Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

$B(C_6F_5)_3$-Catalyzed Metal-Free Hydrogenation of Naphthylamines

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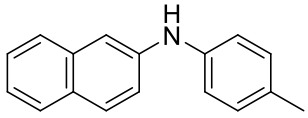
Supporting Information

General consideration: All air-sensitive compounds were handled under an atmosphere of argon or in a nitrogen-filled glovebox. ^{1}H NMR and ^{13}C NMR spectra were recorded on Bruker AV 400 at ambient temperature with $CDCl_3$ and DMSO-d_6 as solvent and TMS as internal standard. Chemical shifts (δ) were given in ppm, referenced to the residual proton resonance of TMS (0), to the carbon resonance of the $CDCl_3$ (77.23). Coupling constants (*J*) were given in Hertz (Hz). Flash column chromatography was performed on silica gel (200-300 mesh). All solvents were purified by conventional methods, distilled before use. Commercially available reagents were used without further purification.

Representative procedure for metal-free hydrogenation of naphthylamines (Table 2, entry 1): To a glass test tube (10 mL) was added $B(C_6F_5)_3$ (0.0126 g, 0.025 mmol), *N*-phenyl-2-naphthylamine (**1a**) (0.0548 g, 0.25 mmol) and dry toluene (1.0 mL) in a nitrogen atmosphere glovebox. The tube was then moved to a stainless-steel autoclave. After being sealed, the autoclave was purged three times with H_2 and the final pressure of hydrogen was adjusted to 20 bar. The reaction mixture was stirred at 60 °C for 6 h. After cooling to ambient temperature, the solvent was removed under reduced pressure. The crude residue was purified by column chromatography on silica gel using petroleum ether/ethyl acetate (100/1 to 50/1) as the eluent to give *N*-phenyl-1,2,3,4-tetrahydronaphthalen-2-amine (**2a**) as a colorless oil (0.0524 g, 94% yield).

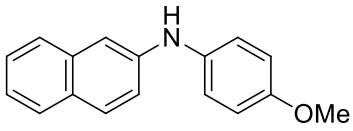
Typical procedure for the synthesis of naphthylamines (1b): A mixture of 2-bromonaphthalene (0.621 g, 3.0 mmol), *p*-toluidine (0.482 g, 4.5 mmol), $Pd_2(dba)_3$ (0.057 g, 0.06 mmol), dppf (0.083 g, 0.15 mmol) and ^{t}BuONa (0.432 g, 4.5 mmol) in toluene (10 mL) was stirred at 100 °C overnight. After cooling to ambient temperature, the solvent was removed under reduced pressure. The crude residue was purified by column chromatography on silica gel using petroleum ether/ethyl acetate (100/1 to 50/1) as the eluent to give *N*-phenylnaphthalen-2-amine (**1b**) as a white solid (0.558 g, 85% yield).

M. Yu, M. Wang, X. Chen, B. Hong, X. Zhang and C. Cheng, *J. Chem. Res.,* 2005, **9**, 558**.**



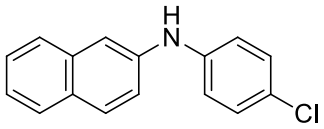
1b, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.71 (d, *J* = 7.6 Hz, 2H), 7.61 (d, *J* = 8.0 Hz, 1H), 7.40-7.35 (m, 2H), 7.28-7.27 (m, 1H), 7.18-7.07 (m, 5H), 5.75 (brs, 1H), 2.33 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 141.9, 140.3, 134.9, 131.6, 130.2, 129.3, 129.1, 127.8, 126.6, 126.5, 123.4, 119.8, 119.6, 110.5, 21.0.

J. Huang and L. Yang, *Org. Lett.,* 2011, **13**, 3750.



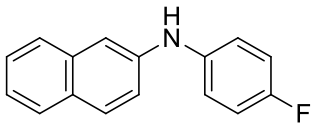
1c, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.71-7.67 (m, 2H), 7.57 (d, *J* = 8.4 Hz, 1H), 7.36 (dd, *J* = 7.6, 7.6 Hz, 1H), 7.25-7.20 (m, 2H), 7.14 (d, *J* = 8.4 Hz, 2H), 7.09 (dd, *J* = 8.8, 1.6 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 2H), 5.63 (brs, 1H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 155.7, 143.1, 135.7, 135.0, 129.3, 128.7, 127.8, 126.6, 126.4, 123.1, 122.8, 119.1, 114.9, 108.9, 55.8.

J. Huang and L. Yang, *Org. Lett.,* 2011, **13**, 3750.



1d, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.73 (d, *J* = 8.8 Hz, 2H), 7.63 (d, *J* = 8.0 Hz, 1H), 7.43-7.38 (m, 2H), 7.33-7.29 (m, 1H), 7.25-7.22 (m, 2H), 7.17 (dd, *J* = 8.8, 2.4 Hz, 1H), 7.07-7.03 (m, 2H), 5.79 (brs, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 141.9, 140.6, 134.7, 129.6, 129.5, 127.9, 126.8, 126.7, 126.1, 124.0, 120.2, 119.5, 112.3.

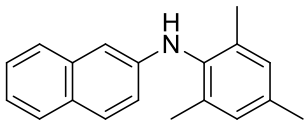
N. E. Shchepina, I. I. Boiko and G. A. Aleksandrova, *Pharm. Chem. J.*, 2011, **45**, 159.



1e, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.72 (d, *J* = 8.4 Hz, 2H), 7.61 (d, *J* = 8.0 Hz, 1H), 7.41-7.37 (m, 1H), 7.30-7.26 (m, 2H), 7.15-7.10 (m, 3H), 7.05-6.99 (m, 2H), 5.71 (brs, 1H); ^{13}C NMR

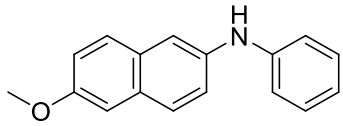
(100 MHz, $CDCl_3$, ppm): δ 158.4 (d, *J* = 239.0 Hz), 141.8, 138.9 (d, *J* = 2.0 Hz), 134.8, 129.5, 129.1, 127.8, 126.7, 126.6, 123.6, 121.2 (d, *J* = 8.0 Hz), 119.5, 116.2 (d, *J* = 22.0 Hz), 110.5.

X. Li, J. Huang and L. Yang, *Org. Lett.,* 2011, **13**, 4950.



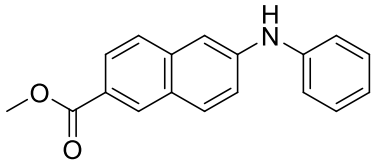
1f, white solid; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.74-7.70 (m, 2H), 7.54 (d, *J* = 8.4 Hz, 1H), 7.38-7.34 (m, 1H), 7.25-7.21 (m, 1H), 7.04 (s, 2H), 6.99 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.60-6.59 (m, 1H), 5.30 (brs, 1H), 2.39 (s, 3H), 2.25 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 144.5, 136.3, 135.9, 135.5, 135.3, 129.5, 129.3, 128.0, 127.8, 126.5, 126.1, 122.3, 117.7, 106.0, 21.2, 18.4.

S. B. Cortright, J. C. Huffman, R. A. Yoder, J. N. Coalter and J. N. Johnston, *Organometallics,* 2004, **23**, 2238.



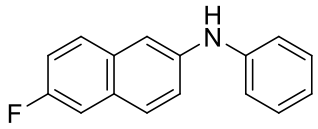
1g, white solid; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.65 (d, *J* = 8.8 Hz, 1H), 7.57 (d, *J* = 8.4 Hz, 1H), 7.42 (s, 1H), 7.30-7.22 (m, 3H), 7.11-7.09 (m, 4H), 6.93 (dd, *J* = 7.6, 7.6 Hz, 1H), 5.78 (brs, 1H), 3.90 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 156.5, 143.9, 139.0, 130.5, 130.1, 129.6, 128.3, 128.1, 121.4, 121.0, 119.3, 117.6, 113.7, 106.3, 55.5.

V. I. Maslennikova, L. V. Shelenkova, O. S. Serkova, L. K. Vasyanina and E. E. Nifantiev, *Arkivoc,* 2012, **9**, 136.

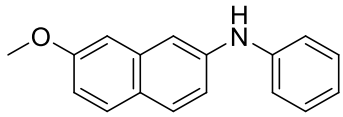


1h, white solid, m.p. 223-225 °C; IR (film): 3446, 3355, 1698, 1624, 1597, 1344, 1100 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 8.48 (s, 1H), 7.96 (d, *J* = 8.4 Hz, 1H), 7.82 (d, *J* = 8.4 Hz, 1H), 7.62 (d, *J* = 8.8 Hz, 1H), 7.40-7.33 (m, 4H), 7.26-7.22 (m, 2H), 7.08-7.04 (m, 1H), 6.02 (brs, 1H), 3.96 (s, 3H); ^{13}C

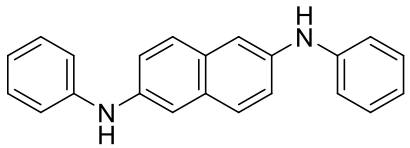
NMR (100 MHz, $CDCl_3$, ppm): δ 167.7, 143.8, 141.9, 137.4, 131.1, 131.0, 129.8, 127.8, 126.6, 126.2, 124.8, 122.8, 120.1, 119.9, 109.5, 52.3; HRMS (ESI): calcd. for $C_{18}H_{16}NO_2$ $(M+H)^+$: 278.1176; Found: 278.1176.



1i, white solid, m.p. 135-137 °C; IR (film): 3399, 1611, 1598, 1515 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.65 (d, J = 8.8 Hz, 1H), 7.60-7.56 (m, 1H), 7.40-7.30 (m, 5H), 7.23-7.11 (m, 3H), 7.01-6.99 (m, 1H), 5.76 (brs, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 159.5 (d, J = 241.5 Hz), 143.1, 140.5, 131.7, 129.6, 128.8, 128.7, 128.6, 128.5, 121.5 (d, J = 21.4 Hz), 118.3, 116.7 (d, J = 21.4 Hz), 112.1, 110.9 (d, J = 20.3 Hz); HRMS (ESI): calcd. for $C_{16}H_{13}FN$ $(M+H)^+$: 238.1027; Found: 238.1027.

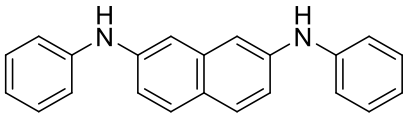


1j, white solid, m.p. 133-136 °C; IR (film): 3385, 1629, 1602, 1508 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.65-7.60 (m, 2H), 7.32-7.28 (m, 3H), 7.15 (d, J = 7.6 Hz, 2H), 7.04 (d, J = 8.8 Hz, 1H), 6.99-6.95 (m, 3H), 5.82 (brs, 1H), 3.87 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 158.4, 143.1, 141.7, 136.1, 129.6, 129.3, 129.1, 124.8, 121.6, 118.7, 117.7, 116.3, 110.8, 105.0, 55.5; HRMS (ESI): calcd. for $C_{17}H_{16}NO$ $(M+H)^+$: 250.1226; Found: 250.1227.



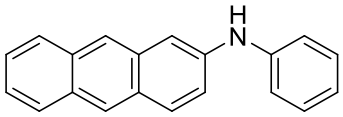
1k, white solid; ^1H NMR (400 MHz, DMSO-d_6, ppm): δ 8.15 (s, 2H), 7.56 (d, J = 8.8 Hz, 2H), 7.35 (s, 2H), 7.21-7.14 (m, 6H), 7.07 (d, J = 8.0 Hz, 4H), 6.78-6.75 (m, 2H); ^{13}C NMR (100 MHz, DMSO-d_6, ppm): δ 149.2, 144.2, 134.8, 134.5, 132.7, 126.1, 124.8, 121.7, 116.3.

S. M. Shein, V. P. Rusov and V. I. Sokolenko, *J. Org. Chem.,* 1980, **16**, 2014.



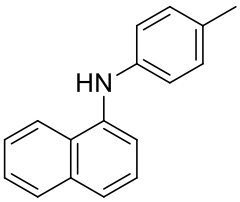
1l, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.62 (d, *J* = 8.8 Hz, 1H), 7.32-7.25 (m, 6H), 7.16 (d, *J* = 8.0 Hz, 4H), 7.04 (d, *J* = 8.4 Hz, 2H), 6.99-6.96 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 142.9, 141.6, 136.0, 129.6, 129.2, 125.2, 121.8, 118.8, 117.7, 110.6.

V. I. Maslennikova, L. V. Shelenkova, O. S. Serkova, L. K. Vasyanina and E. E. Nifantiev, *Arkivoc,* 2012, **9**, 136.



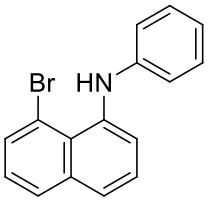
1m, yellow solid; m.p. 135-137 °C; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 8.31 (s, 1H), 8.16 (s, 1H), 7.95-7.89 (m, 3H), 7.54 (s, 1H), 7.43-7.33 (m, 4H), 7.26-7.22 (m, 4H), 7.04 -7.00 (m, 1H), 5.92 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 142.8, 140.4, 133.1, 130.5, 129.8, 129.7, 128.6, 128.5, 127.8, 126.4, 125.7, 124.5, 123.9, 121.9, 121.5, 119.0, 109.1.

N. E. Shchepina, I. I. Boiko and G. A. Aleksandrova, *Pharm. Chem. J*. 2011, **45**, 159.

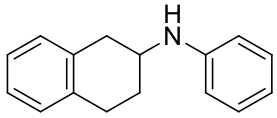


1o, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 8.00-7.97 (m, 1H), 7.84-7.82 (m, 1H), 7.50-7.42 (m, 3H), 7.34 (dd, *J* = 7.6, 7.6 Hz, 1H), 7.26 (d, *J* = 7.6 Hz, 1H), 7.07 (d, *J* = 8.0 Hz, 2H), 6.93 (d, *J* = 8.0 Hz, 2H), 5.85 (brs, 1H), 2.30 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 142.0, 139.8, 134.9, 130.6, 130.1, 128.7, 127.2, 126.3, 126.2, 125.7, 122.2, 121.7, 118.7, 114.3, 20.9.

T. Ogata and J. F. Hartwig, *J. Am. Chem. Soc.,* 2008, **130**, 13848.

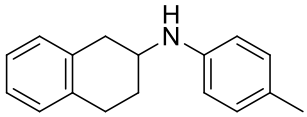


1p, white oil; IR (film): 3421, 3054, 1599, 1561, 1340, 1192, 918 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.77 (d, *J* = 8.0 Hz, 1H), 7.71 (d, *J* = 7.2 Hz, 1H), 7.50 (dd, *J* = 7.6, 7.6 Hz, 2H), 7.38 (dd, *J* = 8.0, 8.0 Hz, 1H), 7.29-7.19 (m, 4H), 7.04 (d, *J* = 8.0 Hz, 2H), 6.94-6.90 (dd, *J* = 7.2, 7.2 Hz, 1H) ; ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 144.2, 139.3, 137.7, 133.2, 129.6, 126.8, 126.2, 124.6, 123.3, 120.9, 118.7, 116.8. HRMS (ESI): calcd. for $C_{16}H_{13}BrN$ $(M+H)^+$: 298.0226; Found: 298.0225.

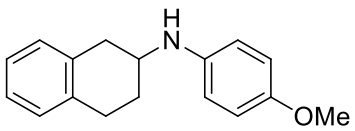


2a, colorless oil; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.20-7.08 (m, 6H), 6.70 (dd, *J* = 7.2, 7.2 Hz, 1H), 6.64 (dd, *J* = 8.4, 0.4 Hz, 2H), 3.85-3.78 (m, 1H), 3.66 (brs, 1H), 3.22 (dd, *J* = 16.0, 4.4 Hz, 1H), 2.95-2.85 (m, 2H), 2.69 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.20-2.14 (m, 1H), 1.82-1.73 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 147.3, 136.1, 134.9, 129.7, 129.6, 129.0, 126.3, 126.1, 117.5, 113.5, 48.6, 36.7, 29.0, 27.7.

A. Abdel-Magid, K. Carson, B. Harris, C. Maryanoff and R. Shah, *J. Org. Chem.,* 1996, **61**, 3849.



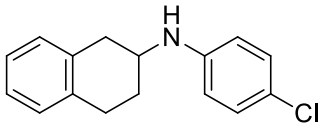
2b, white solid; m.p. 69-70 °C; IR (film): 3398, 1616, 1519 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.13-7.07 (m, 4H), 6.99 (d, *J* = 8.0 Hz, 2H), 6.57 (d, *J* = 8.0 Hz, 2H), 3.81-3.75 (m, 1H), 3.52 (brs, 1H), 3.20 (dd, *J* = 16.4, 4.4 Hz, 1H), 2.91-2.88 (m, 2H), 2.66 (dd, *J* = 16.4, 8.4 Hz, 1H), 2.24 (s, 3H), 2.18-2.15 (m, 1H), 1.79-1.70 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 145.0, 136.1, 135.0, 130.0, 129.7, 129.0, 126.8, 126.2, 126.0, 113.8, 48.9, 36.7, 29.0, 27.7, 20.6; HRMS (ESI) calcd. for $C_{12}H_{20}NO(M+H)$: 238.1590, Found: 238.1589.



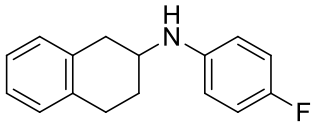
2c, pale yellow solid; ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 7.15-7.07 (m, 4H), 6.82-6.77 (m, 2H), 6.64-6.60 (m, 2H), 3.75 (s, 3H), 3.75-3.70 (m, 1H), 3.40 (brs, 1H), 3.20 (dd, *J* = 16.4, 4.4 Hz, 1H),

2.92-2.89 (m, 2H), 2.67 (dd, *J* = 16.4, 8.4 Hz, 1H), 2.24-2.14 (m, 1H), 1.79-1.69 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 152.4, 141.5, 136.2, 135.1, 129.7, 129.0, 126.2, 126.1, 115.24, 115.19, 56.0, 49.7, 36.8, 29.1, 27.7.

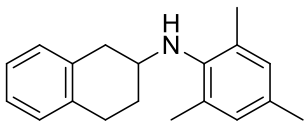
B. Yao, H. Ji, Y. Cao, Y. Zhou, J. Zhu, J. Lue, Y. Li, J. Chen, C. Zheng, Y. Jiang, R. Liang and H. Tang, *J. Med. Chem.,* 2007, **50**, 5293.



2d, pale yellow solid, m.p. 102-104 °C; IR (film): 3406, 1597, 1494 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.14-7.07 (m, 6H), 6.54 (d, *J* = 8.8 Hz, 2H), 3.77-3.75 (m, 1H), 3.67 (brs, 1H), 3.19 (dd, *J* = 16.0, 4.0 Hz, 1H), 2.92-2.88 (m, 2H), 2.67 (dd, *J* = 16.4, 8.0 Hz, 1H), 2.16-2.13 (m, 1H), 1.81-1.71 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 145.9, 135.9, 134.6, 129.7, 129.4, 129.0, 126.4, 126.1, 121.9, 114.5, 48.7, 36.5, 28.7, 27.5; HRMS (ESI) calcd. for $C_{16}H_{17}NCl$ (M+H): 258.1044; Found: 258.1043.

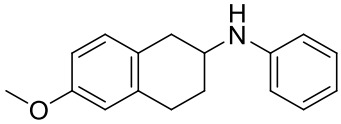


2e, white solid; m.p. 67-68 °C; IR (film): 3398, 1509, 1219 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.15-7.07 (m, 4H), 6.91-6.87 (m, 2H), 6.59-6.56 (m, 2H), 3.78-3.71 (m, 1H), 3.54 (brs, 1H), 3.20 (dd, *J* = 16.4, 4.4 Hz, 1H), 2.92-2.89 (m, 2H), 2.68 (dd, *J* = 16.4, 8.0 Hz, 1H), 2.19-2.14 (m, 1H), 1.80-1.71 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 155.9 (d, *J* = 234.0 Hz), 143.6 (d, *J* = 2.0 Hz), 136.0, 134.8, 129.7, 129.0, 126.3, 126.1, 115.9 (d, *J* = 23.0 Hz), 114.5 (d, *J* = 7.0 Hz), 49.3, 36.6, 28.9, 27.6; HRMS (ESI) calcd. for $C_{16}H_{17}NF$ (M+H): 242.1340; Found: 242.1338.



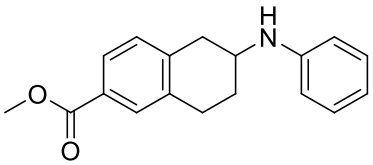
2f, colorless oil; IR (film): 1483, 1452, 1235 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.20-7.04 (m, 4H), 6.81 (s, 2H), 3.50-3.42 (m, 1H), 3.07 (dd, *J* = 16.0, 4.4 Hz, 1H), 2.94-2.76 (m, 3H), 2.64 (dd, *J* = 16.0, 9.2 Hz, 1H), 2.23 (s, 3H), 2.21 (s, 6H), 2.11-2.05 (m, 1H), 1.69-1.59 (m, 1H); ^{13}C NMR (100 MHz,

$CDCl_3$, ppm): δ 142.2, 136.2, 135.5, 131.0, 129.7, 129.6, 128.9, 126.1, 126.0, 53.2, 37.6, 30.7, 28.6, 20.8, 19.0; HRMS (ESI) calcd. for $C_{19}H_{29}N$ (M+H): 266.1903; Found: 266.1901.

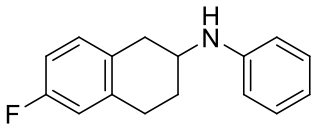


2g, colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.24-7.15 (m, 2H), 6.99 (d, *J* = 8.4, 1H), 6.71-6.62 (m, 5H), 3.78 (brs, 1H), 3.77 (s, 3H), 3.14 (dd, *J* = 16.0, 4.8 Hz, 1H), 2.88-2.86 (m, 2H), 2.61 (dd, *J* = 15.6, 8.0 Hz, 1H), 2.17-2.14 (m, 1H), 1.80-1.71 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 158.1, 147.4, 137.2, 130.6, 129.5, 126.9, 117.5, 113.6, 113,5, 112.5, 55.5, 48.9, 35.9, 28.9, 27.9.

B. Yao, H. Ji, Y. Cao, Y. Zhou, J. Zhu, J. Lue, Y. Li, J. Chen, C. Zheng, Y. Jiang, R. Liang and H. Tang, *J. Med. Chem.,* 2007, **50**, 5293.

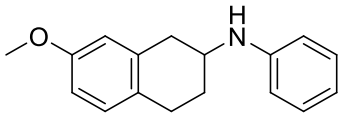


2h white solid; m.p. 103-105 °C; IR (film): 3392, 1716, 1602, 1285 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.81 (s, 1H), 7.77 (d, *J* = 8.0, 1H), 7.25-7.12 (m, 3H), 6.71 (dd, *J* = 7.2, 7.2 Hz, 1H), 6.64 (d, *J* = 8.0, 2H), 3.90 (s, 3H), 3.84-3.80 (m, 1H), 3.66 (brs, 1H), 3.25 (dd, *J* = 16.8, 4.4 Hz, 1H), 2.97-2.93 (m, 2H), 2.73 (dd, *J* = 16.8, 8.0 Hz, 1H), 2.22-2.20 (m, 1H), 1.83-1.74 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 167.4, 147.1, 140.5, 136.3, 130.3, 129.8, 129.6, 128.2, 127.1, 117.7, 113.6, 52.2, 48.4, 36.9, 28.9, 27.6; HRMS (ESI): calcd. for $C_{18}H_{20}O_2N$ $(M+H)^+$: 282.1489; Found: 282.1489.



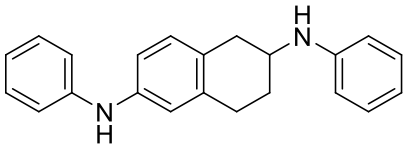
2i white solid; m.p. 98-100 °C; IR (film): 3399, 1602, 1499, 1180, 941 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.22-7.16 (m, 2H), 7.03-6.99 (m, 1H), 6.84-6.80 (m, 2H), 6.70 (dd, *J* = 7.2, 7.2 Hz, 1H), 6.68-6.61 (m, 2H), 3.80-3.78 (m, 1H), 3.62 (brs, 1H), 3.15 (dd, *J* = 16.0, 4.0 Hz, 1H), 2.90-2.86 (m, 2H), 2.62 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.17-2.14 (m, 1H), 1.79-1.70 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$,

ppm): δ 161.4 (d, J = 242.5 Hz), 147.2, 138.0(d, J = 6.2 Hz), 130.9 (d, J = 7.9 Hz), 130.3, 129.6, 117.6, 115.1 (d, J = 20.4 Hz), 113.5, 113.2 (d, J = 21.2 Hz), 48.6, 36.0, 28.6, 27.8; HRMS (ESI): calcd. for $C_{16}H_{17}FN$ $(M+H)^+$: 242.1340; Found: 242.1339.

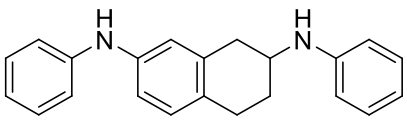


2j white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.22-7.15 (m, 2H), 7.02 (d, J = 8.0 Hz, 1H), 6.73-6.69 (m, 2H), 6.64-6.61 (m, 3H), 3.80-3.78 (m, 1H), 3.78 (s, 3H), 3.65 (brs, 1H), 3.17 (dd, J = 16.0, 4.4 Hz, 1H), 2.87-2.78 (m, 2H), 2.65 (dd, J = 16.4, 8.4 Hz, 1H), 2.16-2.13 (m, 1H), 1.79-1.70 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ157.9, 147.4, 136.0, 129.9, 129.5, 128.1, 117.5, 114.2, 113.5, 112.7, 55.5, 48.6, 36.9, 29.2, 26.8.

B. Yao, H. Ji, Y. Cao, Y. Zhou, J. Zhu, J. Lue, Y. Li, J. Chen, C. Zheng, Y. Jiang, R. Liang and H. Tang, *J. Med. Chem.,* 2007, **50**, 5293.

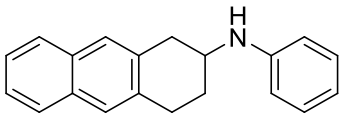


2k, white oil; IR (film): 3392, 1599, 1503, 1242 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.25-7.23 (m, 2H), 7.18-7.16 (m, 2H), 7.03 (d, J = 8.0 Hz, 2H), 7.00-6.98 (m, 1H), 6.92-6.85 (m, 3H), 6.72-6.68 (m, 1H), 6.64 (m, d, J = 8.0 Hz, 2H), 5.60 (brs, 1H), 3.80-3.79 (m, 1H), 3.69 (brs, 1H), 3.16 (dd, J = 16.0, 4.4 Hz, 1H), 2.87-2.84 (m, 2H), 2.62 (dd, J = 16.0, 8.4 Hz, 1H), 2.17-2.14 (m, 1H), 1.79-1.73 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 147.4, 143.8, 141.3, 137.1, 130.5, 129.5, 127.7, 120.8, 118.3, 117.5, 117.4, 116.7, 113.5, 48.8, 36.1, 28.9, 27.8; HRMS (ESI): calcd. for $C_{22}H_{23}N_2$ $(M+H)^+$: 315.1856; Found: 315.1857.

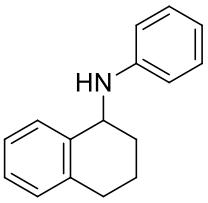


2l, white oil; IR (film): 3394, 1600, 1496, 1206, 1026 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.25-7.17 (m, 4H), 7.00 (d, J = 8.0 Hz, 3H), 6.89-6.87 (m, 2H), 6.78-6.75 (m, 2H), 6.68-6.66 (m, 2H),

4.70 (brs, 2H), 3.78-3.76 (m, 1H), 3.09 (dd, *J* = 16.4, 4.0 Hz, 1H), 2.84-2.83 (m, 2H), 2.63 (dd, *J* = 16.4, 8.4 Hz, 1H), 2.15-2.12 (m, 1H), 1.79-1.70 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 145.8, 143.6, 141.2, 135.4, 129.9, 129.6, 129.5, 128.6, 120.9, 118.9, 118.8, 117.6, 117.0, 114.6, 49.8, 36.3, 28.8, 26.8; HRMS (ESI): calcd. for $C_{22}H_{23}N_2$ $(M+H)^+$: 315.1856; Found: 315.1855.

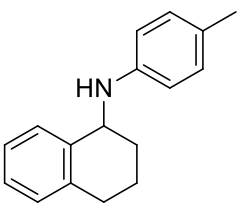


2m, yellow solid, m.p. 130-132 °C; IR (film): 3397, 1600, 1503, 1317, 1091 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.74-7.71 (m, 2H), 7.58 (d, *J* = 10.4 Hz, 2H), 7.41-7.36 (m, 2H), 7.19 (dd, *J* = 7.6, 7.6 Hz, 2H), 6.71 (dd, *J* = 7.6, 7.6 Hz, 1H), 6.65 (d, *J* = 8.0 Hz, 2H), 3.92-3.89 (m, 1H), 3.70 (brs, 1H), 3.4 (dd, *J* = 16.4, 4.0 Hz, 1H), 3.12-3.06 (m, 2H), 2.88 (dd, *J* = 16.0, 8.0 Hz, 1H), 2.29-2.25 (m, 1H), 1.86-1.82 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 147.3, 134.9, 133.8, 132.6, 132.4, 129.6, 127.7, 127.2, 126.8, 125.5, 125.4, 117.6, 113.6, 48.8, 37.0, 29.4, 27.8; HRMS (ESI): calcd. for $C_{20}H_{19}N$ $(M+H)^+$: 274.1590; Found: 274.1589.



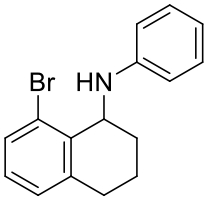
2n, colorless oil; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.40-7.38 (m, 1H), 7.23-7.10 (m, 5H), 6.70 (dd, *J* = 7.2, 7.2 Hz, 1H), 6.66 (d, *J* = 8.0 Hz, 2H), 4.64-4.61 (m, 1H), 3.86 (brs, 1H), 2.88-2.71 (m, 2H), 2.02-1.76 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 147.6, 138.4, 137.8, 129.6, 129.5, 129.2, 127.3, 126.3, 117.2, 113.0, 51.2, 29.5, 28.9, 19.6.

M. Rueping, E.Suigiono, C. Azap, T. Theissmann and M. Bolte, *Org. Lett.,* 2005, **7**, 3781.

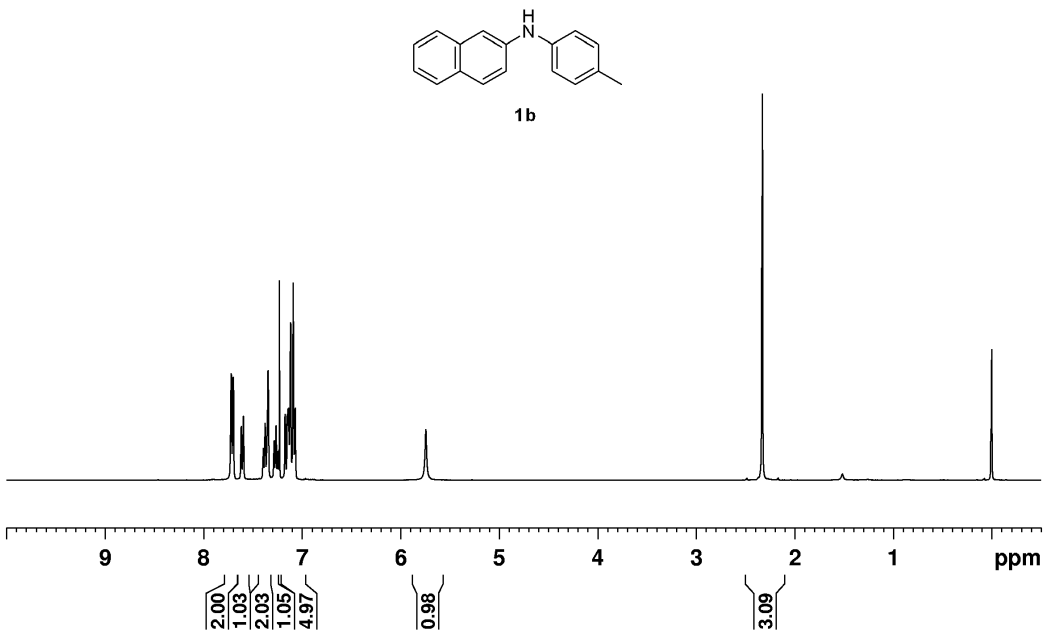


2o, white solid; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.39 (d, *J* = 6.8 Hz, 1H), 7.18-7.14 (m, 2H), 7.13-7.10 (m, 1H), 7.00 (d, *J* = 8.0 Hz, 2H), 6.59 (d, *J* = 8.0 Hz, 2H), 4.58 (dd, *J* = 4.8, 4.0 Hz, 1H), 3.73 (brs, 1H), 2.87-2.70 (m, 2H), 2.25 (s, 3H), 1.97-1.91 (m, 2H), 1.90-1.75 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 145.4, 138.6, 137.8, 130.1, 129.5, 129.2, 127.3, 126.5, 126.3, 113.2, 51.5, 29.6, 28.9, 20.6, 19.6.

X. Zhou, M. Bao and Y. Zhou, *Adv. Synth. Catal.,* 2011, **353**, 84.



2p, white oil; IR (film): 3411, 1600, 1502, 1410, 1262, 935 cm^{-1}; ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.43 (d, *J* = 6.8 Hz, 1H), 7.20 (dd, *J* = 8.4, 7.6 Hz, 1H), 7.08-7.06 (m, 2H), 6.70-6.68 (m, 3H), 4.74 (brs, 1H), 3.70 (brs, 1H), 2.89-2.83 (m, 1H), 2.78-2.73 (m, 1H), 2.31-2.26 (m, 1H), 1.91-1.77 (m, 2H), 1.66-1.52 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 147.5, 140.6, 136.5, 131.0, 129.5, 128.8, 128.7, 127.3, 117.4, 112.9, 50.5, 29.7, 27.7, 17.7; HRMS (ESI): calcd. for $C_{16}H_{16}BrN$ $(M+H)^+$: 302.0539; Found: 302.0538.




```
NAME          lyb-H-2014
EXPNO               1117
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Date_           20140326
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PULPROG             zg30
TD                 32768
SOLVENT            CDCl3
NS                     8
DS                     0
SWH            12019.230 Hz
FIDRES          0.366798 Hz
AQ             1.3631988 sec
RG                   144
DW                41.600 usec
DE                 6.50 usec
TE                300.0 K
D1           2.00000000 sec
TD0                    1

======== CHANNEL f1 ========
SFO1        400.1320007 MHz
NUC1                   1H
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SI                 65536
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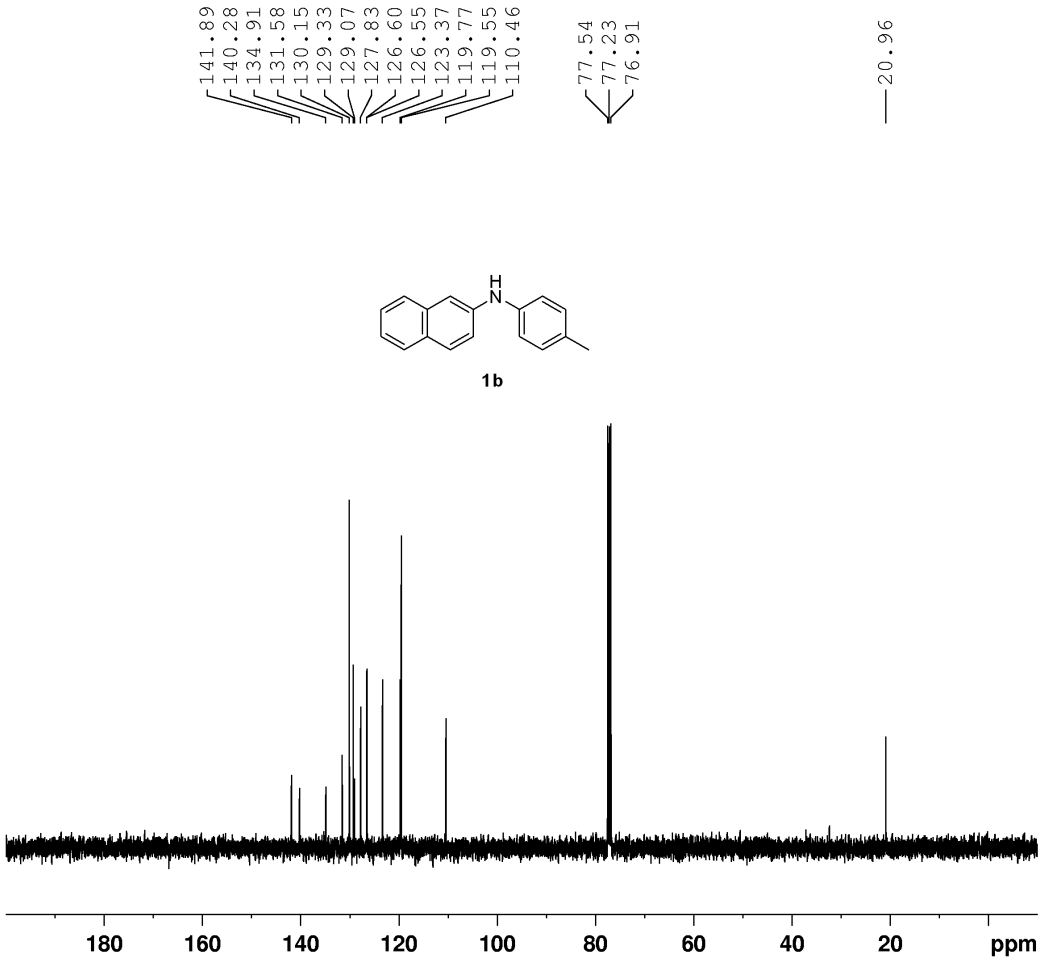

NAME	lyb-C-2014
EXPNO	1117
PROCNO	1
Date_	20140326
Time	12.30
INSTRUM	spect
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PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	70
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
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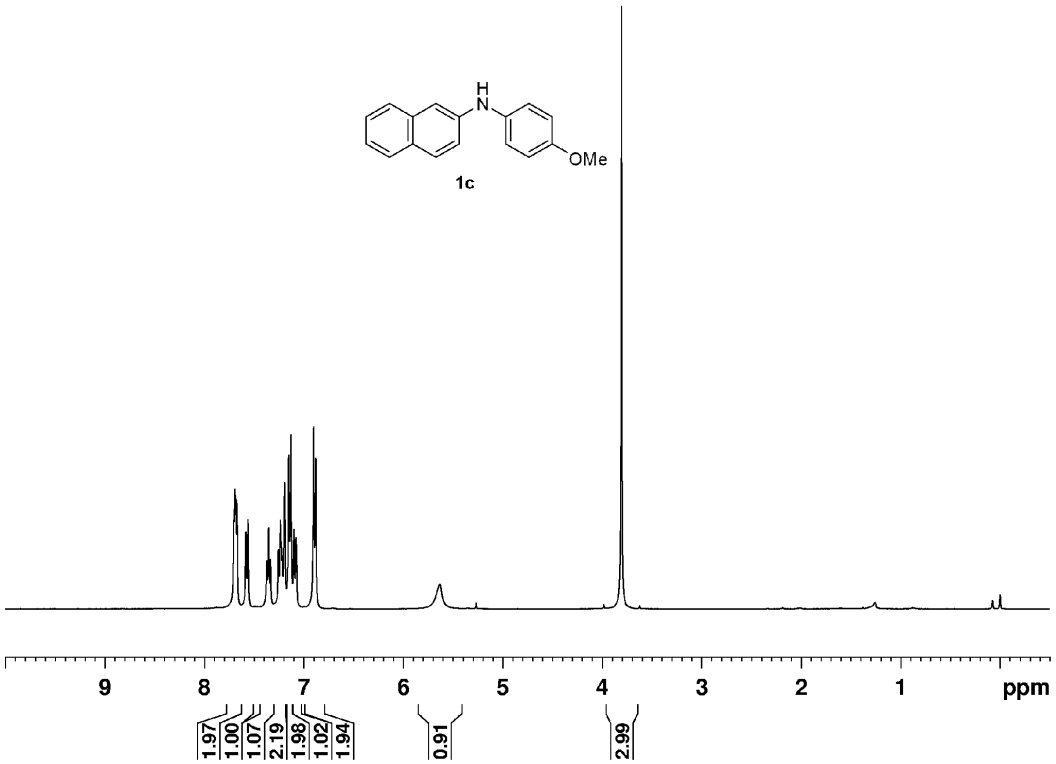
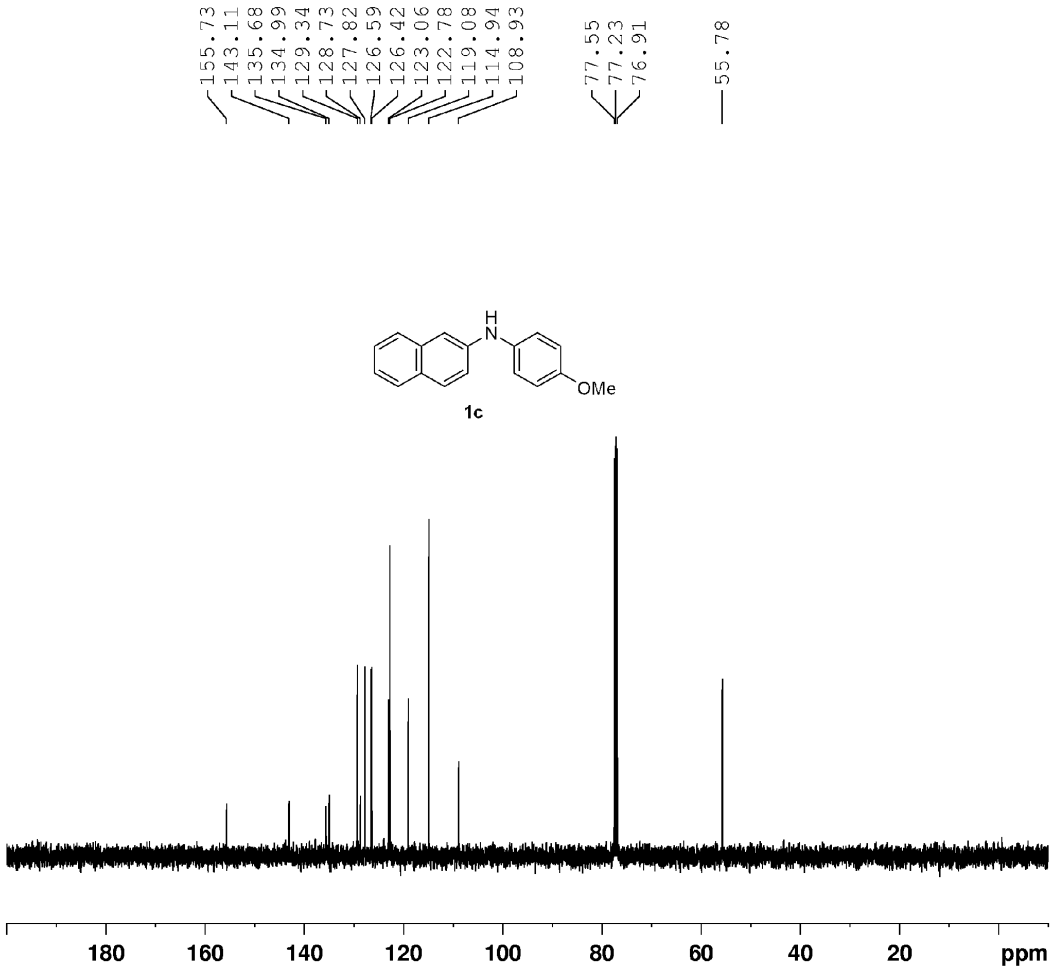
SI	32768
SF	100.6127518 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



NAME	lyb-H-2014	
EXPNO	1096	
PROCNO	1	
Date_	20140315	
Time	2.09	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300226	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



NAME	lyb-C-2014
EXPNO	1096
PROCNO	1
Date_	20140315
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INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	66
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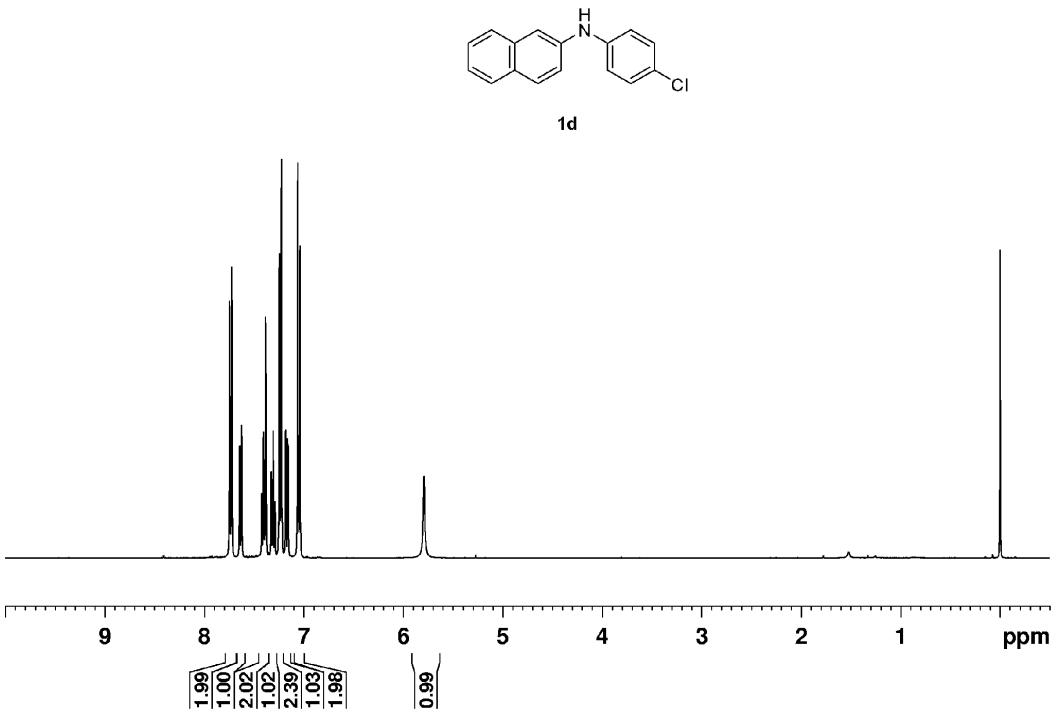
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127525 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



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EXPNO	1118	
PROCNO	1	
Date_	20140326	
Time	6.53	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
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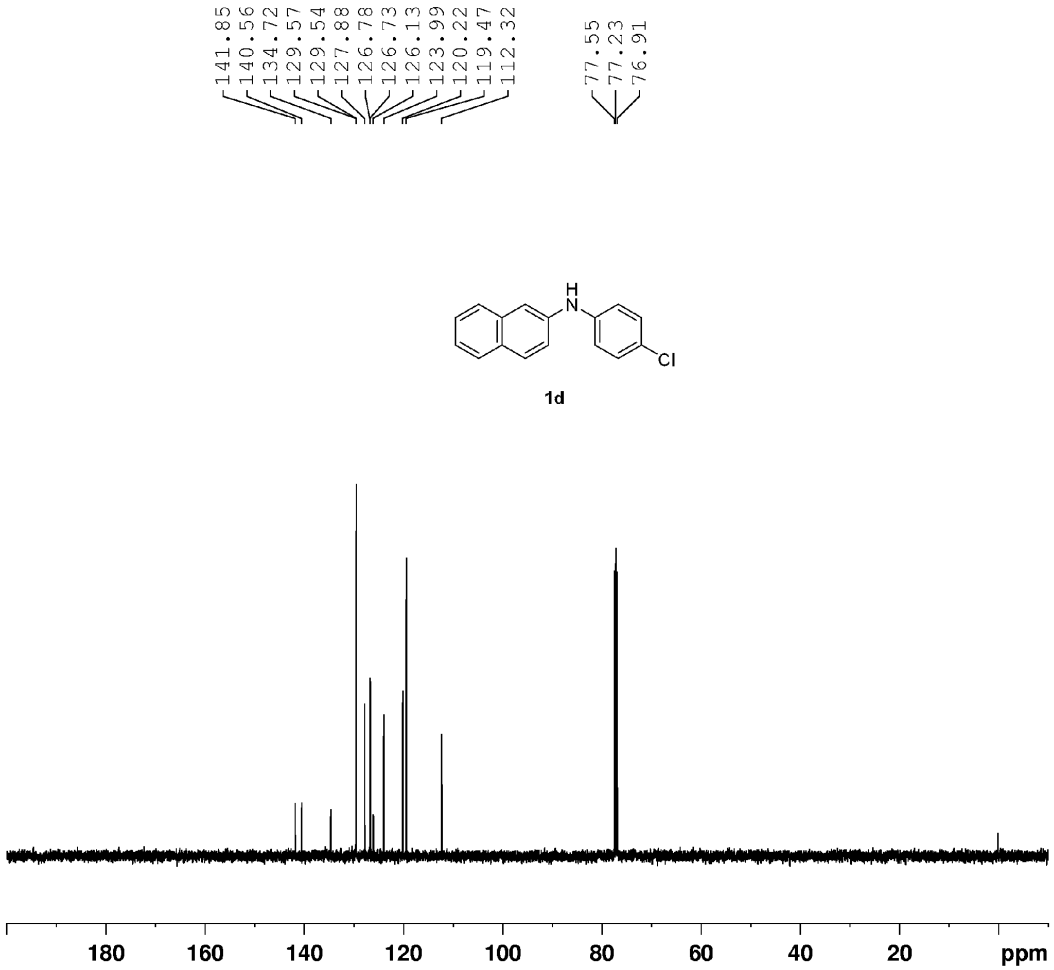
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300213	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



NAME	lyb-C-2014
EXPNO	1118
PROCNO	1
Date_	20140326
Time	6.56
INSTRUM	spect
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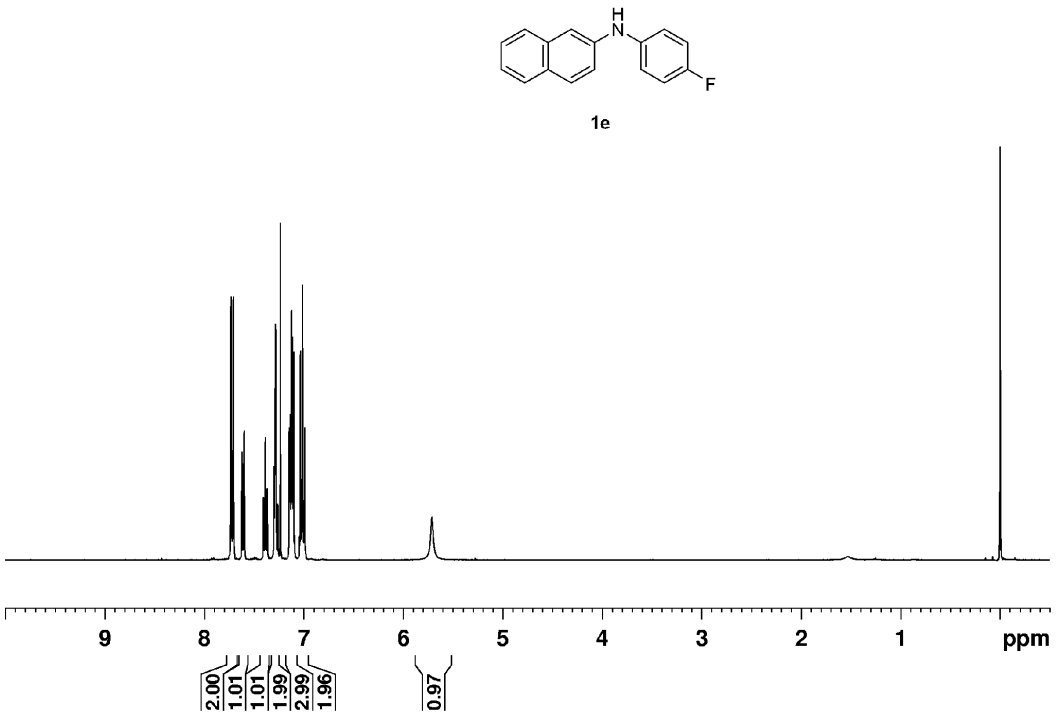
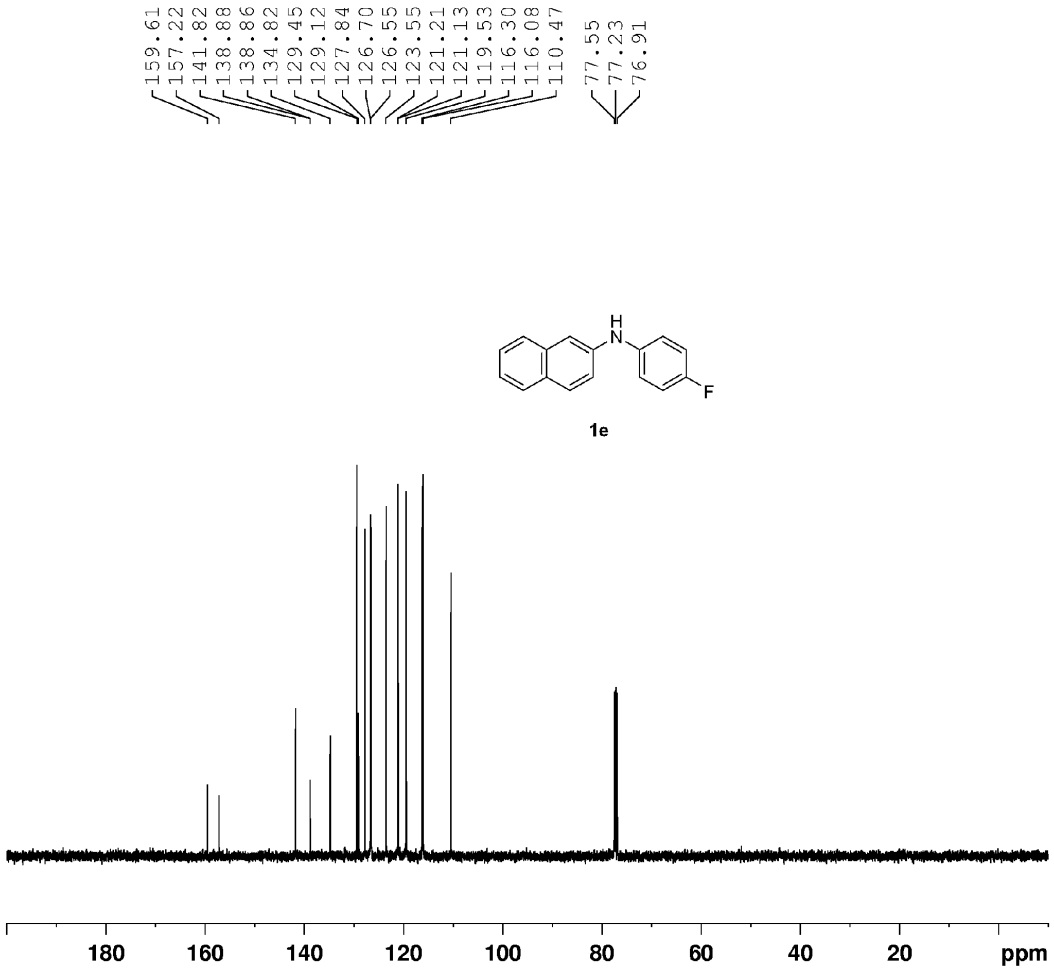
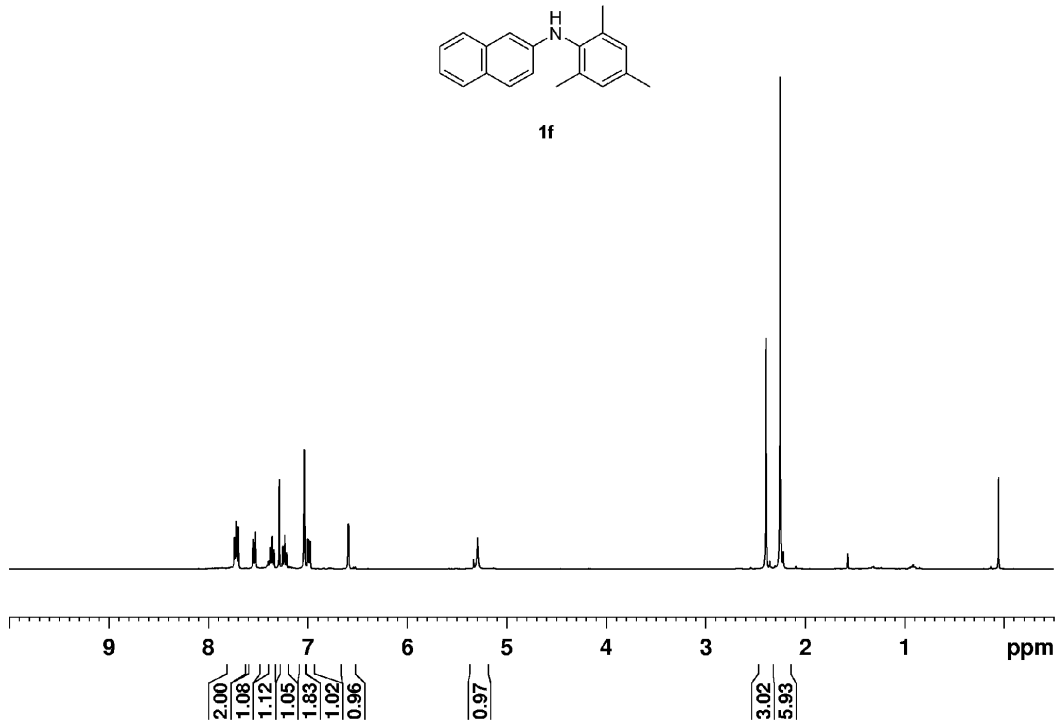
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127518 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



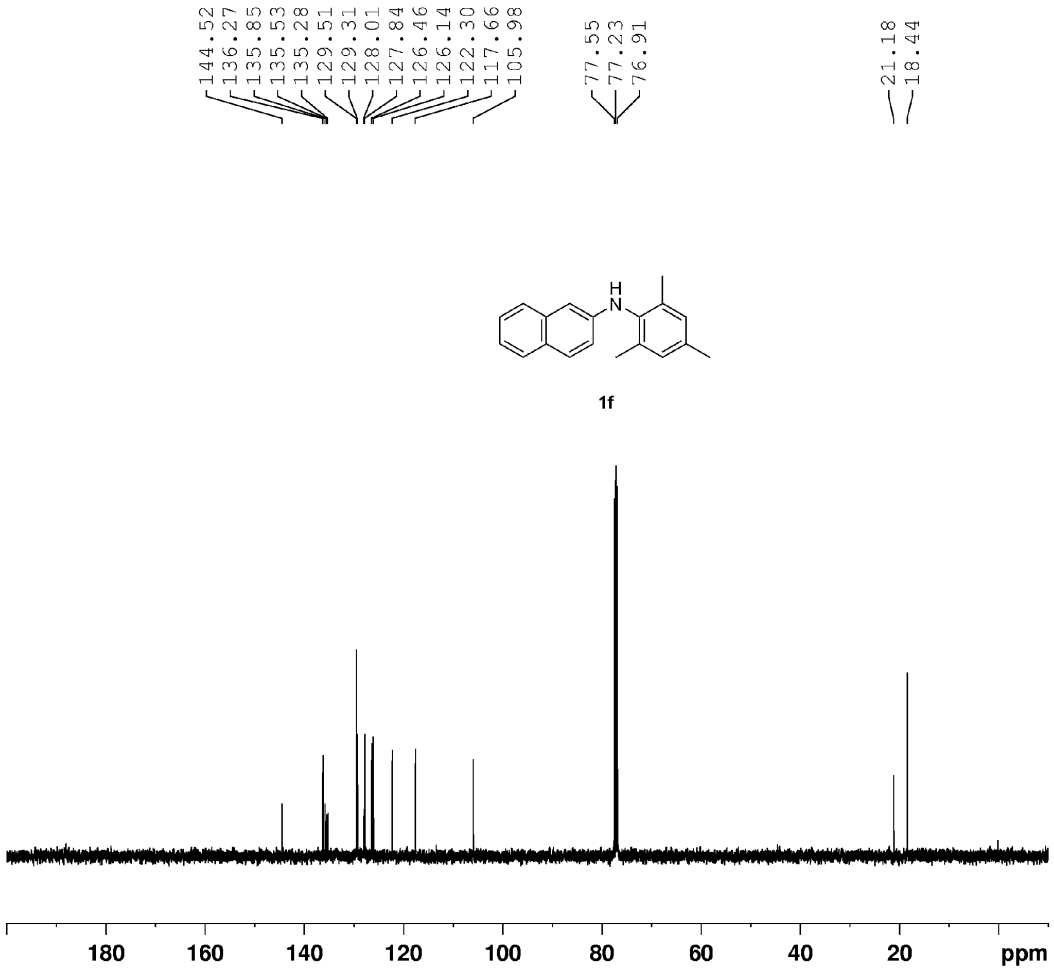
NAME	lyb-H-2014	
EXPNO	1123	
PROCNO	1	
Date_	20140328	
Time	11.47	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300186	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



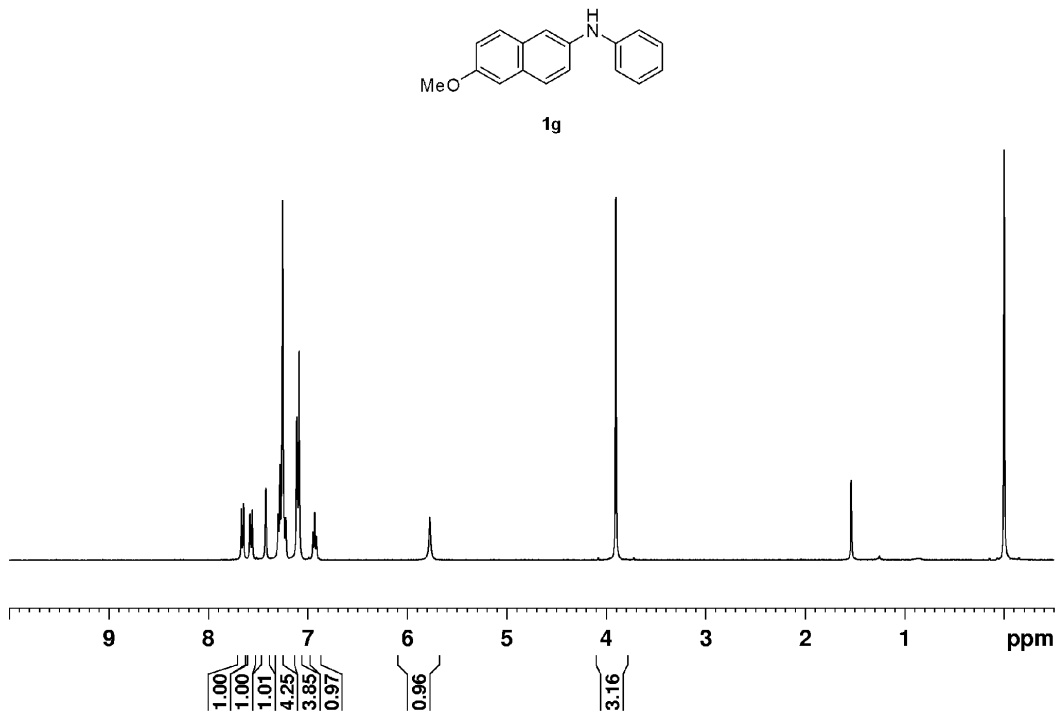
NAME	lyb-C-2014
EXPNO	1123
PROCNO	2
Date_	20140329
Time	1.28
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127610 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



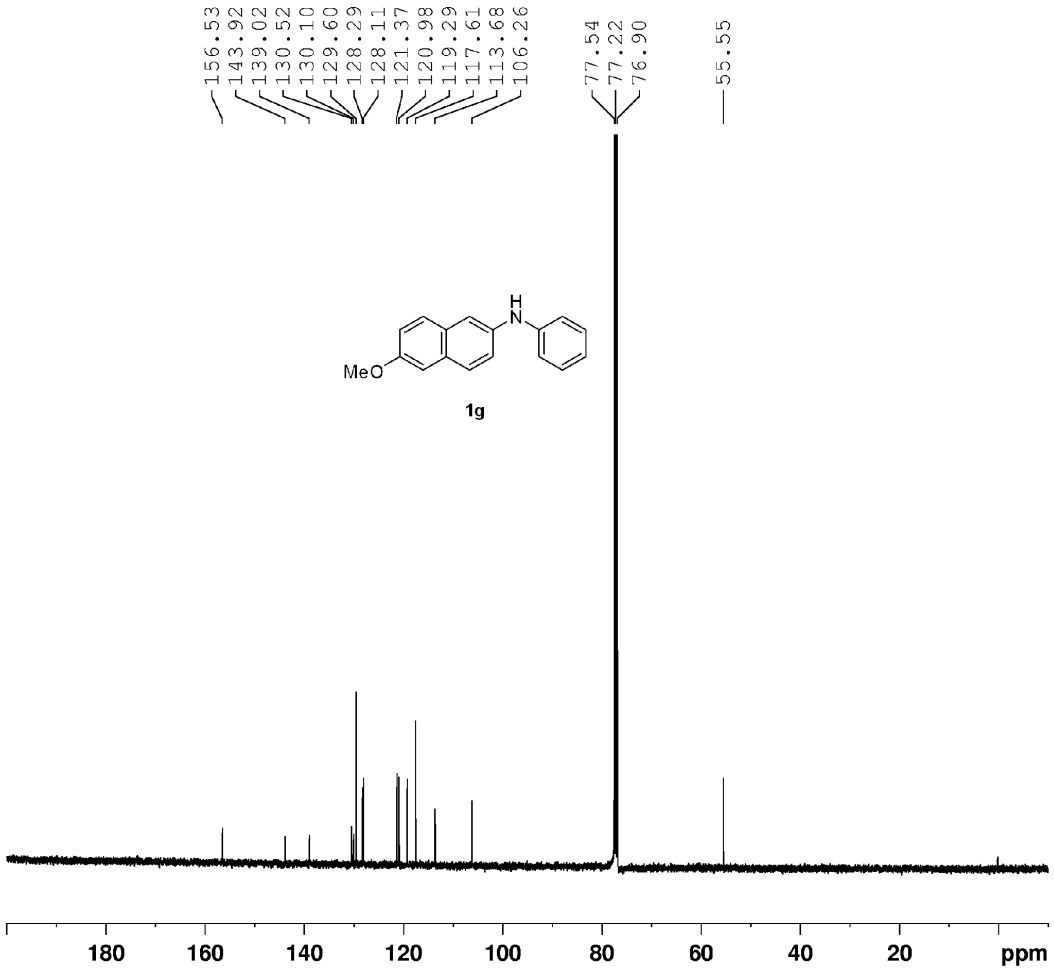
NAME	lyb-H-2014	
EXPNO	1076	
PROCNO	1	
Date_	20140301	
Time	6.14	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	128	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1299984	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



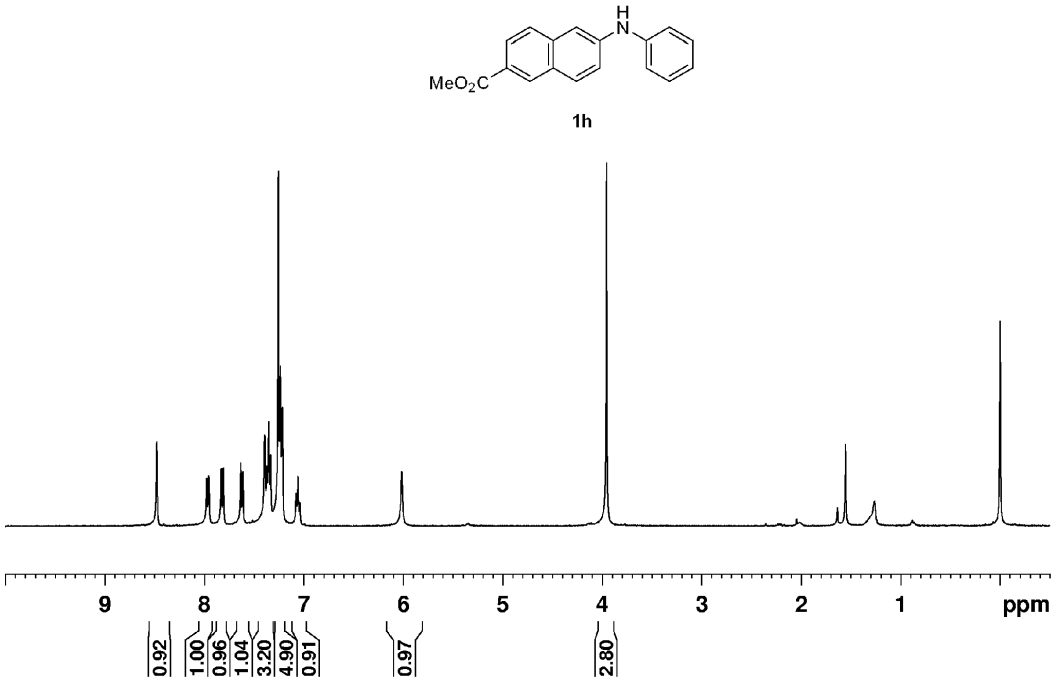
NAME	lyb-C-2014
EXPNO	1076
PROCNO	1
Date_	20140301
Time	6.18
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127510 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



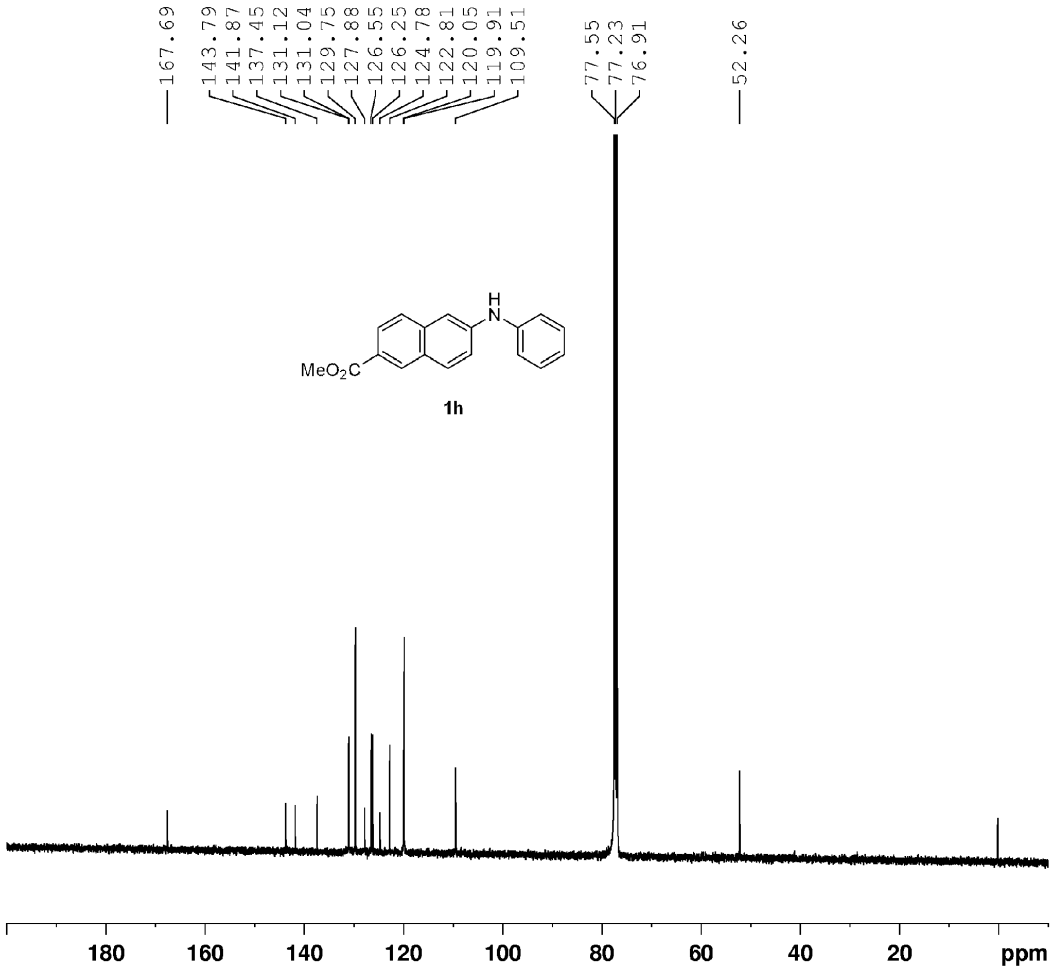
NAME	Lgzz	
EXPNO	113	
PROCNO	1	
Date_	20141125	
Time	7.02	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300128	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



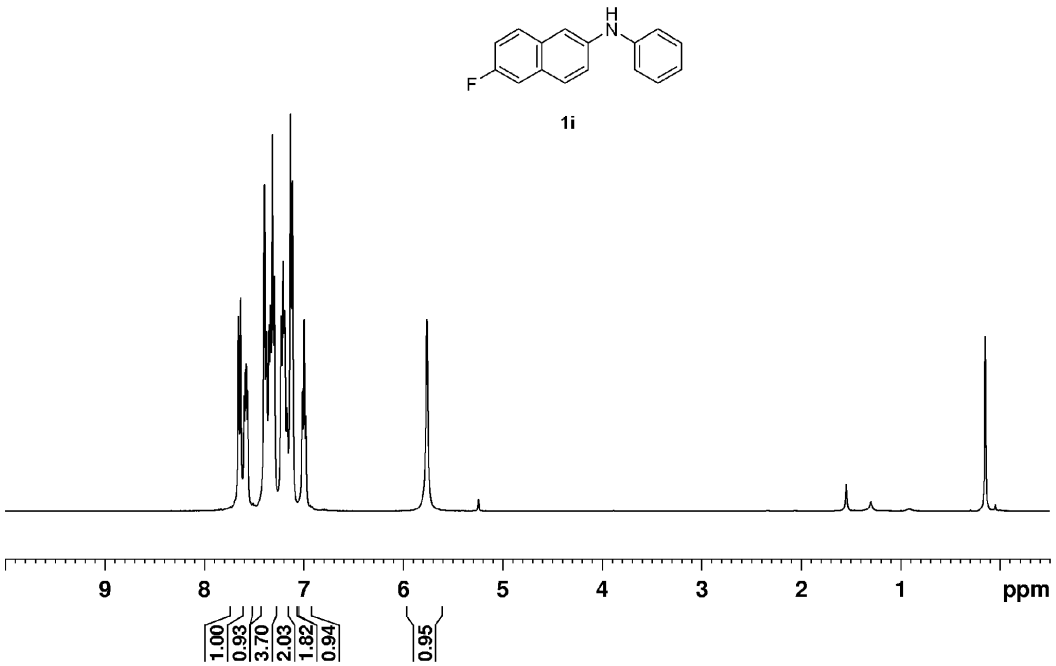
NAME	Lgzz
EXPNO	20
PROCNO	1
Date_	20140924
Time	7.47
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	1642
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127478 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



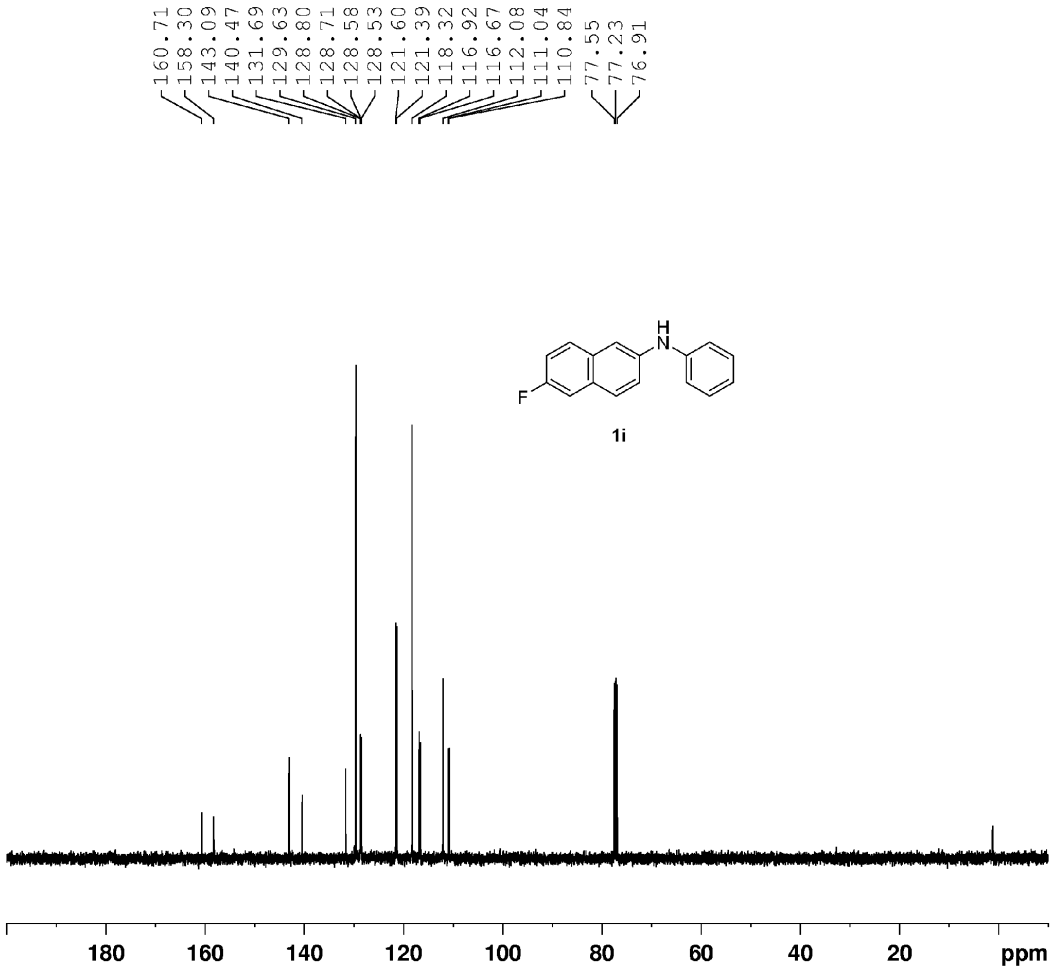
NAME	Lgzz	
EXPNO	117	
PROCNO	1	
Date_	20141125	
Time	7.16	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300116	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



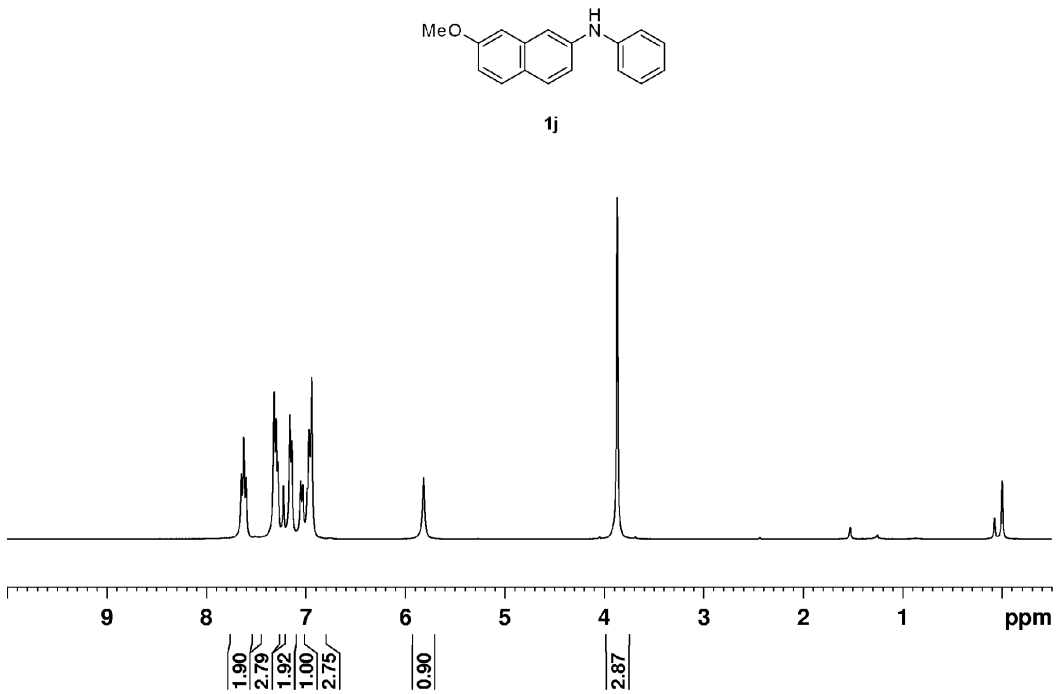
NAME	Lgzz
EXPNO	136
PROCNO	1
Date_	20141130
Time	7.12
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	10838
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127480 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



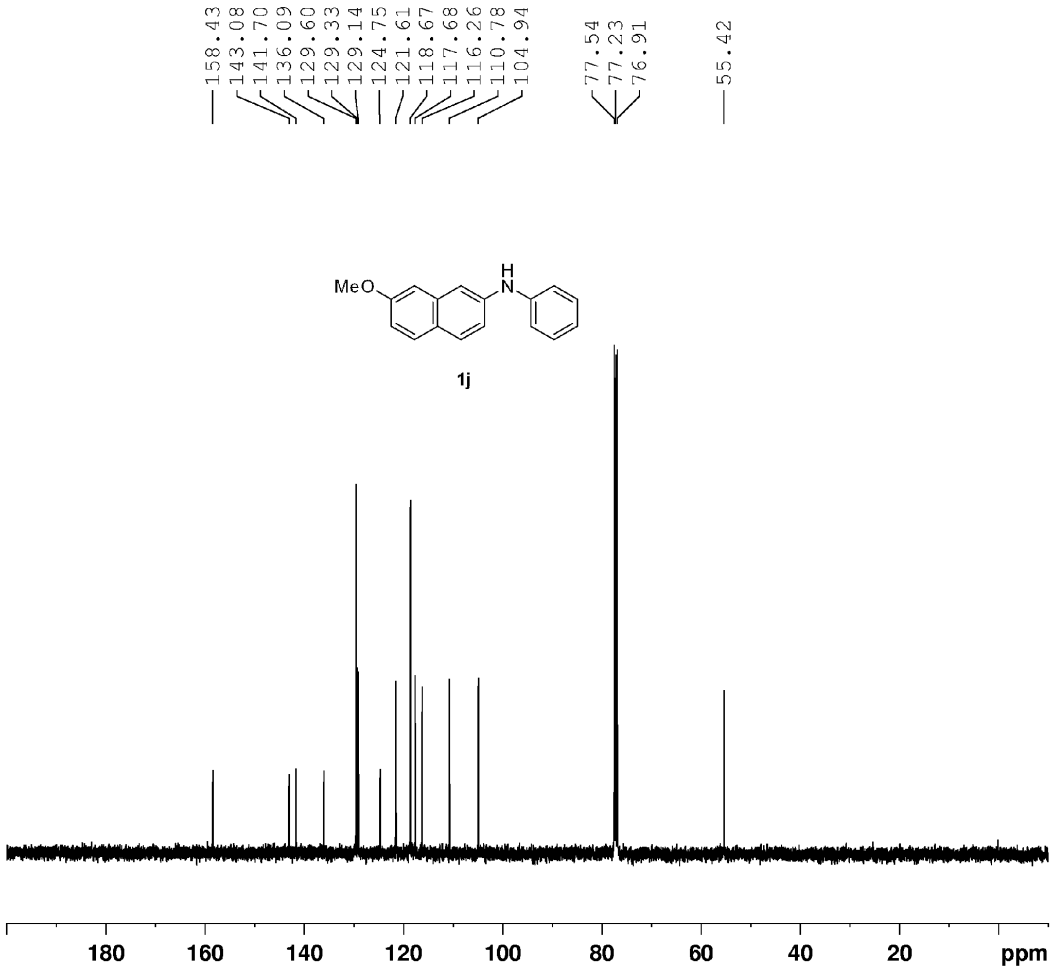
NAME	Lgzz	
EXPNO	57	
PROCNO	1	
Date_	20141011	
Time	6.09	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	3	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	57	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300343	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



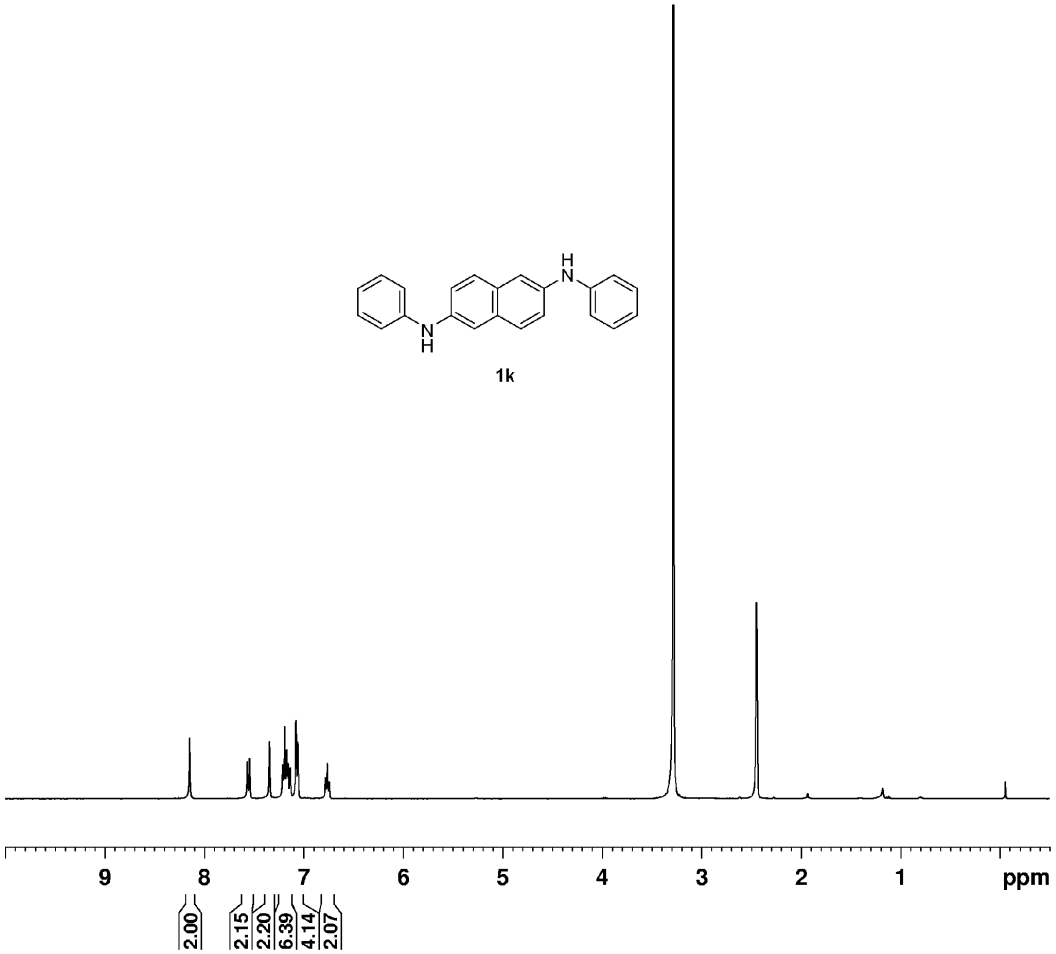
NAME	Lgzz
EXPNO	58
PROCNO	1
Date_	20141011
Time	6.11
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	24
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127625 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



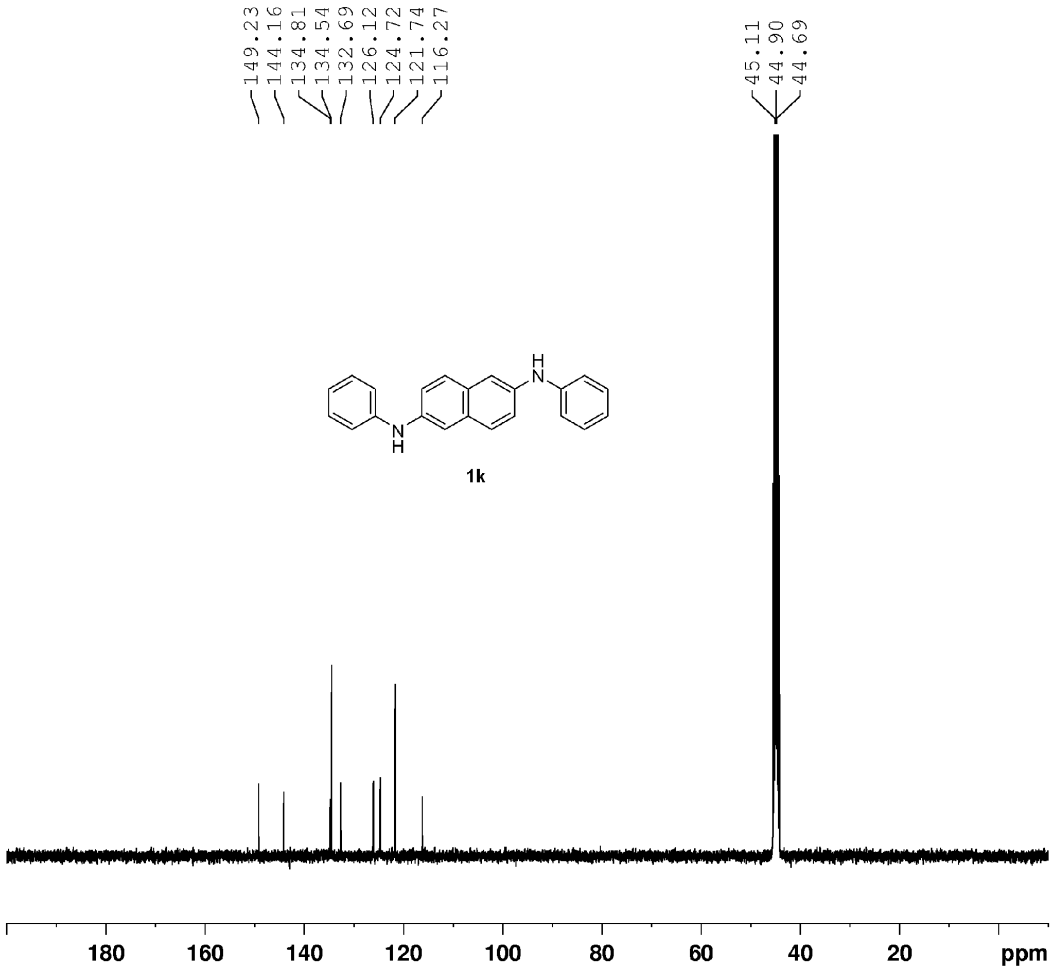
NAME	Lgzz	
EXPNO	121	
PROCNO	1	
Date_	20141125	
Time	11.24	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	5	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	144	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300249	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



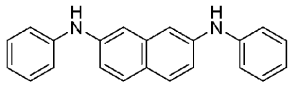
NAME	Lgzz
EXPNO	122
PROCNO	1
Date_	20141125
Time	11.26
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	204
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127529 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



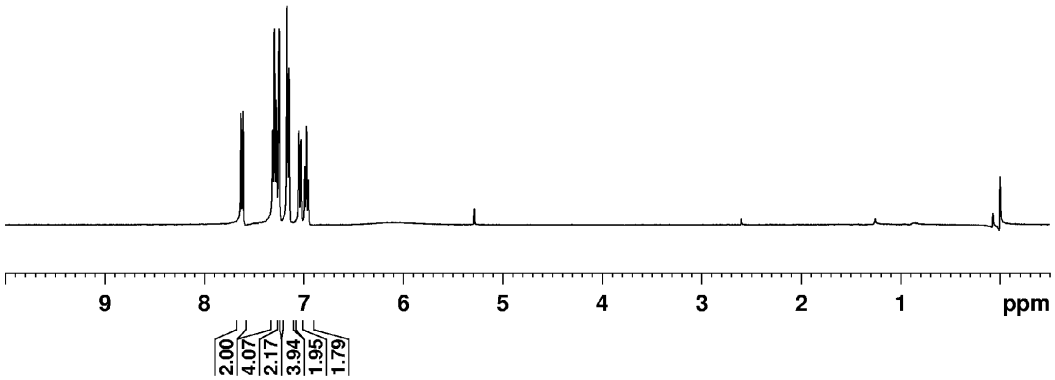
NAME	Lgzz	
EXPNO	82	
PROCNO	1	
Date_	20141021	
Time	4.53	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	DMSO	
NS	16	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300237	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



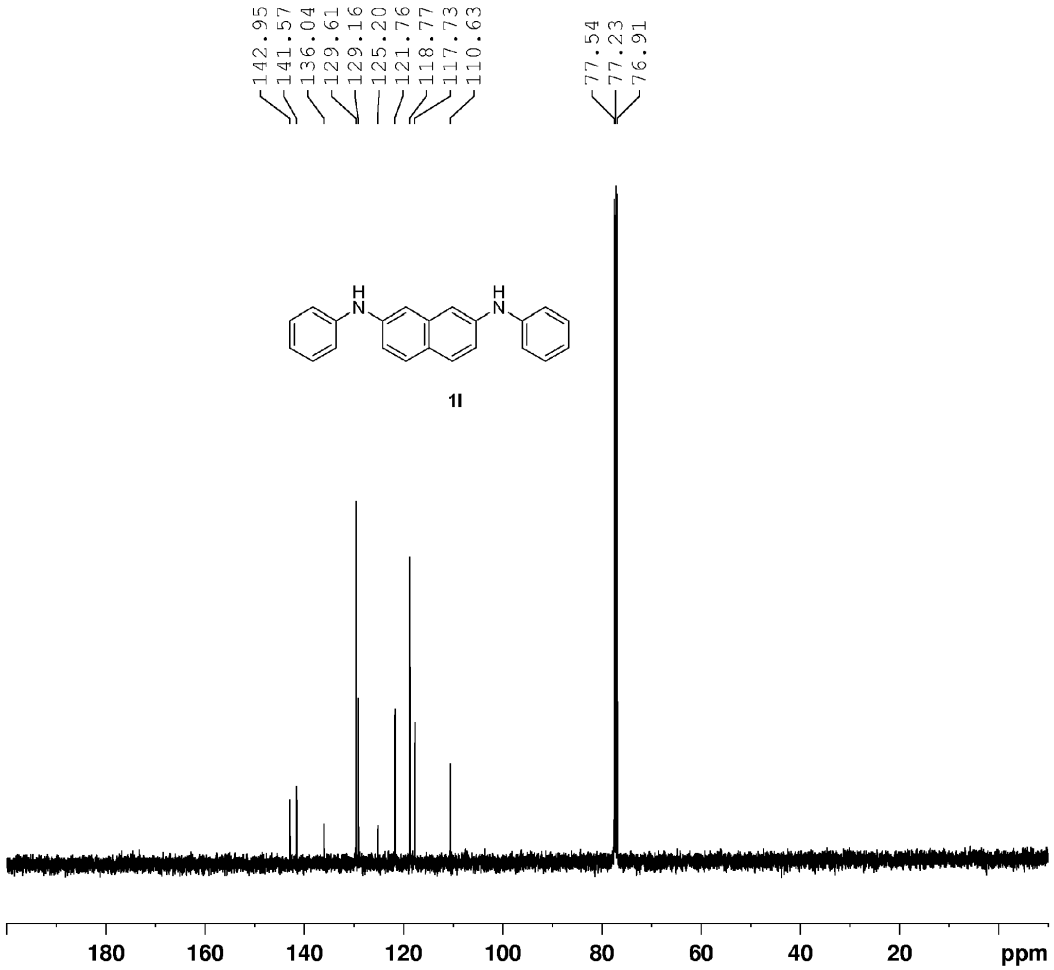
NAME	Lgzz
EXPNO	83
PROCNO	1
Date_	20141021
Time	9.34
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	1934
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127550 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



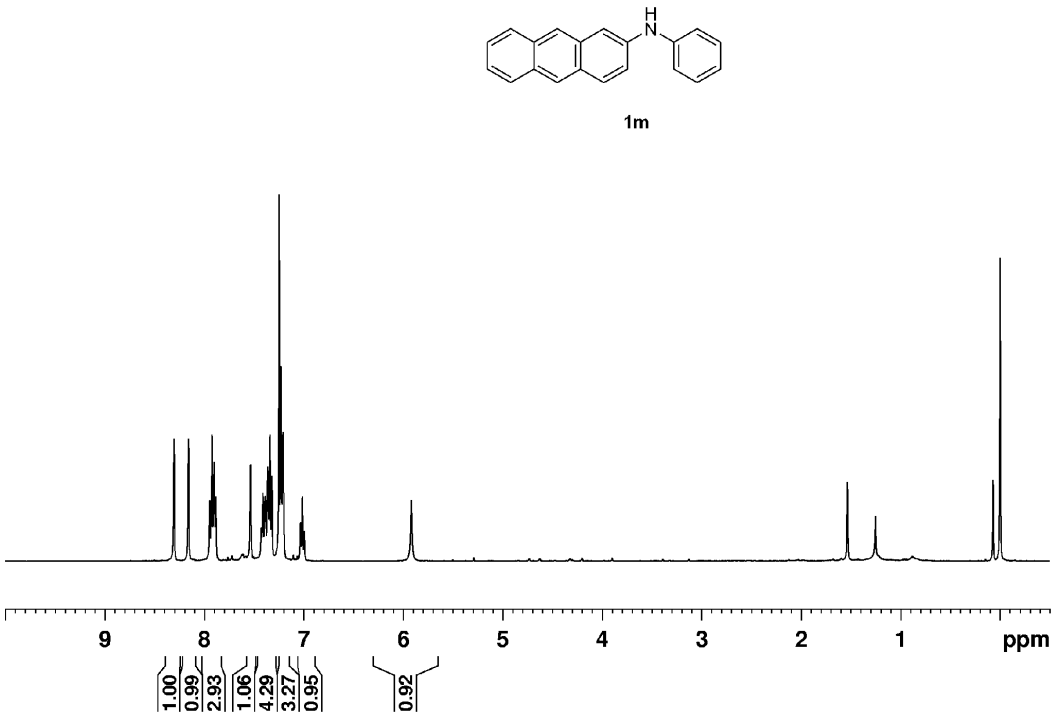
1l



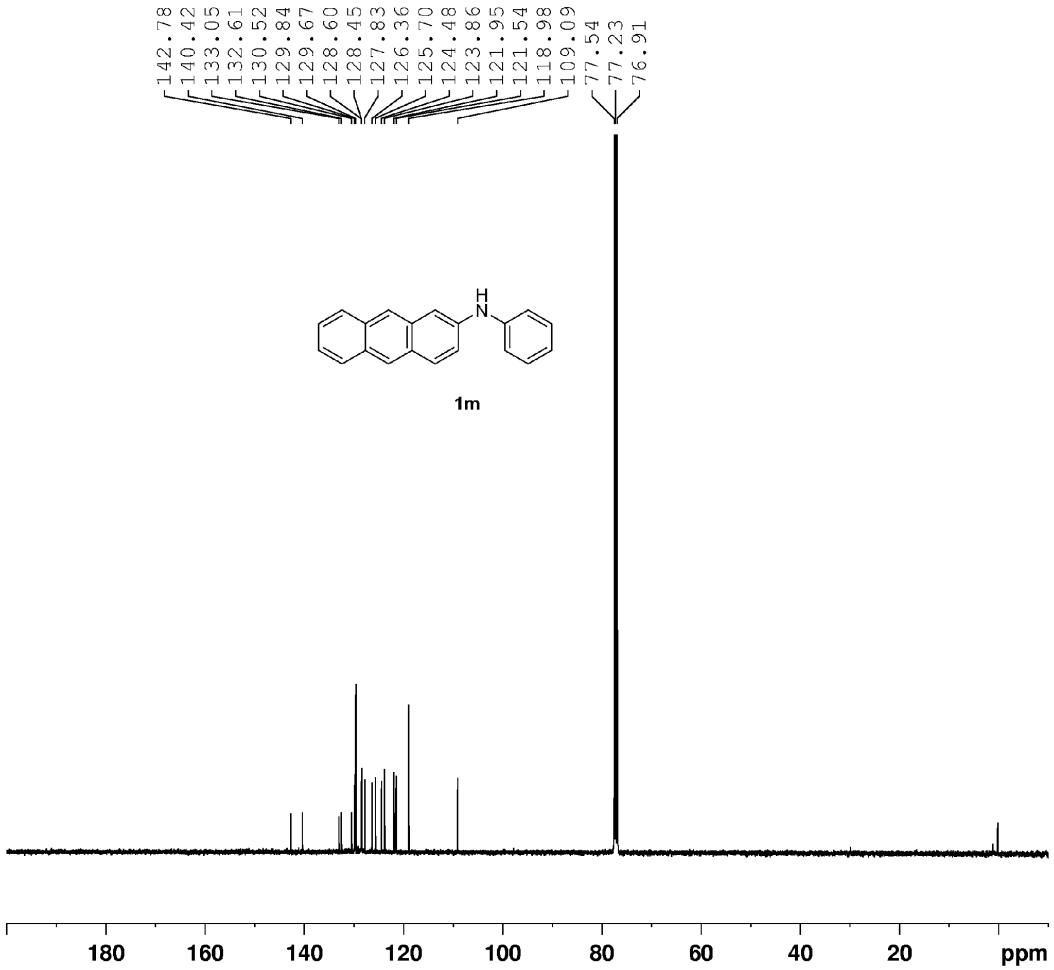
NAME	Lgzz	
EXPNO	67	
PROCNO	1	
Date_	20141015	
Time	4.48	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	4	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300147	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



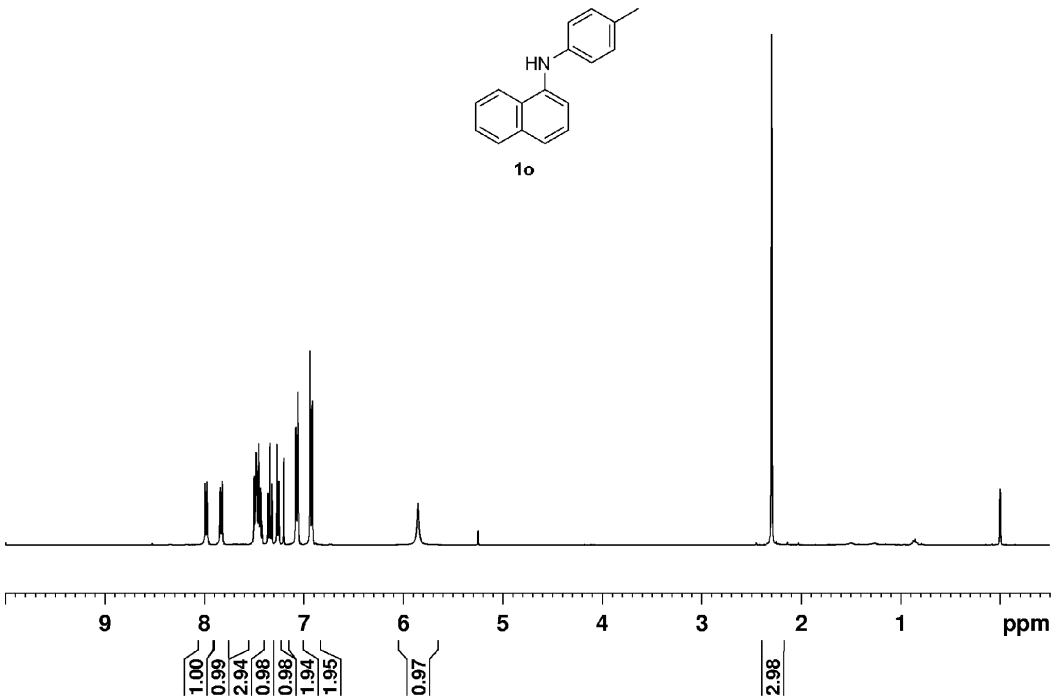
NAME	Lgzz
EXPNO	68
PROCNO	1
Date_	20141015
Time	4.51
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	153
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127496 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



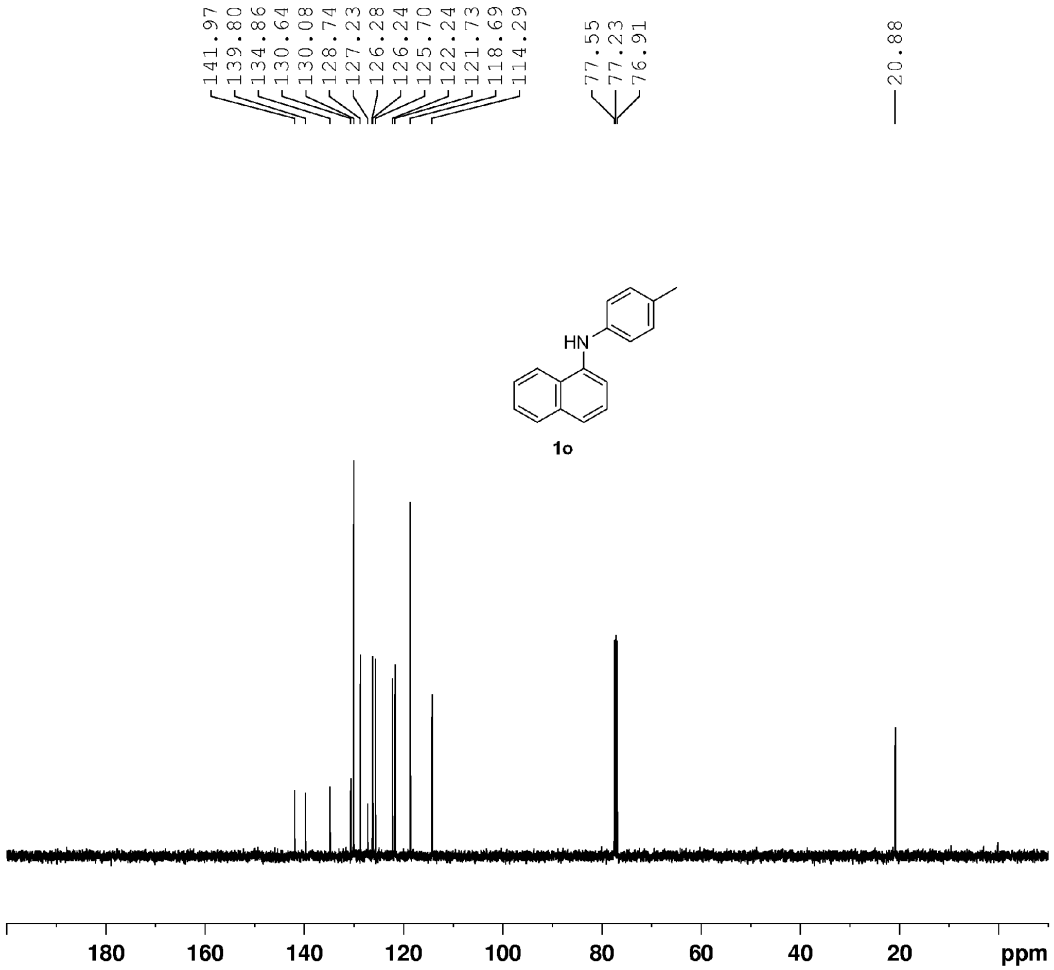
NAME	Lgzz	
EXPNO	140	
PROCNO	1	
Date_	20141202	
Time	2.39	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	16	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300146	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



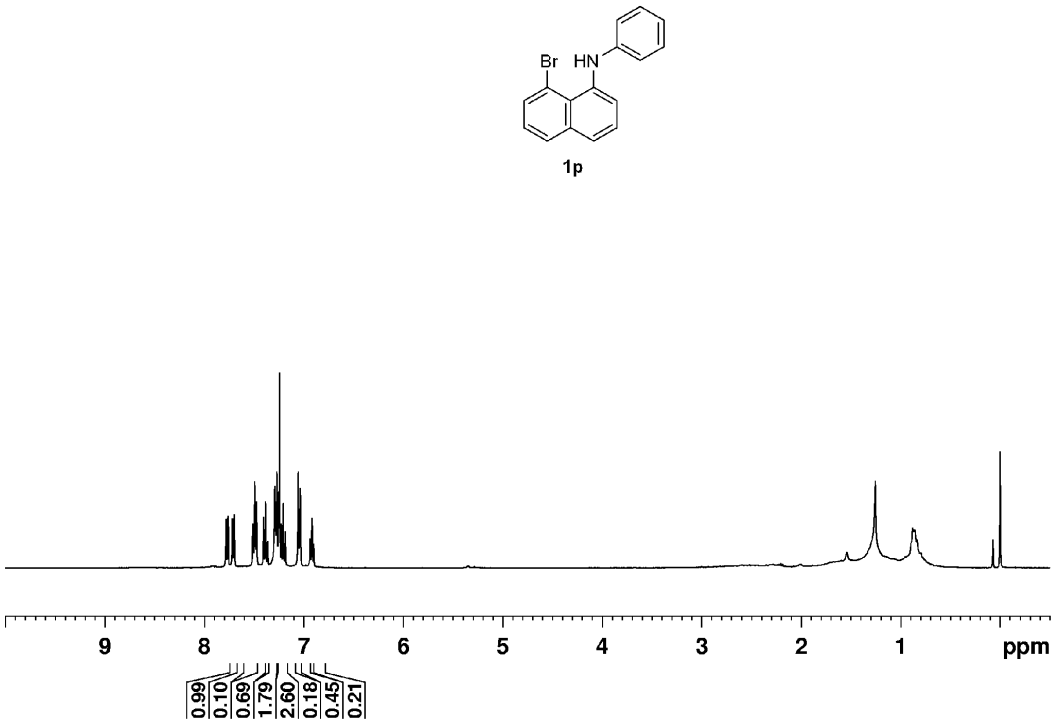
NAME	Lgzz
EXPNO	141
PROCNO	1
Date_	20141202
Time	8.28
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	4371
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127494 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



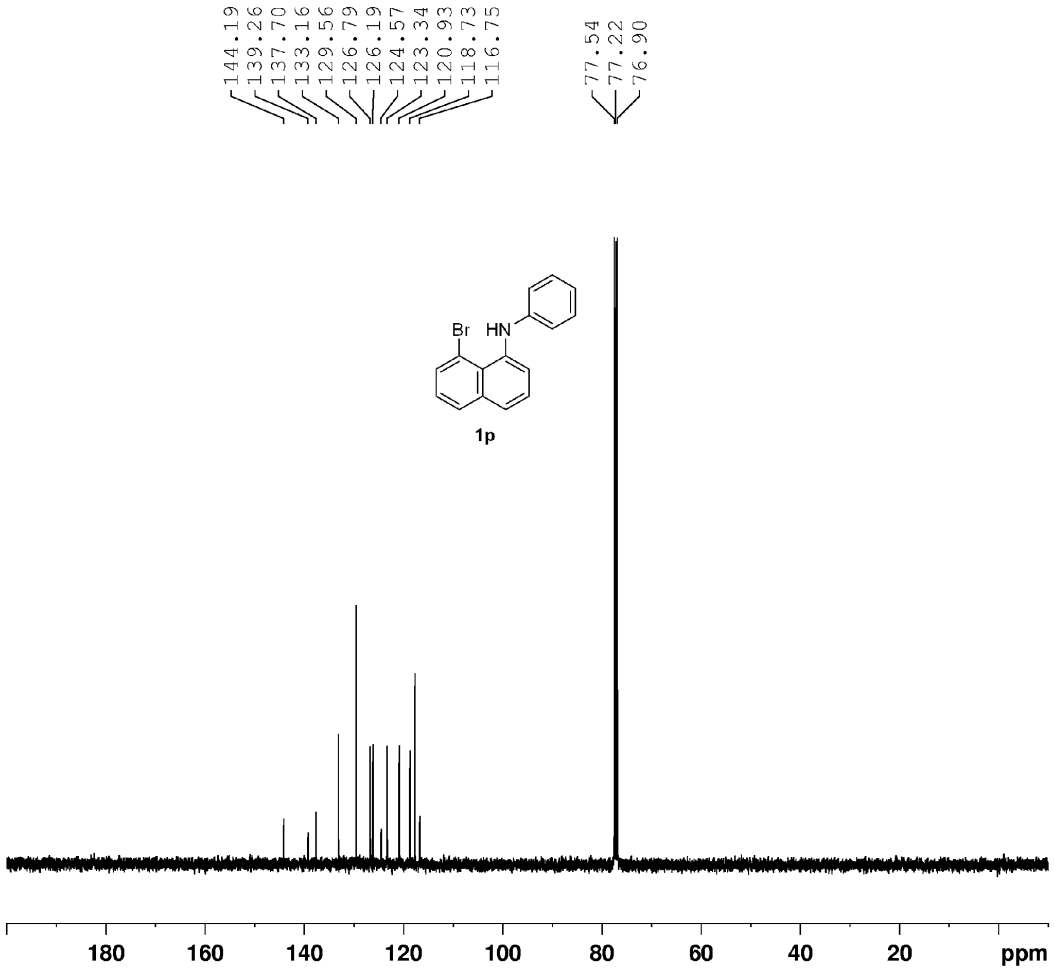
NAME	lyb-H-2014	
EXPNO	1130	
PROCNO	1	
Date_	20140330	
Time	11.00	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	90.5	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300323	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



NAME	lyb-C-2014
EXPNO	1130
PROCNO	1
Date_	20140330
Time	11.03
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	73
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127549 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



NAME	Lgzz	
EXPNO	115	
PROCNO	1	
Date_	20141125	
Time	7.10	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	7	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300163	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	



NAME	Lgzz
EXPNO	48
PROCNO	1
Date_	20140930
Time	4.38
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	300
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127492 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

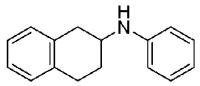
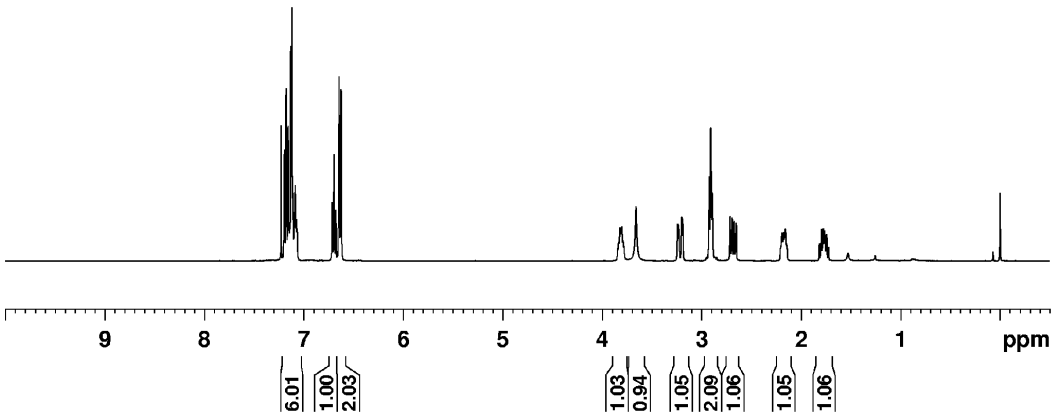


Table 2, entry1



NAME	lyb-H-2014	
EXPNO	1057	
PROCNO	2	
Date_	20140119	
Time	8.04	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	128	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300217	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

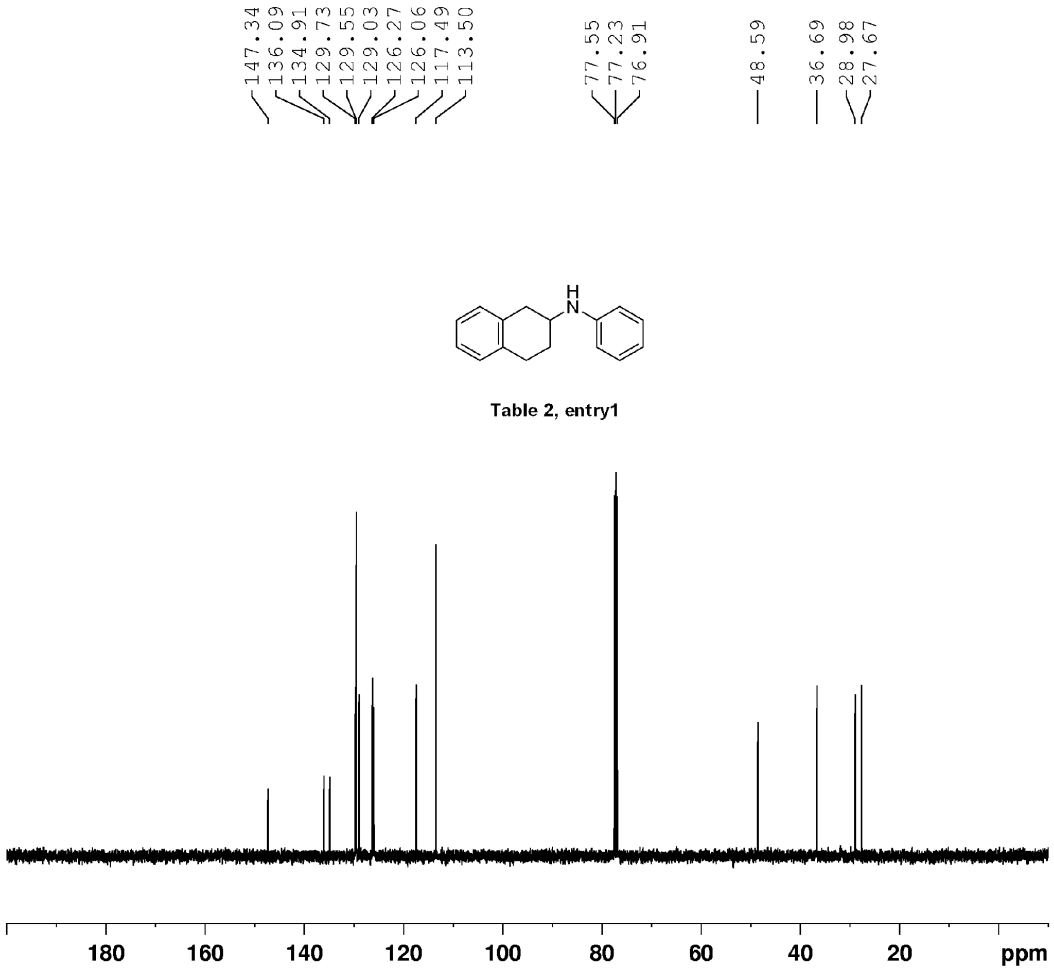


Table 2, entry1

NAME	lyb-C-2014
EXPNO	1057
PROCNO	1
Date_	20140119
Time	8.10
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	117
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127526 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

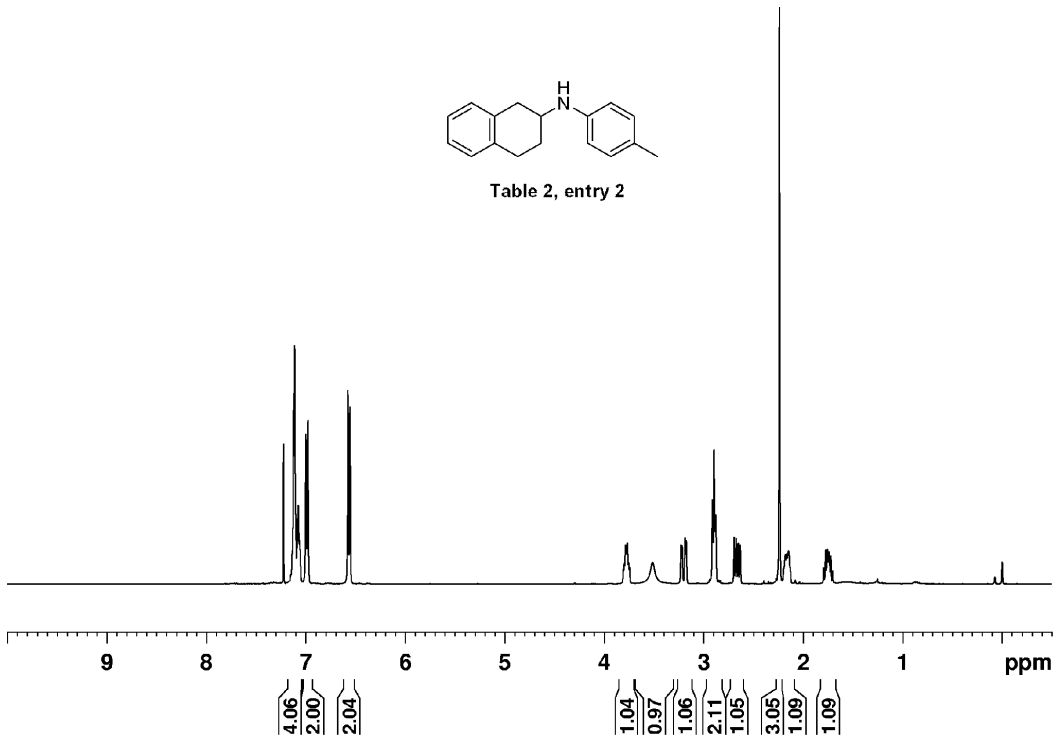


Table 2, entry 2

NAME	lyb-H-2014	
EXPNO	1121	
PROCNO	2	
Date_	20140327	
Time	9.22	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	144	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300239	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

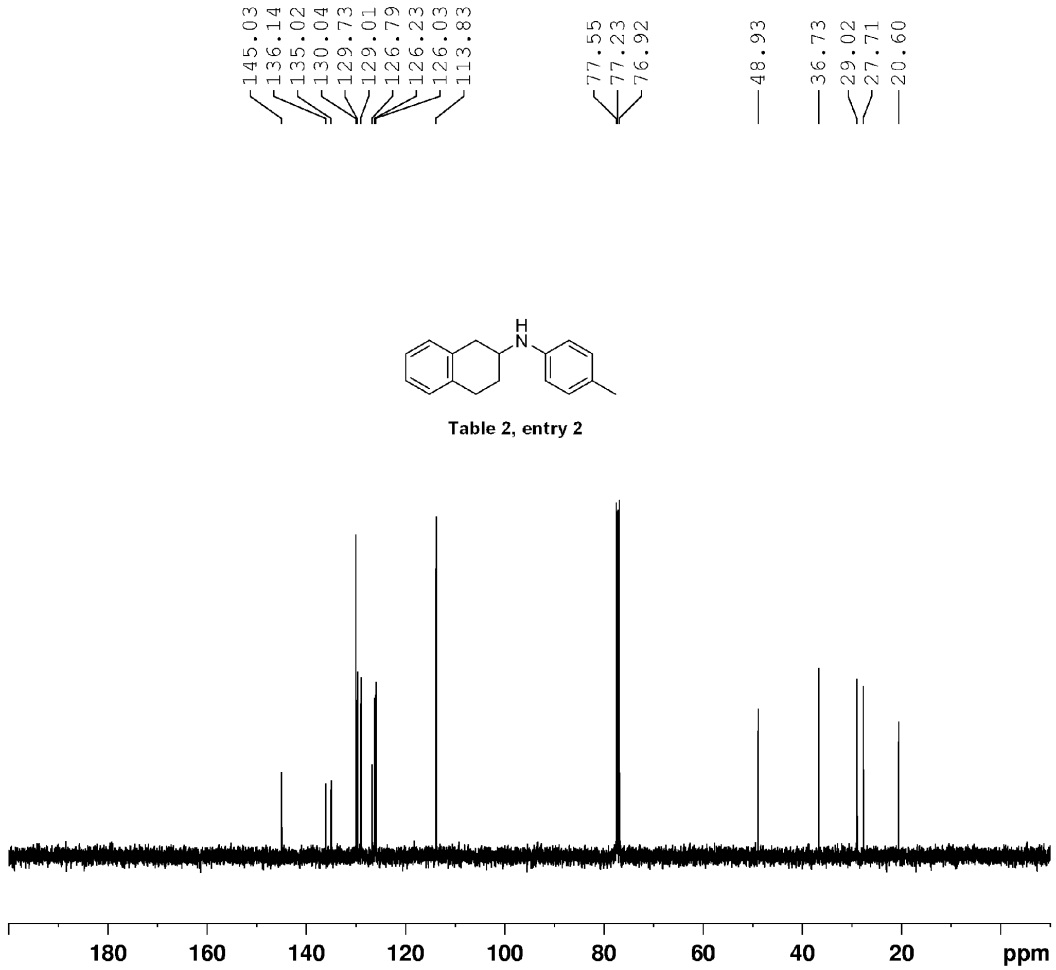


Table 2, entry 2

NAME	lyb-C-2014
EXPNO	1121
PROCNO	1
Date_	20140327
Time	9.25
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	51
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127526 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

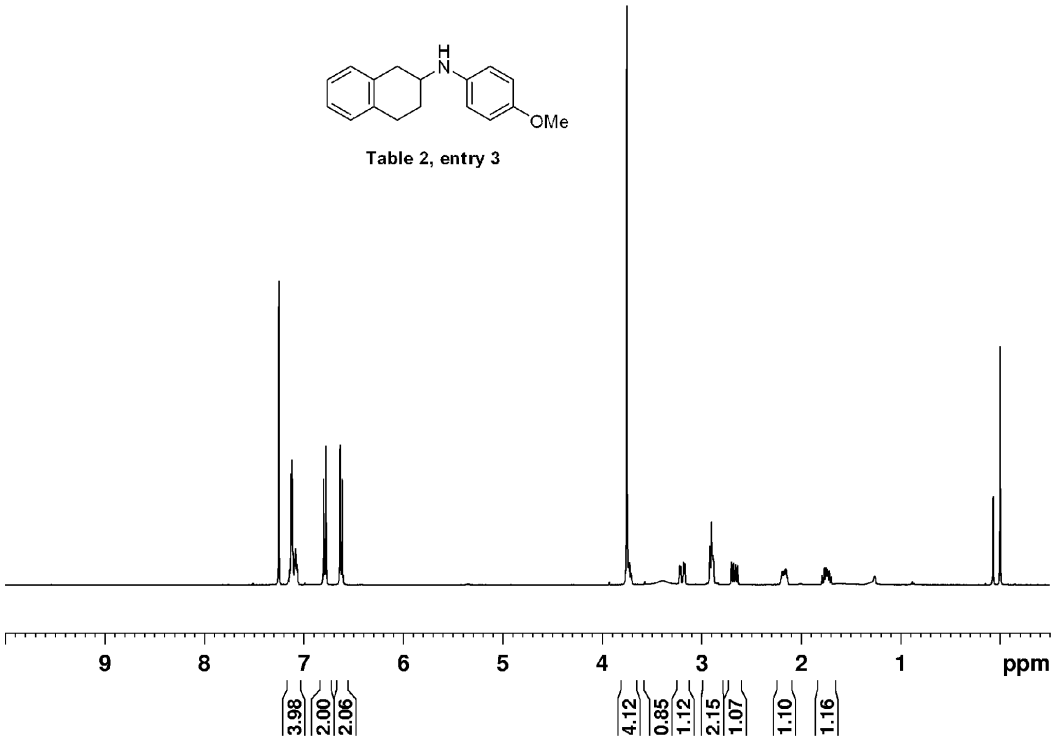


Table 2, entry 3

NAME	lyb-H-2014	
EXPNO	1119	
PROCNO	2	
Date_	20140326	
Time	12.33	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300127	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

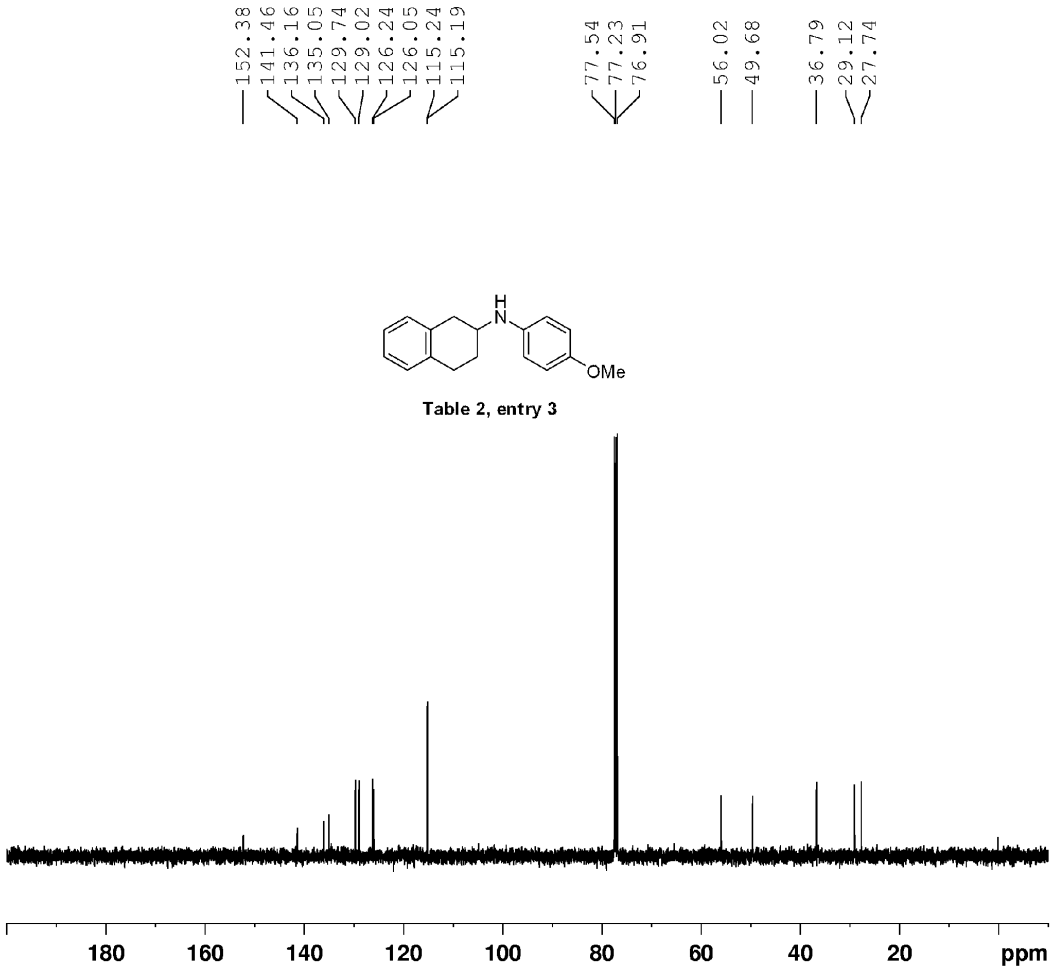


Table 2, entry 3

NAME	lyb-C-2014
EXPNO	1119
PROCNO	1
Date_	20140326
Time	12.38
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	135
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127487 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

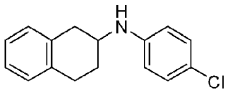
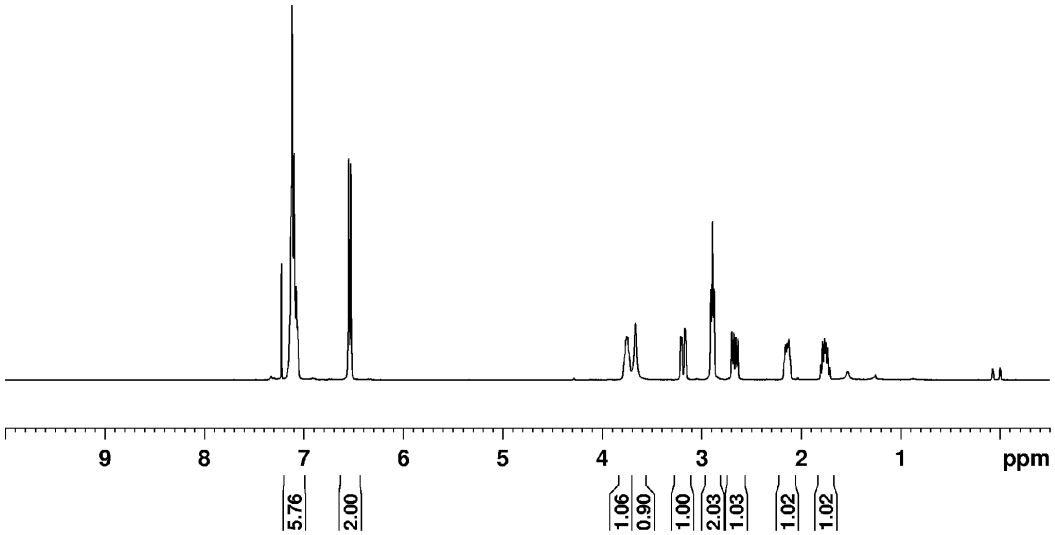


Table 2, entry 4



NAME	lyb-H-2014	
EXPNO	1122	
PROCNO	2	
Date_	20140327	
Time	9.27	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	114	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300234	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

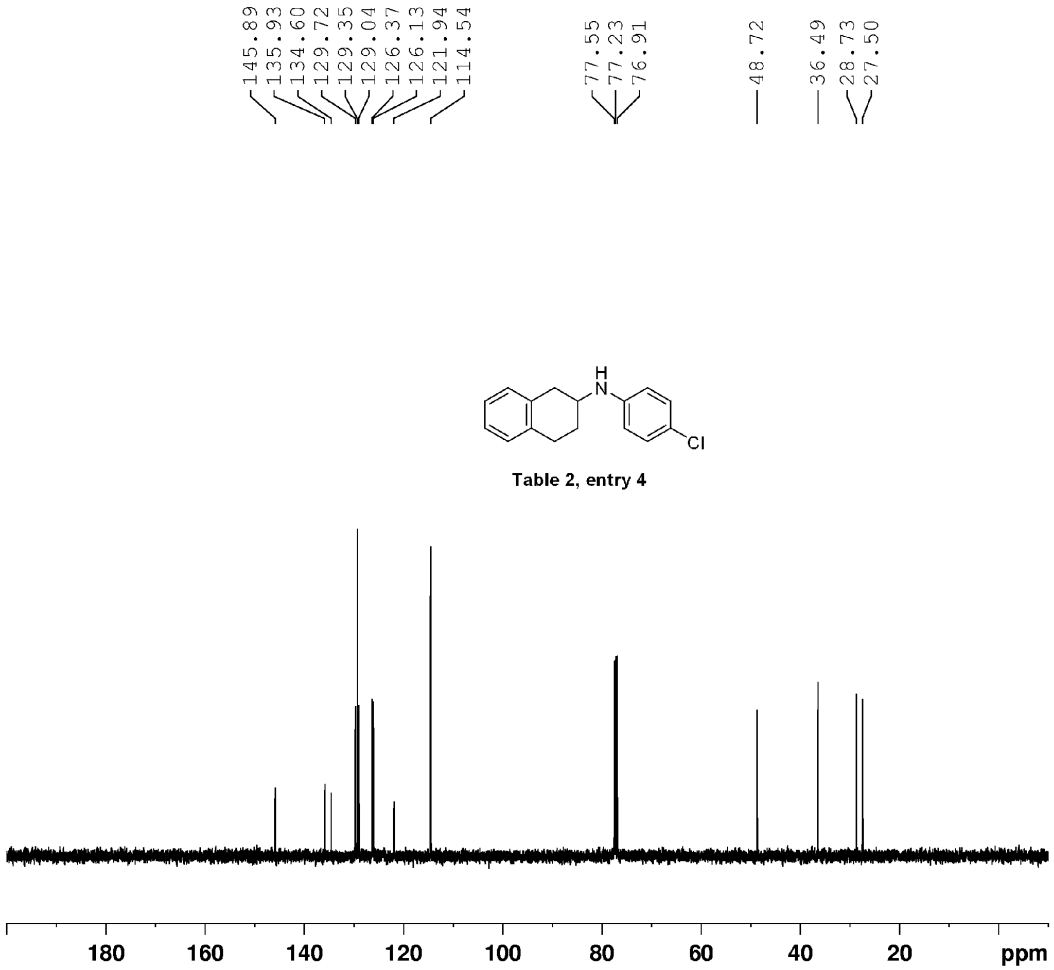


Table 2, entry 4

NAME	lyb-C-2014
EXPNO	1122
PROCNO	1
Date_	20140327
Time	9.31
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	67
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127533 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

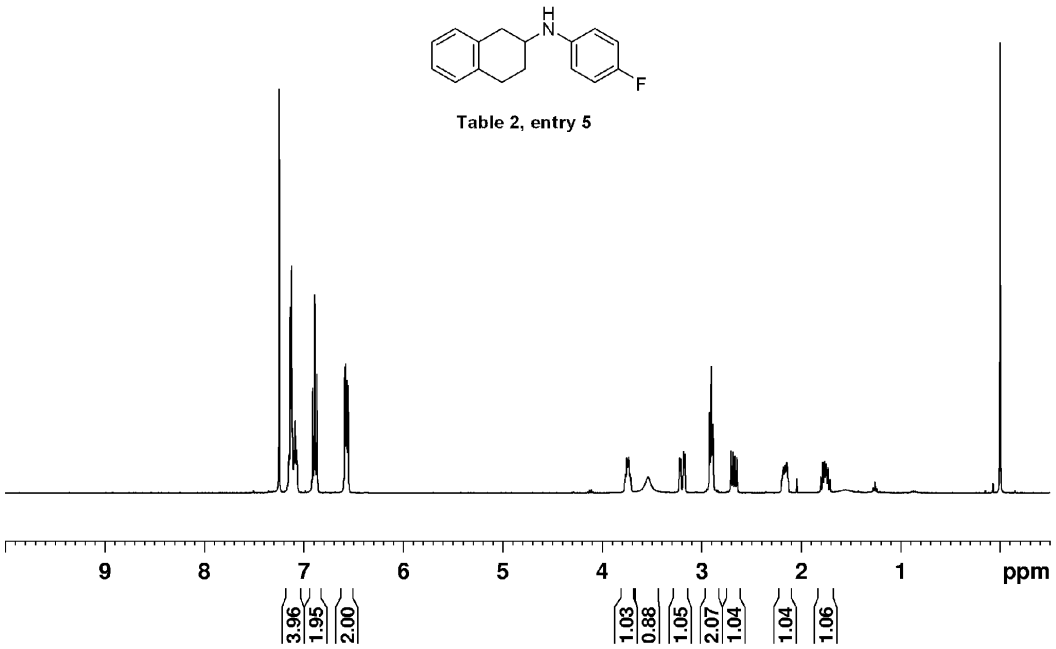


Table 2, entry 5

NAME	lyb-H-2014	
EXPNO	1128	
PROCNO	2	
Date_	20140329	
Time	9.12	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300140	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

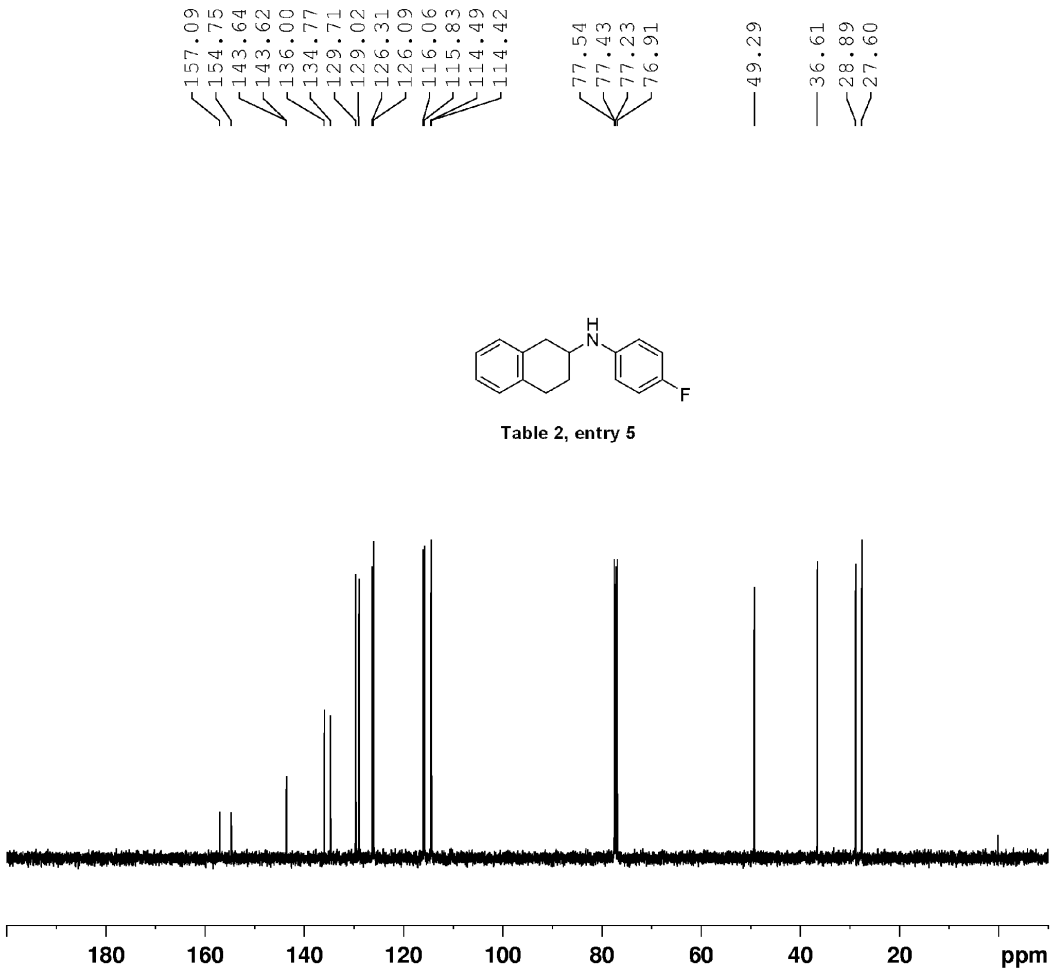


Table 2, entry 5

NAME	lyb-C-2014
EXPNO	1128
PROCNO	1
Date_	20140329
Time	9.15
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127548 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

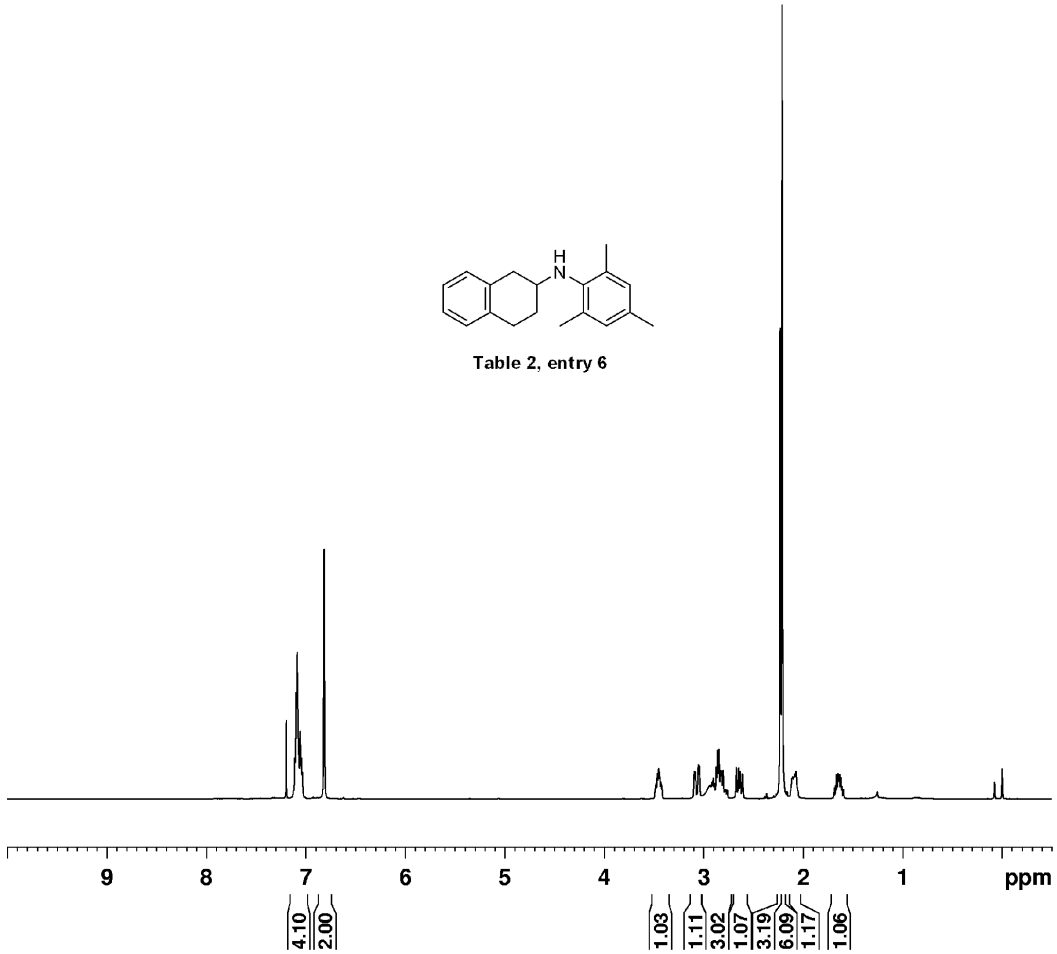


Table 2, entry 6

NAME	lyb-H-2014	
EXPNO	1101	
PROCNO	2	
Date_	20140316	
Time	8.38	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	71.8	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300341	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

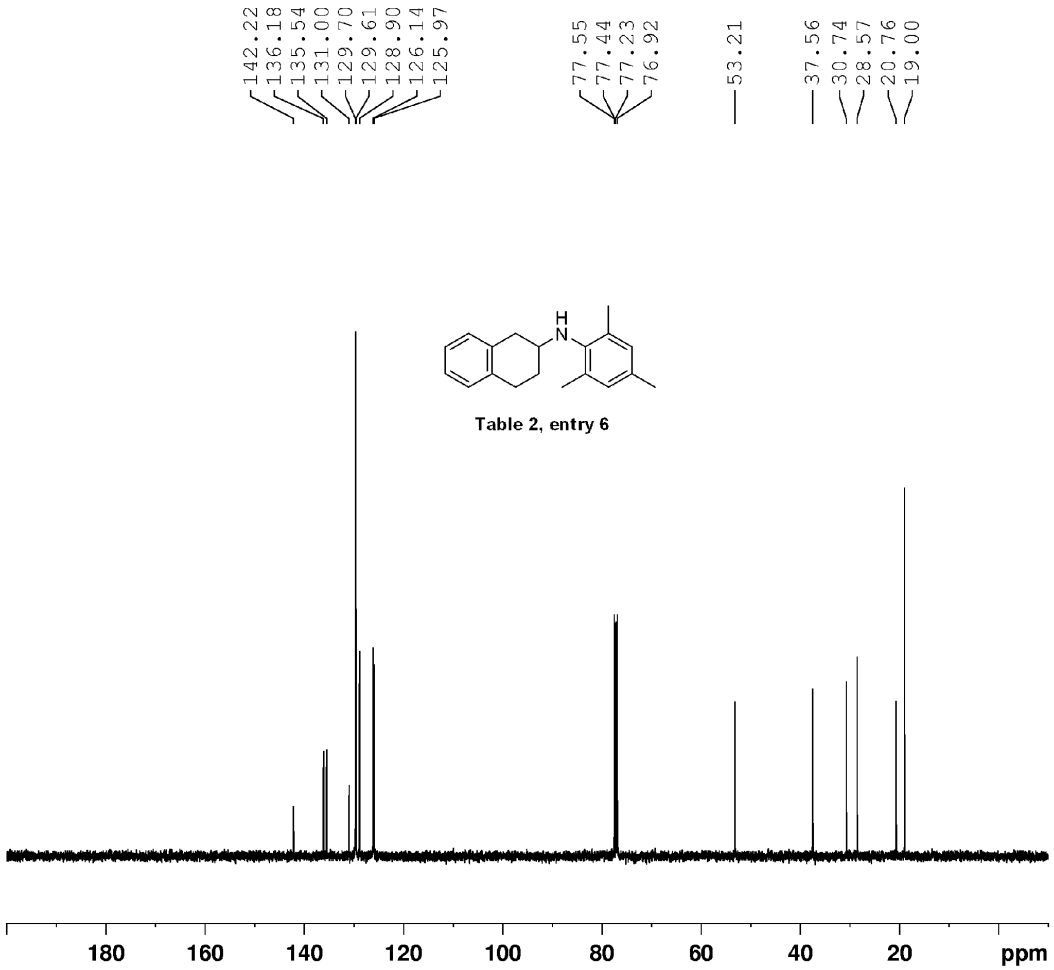


Table 2, entry 6

NAME	lyb-C-2014
EXPNO	1101
PROCNO	1
Date_	20140316
Time	8.41
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127556 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

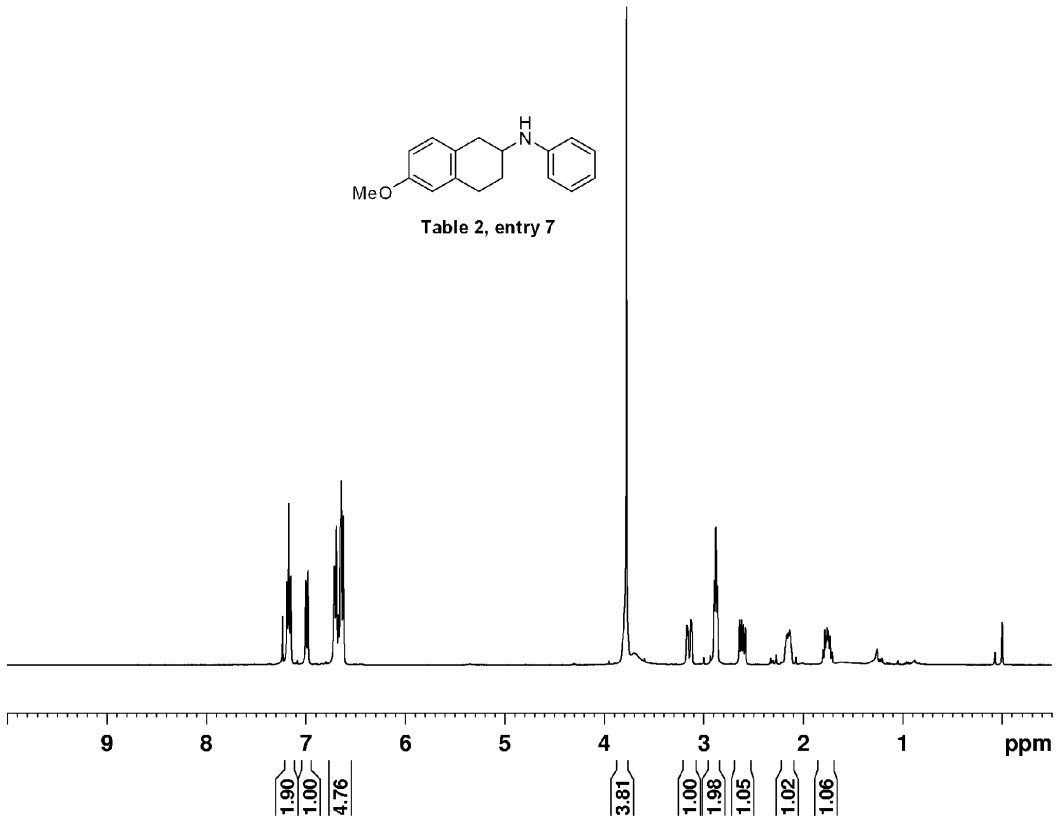


Table 2, entry 7

NAME	Lgzz	
EXPNO	17	
PROCNO	1	
Date_	20140923	
Time	4.33	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	12	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	144	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300191	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

158.14
147.36
137.19
130.57
129.54
126.92
117.51
113.61
113.56
112.46
77.55
77.23
76.91
55.48
48.85
35.92
28.88
27.94

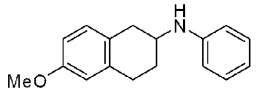
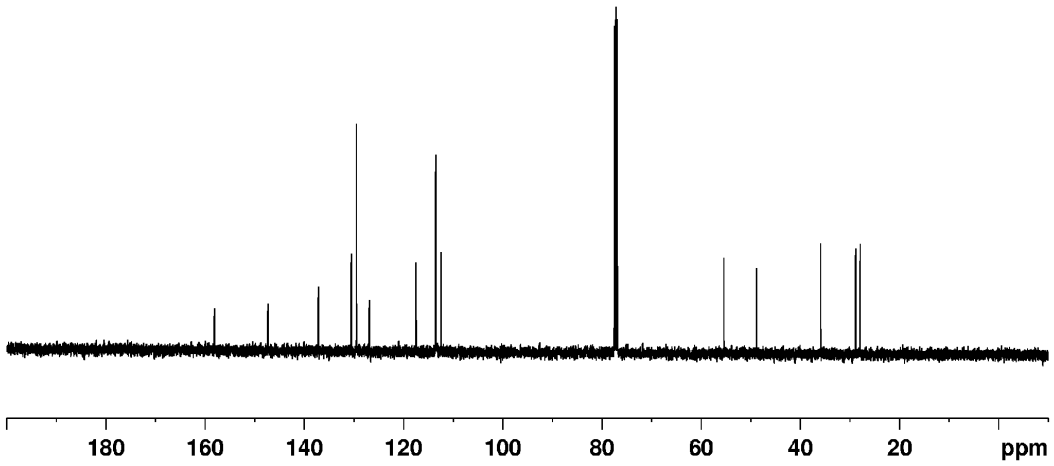
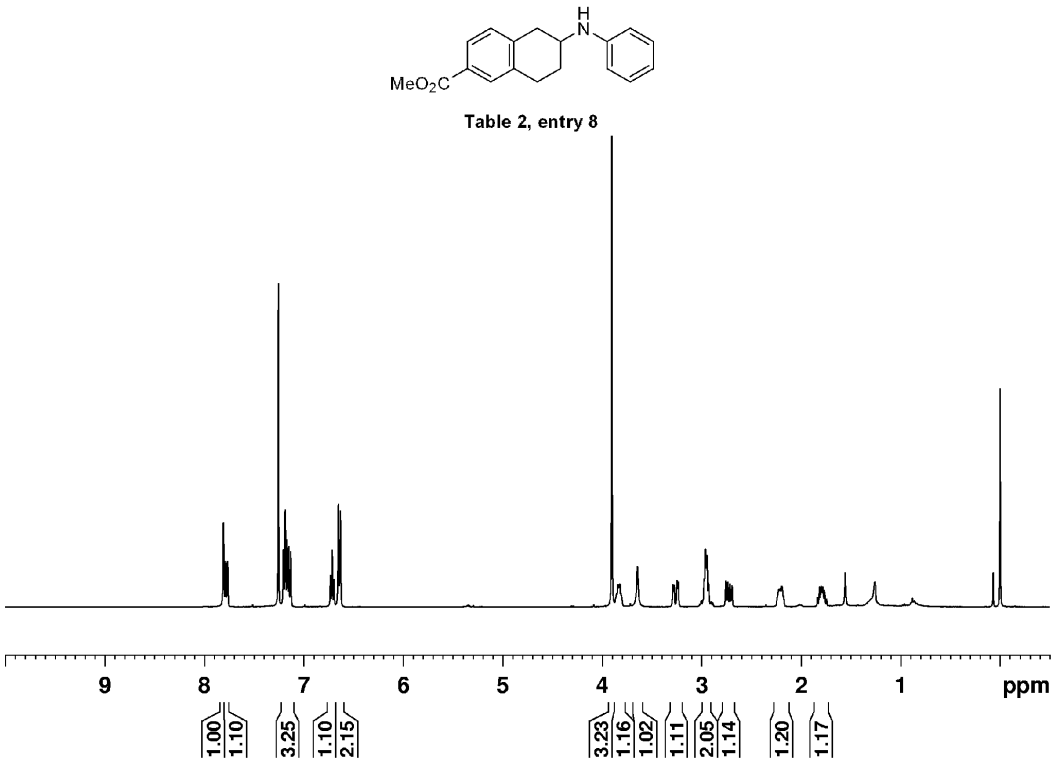


Table 2, entry 7



NAME	Lgzz
EXPNO	18
PROCNO	1
Date_	20140923
Time	4.35
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	83
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127503 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



NAME	Lgzz
EXPNO	114
PROCNO	1
Date_	20141125
Time	7.05
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	12
DS	0
SWH	12019.230 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	41.600 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	400.1320007 MHz
NUC1	1H
P1	12.60 usec
SI	65536
SF	400.1300120 MHz
WDW	EM
SSB	0
LB	0.50 Hz
GB	0
PC	1.00

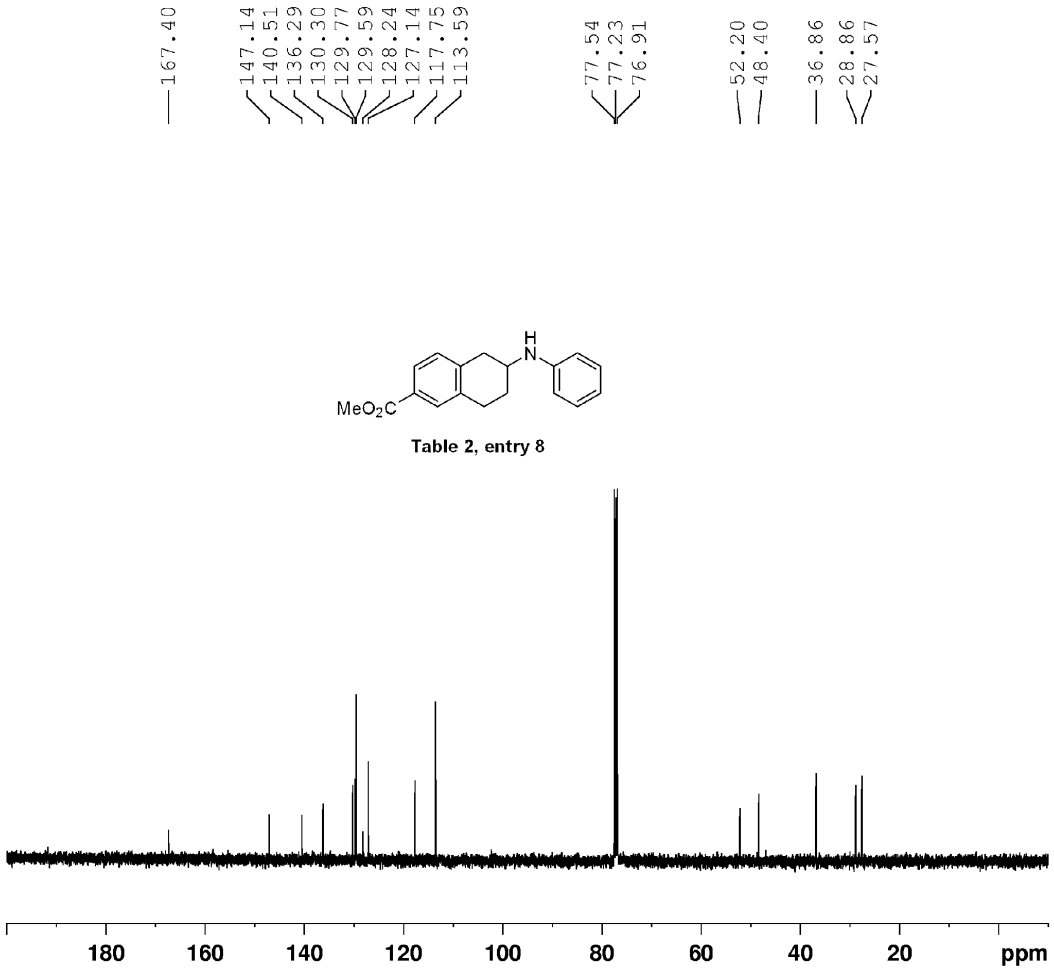


Table 2, entry 8

NAME	Lgzz
EXPNO	45
PROCNO	1
Date_	20140929
Time	7.38
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	100
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127493 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

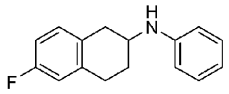
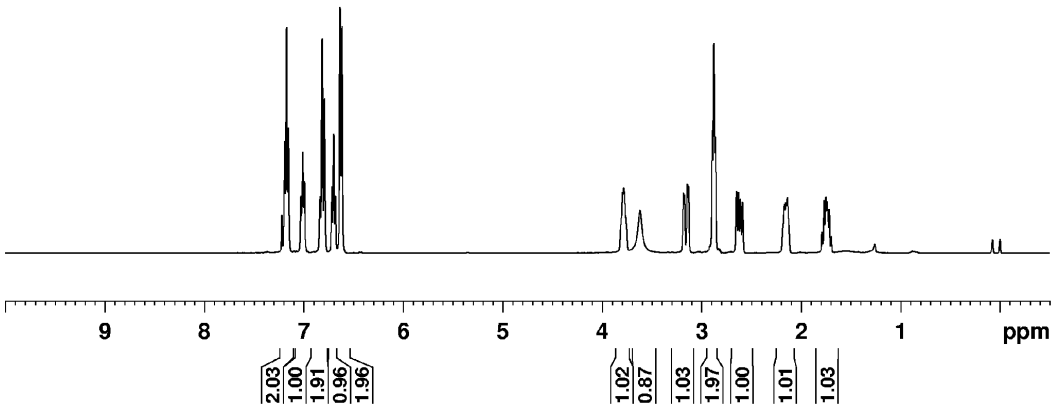


Table 2, entry 9



NAME	Lgzz	
EXPNO	61	
PROCNO	1	
Date_	20141011	
Time	6.25	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	4	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	101	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300248	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

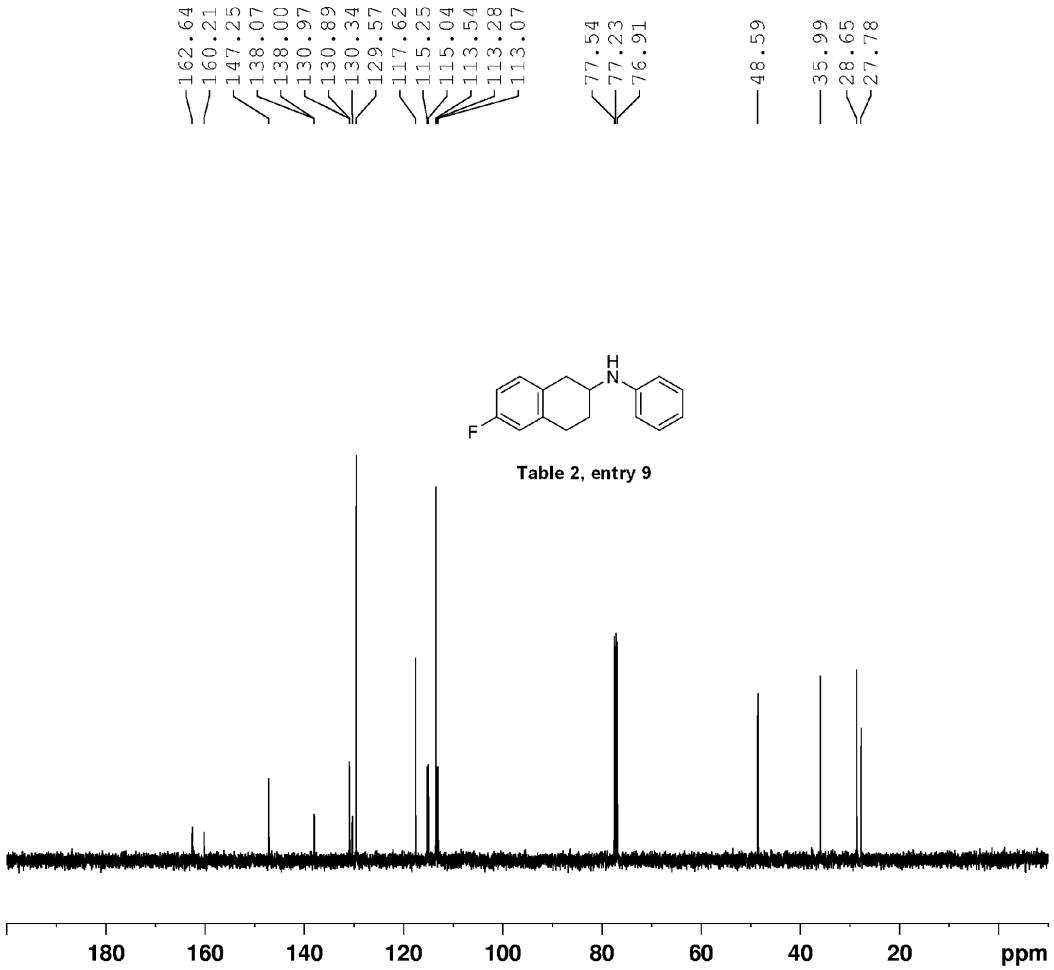
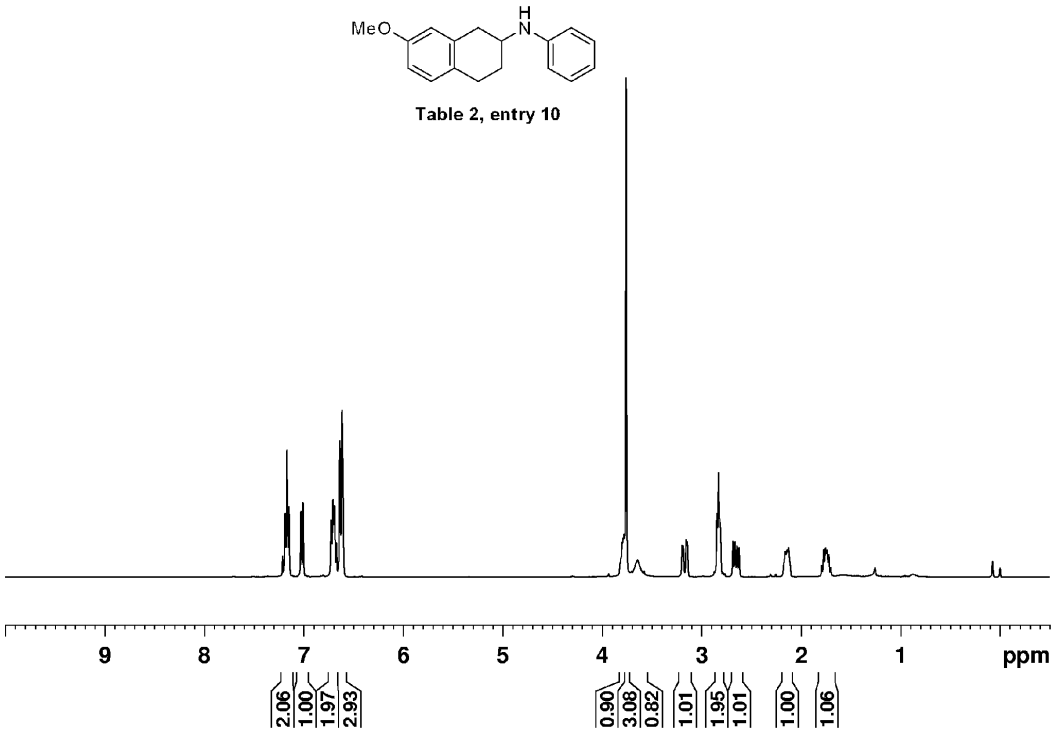


Table 2, entry 9

NAME	Lgzz
EXPNO	62
PROCNO	1
Date_	20141011
Time	6.26
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	49
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127529 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40



NAME	Lgzz
EXPNO	63
PROCNO	1
Date_	20141011
Time	6.30
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	4
DS	0
SWH	12019.230 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	101
DW	41.600 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	400.1320007 MHz
NUC1	1H
P1	12.60 usec
SI	65536
SF	400.1300277 MHz
WDW	EM
SSB	0
LB	0.50 Hz
GB	0
PC	1.00

157.93
147.37
136.01
129.89
129.53
128.12
117.49
114.18
113.54
112.69
77.55
77.23
76.91
55.45
48.57
36.94
29.17
26.77

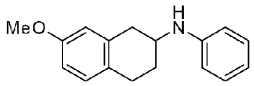
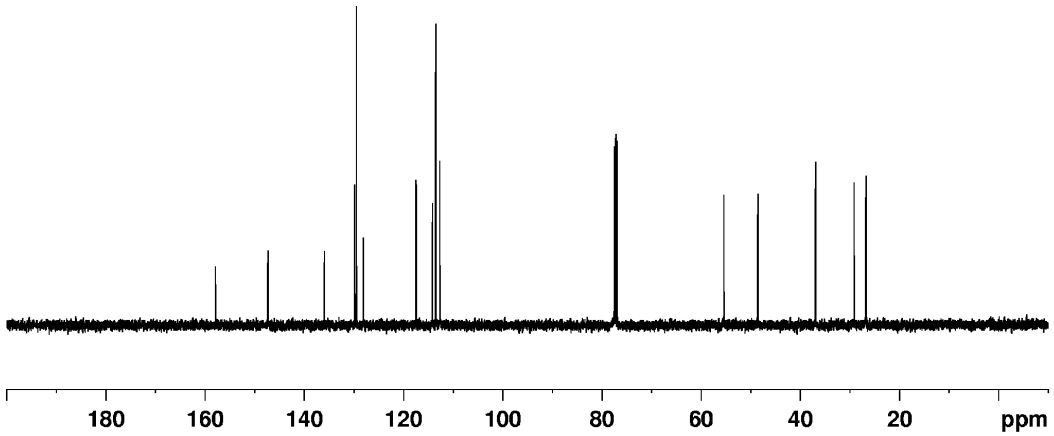


Table 2, entry 10



NAME	Lgzz
EXPNO	64
PROCNO	1
Date_	20141011
Time	6.32
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	64
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127544 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

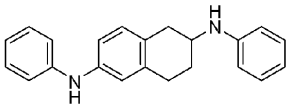
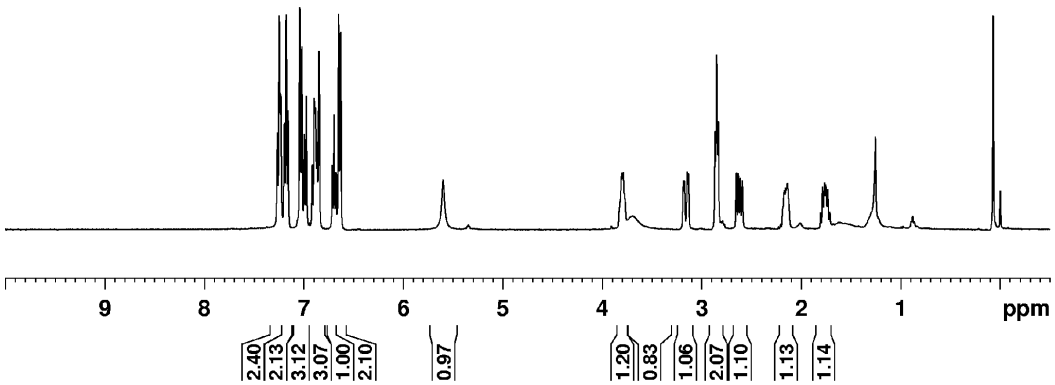


Table 2, entry 11



NAME	Lgzz	
EXPNO	87	
PROCNO	1	
Date_	20141023	
Time	4.33	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	4	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	144	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300180	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

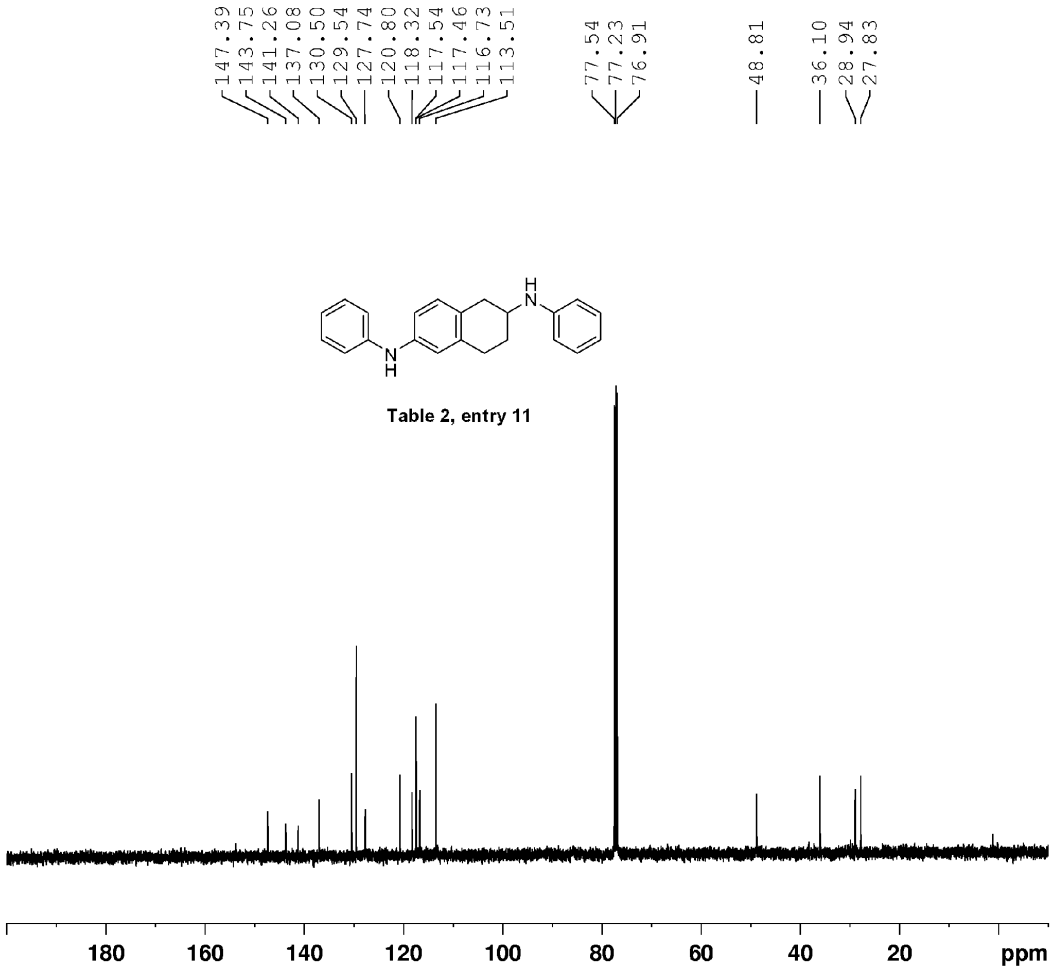


Table 2, entry 11

NAME	Lgzz
EXPNO	88
PROCNO	1
Date_	20141023
Time	4.35
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	134
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127512 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

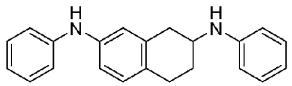
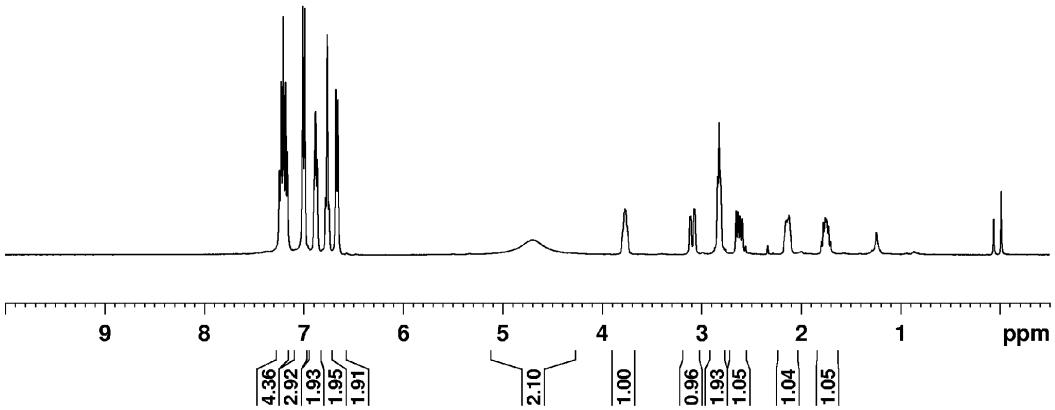


Table 2, entry 12



NAME	Lgzz
EXPNO	100
PROCNO	1
Date_	20141101
Time	4.54
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	7
DS	0
SWH	12019.230 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	90.5
DW	41.600 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	400.1320007 MHz
NUC1	1H
P1	12.60 usec
SI	65536
SF	400.1300301 MHz
WDW	EM
SSB	0
LB	0.50 Hz
GB	0
PC	1.00

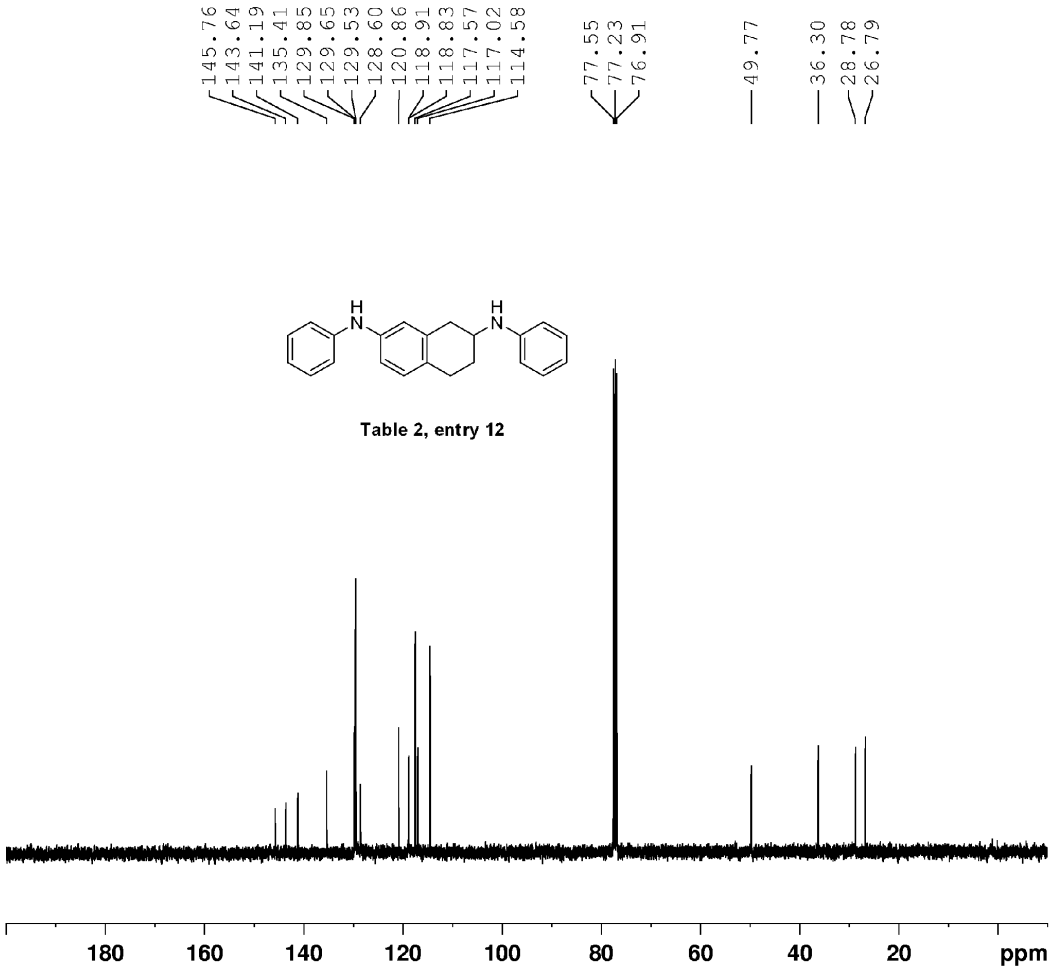


Table 2, entry 12

NAME	Lgzz
EXPNO	101
PROCNO	1
Date_	20141101
Time	4.56
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	109
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
========	CHANNEL f1 ========
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127544 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

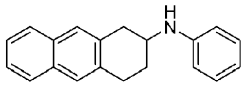
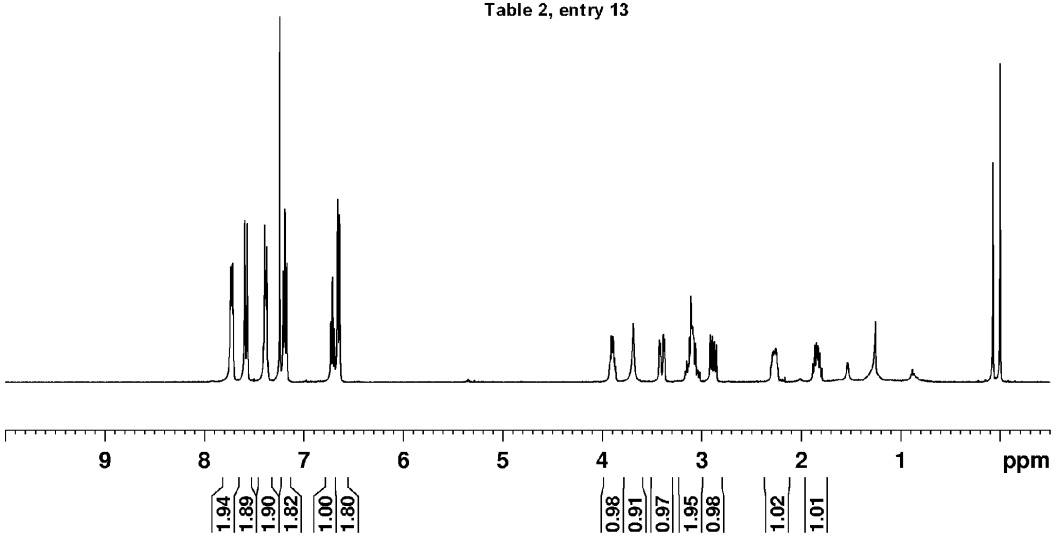


Table 2, entry 13



NAME	Lgzz	
EXPNO	132	
PROCNO	1	
Date_	20141128	
Time	2.52	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	3	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300173	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

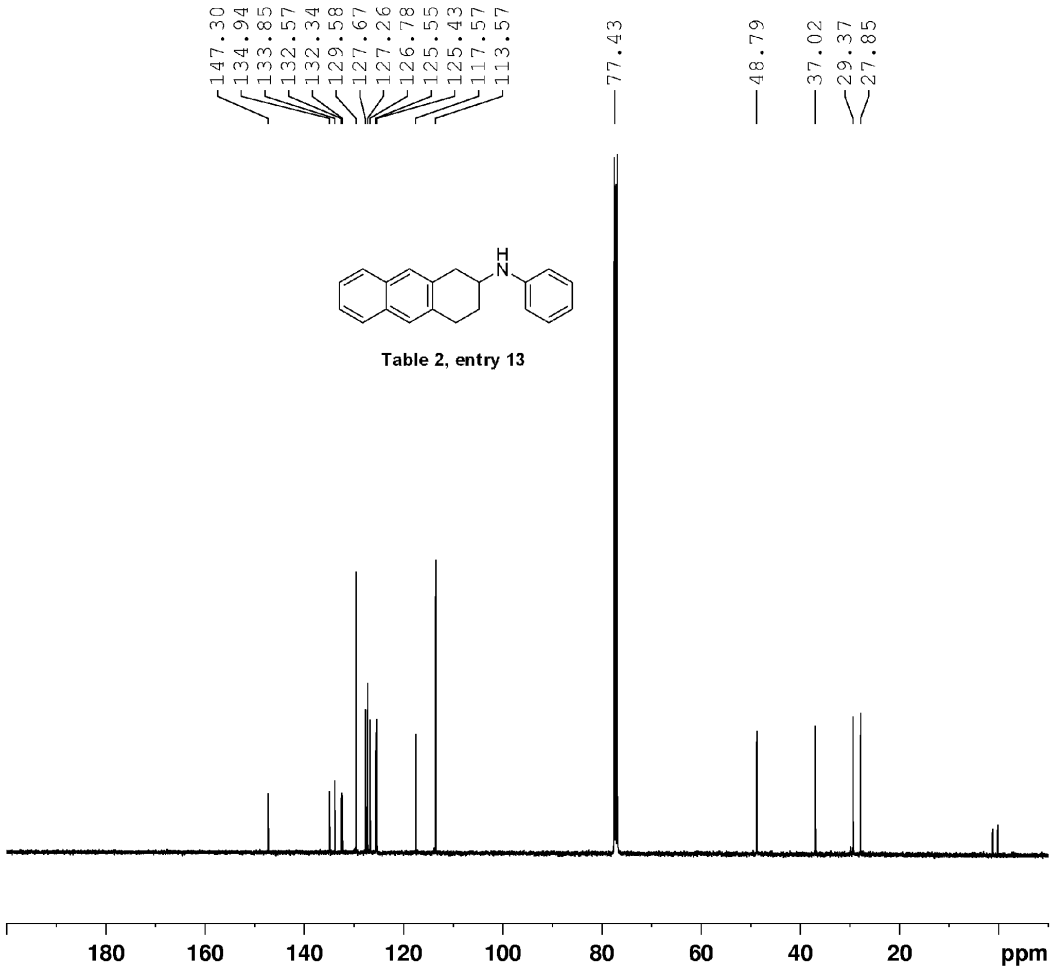


Table 2, entry 13

NAME	Lgzz
EXPNO	133
PROCNO	1
Date_	20141128
Time	10.38
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	4107
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127504 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

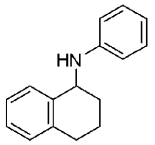
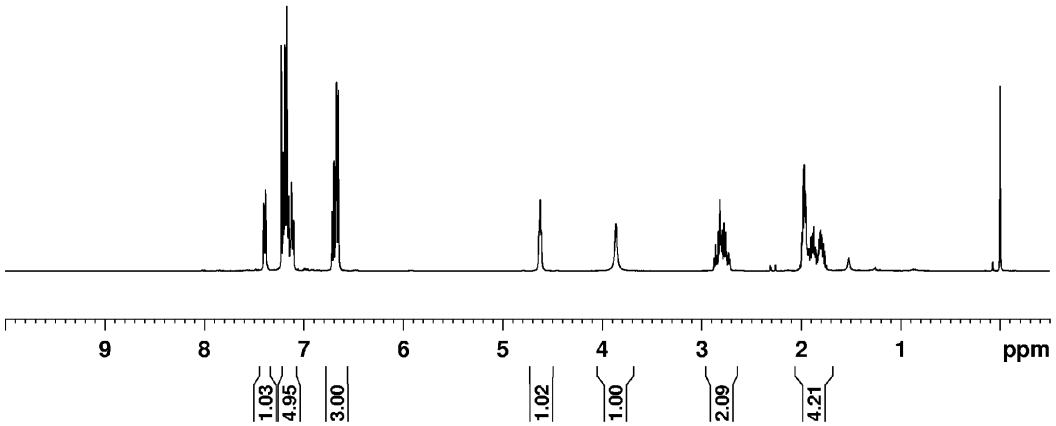


Table 2, entry 14



NAME	lyb-H-2014	
EXPNO	1132	
PROCNO	2	
Date_	20140401	
Time	5.14	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	114	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300230	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

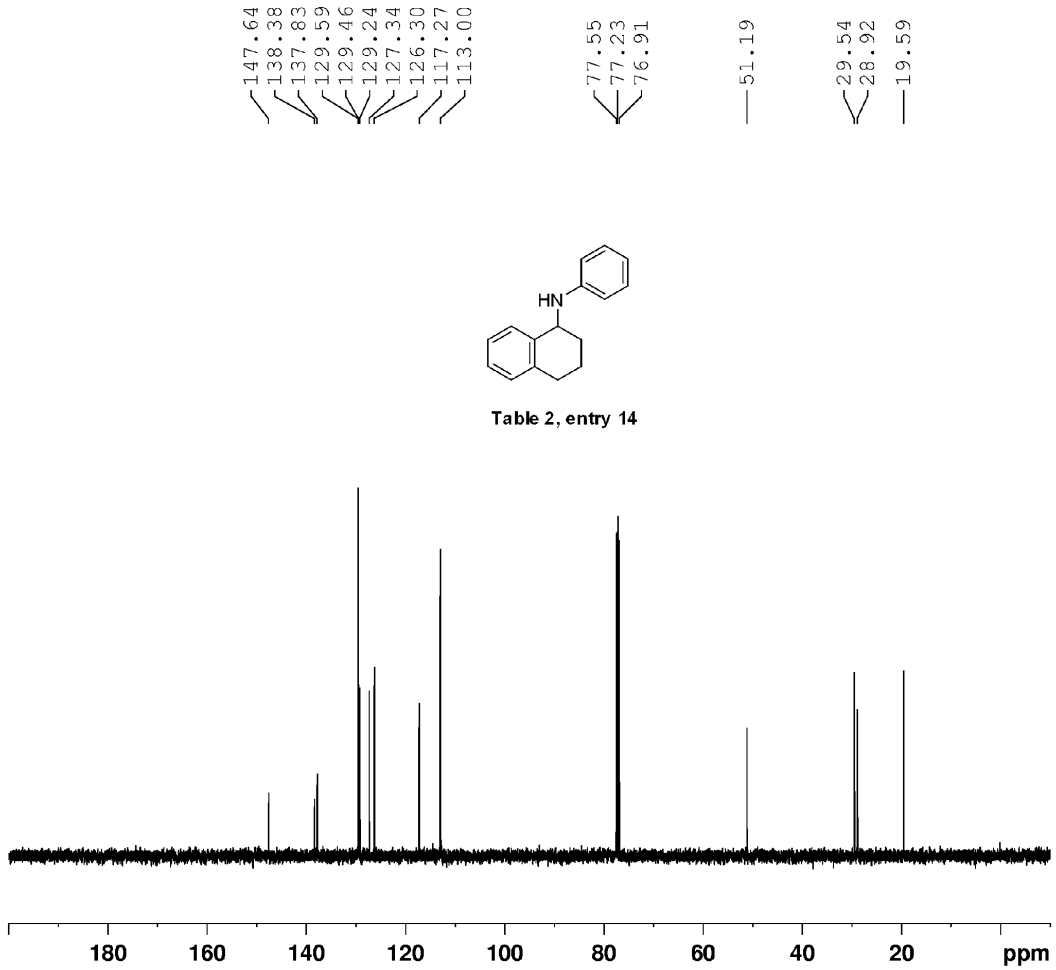


Table 2, entry 14

NAME	lyb-C-2014
EXPNO	1132
PROCNO	1
Date_	20140401
Time	5.17
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	100
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127525 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

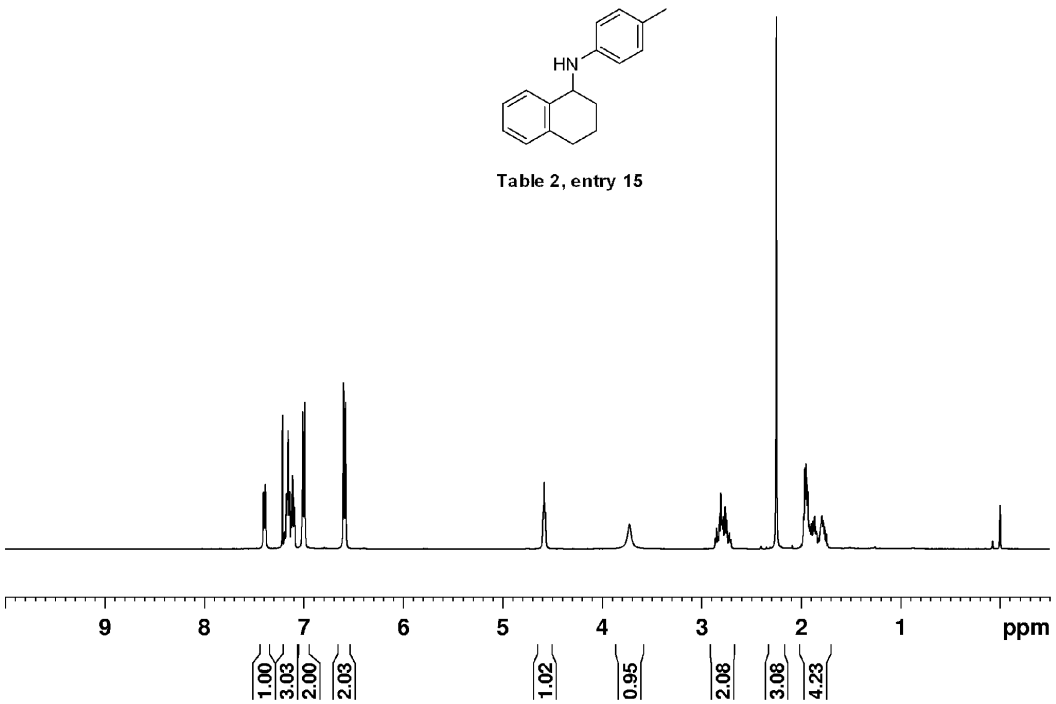


Table 2, entry 15

NAME	lyb-H-2014	
EXPNO	1140	
PROCNO	2	
Date_	20140402	
Time	11.14	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	8	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	90.5	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300273	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

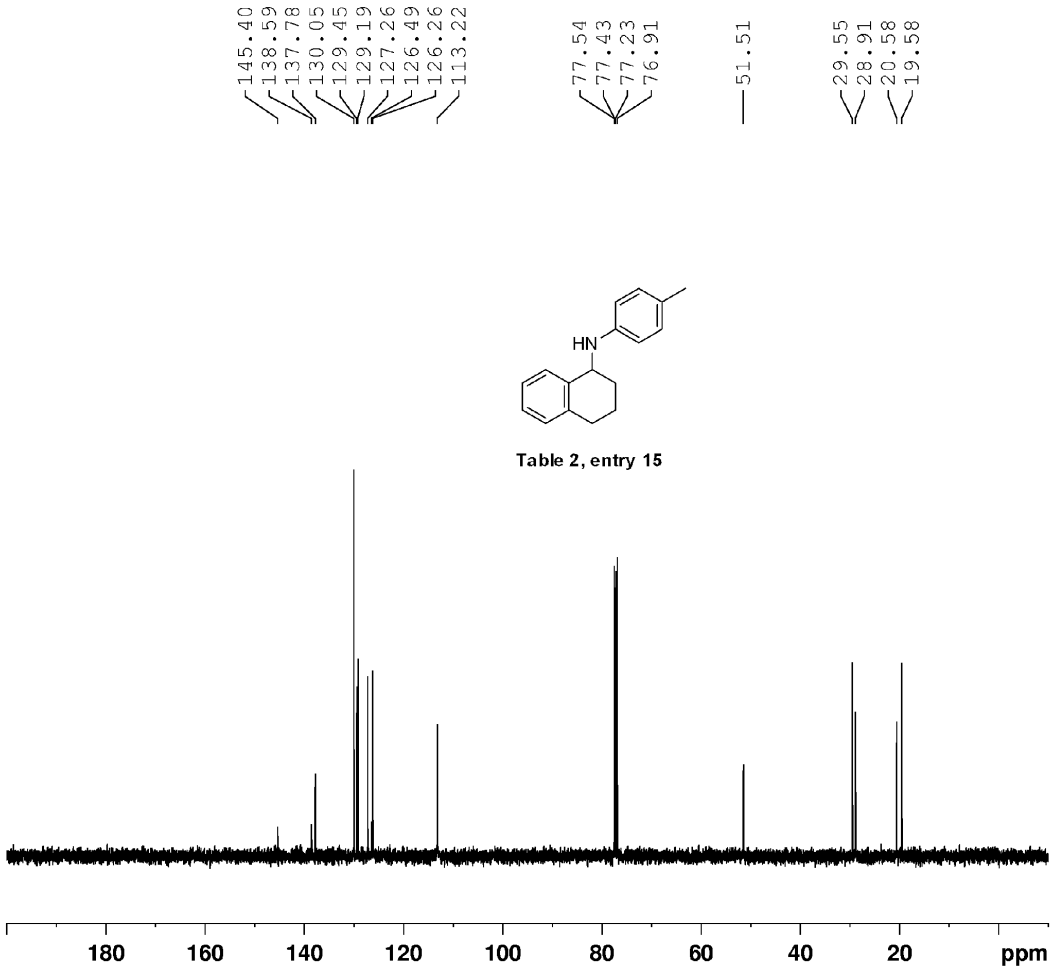


Table 2, entry 15

NAME	lyb-C-2014
EXPNO	1140
PROCNO	1
Date_	20140402
Time	11.17
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	32768
SOLVENT	CDCl3
NS	65
DS	0
SWH	25252.525 Hz
FIDRES	0.770646 Hz
AQ	0.6488564 sec
RG	203
DW	19.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228298 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127541 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

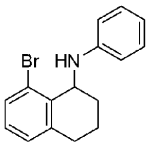
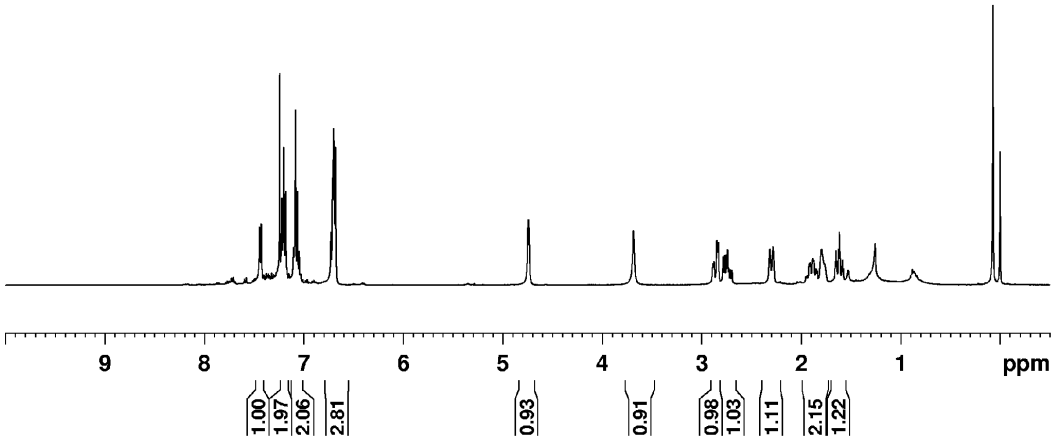


Table 2, entry 16



NAME	Lgzz	
EXPNO	116	
PROCNO	1	
Date_	20141125	
Time	7.13	
INSTRUM	spect	
PROBHD	5 mm PADUL 13C	
PULPROG	zg30	
TD	32768	
SOLVENT	CDCl3	
NS	6	
DS	0	
SWH	12019.230	Hz
FIDRES	0.366798	Hz
AQ	1.3631988	sec
RG	203	
DW	41.600	usec
DE	6.50	usec
TE	300.0	K
D1	2.00000000	sec
TD0	1	
======== CHANNEL f1 ========		
SFO1	400.1320007	MHz
NUC1	1H	
P1	12.60	usec
SI	65536	
SF	400.1300168	MHz
WDW	EM	
SSB	0	
LB	0.50	Hz
GB	0	
PC	1.00	

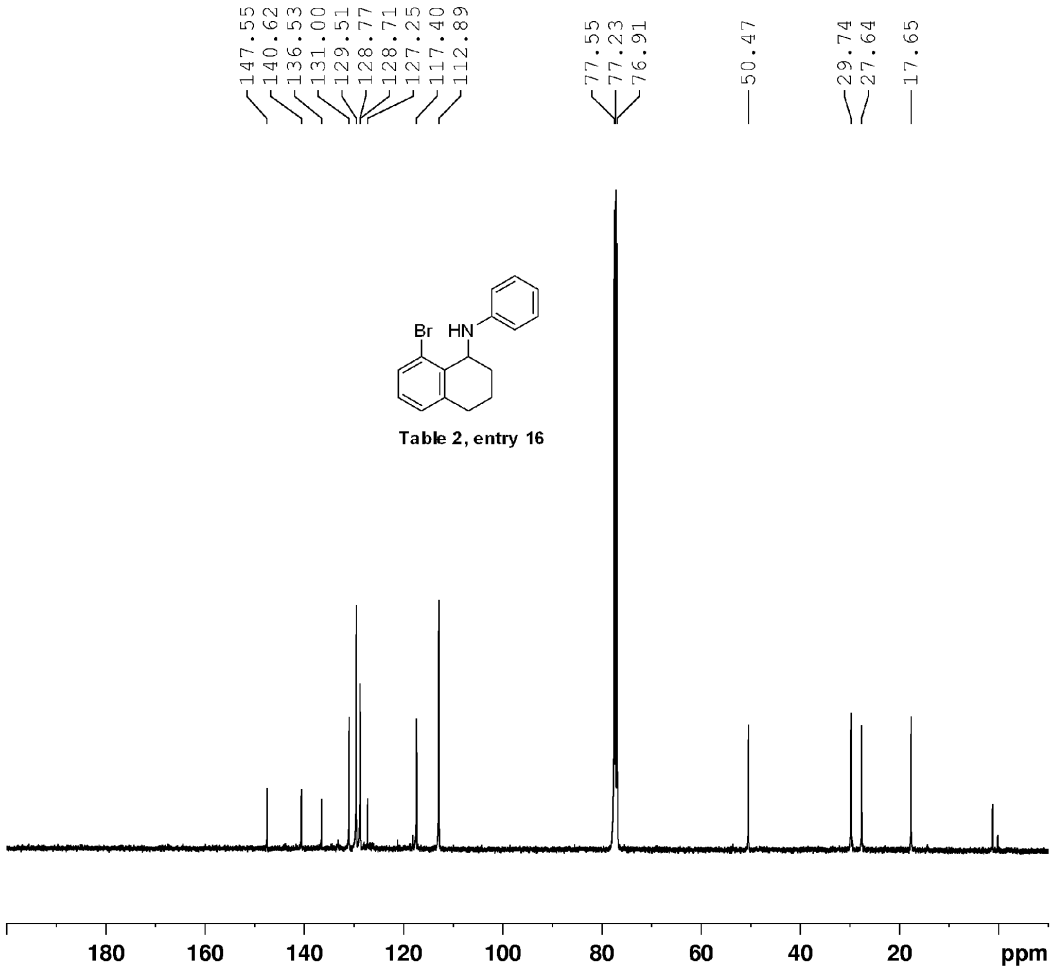


Table 2, entry 16

NAME	Lgzz
EXPNO	124
PROCNO	1
Date_	20141125
Time	22.50
INSTRUM	spect
PROBHD	5 mm PADUL 13C
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	10441
DS	4
SWH	24038.461 Hz
FIDRES	0.366798 Hz
AQ	1.3631988 sec
RG	203
DW	20.800 usec
DE	6.50 usec
TE	300.0 K
D1	2.00000000 sec
D11	0.03000000 sec
TD0	1
======== CHANNEL f1 ========	
SFO1	100.6228293 MHz
NUC1	13C
P1	9.40 usec
SI	32768
SF	100.6127501 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40