Electronic Supplementary Material (ESI) for ChemComm.

Supplementary Information

Electrochemical Dehydrogenative Cross-Coupling of Two Anilines: Facile Synthesis of Unsymmetrical Biaryls

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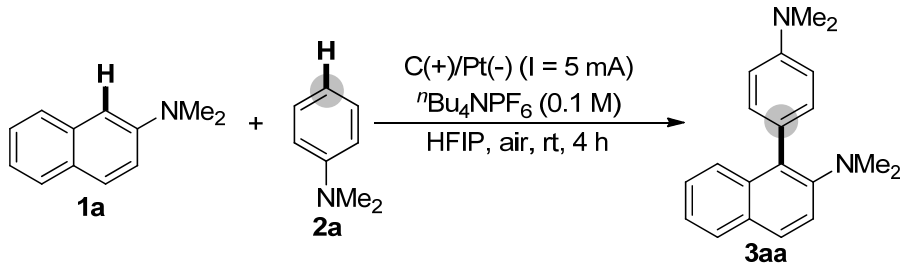
(A) Typical Experimental Procedure

(a) General

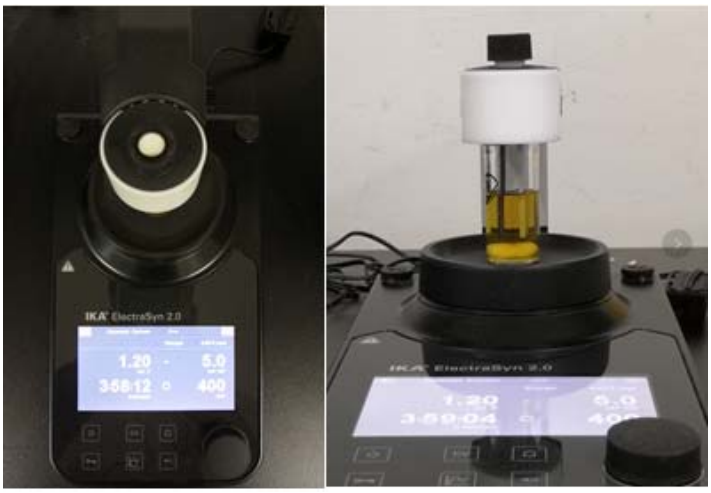
The ^{1}H and ^{13}C NMR spectra were recorded in $CDCl_3$ solvent on a NMR spectrometer using TMS as internal standard. HRMS was measured on an electrospray ionization (ESI) apparatus using time-of-flight (TOF) mass spectrometry. Melting points are uncorrected. The instrument for electrolysis is IKA ElectraSyn 2.0 and DC power source (PM3005B) (made in China). Cyclic voltammograms were obtained on a CHI 605E potentiostat.

(b) General procedure for synthesis of compound 3aa.

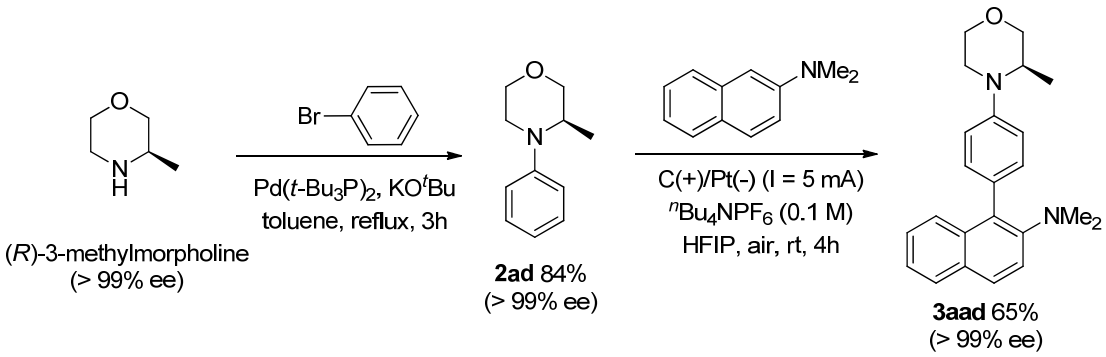


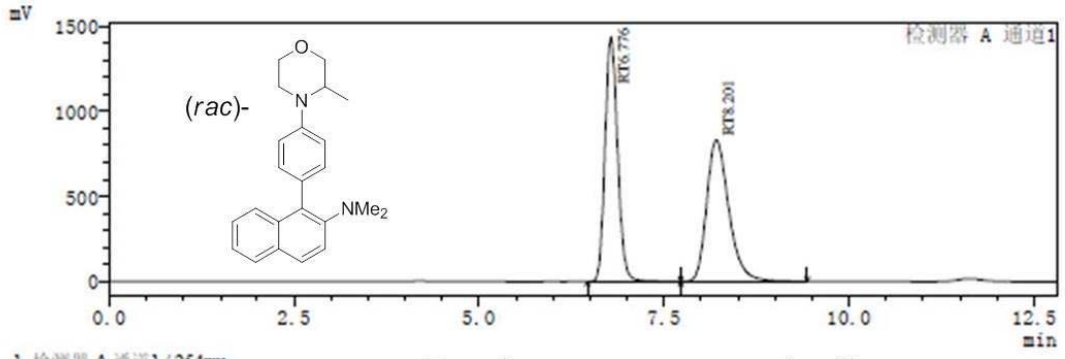
To an undivided three-necked bottle (10 mL) were added *N*,*N*-dimethylnaphthalen-2-amine **1a** (0.2 mmol), *N*,*N*-dimethylaniline **2a** (0.3 mmol) and HFIP (6 mL). The bottle was equipped with platinum electrodes (1.0×1.0 cm^2) as cathode and graphite electrode as anode under air. The reaction mixture was stirred and electrolyzed at a constant current of 5 mA at room temperture for 4 h until complete consumption of **1a** as monitored by TLC and/or GC-MS analysis. After the reaction was finished, the solution was extracted with EtOAc (3×10 mL). The combined organic layer was dried with Na_2SO_4, filtered and concentrated in vacuum. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to afford the desired products **3aa**.

(c) Experimental device



(d) Synthesis of compound 3aad.



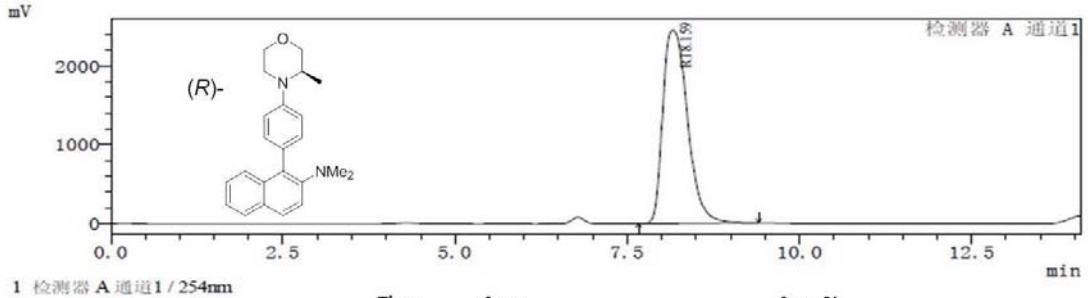


Time Area

Area %

检测器 A Ch1 254nm

峰#	保留时间	面积	高度	面积 %	高度 %
1	6.776	17020713	1435045	49.663	63.333
2	8.201	17251720	830829	50.337	36.667
总计		34272433	2265874	100.000	100.000



1 检测器 A 通道1 / 254nm

检测器 A Ch1 254nm

Time Area Area %

峰#	保留时间	面积	高度	面积 %	高度 %
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总计		61273254	2445489	100.000	100.000

(e) Cyclic Voltammogram Curve

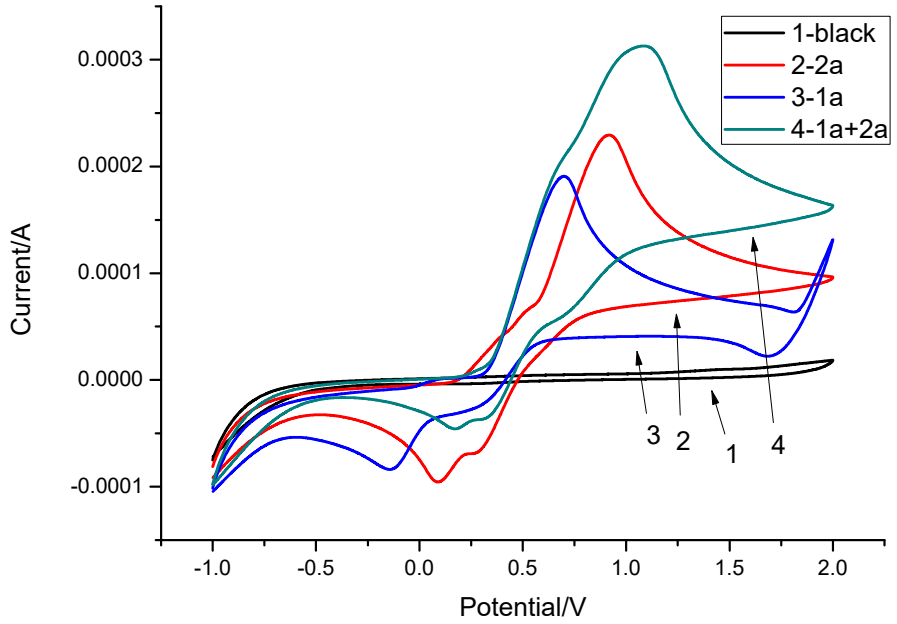
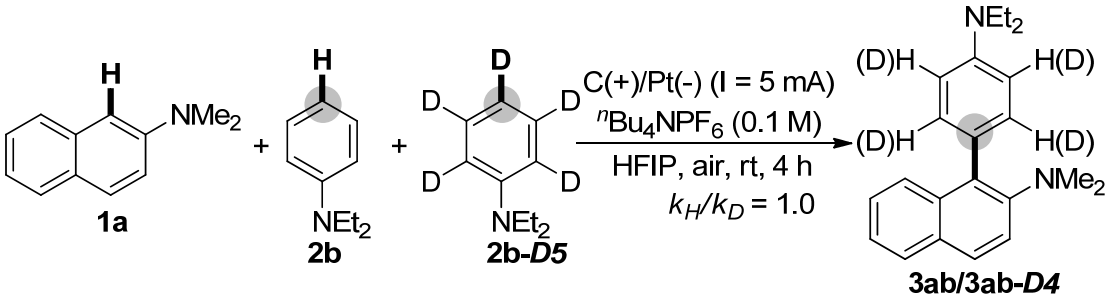
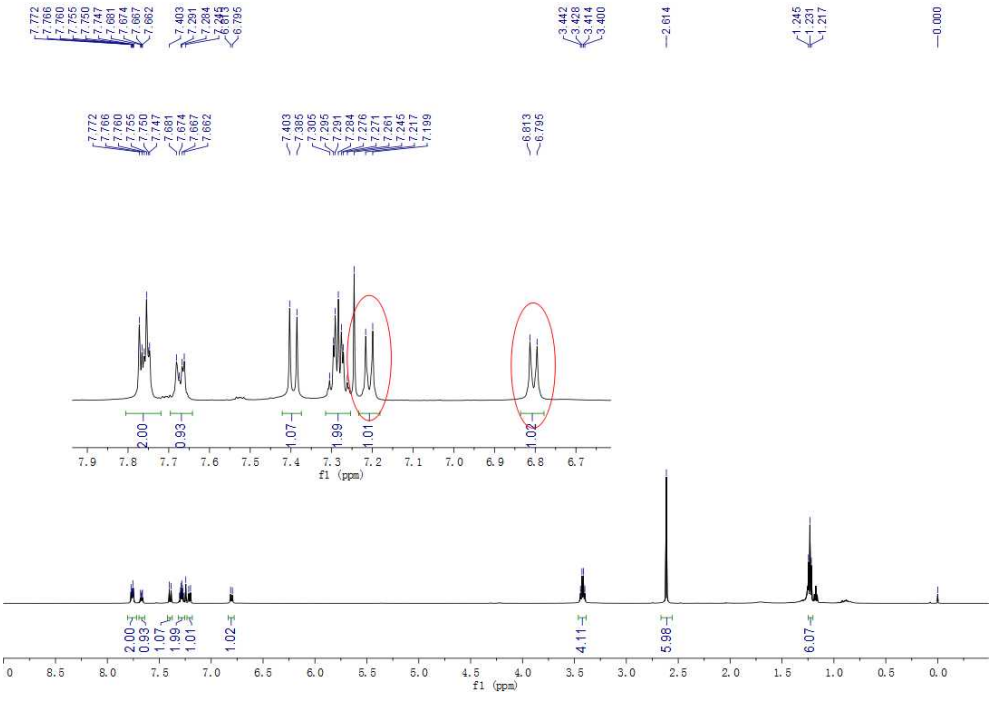


Figure S1. Cyclic voltammogram curves. using GC disk as working electrode, Pt slice, and Ag/AgCl as counter and reference electrode at 100 mV/s scan rate: (1) $^{n}Bu_4NPF_6$ (0.1 M) and HFIP (6 mL); (2) **2a** (0.03 M), $^{n}Bu_4NPF_6$ (0.1 M) and HFIP (6 mL); (3) **1a** (0.05 M), $^{n}Bu_4NPF_6$ (0.1 M) and HFIP (6 mL); (4) **1a** (0.05 M), **2a** (0.03 M), $^{n}Bu_4NPF_6$ (0.1 M) and HFIP (6 mL).

(f) KIE Experiment.

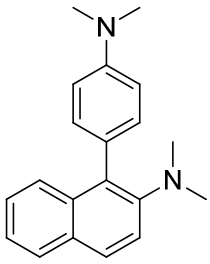


To an undivided three-necked bottle (10 mL) were added *N*,*N*-dimethylnaphthalen-2-amine **1a** (0.2 mmol), *N*,*N*-dimethylaniline **2b** (0.15 mmol), **2b-*D*5** (0.15 mmol) and HFIP (6 mL). The bottle was equipped with platinum electrodes (1.0×1.0 cm^2) as cathode and graphite rod electrode as anode under air. The reaction mixture was stirred and electrolyzed at a constant current of 5 mA at room temperture for 4 h until complete consumption of starting material as monitored by TLC and/or GC-MS analysis. After the reaction was finished, the solution was extracted with EtOAc (3×10 mL). The combined organic layer was dried with Na_2SO_4, filtered and concentrated in vacuum. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to afford the desired products **3ab/3ab-*D*4**.



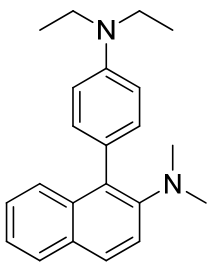
(B) Analytical data

1-(4-(Dimethylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3aa):[1]



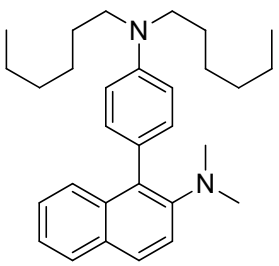
White solid, mp 129.8-131.4 ºC; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.75 (m, 2H), 7.63-7.61 (m, 1H), 7.39 (d, *J* = 9.0 Hz, 1H), 7.30-7.23 (m, 4H), 6.88-6.85 (m, 2H), 3.02 (s, 6H), 2.60 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 149.1, 134.2, 131.8, 130.4, 129.8, 127.8, 127.7, 126.9, 125.7 (2C), 123.5, 119.5, 112.4, 44.0, 40.7; LRMS (EI, 70 eV) *m/z* (%): 290 (M^+, 100), 275 (18), 231 (15), 134 (22); The analytical data are in accordance with those reported in the literature.[1]

1-(4-(Diethylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ab):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76-7.74 (m, 2H), 7.68-7.66 (m, 1H), 7.39 (d, *J* = 9.0 Hz, 1H), 7.29-7.27 (m, 2H), 7.22-7.20 (m, 2H), 6.80 (d, *J* = 8.5 Hz, 2H), 3.41 (q, *J* = 7.0 Hz, 4H), 2.61 (s, 6H), 1.22 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 146.6, 134.3, 132.0, 130.5, 129.8, 127.7 125.8, 125.7, 125.6, 123.4, 119.5, 111.8, 44.4, 44.0, 12.8; LRMS (EI, 70 eV) *m/z* (%): 318 (M^+, 100), 303 (81), 274 (18), 151 (12); HRMS *m/z* (ESI) calcd for $C_{22}H_{27}N_2$ $[M+H]^+$ 319.2169, found 319.2186.

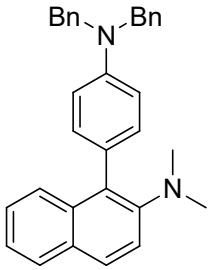
1-(4-(Dihexylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ac):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76-7.74 (m, 2H), 7.69-7.67 (m, 1H), 7.38 (d, *J* = 9.0 Hz, 1H), 7.29-7.26 (m, 2H), 7.19 (d, *J* = 8.5 Hz, 2H), 6.75 (d, *J* = 8.5 Hz, 2H), 3.33-3.29 (m, 4H), 2.61 (s, 6H), 1.67-1.64 (m, 4H), 1.35-1.32 (m, 12H), 0.91 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 147.0, 134.3, 131.9, 130.5, 129.8, 127.6, 127.6, 125.9, 125.6, 125.3, 123.4, 119.5, 111.5, 51.2, 44.0,

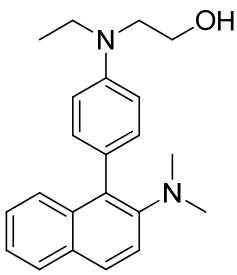
31.9, 27.4, 27.0, 22.8, 14.1; LRMS (EI, 70 eV) *m/z* (%): 430 (M^+, 90), 359 (100), 289 (70), 144 (30); HRMS *m/z* (ESI) calcd for $C_{30}H_{43}N_2$ $[M+H]^+$ 431.3421, found 431.3433.

1-(4-(Dibenzylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ad):



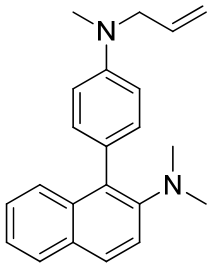
Light yellow solid, mp 151.6-152.8 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76-7.74 (m, 2H), 7.66-7.64 (m, 1H), 7.39-7.26 (m, 13H), 7.17 (d, *J* = 8.5 Hz, 2H), 6.86 (d, *J* = 8.5 Hz, 2H), 4.71 (s, 4H), 2.59 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 148.0, 138.9, 134.1, 131.9, 130.1, 129.7, 128.7, 127.8, 127.7, 127.1, 126.9 (2C), 125.7 (2C), 123.5, 119.5, 112.5, 54.26, 43.91; HRMS *m/z* (ESI) calcd for $C_{32}H_{31}N_2$ $[M+H]^+$ 443.2482, found 443.2476.

2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethanol (3ae):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.75 (m, 2H), 7.64-7.62 (m, 1H), 7.40 (d, *J* = 9.0 Hz, 1H), 7.31-7.27 (m, 2H), 7.23 (d, *J* = 8.5 Hz, 2H), 6.89 (d, *J* = 8.5 Hz, 2H), 3.85 (t, *J* = 4.5 Hz, 2H), 3.53 (t, *J* = 5.5 Hz, 2H), 3.48 (q, *J* = 7.0 Hz, 2H), 2.61 (s, 6H), 1.92 (s, 1H), 1.23 (t, *J* = 6.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 147.0, 134.2, 132.0, 130.3, 129.8, 127.9, 127.7, 127.2, 125.7, 125.6, 123.5, 119.5, 113.0, 60.3, 52.7, 45.9, 44.0, 12.1; HRMS *m/z* (ESI) calcd for $C_{22}H_{27}N_2O$ $[M+H]^+$ 335.2118, found 335.2141.

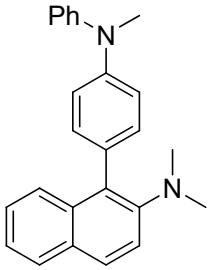
1-(4-(Allyl(methyl)amino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3af):



Light yellow solid, mp 141.5-142.3 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.65-7.63 (m, 1H), 7.38 (d, *J* = 9.0 Hz, 1H), 7.30-7.25 (m, 2H), 7.25-7.21 (m, 2H), 6.84 (d, *J* = 8.5 Hz, 2H), 5.96-5.88 (m, 1H), 5.25-5.18 (m, 2H), 3.98 (d, *J* = 5.0 Hz, 2H),

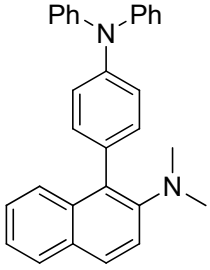
2.99 (s, 3H), 2.60 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 148.3, 134.3, 134.2, 131.9, 130.4, 129.8, 127.8, 127.7, 126.8, 125.7, 123.5, 119.5, 116.3, 112.3, 55.5, 44.0, 38.0; LRMS (EI, 70 eV) *m/z* (%): 316 (M^+, 100), 275 (21), 244 (22), 160 (11); HRMS *m/z* (ESI) calcd for $C_{22}H_{25}N_2$ $[M+H]^+$ 317.2012, found 317.2031.

***N*,*N*-Dimethyl-1-(4-(methyl(phenyl)amino)phenyl)naphthalen-2-amine (3ag):**



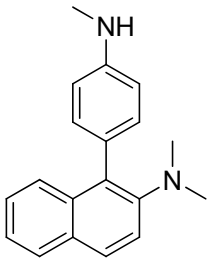
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80-7.76 (m, 2H), 7.64-7.62 (m, 1H), 7.41 (d, *J* = 9.0 Hz, 1H), 7.34-7.28 (m, 6H), 7.16-7.13 (m, 4H), 6.99 (t, *J* = 7.5 Hz, 1H), 3.41 (s, 3H), 2.63 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1 (2C), 147.4, 133.9, 132.0, 131.6, 129.9, 129.7, 129.3, 128.1, 127.8, 125.9, 125.4, 123.6, 121.4, 120.9, 119.8, 119.5, 44.0, 40.4; LRMS (EI, 70 eV) *m/z* (%): 352 (M^+, 100), 320 (10), 231 (20), 196 (13); HRMS *m/z* (ESI) calcd for $C_{25}H_{25}N_2$ $[M+H]^+$ 353.2012, found 353.2036.

1-(4-(Diphenylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ah):



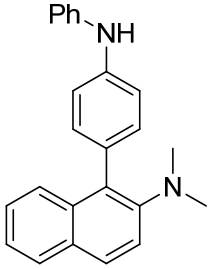
White solid, mp 163.8-165.1 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80-7.77 (m, 2H), 7.67-7.65 (m, 1H), 7.40 (d, *J* = 8.5 Hz, 1H), 7.35-7.26 (m, 8H), 7.21-7.18 (m, 6H), 7.05-7.02 (m, 2H), 2.64 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.0, 147.9, 146.2, 133.7, 133.3, 132.1, 129.4, 129.3, 128.2, 127.8, 125.9, 125.2, 124.7, 124.3, 123.7, 122.7, 119.5, 43.8; LRMS (EI, 70 eV) *m/z* (%): 414 (M^+, 100), 309 (19), 231 (17), 207 (10); HRMS *m/z* (ESI) calcd for $C_{20}H_{27}N_2$ $[M+H]^+$ 415.2169, found 415.2183.

***N*,*N*-Dimethyl-1-(4-(methylamino)phenyl)naphthalen-2-amine (3ai):**



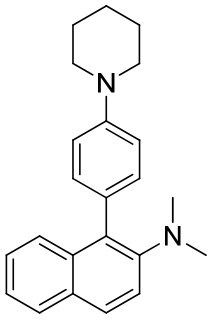
White soild, mp 138.6-139.8 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.75 (m, 2H), 7.64-7.62 (m, 1H), 7.39 (d, *J* = 9.0 Hz, 1H), 7.31-7.25 (m, 2H), 7.22-7.19 (m, 2H), 6.76- 6.73 (m, 2H), 3.76 (s, 1H), 2.91 (s, 3H), 2.61 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 148.0, 134.2, 131.9, 130.4, 129.8, 127.8, 127.7 (2C) 125.7, 125.6, 123.5, 119.5, 112.3, 44.0, 30.9; LRMS (EI, 70 eV) *m/z* (%): 276 (M^+, 100), 260 (20), 231 (20), 196 (13); HRMS *m/z* (ESI) calcd for $C_{19}H_{21}N_2$ $[M+H]^+$ 277.1699, found 277.1713.

***N*,*N*-Dimethyl-1-(4-(phenylamino)phenyl)naphthalen-2-amine (3aj):**



White solid, mp 144.4-145.0 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81-7.77 (m, 2H), 7.64-7.63 (m, 1H), 7.41 (d, *J* = 9.0 Hz, 1H), 7.32-7.28 (m, 6H), 7.24-7.16 (m, 4H), 6.95 (t, *J* = 7.0 Hz, 1H), 5.80 (s, 1H), 2.63 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 143.2, 141.6, 133.9, 132.1, 131.6, 130.0, 129.8, 129.41, 128.2, 127.8, 125.9, 125.4, 123.6, 121.0, 119.5, 117.9, 117.6, 44.0; LRMS (EI, 70 eV) *m/z* (%): 338 (M^+, 100), 306 (12), 231 (23), 182 (15); HRMS *m/z* (ESI) calcd for $C_{24}H_{23}N_2$ $[M+H]^+$ 339.1856, found 339.1848.

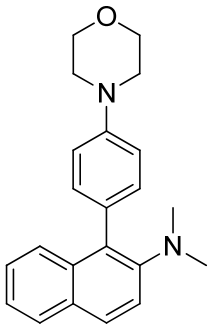
***N*,*N*-Dimethyl-1-(4-(piperidin-1-yl)phenyl)naphthalen-2-amine (3al):**



Light yellow solid, mp 145.3-146.8 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.60 (d, *J* = 7.5 Hz, 1H), 7.38 (d, *J* = 8.5 Hz, 1H), 7.30-7.22 (m, 4H), 7.05 (d, *J* = 8.5 Hz, 2H), 3.24 (t, *J* = 5.0 Hz, 4H), 2.59 (s, 6H), 1.78-1.73 (m, 4H), 1.62-1.59 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.8, 149.1, 134.1, 131.8, 130.1, 129.7,

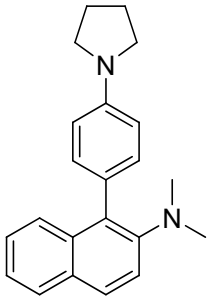
129.5, 127.9, 127.7, 125.8, 125.6, 123.5, 119.5, 116.2, 50.6, 44.0, 26.1, 24.4; LRMS (EI, 70 eV) *m/z* (%): 330 (M^+, 100), 298 (11), 231 (11), 174 (11); HRMS *m/z* (ESI) calcd for $C_{23}H_{27}N_2$ $[M+H]^+$ 331.2169, found 331.2183.

***N*,*N*-Dimethyl-1-(4-morpholinophenyl)naphthalen-2-amine (3am)[1]:**



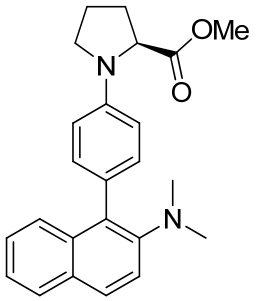
Yellow solid, mp 156.2-157.3 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80-7.76 (m, 2H), 7.57 (d, *J* = 8.0 Hz, 1H), 7.41 (d, *J* = 9.0 Hz, 1H), 7.32-7.26 (m, 4H), 7.04 (d, *J* = 9.0 Hz, 2H), 3.92 (t, *J* = 5.0 Hz, 4H), 3.27 (t, *J* = 5.0 Hz, 4H), 2.60 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.7, 149.1, 134.0, 131.9, 130.5, 129.9, 129.8, 128.1, 127.7, 125.8, 125.4, 123.6, 119.5, 115.3, 67.1, 49.3, 44.0; LRMS (EI, 70 eV) *m/z* (%): 332 (M^+, 100), 273 (40), 230 (22), 136 (27).

***N*,*N*-Dimethyl-1-(4-(pyrrolidin-1-yl)phenyl)naphthalen-2-amine(3an):**



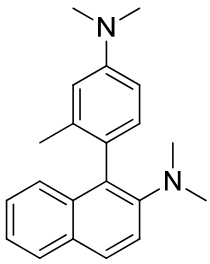
Yellow solid, mp 150.4-151.3 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.55 (m, 2H), 7.64 (d, *J* = 8.0 Hz, 1H), 7.39 (d, *J* = 9.0 Hz, 1H), 7.31-7.22 (m, 4H), 6.70 (d, *J* = 8.5 Hz, 2H), 3.37 (t, *J* = 6.0 Hz, 4H), 2.61 (s, 6H), 2.05-2.03 (m, 4H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 146.6, 134.3, 131.9, 130.6, 129.8, 127.7, 127.6, 125.8, 125.6, 123.4, 119.5, 111.4, 47.7, 44.0, 25.6; HRMS *m/z* (ESI) calcd for $C_{22}H_{25}N_2$ $[M+H]^+$ 317.2012, found 317.2031.

(S)-Methyl-1-(4-(2-(dimethylamino)naphthalen-1-yl)phenyl)pyrrolidine-2-carboxylate (3ao):



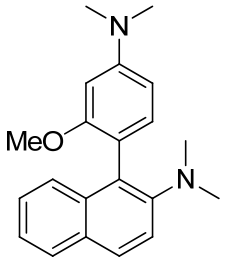
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.62-7.59 (m, 1H), 7.39 (d, *J* = 9.0 Hz, 1H), 7.30-7.26 (m, 2H), 7.26-7.22 (m, 2H), 6.67 (d, *J* = 8.5 Hz, 2H), 4.34-4.32 (m, 1H), 3.76 (s, 3H), 3.68-3.65 (m, 1H), 3.45 (q, *J* = 8.0 Hz, 1H), 2.59 (s, 6H), 2.34-2.28 (m, 1H), 2.24-2.16 (m, 2H), 2.12-2.04 (m, 1H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 175.2, 149.1, 145.4, 134.2, 131.9, 130.4, 129.8, 127.8, 127.7, 127.0, 125.7, 123.5, 119.5, 111.9, 111.9, 61.0, 52.2, 48.5, 44.0, 31.1, 24.0; LRMS (EI, 70 eV) *m/z* (%): 374 (M^+, 41), 315 (100), 299 (18), 157 (12); HRMS *m/z* (ESI) calcd for $C_{24}H_{27}N_2O_2$ $[M+H]^+$ 375.2067, found 375.2088.

1-(4-(Dimethylamino)-2-methylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ap):



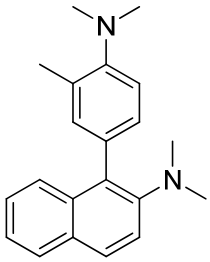
White solid, mp 146.8-147.7 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79-7.75 (m, 2H), 7.40-7.35 (m, 2H), 7.29 (d, *J* = 6.5 Hz, 1H), 7.25-7.22 (m, 1H), 7.07 (d, *J* = 8.0 Hz, 1H), 6.73-6.71 (m, 2H), 3.01 (s, 6H), 2.62 (s, 6H), 1.97 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.7, 149.2, 137.9, 134.2, 132.1, 129.8, 129.7, 127.9, 127.7, 127.0, 125.8, 125.6, 123.5, 119.5, 114.1, 110.3, 43.9, 40.8, 20.6; LRMS (EI, 70 eV) *m/z* (%): 304 (M^+, 100), 289 (27), 259 (18), 144 (13); HRMS *m/z* (ESI) calcd for $C_{21}H_{25}N_2$ $[M+H]^+$ 305.2012, found 305.2036.

1-(4-(Dimethylamino)-2-methoxyphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3aq):



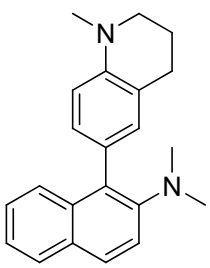
Light yellow solid, mp 153.3-154.8 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.73 (m, 2H), 7.39 (d, *J* = 8.5 Hz, 2H), 7.28-7.23 (m, 2H), 7.01 (d, *J* = 8.0 Hz, 1H), 6.47-6.43 (m, 2H), 3.70 (s, 3H), 3.04 (s, 6H), 2.63 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.4, 151.3, 149.7, 134.4, 132.6, 129.6, 127.9, 127.7, 127.2, 125.8, 125.6, 123.3, 119.8, 116.4, 105.1, 96.3, 55.4, 43.9, 40.8; LRMS (EI, 70 eV) *m/z* (%): 320 (M^+, 100), 289 (25), 274 (46), 184 (27); HRMS *m/z* (ESI) calcd for $C_{21}H_{25}N_2O$ $[M+H]^+$ 321.1961, found 321.1980.

1-(4-(Dimethylamino)-3-methylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ar):



White solid, mp 147.4-148.8 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79-7.75 (m, 2H), 7.57-7.55 (m, 1H), 7.40 (d, *J* = 9.0 Hz, 1H), 7.32-7.26 (m, 2H), 7.15-7.12 (m, 3H), 2.79 (s, 6H), 2.60 (s, 6H), 2.38 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 151.2, 148.9, 134.0, 133.8, 132.9, 131.5, 130.2, 129.7, 129.1, 128.0, 127.7, 125.8, 125.6, 123.5, 119.5, 118.0, 44.4, 44.1, 18.7; LRMS (EI, 70 eV) *m/z* (%): 304 (M^+, 100), 289 (20), 258 (18), 144 (15); HRMS *m/z* (ESI) calcd for $C_{21}H_{25}N_2$ $[M+H]^+$ 305.2012, found 305.2027.

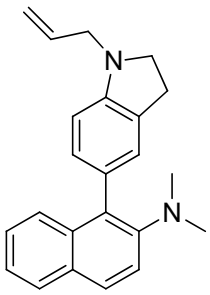
***N*,*N*-Dimethyl-1-(1-methyl-1,2,3,4-tetrahydroquinolin-6-yl)naphthalen-2-amine (3as):**



Light yellow solid, mp 163.4-165.1 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.71 (m, 2H), 7.66-7.64 (m, 1H), 7.37 (d, *J* = 9.0 Hz, 1H), 7.31-7.24 (m, 2H), 7.06 (d, *J* = 8.5 Hz, 1H), 6.95-6.94 (m, 1H), 6.70 (d, *J* = 8.5 Hz, 1H), 3.32-3.25 (m, 2H), 2.95 (s, 3H), 2.81 (t, *J* = 6.5 Hz, 2H), 2.61 (s, 6H), 2.06-2.01 (m, 2H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.9, 145.3,

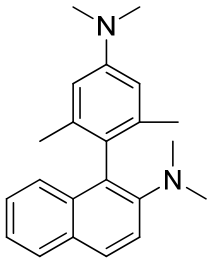
134.3, 131.4, 130.5, 129.7, 129.6, 127.6, 126.5, 125.7, 125.5, 123.3, 122.5, 119.5, 110.6, 51.4, 44.0, 39.1, 27.8, 22.6; HRMS *m/z* (ESI) calcd for $C_{22}H_{25}N_2$ $[M+H]^+$ 317.2012, found 317.2006.

1-(1-Allylindolin-5-yl)-N,N-dimethylnaphthalen-2-amine (3at):



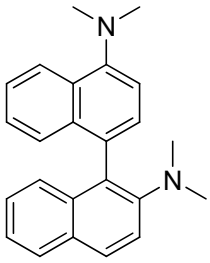
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81-7.70 (m, 2H), 7.68-7.59 (m, 1H), 7.37 (d, *J* = 9.0 Hz, 1H), 7.34-7.22 (m, 2H), 7.12-7.00 (m, 2H), 6.63 (d, *J* = 8.0 Hz, 1H), 6.02-5.94 (m, 1H), 5.35-5.31 (m, 1H), 5.24-5.21 (m, 1H), 3.77 (t, *J* = 6.5 Hz, 2H), 3.42-3.37 (m, 2H), 3.04-3.00 (m, 2H), 2.60 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.9, 148.9, 134.5, 134.3, 130.6, 130.1, 129.9, 129.7, 128.2, 127.6, 127.6, 127.2, 125.6, 125.6, 123.3, 119.4, 117.3, 107.0, 53.4, 52.4, 43.9, 28.6; HRMS *m/z* (ESI) calcd for $C_{23}H_{25}N_2$ $[M+H]^+$ 329.2012, found 329.2028.

1-(4-(Dimethylamino)-2,6-dimethylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3au):



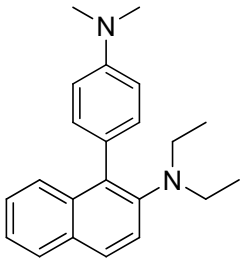
Light yellow solid, mp 123.6-124.2 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79-7.76 (m, 2H), 7.38 (d, *J* = 9.0 Hz, 1H), 7.30-7.26 (m, 1H), 7.24-7.22 (m, 2H), 6.60 (s, 2H), 3.00 (s, 6H), 2.64 (s, 6H), 1.89 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.6, 148.9, 137.9, 133.7, 129.7, 128.4, 127.9, 127.7, 126.9, 125.9, 125.0, 123.4, 119.3, 112.1, 43.3, 40.8, 21.0; LRMS (EI, 70 eV) *m/z* (%): 318 (M^+, 100), 303 (25), 273 (19), 149 (19); HRMS *m/z* (ESI) calcd for $C_{22}H_{27}N_2$ $[M+H]^+$ 319.2169, found 319.2184.

N^2,N^2,$N^{4'}$,$N^{4'}$-Tetramethyl-[1,1'-binaphthalene]-2,4'-diamine (3av):



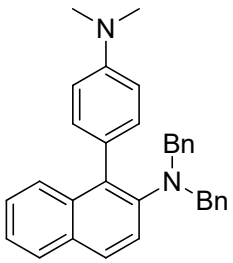
Yellow solid, mp 152.4-152.9 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.32 (d, *J* = 8.5 Hz, 1H), 7.86 (d, *J* = 8.5 Hz, 1H), 7.79 (d, *J* = 8.5 Hz, 1H), 7.47-7.43 (m, 2H), 7.35-7.32 (m, 2H), 7.28-7.18 (m, 3H), 7.13 (d, *J* = 3.5 Hz, 2H), 2.98 (s, 6H), 2.50 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.3, 149.9, 134.7, 134.3, 131.6, 129.6, 129.0, 128.8, 128.6, 127.9, 127.7, 127.2, 126.0, 125.9, 125.6, 124.9, 124.4, 123.5, 119.8, 113.9, 45.5, 44.0; LRMS (EI, 70 eV) *m/z* (%): 340 (M^+, 100), 295 (21), 281 (19), 170 (13); HRMS *m/z* (ESI) calcd for $C_{24}H_{25}N_2$ $[M+H]^+$ 341.2012, found 341.2025.

1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethylnaphthalen-2-amine (3ba):[1]



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 (t, *J* = 8.0 Hz, 2H), 7.61 (d, *J* = 8.5 Hz, 1H), 7.41 (d, *J* = 9.0 Hz, 1H), 7.32 (t, *J* = 7.2 Hz, 1H), 7.27 (d, *J* = 7.0 Hz, 1H), 7.24-7.21 (m, 2H), 6.85 (d, *J* = 8.5 Hz, 2H), 3.02 (s, 6H), 2.93 (q, *J* = 7.0 Hz, 4H), 0.86 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 146.5, 134.4, 131.8, 130.4, 127.6, 127.3, 127.0, 126.1, 125.5, 123.9, 122.1, 112.2, 47.5, 40.8, 12.9; LRMS (EI, 70 eV) *m/z* (%): 318 (M^+, 85), 303 (42), 274 (100), 159 (11); The analytical data are in accordance with those reported in the literature.[1]

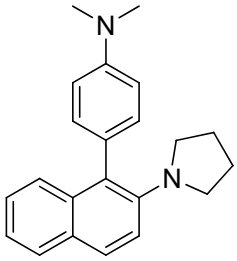
***N*,*N*-Dibenzyl-1-(4-(dimethylamino)phenyl)naphthalen-2-amine (3ca):[1]**



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.0 Hz, 1H), 7.70 (d, *J* = 9.0 Hz, 1H), 7.59 (d, *J* = 8.0 Hz, 1H), 7.35 (d, *J* = 9.0 Hz, 1H), 7.32-7.25 (m, 2H), 7.21 (d, *J* = 8.5 Hz, 2H), 7.19-7.12 (m, 6H), 7.04 (d, *J* = 7.0 Hz, 4H), 6.89 (d, *J* = 8.5 Hz, 2H), 3.99 (s, 4H), 3.02 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.7, 146.9, 138.9, 134.5, 134.0, 131.8, 130.7, 129.2, 128.1, 127.7, 127.6, 126.9, 126.3, 125.7, 124.2,

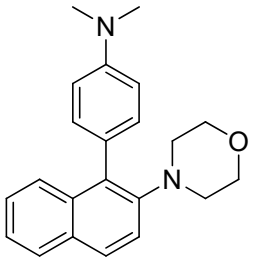
122.4, 112.8, 57.0, 41.0; The analytical data are in accordance with those reported in the literature.[1]

***N*,*N*-Dimethyl-4-(2-(pyrrolidin-1-yl)naphthalen-1-yl)aniline (3da):[1]**



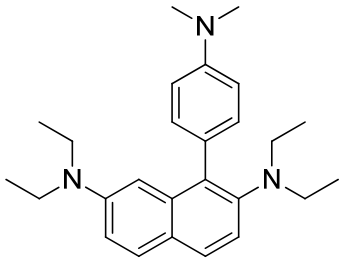
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.70 (d, *J* = 9.0 Hz, 2H), 7.45 (d, *J* = 8.5 Hz, 1H), 7.24 (d, *J* = 2.0 Hz, 1H), 7.22-7.20 (m, 3H), 7.18-7.15 (m, 1H), 6.81 (d, *J* = 9.0 Hz, 2H), 3.02-3.00 (m, 10H), 1.75-1.72 (m, 4H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 145.6, 135.2, 132.6, 128.3, 127.6 (2C), 127.3, 125.7, 124.8, 122.1, 121.6, 117.1, 112.1, 51.0, 40.7, 25.7; The analytical data are in accordance with those reported in the literature.[1]

***N*,*N*-Dimethyl-4-(2-morpholinonaphthalen-1-yl)aniline (3ea): [1]**



White solid, mp 167.4-168.7 ºC; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79-7.76 (m, 2H), 7.72 (d, *J* = 8.5 Hz, 1H), 7.34-7.28 (m, 5H), 6.84 (d, *J* = 8.5 Hz, 2H), 3.53 (t, *J* = 4.5 Hz, 4H), 3.01 (s, 6H), 2.87 (t, *J* = 4.5 Hz, 4H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.4, 147.6, 133.8, 131.9, 131.8, 130.5, 128.1, 127.8, 125.9 (3C), 124.1, 119.4, 112.3, 67.4, 51.8, 40.7; LRMS (EI, 70 eV) *m/z* (%): 332 (M^+, 100), 273 (39), 230 (22), 136 (26); The analytical data are in accordance with those reported in the literature.[1]

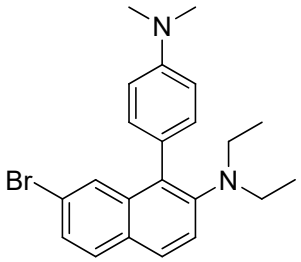
1-(4-(Dimethylamino)phenyl)-*N*^{2},*N*^{2},*N*^{7},*N*^{7}-tetraethylnaphthalene-2,7-diamine (3ga):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.63 (d, *J* = 9.0 Hz, 1H), 7.59 (d, *J* = 8.5 Hz, 1H), 7.24-7.21 (m, 2H), 7.12 (d, *J* = 8.5 Hz, 1H), 6.98-6.96 (m, 1H), 6.85 (d, *J* = 8.5 Hz, 2H), 6.64 (s, 1H), 3.26 (q, *J* = 7.0 Hz, 4H), 3.00 (s, 6H), 2.89 (q, *J* = 7.0 Hz, 4H), 1.06 (t, *J* = 7.0 Hz, 6H), 0.85 (t, *J* = 7.0 Hz, 6H);

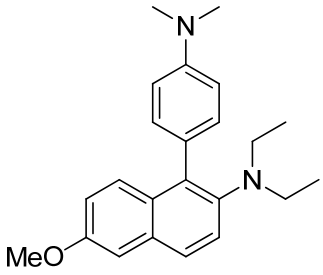
^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 146.6, 145.4, 135.9, 132.6, 131.9, 128.6, 128.1, 126.8, 123.6, 117.8, 114.2, 112.5, 105.0, 47.7, 44.8, 41.0, 12.9, 12.6; LRMS (EI, 70 eV) *m/z* (%): 389 (M^+, 100), 374 (48), 345 (70), 165 (25); HRMS *m/z* (ESI) calcd for $C_{26}H_{36}N_3$ $[M+H]^+$ 390.2904, found 390.2917.

7-Bromo-1-(4-(dimethylamino)phenyl)-*N*,*N*-diethylnaphthalen-2-amine (3ha):



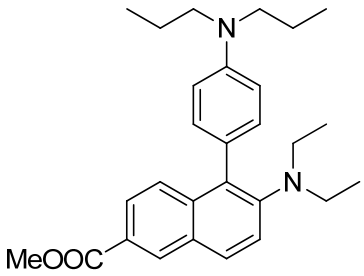
White solid, mp 134.3-135.6 ºC; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 (s, 1H), 7.69 (d, *J* = 9.0 Hz, 1H), 7.61 (d, *J* = 8.5 Hz, 1H), 7.43-7.33 (m, 2H), 7.18 (d, *J* = 8.0 Hz, 2H), 6.85 (d, *J* = 8.0 Hz, 2H), 3.02 (s, 6H), 2.91 (q, *J* = 7.0 Hz, 4H), 0.85 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.3, 147.7, 135.7, 132.9, 131.7, 129.3, 128.6, 128.0, 127.2, 127.1, 126.1, 122.4, 120.1, 112.4, 47.1, 40.7, 12.8; LRMS (EI, 70 eV) *m/z* (%): 396 (M^+, 100), 381 (50), 352 (99), 273 (56); HRMS *m/z* (ESI) calcd for $C_{22}H_{26}BrN_2$ $[M+H]^+$ 397.1274, found 397.1260.

1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethyl-6-methoxynaphthalen-2-amine (3ia):



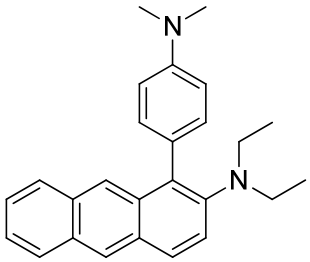
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.66 (d, *J* = 9.0 Hz, 1H), 7.52 (d, *J* = 9.0 Hz, 1H), 7.38 (d, *J* = 9.0 Hz, 1H), 7.21-7.18 (m, 2H), 7.10 (d, *J* = 3.0 Hz, 1H), 6.97-6.95 (m, 1H), 6.83 (t, *J* = 5.5 Hz, 2H), 3.88 (s, 3H), 3.00 (s, 6H), 2.89 (q, *J* = 7.0 Hz, 4H), 0.85 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 156.5, 149.2, 144.6, 135.4, 131.8, 131.6, 129.8, 128.0, 127.1, 126.2, 122.9, 118.0, 112.1, 105.7, 55.4, 47.9, 40.8, 12.9; LRMS (EI, 70 eV) *m/z* (%): 348 (M^+, 89), 333 (32), 304(100), 152 (18); HRMS *m/z* (ESI) calcd for $C_{23}H_{29}N_2O$ $[M+H]^+$ 349.2274, found 349.2293.

Methyl 6-(diethylamino)-5-(4-(dipropylamino)phenyl)-2-naphthoate (3ja):



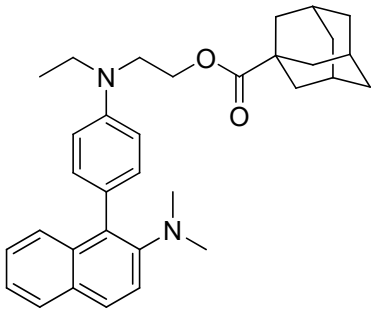
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.51 (s, 1H), 7.82 (d, *J* = 8.5 Hz, 2H), 7.69 (d, *J* = 9.0 Hz, 1H), 7.42 (d, *J* = 8.5 Hz, 1H), 7.15 (d, *J* = 8.0 Hz, 2H), 6.75 (d, *J* = 8.5 Hz, 2H), 3.94 (s, 3H), 3.30 (t, *J* = 7.5 Hz, 4H), 2.97 (q, *J* = 6.5 Hz, 4H), 1.69 (q, *J* = 7.5 Hz, 4H), 0.97 (t, *J* = 7.0 Hz, 6H), 0.88 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 167.6, 149.2, 147.1, 136.8, 132.7, 131.8, 130.9, 128.8, 128.5, 126.1, 124.9, 124.8, 124.7, 122.4, 111.6, 53.0, 52.0, 46.7, 20.6, 12.8, 11.6; LRMS (EI, 70 eV) *m/z* (%): 432 (M^+, 76), 403 (100), 388(27), 194 (13); HRMS *m/z* (ESI) calcd for $C_{28}H_{37}N_2O_2$ $[M+H]^+$ 433.2850, found 433.2838.

1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethylanthracen-2-amine (3ka):



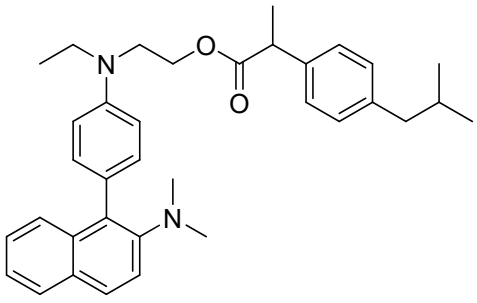
Yellow solid, mp 159.3-160.1 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.34 (s, 1H), 8.14 (s, 1H), 7.92 (d, *J* = 9.0 Hz, 2H), 7.78 (d, *J* = 8.0 Hz, 1H), 7.45 (d, *J* = 9.0 Hz, 1H), 7.36-7.22 (m, 4H), 6.90 (d, *J* = 8.5 Hz, 2H), 3.05 (s, 6H), 2.96 (q, *J* = 7.0 Hz, 4H), 0.89 (t, *J* = 7.0 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 145.5, 133.2, 132.8, 132.0, 131.7, 130.5, 129.6, 128.6, 127.8, 127.7, 127.2, 125.8, 124.9, 124.6, 124.3, 122.8, 47.4, 40.8, 13.1; HRMS *m/z* (ESI) calcd for $C_{26}H_{29}N_2$ $[M+H]^+$ 369.2325, found 369.2354.

(3r,5r,7r)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl adamantane-1-carboxylate (3aw):



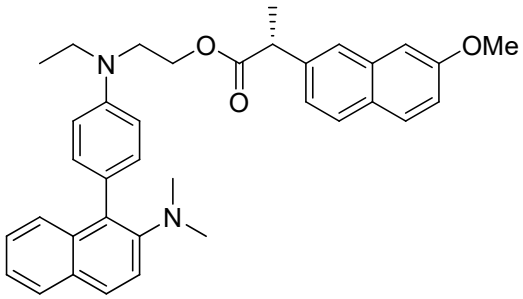
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.75 (m, 2H), 7.65-7.63 (m, 1H), 7.39 (d, *J* = 8.5 Hz, 1H), 7.31-7.25 (m, 2H), 7.22 (d, *J* = 8.5 Hz, 2H), 6.85 (d, *J* = 9.0 Hz, 2H), 4.28 (t, *J* = 6.5 Hz, 2H), 3.62 (t, *J* = 6.0 Hz, 2H), 3.48 (q, *J* = 7.0 Hz, 2H), 2.60 (s, 6H), 2.01 (s, 3H), 1.91-1.90 (m, 6H), 1.74-1.67 (m, 6H), 1.24 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 177.9, 149.1, 146.4, 134.2, 132.0, 130.3, 129.8, 127.7 (2C), 126.3, 125.7 (2C), 123.5, 119.5, 111.7, 62.0, 48.7, 45.1, 44.0, 40.8, 38.9, 36.5, 28.0, 12.4; HRMS *m/z* (ESI) calcd for $C_{33}H_{41}N_2O_2$ $[M+H]^+$ 497.3163, found 497.3182.

2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(4-isobutylphenyl)propanoate (3ax):



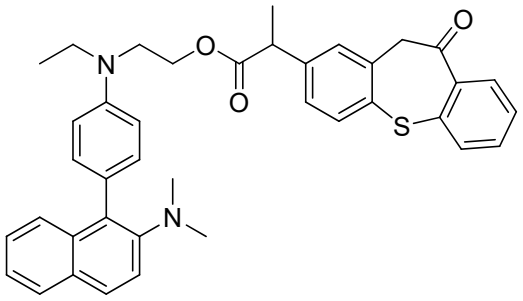
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.75 (m, 2H), 7.63 (d, *J* = 7.0 Hz, 1H), 7.40 (d, *J* = 9.0 Hz, 1H), 7.31-7.24 (m, 2H), 7.22-7.20 (m, 4H), 7.10 (d, *J* = 8.0 Hz, 2H), 6.79 (d, *J* = 8.0 Hz, 2H), 4.31-4.28 (m, 2H), 3.71 (q, *J* = 7.5 Hz, 1H), 3.56 (t, *J* = 6.5 Hz, 2H), 3.35 (q, *J* = 7.0 Hz, 2H), 2.60 (s, 6H), 2.44 (d, *J* = 7.0 Hz, 2H), 1.89-1.80 (m, 1H), 1.50 (d, *J* = 7.0 Hz, 3H), 1.16 (t, *J* = 7.0 Hz, 3H), 0.89 (d, *J* = 6.5 Hz, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 174.8, 149.1, 146.2, 140.6, 137.6, 134.1, 131.9, 130.3, 129.7, 129.4, 127.7, 127.6, 127.2, 126.3, 125.6, 123.4, 119.4, 111.6, 62.4, 48.6, 45.2, 45.1, 45.0, 43.9, 30.2, 22.4, 18.5, 12.3; HRMS *m/z* (ESI) calcd for $C_{35}H_{43}N_2O_2$ $[M+H]^+$ 523.3319, found 523.3331.

(R)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl 2-(7-methoxynaphthalen-2-yl)propanoate (3ay):



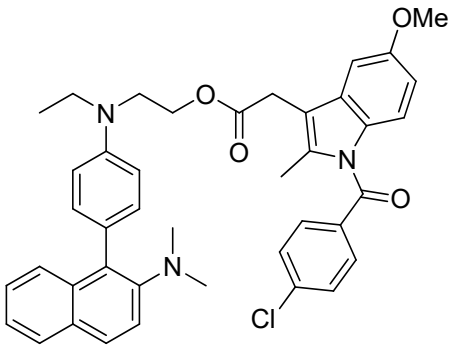
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.71-7.67 (m, 3H), 7.63 (d, *J* = 8.5 Hz, 1H), 7.41-7.38 (m, 2H), 7.30-7.25 (m, 2H), 7.19 (d, *J* = 8.0 Hz, 2H), 7.13-7.10 (m, 2H), 6.78 (d, *J* = 8.0 Hz, 2H), 4.33-4.27 (m, 2H), 3.88-3.84 (m, 4H), 3.54 (t, *J* = 6.0 Hz, 2H), 3.33-3.28 (m, 2H), 2.59 (s, 6H), 1.58 (d, *J* = 7.2 Hz, 3H), 1.11 (t, *J* = 7.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 174.7, 157.6, 149.1, 146.2, 135.5, 134.1, 133.7, 131.9, 130.3, 129.7, 129.2, 128.9, 127.7, 127.6, 127.2, 126.3, 126.2, 126.0, 125.6, 123.4, 119.4, 119.0, 111.7, 105.5, 62.4, 55.3, 48.6, 45.5, 45.0, 43.9, 18.4, 12.3; HRMS *m/z* (ESI) calcd for $C_{36}H_{39}N_2O_3$ $[M+H]^+$ 547.2955, found 547.2973.

2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(10-oxo-10,11-dihydrodibenzo[*b*,*f*]thiepin-2-yl)propanoate (3az):



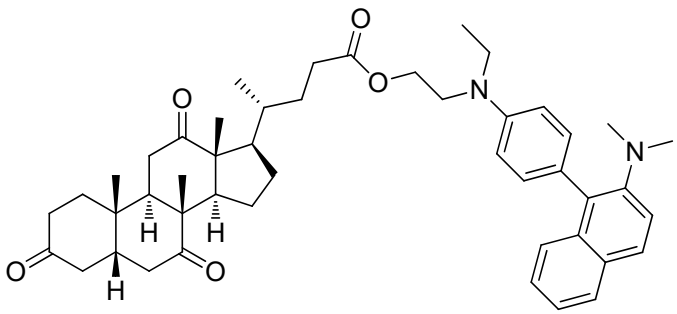
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.19 (d, *J* = 7.5 Hz, 1H), 7.77-7.75 (m, 2H), 7.63-7.57 (m, 3H), 7.41-7.38 (m, 3H), 7.31 -7.26 (m, 3H), 7.20 (d, *J* = 8.5 Hz, 2H), 7.15-7.13 (m, 1H), 6.77 (d, *J* = 8.5 Hz, 2H), 4.39-4.23 (m, 4H), 3.72 (q, *J* = 7.0 Hz, 1H), 3.55 (t, *J* = 6.5 Hz, 2H), 3.34-3.30 (m, 2H), 2.59 (s, 6H), 1.49 (d, *J* = 7.0 Hz, 3H), 1.12 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 191.3, 173.9, 149.0, 146.1, 142.5, 140.1, 137.9, 136.1, 134.1, 133.3, 132.5, 131.9, 131.5, 131.5, 130.8, 130.3, 129.7, 128.6, 127.7, 127.6, 126.8, 126.4, 125.6, 123.4, 119.4, 111.7, 62.5, 51.0, 48.5, 45.2, 45.1, 43.9, 18.4, 12.3; HRMS *m/z* (ESI) calcd for $C_{39}H_{39}N_2O_3S$ $[M+H]^+$ 615.2676, found 615.2664.

2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1*H*-indol-3-yl)acetate (3aaa):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.65-7.61 (m, 3H), 7.44 (d, *J* = 8.0 Hz, 2H), 7.39 (d, *J* = 8.5 Hz, 1H), 7.30-7.25 (m, 2H), 7.23-7.21 (m, 3H), 6.97 (s, 1H), 6.86 (d, *J* = 9.0 Hz, 1H), 6.81 (d, *J* = 8.5 Hz, 2H), 6.67 (d, *J* = 7.5 Hz, 1H), 4.34 (t, *J* = 6.0 Hz, 2H), 3.81 (s, 3H), 3.69 (s, 2H), 3.61 (t, *J* = 6.0 Hz, 2H), 3.38 (q, *J* = 7.0 Hz, 2H), 2.59 (s, 6H), 2.39 (s, 3H), 1.18 (t, *J* = 6.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 170.9, 168.2, 156.0, 149.0, 146.1, 139.2, 135.9, 134.1, 133.8, 132.0, 131.1, 130.8, 130.6, 130.2, 129.7, 129.1, 127.7, 127.6, 126.5, 125.6, 125.5, 123.4, 119.4, 114.9, 112.4, 111.7, 111.6, 101.3, 62.6, 55.7, 48.7, 45.2, 43.9, 30.3, 13.3, 12.3; HRMS *m/z* (ESI) calcd for $C_{41}H_{41}ClN_3O_4$ $[M+H]^+$ 674.2780, found 673.2796.

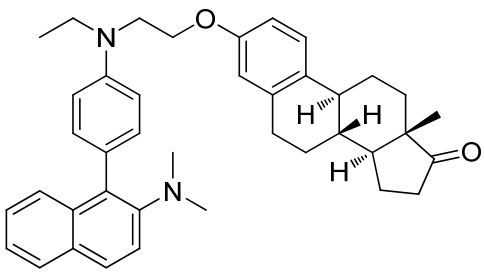
(R)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl 4-((5S,8R,9R,10S,13R,14R,17R)-8,10,13-trimethyl-3,7,12-trioxohexadecahydro-1*H*-cyclopenta[a]phenanthren-17-yl)pentanoate (3aab):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78-7.75 (m, 2H), 7.65-7.63 (m, 1H), 7.40 (d, *J* = 9.0 Hz, 1H), 7.30-7.27 (m, 2H), 7.22 (d, *J* = 9.0 Hz, 2H), 6.83 (d, *J* = 8.5 Hz, 2H), 4.30 (t, *J* = 6.5 Hz, 2H), 3.62 (t, *J* = 6.5 Hz, 2H), 3.48 (q, *J* = 7.0 Hz, 2H), 2.91-2.80 (m, 3H), 2.61 (s, 6H), 2.46-2.40 (m, 1H), 2.36-2.30 (m, 7H), 2.14-2.09 (m, 2H), 2.07-2.00 (m, 3H), 1.96-1.93 (m, 1H),

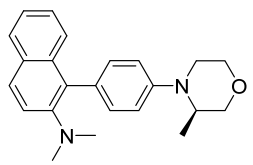
1.90-1.81 (m, 2H), 1.63-1.56 (m, 1H), 1.44-1.29 (m, 6H), 1.25-1.21 (m, 3H), 1.05 (s, 3H), 0.86 (d, J = 6.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 211.9, 209.0, 208.7, 174.1, 149.0, 146.2, 134.1, 131.9, 130.2, 129.7, 127.7, 127.6, 126.3, 125.6 (2C), 123.4, 119.4, 111.6, 61.8, 56.8, 51.7, 48.9, 48.8, 46.8, 45.6, 45.5, 45.3, 44.9, 43.9, 42.7, 38.6, 36.42, 35.9, 35.4, 35.2, 31.4, 30.4, 27.6, 25.1, 21.8, 18.6, 12.4, 11.8; HRMS *m/z* (ESI) calcd for $C_{47}H_{61}N_2O_5$ $[M+H]^+$ 733.4575, found 733.4589.

(8R,9S,13S,14S)-3-(2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethoxy)-13-methyl-7,8,9,11,12,13,15,16-octahydro-6*H*-cyclopenta[*a*]phenanthren-17(14*H*)-one (3aac):



Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77-7.74 (m, 2H), 7.65 (d, J = 8.0 Hz, 1H), 7.39 (d, J = 8.5 Hz, 1H), 7.30-7.25 (m, 2H), 7.23-7.20 (m, 3H), 6.83 (d, J = 8.5 Hz, 2H), 6.75 (d, J = 8.0 Hz, 1H), 6.68 (s, 1H), 4.17 (t, J = 6.0 Hz, 2H), 3.78 (t, J = 6.0 Hz, 2H), 3.56-3.52 (m, 2H), 2.88 (d, J = 4.0 Hz, 2H), 2.61 (s, 6H), 2.52-2.48 (m, 1H), 2.39-2.37 (m, 1H), 2.25 (d, J = 9.5 Hz, 1H), 2.16-2.10 (m, 1H), 2.06-1.94 (m, 3H), 1.64-1.47 (m, 6H), 1.27 (t, J = 7.0 Hz, 3H), 0.89 (s, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 220.9, 156.8, 149.0, 146.2, 137.8, 134.1, 132.2, 131.9, 130.2, 129.7, 127.7, 127.6, 126.3, 126.1, 125.6, 125.6, 123.4, 119.4, 114.4, 112.1, 111.5, 65.5, 50.3, 49.7, 48.0, 45.7, 43.9, 38.3, 35.8, 31.5, 29.6, 26.5, 25.9, 21.5, 13.8, 12.5; HRMS *m/z* (ESI) calcd for $C_{40}H_{47}N_2O_2$ $[M+H]^+$ 587.3632, found 587.3642.

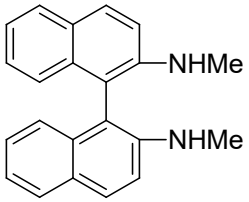
(R)-*N*,*N*-Dimethyl-1-(4-(3-methylmorpholino)phenyl)naphthalen-2-amine(3aad):



White solid, mp 135.1-135.9 ºC; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80-7.76 (m, 2H), 7.60 (d, J = 7.5 Hz, 1H), 7.40 (d, J = 9.0 Hz,

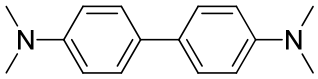
1H), 7.32-7.27 (m, 4H), 7.02 (d, *J* = 8.5 Hz, 2H), 4.05-4.02 (m, 1H), 3.93-3.91 (m, 1H), 3.89-3.84 (m, 1H), 3.80-3.75 (m, 2H), 3.27-3.19 (m, 2H), 2.60 (s, 6H), 1.18 (d, *J* = 6.5 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.1, 148.4, 134.0, 132.0, 130.0, 129.8, 129.7, 128.0, 127.7, 125.8, 125.4, 123.5, 119.4, 116.1, 72.1, 67.3, 51.0, 43.9, 43.8, 11.6; LRMS (EI, 70 eV) m/z (%): 346 (M^+, 100), 331 (45), 288 (26), 202 (13); HRMS m/z (ESI) calcd for $C_{23}H_{27}N_2O$ $[M+H]^+$ 347.2118, found 347.2141.

N^2,$N^{2'}$-Dimethyl-[1,1'-binaphthalene]-2,2'-diamine (4):[2]



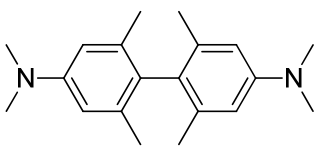
White solid; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 8.5 Hz, 2H), 7.81-7.79 (m, 2H), 7.26 (d, *J* = 3.5 Hz, 2H), 7.21-7.13 (m, 4H), 6.96 (dd, *J* = 8.0, 1.0 Hz, 2H), 3.68 (s, 2H), 2.82 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 145.6, 133.7, 129.6, 128.1, 127.6, 126.7, 123.6, 121.7, 113.4, 111.7, 31.1; LRMS (EI, 70 eV) *m/z* (%): 312 (M^+, 100), 280 (27), 267 (22), 170 (71); The analytical data are in accordance with those reported in the literature.[2]

N^4,N^4,$N^{4'}$,$N^{4'}$-Tetramethyl-[1,1'-biphenyl]-4,4'-diamine (5):[3]



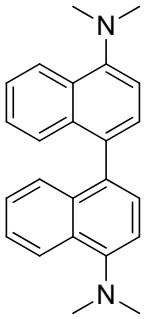
White solid; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.45 (d, *J* = 9.0 Hz, 4H), 6.80 (d, *J* = 9.0 Hz, 4H), 2.96 (s, 12H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 149.2, 129.8, 126.9, 113.0, 40.8; LRMS (EI, 70 eV) *m/z* (%): 240 (M^+, 100), 225 (34), 152 (9), 119 (26); The analytical data are in accordance with those reported in the literature.[3]

N^4,N^4,$N^{4'}$,$N^{4'}$,2,2',6,6'-Octamethyl-[1,1'-biphenyl]-4,4'-diamine (6):[4]



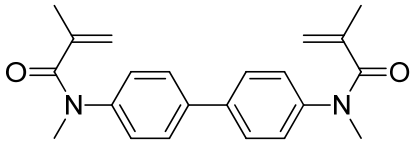
White solid, mp 103.1-104.3 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 6.52 (s, 4H), 2.95 (s, 12H), 1.88 (s, 12H); ^{13}C NMR (125 MHz, $CDCl_3$) δ149.1, 137.0, 129.2, 111.7, 40.7, 20.6; LRMS (EI, 70 eV) *m/z* (%): 296 (M^+, 100), 281 (9), 266 (10), 147 (28); The analytical data are in accordance with those reported in the literature.[4]

N^4,N^4,$N^{4'}$,$N^{4'}$-Tetramethyl-[1,1'-binaphthalene]-4,4'-diamine (7):[2]



White solid, mp 121.1-121.9 °C; ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.33 (d, *J* = 8.5 Hz, 2H), 7.47-7.44 (m, 2H), 7.41 (d, *J* = 8.0 Hz, 2H), 7.37 (d, *J* = 7.5 Hz, 2H), 7.27-7.23 (m, 2H), 7.16 (d, *J* = 7.5 Hz, 2H), 2.97 (s, 12H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.4, 134.3, 133.4, 128.7, 127.9, 127.2, 125.6, 124.9, 124.2, 113.5, 45.32; LRMS (EI, 70 eV) *m/z* (%): 340 (M^+, 100), 325 (25), 280 (8), 170 (8); The analytical data are in accordance with those reported in the literature.[2]

***N*,*N*'-([1,1'-Biphenyl]-4,4'-diyl)bis(*N*,2-dimethylacrylamide) (8):**

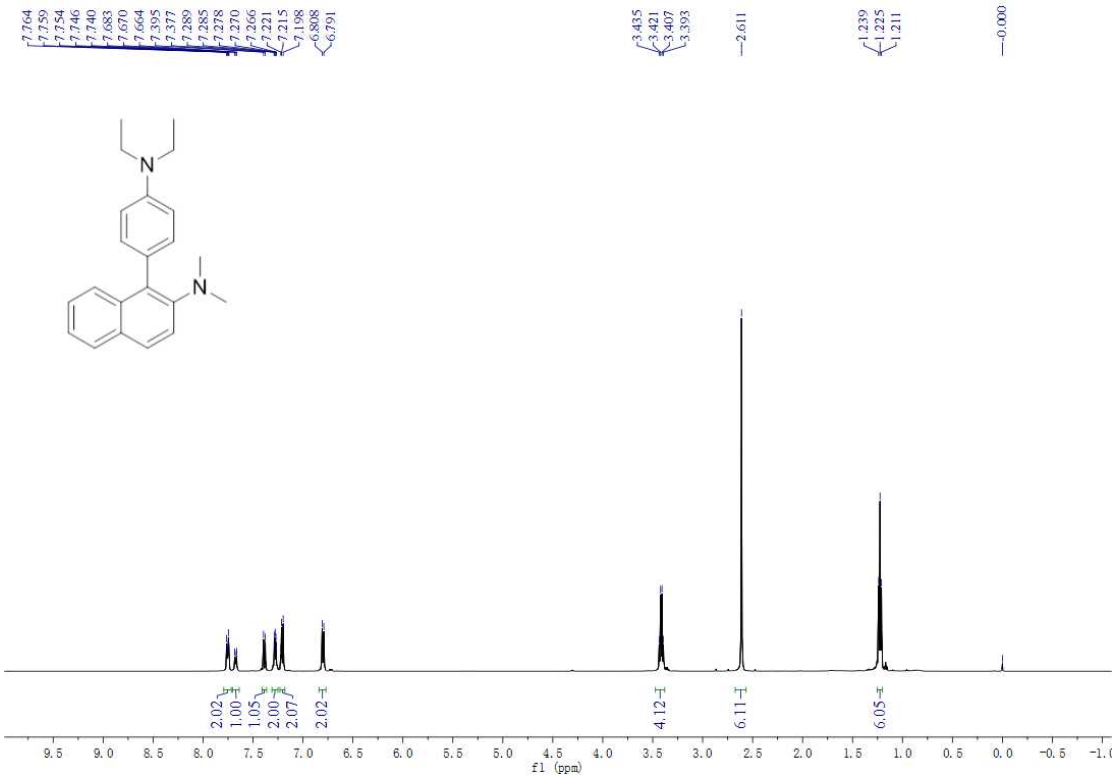


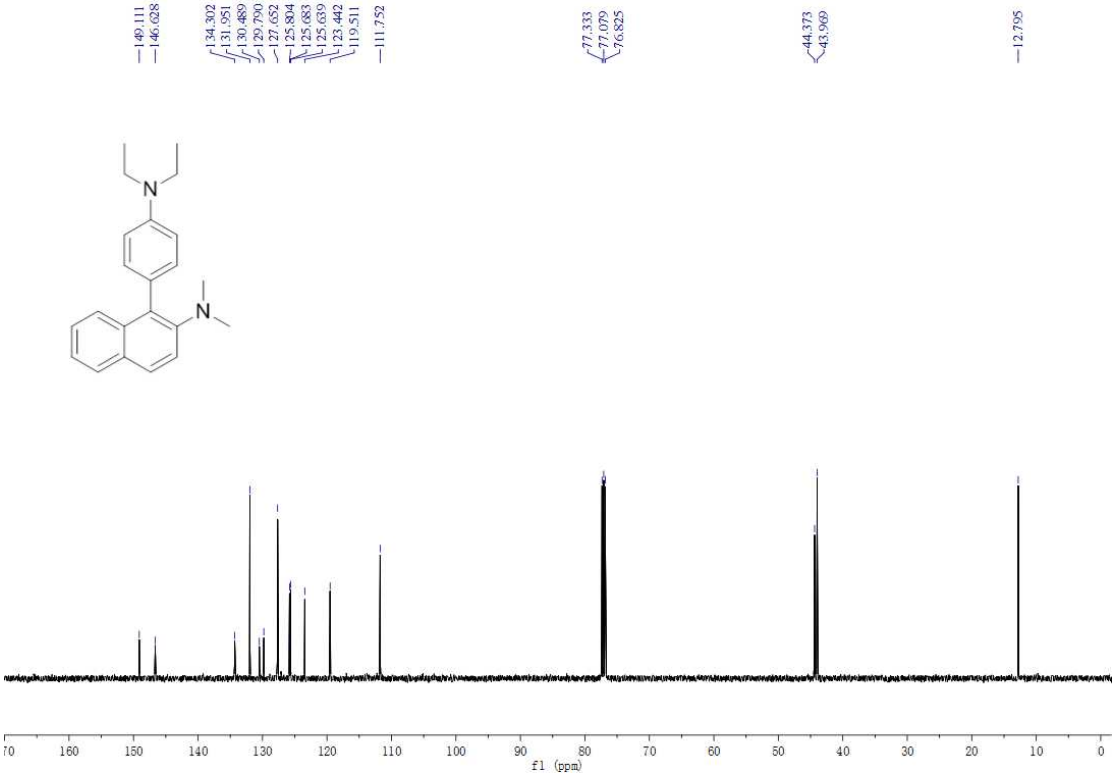
Light yellow oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.5 Hz, 4H), 7.22 (d, *J* = 8.5 Hz, 4H), 5.06 (d, *J* = 18.0 Hz, 4H), 3.39 (s, 6H), 1.81 (s, 6H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 172.0, 144.0, 140.6, 138.4, 127.7, 126.8, 119.6, , 37.7, 20.3; LRMS (EI, 70 eV) *m/z* (%): 348 (M^+, 60), 333 (8), 279 (6), 82 (100); HRMS *m/z* (ESI) calcd for $C_{22}H_{25}N_2O_2$ $[M+H]^+$ 349.1911, found 349.1931.

(C) Spectra

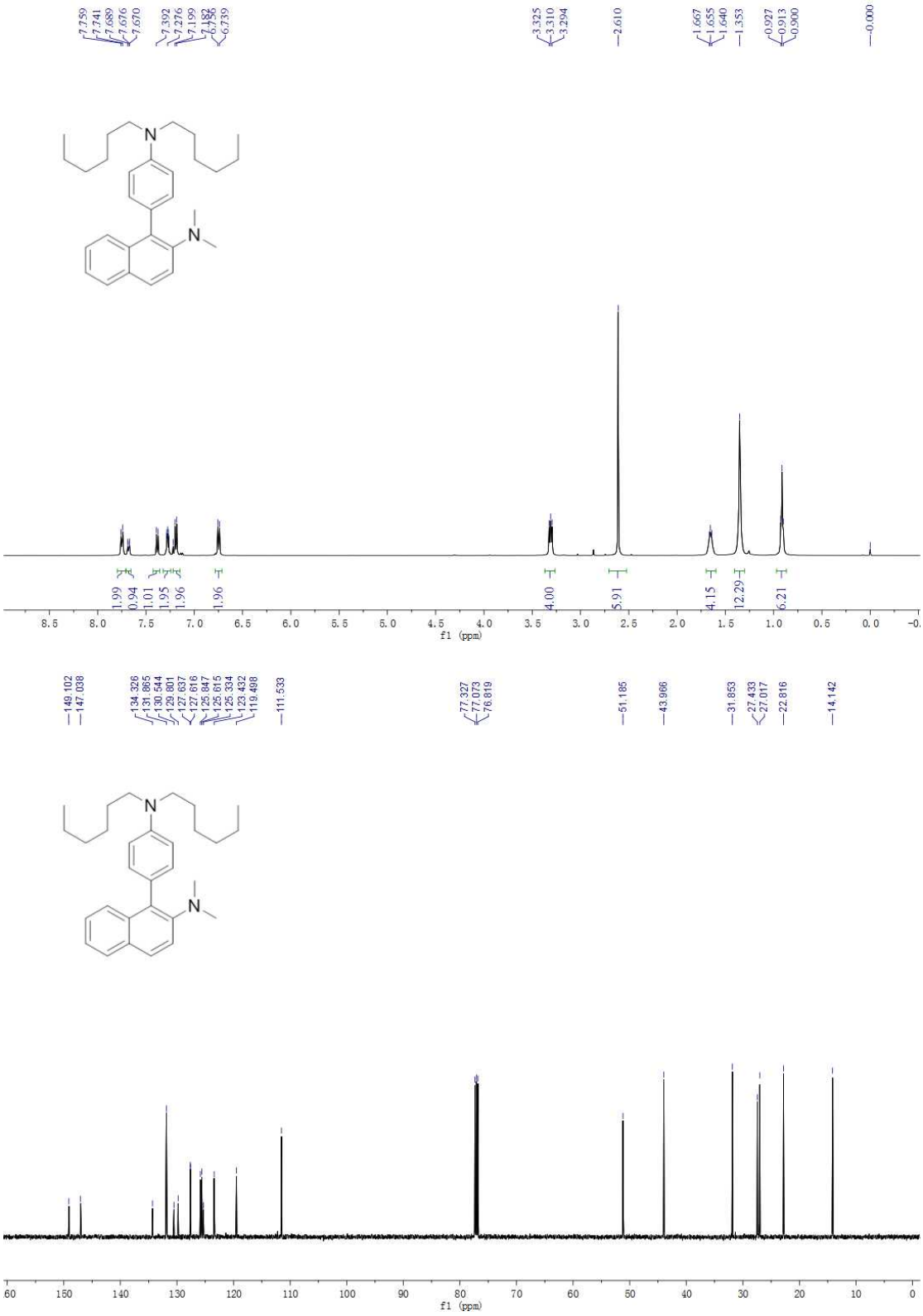
1-(4-(Dimethylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3aa):

1-(4-(Diethylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ab):

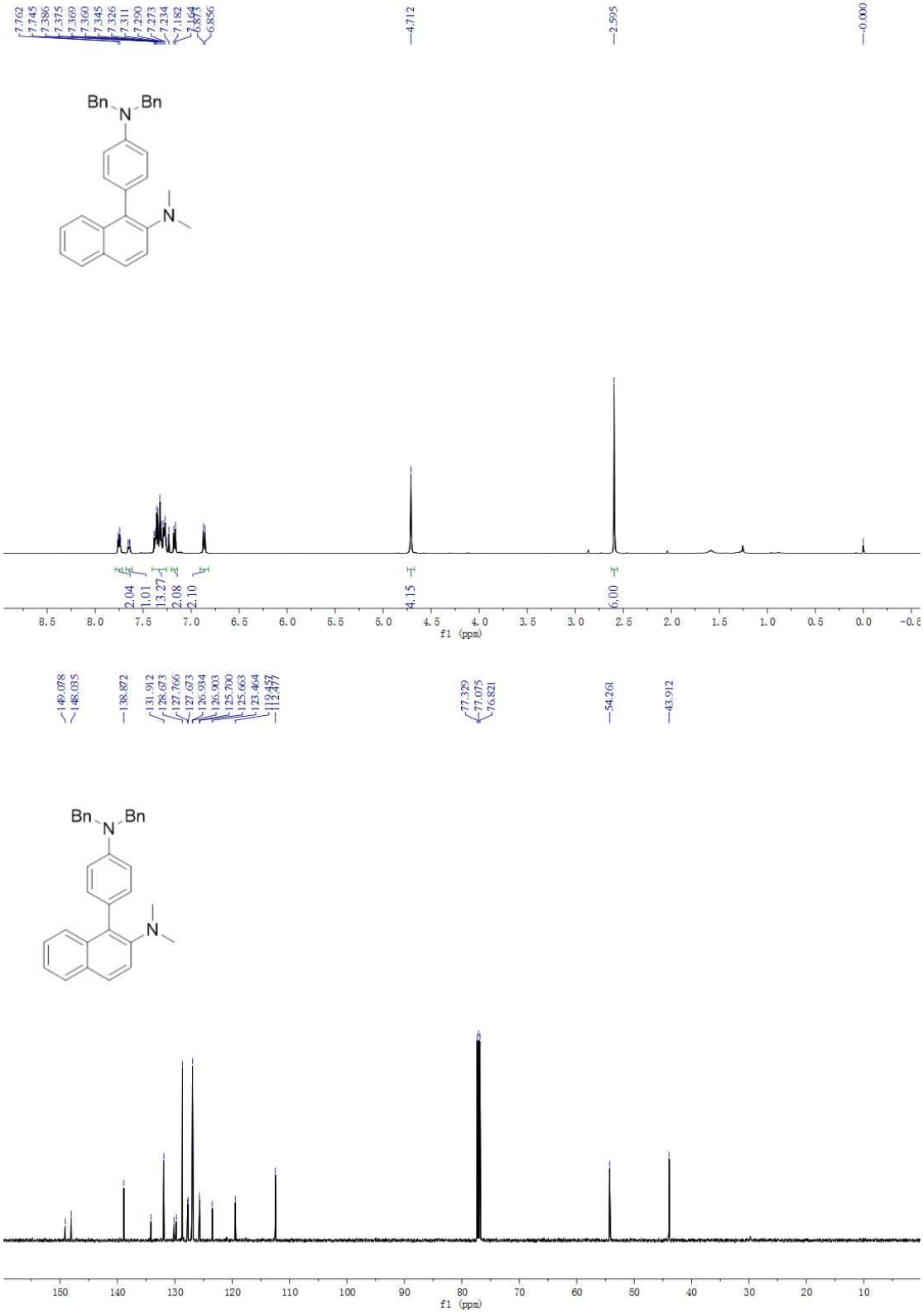




1-(4-(Dihexylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ac):

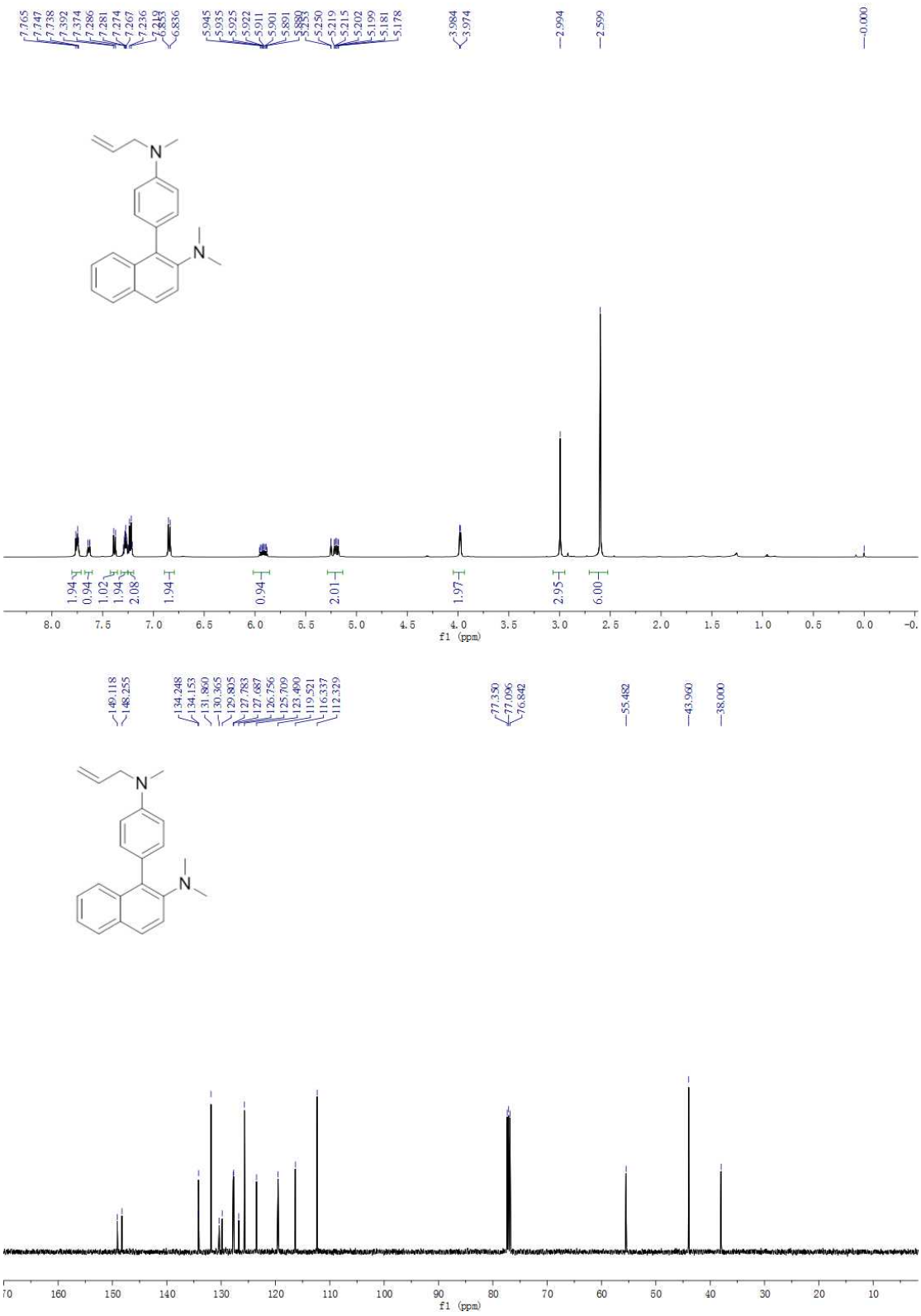


1-(4-(Dibenzylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ad):

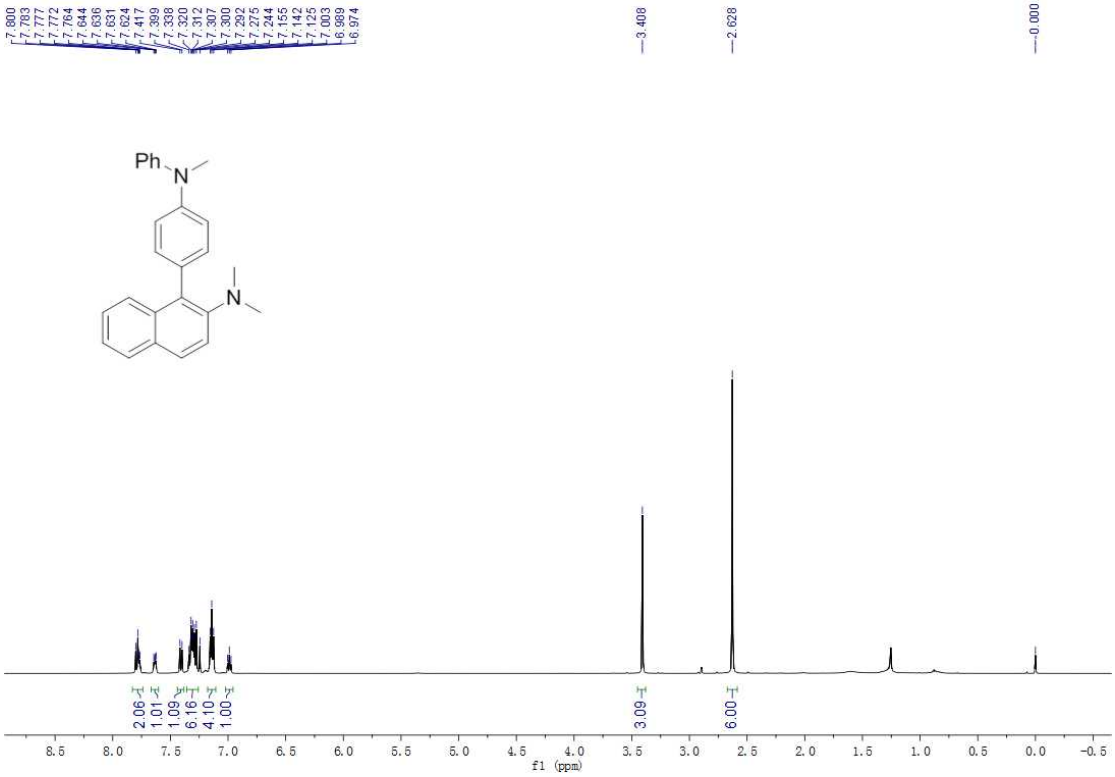


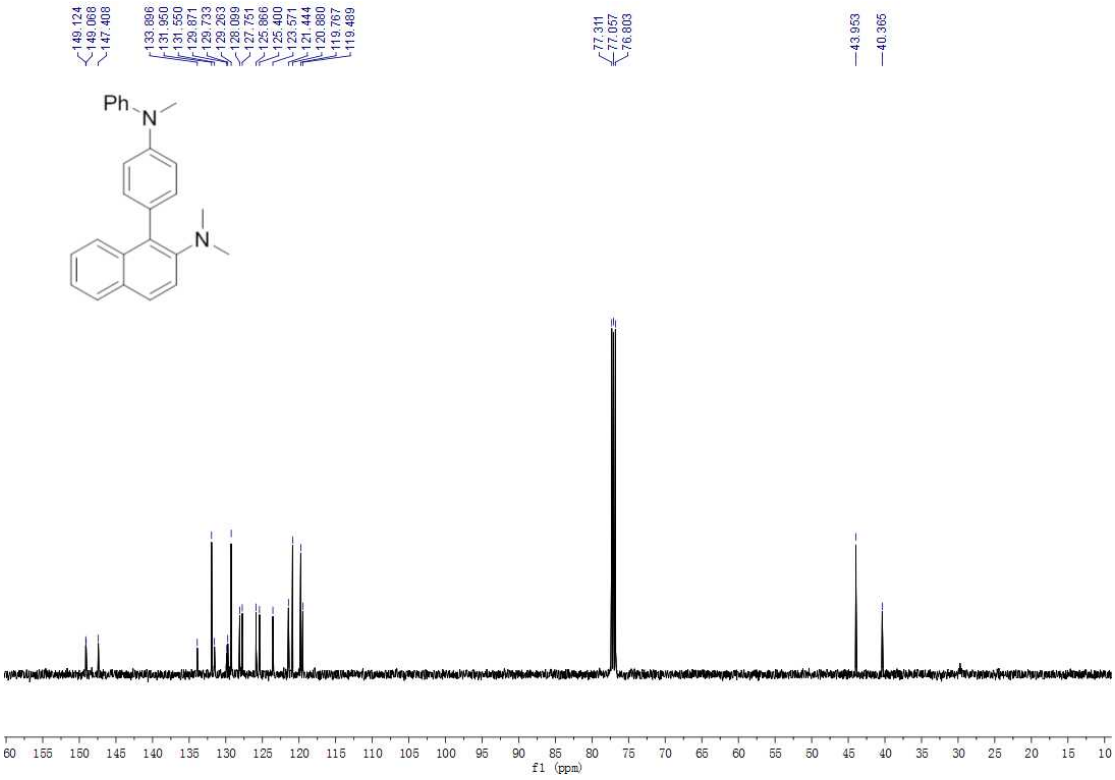
2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethanol (3ae):

1-(4-(Allyl(methyl)amino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3af):

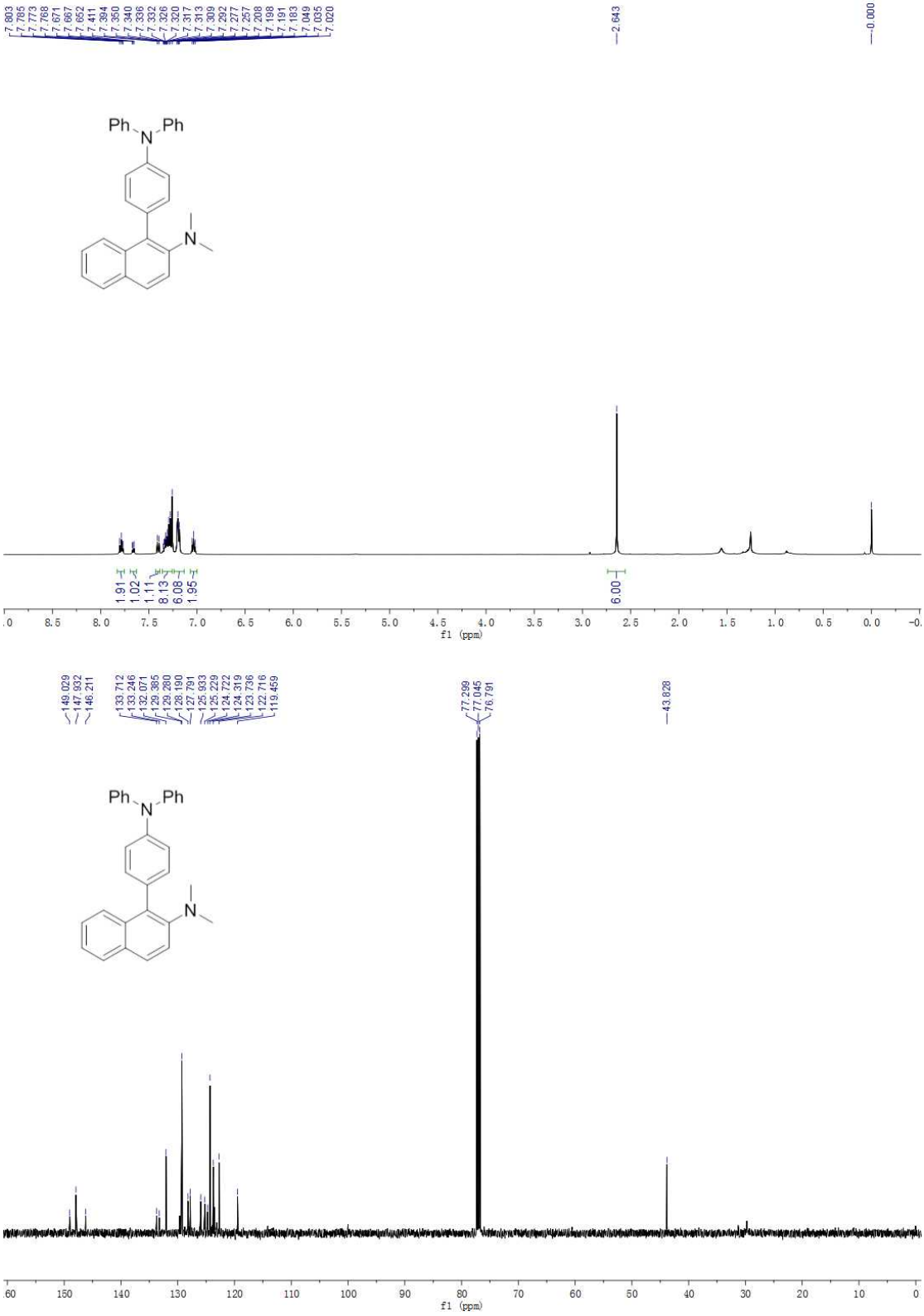


***N*,*N*-Dimethyl-1-(4-(methyl(phenyl)amino)phenyl)naphthalen-2-amine (3ag):**

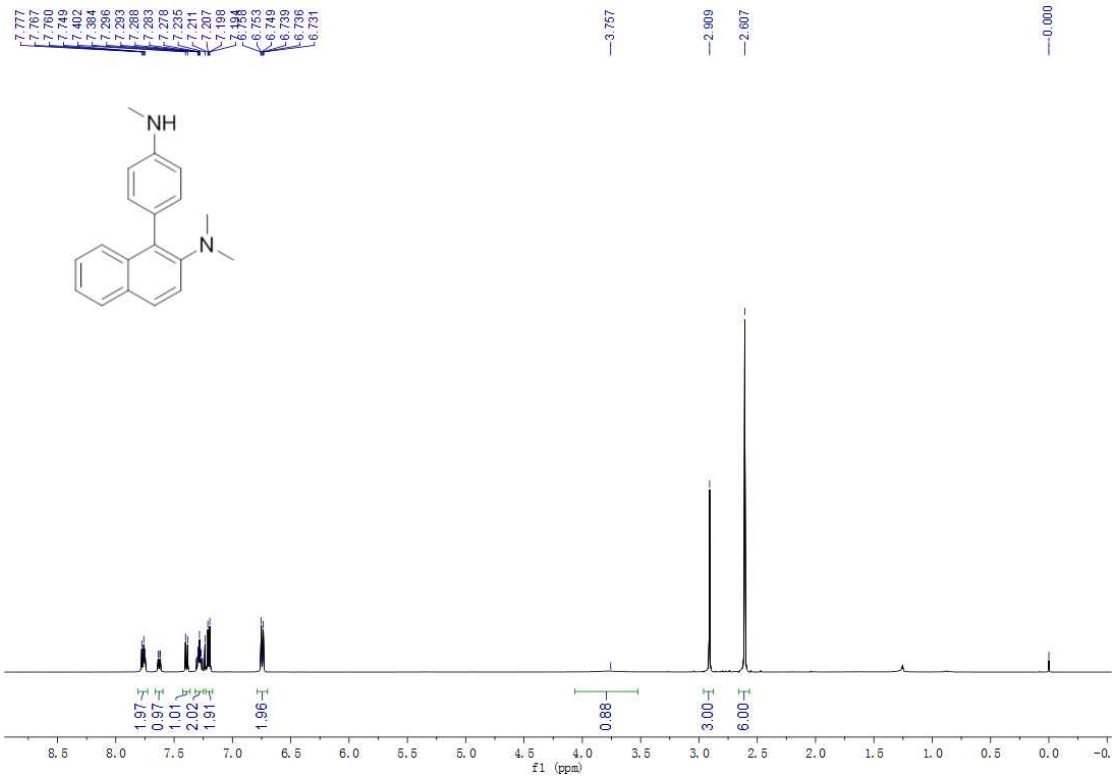


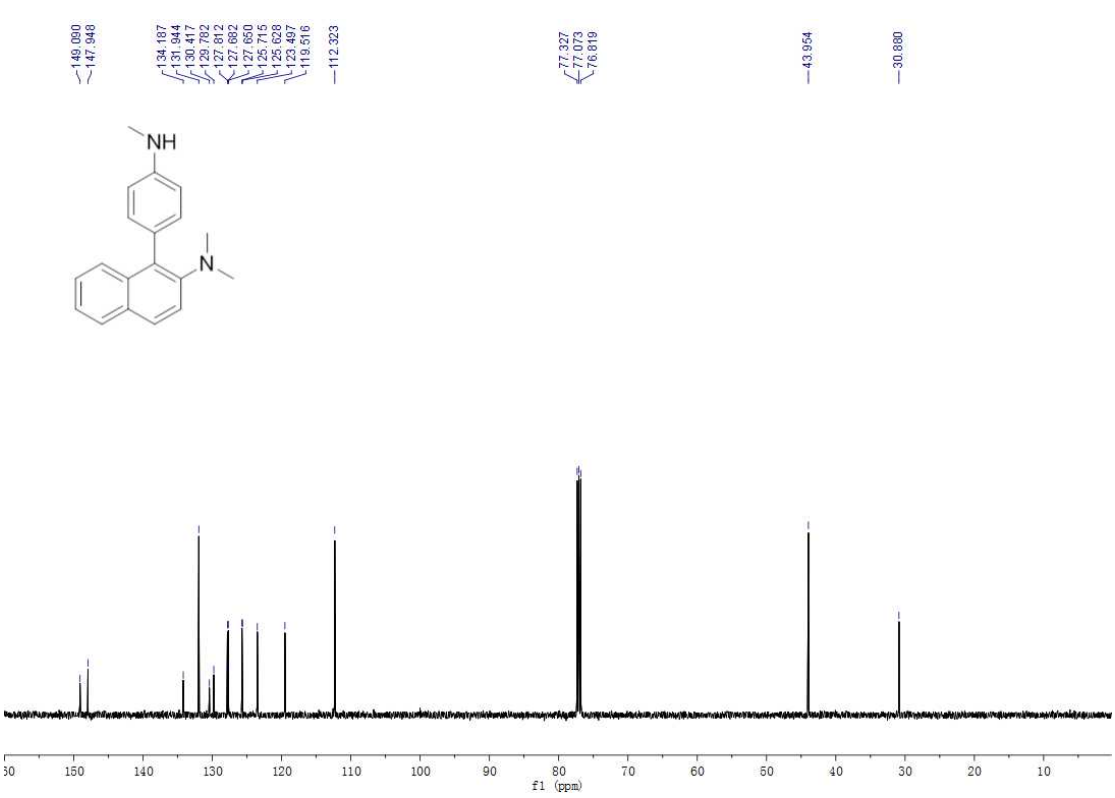


1-(4-(Diphenylamino)phenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ah)

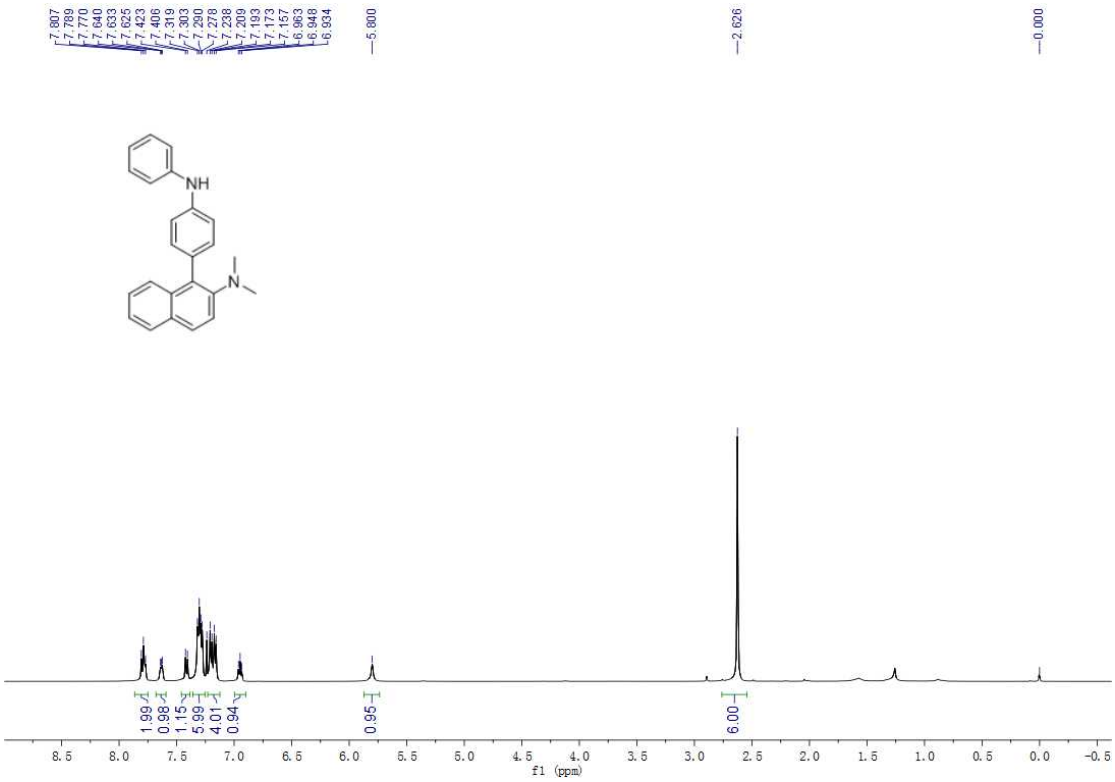


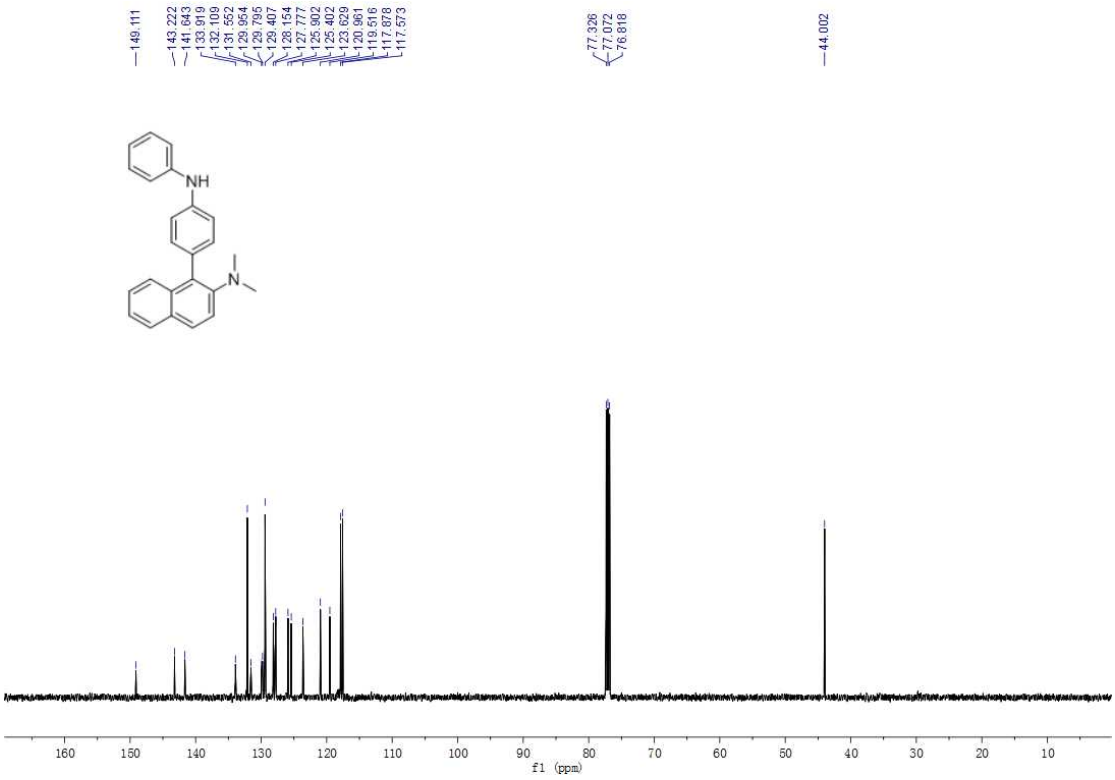
***N*,*N*-Dimethyl-1-(4-(methyl(phenyl)amino)phenyl)naphthalen-2-amine (3ai):**



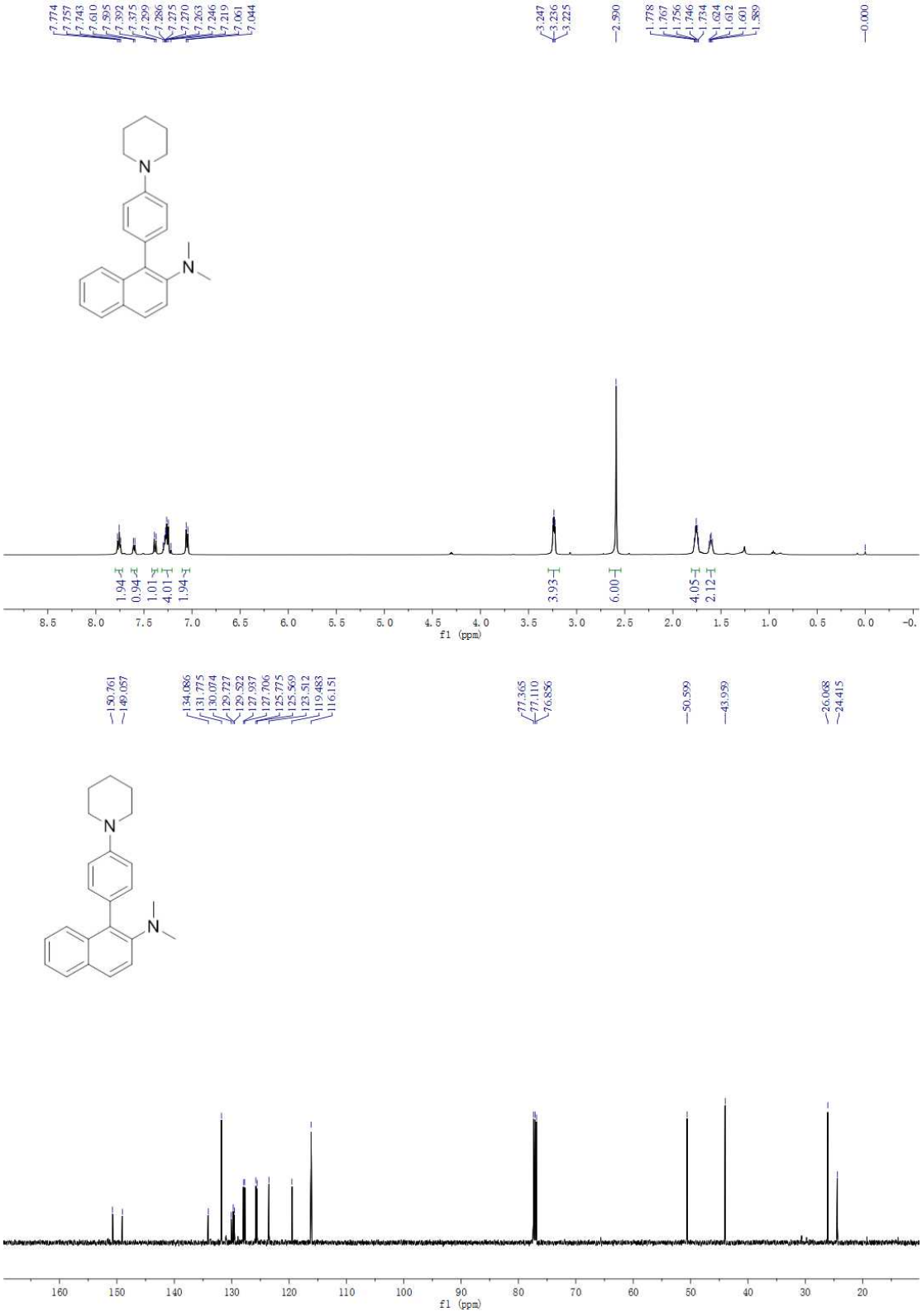


***N*,*N*-Dimethyl-1-(4-(phenylamino)phenyl)naphthalen-2-amine (3aj):**

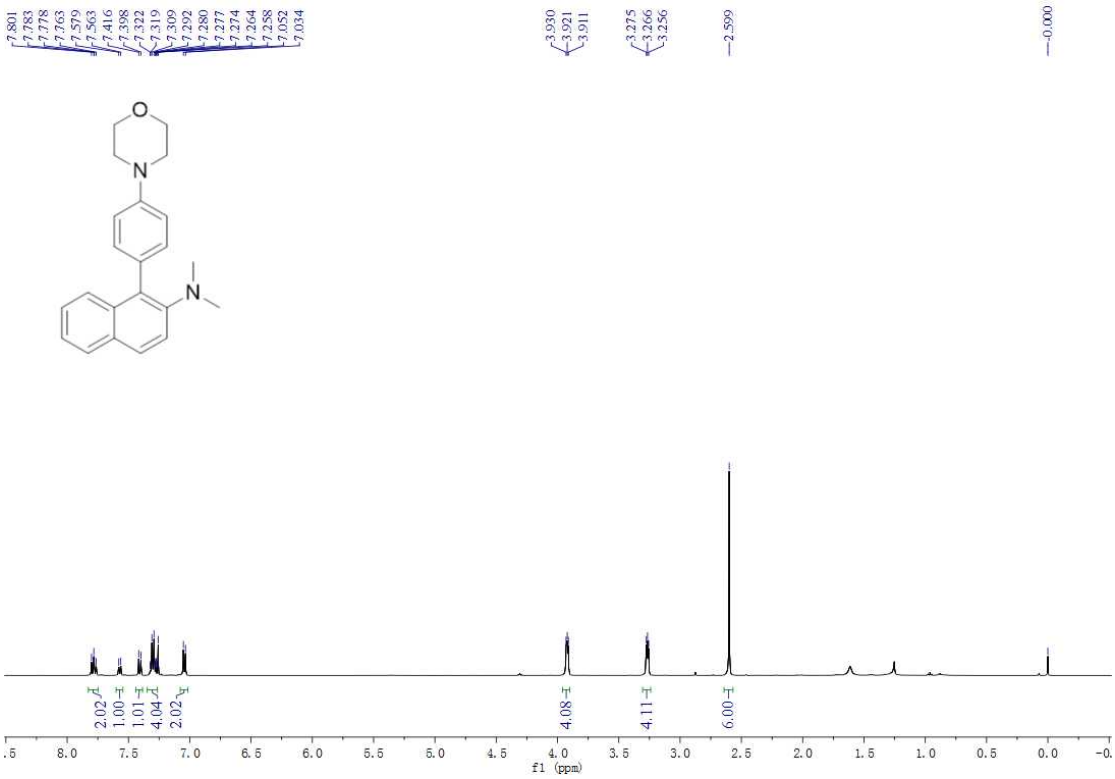


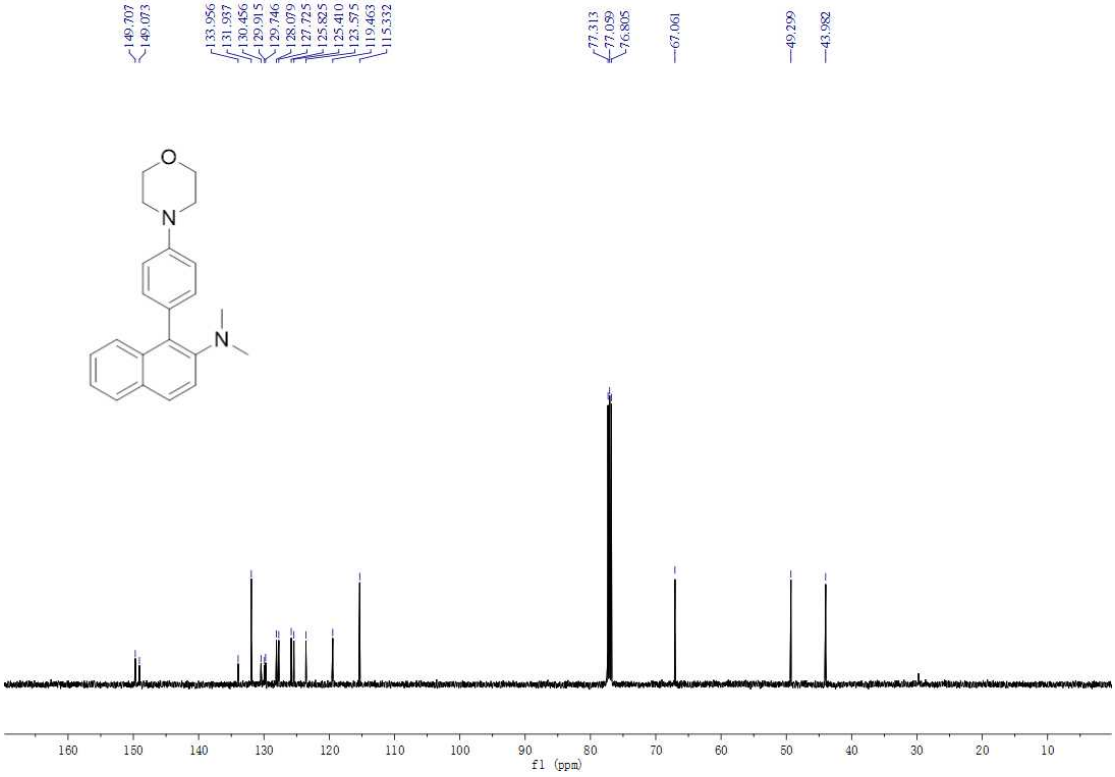


***N*,*N*-Dimethyl-1-(4-(piperidin-1-yl)phenyl)naphthalen-2-amine (3al):**

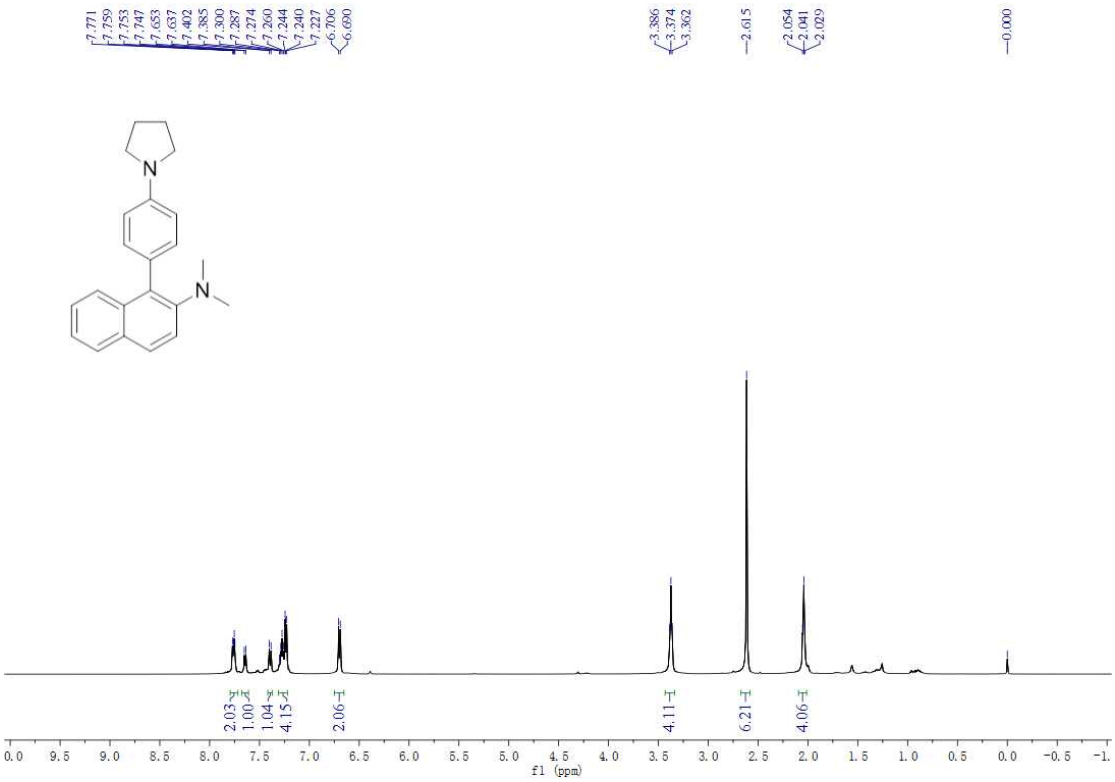


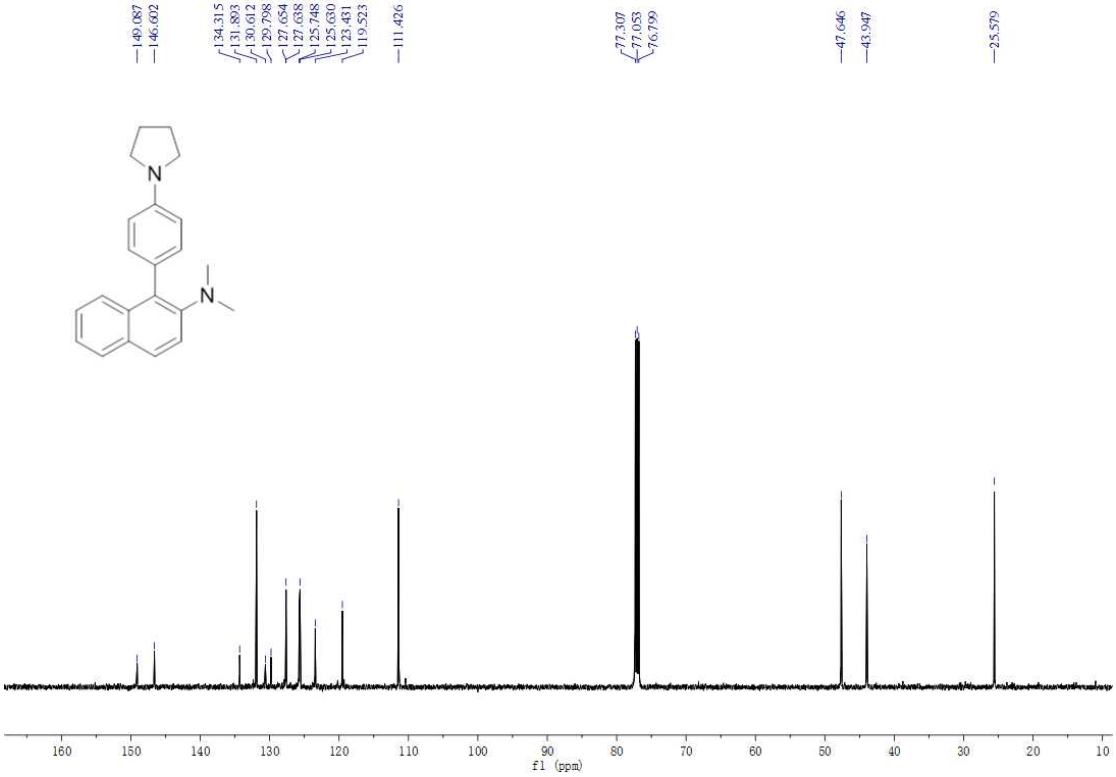
***N*,*N*-Dimethyl-1-(4-morpholinophenyl)naphthalen-2-amine (3am):**





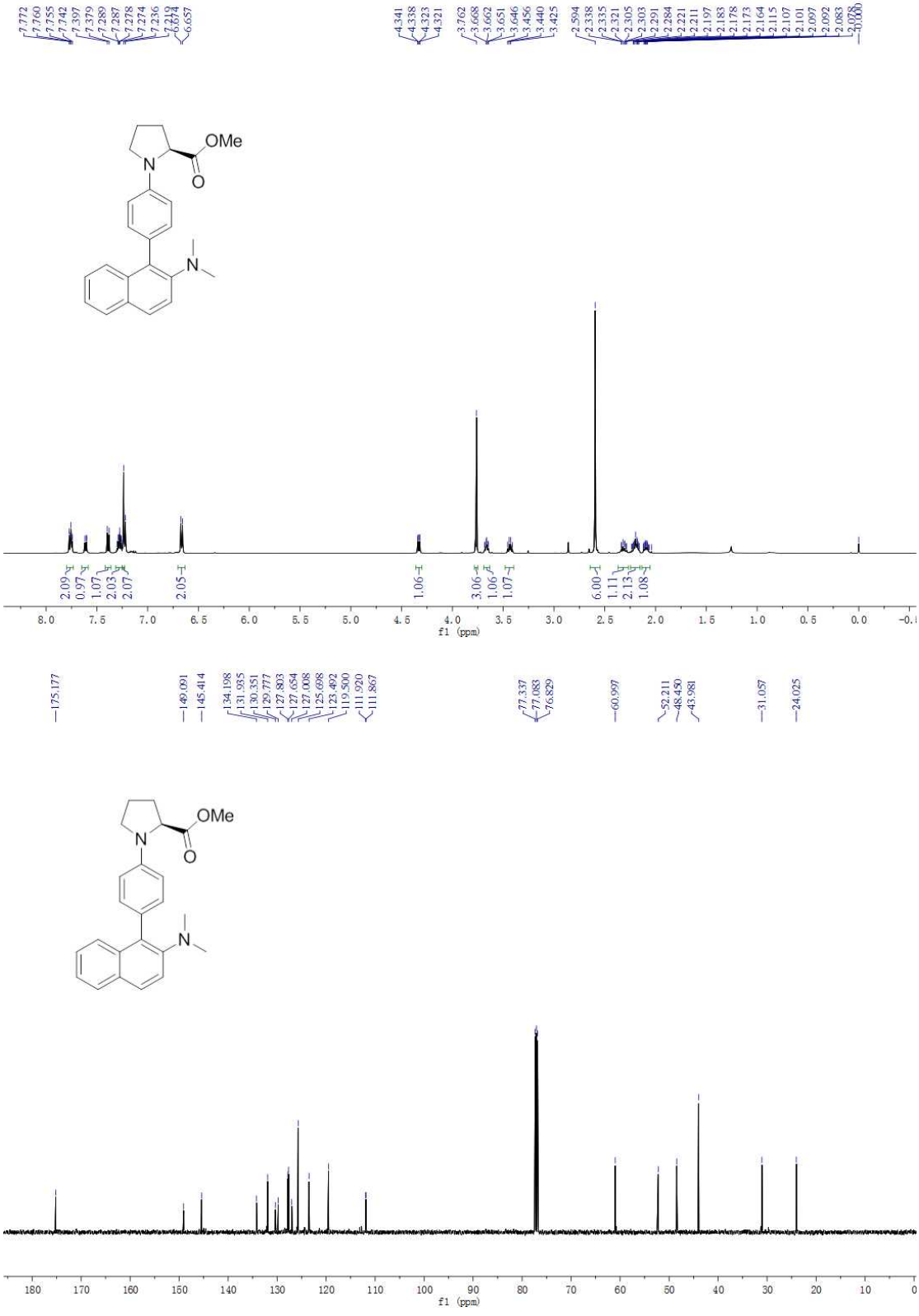
***N,N*-Dimethyl-1-(4-(pyrrolidin-1-yl)phenyl)naphthalen-2-amine(3an):**



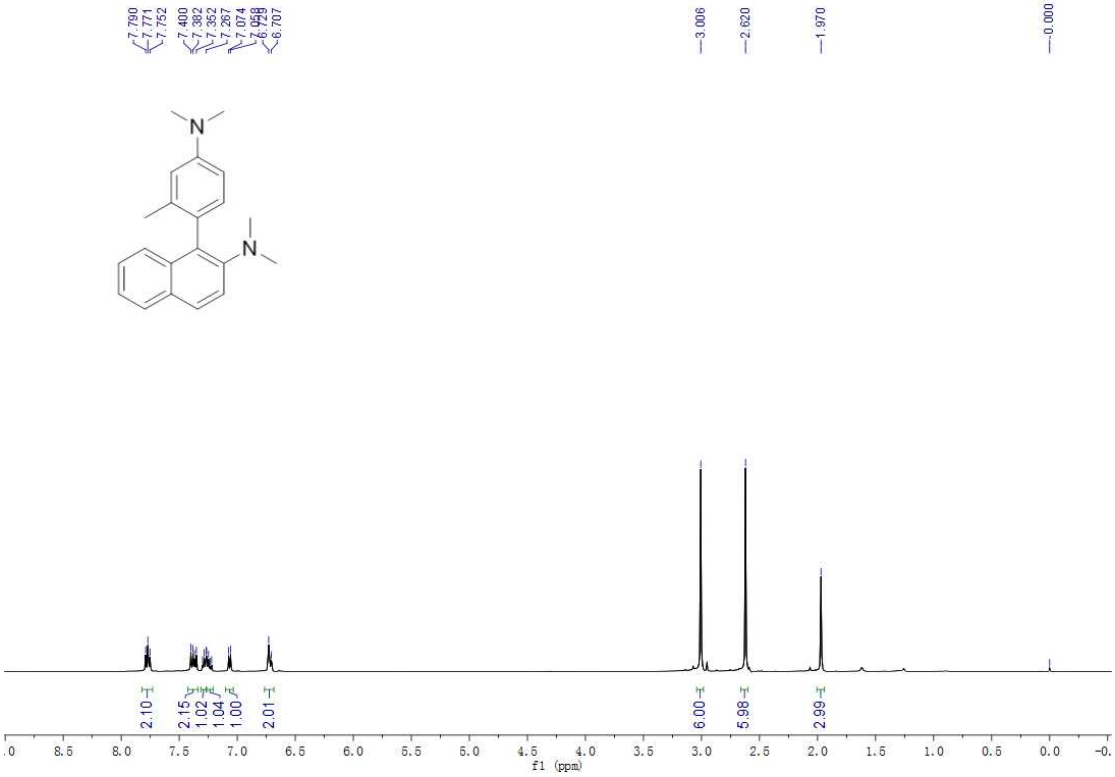


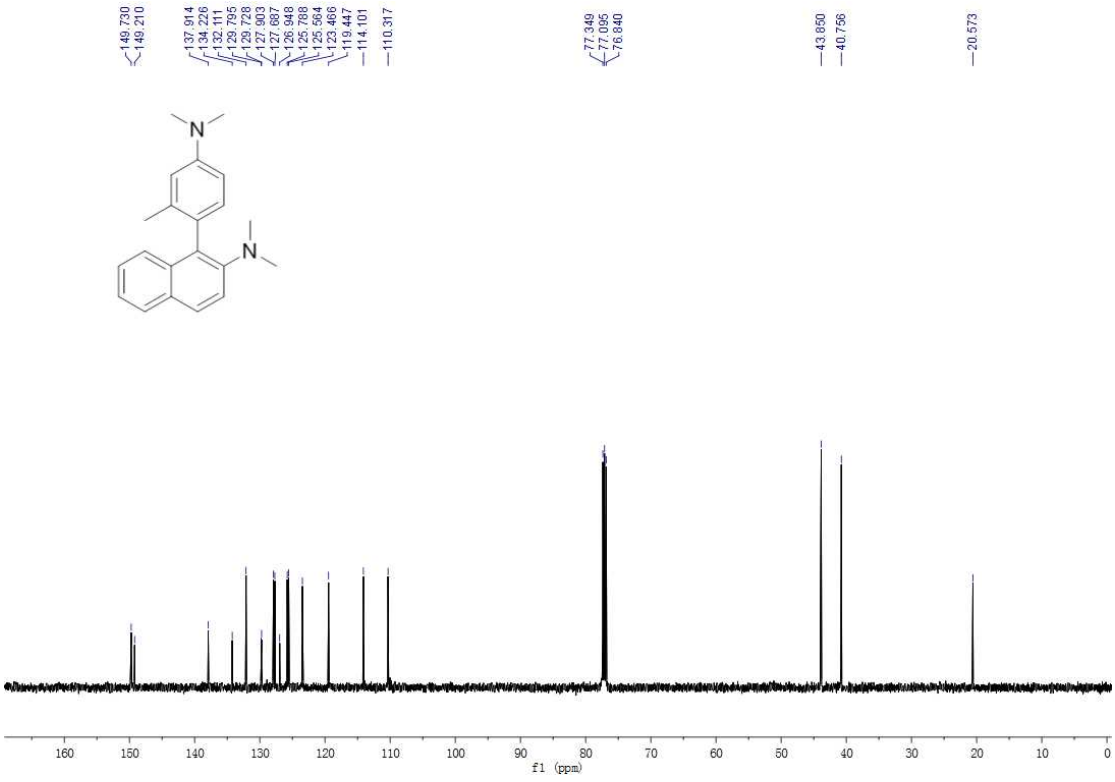
(S)-Methyl-1-(4-(2-(dimethylamino)naphthalen-1-yl)phenyl)pyrrolidine-2-carbox

ylate (3ao):



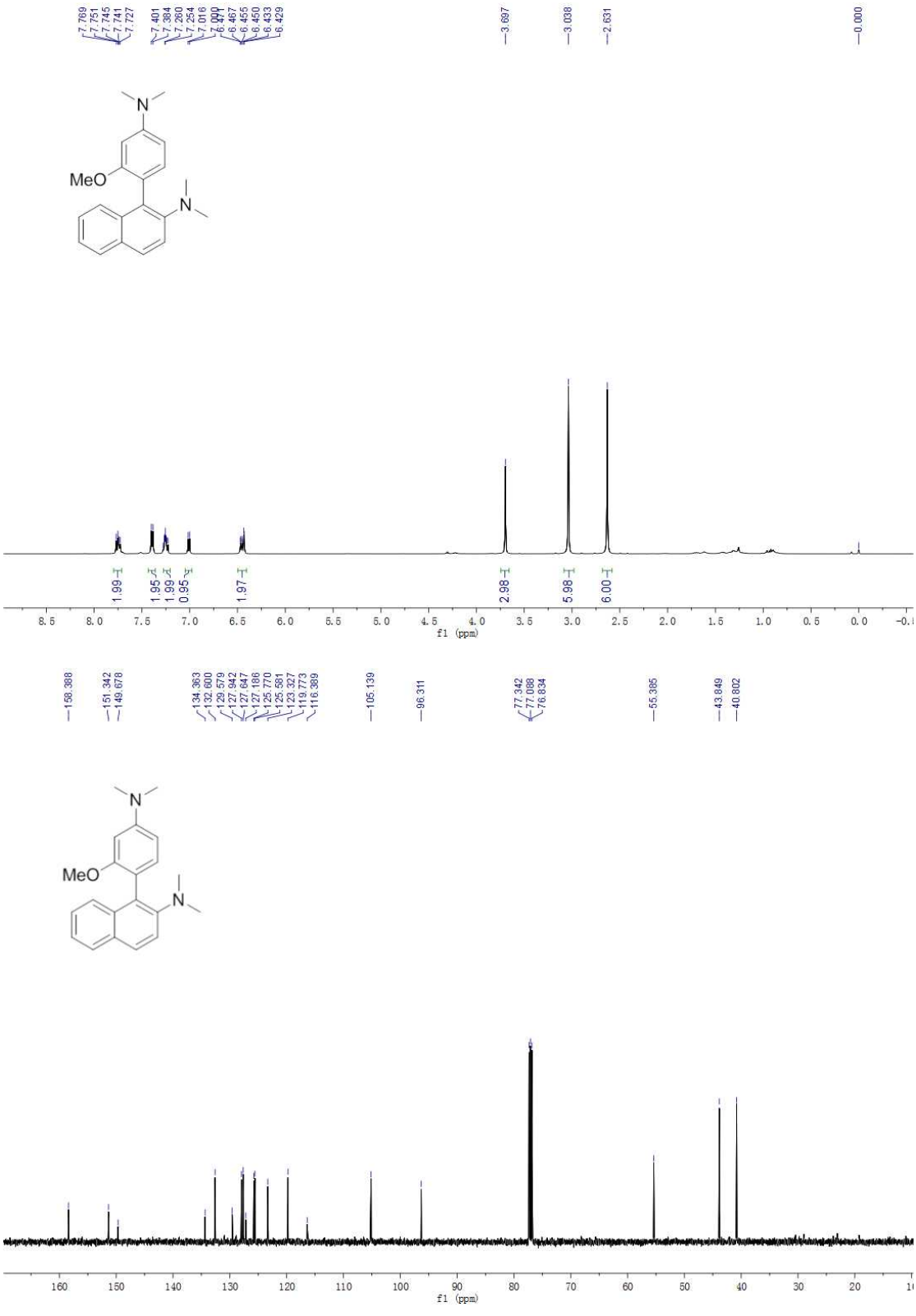
1-(4-(Dimethylamino)-2-methylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ap):



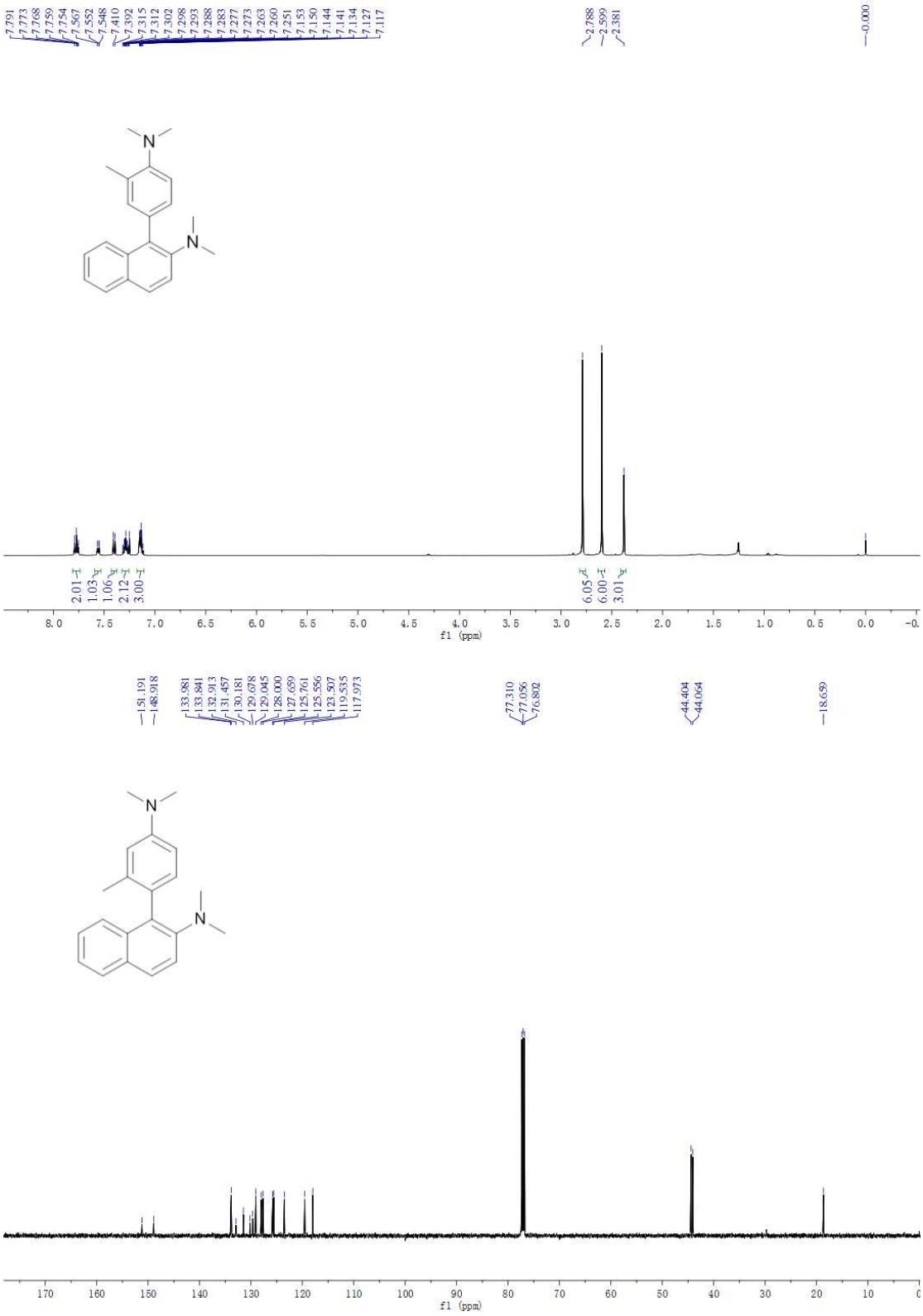


1-(4-(Dimethylamino)-2-methoxyphenyl)-*N*,*N*-dimethylnaphthalen-2-amine

(3aq):

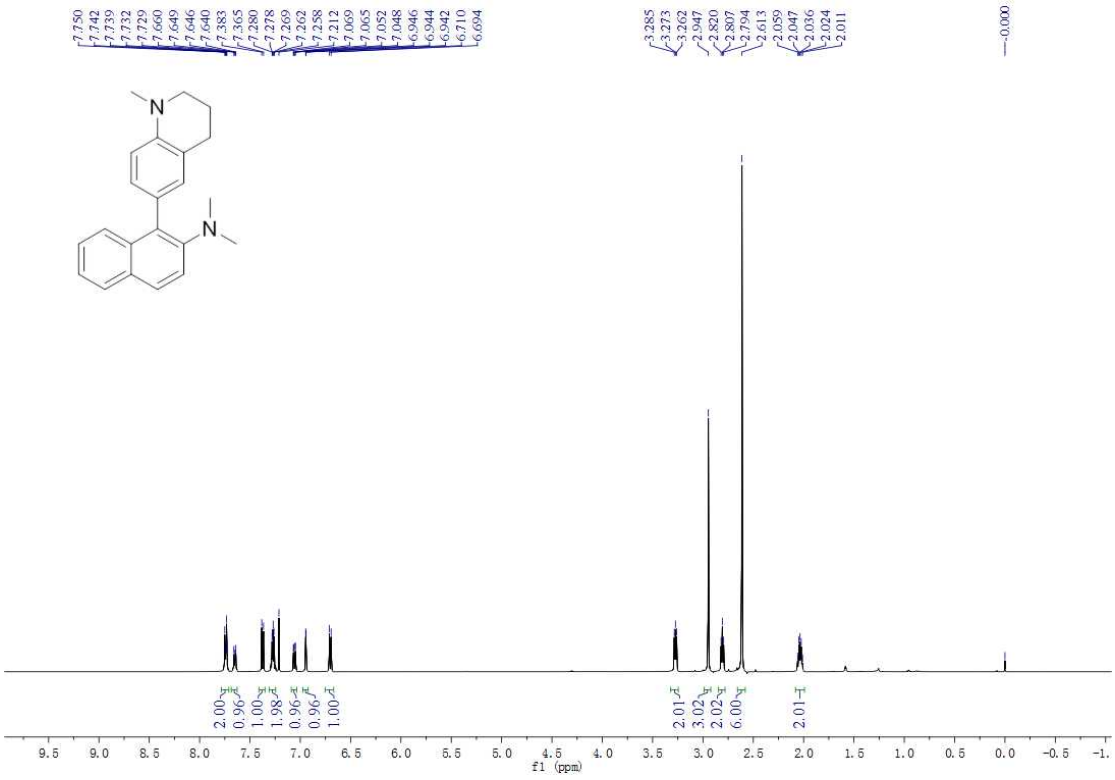


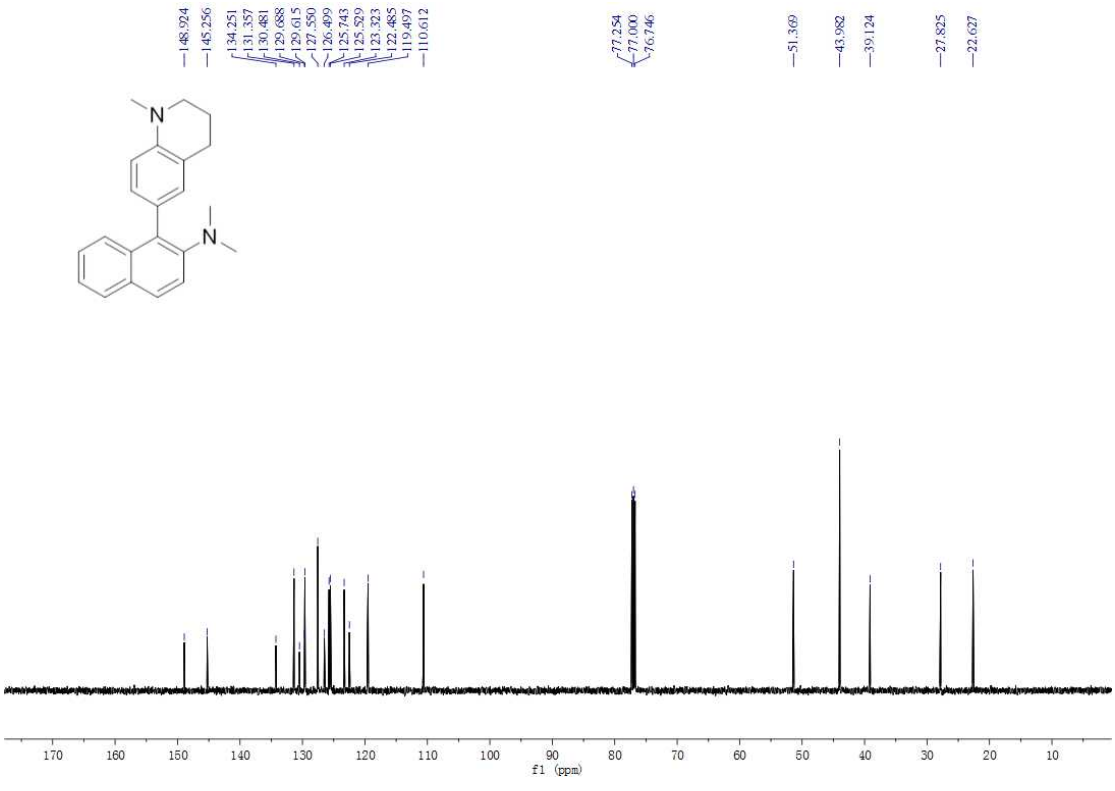
1-(4-(Dimethylamino)-3-methylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3ar):



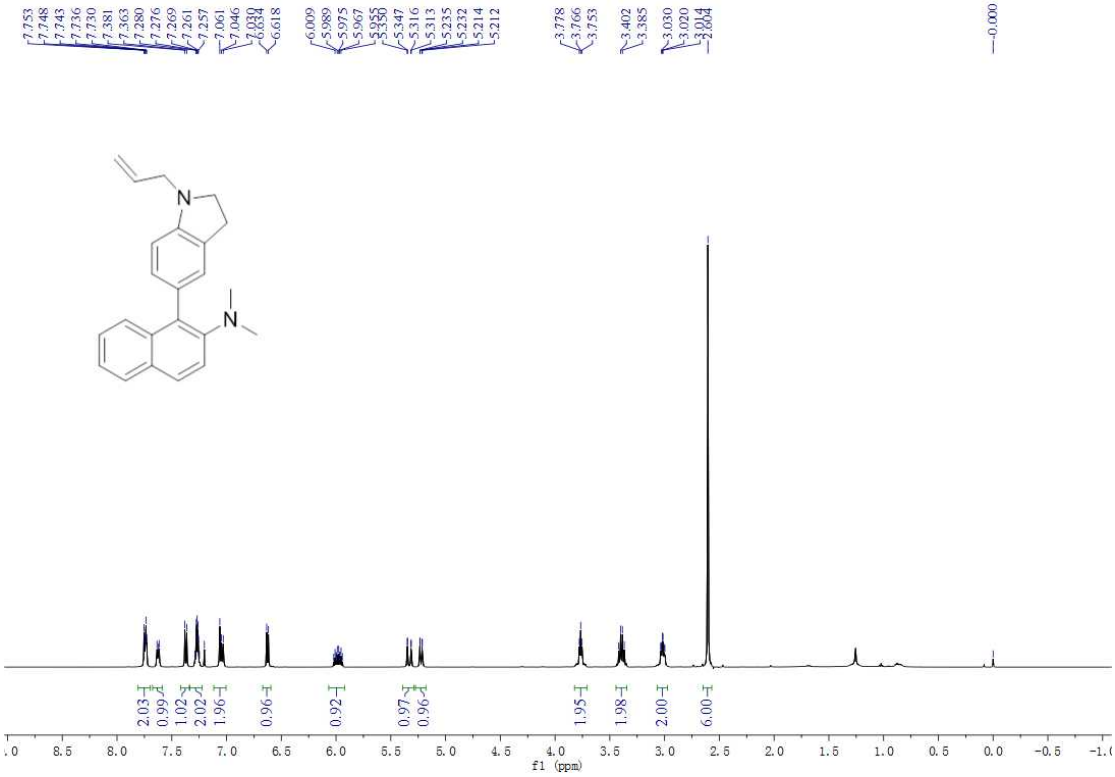
***N*,*N*-Dimethyl-1-(1-methyl-1,2,3,4-tetrahydroquinolin-6-yl)naphthalen-2-amine**

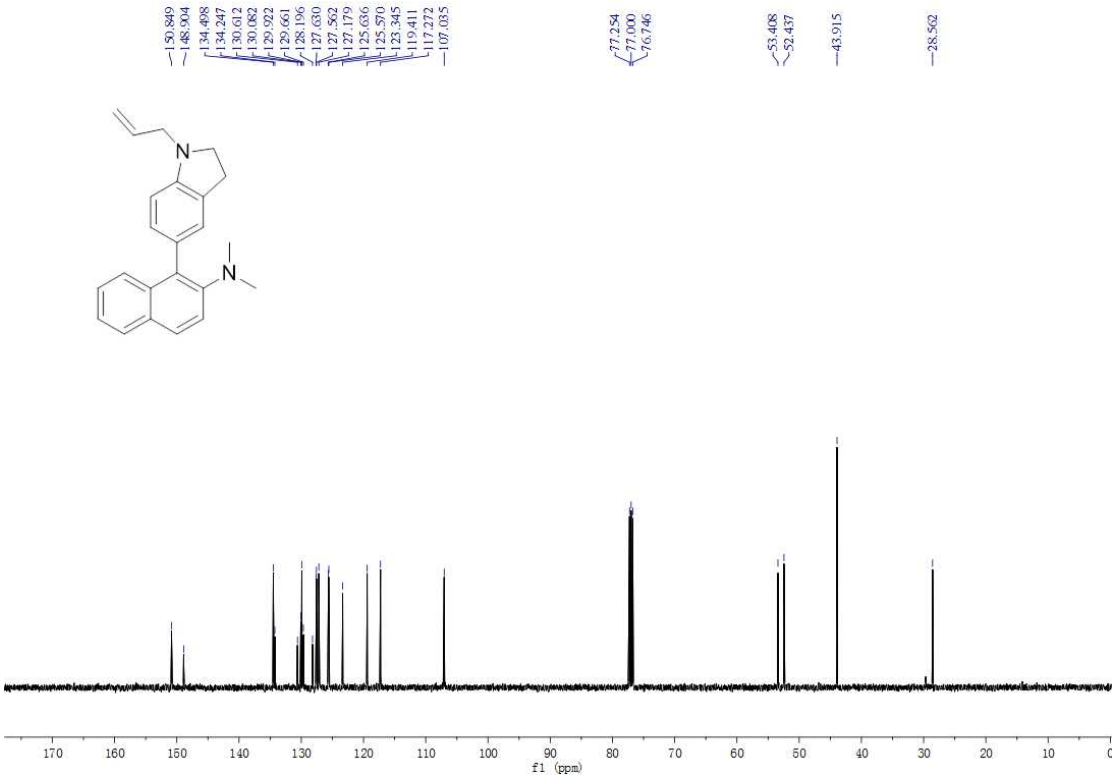
(3as):



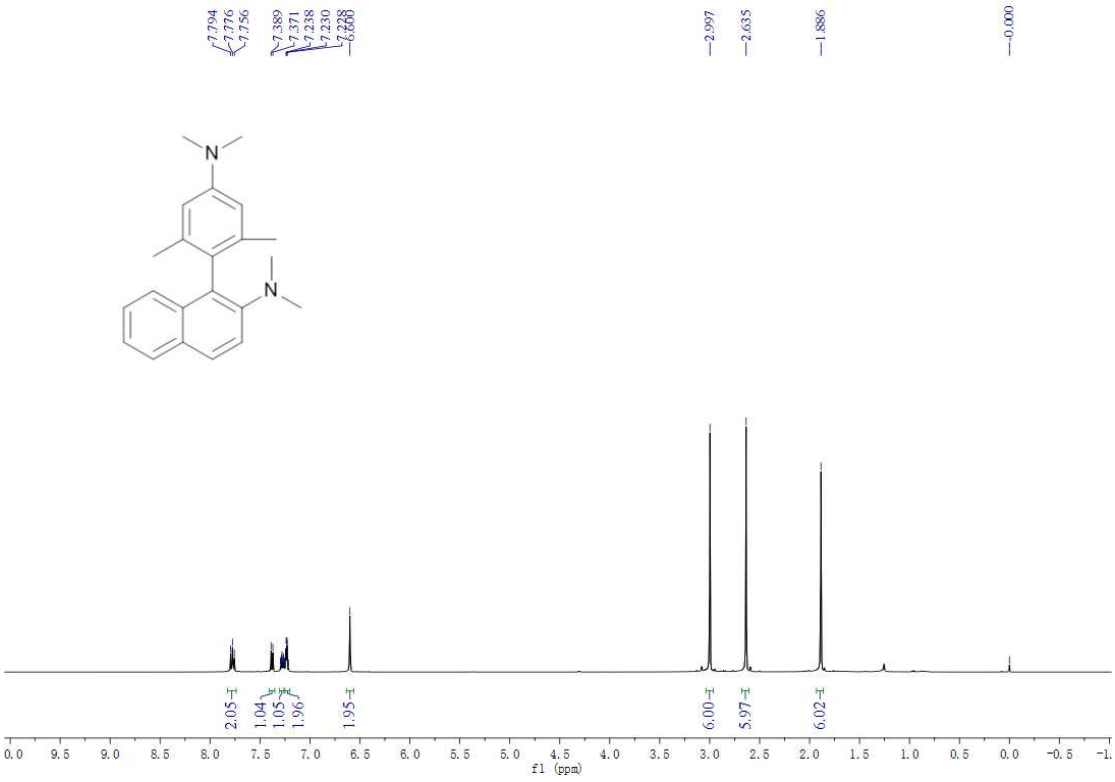


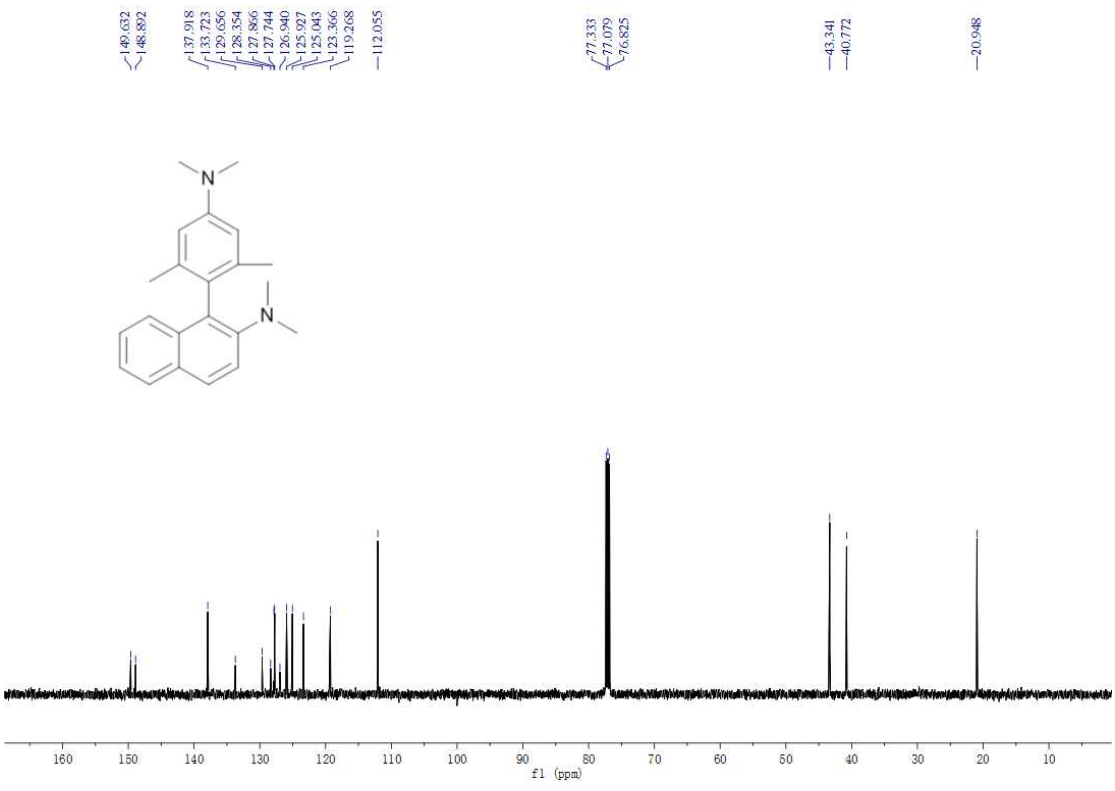
1-(1-Allylindolin-5-yl)-N,N-dimethylnaphthalen-2-amine (3at):



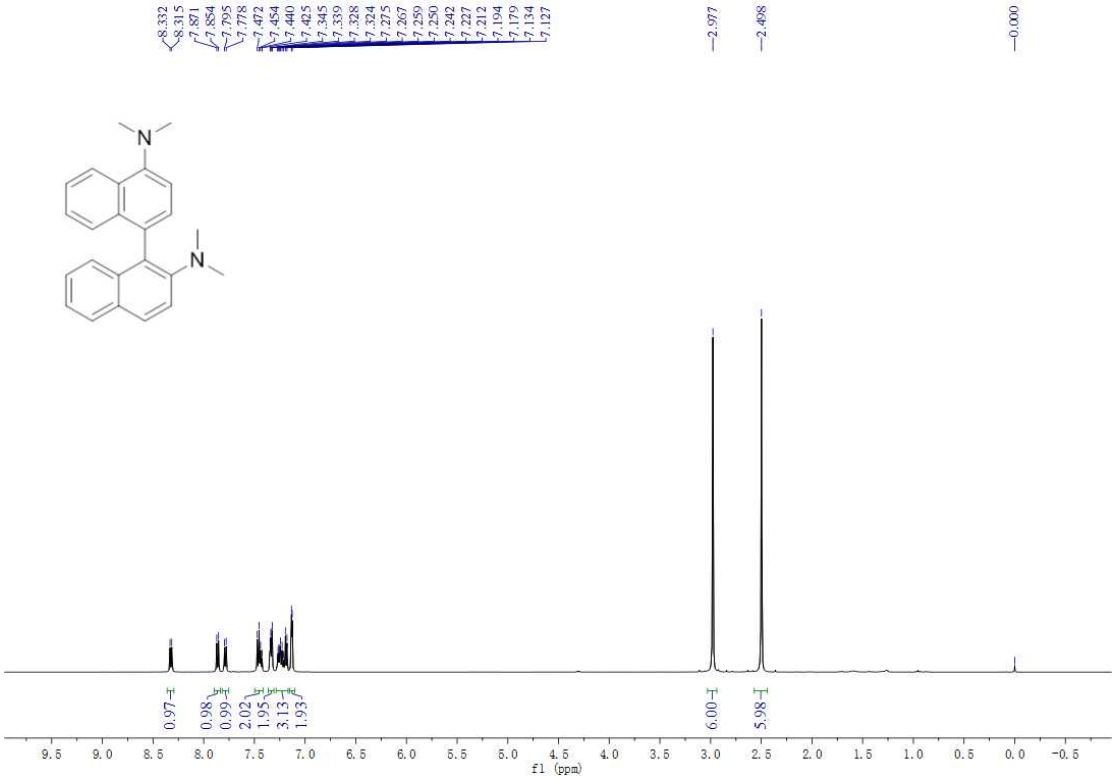


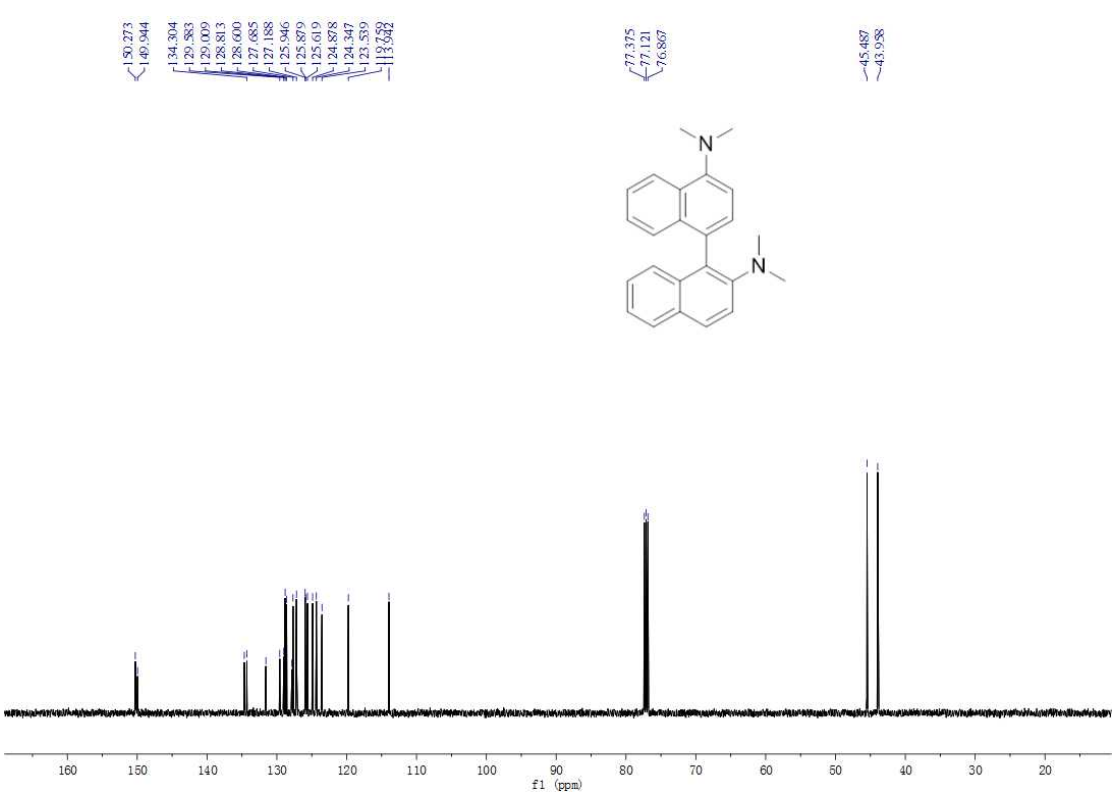
1-(4-(Dimethylamino)-2,6-dimethylphenyl)-*N*,*N*-dimethylnaphthalen-2-amine (3au):



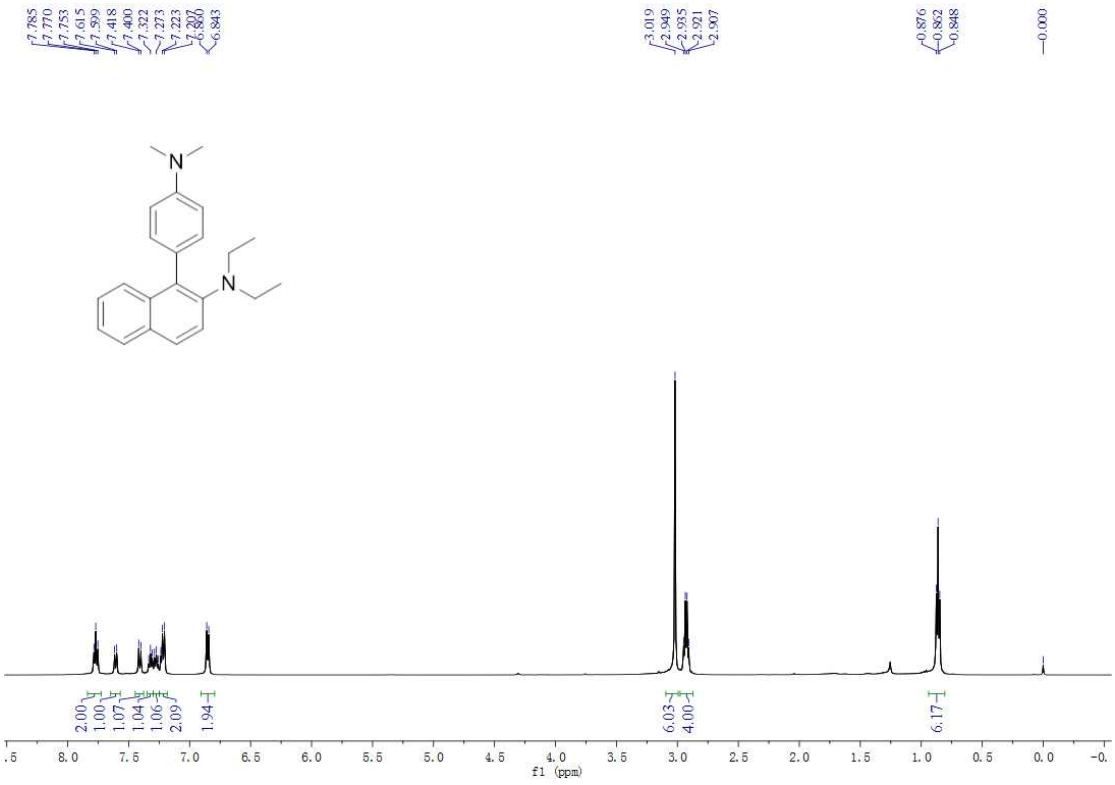


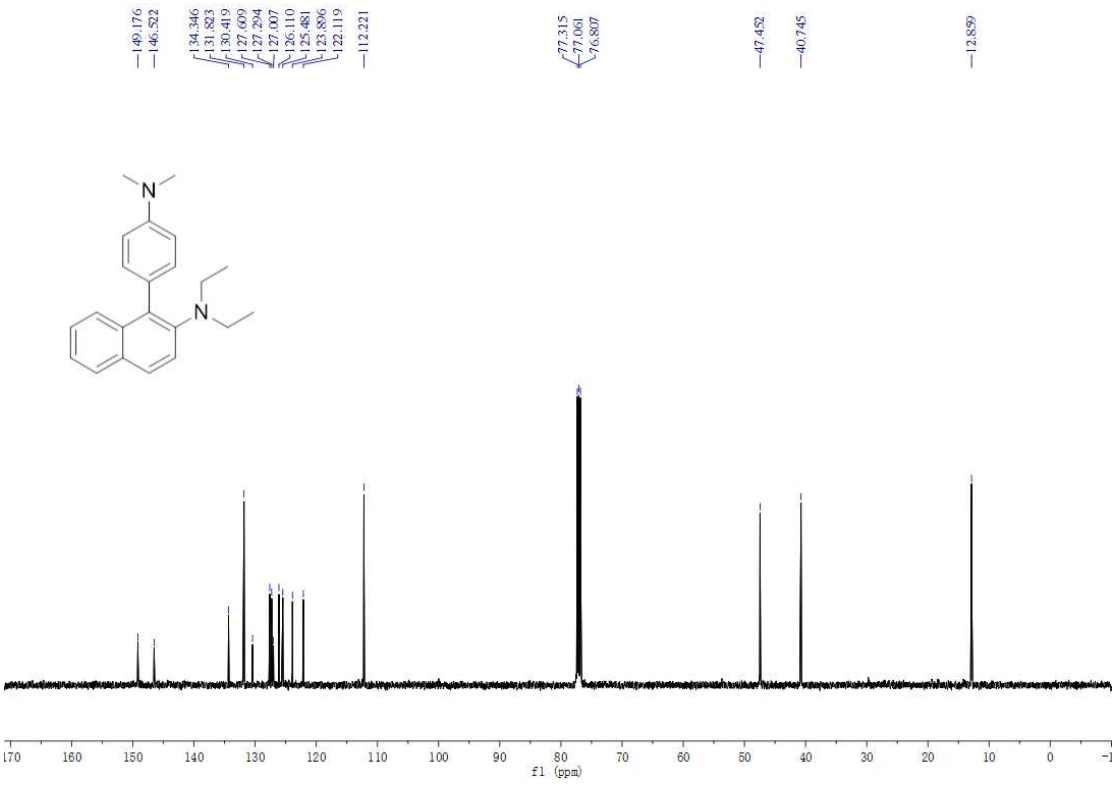
N^2,N^2,$N^{4'}$,$N^{4'}$-Tetramethyl-[1,1'-binaphthalene]-2,4'-diamine (3av):



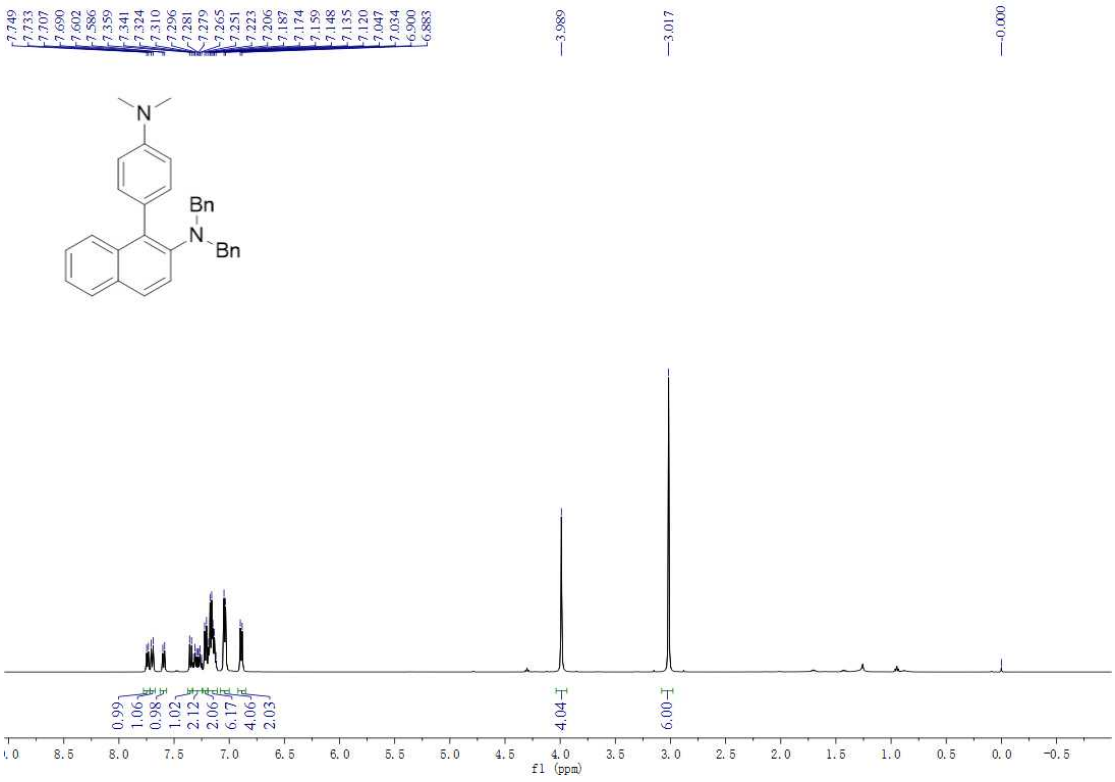


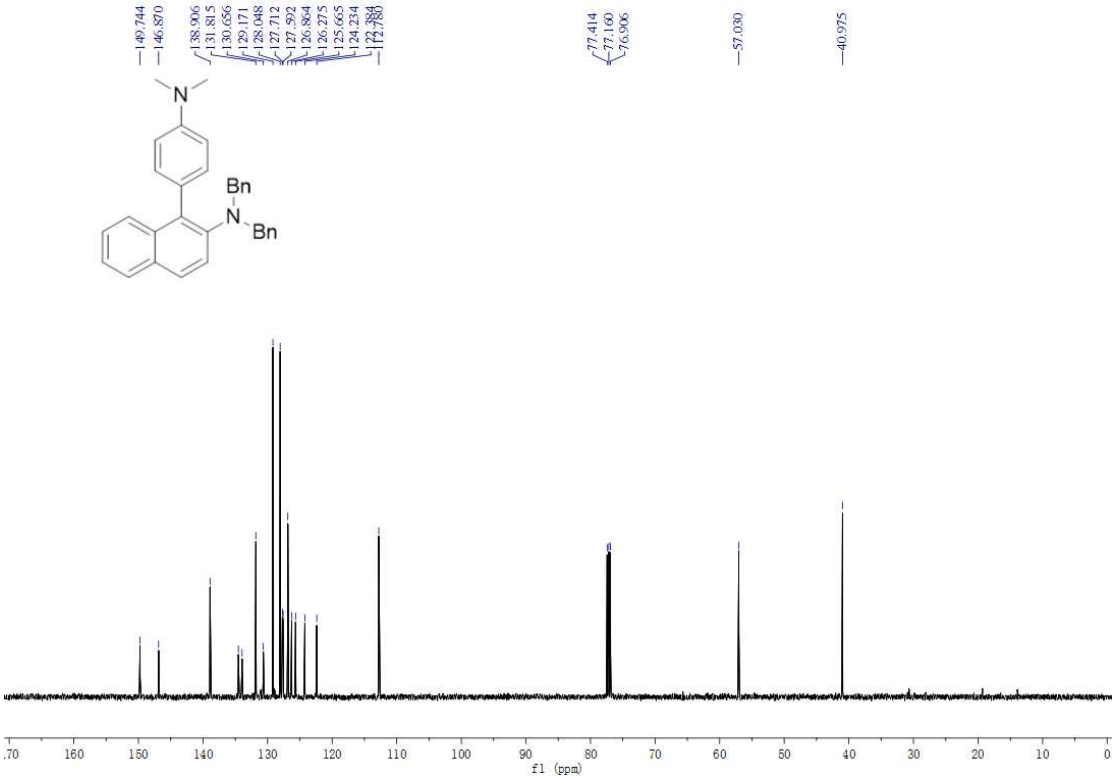
1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethylnaphthalen-2-amine (3ba):



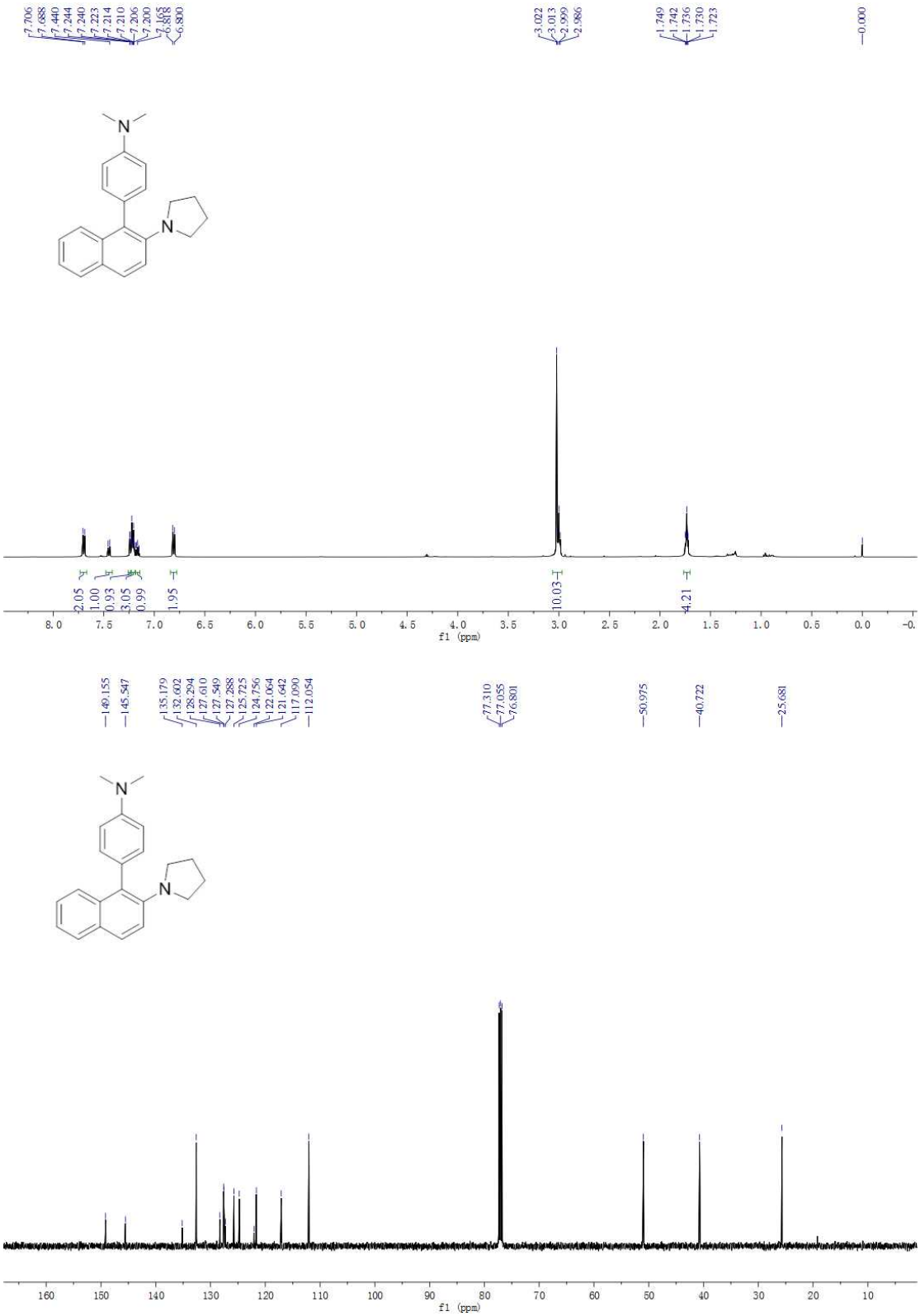


***N*,*N*-Dibenzyl-1-(4-(dimethylamino)phenyl)naphthalen-2-amine (3ca):**

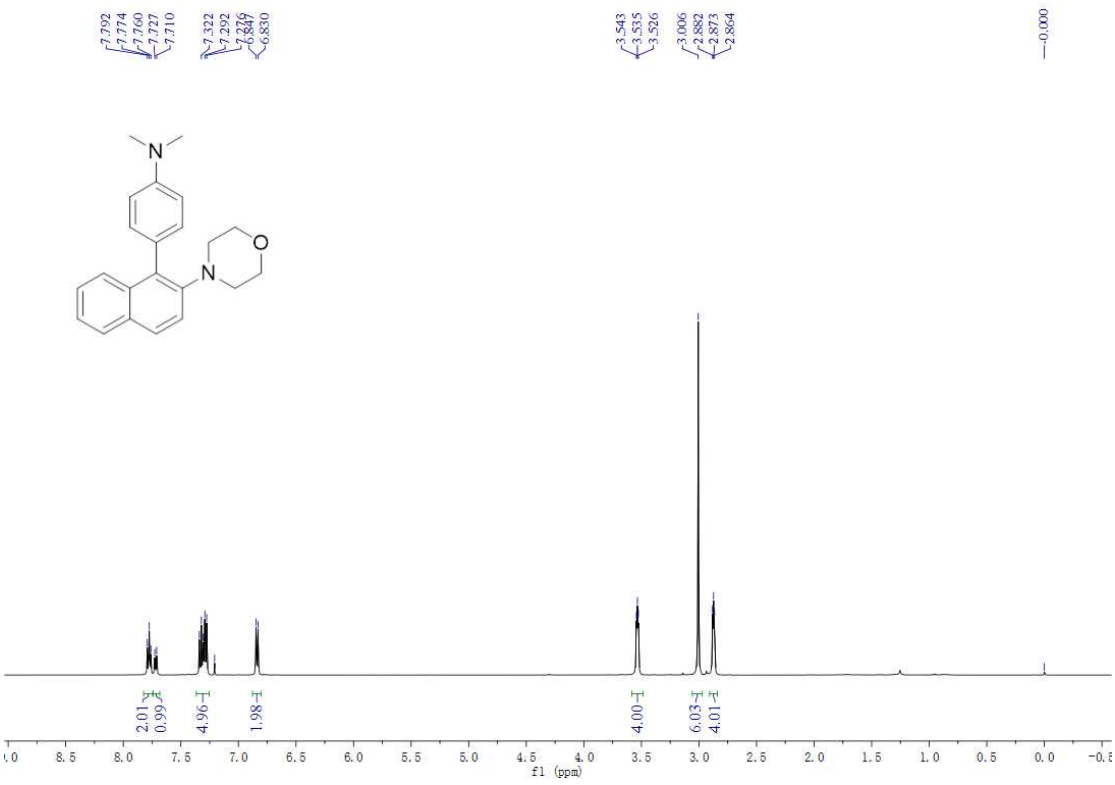


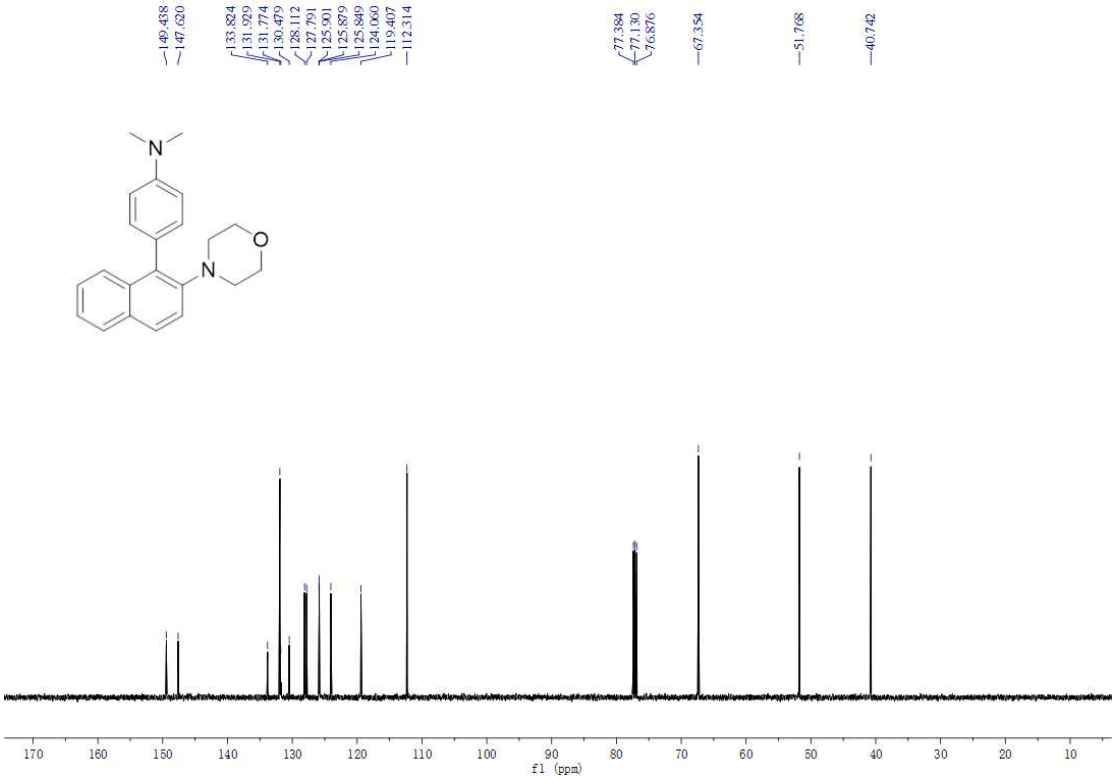


***N*,*N*-Dimethyl-4-(2-(pyrrolidin-1-yl)naphthalen-1-yl)aniline (3da):**

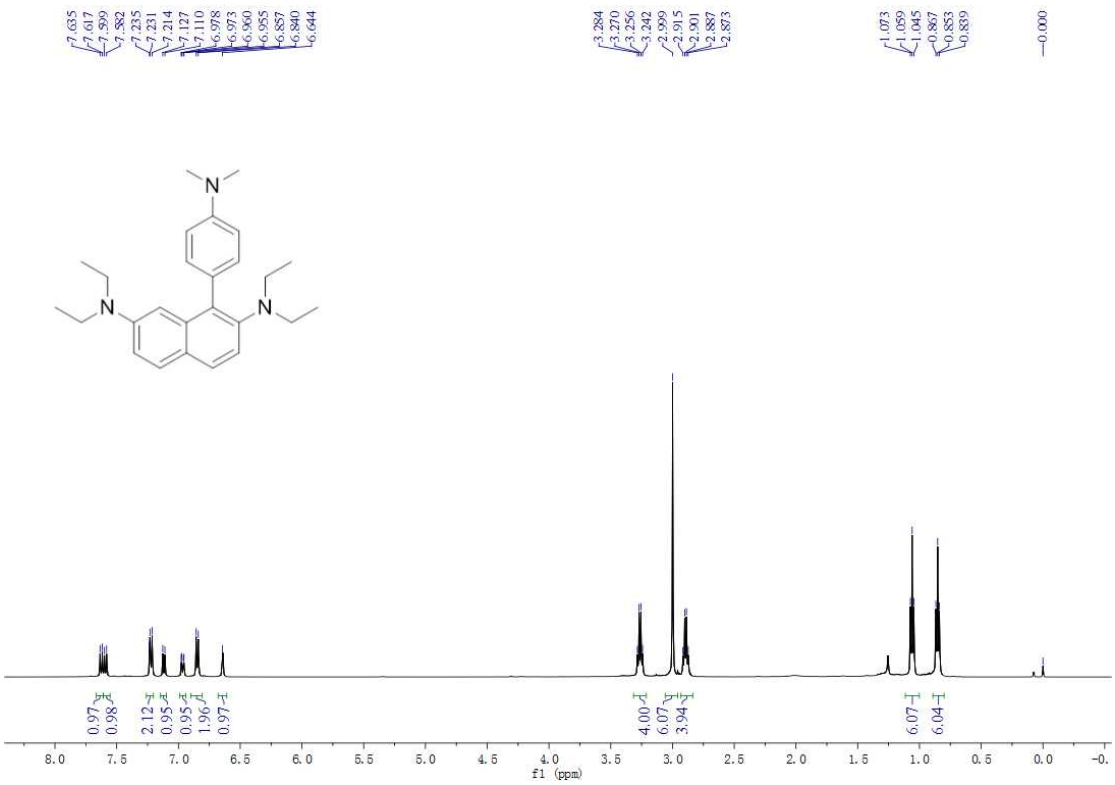


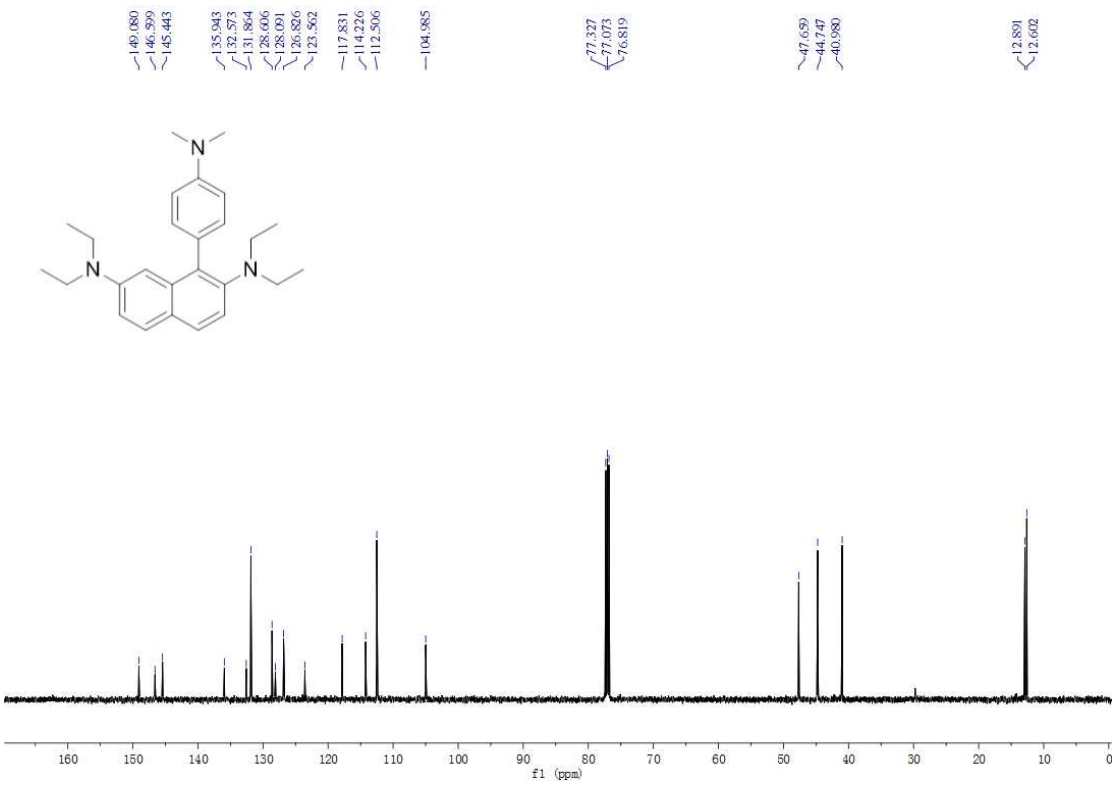
_N_,_N_-Dimethyl-4-(2-morpholinonaphthalen-1-yl)aniline (3ea):



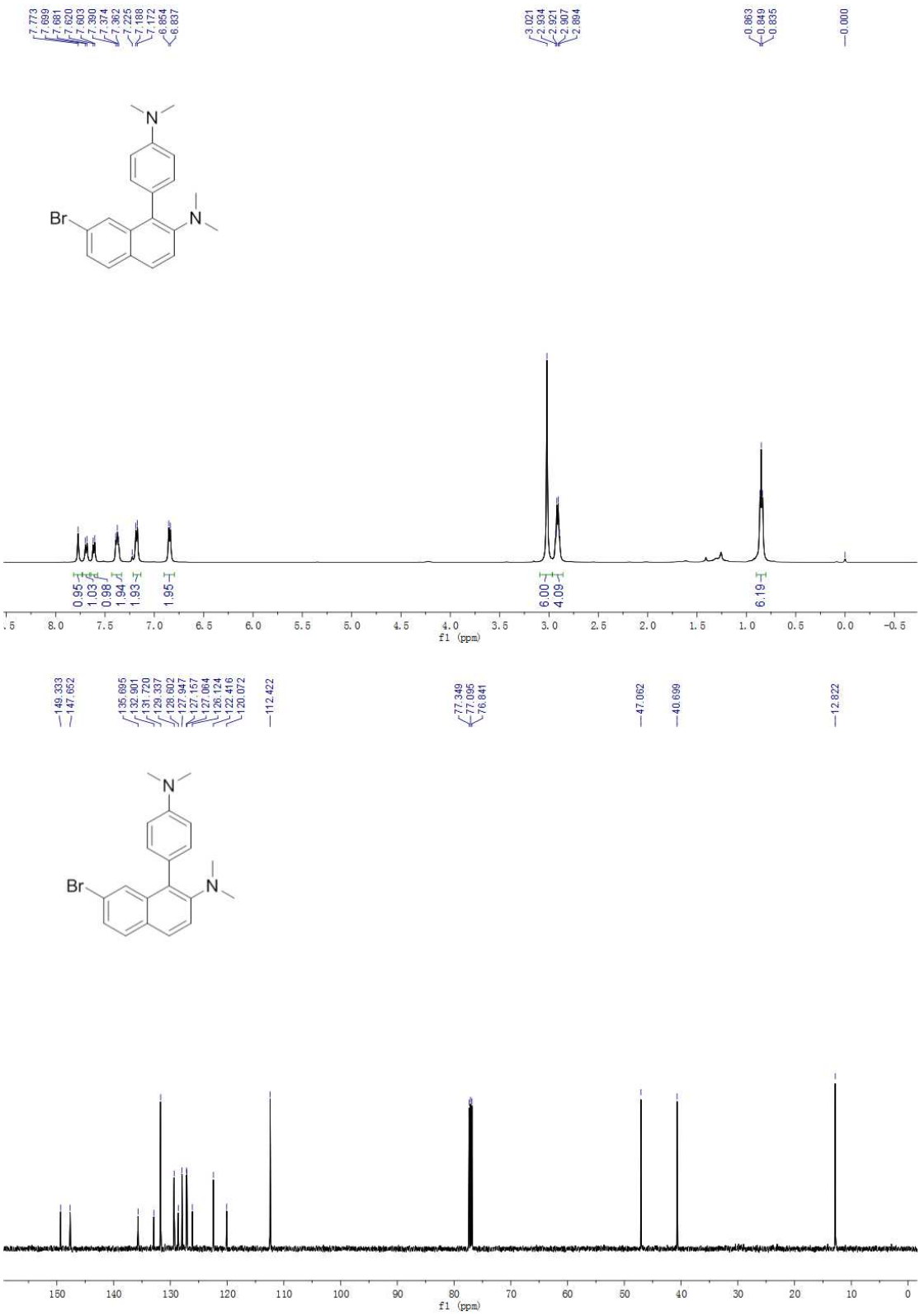


1-(4-(Dimethylamino)phenyl)-N^2,N^2,N^7,N^7-tetraethylnaphthalene-2,7-diamine (3ga):

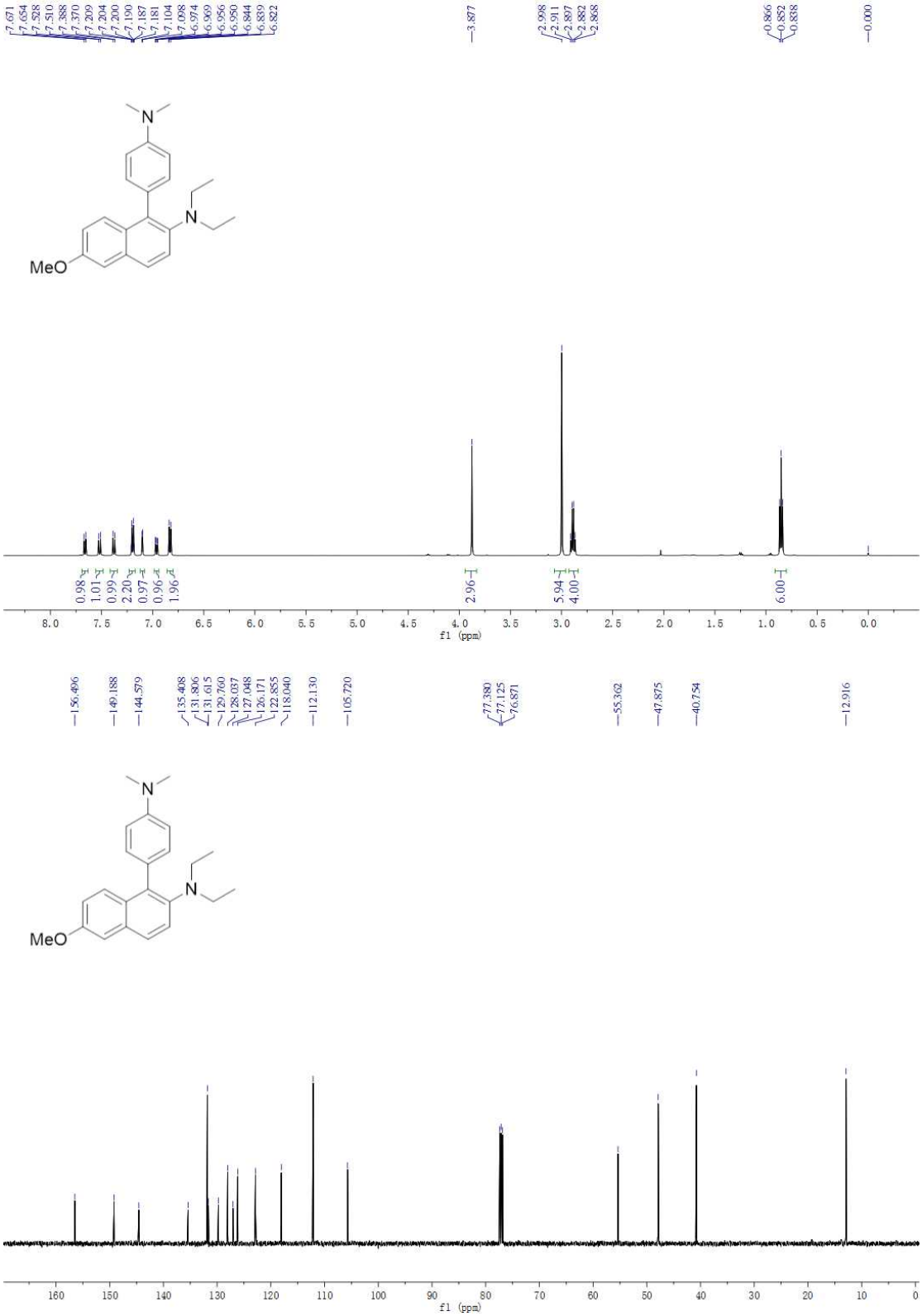




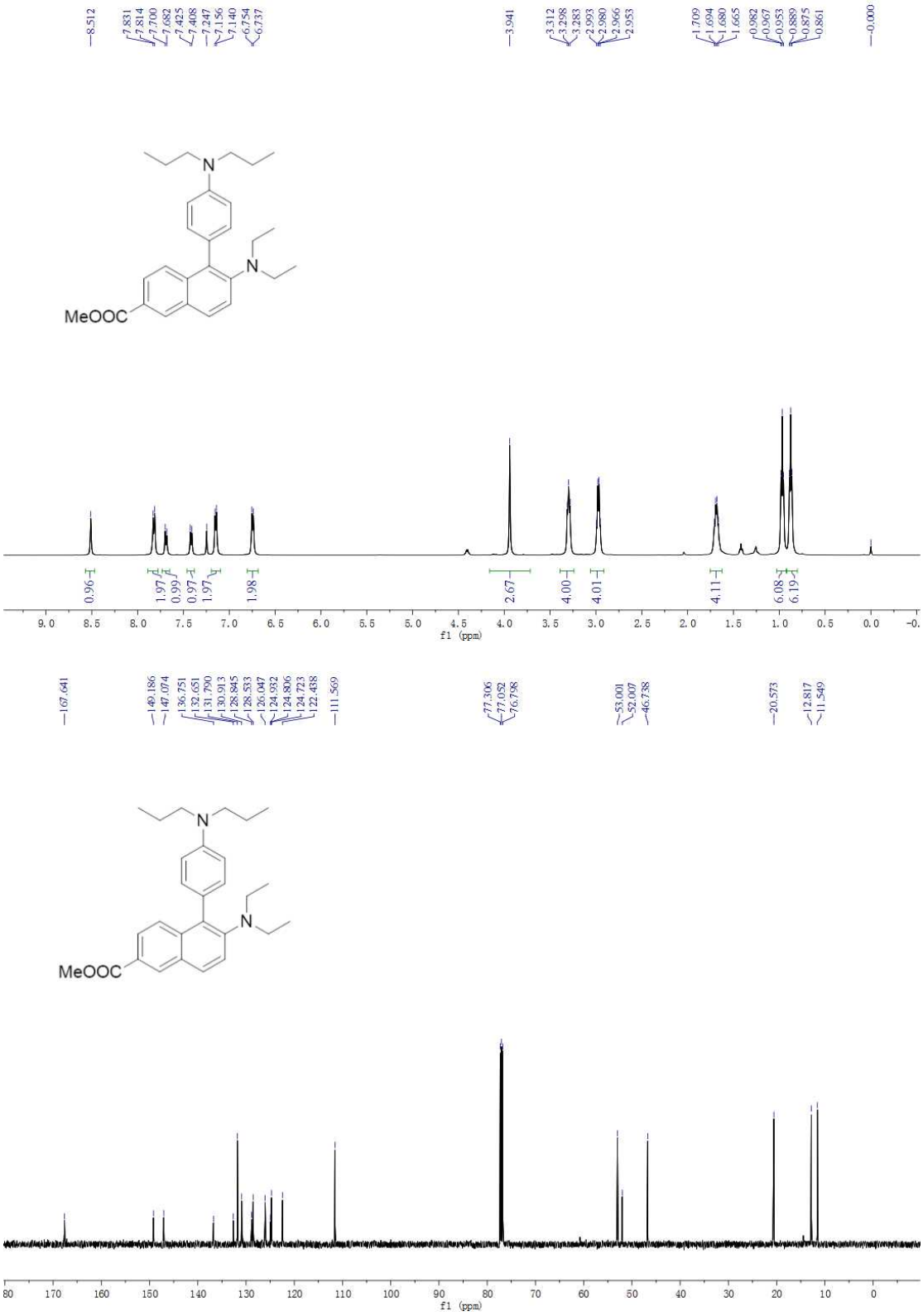
7-Bromo-1-(4-(dimethylamino)phenyl)-*N*,*N*-diethylnaphthalen-2-amine (3ha):



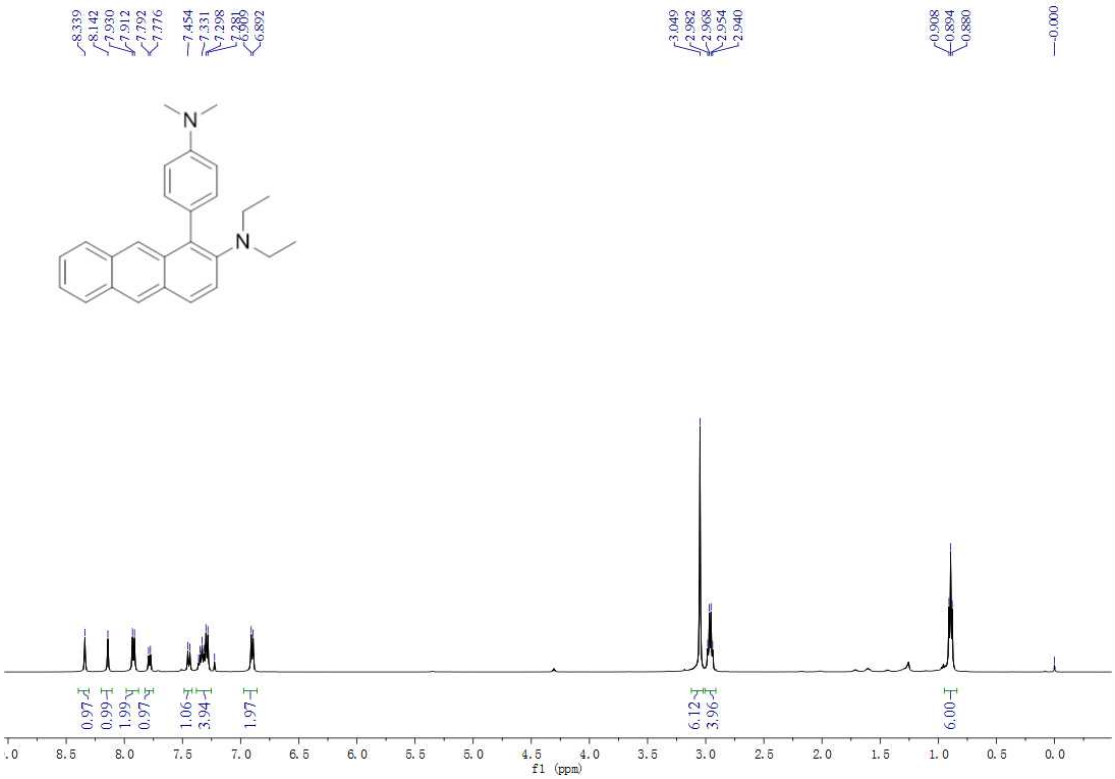
1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethyl-6-methoxynaphthalen-2-amine (3ia):

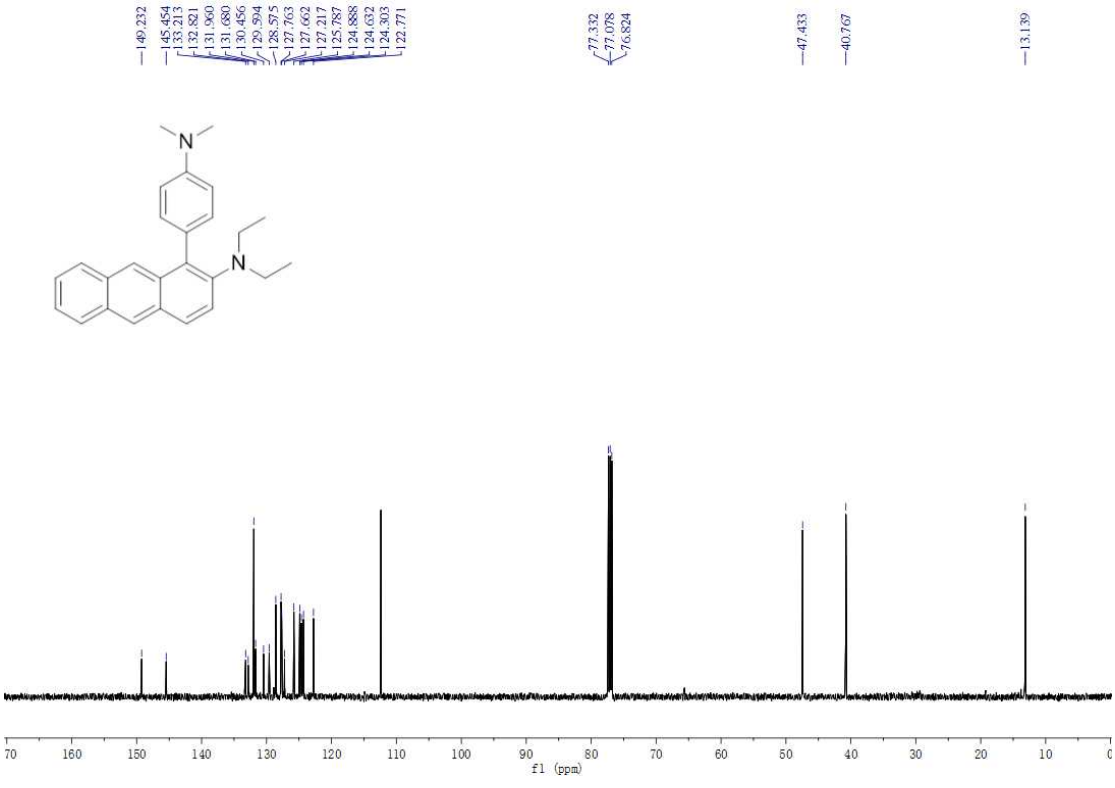


Methyl 6-(diethylamino)-5-(4-(dipropylamino)phenyl)-2-naphthoate (3ja):

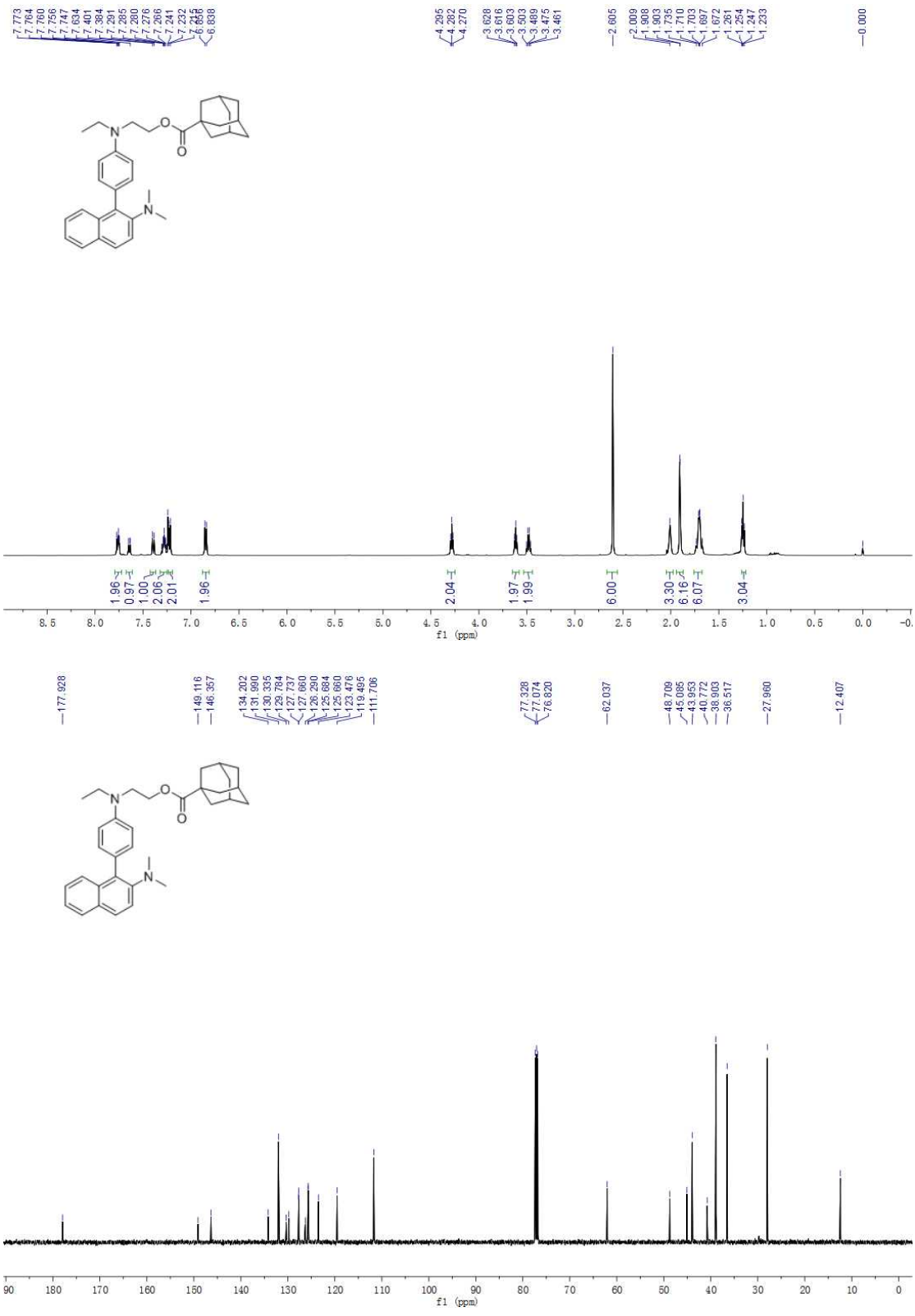


1-(4-(Dimethylamino)phenyl)-*N*,*N*-diethylanthracen-2-amine (3ka):

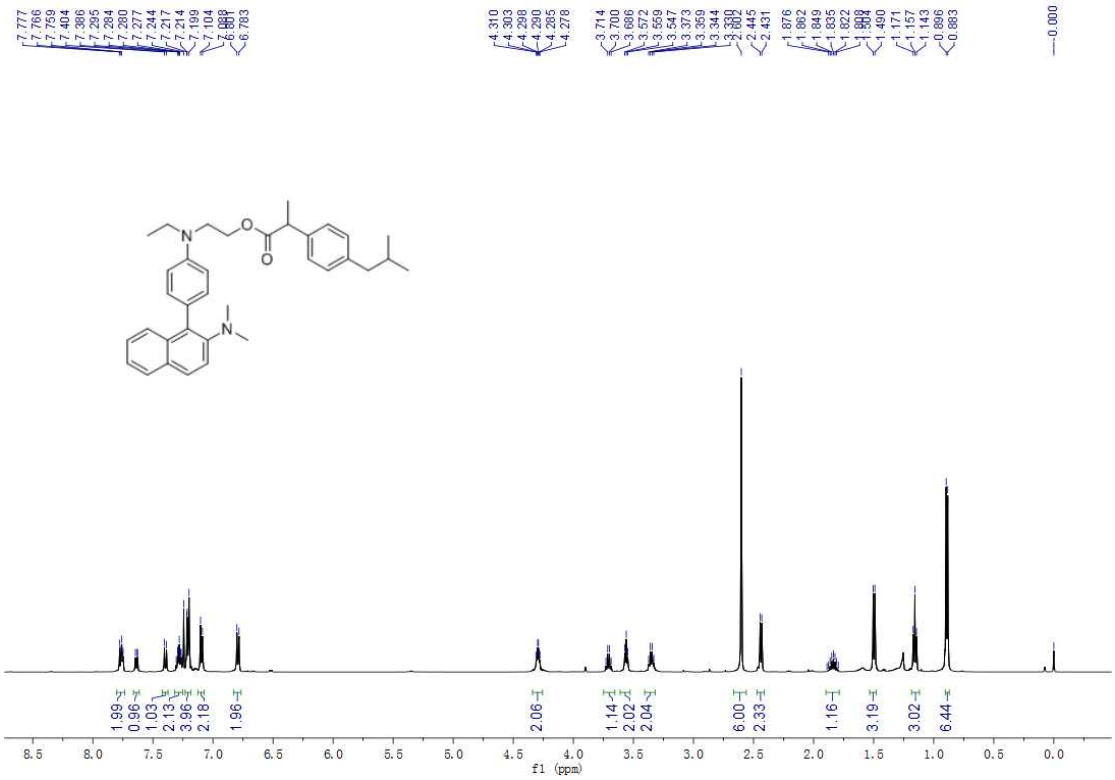


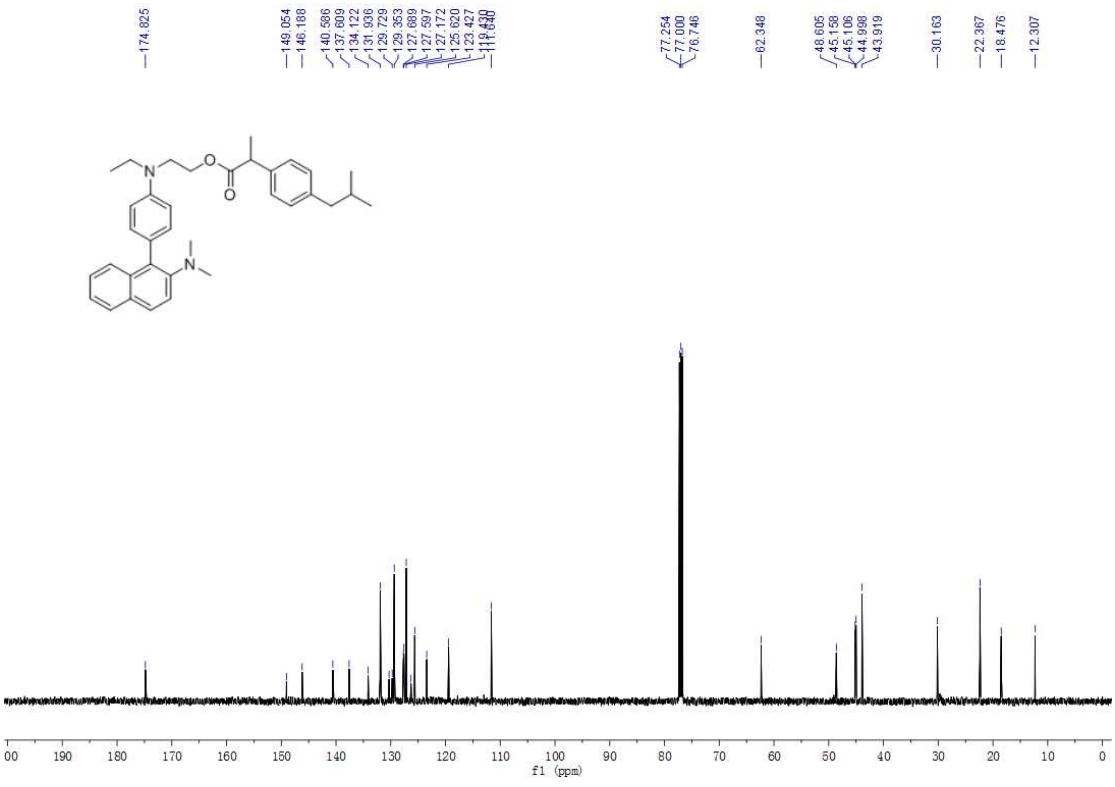


(3r,5r,7r)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl adamantane-1-carboxylate (3aw):

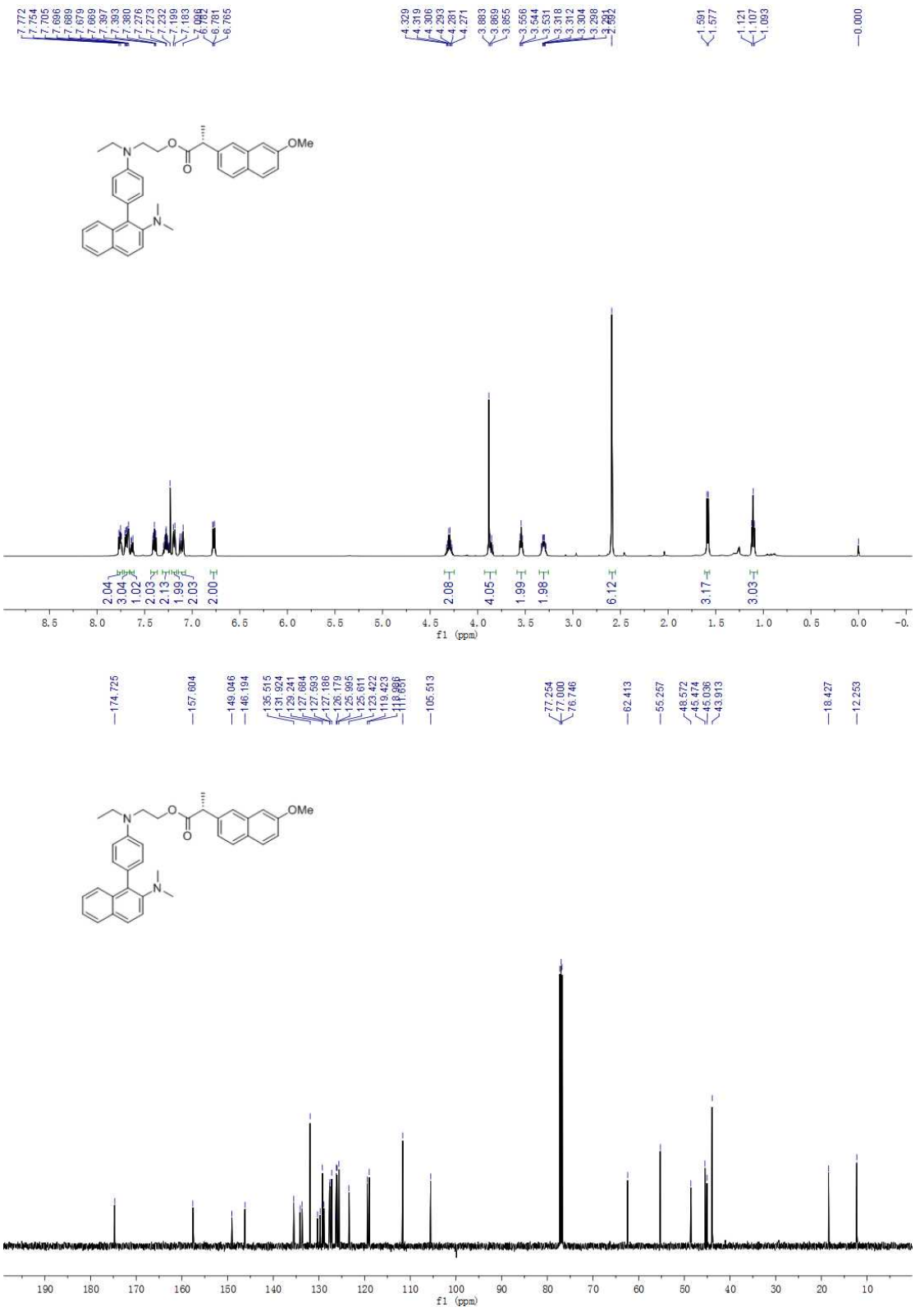


2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(4-isobutylphenyl)propanoate (3ax):

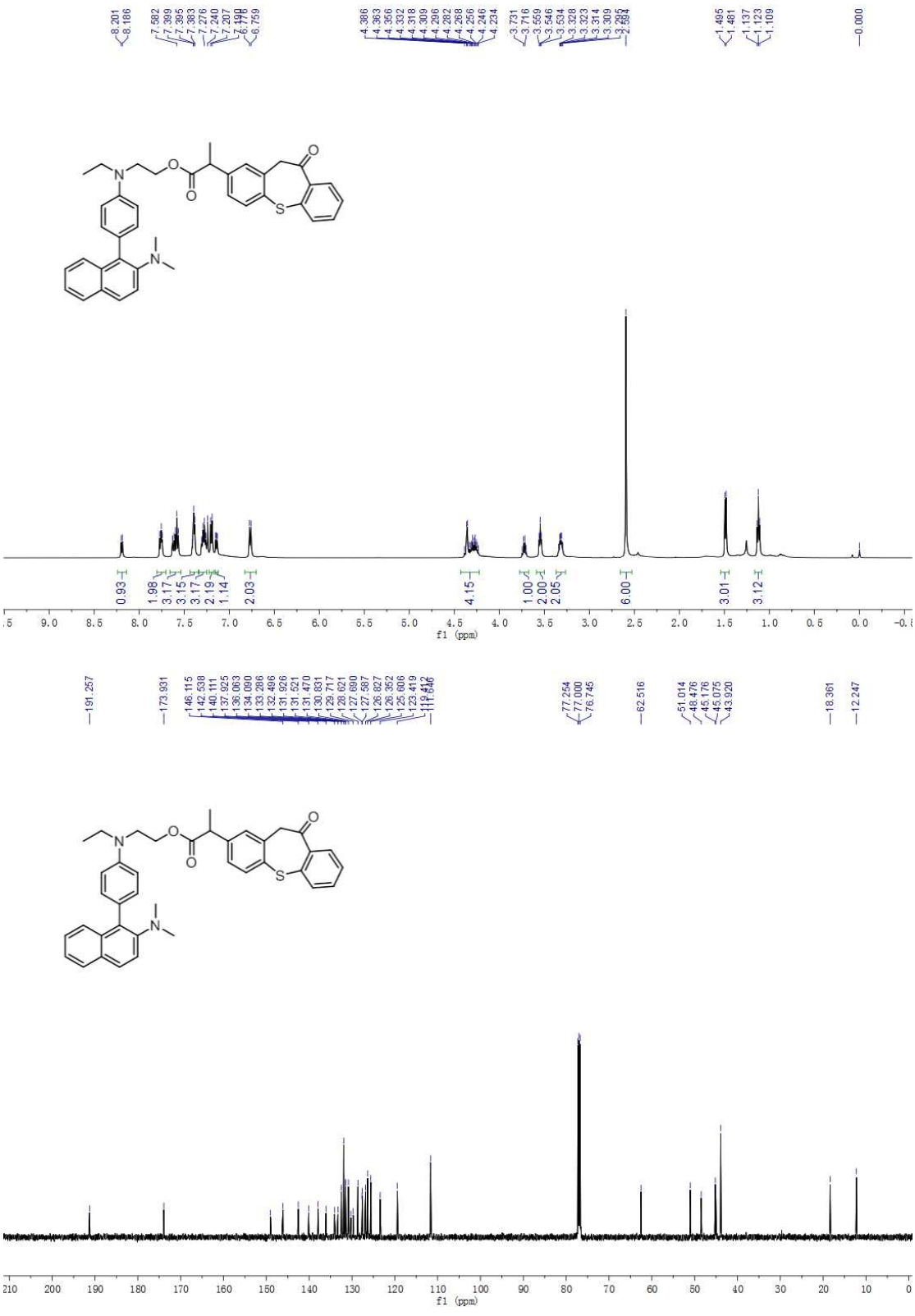




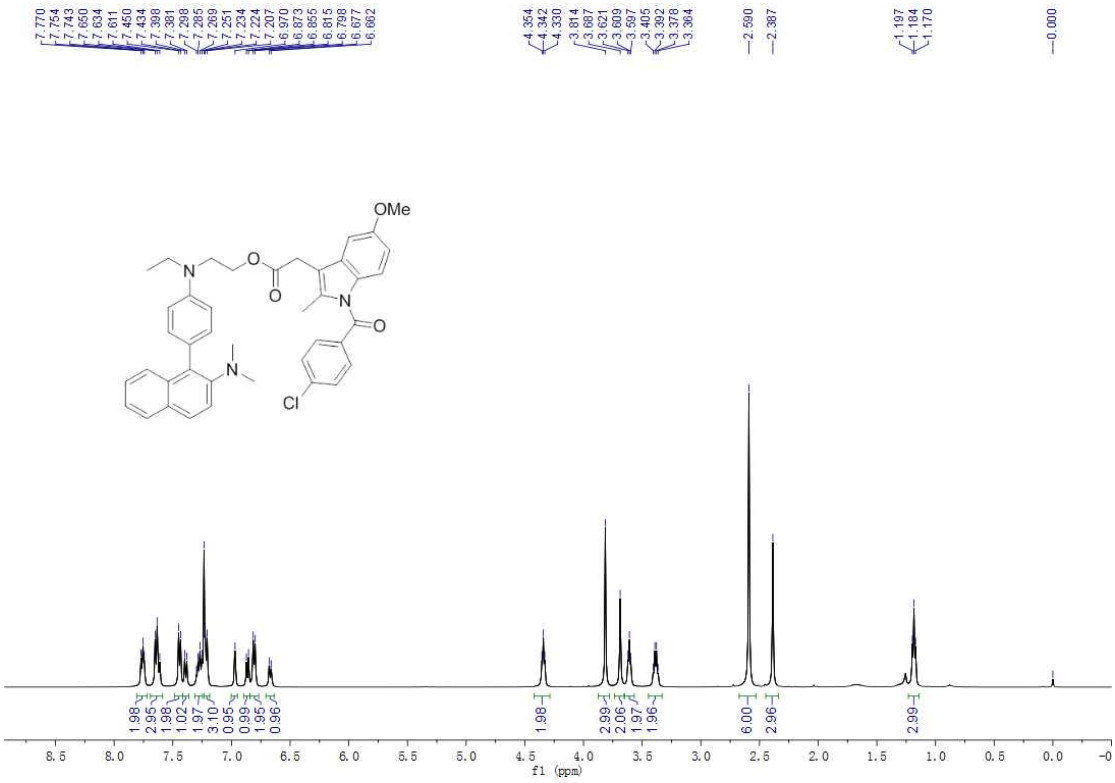
(R)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl 2-(7-methoxynaphthalen-2-yl)propanoate (3ay):

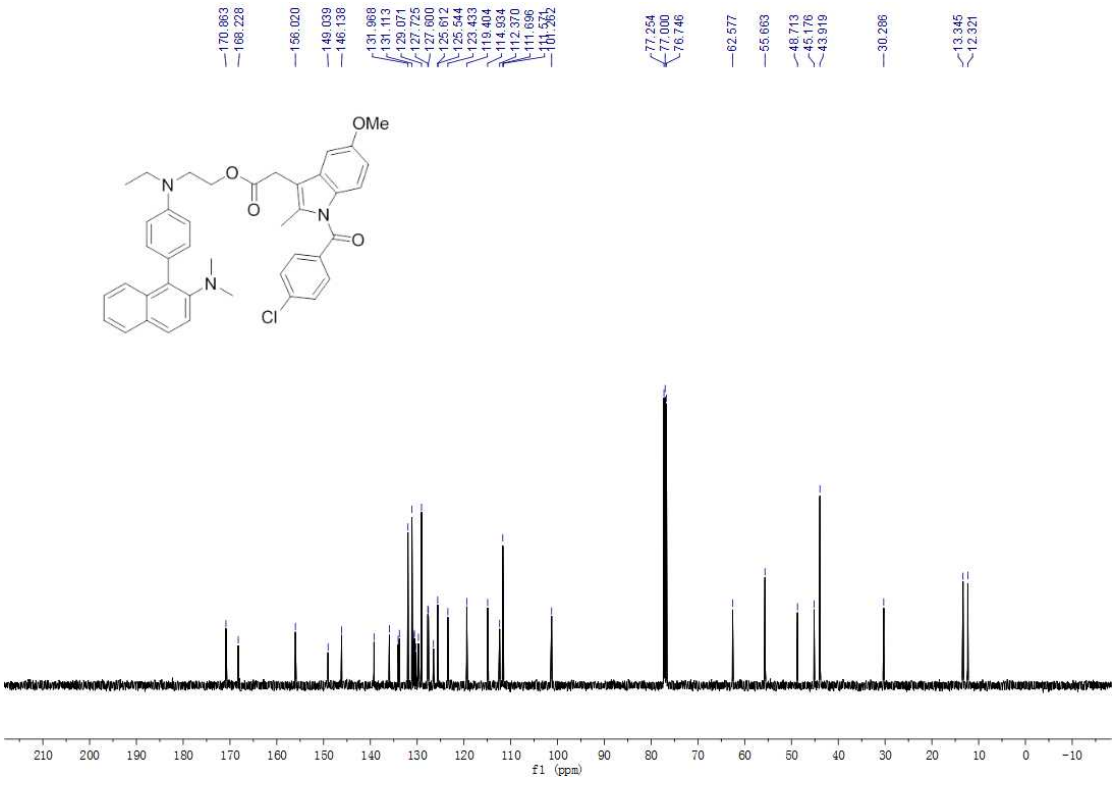


2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(10-oxo-1 0,11-dihydrodibenzo[*b*,*f*]thiepin-2-yl)propanoate (3az):

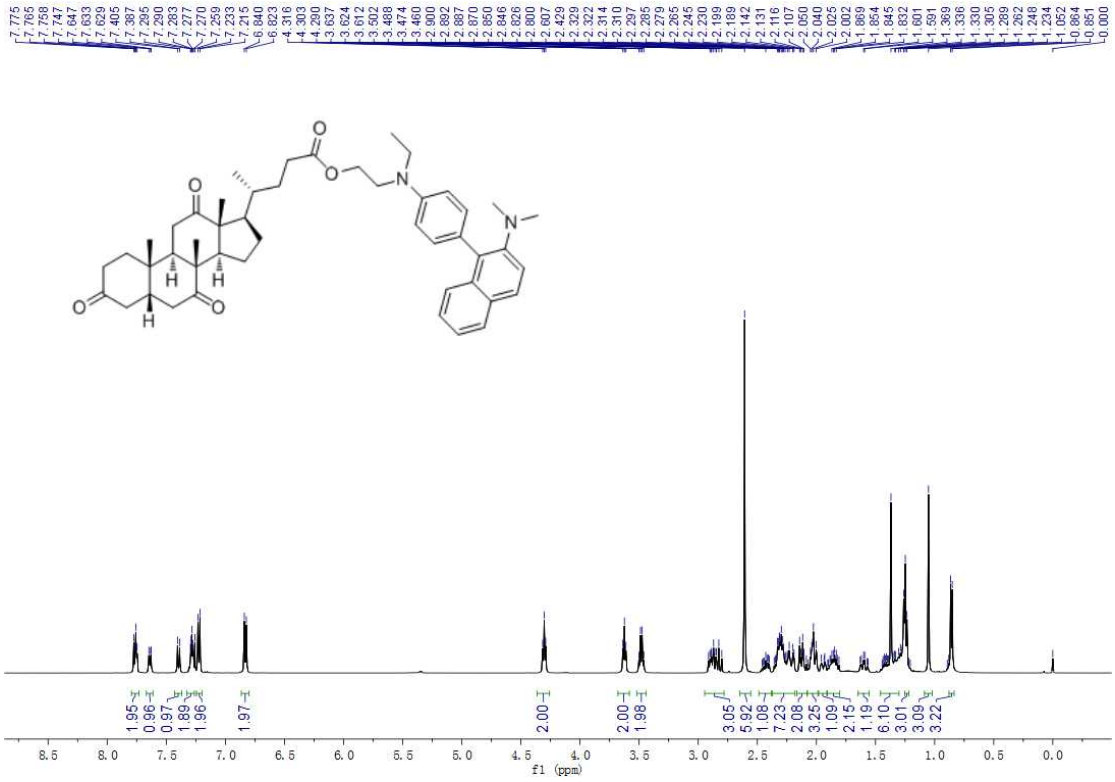


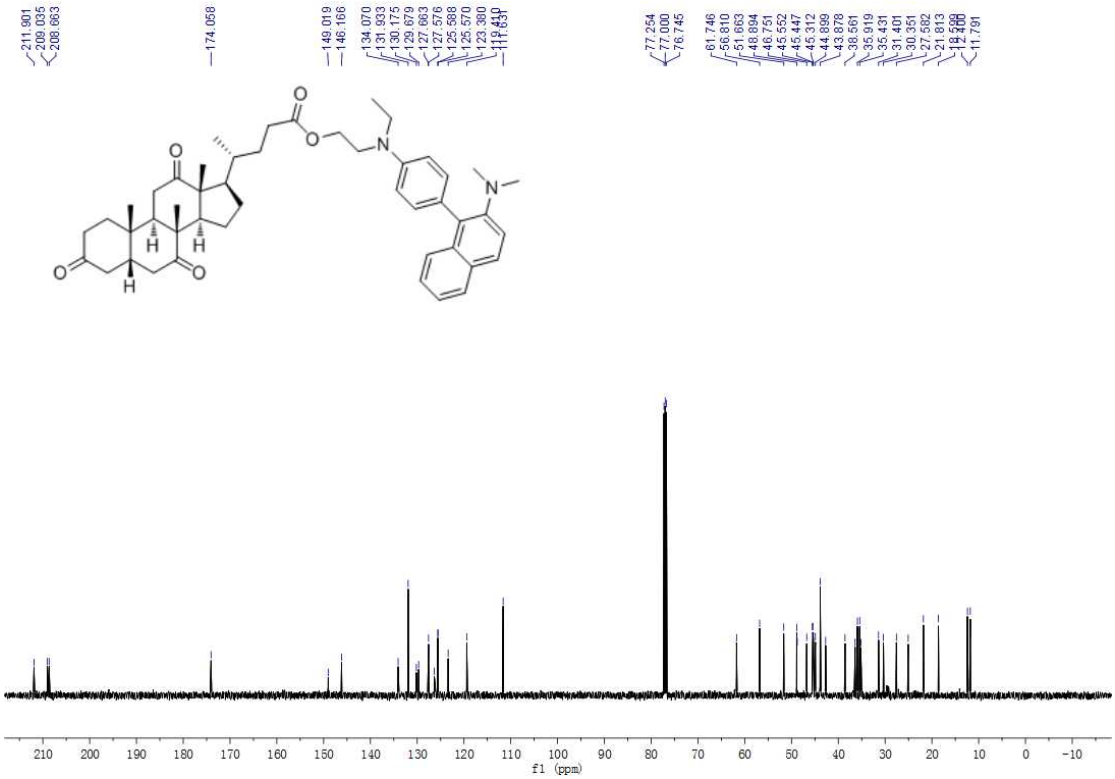
2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl-2-(1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1*H*-indol-3-yl)acetate (3aaa):



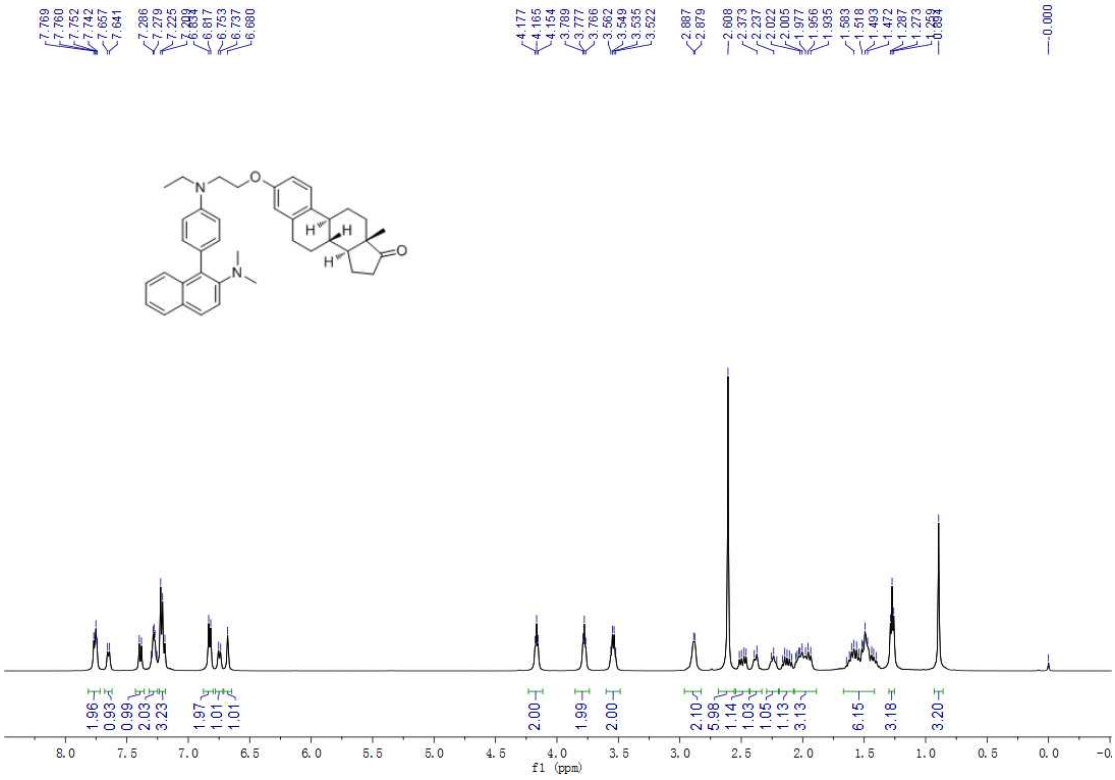


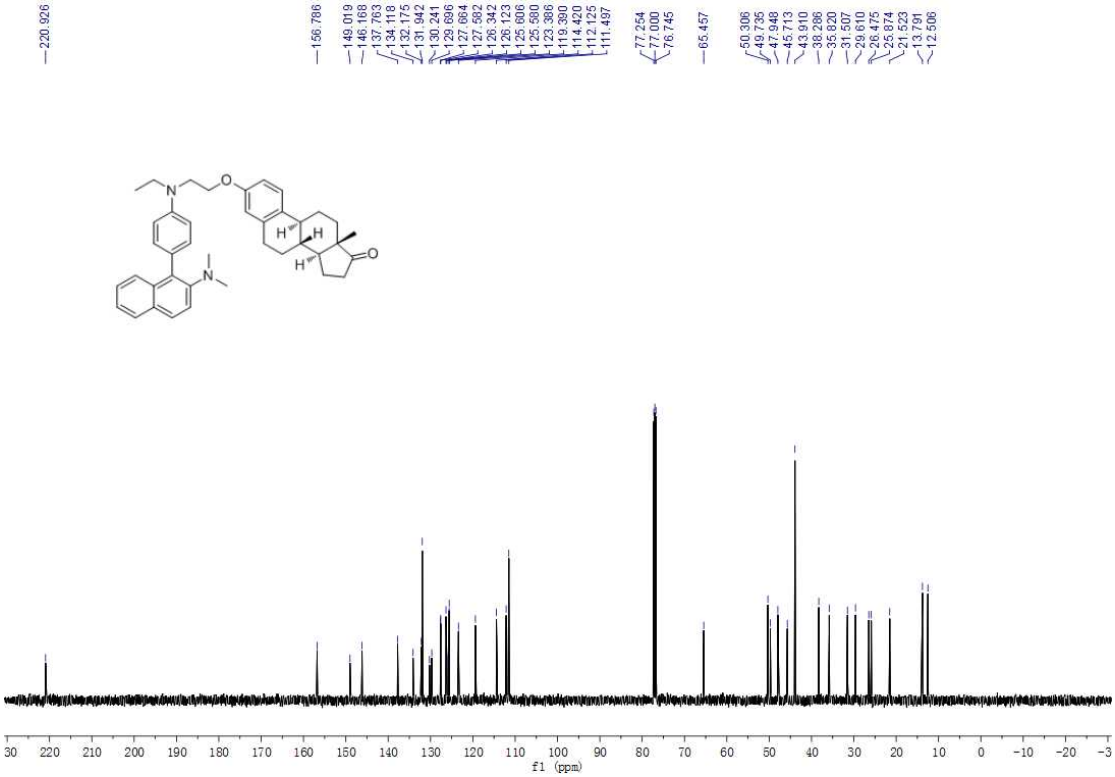
(R)-2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethyl 4-((5S,8R,9R,10S,13R,14R,17R)-8,10,13-trimethyl-3,7,12-trioxohexadecahydro-1*H*-cyclopenta[a]phenanthren-17-yl)pentanoate (3aab):





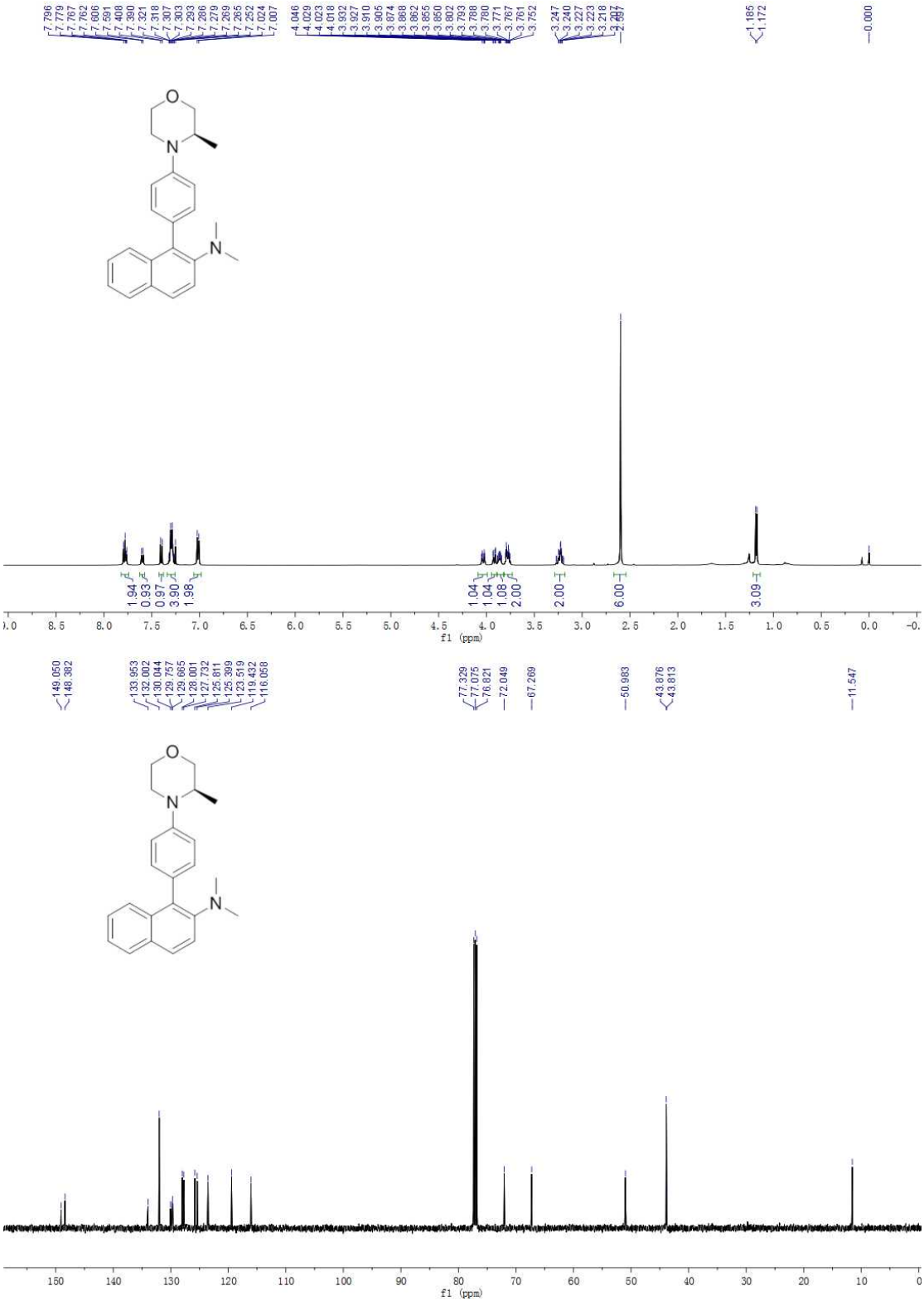
(8R,9S,13S,14S)-3-(2-((4-(2-(Dimethylamino)naphthalen-1-yl)phenyl)(ethyl)amino)ethoxy)-13-methyl-7,8,9,11,12,13,15,16-octahydro-6*H*-cyclopenta[*a*]phenanthren-17(14*H*)-one (3aac):



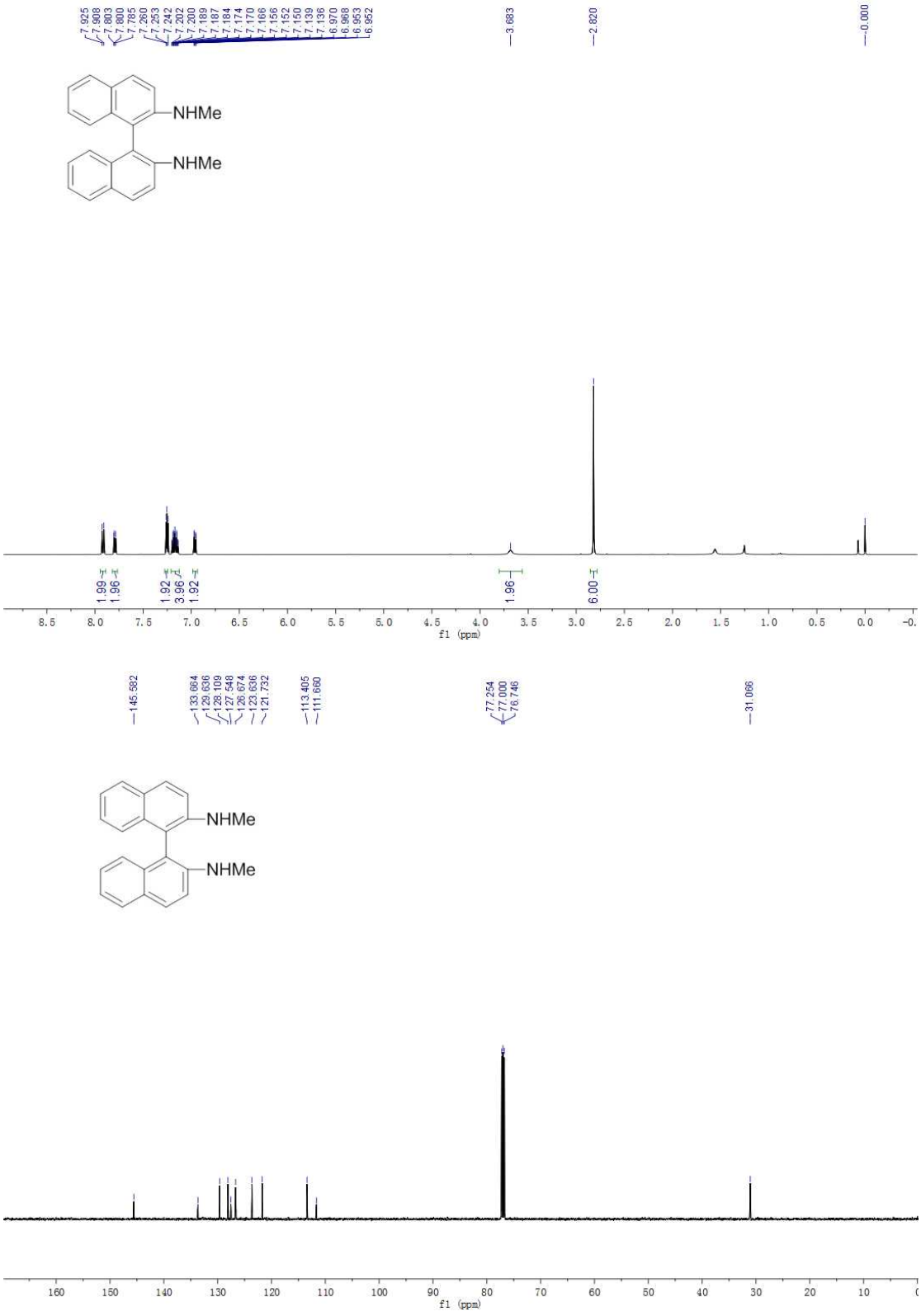


(R)-*N*,*N*-Dimethyl-1-(4-(3-methylmorpholino)phenyl)naphthalen-2-amine

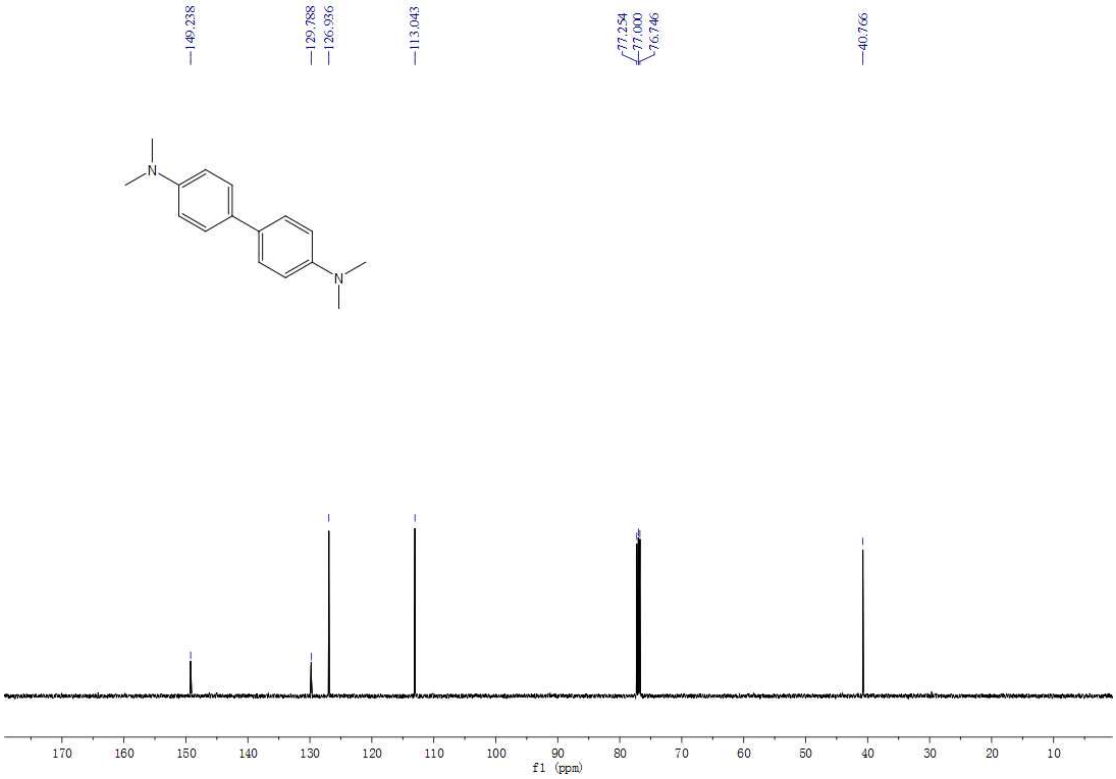
(3aad):



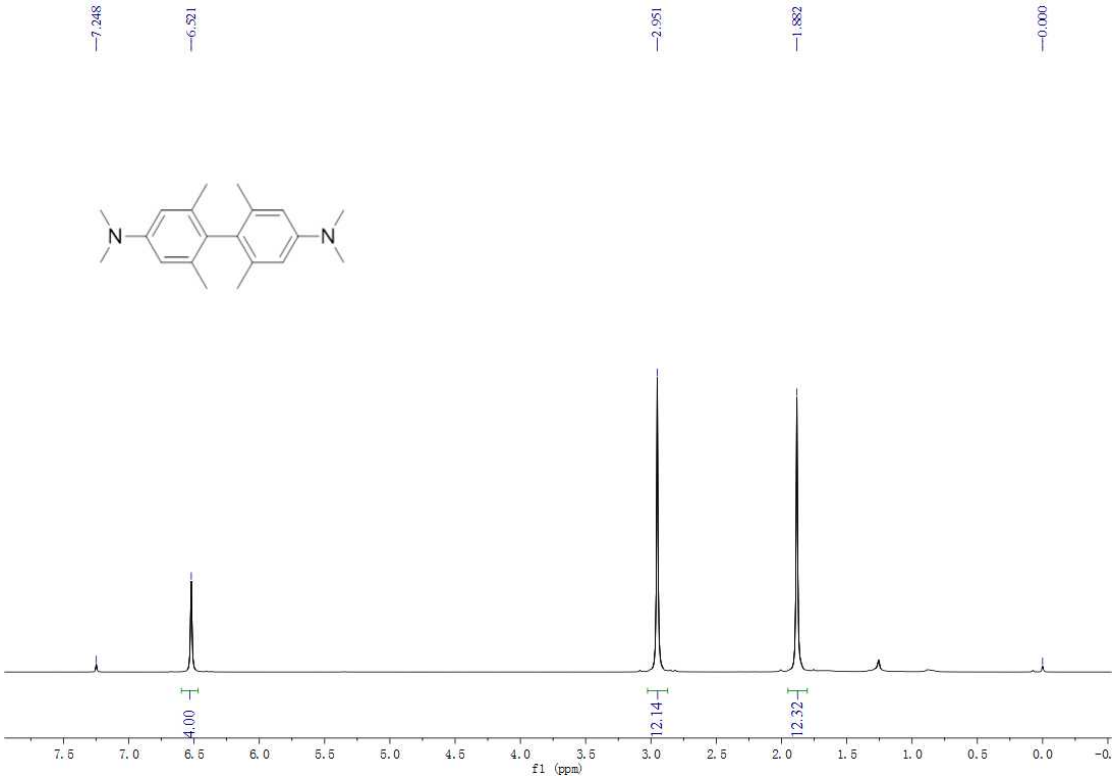
N^2,$N^{2\prime}$-Dimethyl-[1,1'-binaphthalene]-2,2'-diamine (4):

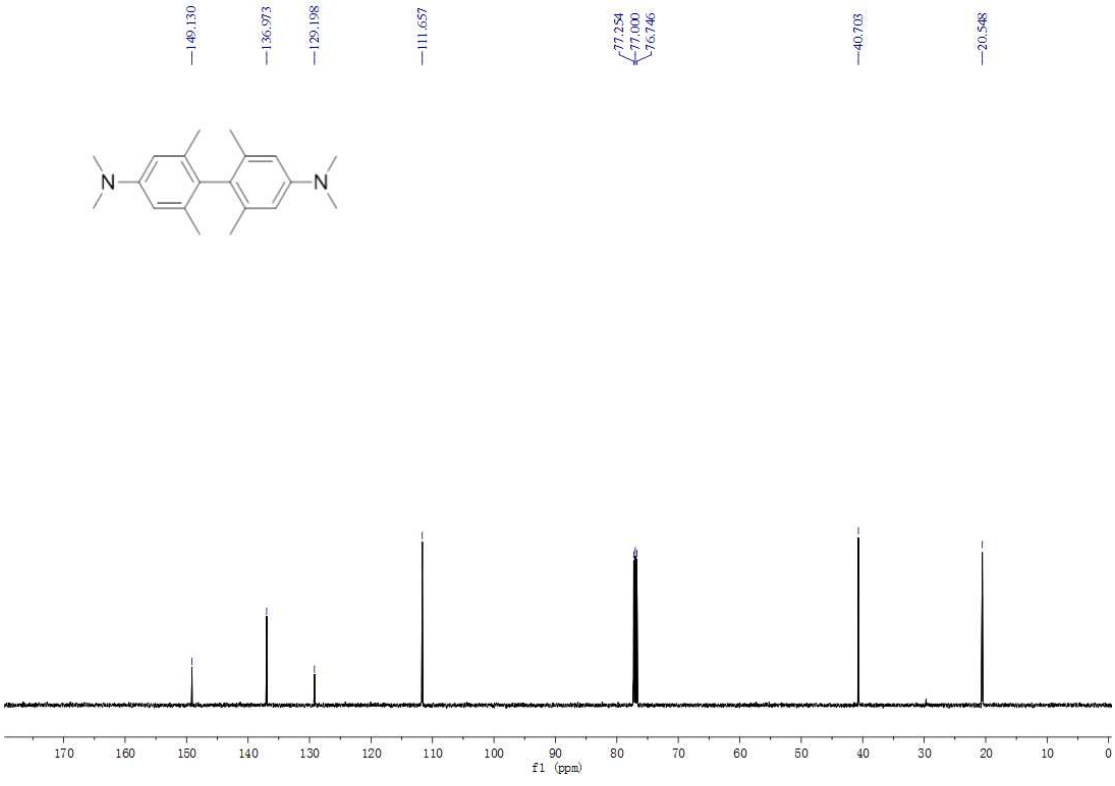


$N^4,N^4,N^{4'},N^{4'}$-Tetramethyl-[1,1'-biphenyl]-4,4'-diamine (5):

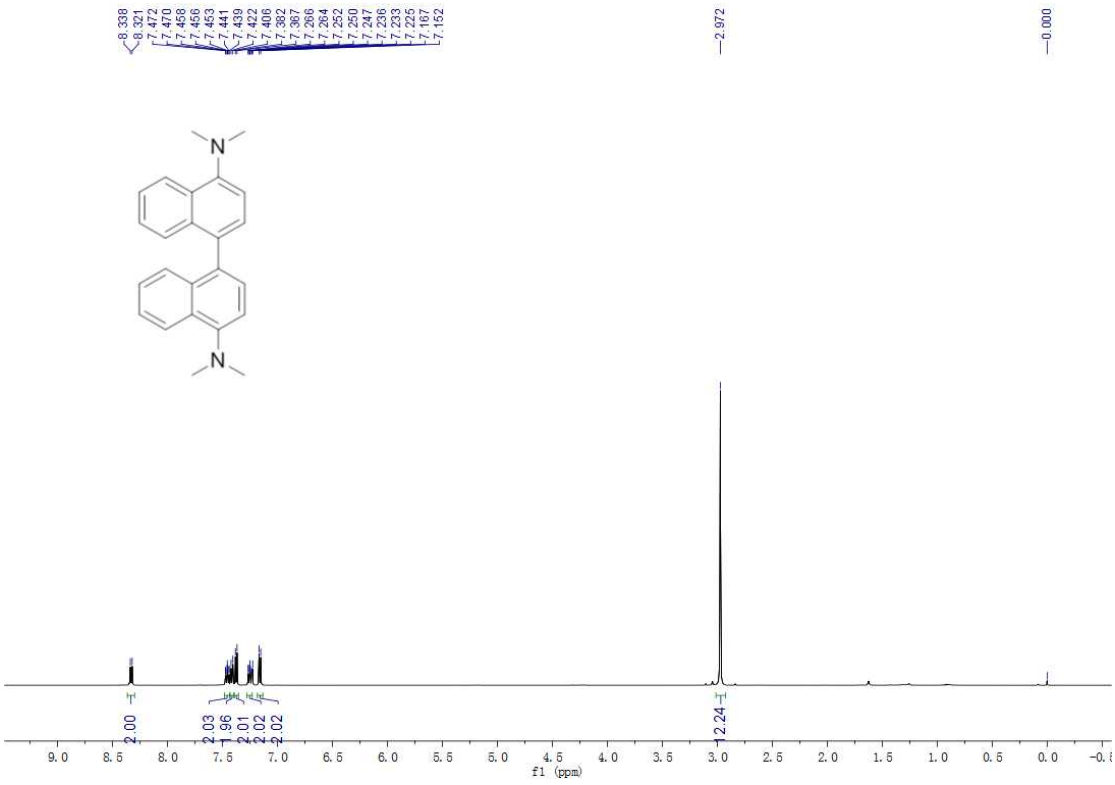


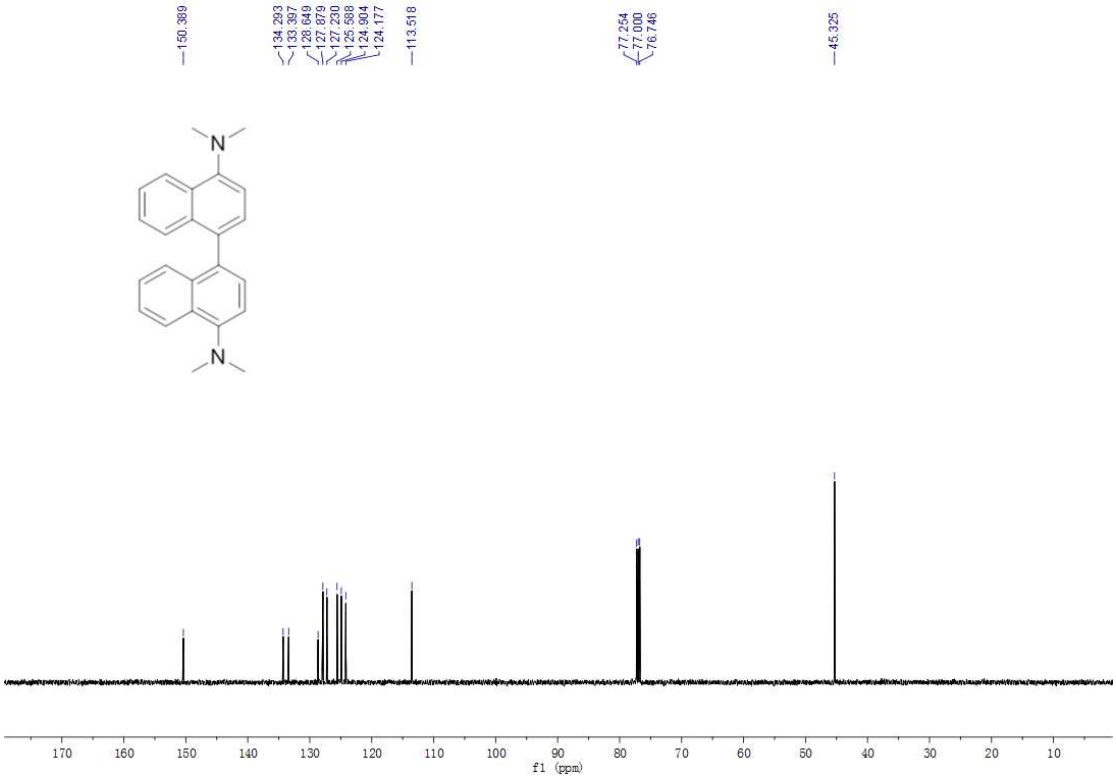
N^4,N^4,$N^{4'}$,$N^{4'}$,2,2',6,6'-octamethyl-[1,1'-biphenyl]-4,4'-diamine (6):



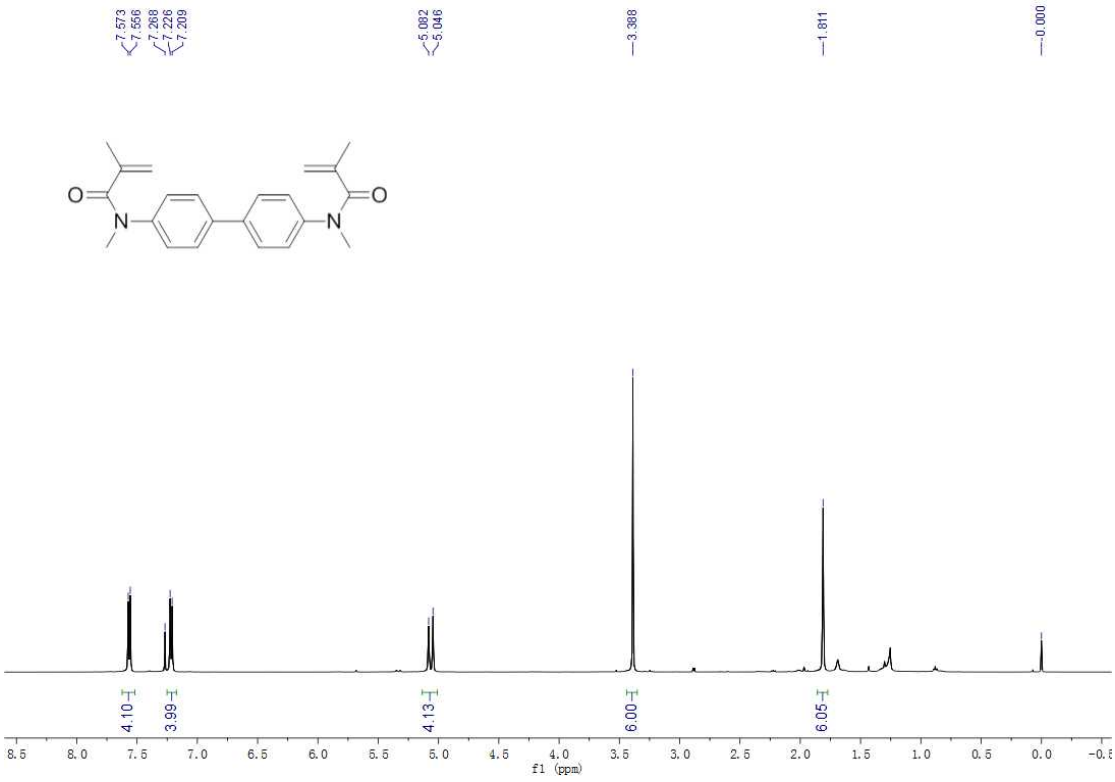


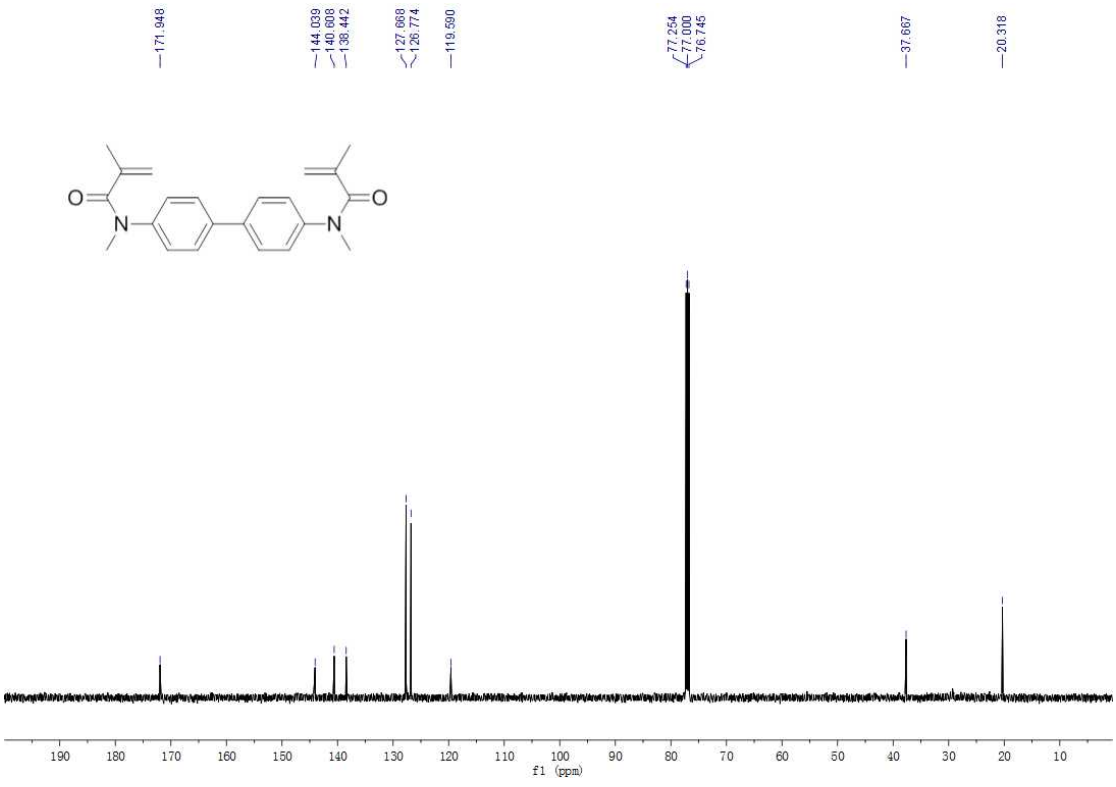
$N^4,N^4,N^{4'},N^{4'}$-Tetramethyl-[1,1'-binaphthalene]-4,4'-diamine (7):





***N*,*N*'-([1,1'-Biphenyl]-4,4'-diyl)bis(*N*,2-dimethylacrylamide) (8):**





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