127.8, 127.7, 127.5, 120.4, 43.8; HRMS (ESI) cald for $C_{16}H_{16}NO$ *m/z* 238.1227 $[M + H]^+$, found 238.1223.

***N*-(4-Methoxybenzyl)cinnamamide (5b).**[12]



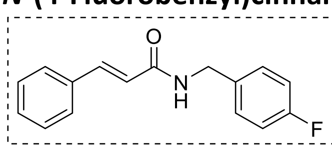
Isolated by filtration, White solid; Yield: 94%; mp: 111–112 °C (lit: 110 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.66 (d, *J* = 15.6 Hz, 1H), 7.48 (dd, *J* = 4.2, 7.7 Hz, 2H), 7.40 – 7.32 (m, 3H), 7.25 (d, *J* = 7.8 Hz, 2H), 6.87 (d, *J* = 8.6 Hz, 2H), 6.40 (d, *J* = 15.6 Hz, 1H), 5.95 (bs, 1H), 4.50 (d, *J* = 5.7 Hz, 2H), 3.79 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 165.6, 159.0, 141.1, 134.7, 130.2, 129.6, 129.2, 128.7, 127.7, 120.5, 114.0, 55.2, 43.2; HRMS (ESI) cald for $C_{17}H_{18}NO_2$ *m/z* 268.1333 $[M + H]^+$, found 268.1335.

***N*-(4-Methylbenzyl)cinnamamide (5c).**[12]



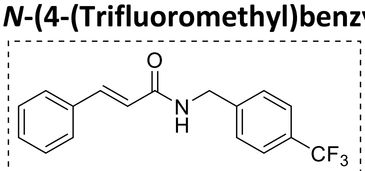
Isolated by filtration, White solid; Yield: 92%; mp: 117–119 °C (lit: 119 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.65 (d, *J* = 15.5 Hz, 1H), 7.49 – 7.46 (m, 2H), 7.36 – 7.32 (m, 3H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.14 (d, *J* = 7.7 Hz, 2H), 6.41 (d, *J* = 15.5 Hz, 1H), 5.98 (s, 1H), 4.52 (d, *J* = 5.6 Hz, 2H), 2.33 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 165.6, 159.0, 141.1, 134.7, 130.2, 129.6, 129.2, 128.7, 127.7, 120.5, 114.0, 55.2, 43.2; HRMS (ESI) cald for $C_{17}H_{18}NO$ *m/z* 252.1383 $[M + H]^+$, found 252.1381.

***N*-(4-Fluorobenzyl)cinnamamide (5d).**[12]



Isolated by filtration, White solid; Yield: 88%; mp: 120–123 °C (lit: 121 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.68 (d, *J* = 15.7 Hz, 1H), 7.52 – 7.47 (m, 2H), 7.39 – 7.34 (m, 3H), 7.30 (dd, *J* = 5.6, 8.0 Hz, 2H), 7.02 (t, *J* = 8.2 Hz, 2H), 6.41 (d, *J* = 15.7 Hz, 1H), 5.97 (bs, 1H), 4.54 (d, *J* = 5.8 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 165.8, 163.3 and 160.9 (d, *J* = 245.7 Hz), 141.5, 134.6, 134.0 (d, *J* = 2.9 Hz), 129.7, 129.5 (d, *J* = 8.0 Hz), 128.7, 127.7, 120.2, 115.5 (d, *J* = 21.2 Hz), 43.0; HRMS (ESI) cald for $C_{16}H_{15}FNO$ *m/z* 256.1133 $[M + H]^+$, found 256.1129.

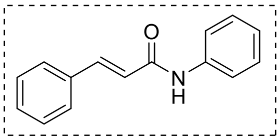
***N*-(4-(Trifluoromethyl)benzyl)cinnamamide (5e).**[13]



Isolated by filtration, White solid; Yield: 86%; mp: 137–139 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.68 (d, *J* = 15.6 Hz, 1H), 7.58 (d, *J* = 8.2

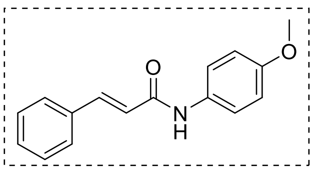
Hz, 2H), 7.50 – 7.46 (m, 2H), 7.42 (d, *J* = 8.0 Hz, 2H), 7.38 – 7.33 (m, 3H), 6.45 (d, *J* = 15.5 Hz, 1H), 6.20 (bs, 1H), 4.61(d, *J* = 5.9 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 166.1, 142.3, 141.7, 134.5, 129.8, 128.8, 127.8, 127.7, 125.6, 125.5, 122.6, 120.0, 43.1; HRMS (ESI) calcd for $C_{17}H_{15}F_3NO$ *m/z* 306.1101 $[M + H]^+$, found 306.1102.

***N*-Phenylcinnamamide (5f).[11]**



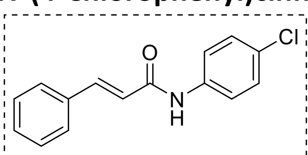
Isolated by filtration, White solid; Yield: 81%; mp: 171–173 °C (lit:170–172 ºC); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.76 (d, *J* = 15.2 Hz, 1H), 7.63 (d, *J* = 6.8 Hz, 2H), 7.55 – 7.45 (m, 3H), 7.41 – 7.32 (m, 5H), 7.13 (t, *J* = 7.3 Hz, 1H), 6.57 (d, *J* = 15.5 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 164.3, 142.2, 138.0, 134.5, 129.8, 128.9, 128.7, 127.8, 124.3, 120.9, 120.1; HRMS (ESI) cald for $C_{15}H_{14}NO$ *m/z* 224.1070 $[M + H]^+$, found 224.1072.

***N*-(4-methoxyphenyl)cinnamamide (5g).[14]**



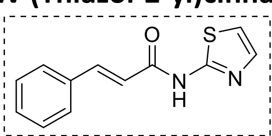
Isolated by filtration, White solid; Yield: 85%; mp: 152–155 °C (lit:150–153 ºC); ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ: 9.53 (s, 1H), 7.69 – 7.60 (m, 3H), 7.56 – 7.50 (m, 2H), 7.43 – 7.32 (m, 3H), 6.89 – 6.83 (m, 2H), 6.80 – 6.73 (m, 1H), 3.79 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 163.9, 156.4, 141.8, 134.6, 131.1, 129.7, 128.7, 127.8, 121.7, 120.9, 114.1, 55.4; HRMS (ESI) cald for $C_{16}H_{16}NO_2$ *m/z* 254.1176 $[M + H]^+$, found 254.1173.

***N*-(4-Chlorophenyl)cinnamamide (5h).[15]**



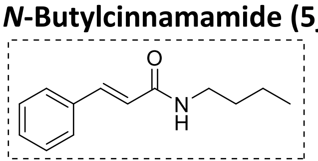
Isolated by filtration, White solid; Yield: 77%; mp: 180–182 °C (lit: 181–183 ºC); ^{1}H NMR (400 MHz, $CDCl_3$ + DMSO-*d*$_6$) δ: 10.23 (s, 1H), 7.70 (d, *J* = 8.8 Hz, 2H), 7.61 – 7.53 (m, 3H), 7.43– 7.34 (m, 3H), 7.28 (d, *J* = 8.8 Hz, 2H), 6.76 (d, *J* = 15.6 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-*d*$_6$) δ: 163.5, 140.2, 137.7, 134.4, 129.3, 128.4, 128.1, 127.3, 127.1, 121.5, 120.4; HRMS (ESI) cald for $C_{15}H_{13}ClNO$ *m/z* 258.0681 $[M + H]^+$, found 258.0679.

***N*-(Thiazol-2-yl)cinnamamide (5i).[16]**



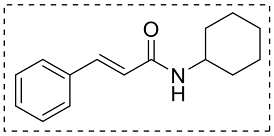
Isolated by filtration, White solid; Yield: 73%; mp: 204–206 °C (lit: 202–203 ºC); ^{1}H NMR (300 MHz, $CDCl_3$ + DMSO-*d*$_6$) δ: 12.25 (s, 1H), 7.68 (d, *J* = 15.9 Hz, 1H), 7.60 – 7.54 (m, 2H), 7.43 (d, *J* = 3.5 Hz, 1H), 7.42– 7.35 (m, 3H), 7.08 (d, *J* = 3.5 Hz, 1H), 6.88 (d, *J* = 15.6 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$ + DMSO-*d*$_6$) δ: 162.9, 157.9, 141.9, 137.5, 134.1, 129.8, 128.6, 127.6, 119.4, 113.2; HRMS (ESI) cald for $C_{12}H_{11}N_2OS$ *m/z* 231.0587 $[M + H]^+$, found 231.0581.

***N*-Butylcinnamamide (5j).[14]**



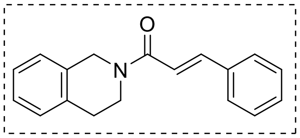
Eluted in 25% EtOAc/n-hexane, White solid; Yield: 92%; mp: 82–84 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.62 (d, *J* = 15.7 Hz, 1H), 7.49 (dd, *J* = 2.1, 7.7 Hz, 2H),7.39 – 7.31 (m, 3H), 6.40 (d, *J* = 15.7 Hz, 1H), 5.73 (bs, 1H), 3.39 (q, *J* = 7.0 Hz, 2H), 1.60 – 1.52 (m, 2H), 1.44 – 1.35 (m, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 165.9, 140.5, 134.8, 129.4, 128.6, 127.6, 120.9, 39.4, 31.6, 20.0, 13.6; HRMS (ESI) calcd for $C_{13}H_{18}NO$ *m/z* 204.1383 $[M + H]^+$, found 204.1388.

***N*-Cyclohexylcinnamamide (5k).[17]**



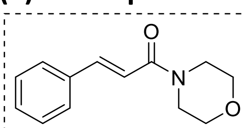
Isolated by filtration, White solid; Yield: 93%; mp: 173–175 °C (lit: mp 175–176 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.61 (d, *J* = 15.6 Hz, 1H), 7.49 (dd, *J* = 2.2, 7.8 Hz, 2H), 7.40 – 7.31 (m, 3H), 6.36 (d, *J* = 15.5 Hz, 1H), 5.47 (bd, *J* = 8.0 Hz, 1H), 3.97 – 3.87 (m, 1H), 2.03 – 1.96 (m, 2H), 1.78 – 1.70 (m, 2H), 1.68 – 1.55 (m, 2H), 1.47 – 1.35 (m, 2H), 1.25 – 1.13 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 164.8, 140.6, 134.9, 129.4, 128.7, 127.6, 121.1, 49.3, 33.2, 25.5, 24.8; HRMS (ESI) cald for $C_{15}H_{20}NO$ *m/z* 230.1540 [M + H]$^+$, found 230.1543.

(*E*)-1-(3,4-Dihydroisoquinolin-2(1H)-yl)-3-phenylprop-2-en-1-one (5l).[18]



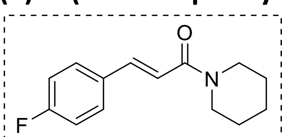
Isolated by filtration, White solid; Yield: 89%; mp: 112–114 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.72 (d, *J* = 15.4 Hz, 1H), 7.55 (d, *J* = 7.9 Hz, 2H), 7.41 – 7.34 (m, 3H), 7.25 – 7.12 (m, 4H), 6.96 (d, *J* = 15.4 Hz, 1H), 4.86 – 4.82 (m, 2H), 3.98 – 3.85 (m, 2H), 3.00 – 2.89 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 165.8, 142.6, 135.2, 134.1, 133.5, 129.5, 128.7, 128.1, 127.7, 126.6, 126.5, 126.0, 117.4, 44.7, 43.5, 29.6 and peaks at 165.7, 135.1, 132.47, 128.8, 126.8, 126.3, 117.6, 47.5, 40.1, 28.5 are may be due to rotamers; HRMS (ESI) calcd for $C_{18}H_{18}NO$ *m/z* 264.1383 [M + H]$^+$, found 264.1386.

(*E*)-1-Morpholino-3-phenylprop-2-en-1-one (5m).[11]



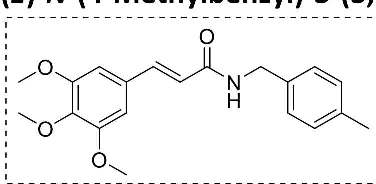
Isolated by filtration, White solid; Yield: 87%; mp: 95–97 °C (lit: 93–94 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.70 (d, *J* = 15.4 Hz, 1H), 7.55 – 7.50 (m, 2H), 7.41 – 7.34 (m, 3H), 6.84 (d, *J* = 15.4 Hz, 1H), 3.79 – 3.63 (m, 8H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 165.4, 143.0, 135.0, 129.6, 128.7, 127.6, 116.4, 66.7, 46.1, 42.3; HRMS (ESI) calcd for $C_{13}H_{16}NO_2$ *m/z* 218.1176 [M + H]$^+$, found 218.1179.

(*E*)-3-(4-Fluorophenyl)-1-(piperidin-1-yl)prop-2-en-1-one (5n).[19]



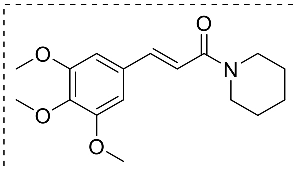
Isolated by filtration, White solid;; Yield: 88%; mp: 137–139 °C (lit: 136–138 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.61 (d, *J* = 15.4 Hz, 1H), 7.50 (dd, *J* = 5.3, 8.6 Hz, 2H), 7.05 (t, *J* = 8.6 Hz, 2H), 6.82 (d, *J* = 15.4 Hz, 1H), 3.71 – 3.54 (m, 4H), 1.73 – 1.65 (m, 2H), 1.65 – 1.58 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 164.3, 163.8 and 161.3 (d, *J* = 249.4 Hz), 140.0, 131.1 and 131.0 (d, *J* = 2.9 Hz), 128.9 and 128.8 (d, *J* = 8.8 Hz), 117.0, 115.2 and 115.0 (d, *J* = 22.0 Hz), 46.3, 42.6, 26.0, 24.9, 23.9; HRMS (ESI) calcd for $C_{14}H_{17}FNO$ *m/z* 234.1289 [M + H]$^+$, found 234.1285.

(*E*)-*N*-(4-Methylbenzyl)-3-(3,4,5-trimethoxyphenyl)acrylamide (5o).[20]



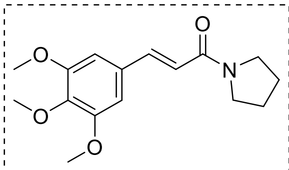
Isolated by filtration, White solid; Yield: 95%; mp: 176–178°C; ^{1}H NMR (400 MHz, $CDCl_3$ + DMSO-d_6) δ: 8.00 (t, *J* = 4.9 Hz, 1H), 7.40 (d, *J* = 15.6 Hz, 1H), 7.13 (d, *J* = 7.7 Hz, 2H), 7.05 (d, *J* = 7.8 Hz, 2H), 6.69 (s, 2H), 6.52 (d, *J* = 15.6 Hz, 1H), 4.37 (d, *J* = 5.6 Hz, 2H), 3.79 (s, 6H), 3.74 (s, 3H), 2.24 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$ + DMSO-d_6) δ: 164.7, 152.1, 138.5, 137.9, 135.3, 134.8, 129.7, 127.9, 126.5, 120.2, 103.7, 59.5, 54.9, 41.8, 19.9; HRMS (ESI) calcd for $C_{20}H_{24}NO_4$ *m/z* 342.1700 [M + H]$^+$, found 342.1705.

(*E*)-1-(Piperidin-1-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one (5p).[21]



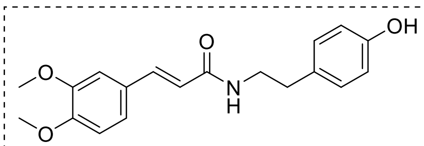
Isolated by filtration, White solid; Yield: 90%; mp: 96–97 °C (lit: 98 ºC); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.56 (d, *J* = 15.4 Hz, 1H), 6.78 (d, *J* = 15.2 Hz, 1H), 6.74 (s, 2H), 3.90 (s, 6H), 3.87 (s, 3H), 3.71 – 3.56 (m, 4H), 1.73 – 1.66 (m, 2H), 1.66 – 1.59 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 165.1, 153.1, 142.1, 139.2, 130.8, 116.7, 104.7, 60.7, 56.0, 46.8, 43.2, 26.6, 25.4, 24.4; HRMS (ESI) calcd for $C_{17}H_{24}NO_4$ *m/z* 306.1700 $[M + H]^+$, found 306.1702.

(*E*)-1-(Pyrrolidin-1-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one (5q).[21]



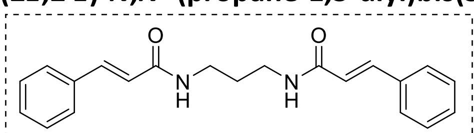
Isolated by filtration, White solid; Yield: 91%; mp: 154–156 °C (lit: mp 155 ºC); ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.62 (d, *J* = 15.4 Hz, 1H), 6.75 (s, 2H), 6.62 (d, *J* = 15.4 Hz, 1H), 3.90 (s, 6H), 3.88 (s, 3H), 3.69 – 3.57 (m, 4H), 2.07 – 1.87 (m, 4H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 164.5, 153.3, 141.6, 139.4, 130.8, 118.0, 105.0, 60.8, 56.1, 46.5, 46.0, 26.0, 24.2; HRMS (ESI) calcd for $C_{16}H_{22}NO_4$ *m/z* 292.1544 $[M + H]^+$, found 292.1547.

(*E*)-3-(3,4-Dimethoxyphenyl)-*N*-(4-hydroxyphenethyl)acrylamide (5r).[22]



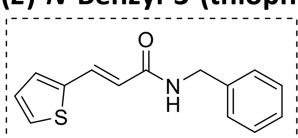
Isolated by filtration, White solid; Yield: 80%; mp: 122–125 °C (lit: 119.8–121.3 ºC); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.55 (d, *J* = 15.2 Hz, 1H), 7.05 (d, *J* = 8.3 Hz, 3H), 6.98 (d, *J* = 1.7 Hz, 1H), 6.86 – 6.78 (m, 3H), 6.44 (bs, 1H), 6.21 (d, *J* = 15.2 Hz, 1H), 5.72 (bs, 1H), 3.89 (s, 3H), 3.87 (s, 3H), 3.61 (q, *J* = 6.7 Hz, 2H), 2.80 (t, *J* = 6.9 Hz, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 166.7, 155.1, 150.5, 148.9, 141.2, 129.6, 127.5, 121.9, 119.9, 118.1, 115.6, 111.0, 109.7, 55.8, 55.7, 41.1, 34.6; HRMS (ESI) calcd for $C_{19}H_{22}NO_4$ *m/z* 328.1544 $[M + H]^+$, found 328.1545.

(2*E*,2'*E*)-*N*,*N*'-(propane-1,3-diyl)bis(3-phenylacrylamide) (5s).[23]



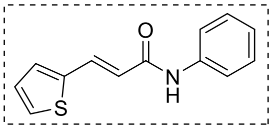
Isolated by filtration, White solid; Yield: 86%; mp: 188–190 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.65 (d, *J* = 15.6 Hz, 1H), 7.55 – 7.47 (m, 2H), 7.40 – 7.32 (m, 3H), 6.60 (brs, 1H), 6.48 (d, *J* = 15. 6 Hz, 1H), 3.47 (q, *J* = 6.3 Hz, 2H), 1.80 – 1.72 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 165.8, 139. 2, 134.3, 128.8, 128.1, 127.0, 120.9, 35.6, 28.9; HRMS (ESI) calcd for $C_{21}H_{23}N_2O_2$ *m/z* 335.1755 $[M + H]^+$, found 335.1757.

(*E*)-*N*-Benzyl-3-(thiophen-2-yl)acrylamide (5t).[24]



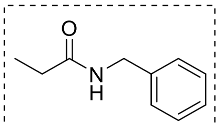
Isolated by filtration, White solid; Yield: 85%; mp: 109–111 °C (lit: 107–110 ºC); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.79 (d, *J* = 15.2 Hz, 1H), 7.37 – 7.27 (m, 6H), 7.21 (d, *J* = 3.3 Hz, 1H), 7.03 (dd, *J* = 3.6, 5.0 Hz, 1H), 6.22 (d, *J* = 15. 2 Hz, 1H), 5.86 (bs, 1H), 4.56 (d, *J* = 5.6 Hz, 2H); ^{13}C NMR (125 MHz, $CDCl_3$ + DMSO–d_6) δ: 165.5, 139.9, 138.2, 133.6, 133.5, 129.9, 128.5, 127.8, 127.7, 127.2, 119.6, 43.5; HRMS (ESI) calcd for $C_{14}H_{14}NOS$ *m/z* 244.0791 $[M + H]^+$, found 244.0788.

(*E*)-*N*-Phenyl-3-(thiophen-2-yl)acrylamide (5w).[25]



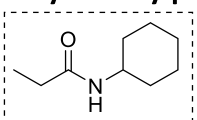
Isolated by filtration, White solid; Yield: 81%; mp: 148–150 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.87 (d, *J* = 15.1 Hz, 1H), 7.60 (d, *J* = 7.7 Hz, 2H), 7.39 – 7.31 (m, 4H), 7.24 (d, *J* = 3.5 Hz, 1H), 7.13 (t, *J* = 7.4 Hz, 1H), 7.05 (dd, *J* = 3.6, 5.0 Hz, 1H), 6.36 (d, *J* = 15.1 Hz, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 163.8, 139.7, 138.0, 134.9, 130.7, 129.0, 128.0, 127.6, 124.3, 119.9, 119.6; HRMS (ESI) calcd for $C_{13}H_{12}NOS$ *m/z* 230.0635 $[M + H]^+$, found 230.0639.

***N*-Benzylpropionamide (7a).[26]**



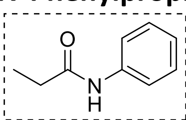
Eluted in 20% EtOAc/n-hexane, White solid; Yield: 85%; mp: 49–51 °C (lit: 46–48 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.37 – 7.27 (m, 5H), 5.73 (bs, 1H), 4.44 (d, *J* = 5.6 Hz, 2H), 2.25 (q, *J* = 7.5 Hz, 2H), 1.19 (t, *J* = 7.5 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 173.6, 138.3, 128.6, 127.7, 127.3, 43.4, 29.6, 9.8; HRMS (ESI) calcd for $C_{10}H_{14}NO$ *m/z* 164.1070 $[M + H]^+$, found 164.1073.

***N*-Cyclohexylpropionamide (7b).[27]**



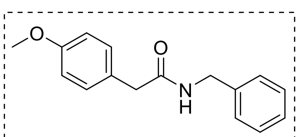
Eluted in 30% EtOAc/n-hexane, White solid; Yield: 89%; mp: 90–92 °C (lit: 89–91 °C); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 5.28(s, 1H), 3.82 – 3.71 (m, 1H), 2.17 (q, *J* = 7.6 Hz, 2H), 1.95 – 1.88 (m, 2H), 1.74 – 1.67 (m, 2H), 1.65 – 1.58 (m, 1H), 1.42 – 1.31 (m, 2H), 1.17– 1.10 (m, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 172.7, 47.9, 33.1, 29.8, 25.4, 24.8, 9.9; HRMS (ESI) calcd for $C_9H_{18}NO$ *m/z* 156.1383 $[M + H]^+$, found 155.1386.

***N*-Phenylpropionamide (7c).[28]**



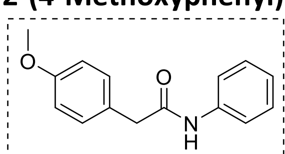
Eluted in 20% EtOAc/n-hexane, White solid; Yield: 74%; mp:105–107 °C (lit:106–107 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.51 (d, *J* = 7.7 Hz, 2H), 7.31 (d, *J* = 7.6 Hz, 2H), 7.21 (bs, 1H), 7.10 (t, *J* = 7.3 Hz, 1H), 2.39 (q, *J* = 7.4 Hz, 2H), 1.25 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 172.1, 137.9, 128.9, 124.0, 119.8, 30.6, 9.6; MS (ESI): *m/z* 150 $[M + H]^+$. HRMS (ESI) calcd for $C_9H_{12}NO$ *m/z* 150.0914 $[M + H]^+$, found 150.0912.

***N*-Benzyl-2-(4-methoxyphenyl)acetamide (7d).[29]**



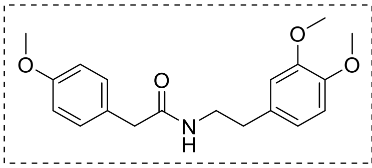
Isolated by filtration, White solid; Yield: 91%; mp: 130–133 °C (lit: 134–135 °C); ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.34 – 7.24 (m, 3H), 7.22 – 7.15 (m, 4H), 6.88 (d, *J* = 8.5 Hz, 2H), 5.69 (bs, 1H), 4.41 (d, *J* = 5.7 Hz, 2H), 3.80 (s, 3H), 3.58 (s, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 171.2, 158.8, 138.1, 130.5, 128.6, 127.4, 127.3, 126.6, 114.4, 55.2, 43.5, 42.8; HRMS (ESI) calcd for $C_{16}H_{18}NO_2$ *m/z* 256.1333 $[M + H]^+$, found 256.1331.

2-(4-Methoxyphenyl)-N-phenylacetamide (7e).[30]



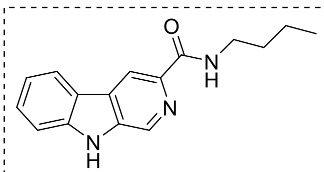
Isolated by filtration, White solid; Yield: 76%; mp: 122–124 °C (lit: 120–121 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.41 (d, *J* = 8.0 Hz, 2H),7.30 – 7.22 (m, 3H), 7.14 – 7.03 (m, 2H), 6.93 (d, *J* = 8.2 Hz, 2H), 3.83 (s, 3H), 3.68 (s, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 169.7, 159.0, 137.5, 130.5, 128.8, 126.2, 124.3, 119.8, 114.5, 55.2, 43.7; HRMS (ESI) calcd for $C_{15}H_{16}NO_2$ *m/z* 242.1176 $[M + H]^+$, found 242.1179.

N-(3,4-dimethoxyphenethyl)-2-(4-methoxyphenyl)acetamide (7f).[31]



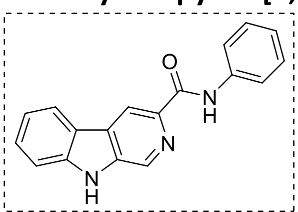
Isolated by filtration, White solid; Yield: 88%; mp: 123–125 °C (lit: 125–127 °C); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.26 (s, 1H), 7.07 (d, *J* = 8.5 Hz, 2H), 6.84 (d, *J* = 8.6 Hz, 2H), 6.72 (d, *J* = 8.0 Hz, 1H), 6.60 (d, *J* = 1.8 Hz, 1H), 6.55 (dd, *J* = 1.8, 8.0 Hz, 1H), 3.86 (s, 3H), 3.83 (s, 3H), 3.81 (s, 3H), 3.47 (s, 2H), 3.44 (q, *J* = 6.7 Hz, 2H), 2.67 (t, *J* = 7.0 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 171.6, 158.8, 148.9, 147.5, 130.9, 130.4, 126.4, 120.5, 114.3, 111.7, 111.2, 55.8, 55.7, 55.2, 42.7, 40.6, 34.9; HRMS (ESI) calcd for $C_{19}H_{24}NO_4$ *m/z* 330.1700 $[M + H]^+$, found 330.1703.

***N*-Butyl-9*H*-pyrido[3,4-*b*]indole-3-carboxamide (9a).[32]**



Isolated by filtration, White solid; Yield: 88%; mp: 230–232°C; ^{1}H NMR (300 MHz, $CDCl_3$ + DMSO–d_6) δ: 11.77 (s, 1H), 8.85 (s, 1H), 8.79 (s, 1H), 8.48 (t, *J* = 5.5 Hz, 1H), 8.26 (d, *J* = 7.9 Hz, 1H), 7.67 – 7.51 (m, 2H), 7.28 (t, *J* = 7.1 Hz, 1H), 3.49 – 3.39 (m, 2H), 1.69 – 1.54 (m, 2H), 1.49 – 1.34 (m, 2H), 0.96 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) δ: 164.5, 140.8, 139.3, 136.9, 131.8, 128.0, 127.9, 121.4, 120.7, 119.5, 113.2, 111.8, 38.3, 31.3, 19.5, 13.4; HRMS (ESI) calcd for $C_{16}H_{18}N_3O$ *m/z* 268.1445 $[M + H]^+$, found 268.1449.

***N*-Phenyl-9*H*-pyrido[3,4-*b*]indole-3-carboxamide (9c).[33]**



Isolated by filtration, White solid; Yield: 72%; mp: 289–291°C; ^{1}H NMR (300 MHz, DMSO–d_6) δ: 12.06 (s, 1H), 10.61 (s, 1H), 8.99 (s, 2H), 8.44 (d, *J* = 7.7 Hz, 1H), 7.95 (d, *J* = 7.7 Hz, 2H), 7.69 (d, *J* = 8.2 Hz, 1H), 7.62 (t, *J* = 7.7 Hz, 1H), 7.42 – 7.29 (m, 3H), 7.11 (t, *J* = 7.4 Hz, 1H); ^{13}C NMR (75 MHz, DMSO–d_6) δ: 163.2, 141.0, 139.2, 138.6, 137.3, 132.1, 128.7, 128.6, 128.3, 123.4, 122.2, 120.8, 120.0, 119.8, 114.5, 112.2; HRMS (ESI) calcd for $C_{18}H_{14}N_3O$ *m/z* 288.1132 $[M + H]^+$, found 288.1137.

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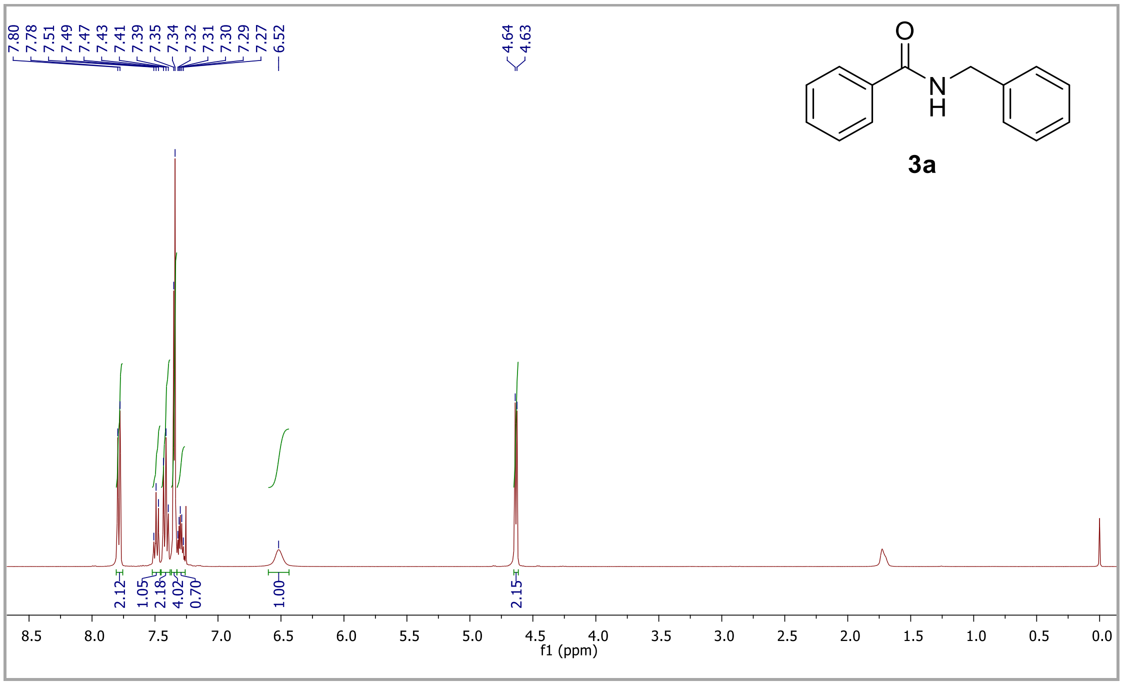
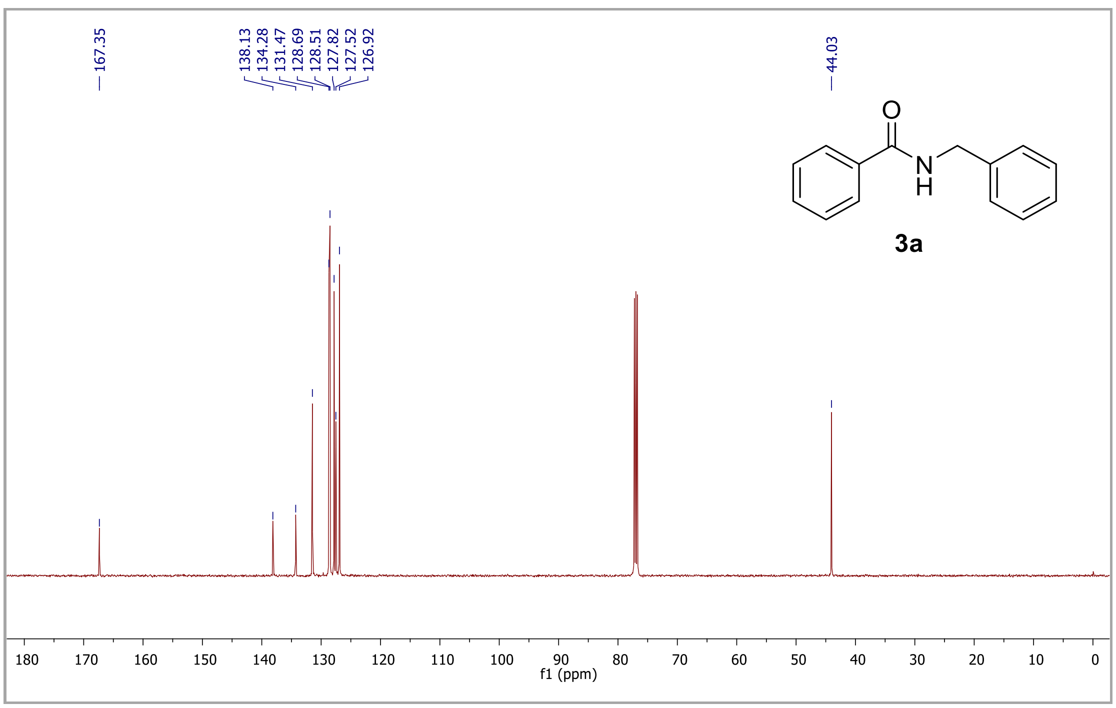
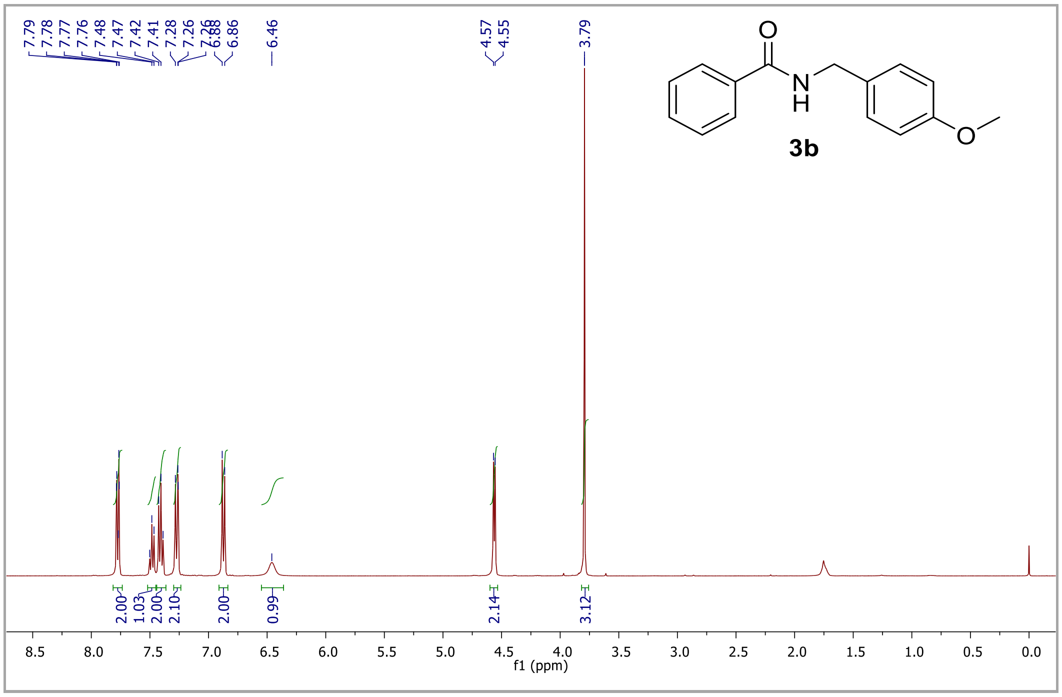


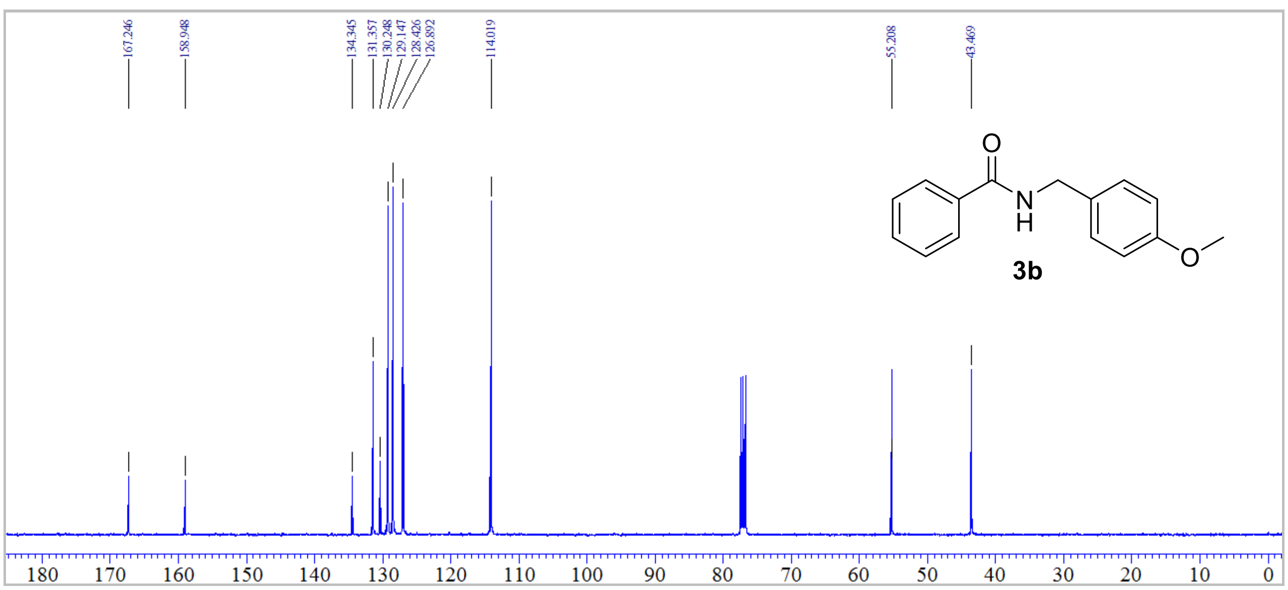
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3a**.



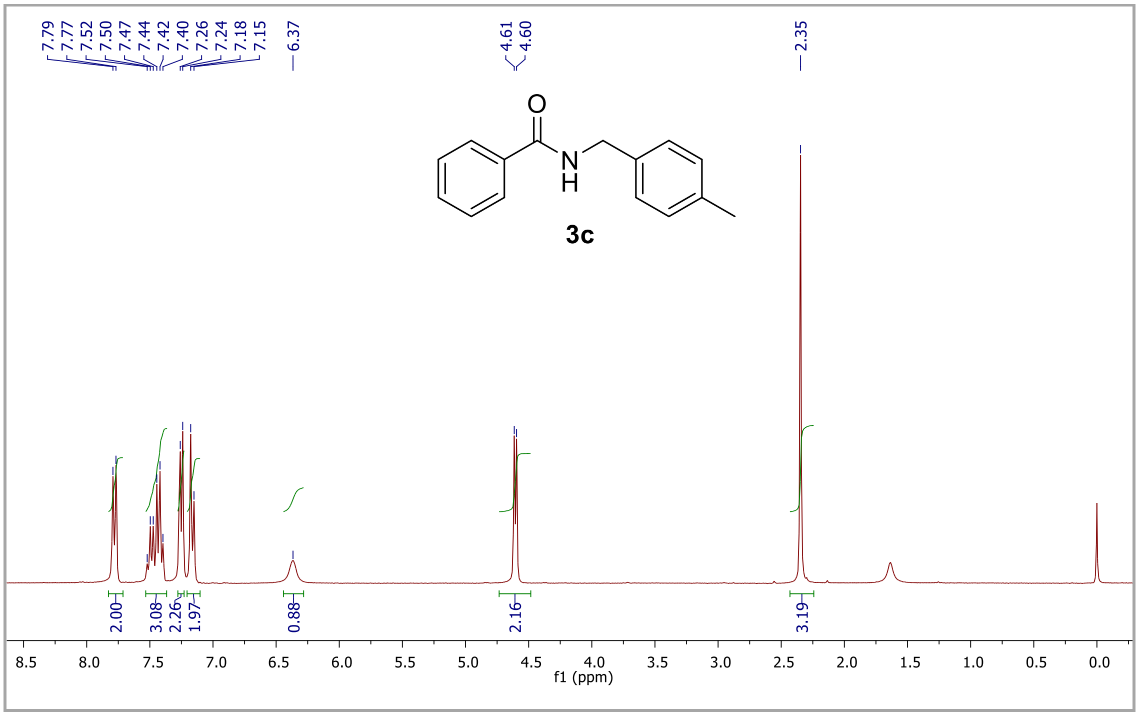
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3a**.



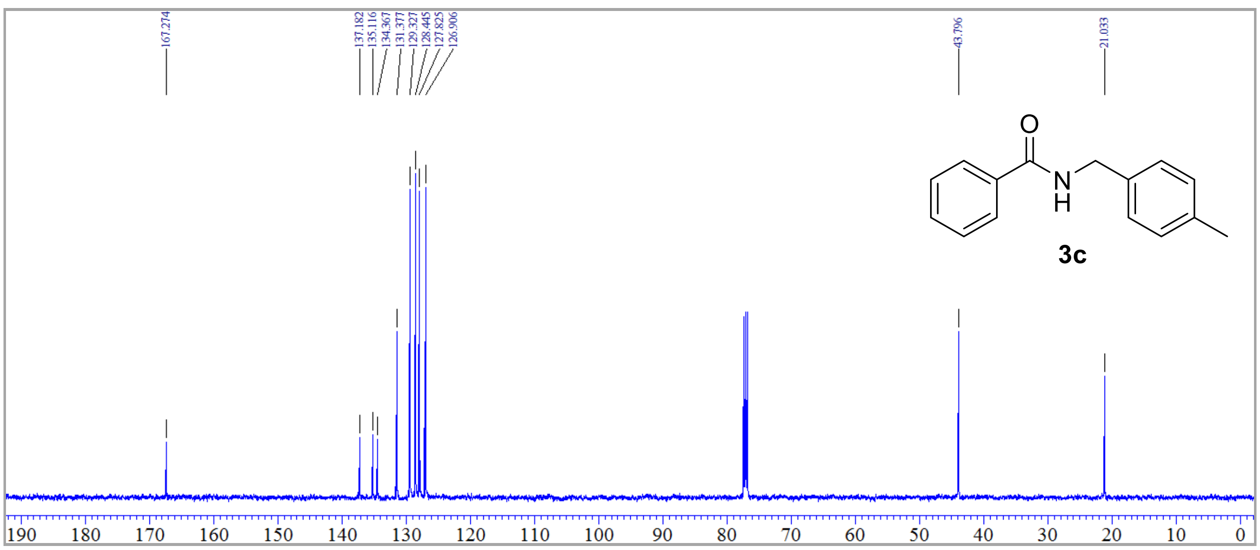
[1]H NMR (400 MHz, $CDCl_3$) spectrum of **3b**.



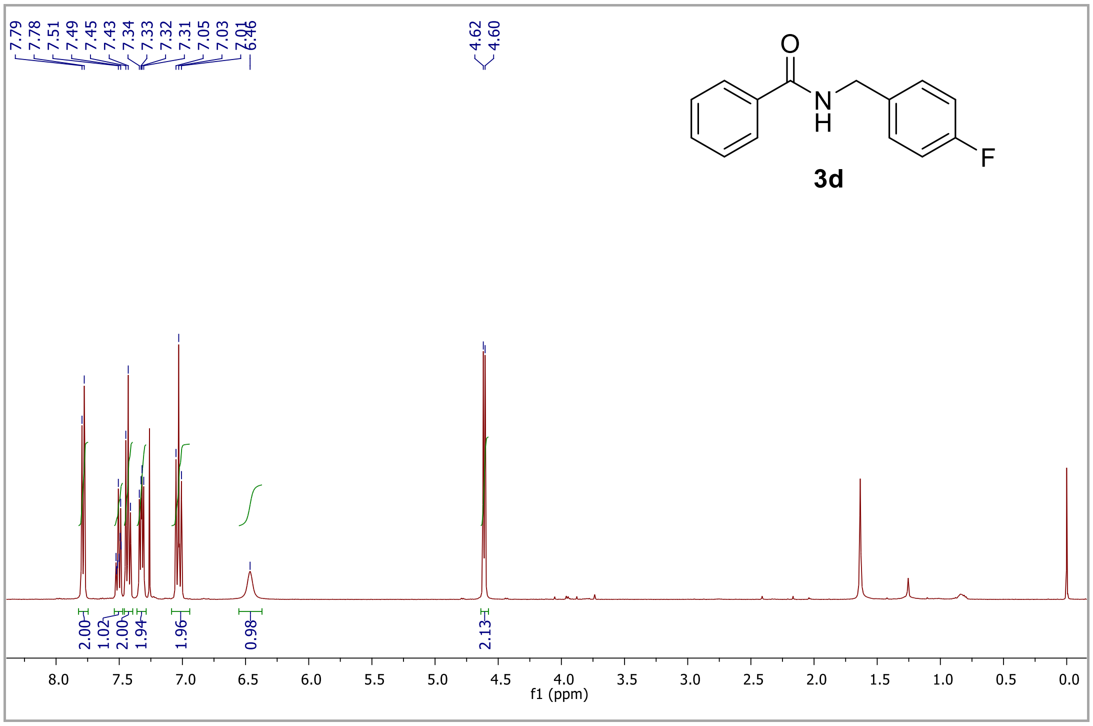
[13]C NMR (100 MHz, $CDCl_3$) spectrum of **3b**.



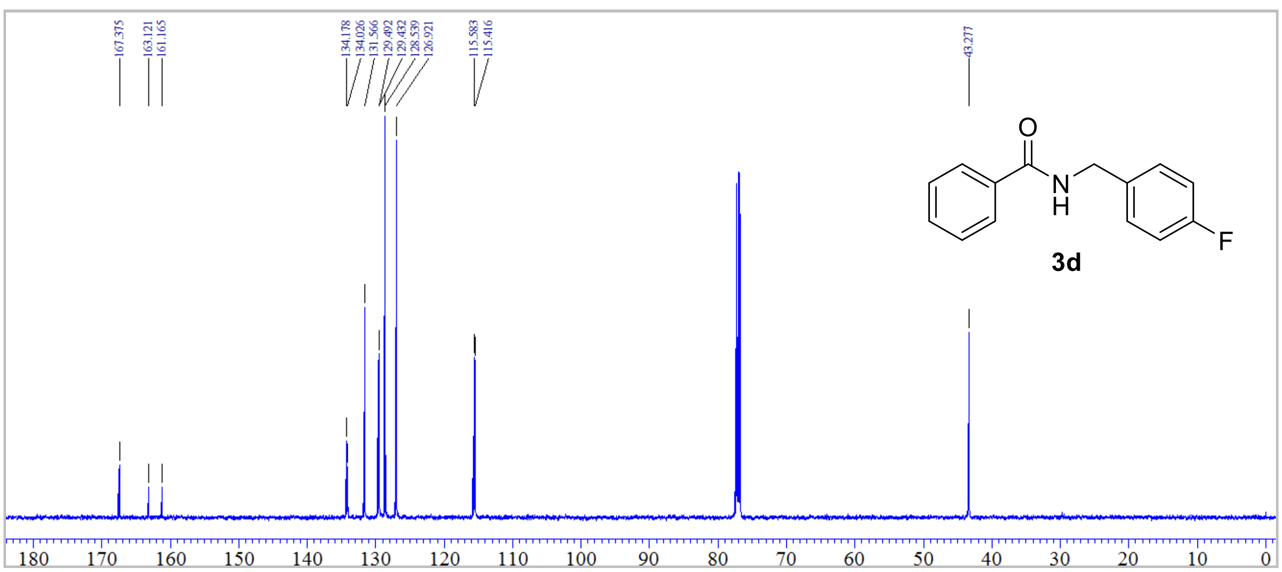
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **3c**.



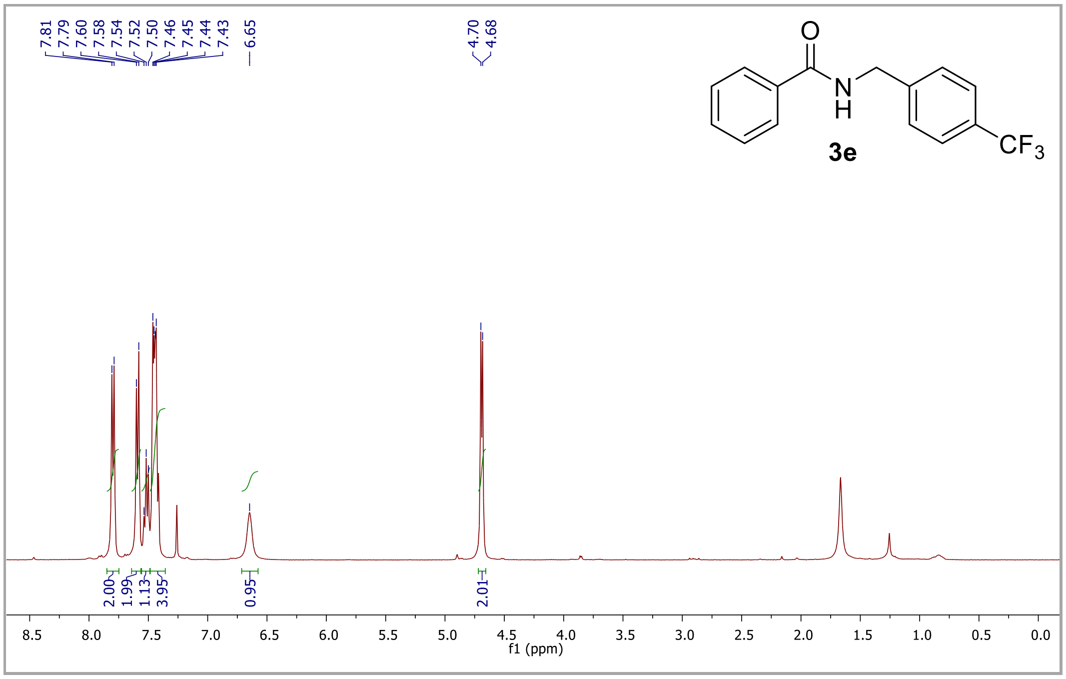
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3c**.



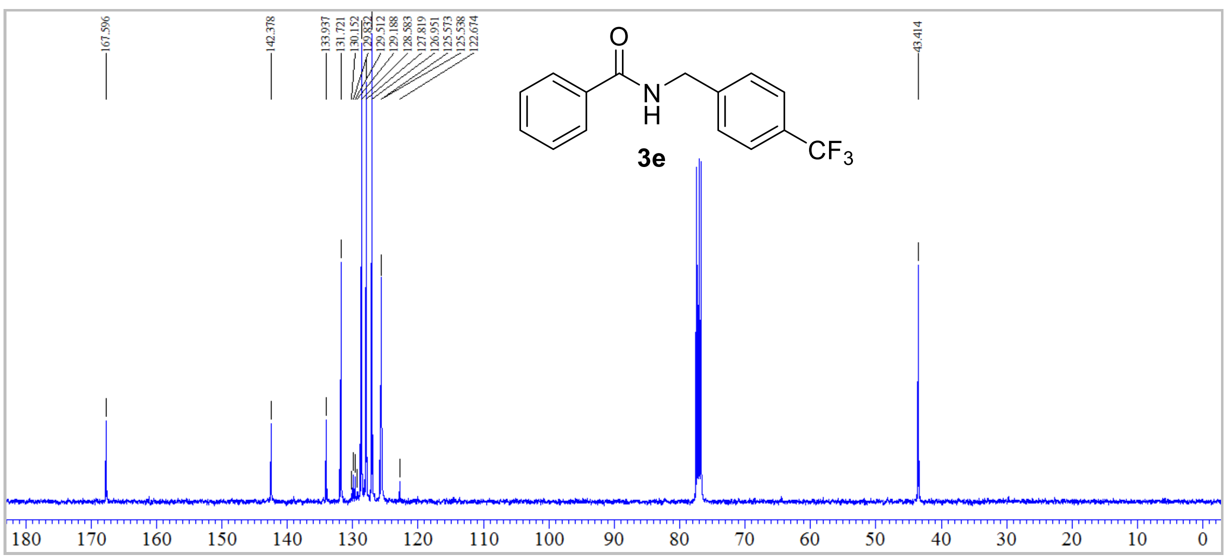
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3d**.



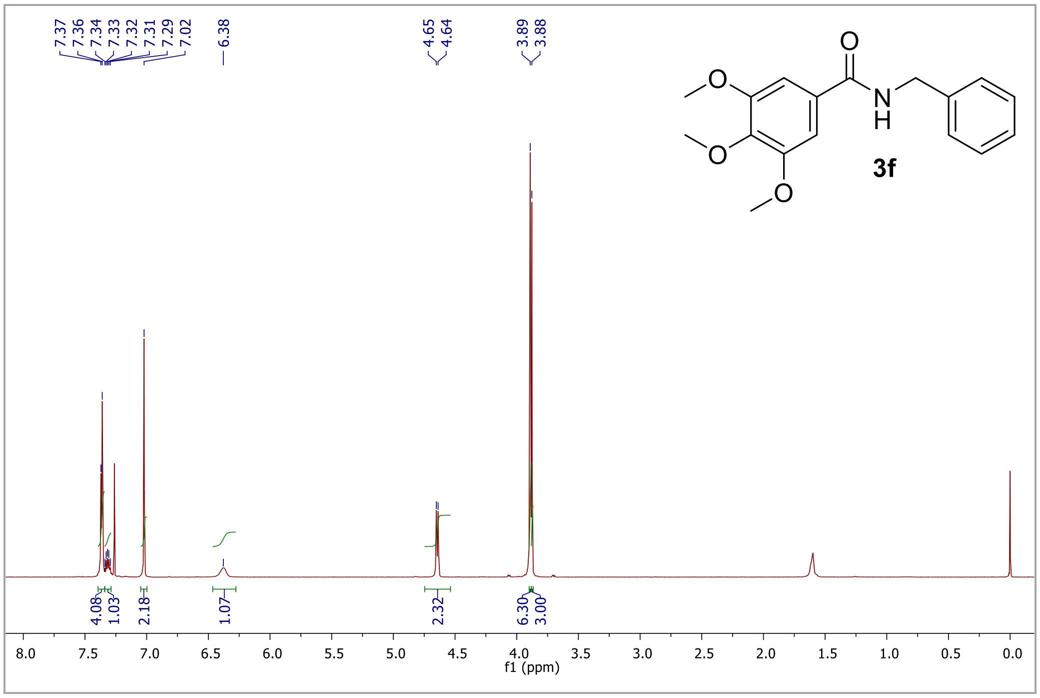
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3d**.



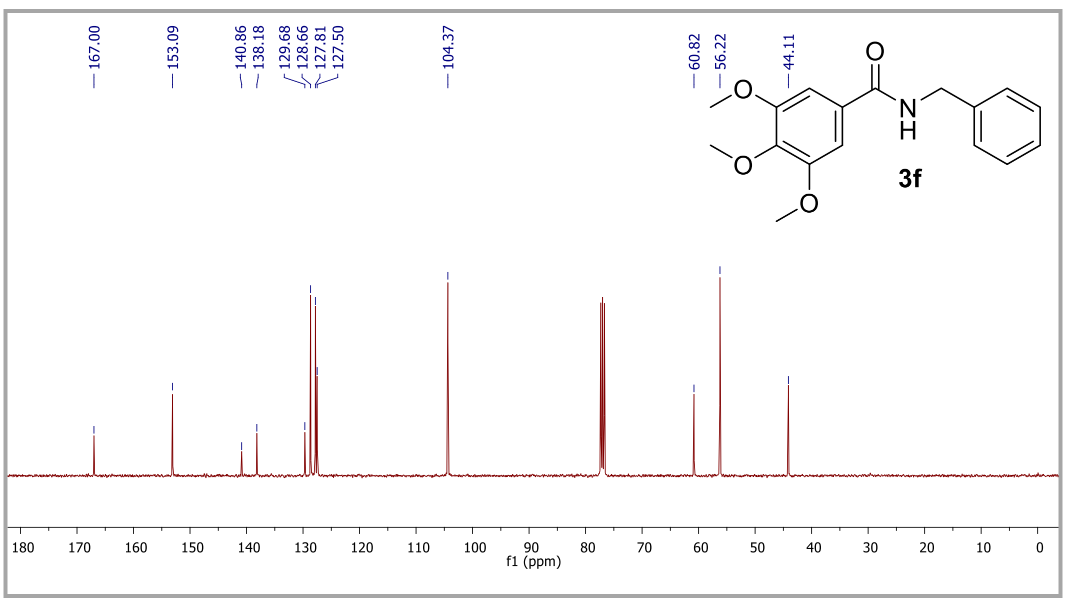
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3e**.



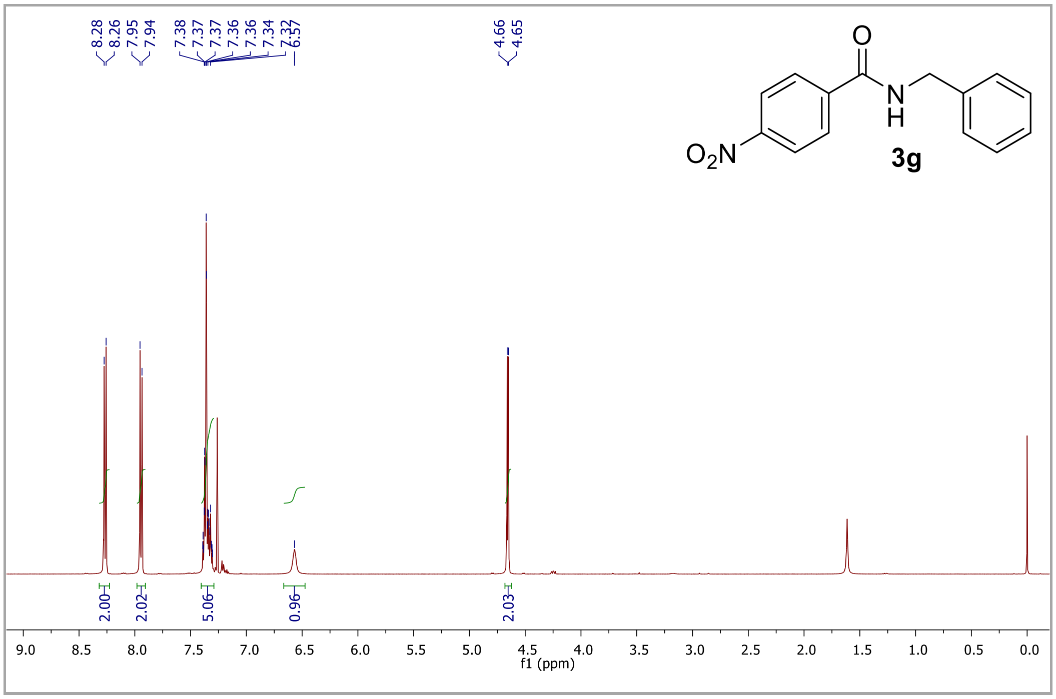
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **3e**.



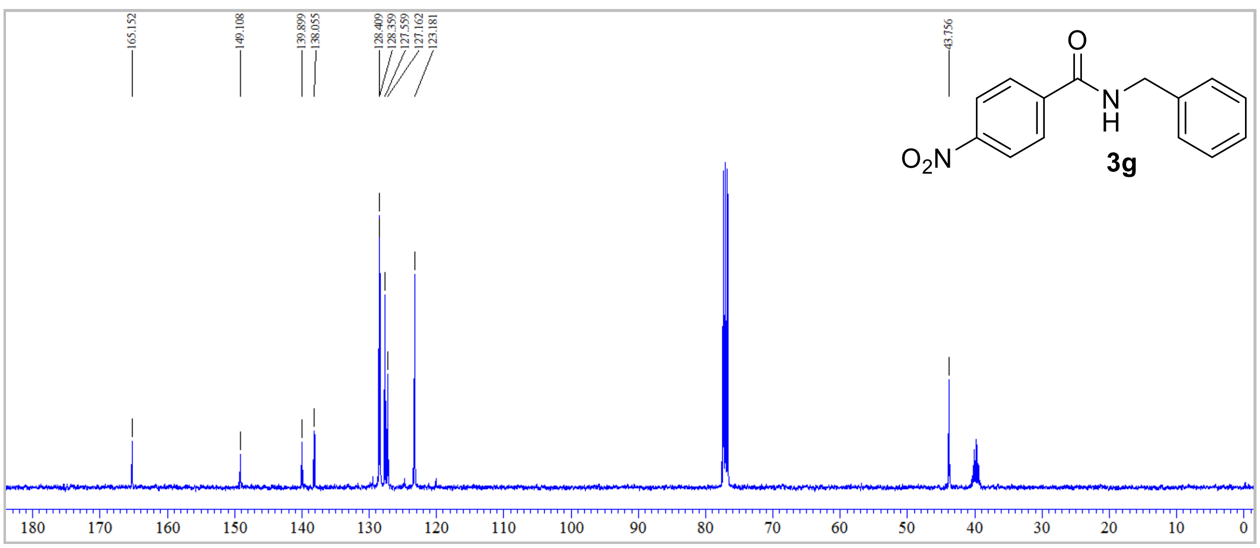
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3f**.



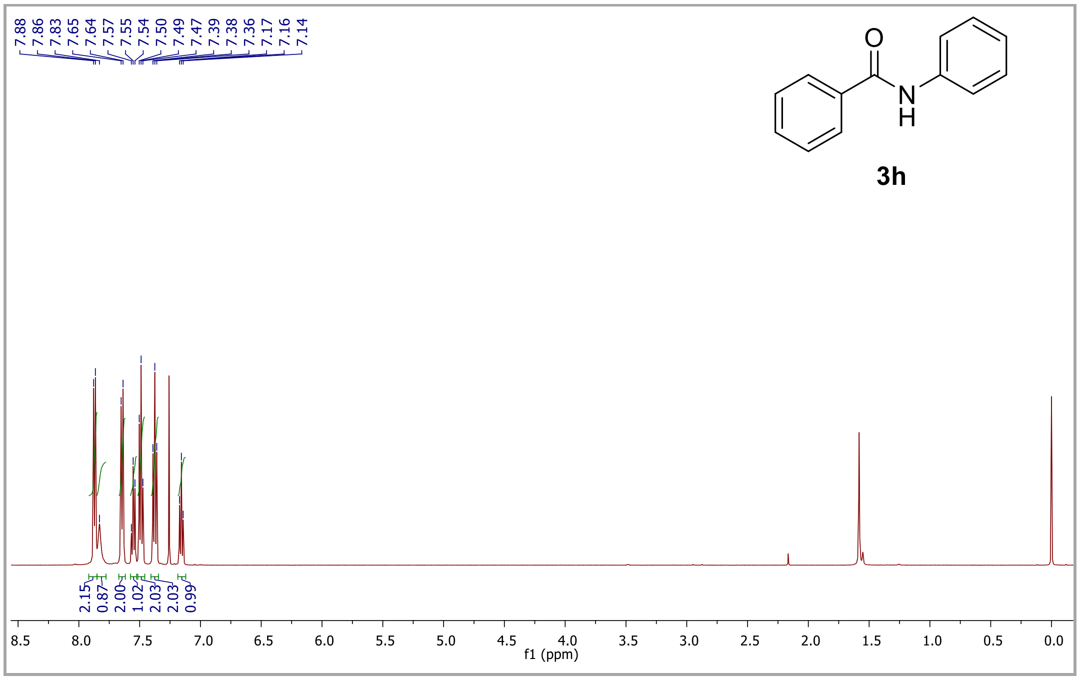
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **3f**.



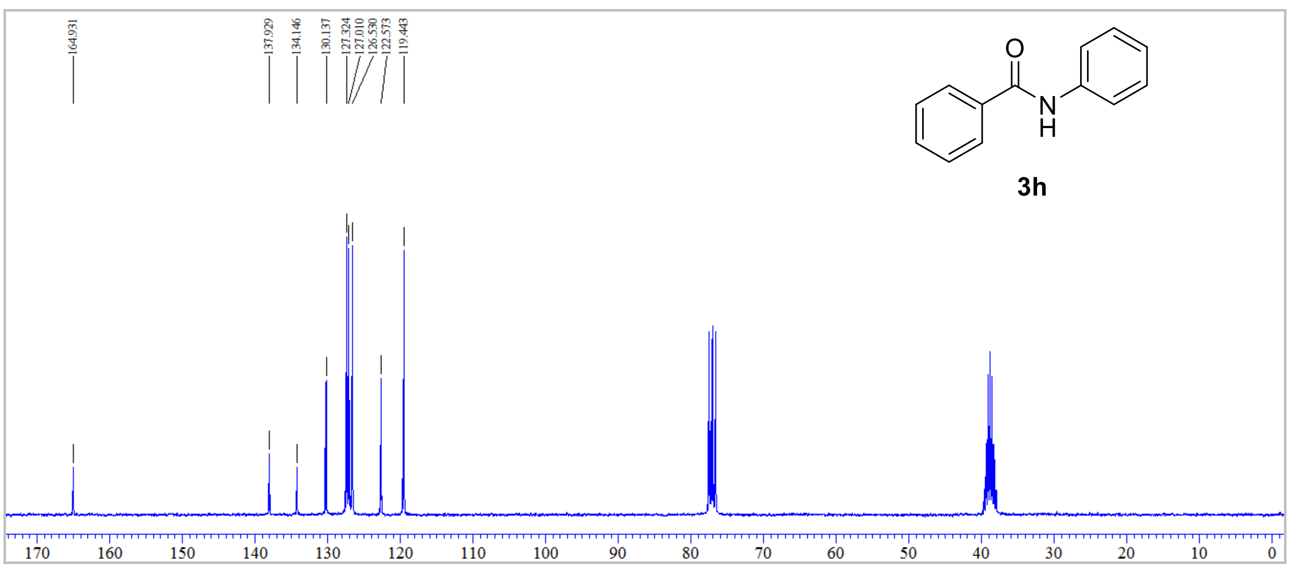
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **3g**.



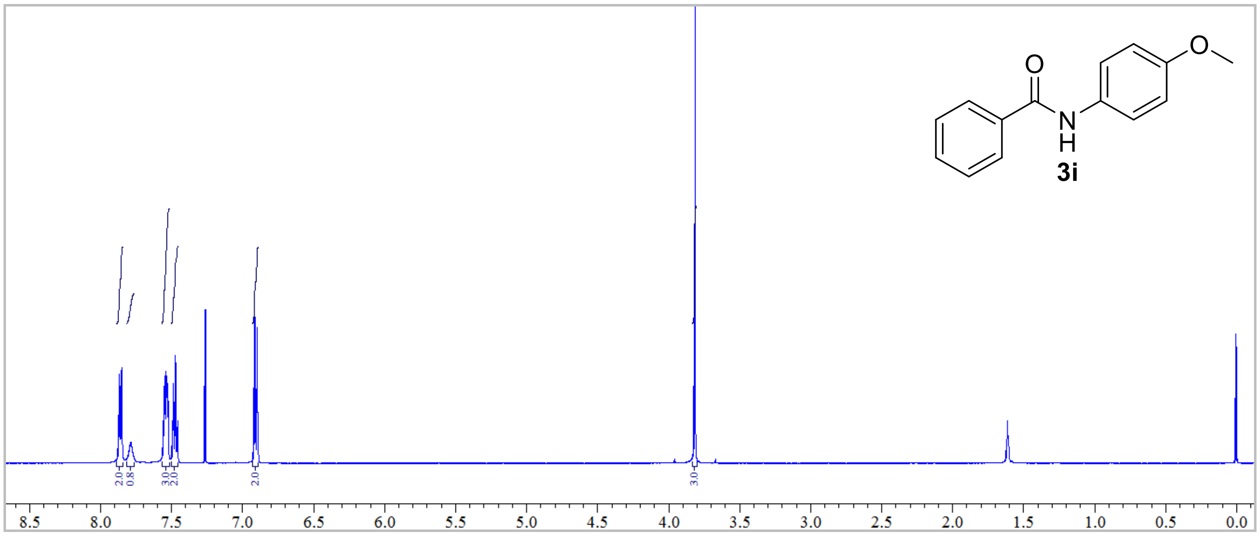
^{13}C NMR (100 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **3g**.



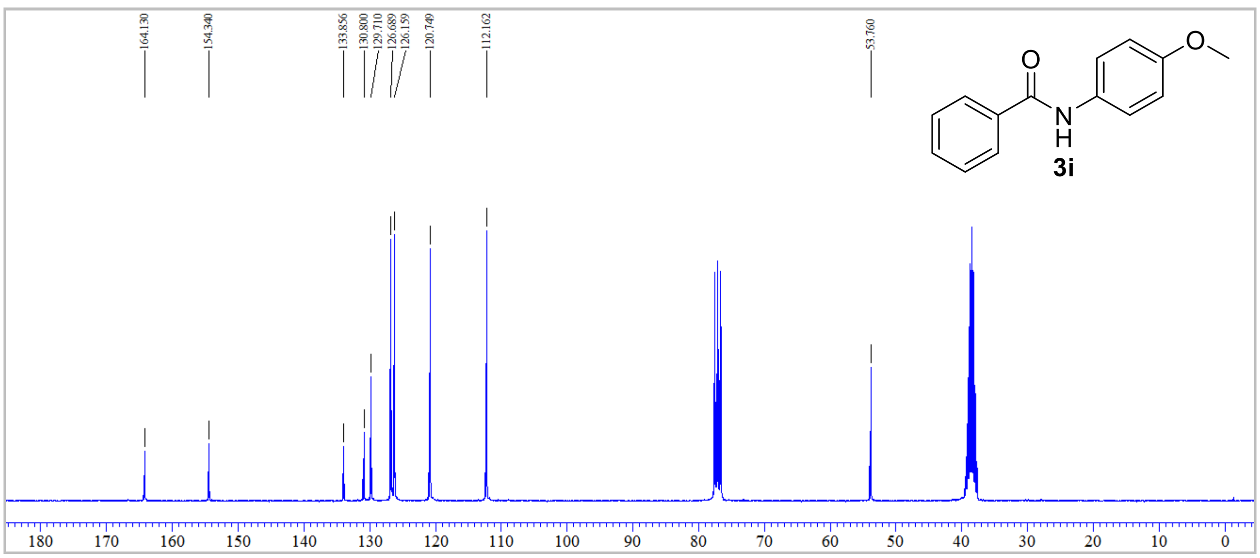
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **3h**.



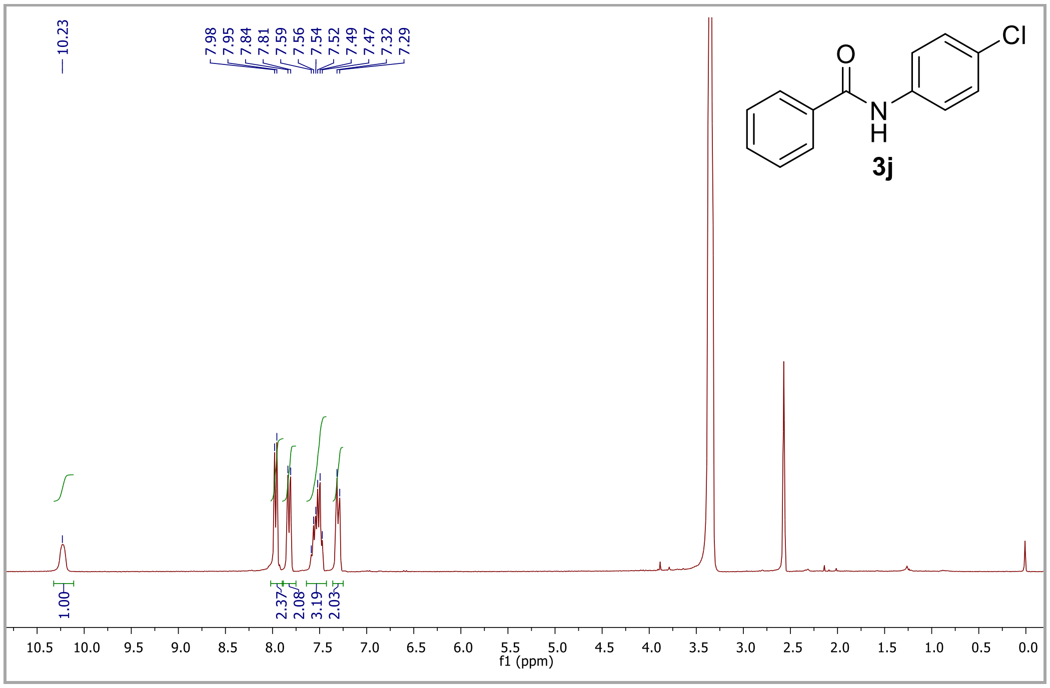
^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **3h**.



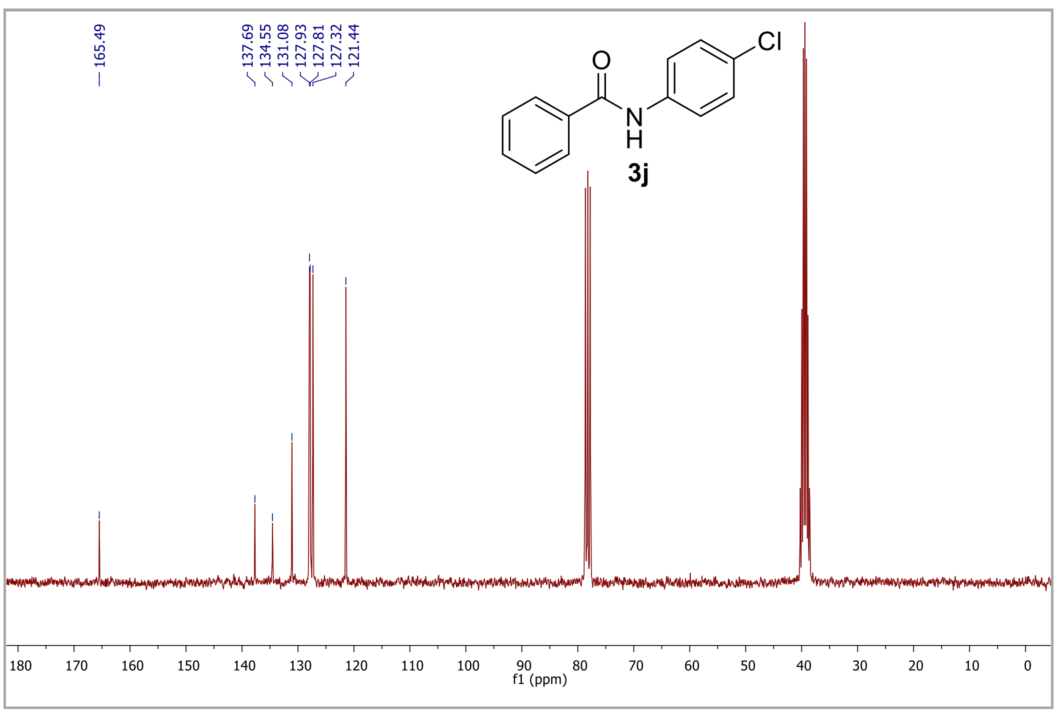
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **3i**.



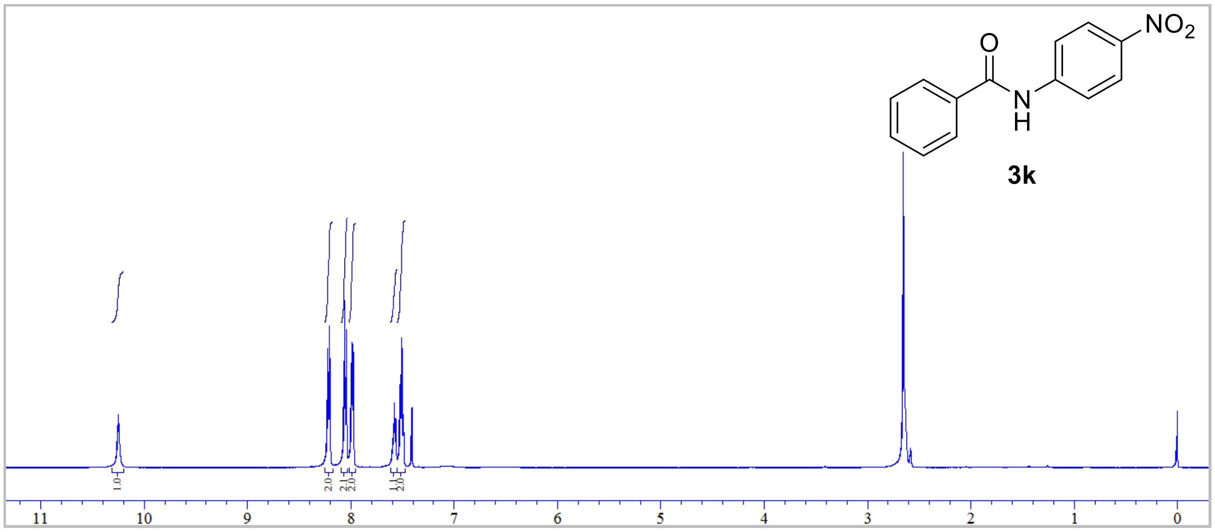
^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **3i**.



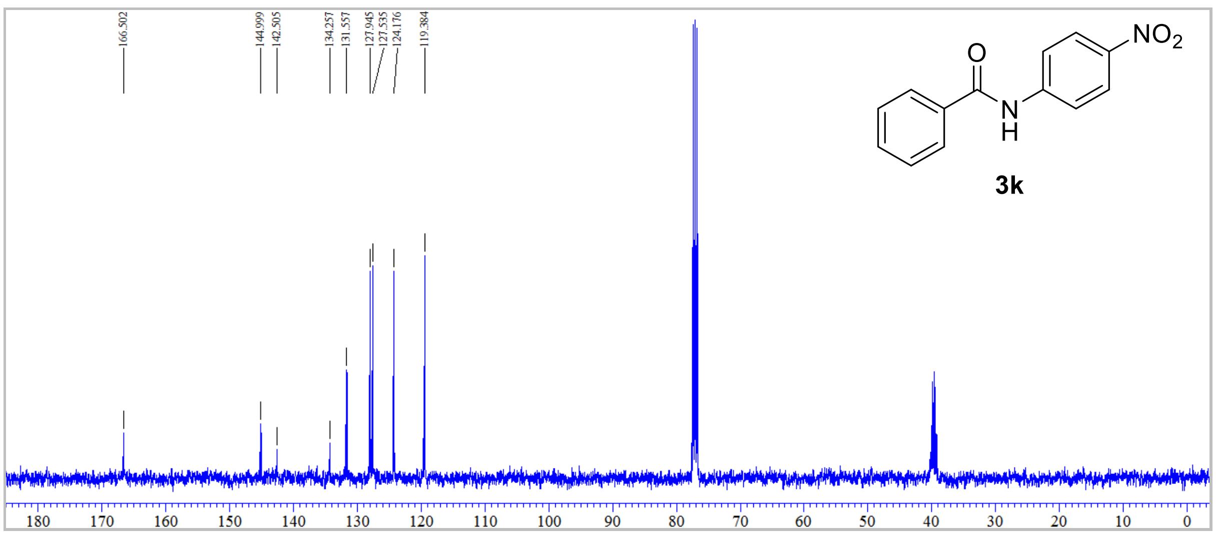
^{1}H NMR (300 MHz, DMSO–d_6) spectrum of **3j**.



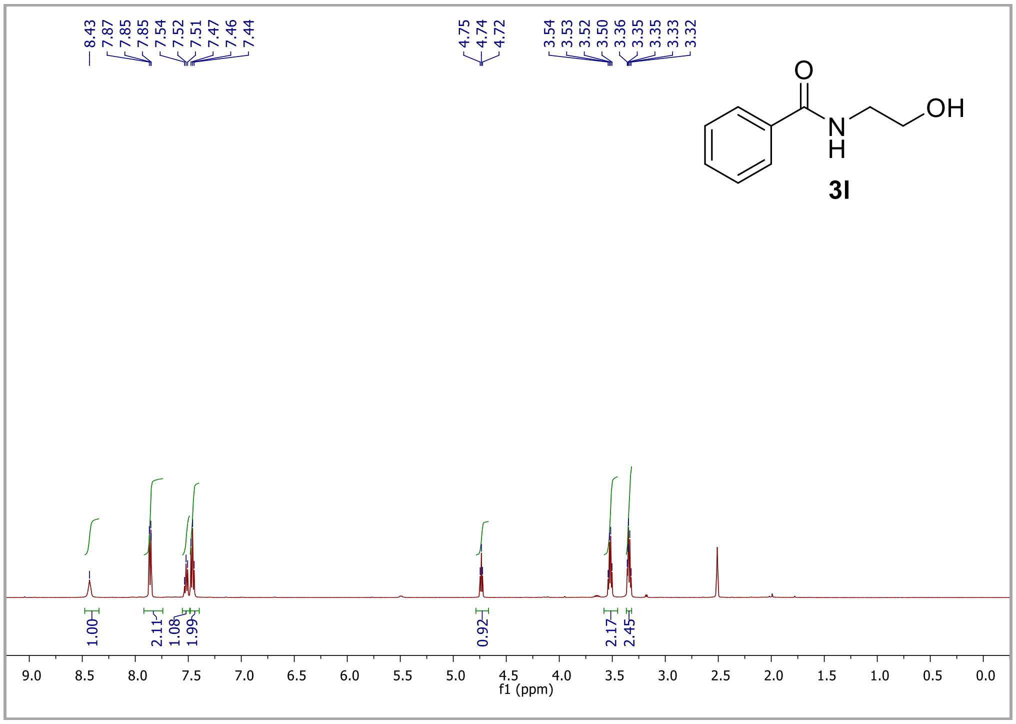
^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **3j**.



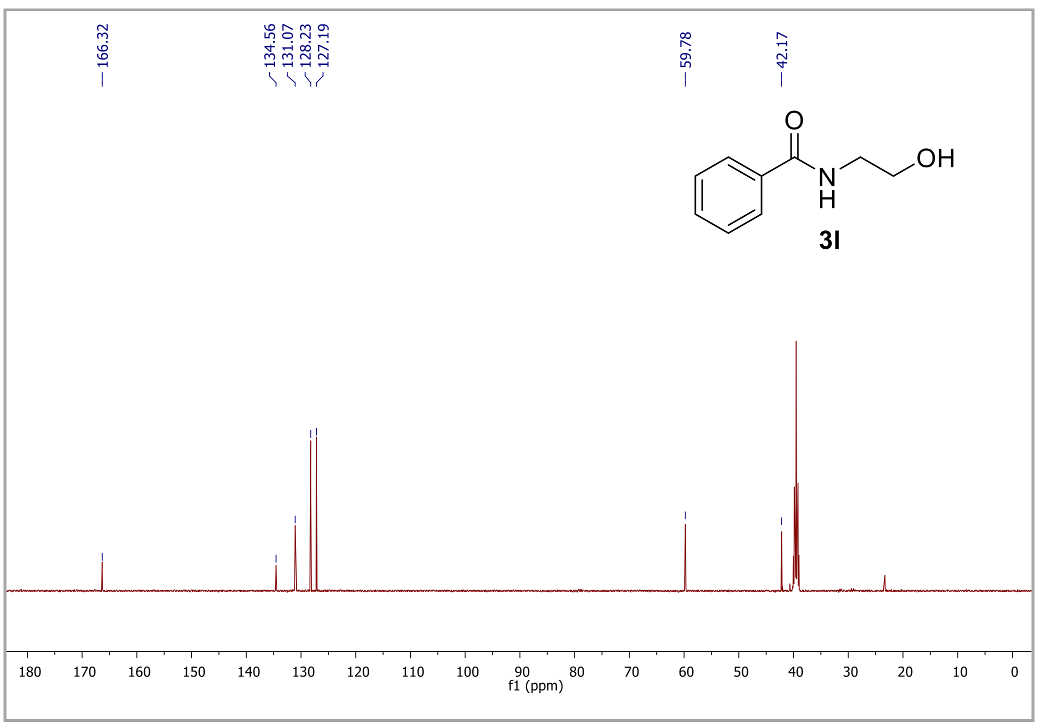
^{1}H NMR (500 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **3k**.



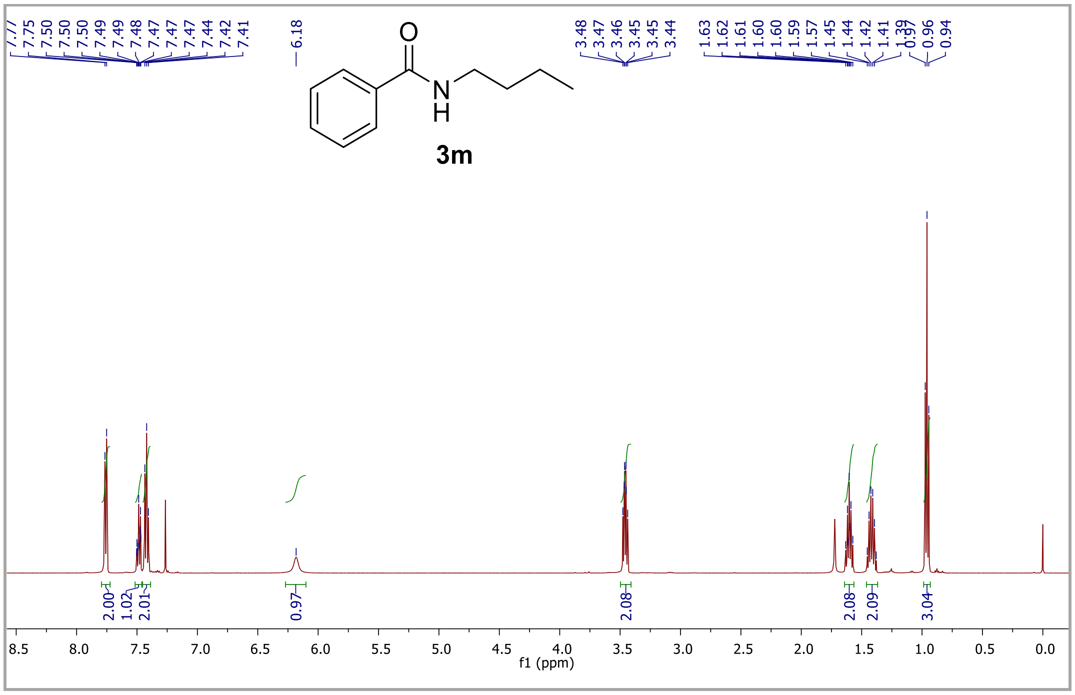
^{13}C NMR (100 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **3k**.



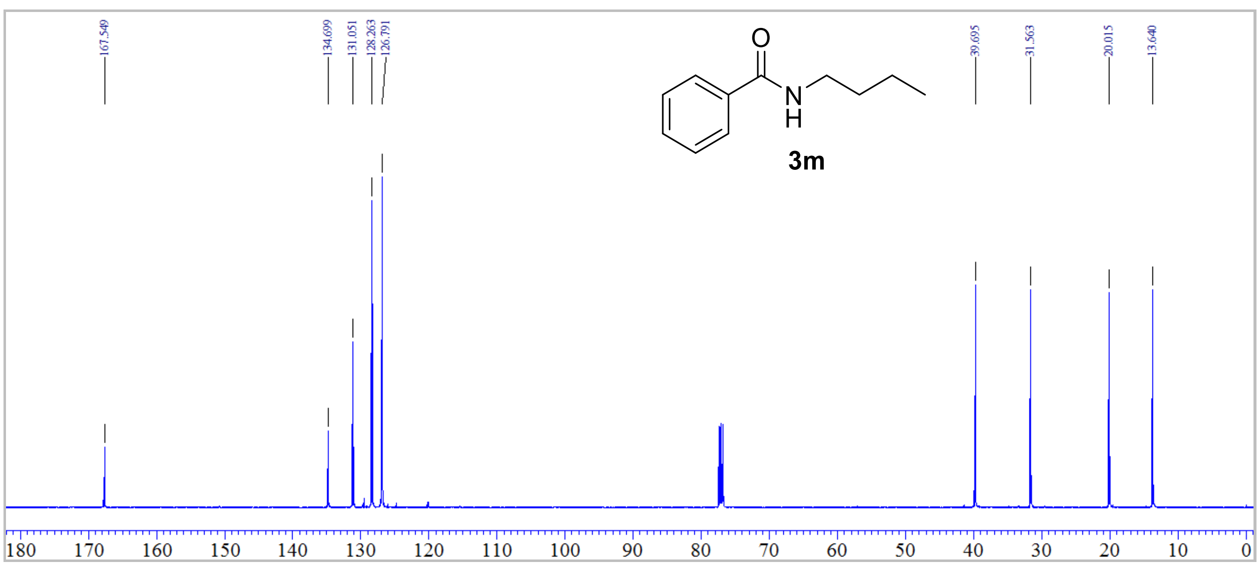
^{1}H NMR (500 MHz, DMSO–d_6) spectrum of **3l**.



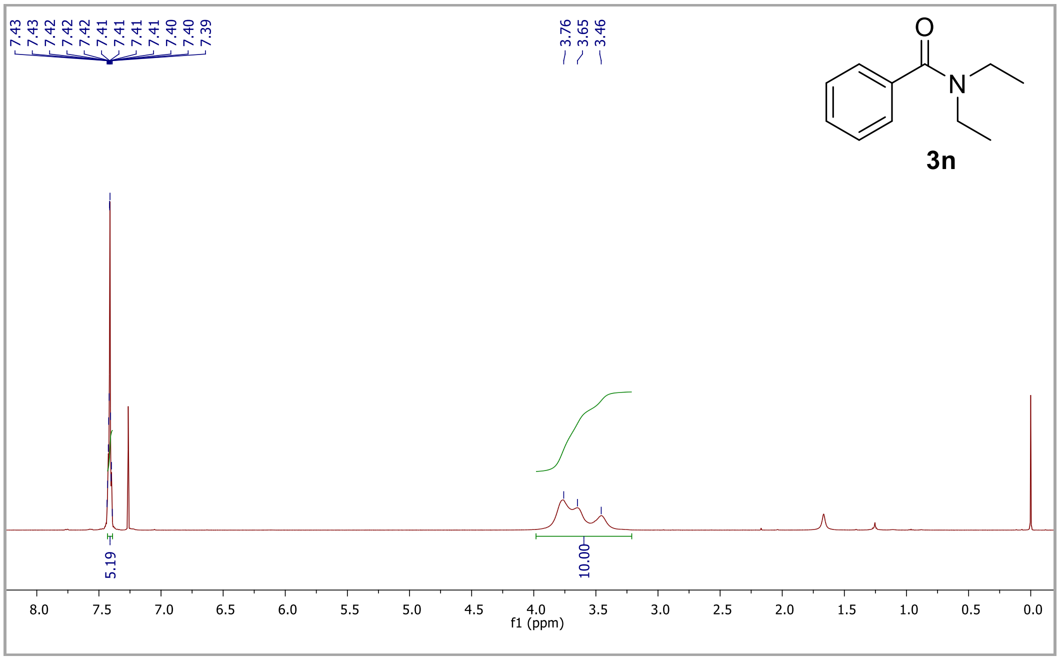
^{13}C NMR (125 MHz, DMSO–d_6) spectrum of **3l**.



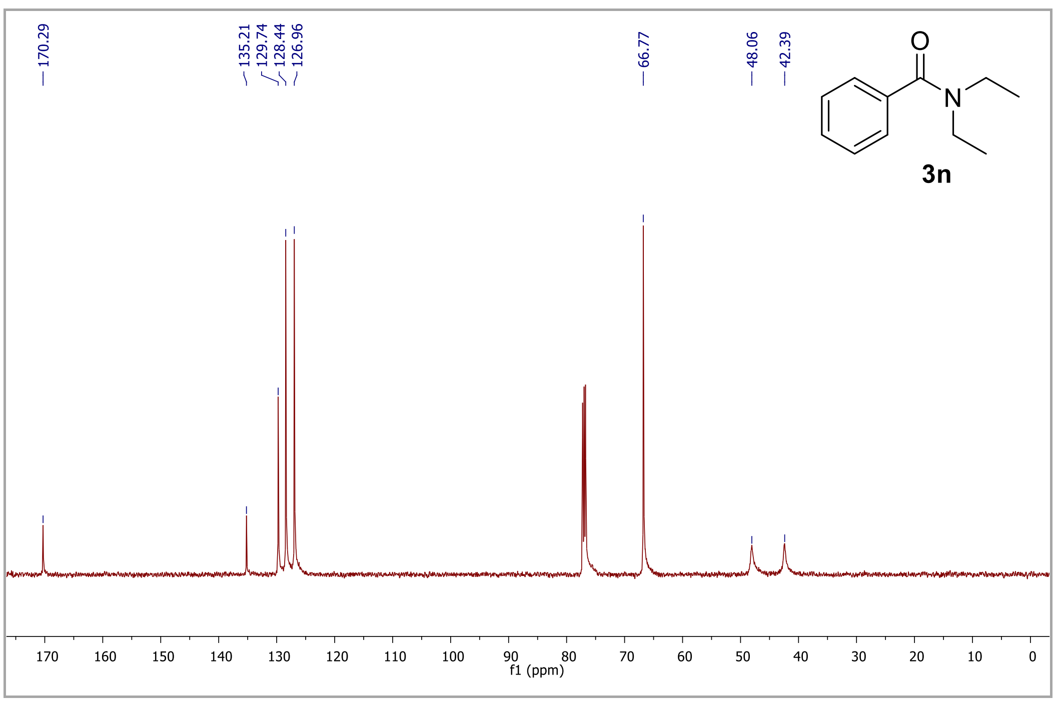
^1H NMR (500 MHz, $CDCl_3$) spectrum of **3m**.



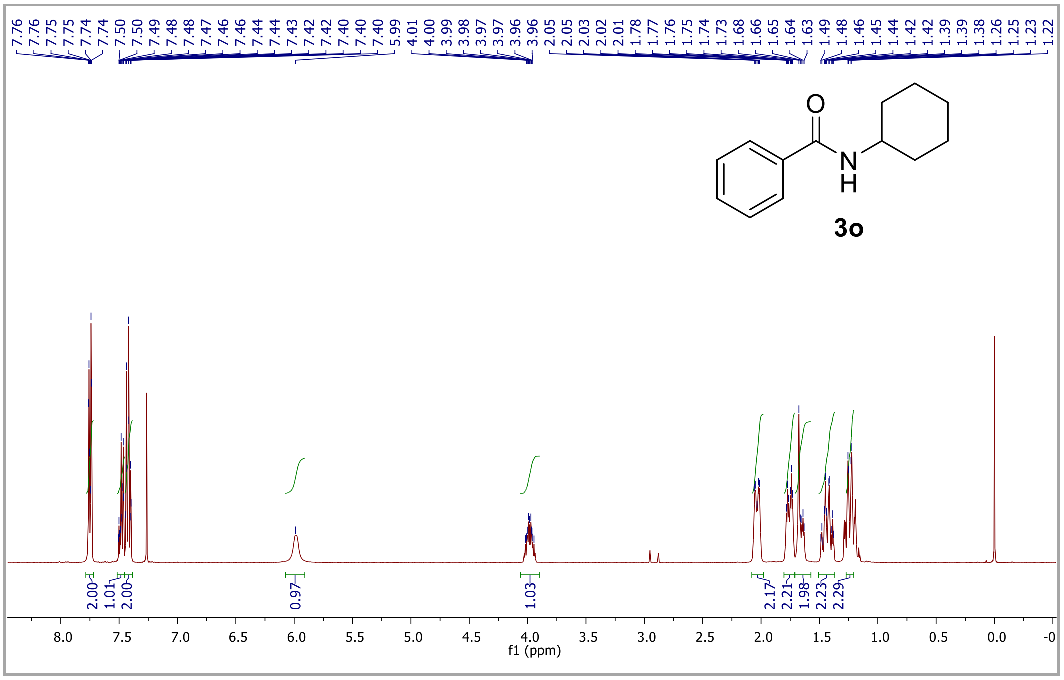
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3m**.



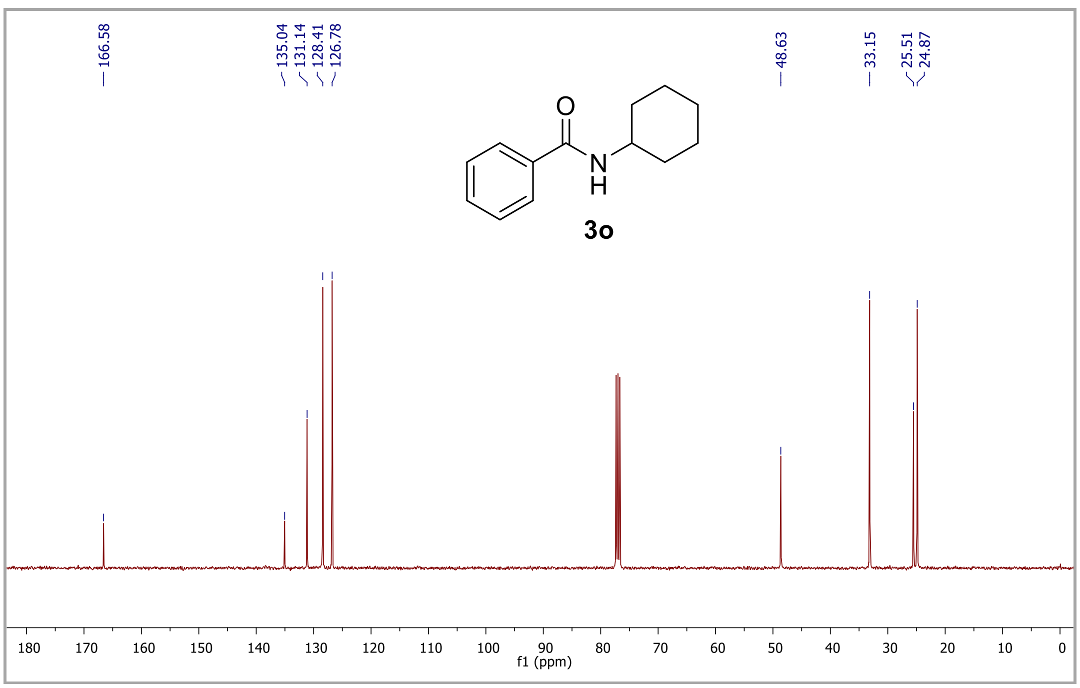
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **3n**.



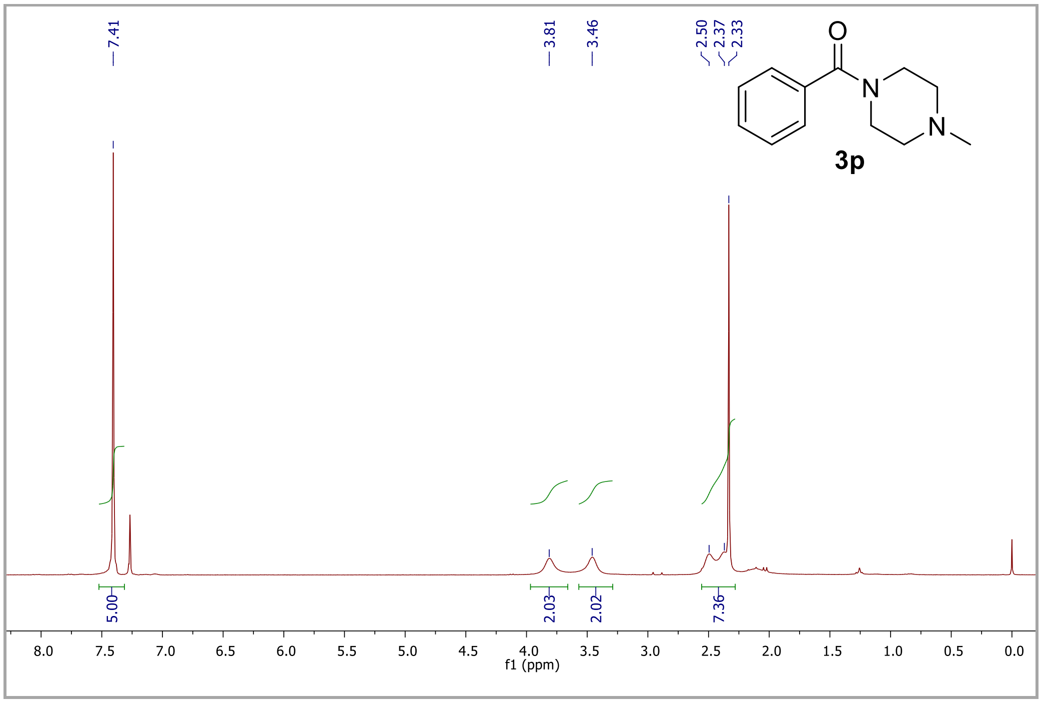
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3n**.



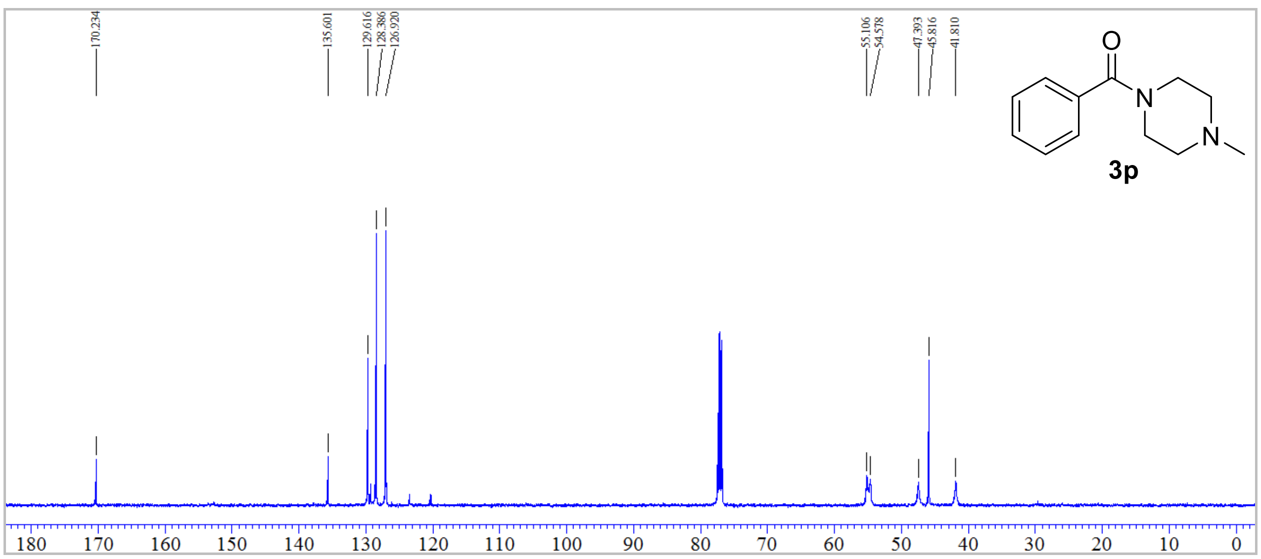
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3o**.



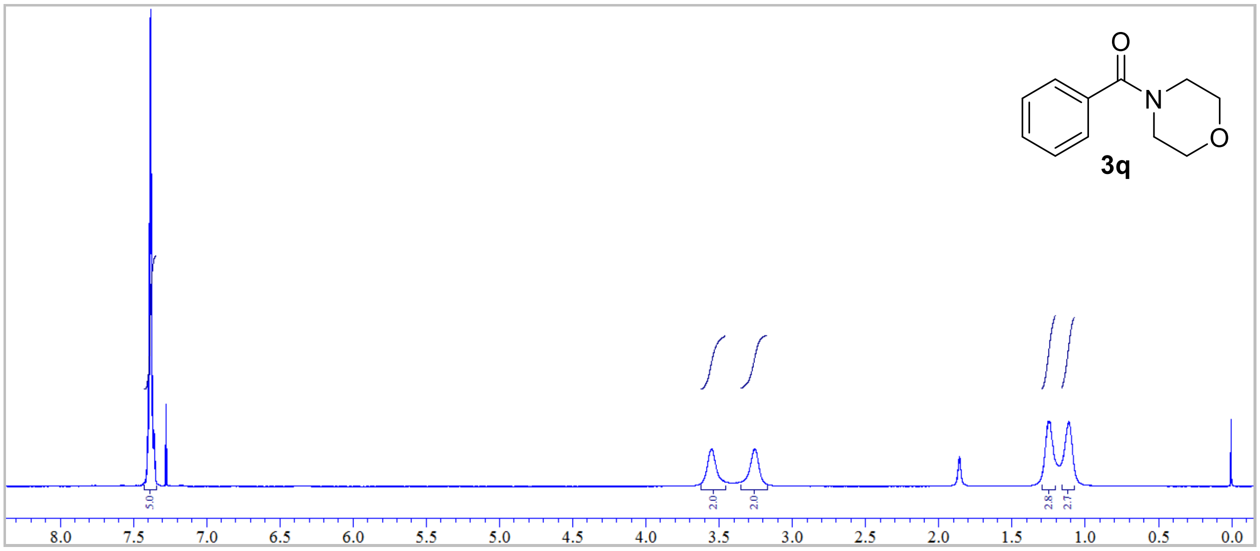
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **3o**.



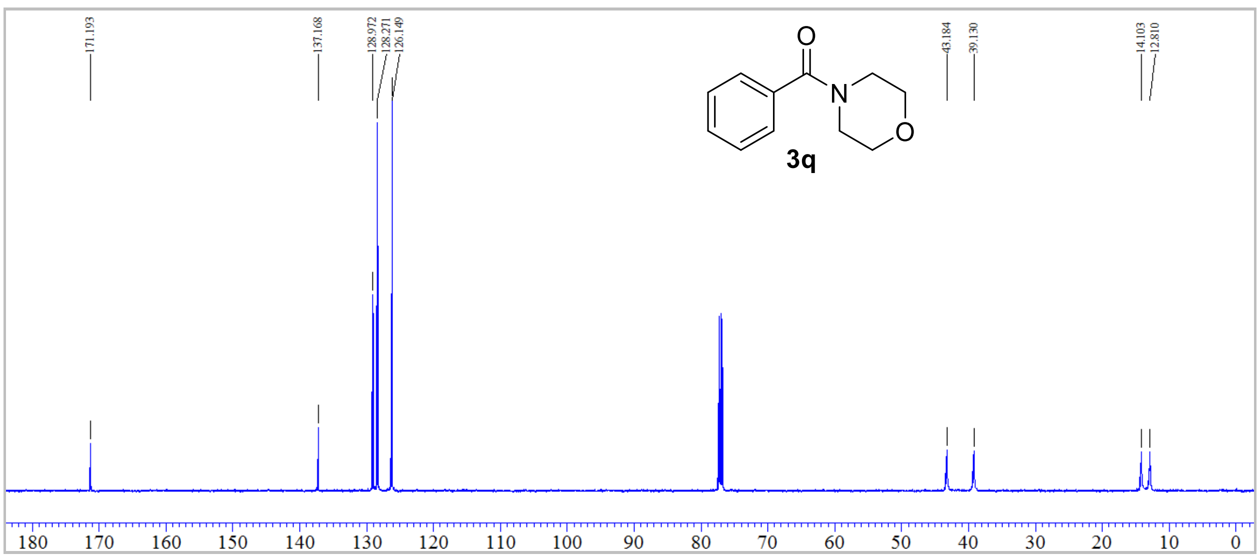
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **3p**.



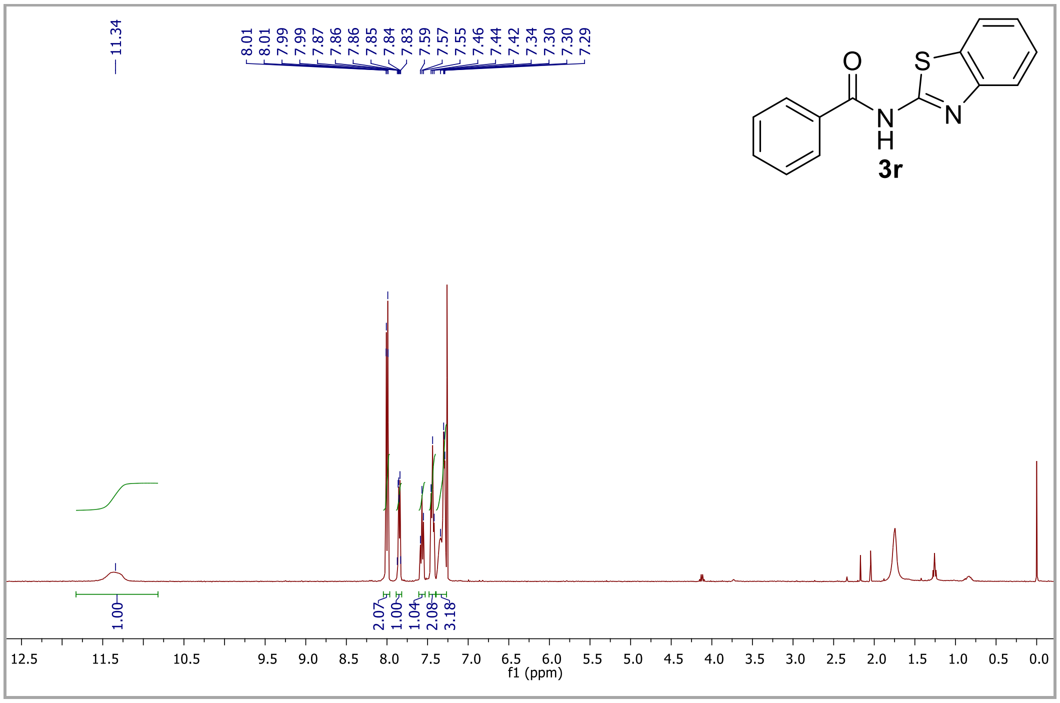
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3p**.



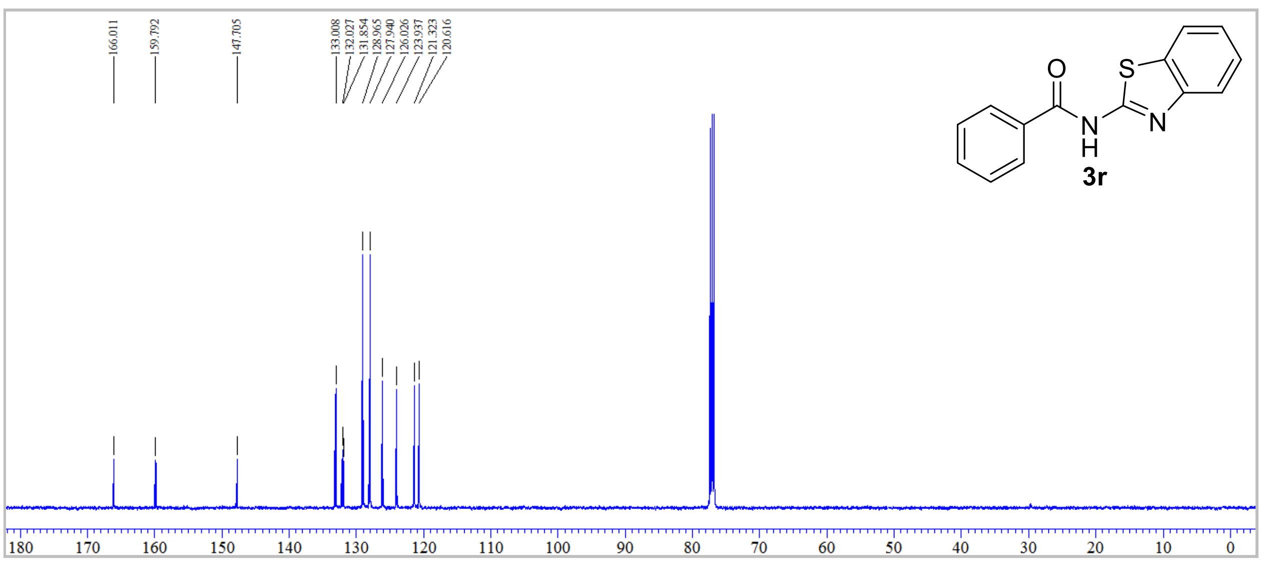
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **3q**.



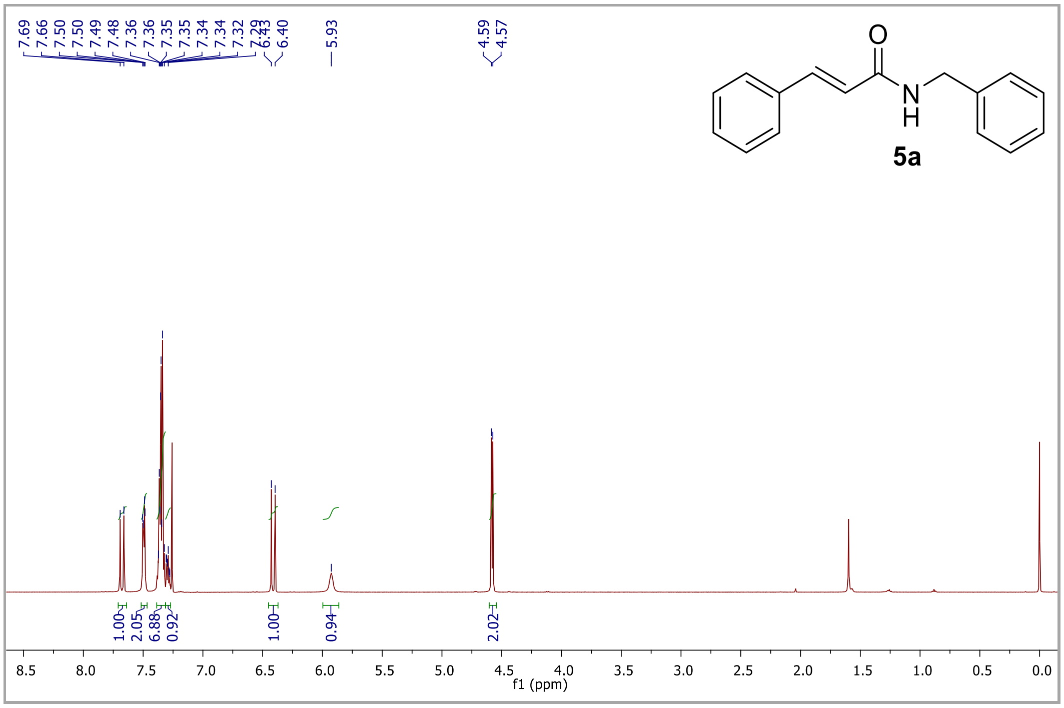
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3q**.



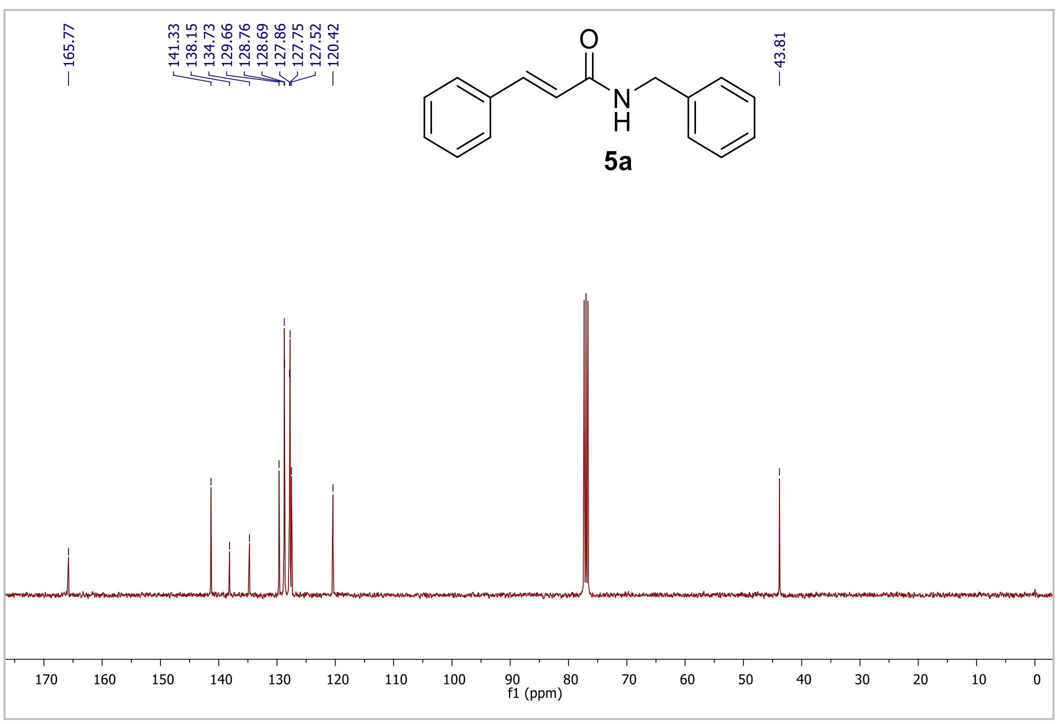
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3r**.



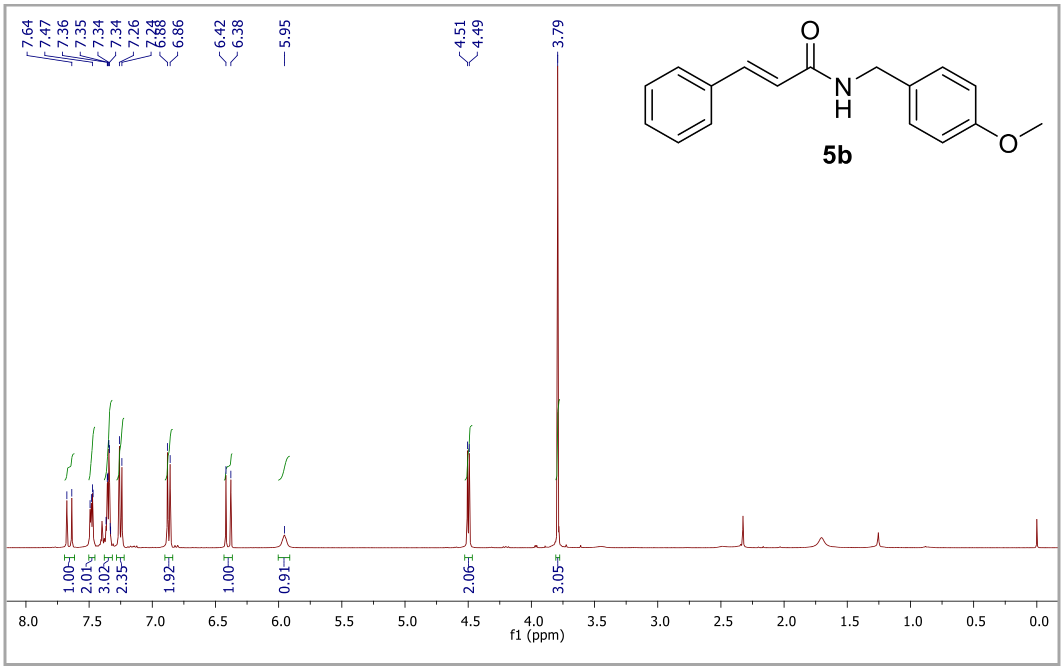
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **3r**.



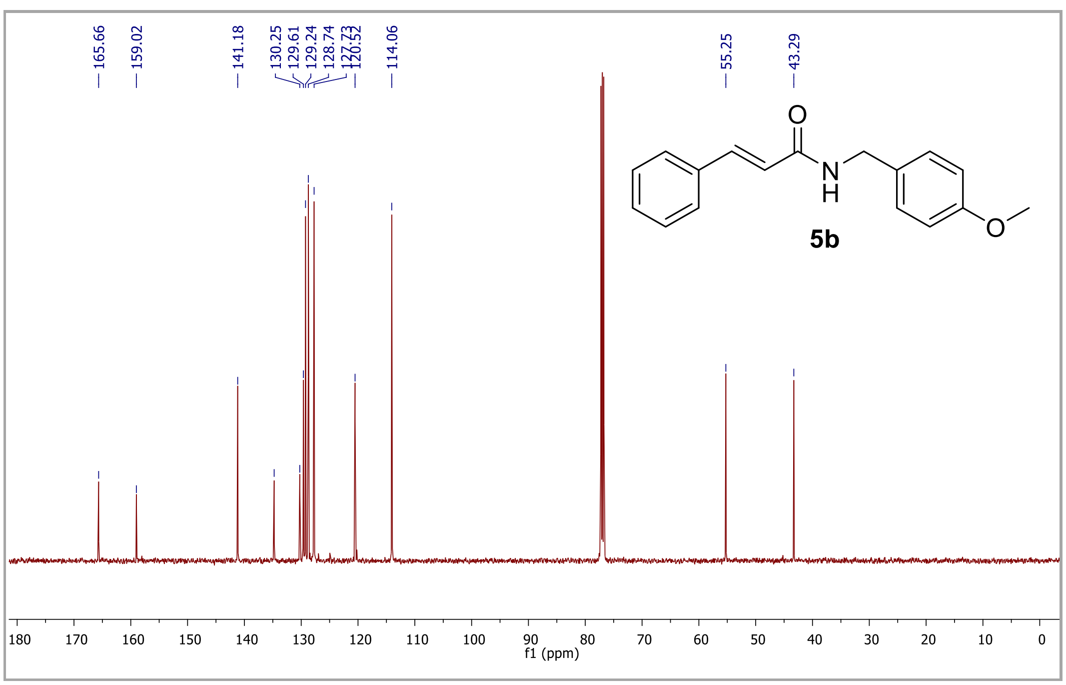
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5a**.



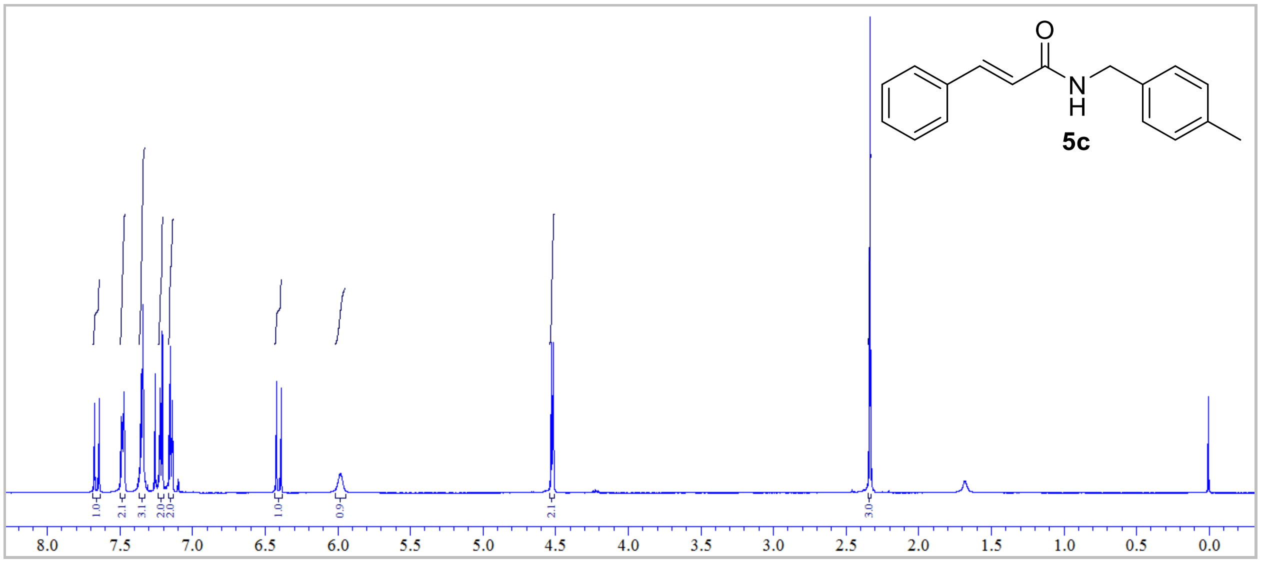
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5a**.



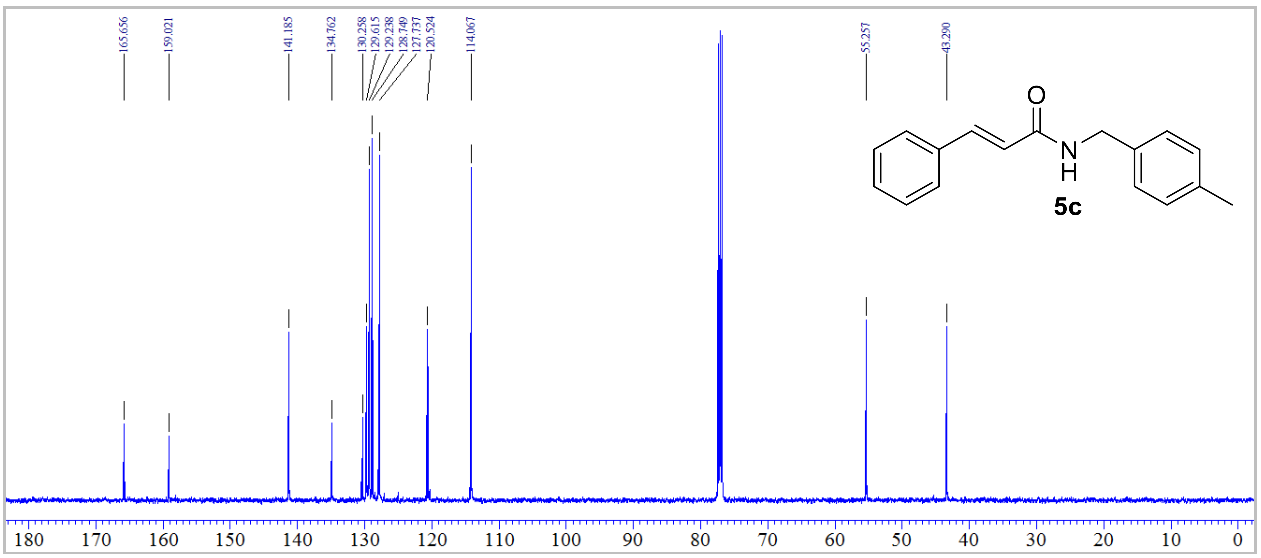
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5b**.



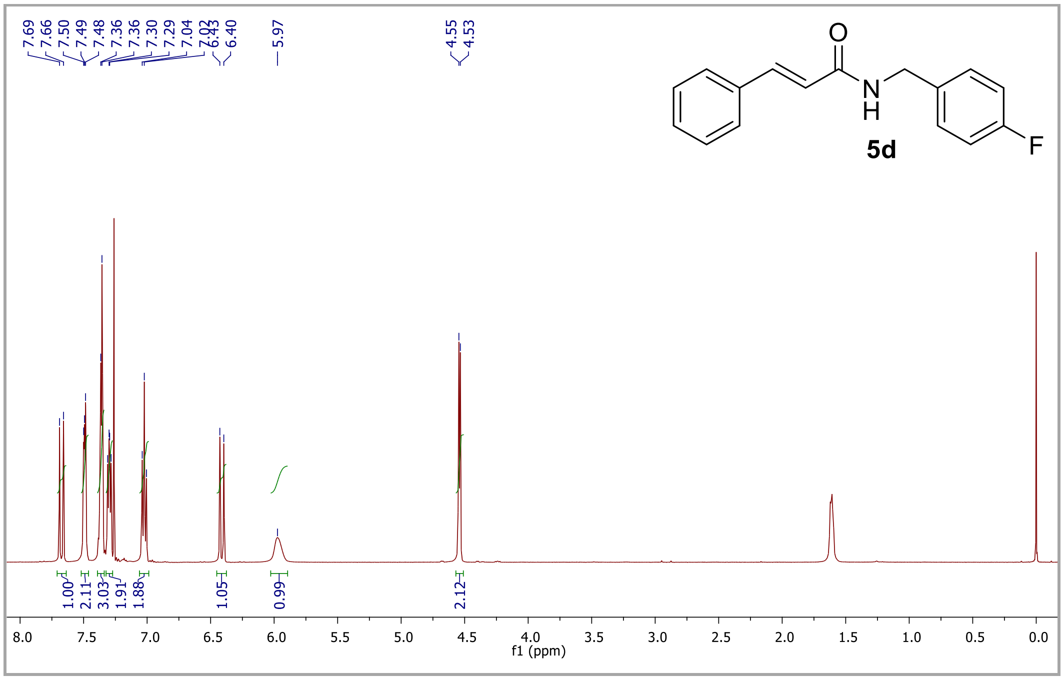
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5b**.



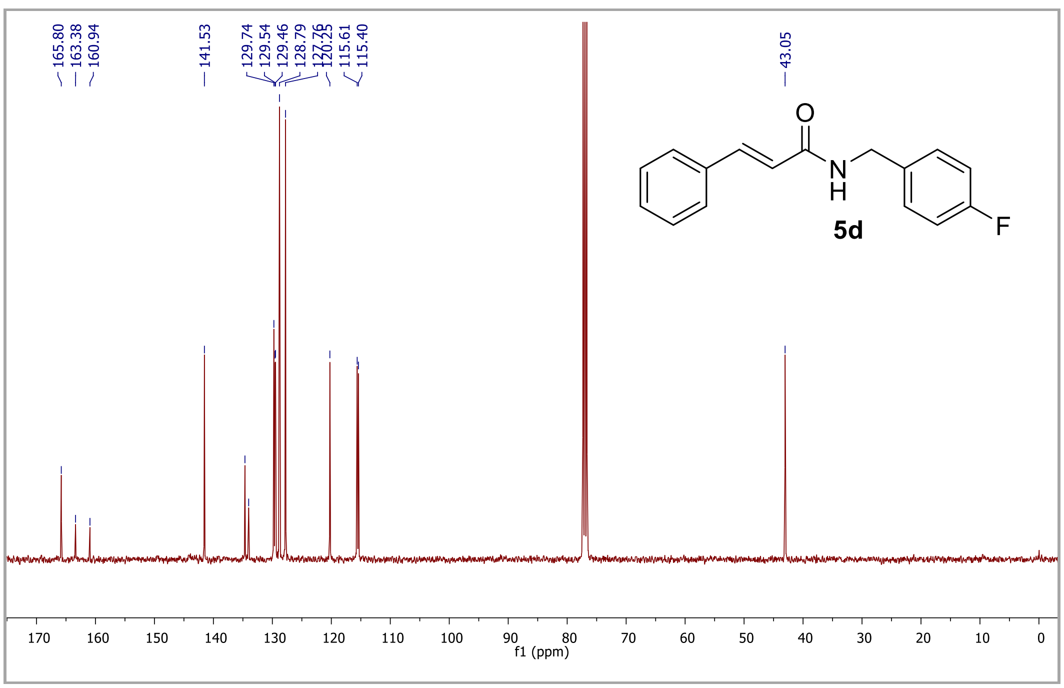
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5c**.



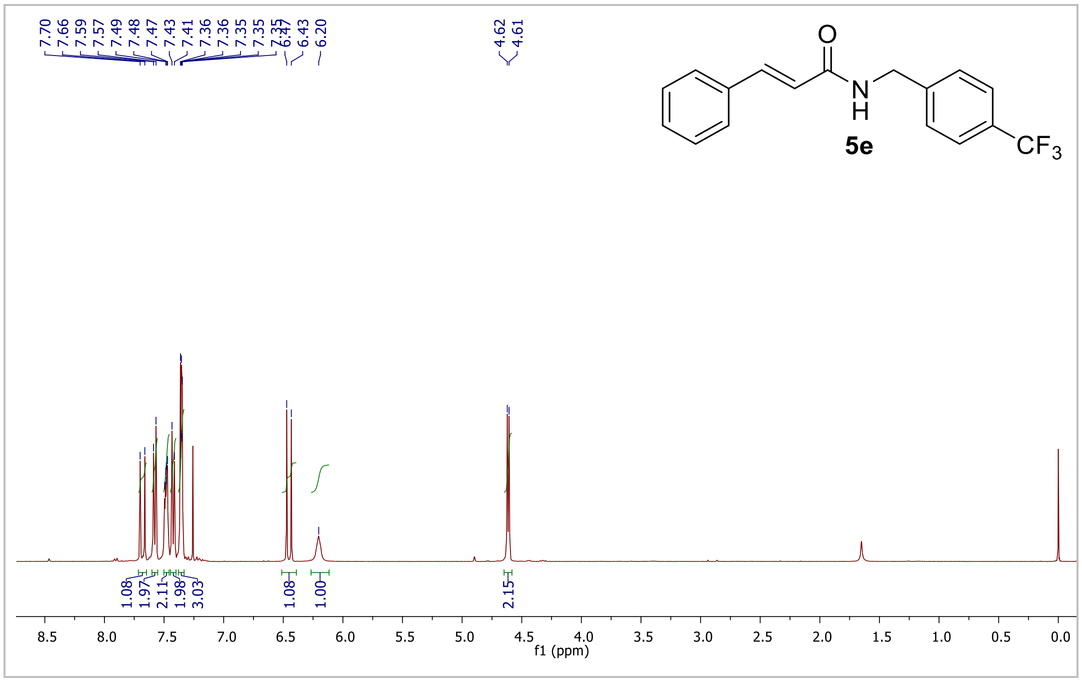
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5c**.



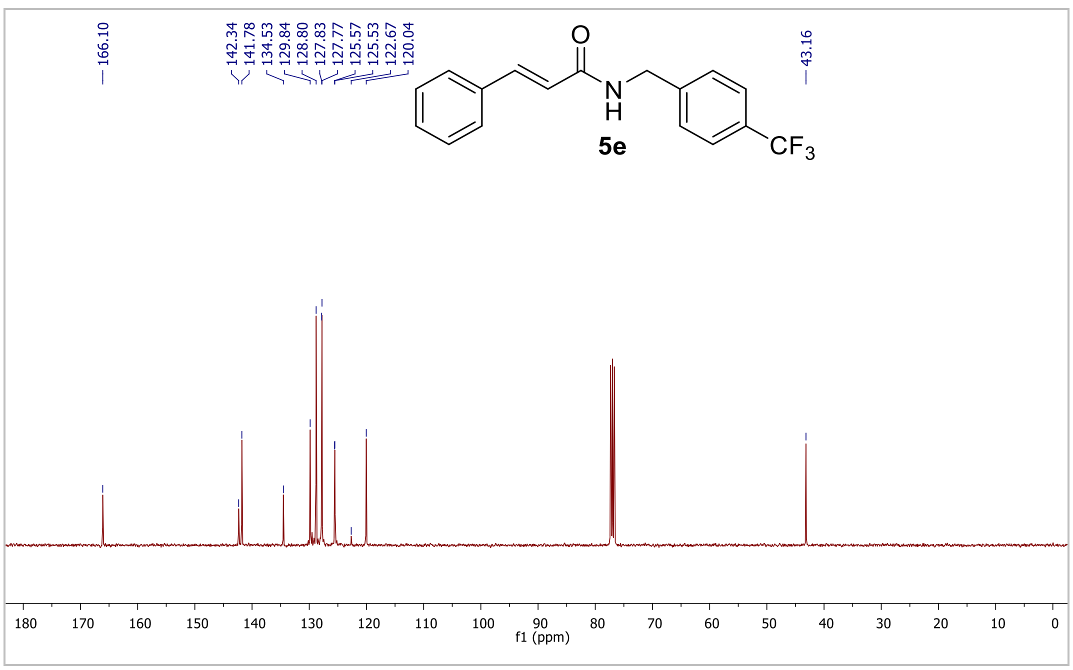
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5d**.



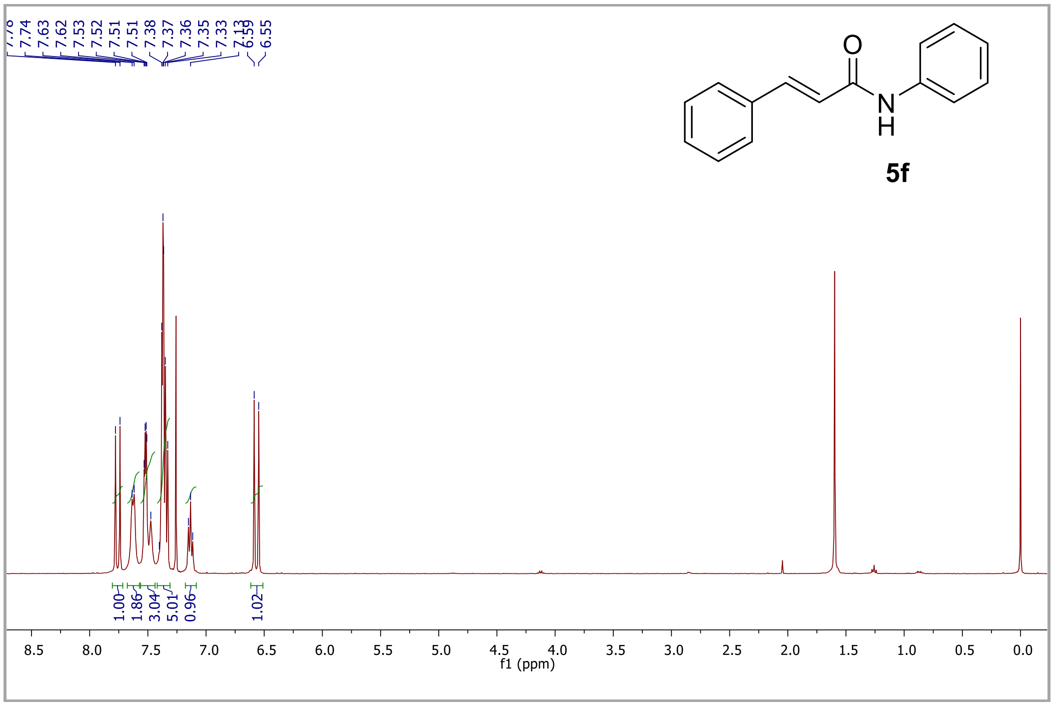
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5d**.



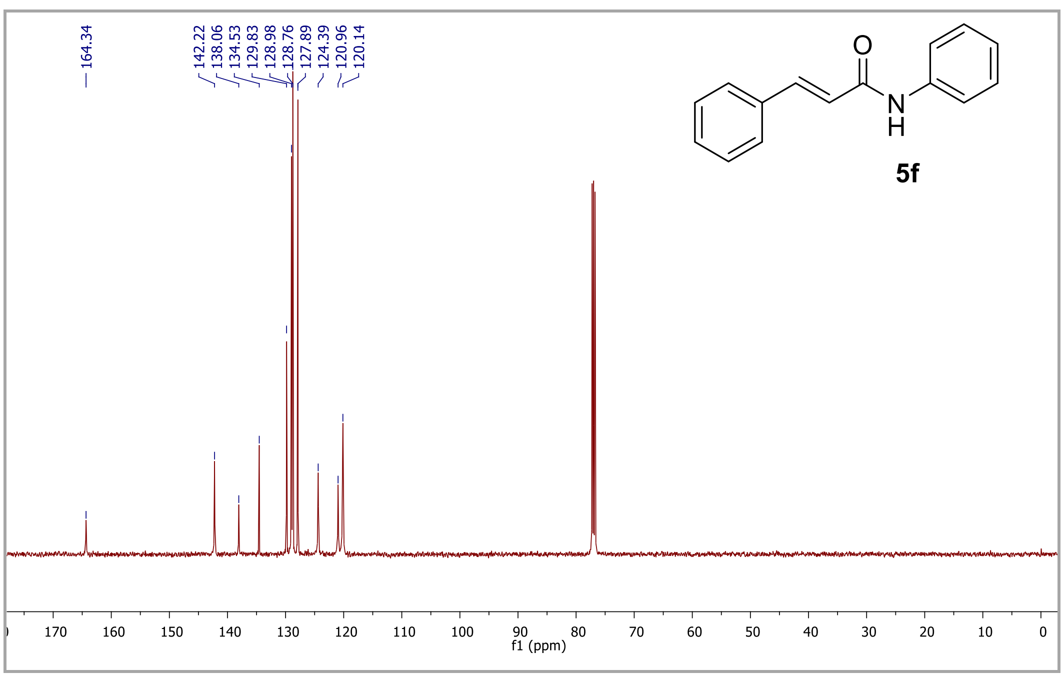
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5e**.



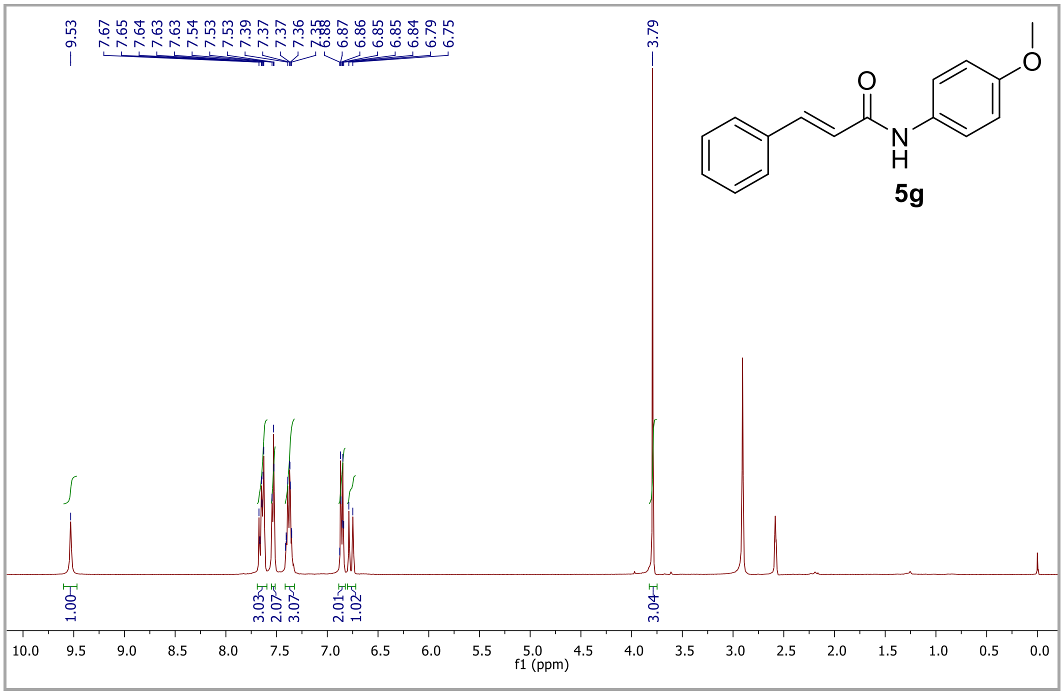
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5e**.



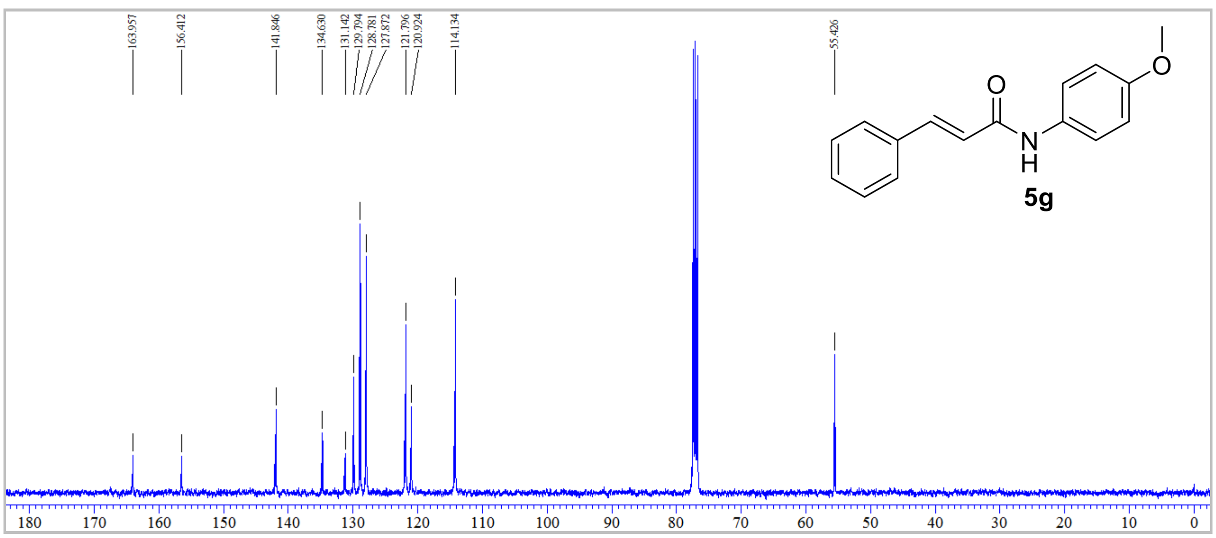
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5f**.



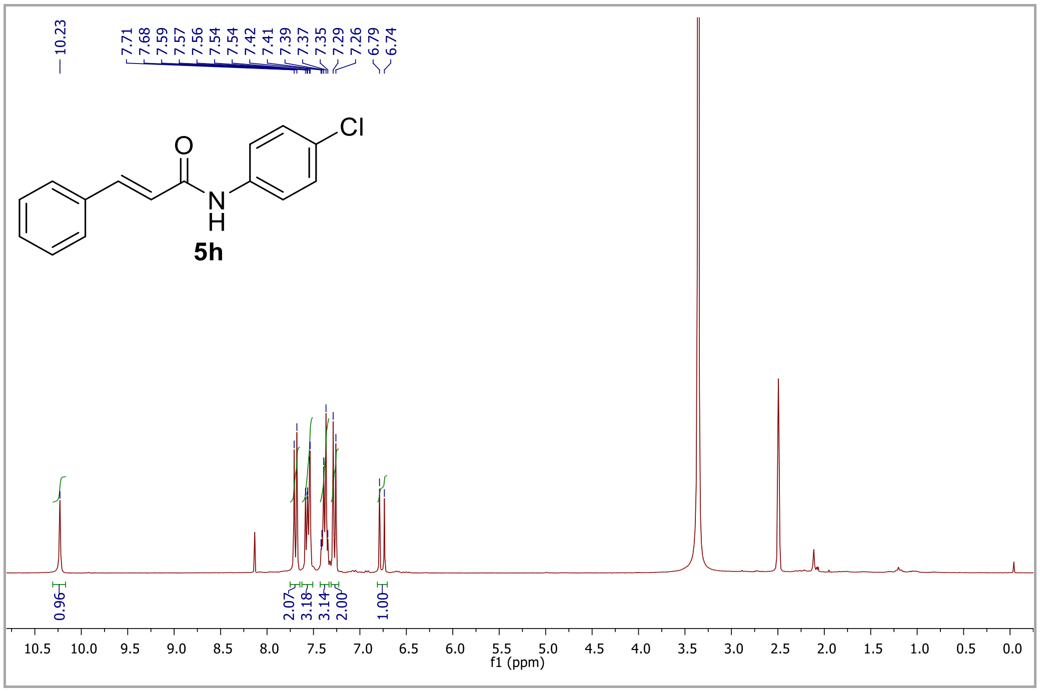
^{13}C NMR (125 MHz, $CDCl_3$) spectrum **5f**.



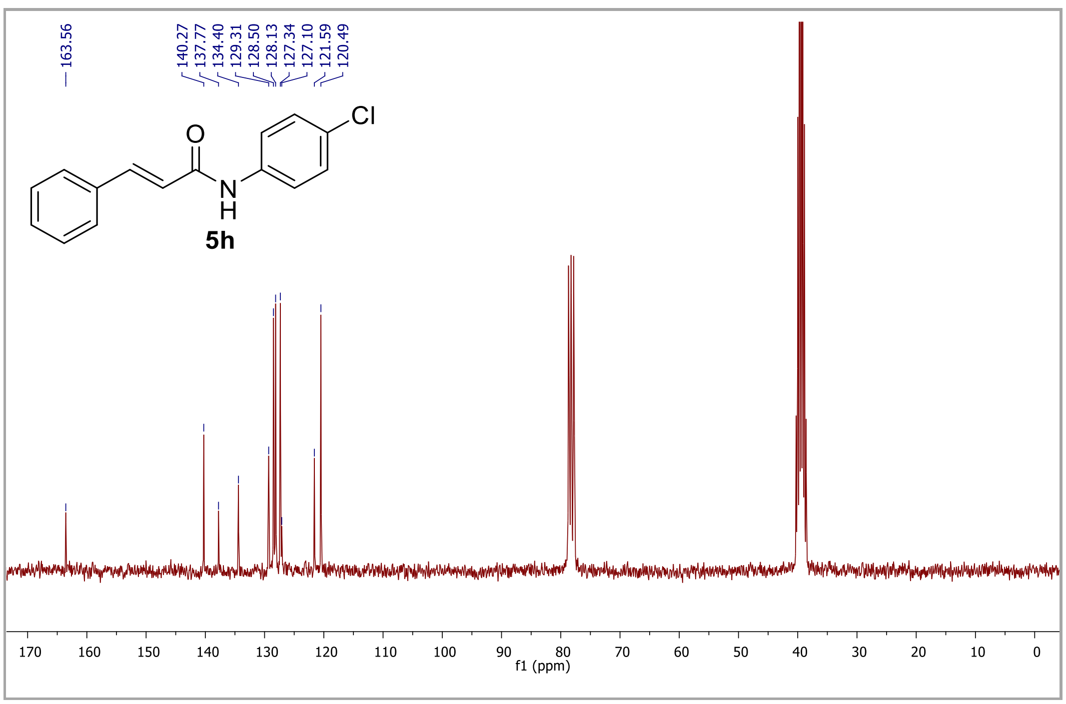
^{1}H NMR (400 MHz, DMSO-d_6) spectrum of **5g**.



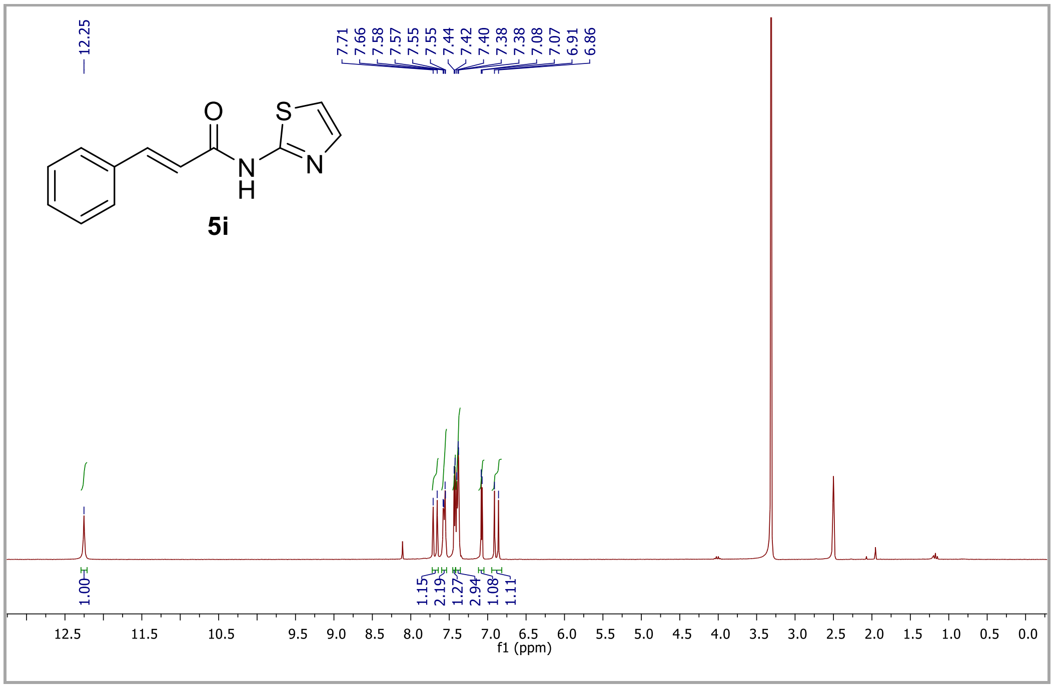
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5g**.



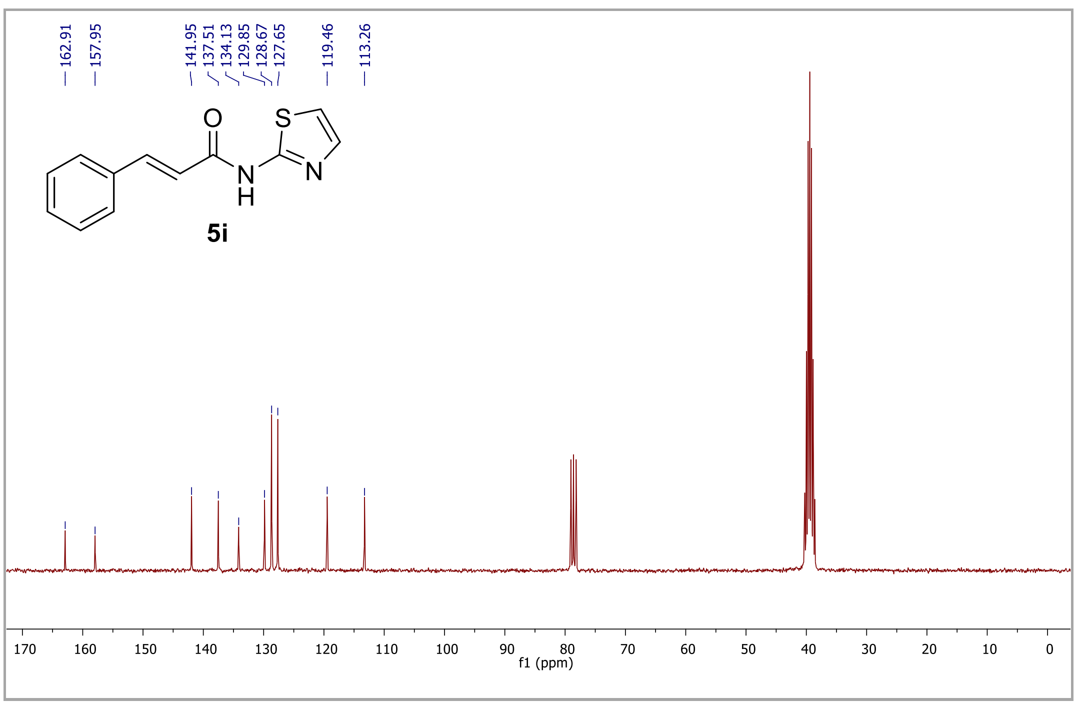
^{1}H NMR (400 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5h**.



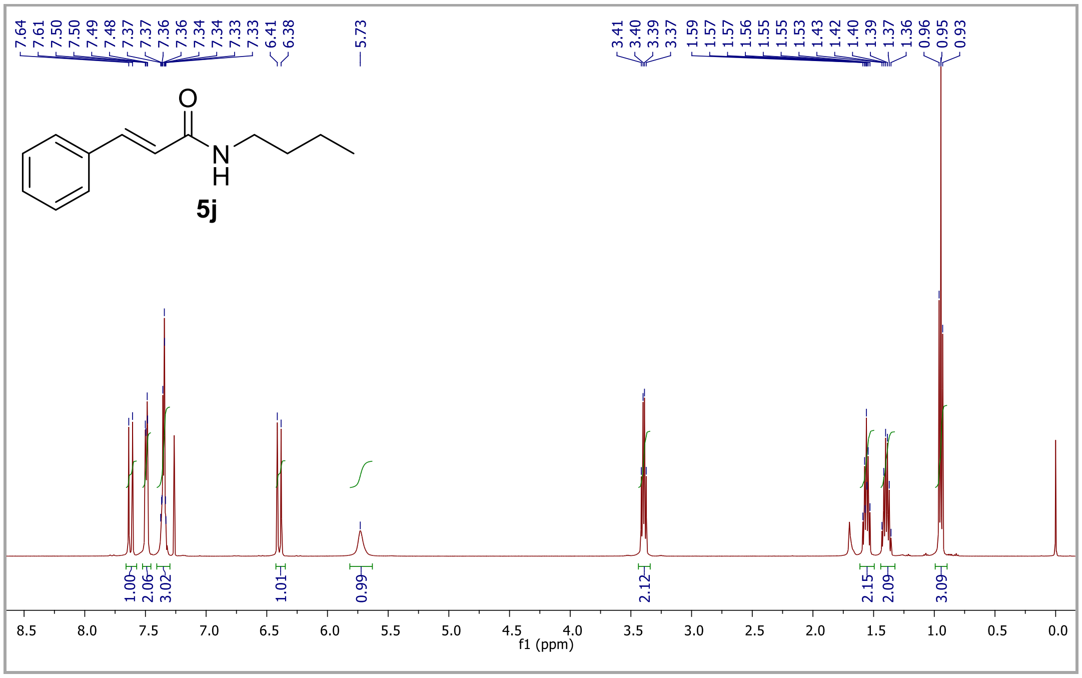
^{13}C NMR (75 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5h**.



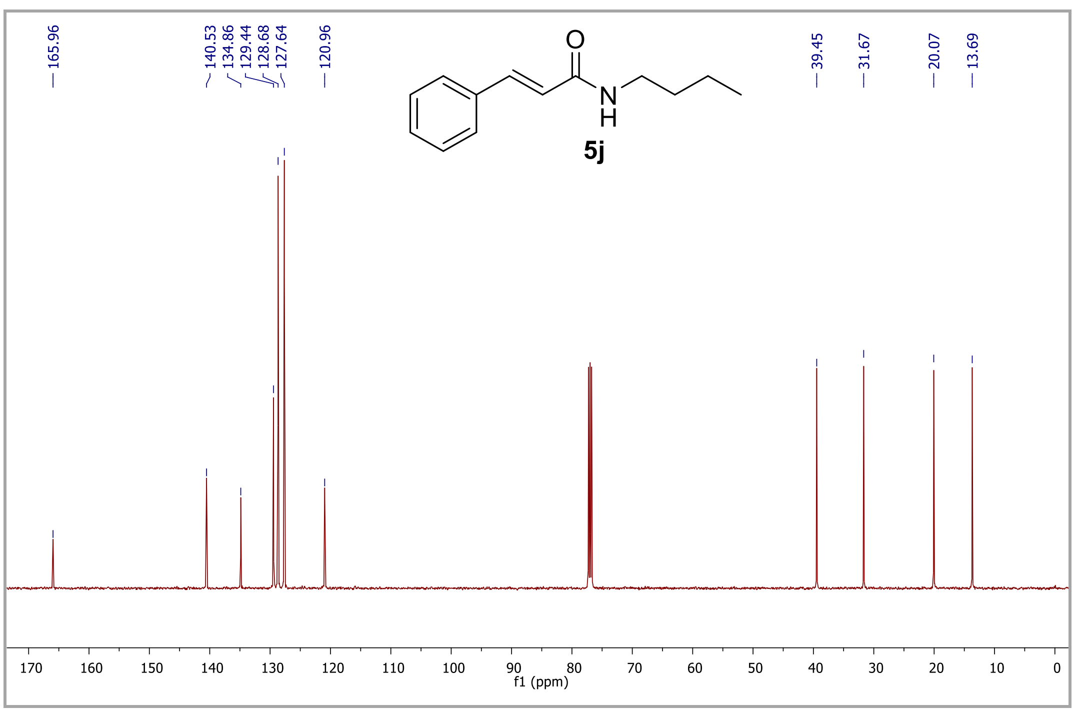
[1]H NMR (300 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5i**.



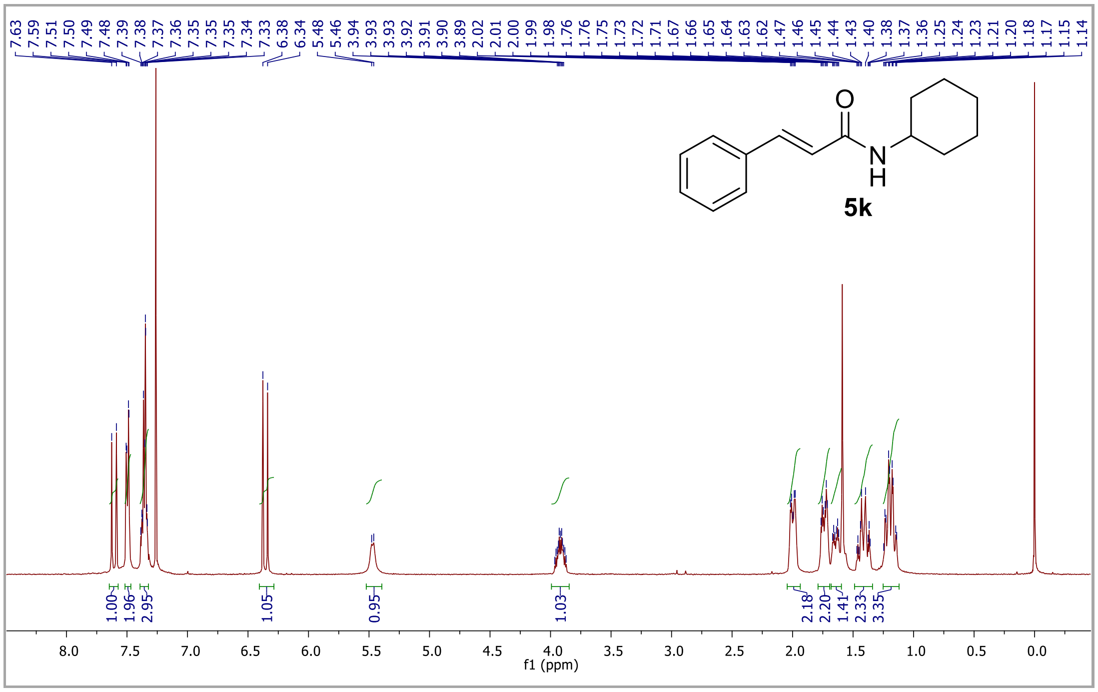
[13]C NMR (125 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5i**.



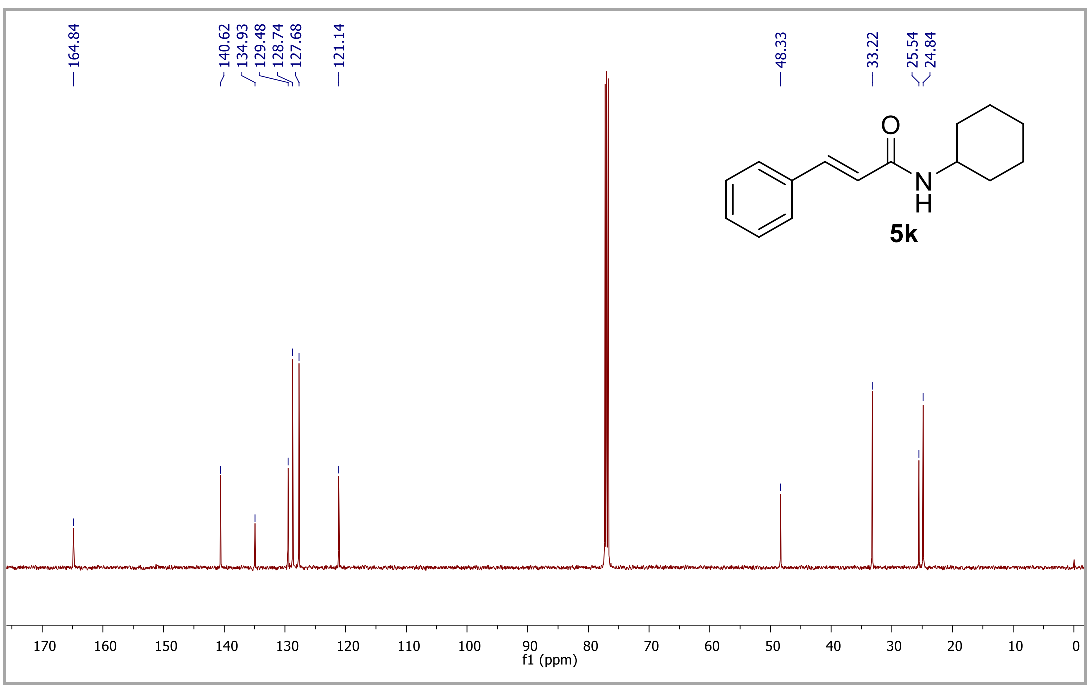
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5j**.



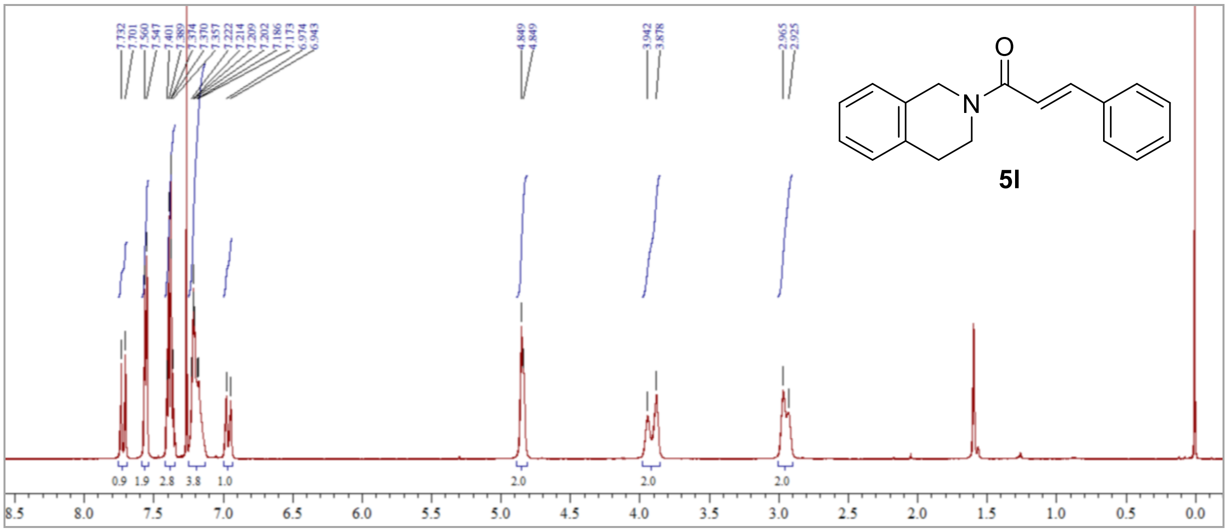
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5j**.



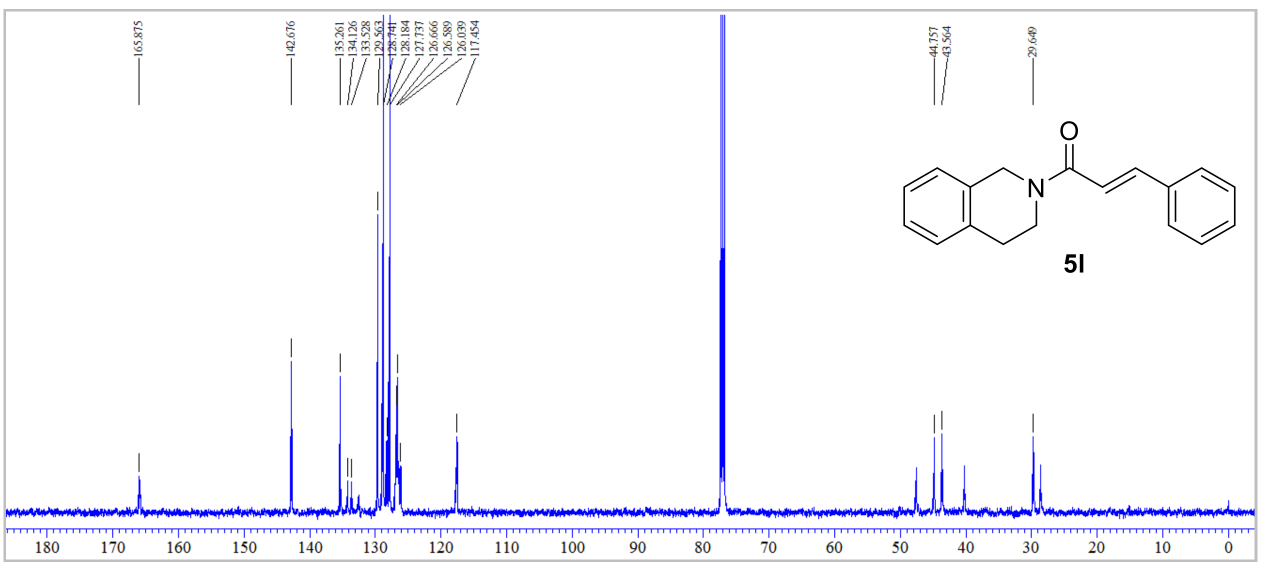
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5k**.



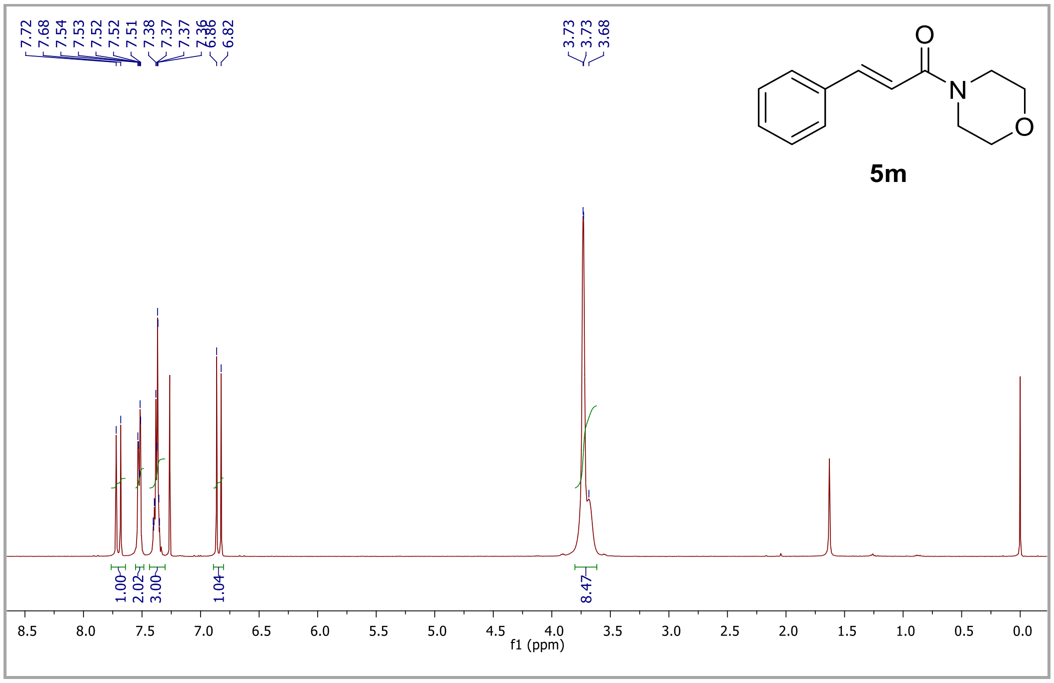
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5k**.



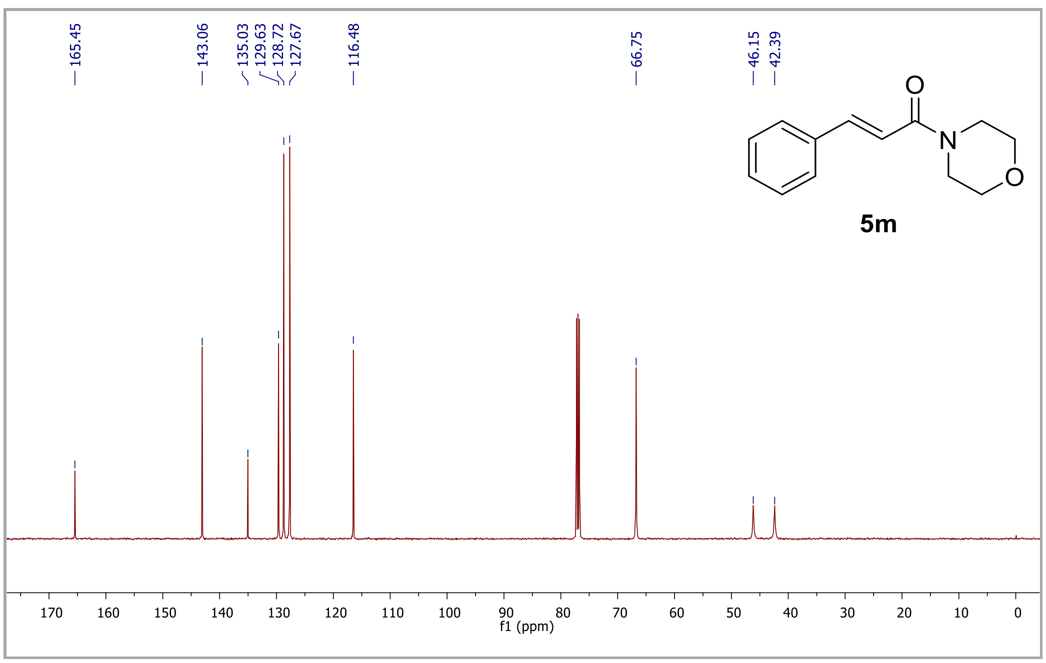
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5l**.



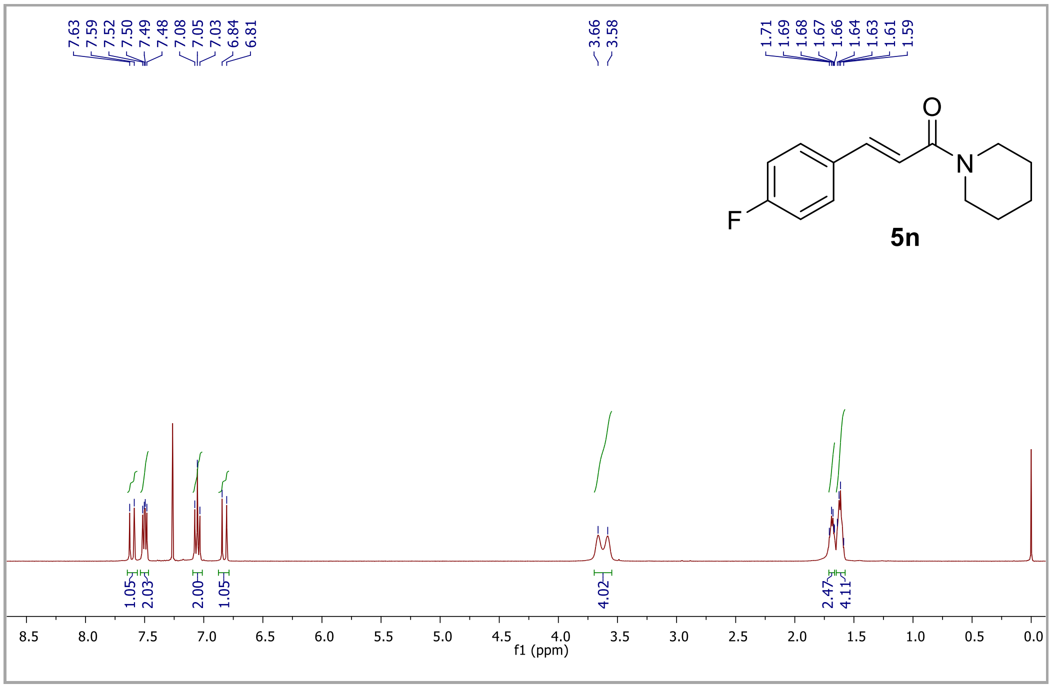
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5l**.



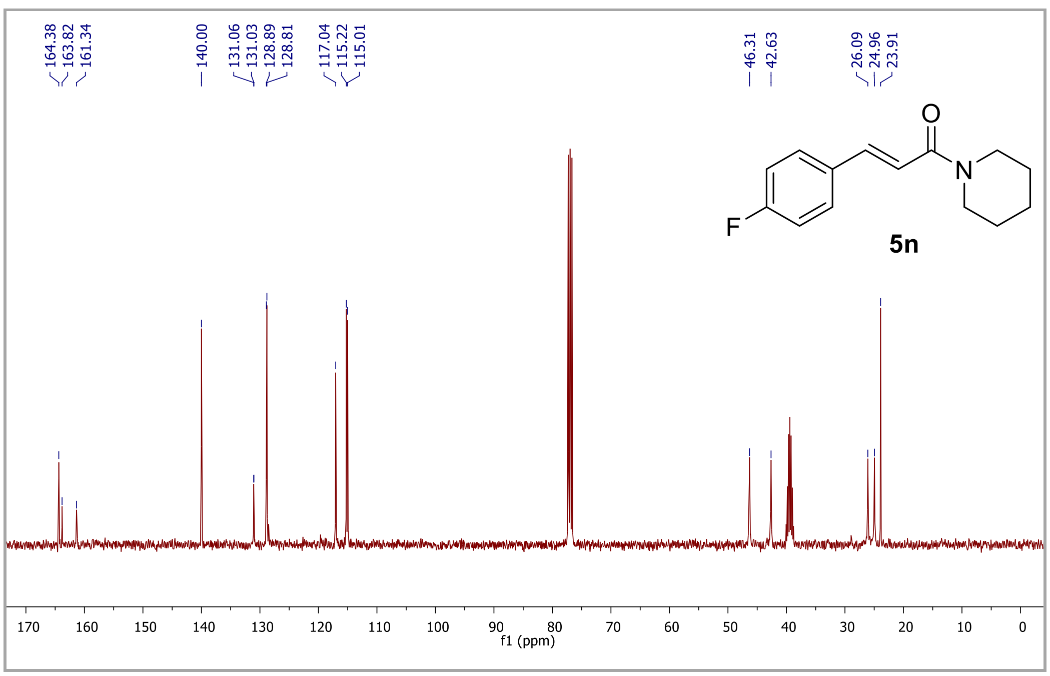
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5m**.



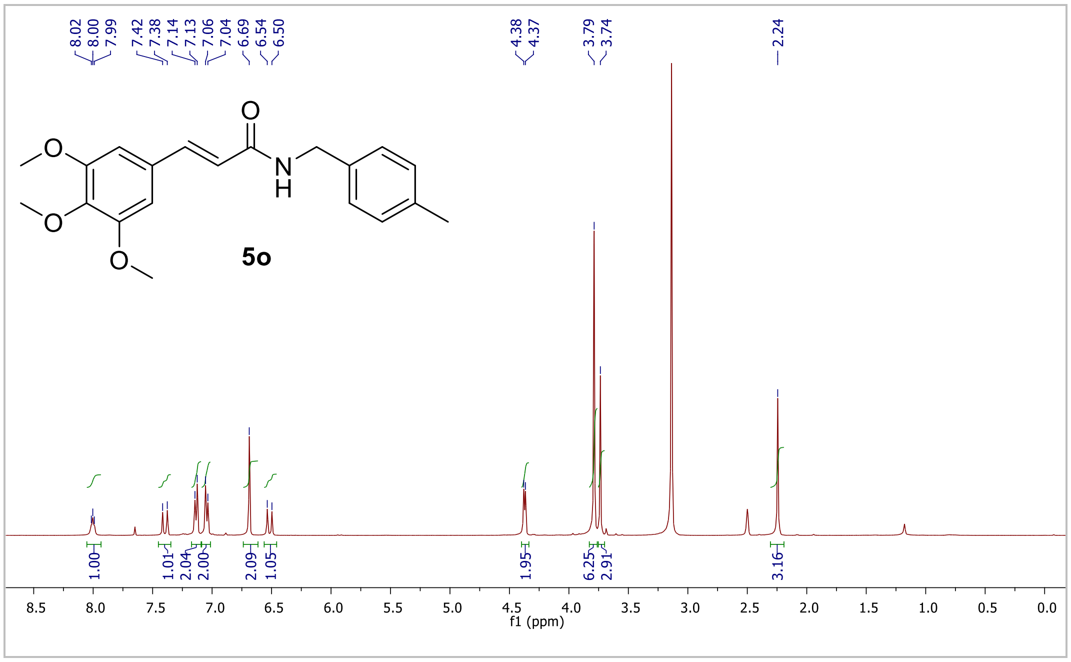
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5m**.



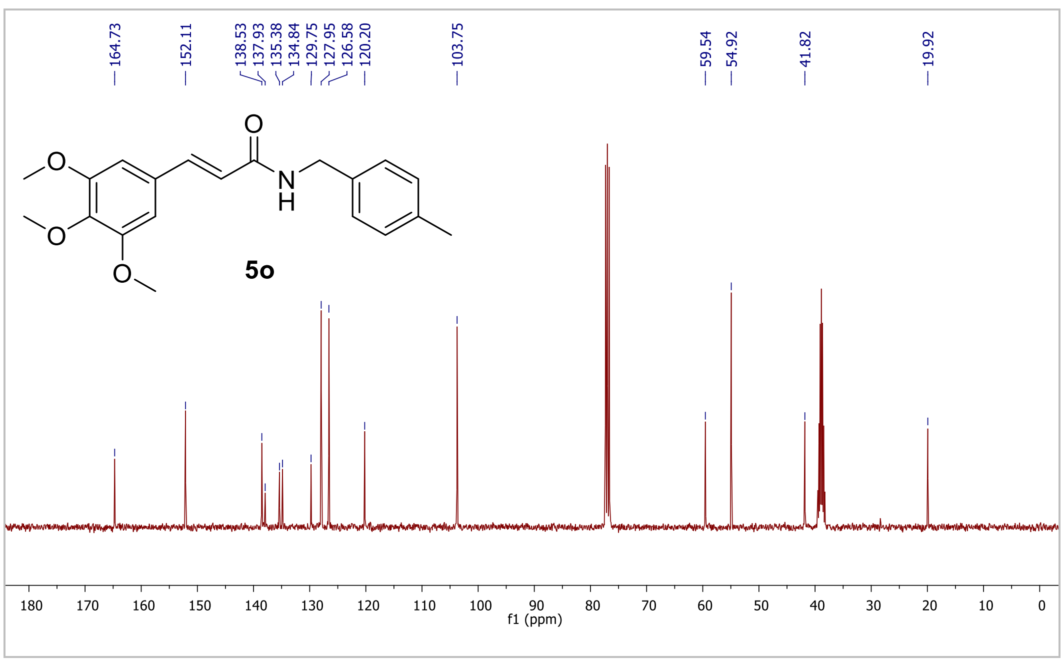
[1]H NMR (400 MHz, $CDCl_3$) spectrum of **5n**.



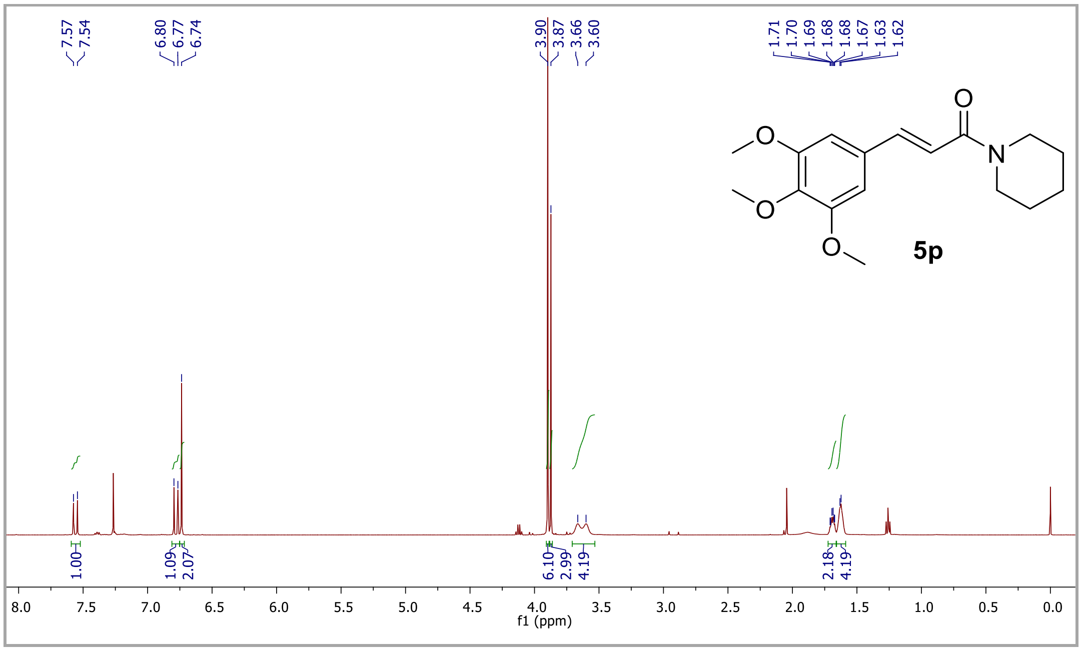
[13]C NMR (100 MHz, $CDCl_3$) spectrum of **5n**.



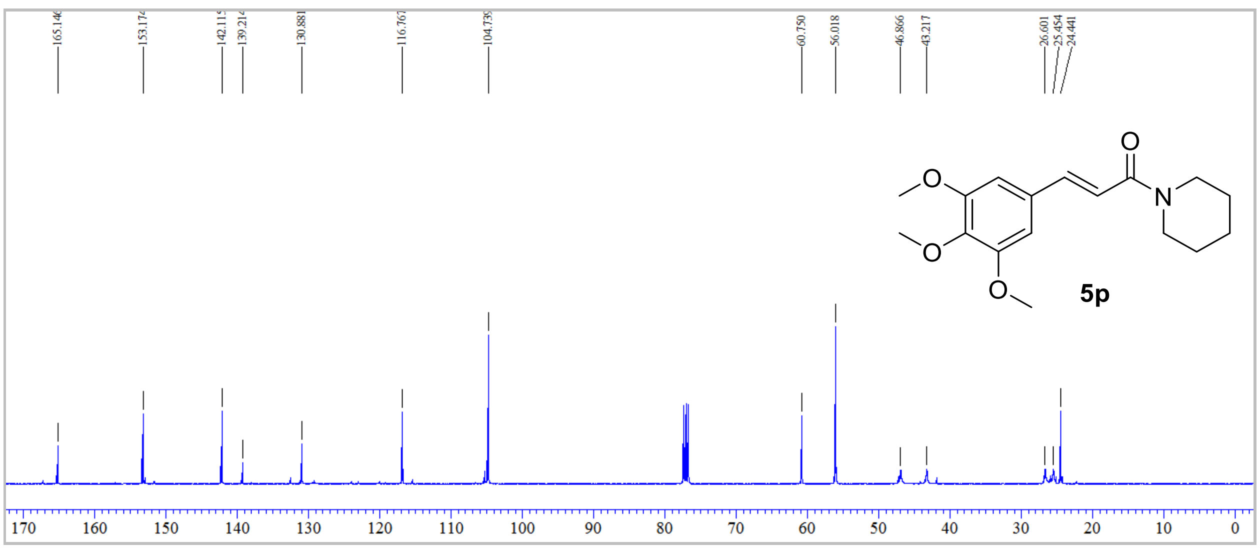
^{1}H NMR (400 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5o**.



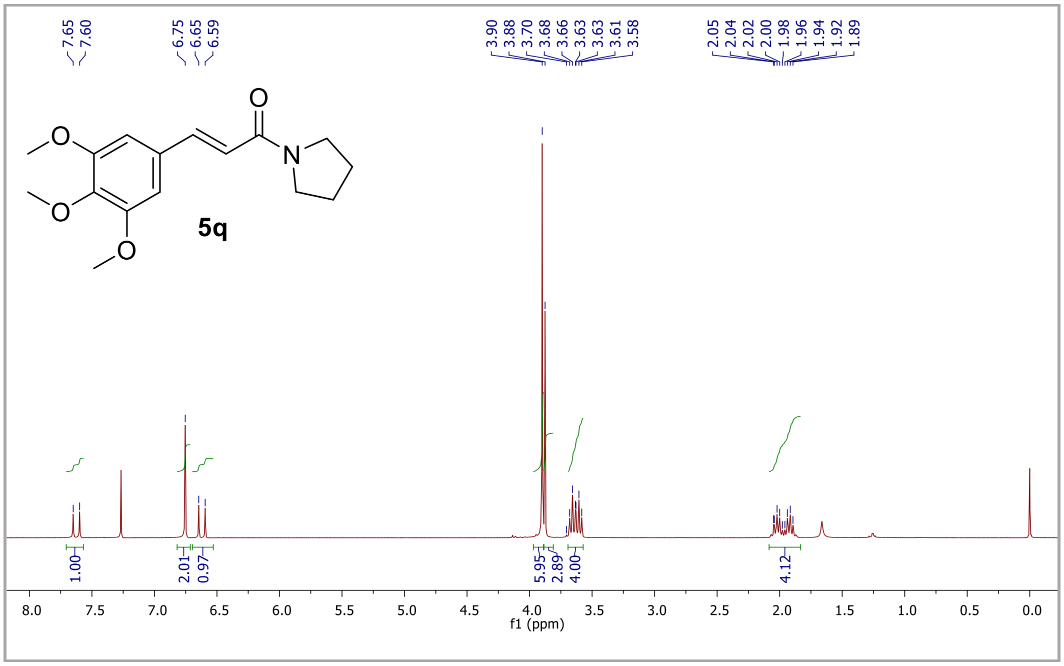
^{13}C NMR (125 MHz, $CDCl_3$ + DMSO-d_6) spectrum of **5o**.



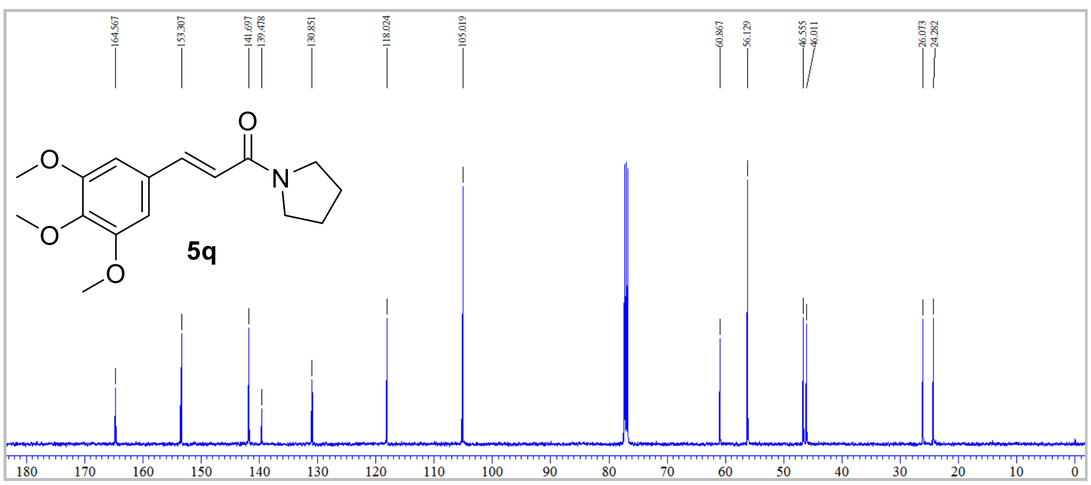
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5p**.



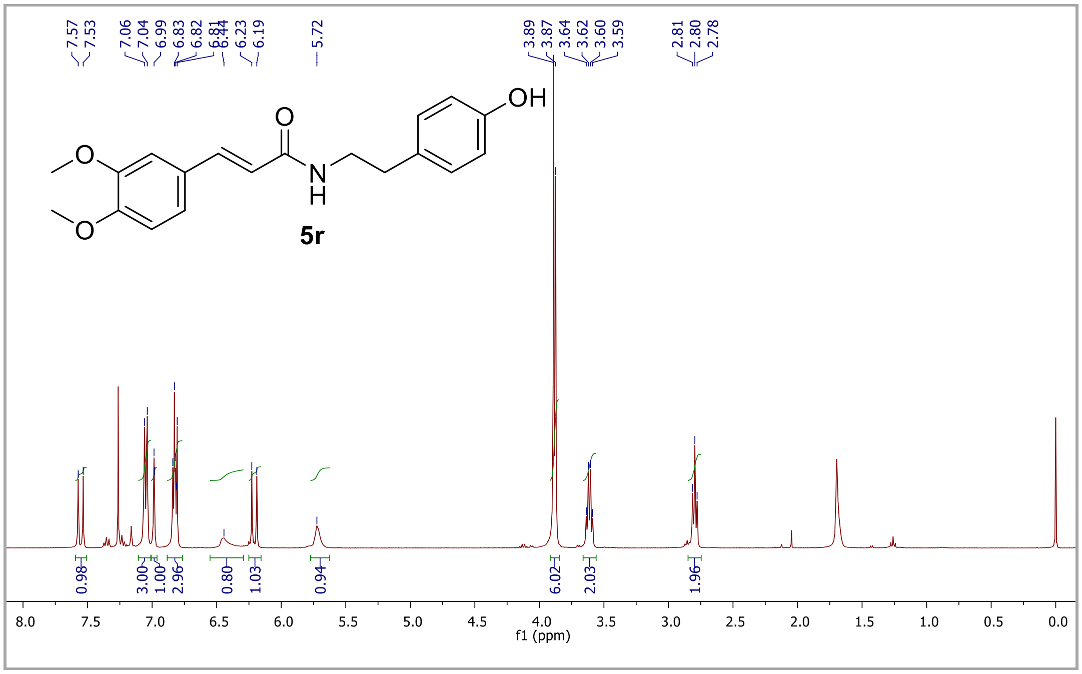
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5p**.



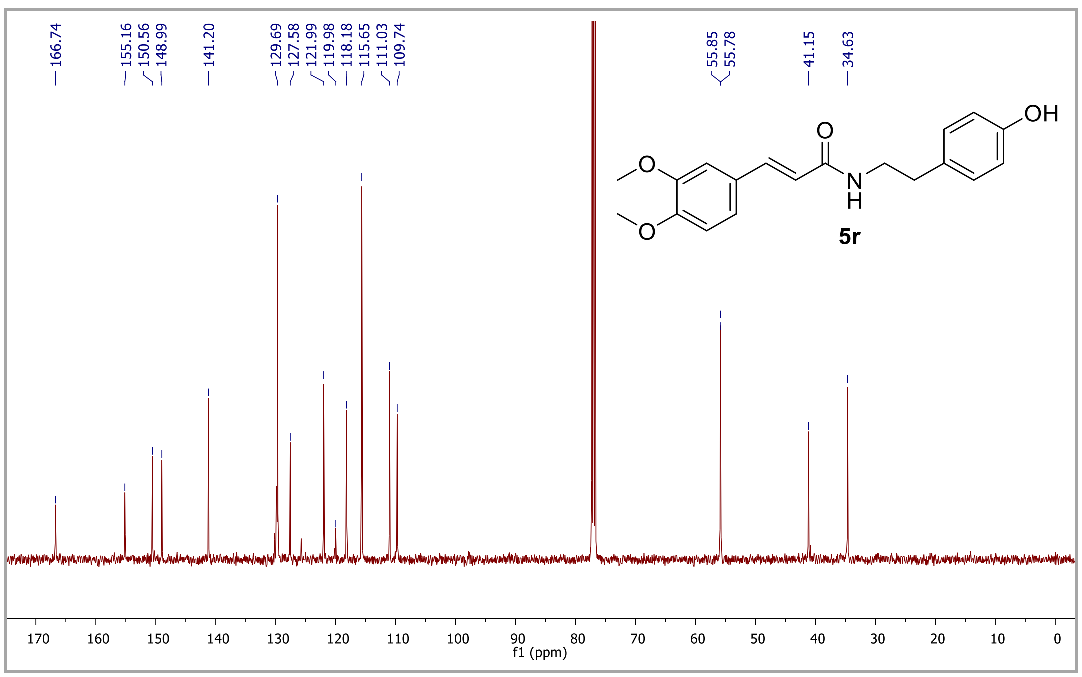
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **5q**.



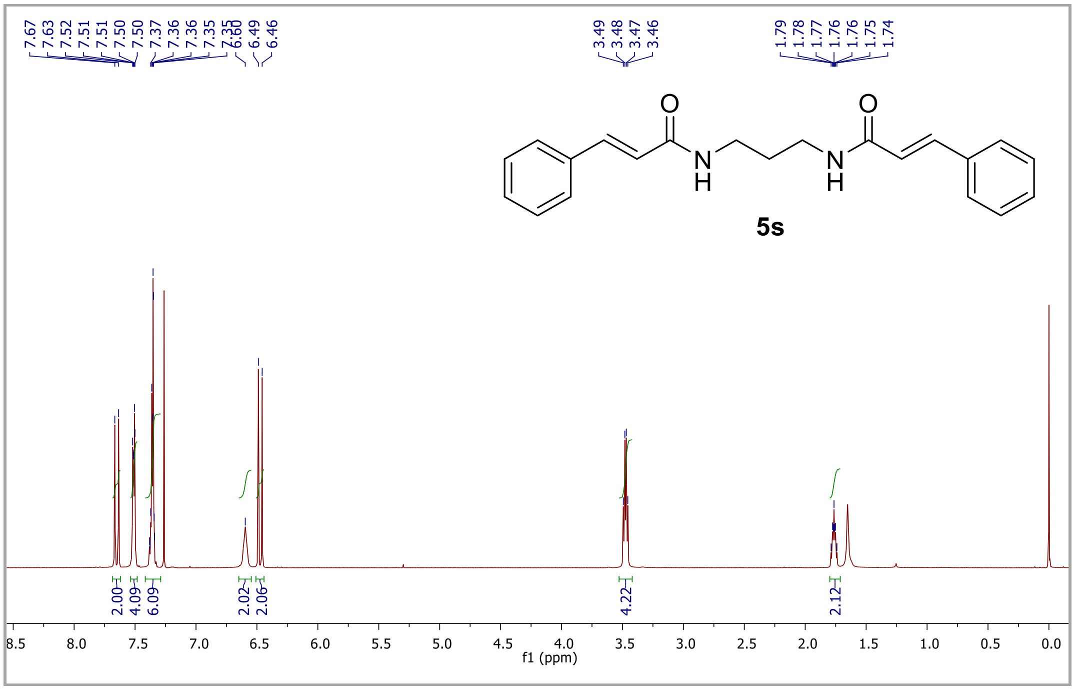
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5q**.



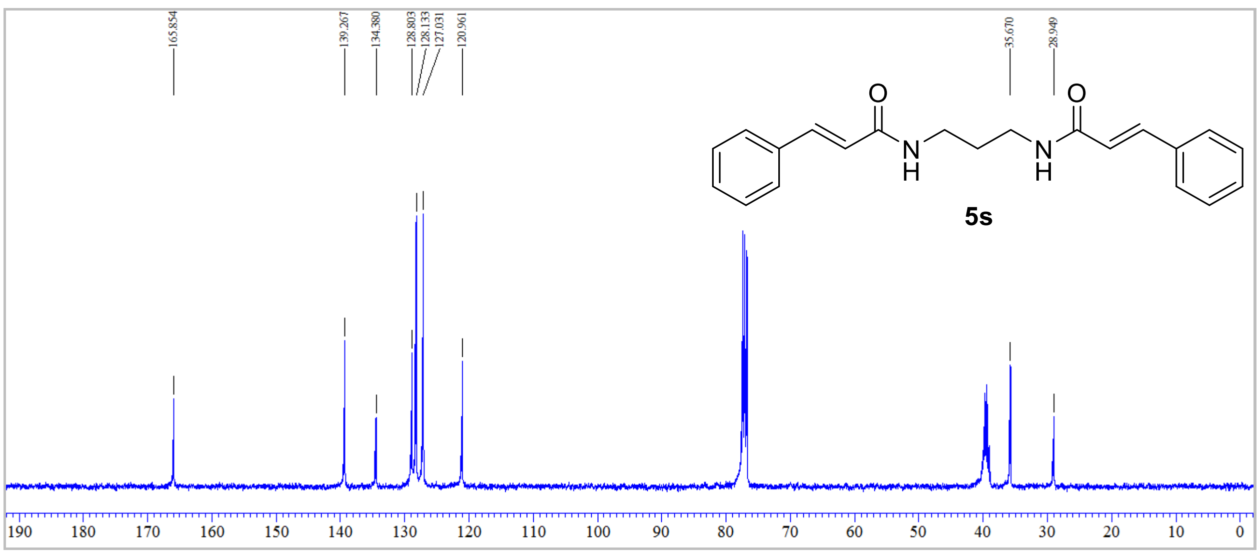
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5r**.



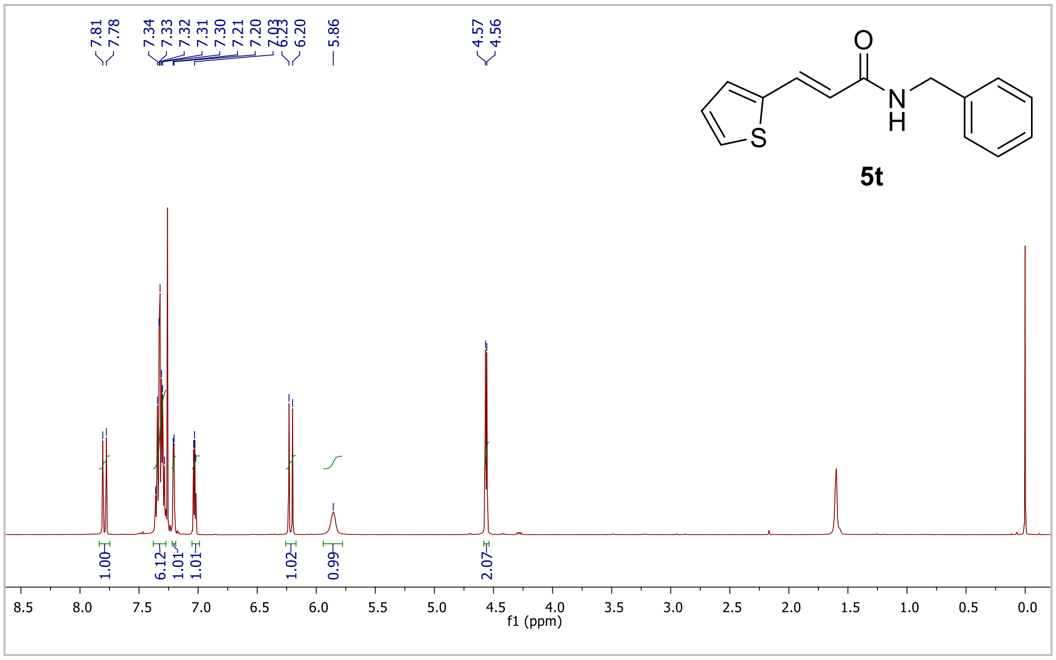
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5r**.



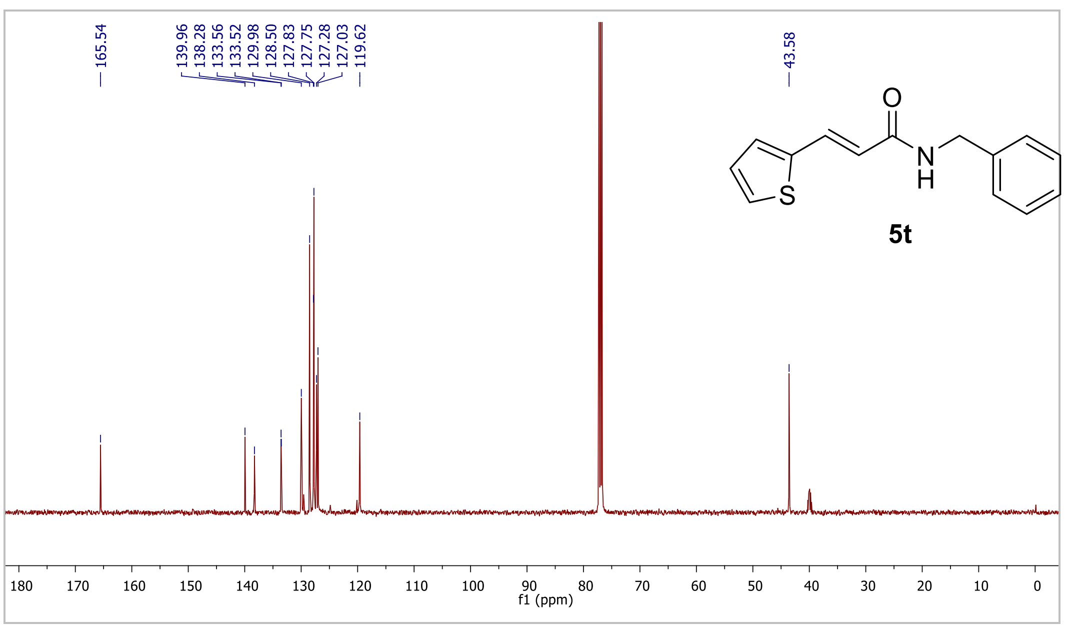
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5s**.



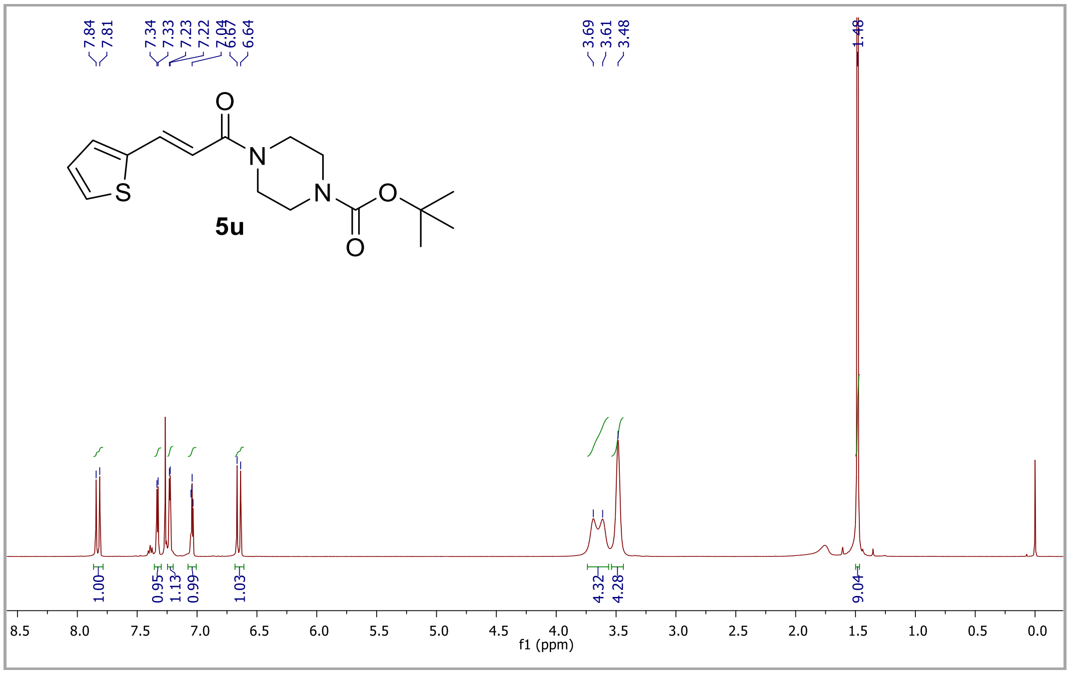
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **5s**.



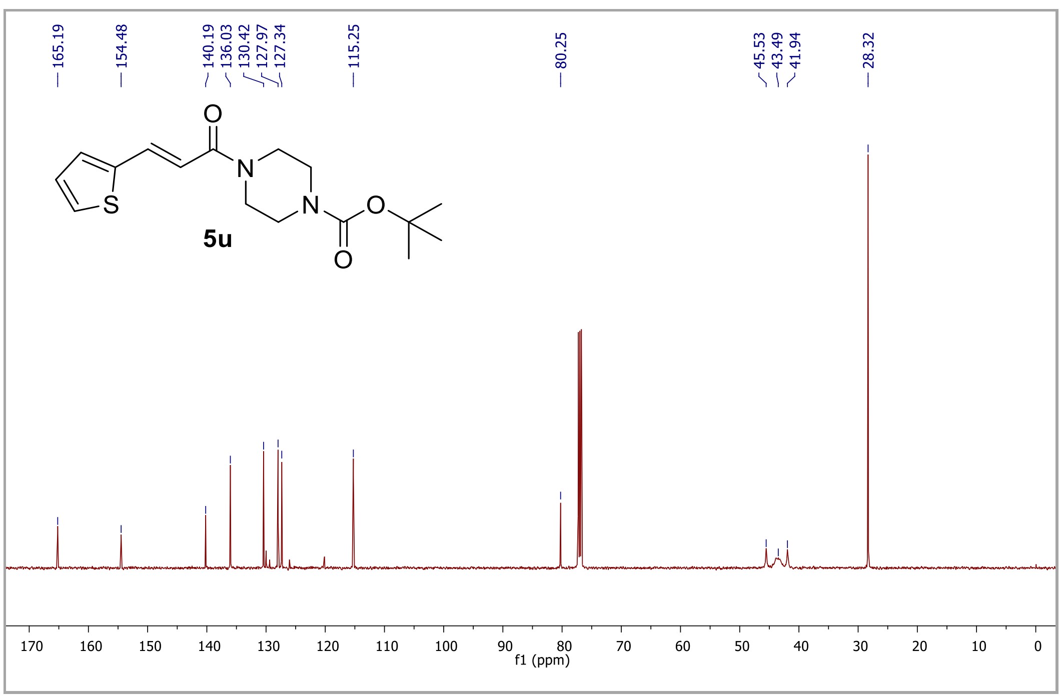
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5t**.



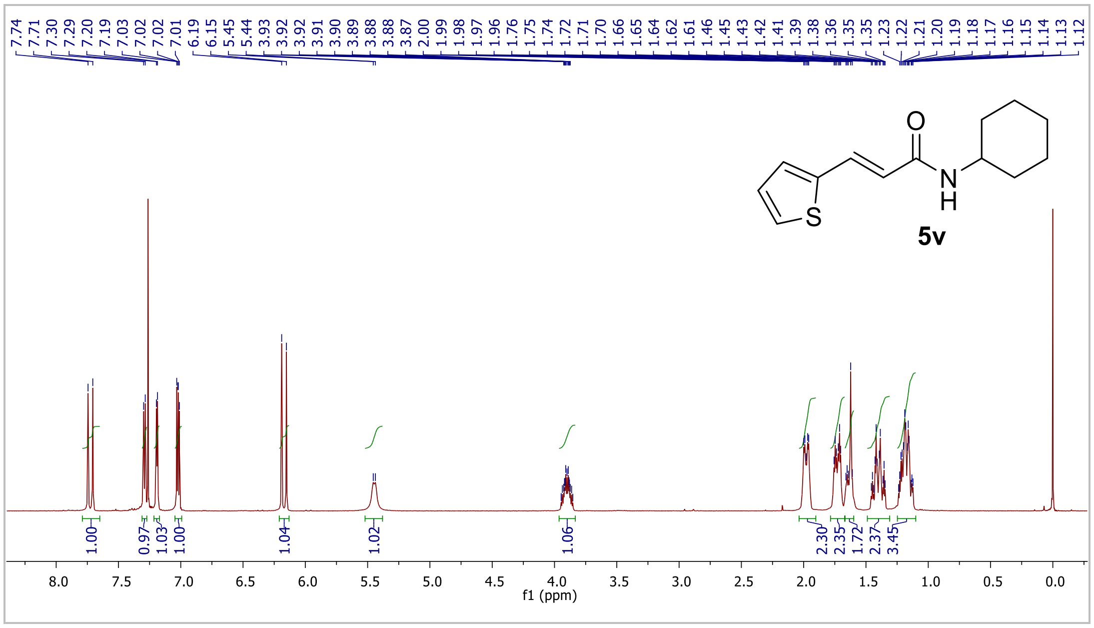
^{13}C NMR (125 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **5t**.



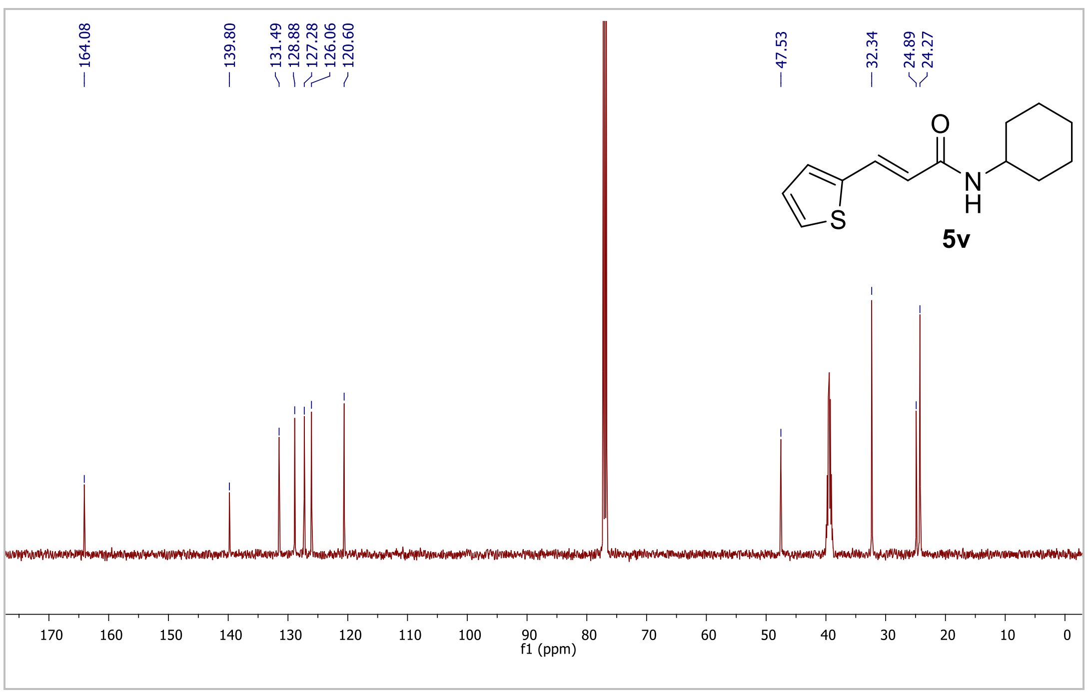
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **5u**.



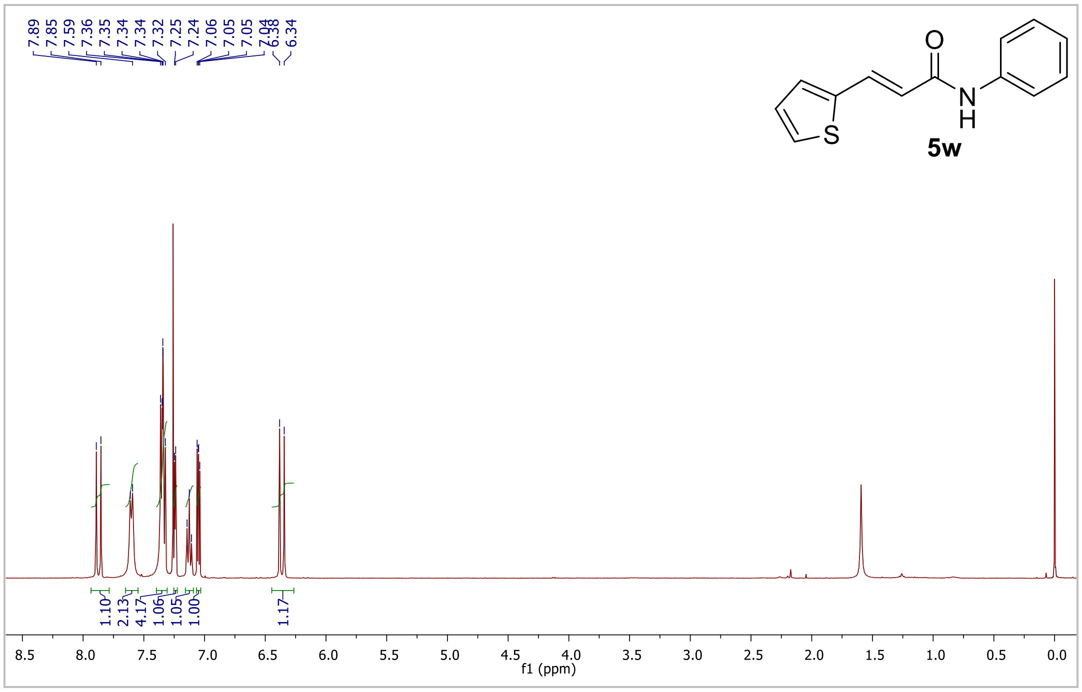
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **5u**.



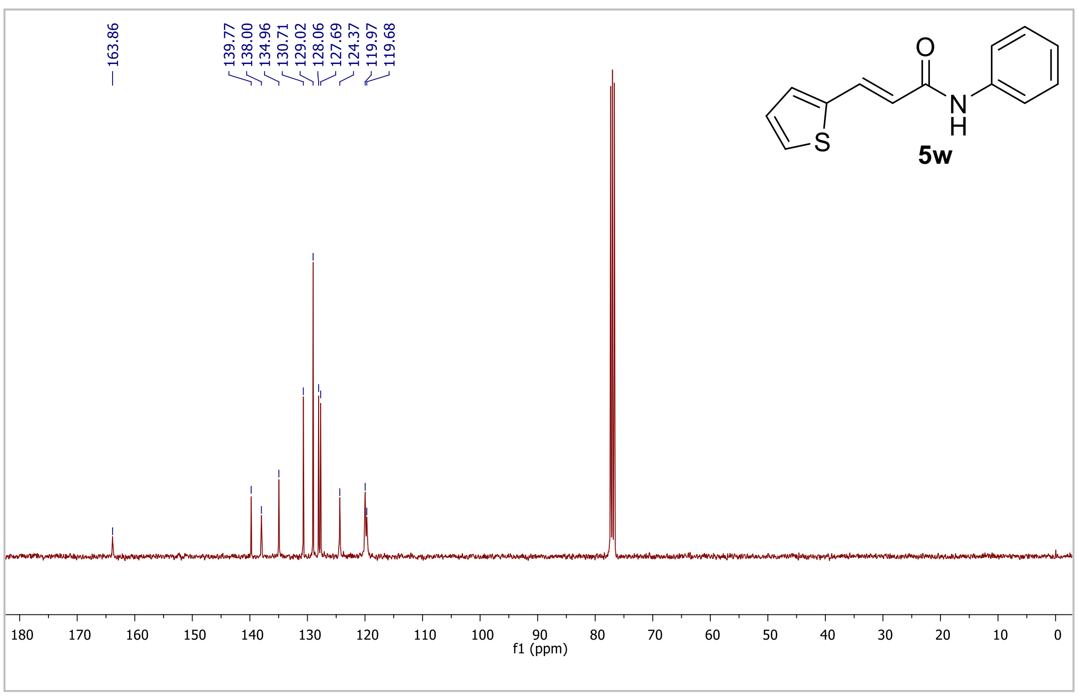
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **5v**.



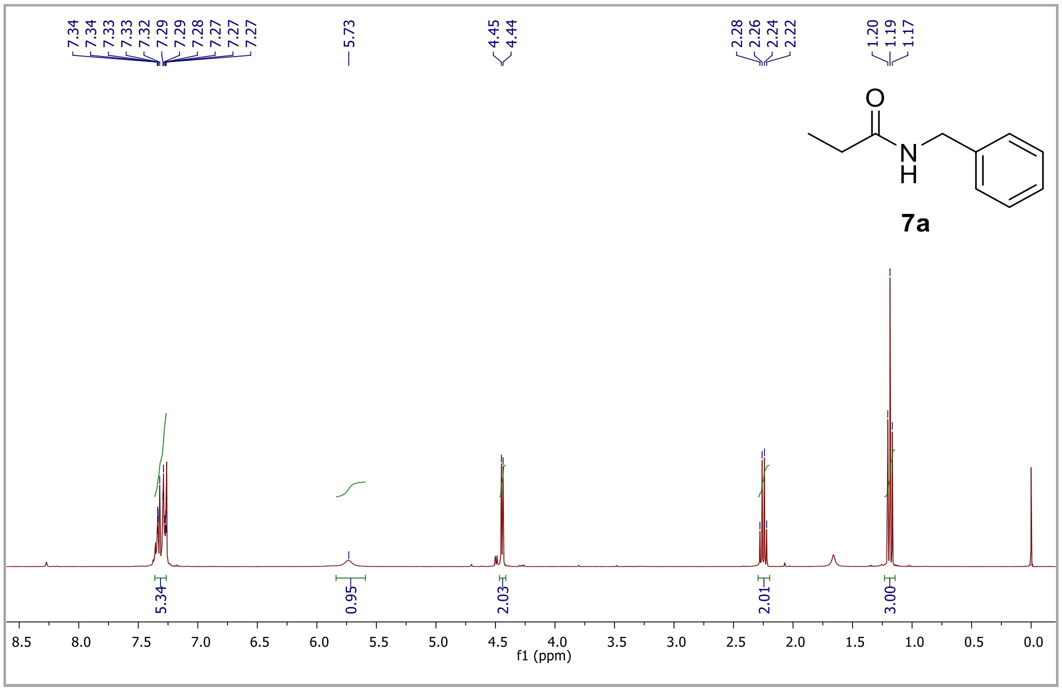
^{13}C NMR (125 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **5v**.



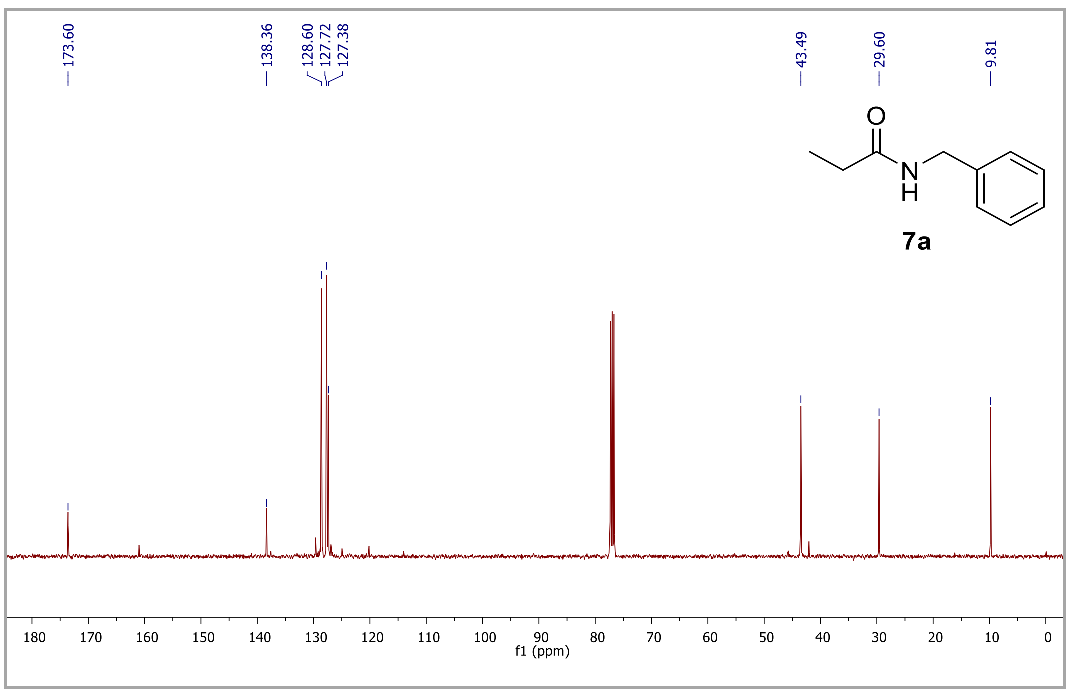
[1]H NMR (400 MHz, $CDCl_3$) spectrum of **5w**.



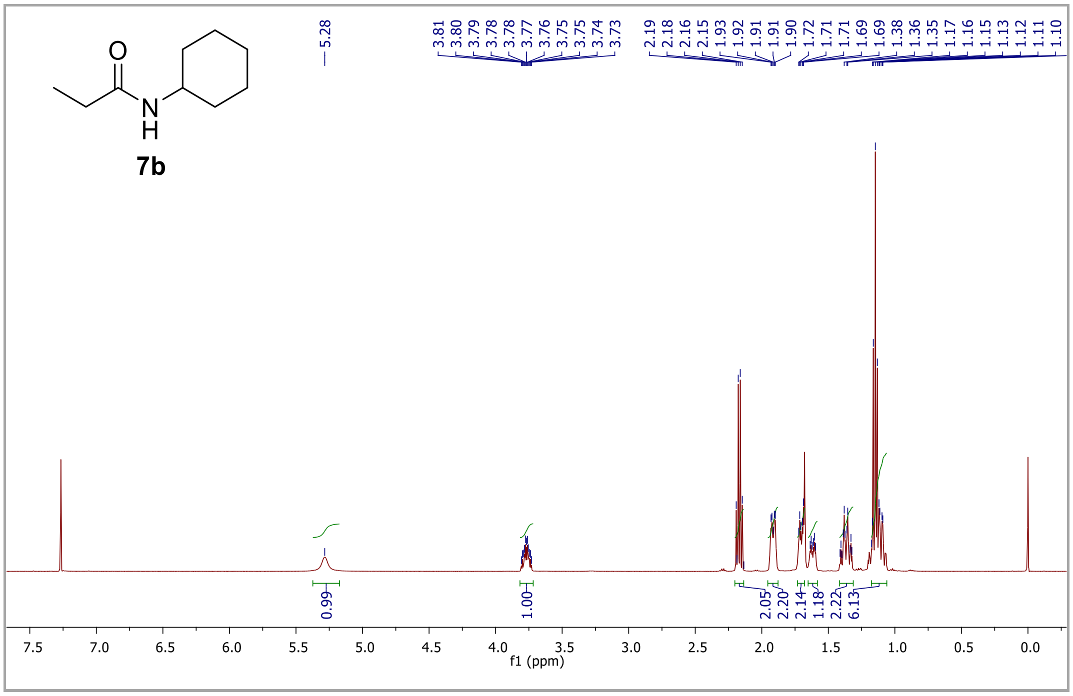
[13]C NMR (125 MHz, $CDCl_3$) spectrum of **5w**.



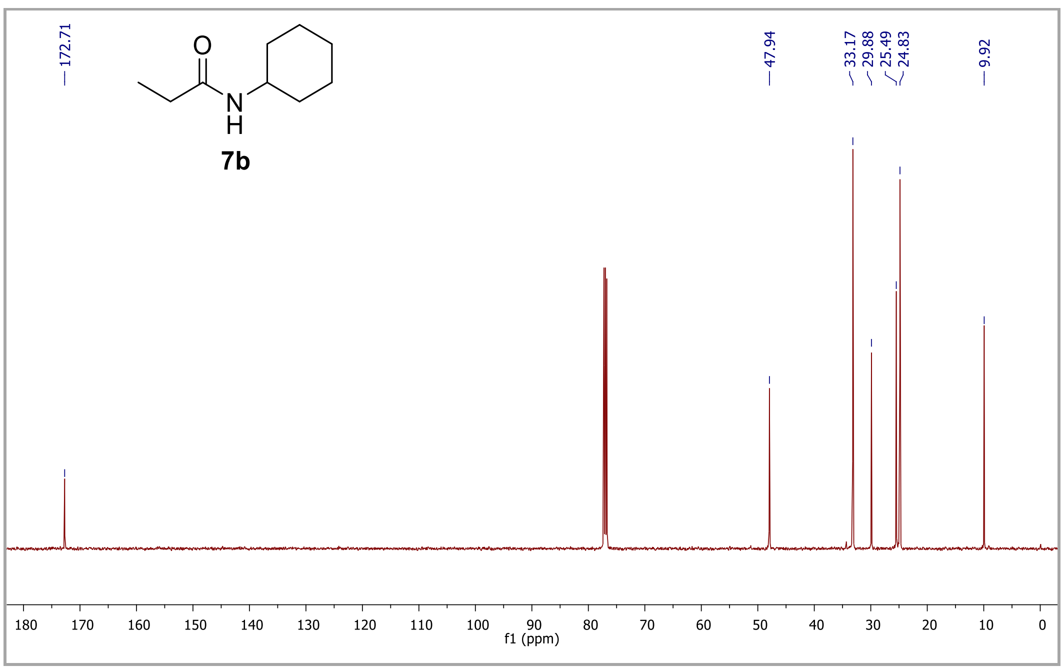
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **7a**.



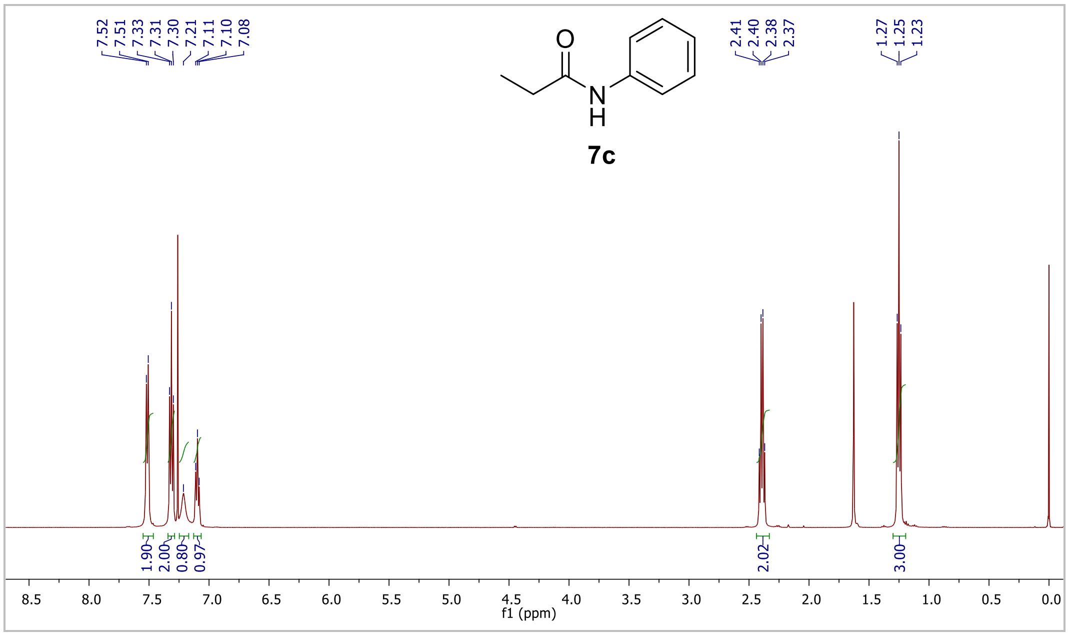
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **7a**.



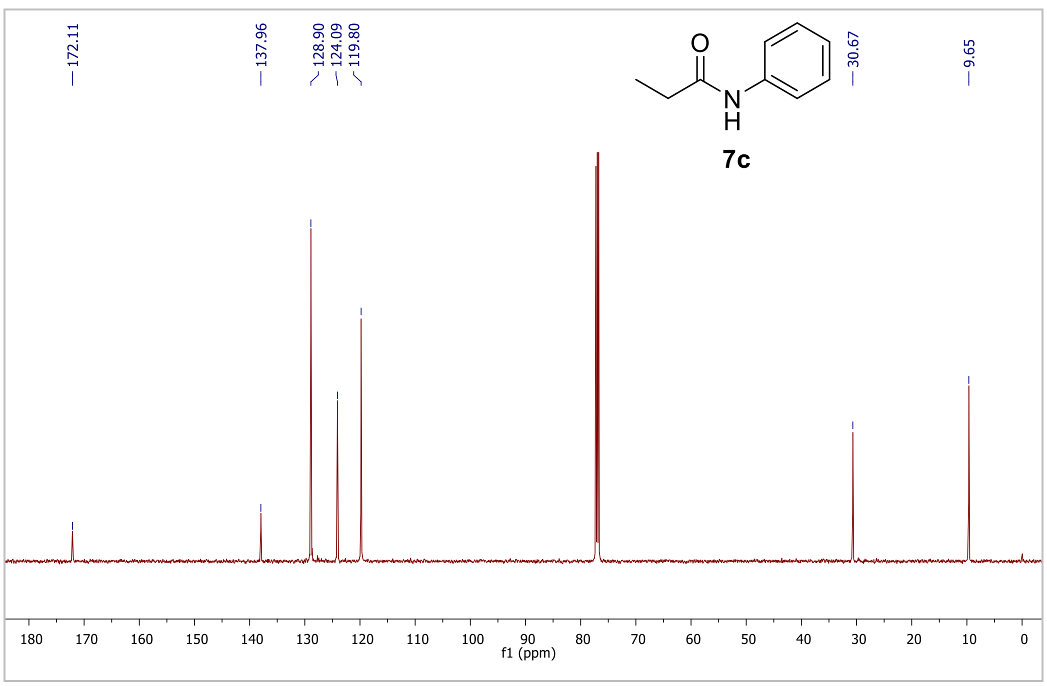
^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **7b**.



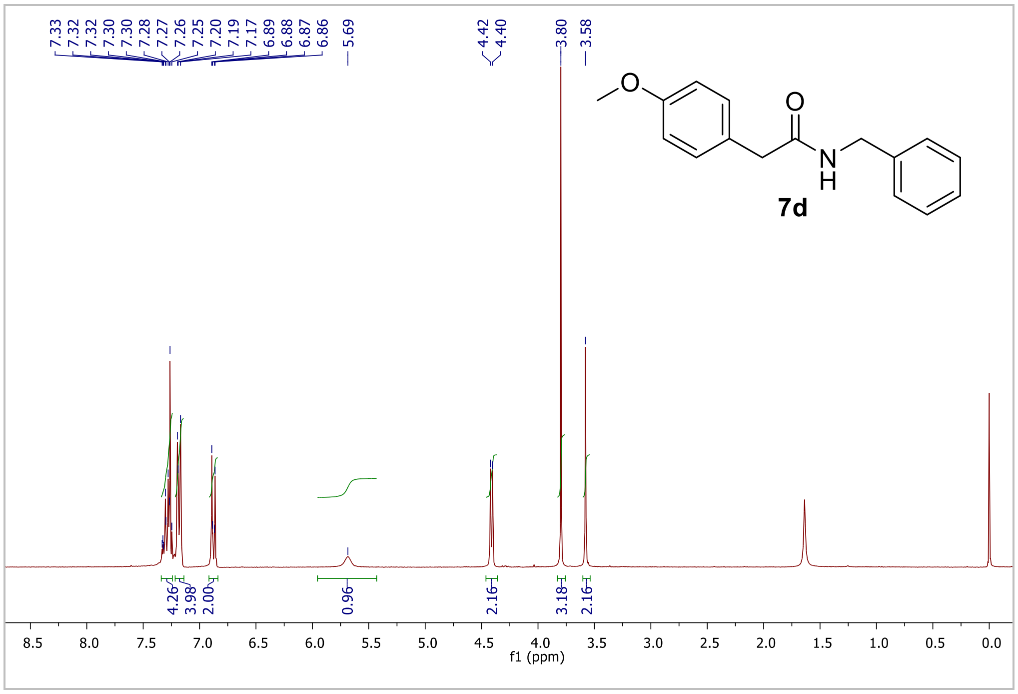
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **7b**.



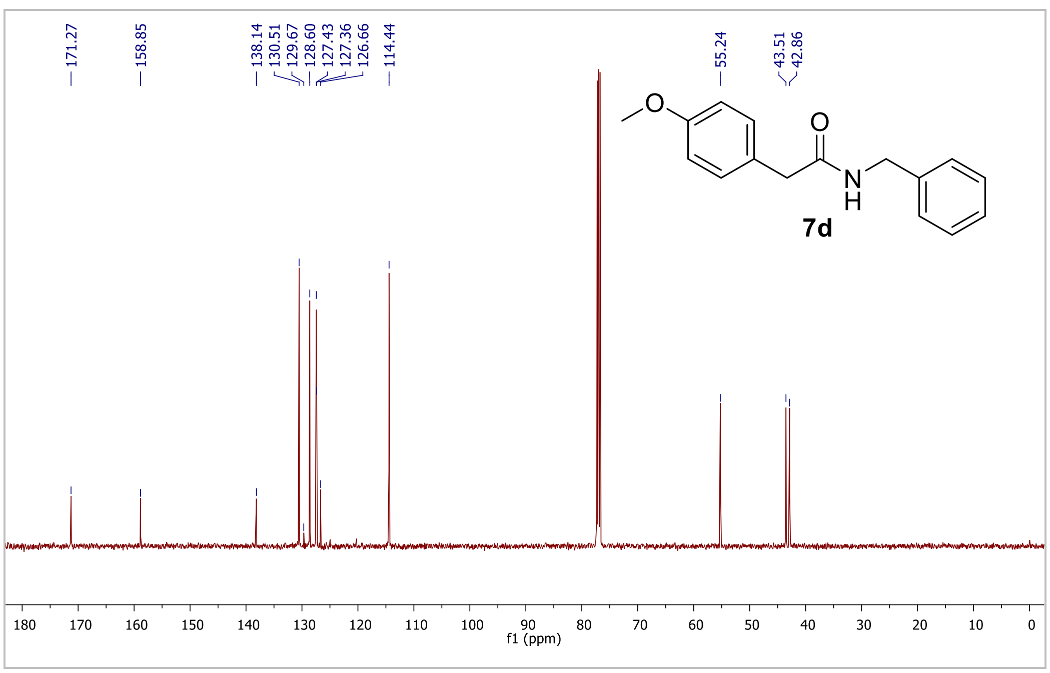
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **7c**.



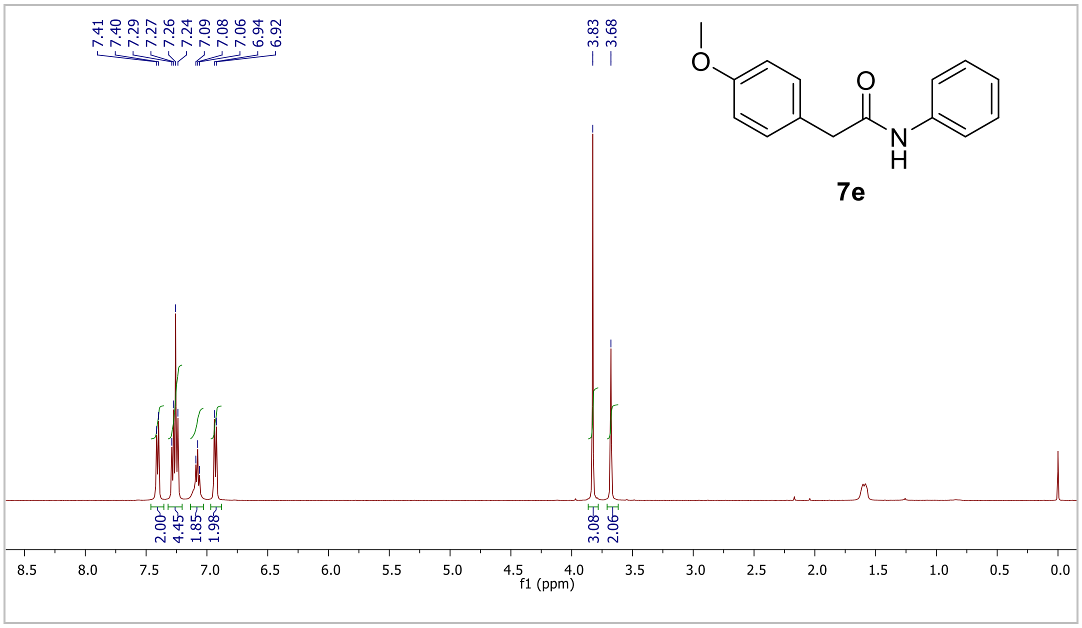
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **7c**.



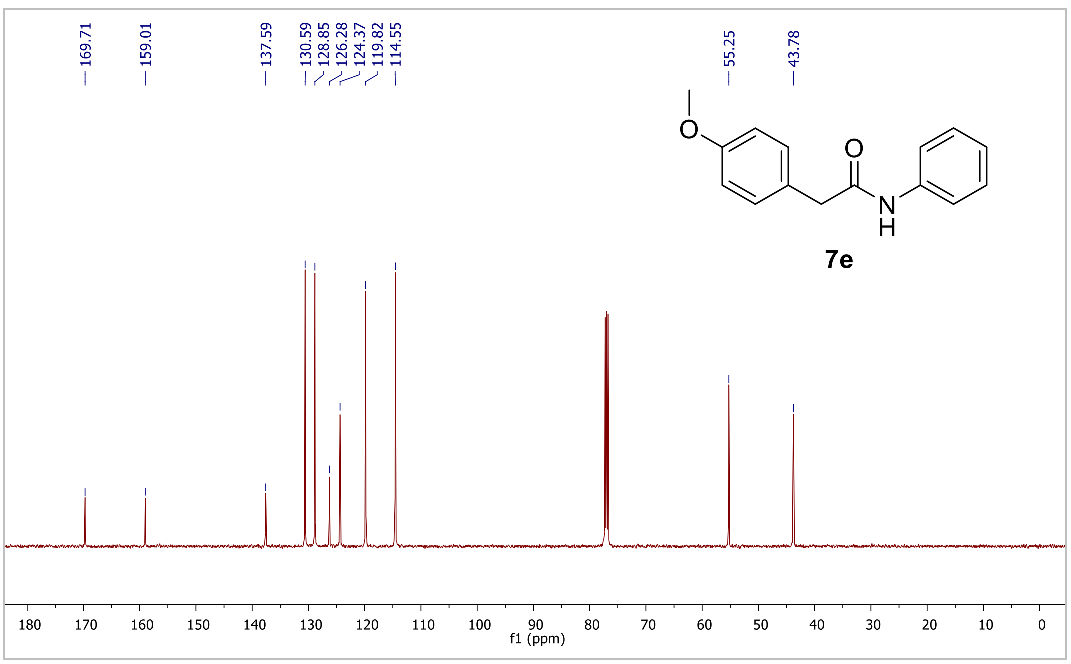
^{1}H NMR (300 MHz, $CDCl_3$) spectrum of **7d**.



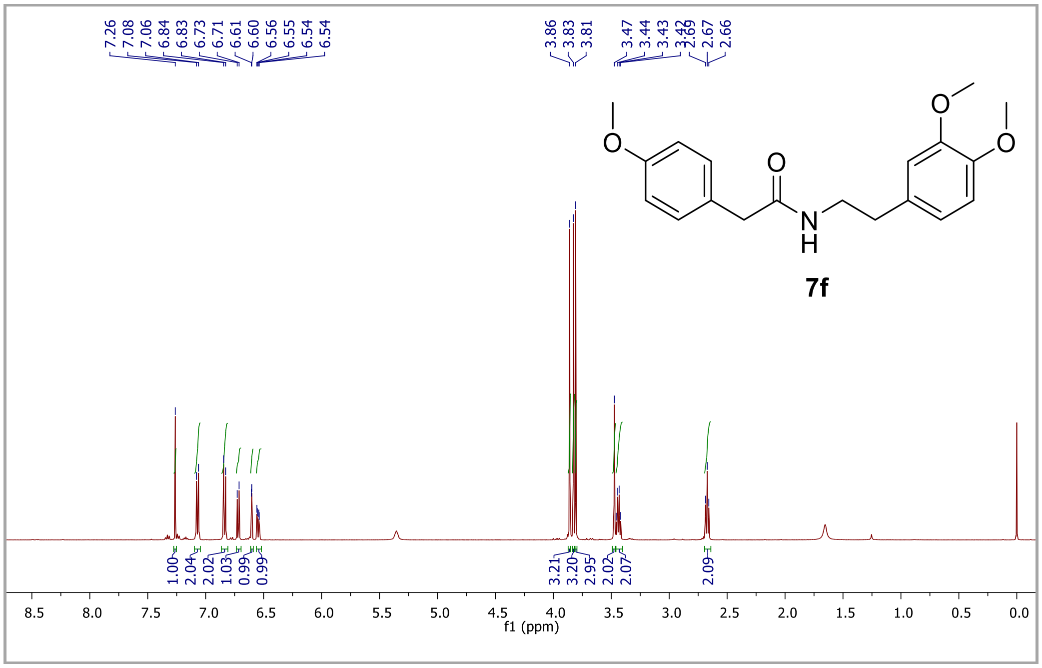
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **7d**.



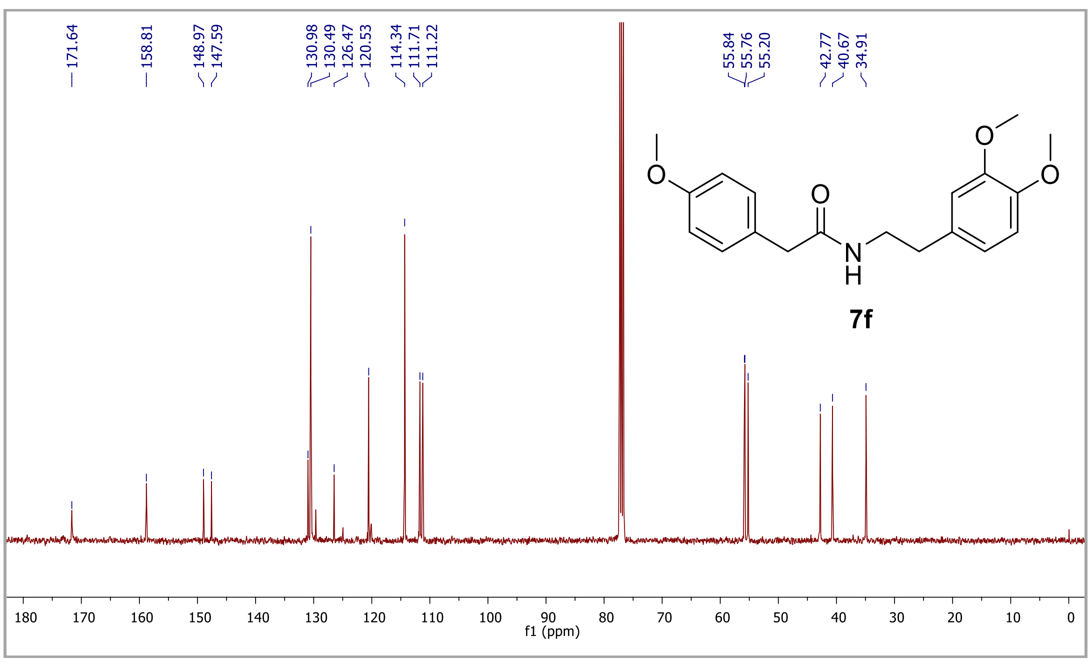
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **7e**.



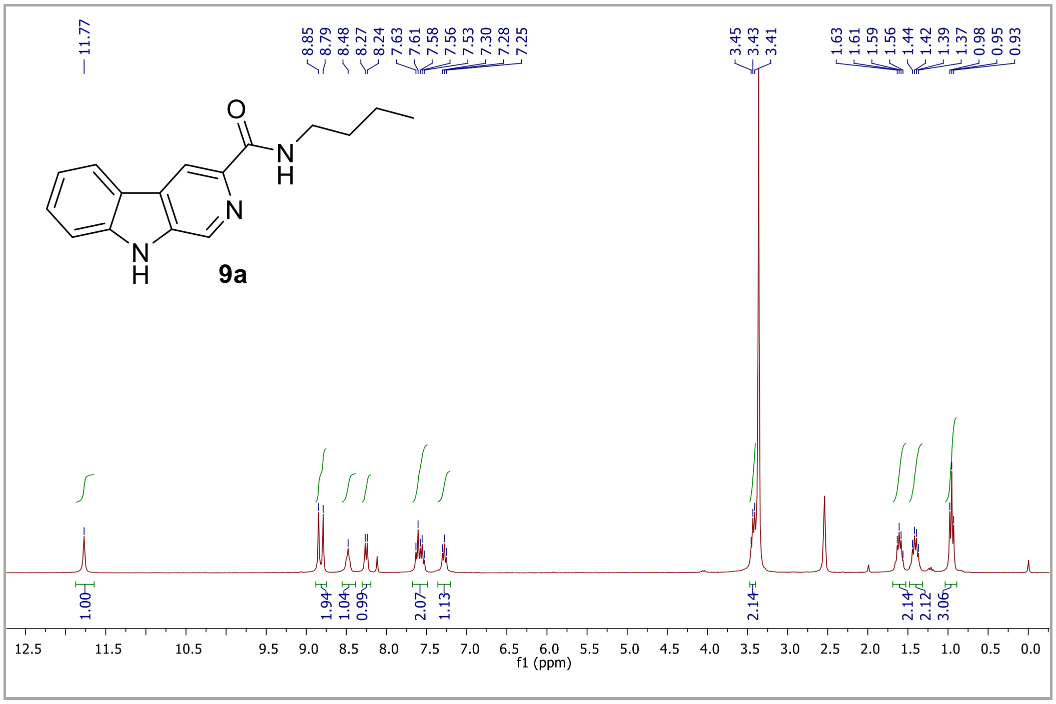
^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **7e**.



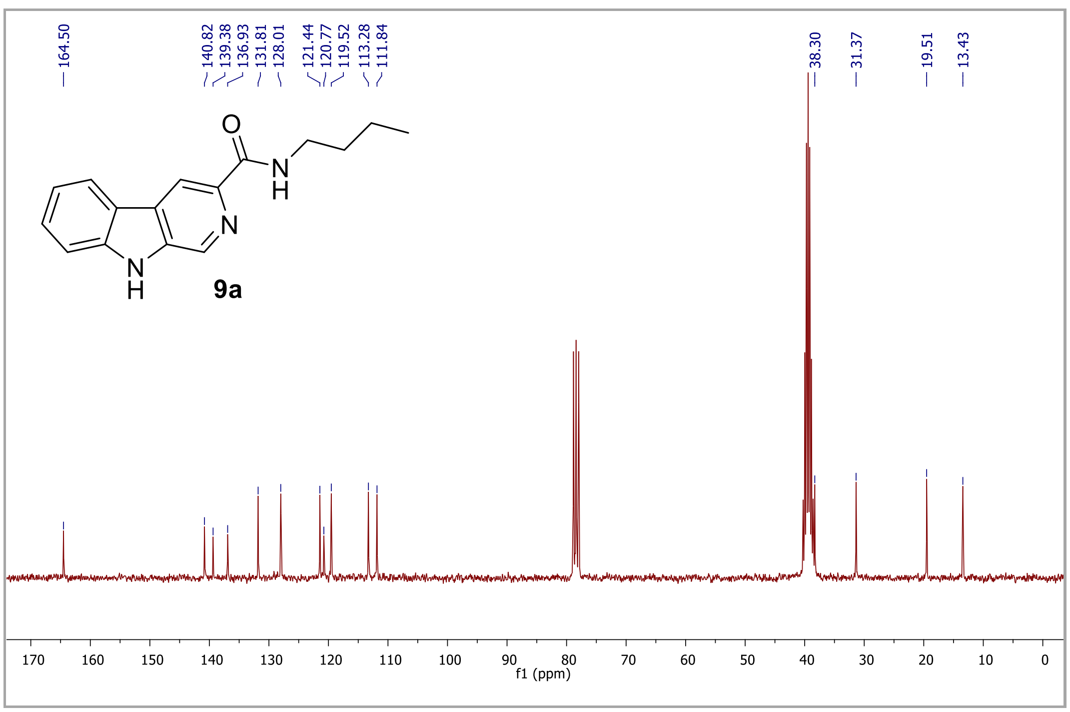
^{1}H NMR (500 MHz, $CDCl_3$) spectrum of **7f**.



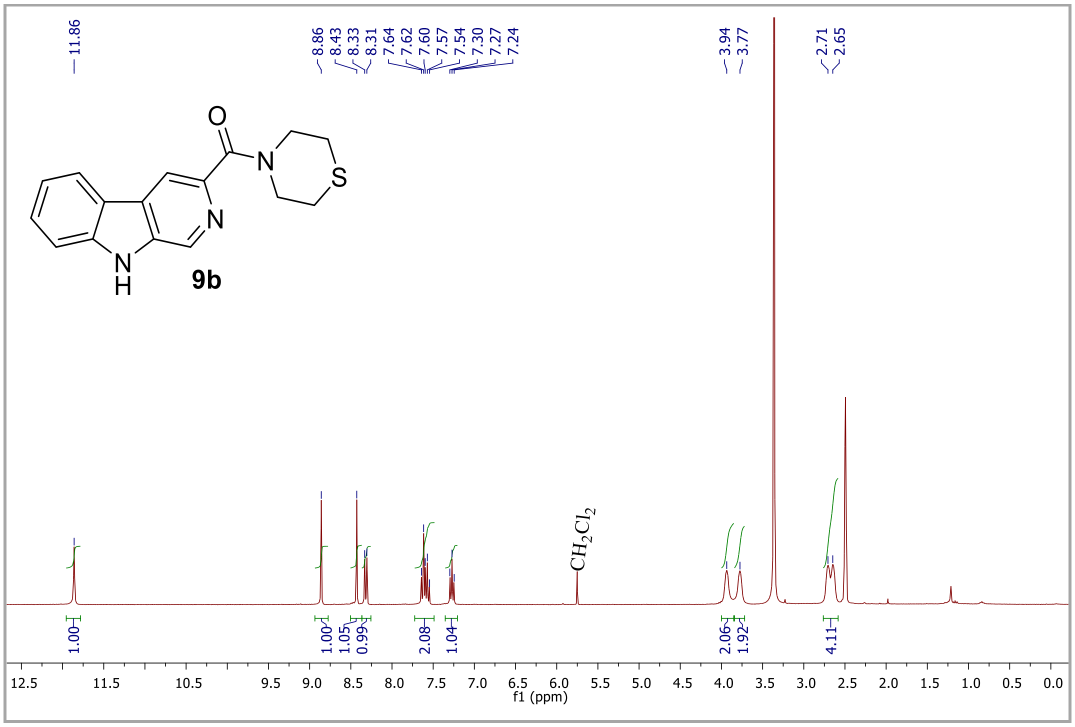
^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **7f**.



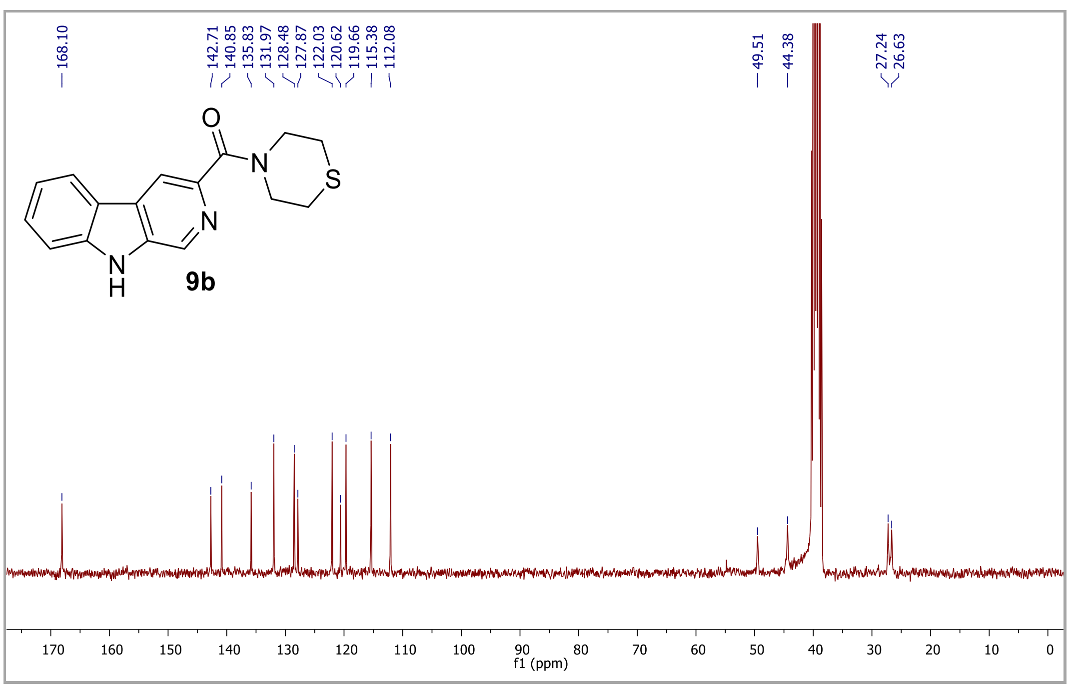
^{1}H NMR (300 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **9a**.



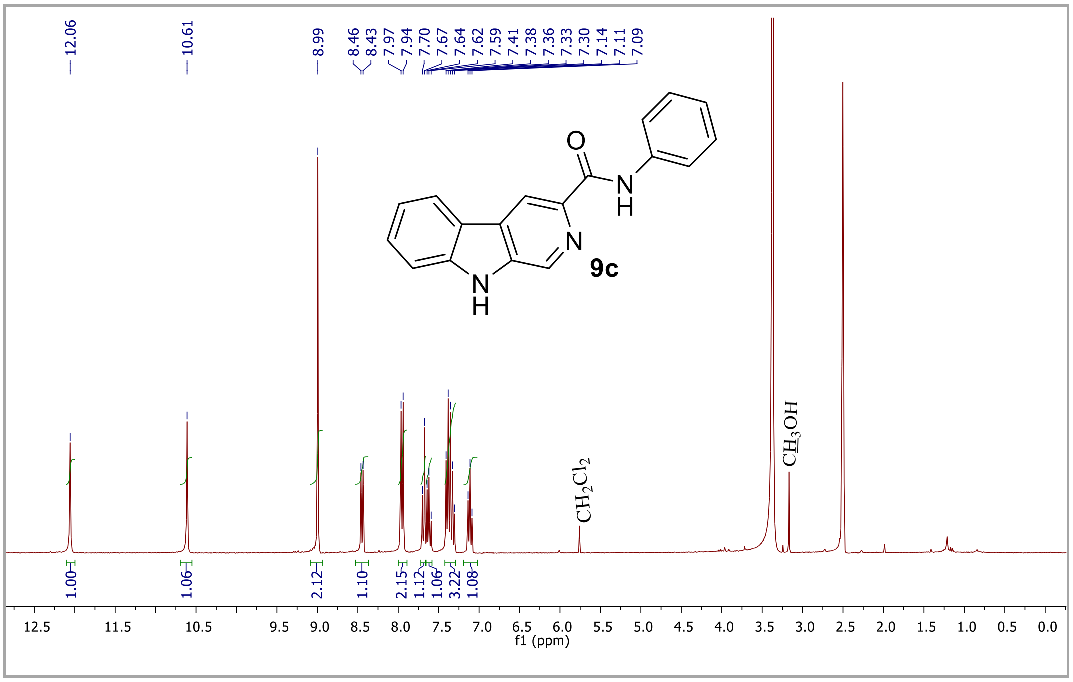
^{13}C NMR (75 MHz, $CDCl_3$ + DMSO–d_6) spectrum of **9a**.



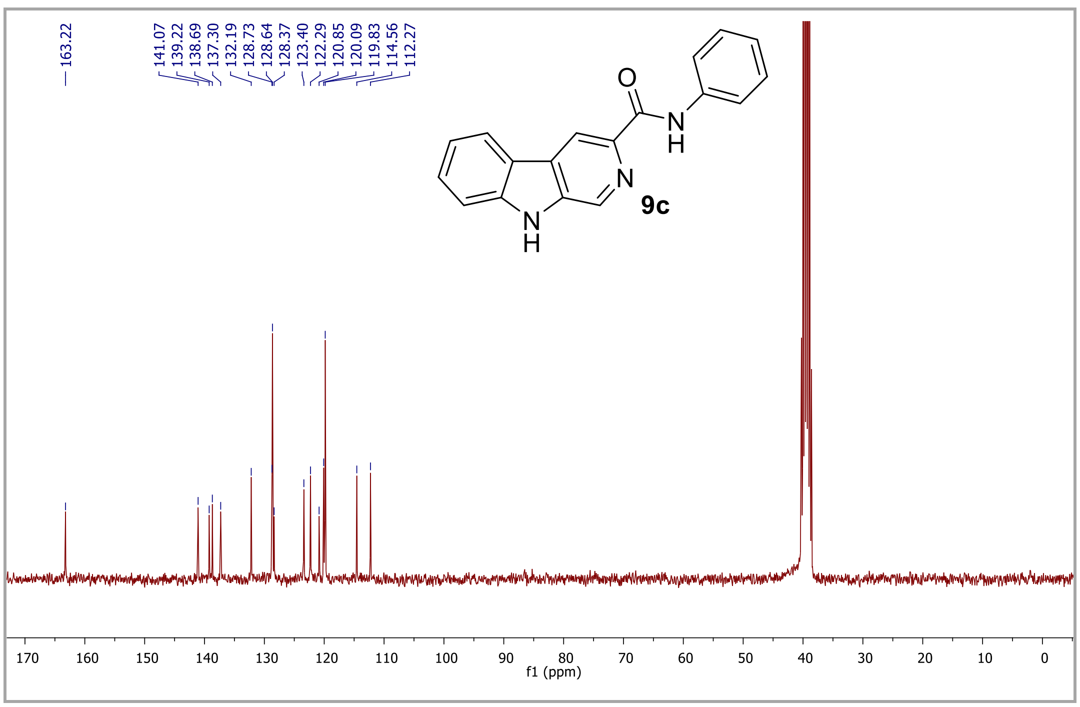
^{1}H NMR (300 MHz, DMSO–d_6) spectrum of **9b**.



^{13}C NMR (75 MHz, DMSO–d_6) spectrum of **9b**.



^{1}H NMR (300 MHz, DMSO–d_6) spectrum of **9c**.



^{13}C NMR (75 MHz, DMSO–d_6) spectrum of **9c**.

