Electronic Supplementary Information

for

Pd-Catalyzed 1, 2-Diarylation of Vinylarenes at Ambient Temperature

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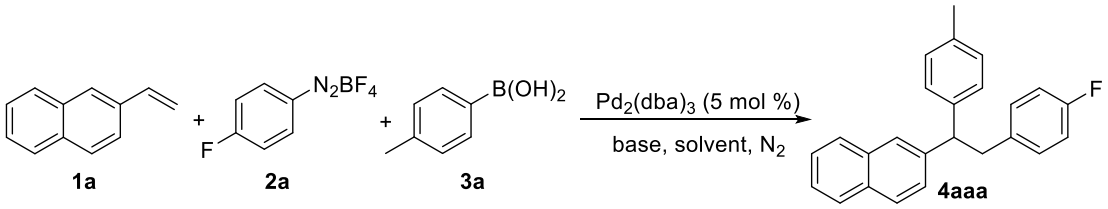
1. General information. ^{1}H NMR and ^{13}C NMR spectra were recorded at ambient temperature using 500 MHz spectrometers. The data are reported as follows: chemical shift in ppm from internal tetramethylsilane on the δ scale, multiplicity (br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants (Hz) and integration. High-resolution mass spectra were obtained by peak matching. All reactions were carried out under an atmosphere of nitrogen in glassware, which had been oven-dried. All reagents and solvents were purchased from commercial suppliers and used without further purification. Unless otherwise stated, all experiments were conducted in a Schlenk tube under N_2 atmosphere. Reactions were monitored by TLC or GC-MS analysis. Flash column chromatography was performed over silica gel (200-300 mesh).

2. Optimization of experimental conditions[1]

Table S1. Condition Screening.[a]

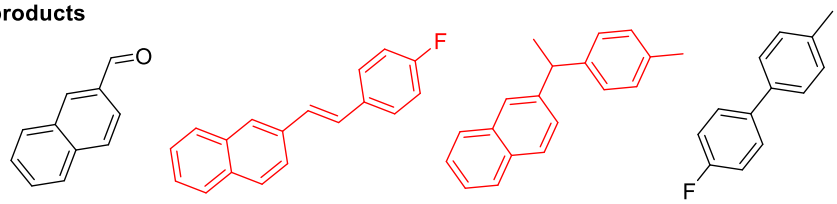


1a **2a** **3a** **4aaa**

entry	base (2 equiv)	solvent (1 mL)	temp (°C)	GC yield (%)[b]
1	Na_2CO_3	t-Amy-OH	60	59
2	K_2CO_3	t-Amy-OH	60	67
3	Cs_2CO_3	t-Amy-OH	60	70
4	KF	t-Amy-OH	60	53
5	NaOAc	t-Amy-OH	60	trace
6	K_3PO_4	t-Amy-OH	60	64
7	K_2HPO_4	t-Amy-OH	60	59
8	KH_2PO_4	t-Amy-OH	60	58
9	CsF	t-Amy-OH	60	trace
10[c]	Cs_2CO_3	t-Amy-OH	RT	trace
11	Cs_2CO_3	t-Amy-OH	RT	80
12	Cs_2CO_3	MeOH	RT	trace
13	Cs_2CO_3	dioxane	RT	trace
14	Cs_2CO_3	toluene	RT	trace
15	Cs_2CO_3	DMF	RT	no reaction
16	Cs_2CO_3	DCE	RT	trace
17	Cs_2CO_3	THF	RT	no reaction
18	Cs_2CO_3	EtOH	RT	no reaction
19	Cs_2CO_3	t-BuOH	RT	no reaction
20	Cs_2CO_3	EA	RT	no reaction

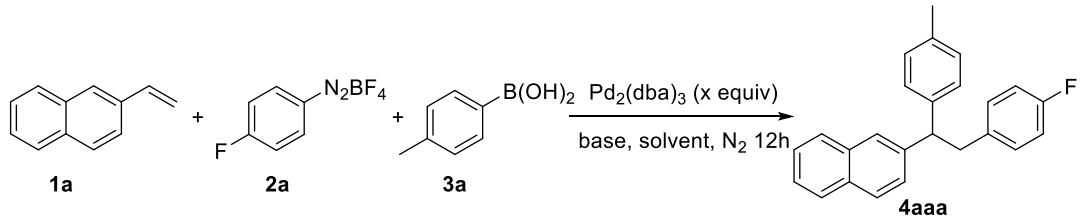
[a] Reaction conditions: all reactions were ran on 0.2 mmol scale with respect to **1a.**
[b] Yields determined by GC by utilizing dodecane as internal standard, figures in brackets represent separation yield. t-Amy-OH = tert-amyl alcohol. [c] under air.

byproducts



by 1 by 2 by3 by 4

Table S1. Base screening.[a]

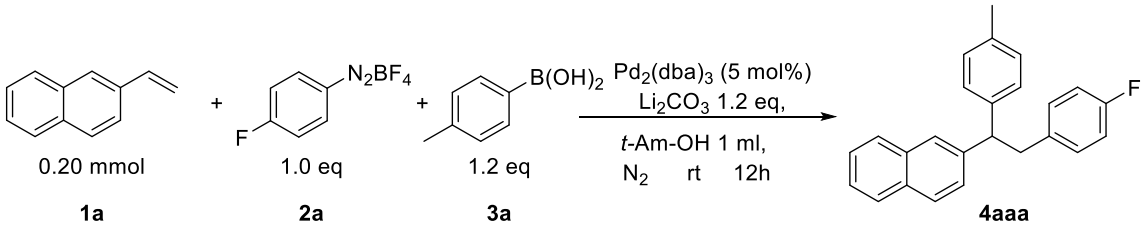


1a **2a** **3a** **4aaa**

entry	**1a** (equiv)	**2a** (equiv)	Pd (equiv)	base (equiv)	solvent (1 mL)	temp (°C)	yield (%)[b]
21	1.0	1.5	0.05	Cs_2CO_3 2.0	t-Amy-OH	rt	81
22	1.0	1.1	0.05	Cs_2CO_3 2.0	t-Amy-OH	rt	64
23	1.0	1.2	0.05	Cs_2CO_3 2.0	t-Amy-OH	rt	80 (70)
24	1.0	1.2	0.05	Cs_2CO_3 1.5	t-Amy-OH	rt	73
25	1.0	1.2	0.05	Cs_2CO_3 1.2	t-Amy-OH	rt	77
26	1.0	1.2	0.05	Cs_2CO_3 1.0	t-Amy-OH	rt	68
27	1.0	1.2	0.05	Li_2CO_3 1.2	t-Amy-OH	rt	92 (82)
28	1.2	1.2	0.05	Li_2CO_3 1.2	t-Amy-OH	rt	88 (79)
29	1.0	1.2	0.05	Li_2CO_3 1.2	t-Amy-OH	0	84
30	1.0	1.2	0.03	Li_2CO_3 1.2	t-Amy-OH	rt	70
31	1.0	1.2	0.01	Li_2CO_3 1.2	t-Amy-OH	rt	30

[a] Reaction conditions: all reactions were run on 0.2 mmol scale with respect to **1a.** [b] Yields determined by GC by utilizing dodecane as internal standard, figures in brackets represent separation yield. *t*-Amy-OH = tert-amyl alcohol.

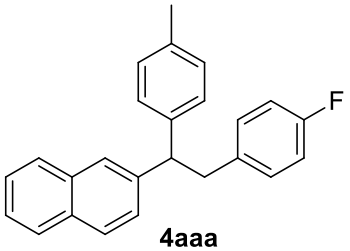
3. General procedure for 1,2-diarylation of vinylnaphthalene derivatives.



0.20 mmol 1.0 eq 1.2 eq

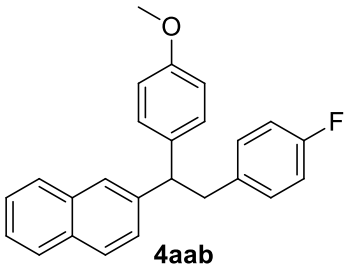
1a **2a** **3a** **4aaa**

To a 25 mL Schlenk tube, under a nitrogen atmosphere, was added 0.20 mmol of 2-vinylnaphthalene (**1a**) followed by 0.20 mmol of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (1.0 equiv), 0.24 mmol of p-tolylboronic acid (**3a**) (1.2 equiv), 0.01 mmol of $Pd_2(dba)_3$ (0.05 equiv), 0.24 mmol of lithium carbonate (1.2 equiv), in 1.0 mL of *t*-Amy-OH. The Schlenk tube was sealed and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 120:1 – 80:1, v/v) to afford the product **4aaa** as a slight yellow solid.



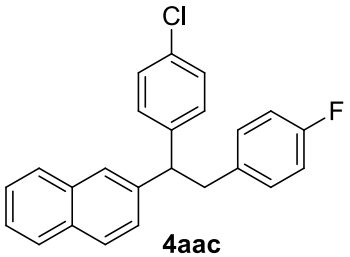
4aaa

2-(2-(4-fluorophenyl)-1-(p-tolyl)ethyl)naphthalene (4aaa). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 56.2 mg of the product as a slight yellow solid (82%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (t, *J* = 7.8 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.65 (s, 1H), 7.48 – 7.41 (m, 2H), 7.33 (d, *J* = 8.5 Hz, 1H), 7.14 (d, *J* = 7.8 Hz, 2H), 7.08 (d, *J* = 7.8 Hz, 2H), 7.01 – 6.95 (m, 2H), 6.86 (t, *J* = 8.7 Hz, 2H), 4.32 (t, *J* = 7.8 Hz, 1H), 3.48-3.39 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.0 Hz), 141.8, 141.0, 135.9 (d, *J* = 3.3 Hz), 135.8, 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 129.1, 128.0, 127.9, 127.7, 127.5, 126.8, 126.0 (d, *J* = 11.4 Hz), 125.4, 114.9, 114.7, 52.9, 41.1, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F$:340.1627; Found: 340.1633.



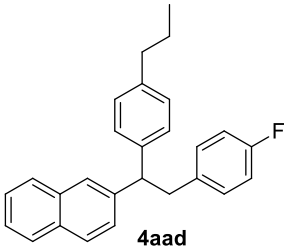
4aab

2-(2-(4-fluorophenyl)-1-(4-methoxyphenyl)ethyl)naphthalene (4aab). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 36.5 mg of (4-methoxyphenyl)boronic acid (**3b**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 50:1, v/v) to afford 51.9 mg of the product as a bronzing oil (73%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (t, *J* = 7.8 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.65 (s, 1H), 7.48 – 7.41 (m, 2H), 7.31 (d, *J* = 8.5 Hz, 1H), 7.14 (d, *J* = 8.4 Hz, 2H), 7.00 – 6.94 (m, 2H), 6.85 (t, *J* = 8.4 Hz, 2H), 6.81 (d, *J* = 8.7 Hz, 2H), 4.30 (t, *J* = 7.8 Hz, 1H), 3.77 (s, 3H), 3.41 (qd, *J* = 13.6, 7.8 Hz, 2H).^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.1 Hz), 158.0, 142.0, 136.1, 135.9 (d, *J* = 3.2 Hz), 133.4, 132.1, 130.4 (d, *J* = 7.7 Hz), 129.0, 128.0, 127.7, 127.5, 126.8, 125.9 (d, *J* = 8.3 Hz), 125.4, 114.9, 114.7, 113.7, 55.2, 52.4, 41.2. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{25}H_{21}FO$: 356.1576; Found: 356.1569.



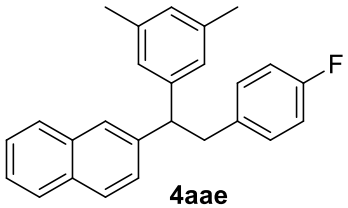
4aac

2-(1-(4-chlorophenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aac). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 37.5 mg of (4-chlorophenyl)boronic acid (**3c**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 80:1, v/v) to afford 51.9 mg of the product as a slight yellow solid (70%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (dd, *J* = 8.8, 7.9 Hz, 2H), 7.75 (d, *J* = 8.5 Hz, 1H), 7.65 (s, 1H), 7.50 – 7.43 (m, 2H), 7.28 (dd, *J* = 8.5, 1.4 Hz, 1H), 7.23 (d, *J* = 8.4 Hz, 2H), 7.14 (t, *J* = 7.5 Hz, 2H), 6.96 (dt, *J* = 8.1, 5.9 Hz, 2H), 6.87 (t, *J* = 8.7 Hz, 2H), 4.32 (t, *J* = 7.8 Hz, 1H), 3.46 (dd, *J* = 13.6, 7.4 Hz, 1H), 3.36 (dd, *J* = 13.6, 8.3 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.4 Hz), 142.5, 141.1, 135.4 (d, *J* = 3.2 Hz), 133.4, 132.2, 132.1, 130.4 (d, *J* = 7.8 Hz), 129.5, 128.5, 128.2, 127.7, 127.6, 126.6, 126.0 (d, *J* = 18.0 Hz), 125.7, 115.0, 114.9, 52.6, 41.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.0. HRMS (EI) m/z: calcd for: $C_{24}H_{18}ClF$: 360.1081; Found: 360.1085.



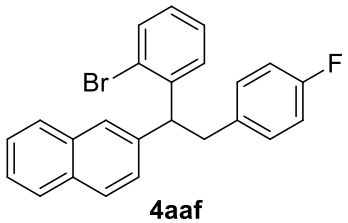
4aad

2-(2-(4-fluorophenyl)-1-(4-propylphenyl)ethyl)naphthalene (4aad). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 39.4 mg of (4-propylphenyl)boronic acid (**3d**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 52.5 mg of the product as a slight yellow solid (71%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81 (t, *J* = 7.5 Hz, 2H), 7.77 (d, *J* = 8.6 Hz, 1H), 7.68 (s, 1H), 7.50 – 7.43 (m, 2H), 7.37 (d, *J* = 8.5 Hz, 1H), 7.19 (d, *J* = 7.5 Hz, 2H), 7.12 (d, *J* = 7.3 Hz, 2H), 7.02 – 6.96 (m, 2H), 6.88 (t, *J* = 8.2 Hz, 2H), 4.35 (t, *J* = 7.8 Hz, 1H), 3.52 – 3.40 (m, 2H), 2.58 (t, *J* = 7.6 Hz, 2H), 1.70 – 1.61 (m, 2H), 0.97 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.0 Hz), 141.8, 141.3, 140.6, 135.9 (d, *J* = 3.1 Hz), 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 128.5, 128.0, 127.8, 127.7, 127.5, 126.8, 126.0 (d, *J* = 23.4 Hz), 125.4, 114.9, 114.7, 52.9, 41.1, 37.6, 24.5, 13.8. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.5. HRMS (EI) m/z: calcd for: $C_{27}H_{25}F$: 368.1940; Found: 368.1937.



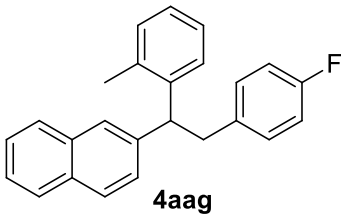
4aae

2-(1-(3,5-dimethylphenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aae). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 39.4 mg of (3, 5-dimethylphenyl)boronic acid (**3e**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 54.4 mg of the product as a yellow oil (77%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 8.8, 7.1 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.64 (s, 1H), 7.48 – 7.41 (m, 2H), 7.34 (dd, *J* = 8.5, 1.7 Hz, 1H), 7.01 – 6.95 (m, 2H), 6.89 (s, 2H), 6.85 (dd, *J* = 11.9, 5.5 Hz, 3H), 4.28 (t, *J* = 7.8 Hz, 1H), 3.48 – 3.39 (m, 2H), 2.28 (s, 6H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.0 Hz), 144.1, 141.7, 137.8, 136.0 (d, *J* = 3.2 Hz), 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 128.0 (d, *J* = 6.4 Hz), 127.7, 127.5, 126.8, 126.2, 125.9, 125.4, 114.9, 114.7, 53.2, 41.1, 21.4. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.6. HRMS (EI) m/z: calcd for: $C_{26}H_{23}F$: 354.1784; Found: 354.1790.



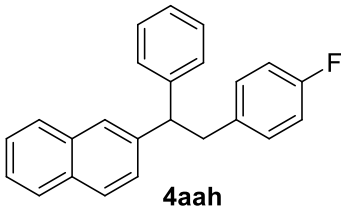
4aaf

2-(1-(2-bromophenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aaf). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 48.0 mg of (2-bromophenyl)boronic acid (**3f**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 54.4 mg of the product as a slight bronzing solid (62%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (dd, *J* = 7.9, 6.6 Hz, 2H), 7.76 (d, *J* = 8.5 Hz, 1H), 7.72 (s, 1H), 7.55 (dd, *J* = 8.0, 1.1 Hz, 1H), 7.50 – 7.43 (m, 2H), 7.41 (dd, *J* = 7.8, 1.5 Hz, 1H), 7.36 (dd, *J* = 8.5, 1.7 Hz, 1H), 7.32 – 7.27 (m, 1H), 7.07 (dd, *J* = 11.1, 5.5 Hz, 3H), 6.92 – 6.85 (m, 2H), 4.99 (t, *J* = 7.8 Hz, 1H), 3.43 (qd, *J* = 13.9, 7.8 Hz, 2H).^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.4 Hz), 143.1, 139.9, 135.2 (d, *J* = 3.2 Hz), 133.3, 133.0, 132.2, 130.4 (d, *J* = 7.8 Hz), 129.2, 127.9 (d, *J* = 4.5 Hz), 127.8, 127.6 (d, *J* = 1.4 Hz), 127.1, 126.6, 126.0, 125.6, 125.3, 115.0, 114.8, 51.0, 40.7. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.1. HRMS (EI) m/z: calcd for: $C_{24}H_{18}BrF$: 404.0576; Found: 404.0580.



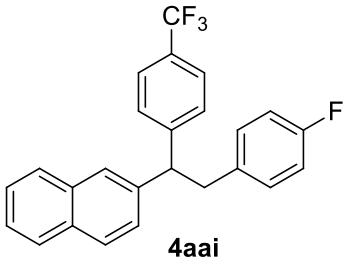
4aag

2-(2-(4-fluorophenyl)-1-(o-tolyl)ethyl)naphthalene (4aag). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of (2-tolylphenyl)boronic acid (**3g**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 54.4 mg of the product as a yellow solid (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 – 7.76 (m, 1H), 7.74 – 7.71 (m, 1H), 7.70 (d, *J* = 8.5 Hz, 1H), 7.54 (s, 1H), 7.46 – 7.40 (m, 3H), 7.22 (ddd, *J* = 9.6, 8.5, 4.5 Hz, 2H), 7.14 (td, *J* = 7.4, 1.2 Hz, 1H), 7.09 (d, *J* = 6.7 Hz, 1H), 6.96 – 6.90 (m, 2H), 6.85 (t, *J* = 8.7 Hz, 2H), 4.52 (t, *J* = 7.7 Hz, 1H), 3.45 – 3.36 (m, 2H), 2.14 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 241.1 Hz), 142.1, 141.1, 136.4, 135.9 (d, *J* = 3.2 Hz), 133.3, 132.0, 130.5 (d, *J* = 2.5 Hz), 130.4, 127.8, 127.7, 127.5, 127.1 (d, *J* = 5.2 Hz), 126.4, 126.3, 126.1, 125.9, 125.4, 114.9, 114.7, 48.9, 41.5, 19.8. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.3. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F$: 340.1627; Found: 340.1614.



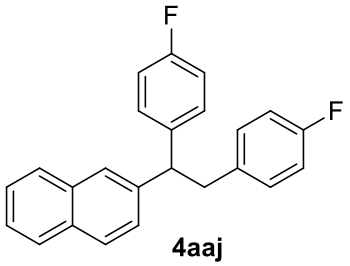
4aah

2-(2-(4-fluorophenyl)-1-phenylethyl)naphthalene (4aah). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 29.3 mg of boronic acid (**3h**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 44.5 mg of the product as a yellow oil (68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81 (t, *J* = 7.3 Hz, 2H), 7.77 (d, *J* = 8.5 Hz, 1H), 7.69 (s, 1H), 7.50 – 7.43 (m, 2H), 7.35 (dd, *J* = 8.5, 1.6 Hz, 1H), 7.32 – 7.28 (m, 2H), 7.27 (dd, *J* = 6.6, 1.2 Hz, 2H), 7.24 – 7.19 (m, 1H), 7.02 – 6.96 (m, 2H), 6.87 (dd, *J* = 12.1, 5.2 Hz, 2H), 4.38 (t, *J* = 7.8 Hz, 1H), 3.47 (qd, *J* = 13.7, 7.9 Hz, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.6 (d, *J* = 242.3 Hz), 144.0, 141.6, 135.8 (d, *J* = 3.2 Hz), 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 128.4, 128.1, 128.0, 127.7, 127.5, 126.8, 126.3, 126.0 (d, *J* = 12.9 Hz), 125.5, 114.9, 114.7, 53.3, 41.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{24}H_{19}F$: 326.1471; Found: 326.1459.



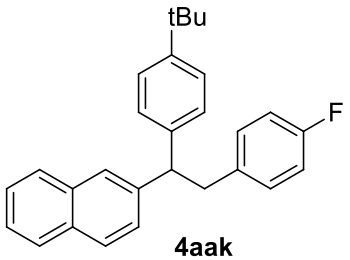
4aai

2-(2-(4-fluorophenyl)-1-(4-(trifluoromethyl)phenyl)ethyl)naphthalene (4aai). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 80:1, v/v) to afford 49.5 mg of the product as a bronzing solid (63 %). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.83 (ddd, *J* = 15.3, 9.3, 5.2 Hz, 2H), 7.77 (d, *J* = 8.6 Hz, 1H), 7.68 (s, 1H), 7.51 (dd, *J* = 8.4, 4.9 Hz, 2H), 7.49 – 7.44 (m, 2H), 7.33 (d, *J* = 8.1 Hz, 2H), 7.29 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.00 – 6.95 (m, 2H), 6.91 – 6.84 (m, 2H), 4.41 (t, *J* = 7.8 Hz, 1H), 3.51 (dd, *J* = 13.7, 7.6 Hz, 1H), 3.41 (dd, *J* = 13.7, 8.1 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.9 Hz), 148.1, 140.5, 135.1 (d, *J* = 3.3 Hz), 133.4, 132.3, 130.4 (d, *J* = 7.9 Hz), 128.4, 128.3, 127.7, 127.6, 126.5, 126.2 (d, *J* = 5.7 Hz), 125.8, 125.3 (q, *J* = 3.7 Hz), 115.1, 115.0, 53.1, 40.8. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.3, -116.9. HRMS, m/z: calcd for: $C_{25}H_{18}F_4$: 394.1345; Found: 394.1335.



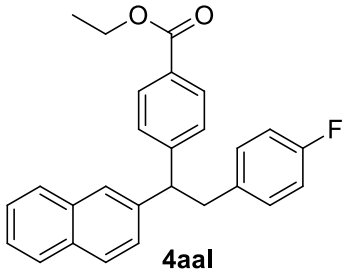
4aaj

2-(1,2-bis(4-fluorophenyl)ethyl)naphthalene (4aaj). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 33.6 mg of (4-fluorophenyl)boronic acid (**3j**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 55.1 mg of the product as a yellow solid (80%).^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (t, *J* = 7.7 Hz, 2H), 7.75 (d, *J* = 8.6 Hz, 1H), 7.66 (s, 1H), 7.46 (p, *J* = 6.9 Hz, 2H), 7.30 (d, *J* = 8.5 Hz, 1H), 7.16 (dd, *J* = 7.2, 5.5 Hz, 2H), 7.00 – 6.91 (m, 4H), 6.90 – 6.83 (m, 2H), 4.33 (t, *J* = 7.8 Hz, 1H), 3.46 (dd, *J* = 13.6, 7.4 Hz, 1H), 3.37 (dd, *J* = 13.6, 8.2 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.4 (d, *J* = 251.6 Hz), 161.4 (d, *J* = 233.9 Hz), 141.4, 139.7 (d, *J* = 3.2 Hz), 135.6 (d, *J* = 3.1 Hz), 133.4, 132.2, 130.4 (d, *J* = 7.9 Hz), 129.5 (d, *J* = 7.8 Hz), 128.1, 127.7 (d, *J* = 19.2 Hz), 126.7, 126.0 (d, *J* = 18.4 Hz), 125.6, 115.3, 115.1, 115.0, 114.8, 52.5, 41.2. ^{19}F NMR (471 MHz, $CDCl_3$) δ -116.7, -117.2. HRMS (EI) m/z: calcd for: $C_{24}H_{18}F_2$: 344.1377; Found: 344.1385.



4aak

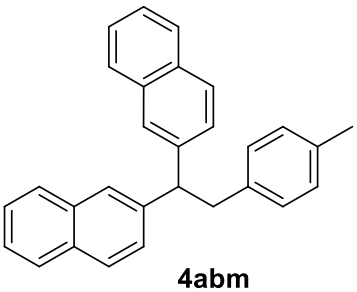
2-(1-(4-(tert-butyl)phenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aak). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 42.7 mg of (4-(tert-butyl)phenyl)boronic acid (**3k**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 66.5 mg of the product as a slight yellow solid (87%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 (dd, *J* = 19.9, 9.8 Hz, 3H), 7.63 (s, 1H), 7.47 – 7.40 (m, 2H), 7.34 (d, *J* = 8.5 Hz, 1H), 7.32 – 7.28 (m, 2H), 7.21 (d, *J* = 8.2 Hz, 2H), 6.99 – 6.94 (m, 2H), 6.84 (t, *J* = 8.7 Hz, 2H), 4.33 (t, *J* = 7.7 Hz, 1H), 3.44 (d, *J* = 7.8 Hz, 2H), 1.30 (s, 9H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 241.9 Hz), 149.1, 141.6, 141.1, 136.0 (d, *J* = 3.2 Hz), 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 128.0, 127.7, 127.5, 126.8, 126.3, 125.9, 125.4, 125.3, 114.9, 114.7, 52.9, 41.1, 34.3, 31.3. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.5. HRMS (EI) m/z: calcd for: $C_{28}H_{27}F$: 382.2097; Found: 382.2106.



4aal

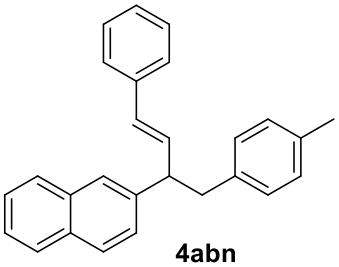
ethyl 4-(2-(4-fluorophenyl)-1-(naphthalen-2-yl)ethyl)benzoate (4aal). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 46.6 mg of (4-(ethoxycarbonyl)phenyl)boronic acid (**3l**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 43.1 mg of the product as a yellow solid (54%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 7.3 Hz, 2H), 7.79 (t, *J* = 7.2 Hz, 2H), 7.75 (d, *J* = 8.5 Hz, 1H), 7.68 (s, 1H), 7.50 – 7.43 (m, 2H), 7.29 (d, *J* = 7.3 Hz, 3H), 6.97 (dd, *J* = 8.2, 5.6 Hz, 2H), 6.86 (t, *J* = 8.4 Hz, 2H), 4.41 (t, *J* = 7.8 Hz, 1H), 4.36 (q, *J* = 6.8 Hz, 2H), 3.50 (dd, *J* = 13.7, 7.4 Hz, 1H), 3.42 (dd, *J* = 13.7, 8.3 Hz, 1H), 1.38 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 166.4, 161.3 (d, *J* = 242.6 Hz), 149.1, 140.8, 135.3 (d, *J* = 3.2 Hz), 133.4, 132.2, 130.4 (d, *J* = 7.8 Hz), 129.7, 128.7, 128.2 (d, *J* = 4.9 Hz), 127.7, 127.6, 126.6, 126.1 (d, *J* = 2.8 Hz), 125.7, 115.0, 114.9, 60.8,

53.3, 40.8, 14.3. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.0. HRMS (EI) m/z: calcd for: $C_{27}H_{23}FO_2$: 398.1682; Found: 398.1680.



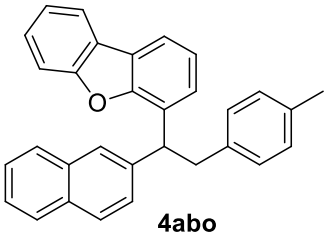
4abm

2,2'-(2-(*p*-tolyl)ethane-1,1-diyl)dinaphthalene(4abm). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 41.2 mg of 4-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 41.3 mg of naphthalen-2-ylboronic acid (**3m**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:0, v/v) to afford 38.9 mg of the product as a colourless solid (52%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 7.6, 1.7 Hz, 4H), 7.74 – 7.71 (m, 4H), 7.47 – 7.40 (m, 4H), 7.38 (dd, *J* = 8.6, 1.6 Hz, 2H), 6.97 (s, 4H), 4.57 (t, *J* = 7.7 Hz, 1H), 3.55 (d, *J* = 7.7 Hz, 2H), 2.25 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 141.9, 137.0, 135.3, 133.4, 132.1, 128.9, 128.8, 128.0, 127.8, 127.5, 127.0, 126.2, 125.9, 125.4, 53.1, 41.3, 21.0. HRMS (EI) m/z: calcd for: $C_{29}H_{24}$: 372.1878; Found: 372.1951.



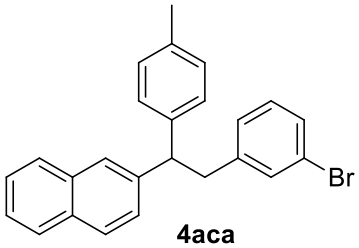
4abn

(*E*)-2-(4-phenyl-1-(*p*-tolyl)but-3-en-2-yl)naphthalene(4abn). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 41.2 mg of 4-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 35.5 mg of (*E*)-styrylboronic acid (**3n**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:0, v/v) to afford 32.1 mg of the product as a colourless solid (46%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (dd, *J* = 16.3, 7.8 Hz, 3H), 7.66 (s, 1H), 7.48 – 7.43 (m, 2H), 7.41 (d, *J* = 8.4 Hz, 1H), 7.30 (dd, *J* = 16.3, 7.3 Hz, 4H), 7.19 (t, *J* = 7.1 Hz, 1H), 7.02 (s, 4H), 6.50 (dd, *J* = 15.9, 7.3 Hz, 1H), 6.33 (d, *J* = 15.9 Hz, 1H), 3.90 (q, *J* = 7.4 Hz, 1H), 3.20 (d, *J* = 7.4 Hz, 2H), 2.28 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 141.3, 137.5, 136.8, 135.4, 133.6, 133.4, 132.3, 130.2, 129.1, 128.9, 128.5, 128.0, 127.7, 127.6, 127.1, 126.6, 126.2, 126.2, 125.9, 125.4, 51.0, 42.1, 21.0. HRMS (EI) m/z: calcd for: $C_{27}H_{24}$: 348.1878; Found: 348.1951.



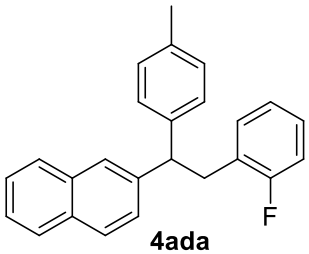
4abo

4-(1-(naphthalen-2-yl)-2-(*p*-tolyl)ethyl)dibenzo[*b,d*]furan(4abo). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 41.2 mg of 4-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 50.9 mg of dibenzo[*b,d*]furan-4-ylboronic acid (**3o**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 37.9 mg of the product as a colourless solid (46%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 7.6 Hz, 1H), 7.85 (s, 1H), 7.81 – 7.73 (m, 4H), 7.60 – 7.54 (m, 2H), 7.42 (dqd, *J* = 13.9, 6.8, 1.1 Hz, 4H), 7.31 (dt, *J* = 15.1, 7.5 Hz, 2H), 7.06 (d, *J* = 7.9 Hz, 2H), 6.96 (d, *J* = 7.9 Hz, 2H), 5.11 (t, *J* = 7.8 Hz, 1H), 3.69 (dd, *J* = 14.0, 7.5 Hz, 1H), 3.63 (dd, *J* = 14.0, 8.2 Hz, 1H), 2.23 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 156.0, 154.2, 140.8, 137.0, 135.3, 133.4, 132.2, 128.8, 128.8, 128.7, 127.8, 127.8, 127.5, 126.9,126.9, 126.5, 125.9, 125.9, 125.4, 124.5, 124.1, 122.8, 122.5, 120.6, 118.6, 111.7, 47.3, 40.4, 21.0. HRMS (EI) m/z: calcd for: $C_{31}H_{24}O$: 412.1827; Found: 412.1900.



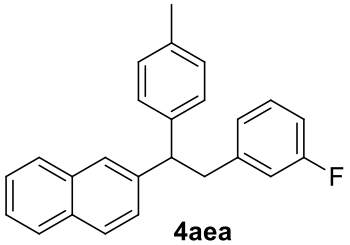
4aca

2-(2-(3-bromophenyl)-1-(p-tolyl)ethyl)naphthalene (4aca). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 59.8 mg of 3-bromophenyldiazonium tetrafluoroborate (**2c**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 58.6 mg of the product as a brown oil (73%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 – 7.76 (m, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.66 (s, 1H), 7.47 – 7.41 (m, 2H), 7.32 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.26 (d, *J* = 7.0 Hz, 2H), 7.13 (d, *J* = 8.1 Hz, 2H), 7.08 (d, *J* = 8.0 Hz, 2H), 7.00 (t, *J* = 8.0 Hz, 1H), 6.91 (d, *J* = 7.6 Hz, 1H), 4.35 (t, *J* = 7.8 Hz, 1H), 3.42 (qd, *J* = 13.7, 7.9 Hz, 2H), 2.30 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 142.6, 141.6, 140.8, 135.9, 133.4, 132.1,132.0, 129.6, 129.1, 129.0, 128.0, 127.9, 127.7, 127.7, 127.5, 126.7, 125.9, 125.9, 125.4, 122.10, 52.4, 41.5, 21.0. HRMS (EI) m/z: calcd for: $C_{25}H_{21}Br$: 400.0827; Found: 400.0824.



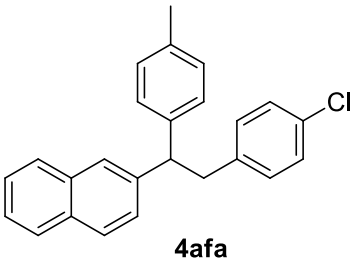
4ada

2-(2-(2-fluorophenyl)-1-(p-tolyl)ethyl)naphthalene (4ada). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 2-fluorophenyldiazonium tetrafluoroborate (**2d**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 38.2 mg of the product as a yellow oil (57 %). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 – 7.75 (m, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.69 (s, 1H), 7.47 – 7.40 (m, 2H), 7.36 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.17 (d, *J* = 8.1 Hz, 2H), 7.13 – 7.06 (m, 3H), 6.96 (td, *J* = 9.3, 2.5 Hz, 2H), 6.88 (td, *J* = 7.5, 1.1 Hz, 1H), 4.47 (t, *J* = 7.9 Hz, 1H), 3.55 – 3.43 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 243.1 Hz), 141.8, 141.0, 135.8, 133.4, 132.1, 131.2 (d, *J* = 4.9 Hz), 129.0, 127.9 (d, *J* = 2.1 Hz), 127.6 (d, *J* = 28.8 Hz), 127.6 (d, *J* = 8.1 Hz), 127.0 (d, *J* = 15.3 Hz), 126.8, 126.0, 125.8, 125.3, 123.6 (d, *J* = 3.5 Hz), 115.1, 114.9, 51.1, 35.0, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -118.1. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F$: 340.1627; Found: 340.1634.



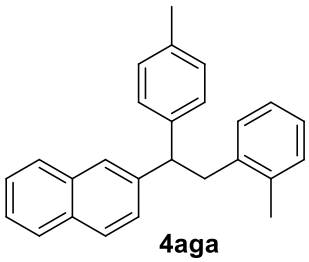
4aea

2-(2-(3-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aea). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 42.0 mg of 3-fluorophenyldiazonium tetrafluoroborate (**2e**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 45.1 mg of the product as a yellow oil (67%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (t, *J* = 7.1 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.67 (s, 1H), 7.48 – 7.41 (m, 2H), 7.34 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.18 – 7.11 (m, 3H), 7.09 (d, *J* = 8.0 Hz, 2H), 7.00 – 6.82 (m, 2H), 6.81 – 6.77 (m, 1H), 4.38 (t, *J* = 7.8 Hz, 1H), 3.47 (qd, *J* = 13.7, 7.8 Hz, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 162. 6 (d, *J* = 243.5 Hz), 142.9 (d, *J* = 7.3 Hz), 141.7, 140.9, 135.9, 133.4, 132.1, 129.4 (d, *J* = 8.4 Hz), 129.1, 128.0, 127.9, 127.7, 127.5, 126.7, 125.9 (d, *J* = 2.9 Hz), 125.4, 124.7 (d, *J* = 2.7 Hz), 115.9, 115.7, 112.9, 112.7, 52.4, 41.6, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -113.9. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F$: 340.1627; Found: 340.1626.



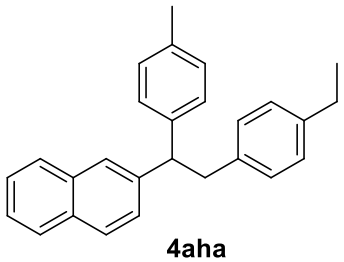
4afa

2-(2-(4-chlorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4afa). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 45.4 mg of 4-chlorophenyldiazonium tetrafluoroborate (**2f**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 56.2 mg of the product as a slight yellow oil (79%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (t, *J* = 7.6 Hz, 2H), 7.75 (d, *J* = 8.5 Hz, 1H), 7.66 (s, 1H), 7.48 – 7.42 (m, 2H), 7.33 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.15 (d, *J* = 8.3 Hz, 4H), 7.09 (d, *J* = 8.0 Hz, 2H), 6.97 (d, *J* = 8.4 Hz, 2H), 4.34 (t, *J* = 7.8 Hz, 1H), 3.48 – 3.39 (m, 2H), 2.32 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 141.7, 140.9, 138.8, 135.9, 133.4, 132.1, 131.6, 130.4, 129.1, 128.2, 128.0, 127.9, 127.7, 127.53, 126.7, 126.0, 126.0, 125.4, 52.6, 41.3, 21.0. HRMS (EI) m/z: calcd for: $C_{25}H_{21}Cl$: 356.1332; Found: 356.1343.



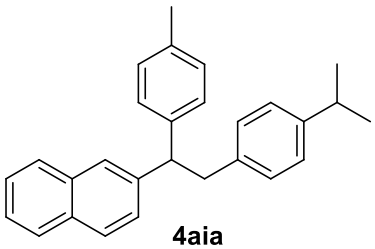
4aga

2-(2-(*o*-tolyl)-1-(*p*-tolyl)ethyl)naphthalene (4aga). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 41.2 mg of *o*-tolyldiazonium tetrafluoroborate **(2g)** (0.20 mmol), 32.6 mg of *p*-tolylboronic acid **(3a)** (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 50.6 mg of the product as a slight yellow oil (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 – 7.76 (m, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.66 (s, 1H), 7.47 – 7.41 (m, 2H), 7.33 (dd, *J* = 8.5, 1.7 Hz, 1H), 7.13 (t, *J* = 7.3 Hz, 2H), 7.07 (ddd, *J* = 9.5, 8.6, 3.1 Hz, 4H), 6.97 (t, *J* = 6.6 Hz, 1H), 6.89 (d, *J* = 7.3 Hz, 1H), 4.39 (t, *J* = 7.5 Hz, 1H), 3.51 – 3.41 (m, 2H), 2.32 (s, 3H), 2.22 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 142.2, 141.4, 138.4, 136.3, 135.7, 133.4, 132.1, 123.0, 129.7, 129.0, 128.0, 127.9, 127.7, 127.5, 127.0, 126.0, 125.9, 125.8, 125.5, 125.3, 51.3, 39.1, 21.0, 19.5. HRMS (EI) m/z: calcd for: $C_{26}H_{24}$: 336.1878; Found: 336.1867.



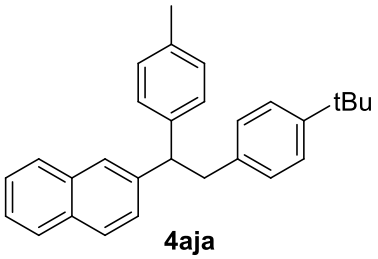
4aha

2-(2-(4-ethylphenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aha). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 44.0 mg of 4-ethylphenyldiazonium tetrafluoroborate (**2h**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 47.6 mg of the product as a yellow oil (68%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (t, *J* = 6.9 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.68 (s, 1H), 7.47 – 7.41 (m, 2H), 7.36 (dd, *J* = 8.5, 1.7 Hz, 1H), 7.18 (d, *J* = 8.1 Hz, 2H), 7.09 (d, *J* = 7.9 Hz, 2H), 7.01 (q, *J* = 8.3 Hz, 4H), 4.40 (t, *J* = 7.7 Hz, 1H), 3.50 – 3.41 (m, 2H), 2.58 (q, *J* = 7.6 Hz, 2H), 2.31 (s, 3H), 1.20 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 142.2, 141.6, 141.5, 137.4, 135.6, 133.4, 132.1, 129.0, 128.9, 128.0, 127.9, 127.7, 127.5, 127.5, 126.9, 126.0, 125.8, 125.3, 52.6, 41.5, 28.4, 21.0, 15.5. HRMS (EI) m/z: calcd for: $C_{27}H_{26}$: 350.2035; Found: 350.2030.



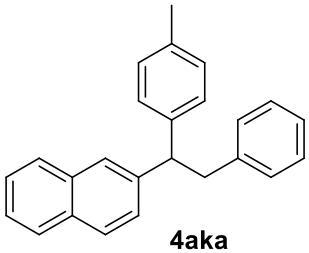
4aia

2-(2-(4-isopropylphenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aia). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 50.4 mg of 4-isopropylphenyldiazonium tetrafluoroborate (**2i**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 43.1 mg of the product as a slight yellow oil (59%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 (t, *J* = 7.7 Hz, 2H), 7.73 (d, *J* = 8.5 Hz, 1H), 7.67 (s, 1H), 7.43 (dq, *J* = 6.9, 5.5 Hz, 2H), 7.36 (dd, *J* = 8.5, 1.5 Hz, 1H), 7.18 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 7.9 Hz, 2H), 7.04 (d, *J* = 8.0 Hz, 2H), 7.00 (d, *J* = 8.0 Hz, 2H), 4.40 (t, *J* = 7.7 Hz, 1H), 3.50 – 3.40 (m, 2H), 2.93 – 2.76 (m, 1H), 2.31 (s, 3H), 1.21 (d, *J* = 6.9 Hz, 6H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 146.3, 142.3, 141.6, 137.6, 135.6, 133.4, 132.1, 129.0, 128.9, 128.0, 127.9, 127.7, 127.5, 126.9, 126.1, 126.0, 125.8, 125.3, 52.6, 41.4, 33.6, 24.0, 24.0, 21.0. HRMS (EI) m/z: calcd for: $C_{28}H_{28}$: 364.2191; Found: 364.2199.



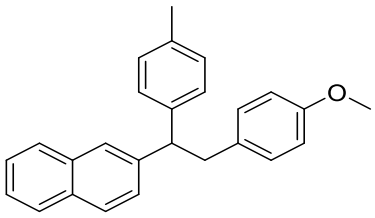
4aja

2-(2-(4-(*tert*-butyl)phenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aia). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 49.6 mg of 4-(tert-butyl)phenyldiazonium tetrafluoroborate (**2j**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 57.5 mg of the product as a yellow oil (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 8.9, 7.4 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.68 (s, 1H), 7.47 – 7.41 (m, 2H), 7.37 (dd, *J* = 8.5, 1.5 Hz, 1H), 7.23 – 7.17 (m, 4H), 7.10 (d, *J* = 8.0 Hz, 2H), 7.02 (d, *J* = 8.1 Hz, 2H), 4.42 (t, *J* = 7.7 Hz, 1H), 3.51 – 3.42 (m, 2H), 2.32 (s, 3H), 1.29 (s, 9H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 148.6, 142.3, 141.6, 137.2, 135.6, 133.5, 132.1, 129.1, 128.6, 128.0, 127.9, 127.7, 127.5, 126.9, 126.1, 125.8, 125.3, 125.0, 52.5, 41.3, 34.3, 31.4, 21.0. HRMS (EI) m/z: calcd for: $C_{29}H_{30}$: 378.2348; Found: 378.2346.



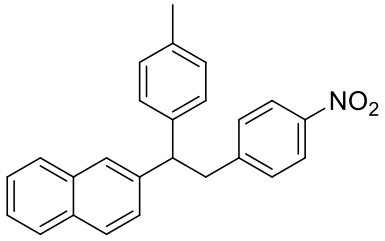
4aka

2-(2-phenyl-1-(*p*-tolyl)ethyl)naphthalene (4aka). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 38.4 mg of phenyldiazonium tetrafluoroborate (**2k**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 49.0 mg of the product as a slight yellow oil (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (dd, *J* = 8.0, 7.0 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.68 (s, 1H), 7.48 – 7.41 (m, 2H), 7.36 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.22 – 7.16 (m, 4H), 7.16 – 7.12 (m, 1H), 7.09 (t, *J* = 8.2 Hz, 4H), 4.41 (t, *J* = 7.8 Hz, 1H), 3.54 – 3.44 (m, 2H), 2.32 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 142.1, 141.3, 140.3, 135.6, 133.4, 132.0, 129.0,129.0, 128.0, 128.0, 127.9, 127.7, 127.5, 126.9, 126.0, 125.8, 125.8, 125.3, 52.6, 41.9, 21.0. HRMS (EI) m/z: calcd for: $C_{25}H_{22}$: 322.1722; Found: 322.1727.



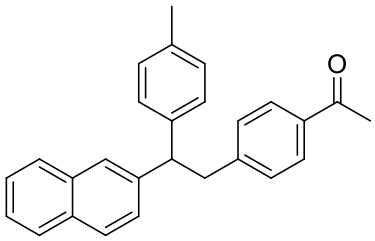
4ala

2-(2-(4-methoxyphenyl)-1-(p-tolyl)ethyl)naphthalene (4ala). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 44.4 mg of 4-methoxyphenyldiazonium tetrafluoroborate (**2l**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 50:1, v/v) to afford 48.2 mg of the product as a slight yellow solid (69%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.83 – 7.79 (m, 2H), 7.77 (d, *J* = 8.5 Hz, 1H), 7.70 (s, 1H), 7.50 – 7.43 (m, 2H), 7.38 (dd, *J* = 8.5, 1.4 Hz, 1H), 7.20 (d, *J* = 8.0 Hz, 2H), 7.12 (d, *J* = 8.1 Hz, 2H), 7.00 (d, *J* = 8.5 Hz, 2H), 6.76 (d, *J* = 8.6 Hz, 2H), 4.38 (t, *J* = 7.7 Hz, 1H), 3.77 (s, 3H), 3.50 – 3.39 (m, 2H), 2.34 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 157.7, 142.2, 141.4, 135.6, 133.5, 132.4, 132.1, 129.9, 129.0, 128.0, 127.9, 127.8, 127.5, 126.9, 126.1, 125.8, 125.3, 113.5, 55.1, 53.0, 41.1, 21.0. HRMS (EI) m/z: calcd for: $C_{26}H_{24}O$: 352.1827; Found: 352.1833.



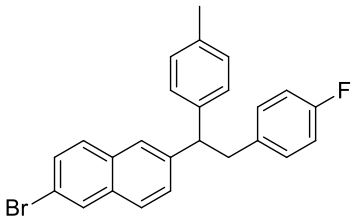
4ama

2-(2-(4-nitrophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4ama). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 47.4 mg of 4-nitrophenyldiazonium tetrafluoroborate (**2m**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 40:1, v/v) to afford 44.5 mg of the product as a yellow oil (61%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.04 – 8.02 (m, 1H), 8.02 – 8.00 (m, 1H), 7.80 – 7.74 (m, 3H), 7.65 (s, 1H), 7.49 – 7.42 (m, 2H), 7.32 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.17 (d, *J* = 8.7 Hz, 2H), 7.13 (d, *J* = 8.2 Hz, 2H), 7.09 (d, *J* = 8.0 Hz, 2H), 4.38 (t, *J* = 7.9 Hz, 1H), 3.61 – 3.51 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 148.2, 146.3, 141.1, 140.2, 136.2, 133.3, 132.2, 129.8, 129.2, 128.2, 127.8, 127.7, 127.5, 126.4, 126.1, 125.9, 125.6, 123.3, 52.3, 41.7, 21.0. HRMS (EI) m/z: calcd for: $C_{29}H_{21}NO_2$: 367.1572; Found: 367.1575.



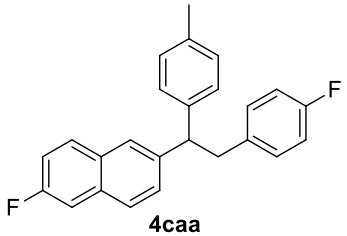
4ana

1-(4-(2-(naphthalen-2-yl)-2-(*p*-tolyl)ethyl)phenyl)ethan-1-one (4ana). The optimized procedure was followed by using 30.8 mg of 2-vinylnaphthalene (**1a**) (0.20 mmol), 50.2 mg of 4-acetylphenonediazonium tetrafluoroborate (**2n**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at stirred at 50 ^oC. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 40:1, v/v) to afford 30.5 mg of the product as a brown oil (42%). ^1H NMR (500 MHz, $CDCl_3$) δ 7.76 (ddd, *J* = 9.3, 6.0, 4.0 Hz, 4H), 7.73 (d, *J* = 8.6 Hz, 1H), 7.65 (s, 1H), 7.43 (ddd, *J* = 5.4, 4.6, 1.5 Hz, 2H), 7.32 (dd, *J* = 8.5, 1.6 Hz, 1H), 7.13 (d, *J* = 8.3 Hz, 4H), 7.07 (d, *J* = 8.1 Hz, 2H), 4.39 (t, *J* = 7.8 Hz, 1H), 3.56 – 3.47 (m, 2H), 2.53 (s, 3H), 2.30 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 197.9, 146.1, 141.6, 140.8, 136.0, 135.1, 133.4, 132.2, 129.2, 129.2, 128.9, 128.4, 128.3, 128.1, 127.9, 127.7, 127.53, 126.7, 126.0, 125.45, 52.3, 41.9, 26.5, 21.0. HRMS (EI) m/z: calcd for: $C_{27}H_{24}O$: 364.1827; Found: 364.1831.



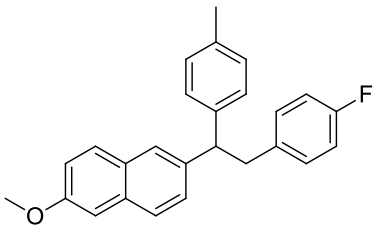
4baa

2-bromo-6-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4baa). The optimized procedure was followed by using 46.4 mg of 2-bromo-6-vinylnaphthalene (**1b**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 55.6 mg of the product as a slight yellow solid (67%). ^1H NMR (500 MHz, $CDCl_3$) δ 7.94 (d, *J* = 1.7 Hz, 1H), 7.63 (dd, *J* = 8.5, 5.9 Hz, 2H), 7.59 (s, 1H), 7.51 (dd, *J* = 8.8, 1.9 Hz, 1H), 7.34 (dd, *J* = 8.6, 1.7 Hz, 1H), 7.13 (d, *J* = 8.1 Hz, 2H), 7.09 (d, *J* = 8.2 Hz, 2H), 6.96 (dd, *J* = 8.5, 5.5 Hz, 2H), 6.85 (t, *J* = 8.7 Hz, 2H), 4.30 (t, *J* = 7.8 Hz, 1H), 3.41 (d, *J* = 7.8 Hz, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.2 Hz), 142.4, 140.7, 136.0, 135.7 (d, *J* = 3.2 Hz), 133.2, 131.8, 130.4 (d, *J* = 7.8 Hz), 129.5, 129.3 (d, *J* = 13.2 Hz), 129.2, 127.9, 127.8, 127.1, 126.0, 119.3, 114.9, 114.8, 52.8, 41.0, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.2. HRMS (EI) m/z: calcd for: $C_{25}H_{20}BrF$: 418.0732; Found: 418.0727.



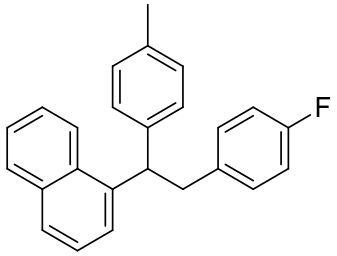
4caa

2-fluoro-6-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4caa). The optimized procedure was followed by using 17.2 mg of 2-fluoro-6-vinylnaphthalene (**1c**) (0.10 mmol), 21.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.10 mmol), 16.3 mg of p-tolylboronic acid (**3a**) (0.12 mmol), 4.6 mg of $Pd_2(dba)_3$ (0.005 mmol), 8.9 mg of lithium carbonate (0.12 mmol) and 0.5 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 23.1 mg of the product as a slight yellow solid (65%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.73 (dd, *J* = 9.0, 5.6 Hz, 1H), 7.66 (d, *J* = 8.5 Hz, 1H), 7.61 (s, 1H), 7.38 (dd, *J* = 9.8, 2.5 Hz, 1H), 7.33 (d, *J* = 8.5 Hz, 1H), 7.22 (td, *J* = 8.7, 2.6 Hz, 1H), 7.12 (d, *J* = 8.1 Hz, 2H), 7.08 (d, *J* = 8.1 Hz, 2H), 6.96 (dd, *J* = 8.5, 5.5 Hz, 2H), 6.84 (t, *J* = 8.7 Hz, 2H), 4.29 (t, *J* = 7.8 Hz, 1H), 3.44 – 3.36 (m, 2H), 2.30 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.3 Hz), 160.4 (d, *J* = 243.8 Hz), 141.2, 140.9, 135.9, 135.8 (d, *J* = 3.2 Hz), 132.7 (d, *J* = 9.1 Hz), 130.4, 130.4 (d, *J* = 7.8 Hz), 130.3, 130.0 (d, *J* = 8.9 Hz), 129.1, 127.9, 127.8, 127.4 (d, *J* = 5.3 Hz), 126.0, 116.2 (d, *J* = 25.3 Hz), 114.9 (d, *J* = 21.1 Hz), 110.6 (d, *J* = 20.3 Hz), 52.7, 41.1, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -115.5, -117.3. HRMS (EI) m/z: calcd for: $C_{25}H_{20}F_2$: 358.1533; Found: 358.1536.



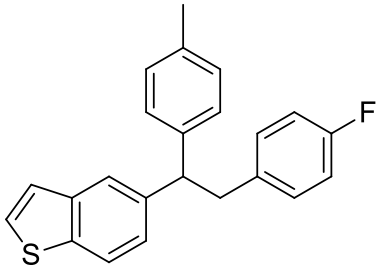
4daa

2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)-6-methoxynaphthalene (4daa). The optimized procedure was followed by using 36.8 mg of 2-methoxy-6-vinylnaphthalene (**1d**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 40:1, v/v) to afford 47.0 mg of the product as a field gray solid (63%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.65 (dd, *J* = 12.9, 8.7 Hz, 2H), 7.57 (s, 1H), 7.29 (dd, *J* = 8.4, 1.5 Hz, 1H), 7.15 – 7.12 (m, 3H), 7.08 (d, *J* = 8.2 Hz, 3H), 6.97 (dd, *J* = 8.3, 5.6 Hz, 2H), 6.85 (t, *J* = 8.7 Hz, 2H), 4.29 (t, *J* = 7.8 Hz, 1H), 3.91 (s, 3H), 3.46 – 3.36 (m, 2H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.8 Hz), 157.4, 141.3, 139.6, 136.0 (d, *J* = 3.1 Hz), 135.7, 133.1, 130.4 (d, *J* = 7.8 Hz), 129.1 (d, *J* = 16.5 Hz), 128.9, 127.9, 127.3, 126.9, 125.9, 118.7, 114.9, 114.7, 105.8, 55.3, 52.7, 41.2, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.5. HRMS (EI) m/z: calcd for: $C_{26}H_{23}FO$: 370.1733; Found: 370.1737.



4eaa

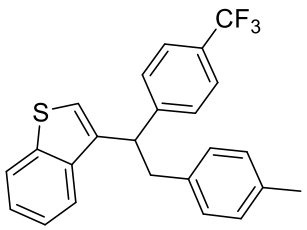
1-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4eaa). The optimized procedure was followed by using 30.8 mg of 1-vinylnaphthalene (**1e**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 51.7 mg of the product as a yellow oil (76%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.05 (d, *J* = 9.0 Hz, 1H), 7.85 – 7.81 (m, 1H), 7.75 (d, *J* = 8.1 Hz, 1H), 7.58 (d, *J* = 7.1 Hz, 1H), 7.49 (t, *J* = 7.7 Hz, 1H), 7.42 (p, *J* = 6.9 Hz, 2H), 7.01 (ddd, *J* = 13.8, 12.7, 6.8 Hz, 6H), 6.86 (t, *J* = 8.4 Hz, 2H), 4.98 – 4.91 (m, 1H), 3.50 (dd, *J* = 13.8, 6.3 Hz, 1H), 3.41 (dd, *J* = 13.8, 9.0 Hz, 1H), 2.27 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.1 Hz), 140.8, 140.0, 136.0 (d, *J* = 3.1 Hz), 135.7, 134.0, 131.7, 130.4 (d, *J* = 7.8 Hz), 129.0, 128.8, 128.1, 127.1, 125.9, 125.3 (d, *J* = 4.0 Hz), 124.4, 123.6, 114.9, 114.7, 47.9, 41.8, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F$: 340.1627; Found: 340.1621.



4faa

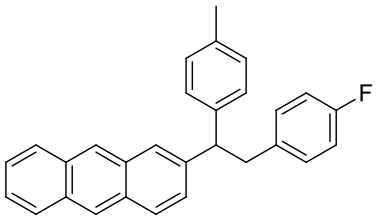
5-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)benzo[*b*]thiophene (4faa). The optimized procedure was followed by using 16.0 mg of 5-vinylbenzo[*b*]thiophene (**1f**) (0.10 mmol), 21.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.10 mmol), 16.3 mg of p-tolylboronic acid (**3a**) (0.12 mmol), 4.6 mg of $Pd_2(dba)_3$ (0.005 mmol), 8.9 mg of lithium carbonate (0.12 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 80:1, v/v) to afford 14.9 mg of the product as a slight yellow solid (44%). ^{1}HNMR (500 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.4 Hz, 1H), 7.63 (d, *J* = 1.6 Hz, 1H), 7.40 (d, *J* = 5.4 Hz, 1H), 7.25 (d, *J* = 5.4 Hz, 1H), 7.17 (dd, *J* = 8.4, 1.7 Hz, 1H), 7.12 (d, *J* = 8.1 Hz, 2H), 7.07 (d, *J* = 8.0 Hz, 2H), 6.98 – 6.93 (m, 2H), 6.87 – 6.81 (m, 2H), 4.27 (t, *J* = 7.8 Hz, 1H), 3.38 (d, *J* = 7.8 Hz, 2H), 2.29 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.0 Hz), 141.4, 140.7, 139.8, 137.6, 136.0 (d, *J* = 3.2 Hz), 135.8, 130.4 (d, *J* = 7.8 Hz), 129.1, 127.8, 126.5, 124.9, 123.8, 122.4 (d, *J* = 24.2 Hz), 114.9, 114.7, 52.7, 41.4, 21.0.

^{19}F NMR (471 MHz, $CDCl_3$) δ -117.5. HRMS (EI) m/z: calcd for: $C_{23}H_{19}FS$: 346.1191; Found: 346.1189.



4gbi

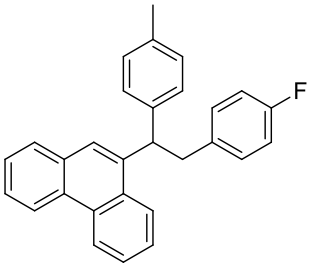
3-(*2*-(*p*-tolyl)-1-(4-(trifluoromethyl)phenyl)ethyl)benzo[*b*]thiophene (4gbi). The optimized procedure was followed by using 32.0 mg of 3-vinylbenzo[*b*]thiophene (**1g**) (0.20 mmol), 41.2 mg of p-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.0.24 mmol) and 1.0 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 200:1, v/v) to afford 43 mg of the product as a light yellow oil (55%).^{1}H NMR (500 MHz, $CDCl_3$) δ 7.85 (d, *J* = 7.9 Hz, 1H), 7.52 (d, *J* = 8.0 Hz, 1H), 7.46 (d, *J* = 8.1 Hz, 2H), 7.38 (s, 1H), 7.31 (dd, *J* = 11.1, 4.0 Hz, 1H), 7.29 – 7.26 (m, 1H), 7.23 (d, *J* = 8.1 Hz, 2H), 7.02 (d, *J* = 7.8 Hz, 2H), 6.91 (d, *J* = 7.9 Hz, 2H), 4.61 (dd, *J* = 9.3, 5.9 Hz, 1H), 3.57 (dd, *J* = 13.7, 5.9 Hz, 1H), 3.27 (dd, *J* = 13.6, 9.4 Hz, 1H), 2.30 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 147.0, 140.5, 138.3, 138.0, 136.0, 135.8, 129.0, 128.8, 128.7 (q, *J* = 75.8, 43.5 Hz),128.4, 125.3 (q, *J* = 3.7 Hz), 124.4, 124.0, 122.9, 122.2, 122.0, 47.1, 41.8, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.3. HRMS (EI) m/z: calcd for: **$C_{24}H_{19}F_3S$**: **396.1160**; Found: 396.1161.



4haa

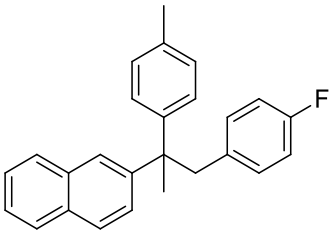
2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)anthracene (4haa). The optimized procedure was followed by using 20.4 mg of 2-vinylanthracene (**1h**) (0.10 mmol), 21.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.10 mmol), 16.3 mg of p-tolylboronic acid (**3a**) (0.12 mmol), 4.6 mg of $Pd_2(dba)_3$ (0.005 mmol), 8.9 mg of lithium carbonate (0.12 mmol) and 0.5 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 29 mg of the product as a brown solid (74%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.35 (s, 1H), 8.34 (s, 1H), 7.98 (dd, *J* = 9.2, 3.4 Hz, 2H), 7.89 (d, *J* = 8.8 Hz, 1H), 7.78 (s, 1H), 7.47 – 7.44 (m, 2H), 7.29 (dd, *J* = 8.8, 1.7 Hz, 1H), 7.16 (d, *J* = 8.1 Hz, 2H), 7.10 (s, 1H), 7.09 (s, 1H), 6.99 (d, *J* = 3.2 Hz, 1H), 6.98 (s, 1H), 6.85 (t, *J* = 8.8 Hz, 2H), 4.33 (t, *J* = 7.8 Hz, 1H), 3.49 (dd, *J* = 13.7, 7.8 Hz, 1H), 3.42 (dd, *J*

= 13.7, 7.7 Hz, 1H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 242.1 Hz), 141.1, 140.7, 135.9 (d, *J* = 2.9 Hz), 131.8, 131.7, 131.5, 130.6, 130.4 (d, *J* = 7.8 Hz), 129.1, 129.0, 128.8 (d, *J* = 15.6 Hz), 128.3, 128.1, 128.1, 128.0, 126.8, 125.9, 125.6, 125.3, 125.1, 114.9, 114.8, 53.0, 40.8, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{29}H_{23}F$: 390.1784; Found:390.1787.



4iaa

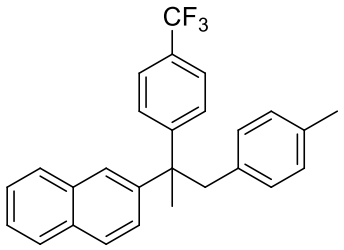
9-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)phenanthrene (4iaa). The optimized procedure was followed by using 40.8 mg of 9-vinylphenanthrene (**1i**) (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 56.2 mg of the product as a slight yellow solid (72%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.73 (d, *J* = 8.1 Hz, 1H), 8.68 (d, *J* = 7.5 Hz, 1H), 8.12 (d, *J* = 8.1 Hz, 1H), 7.94 (dd, *J* = 7.6, 1.5 Hz, 1H), 7.88 (s, 1H), 7.67 – 7.58 (m, 3H), 7.54 – 7.50 (m, 1H), 7.07 (d, *J* = 8.1 Hz, 2H), 7.02 (td, *J* = 8.2, 5.5 Hz, 4H), 6.90 (t, *J* = 8.7 Hz, 2H), 4.94 (dd, *J* = 9.1, 5.9 Hz, 1H), 3.62 (dd, *J* = 13.7, 5.9 Hz, 1H), 3.45 (dd, *J* = 13.7, 9.2 Hz, 1H), 2.28 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.3 (d, *J* = 242.1 Hz), 140.4, 137.9, 136.0 (d, *J* = 3.2 Hz), 135.8, 131.5, 131.1, 130.9, 130.5 (d, *J* = 7.8 Hz), 129.7, 129.0, 128.5, 128.1, 126.6 (d, *J* = 9.8 Hz), 126.4, 126.1, 125.2, 124.5, 123.1, 122.4, 114.9, 114.8, 48.2, 41.9, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{29}H_{23}F$: 390.1784; Found:390.1786.



4kaa

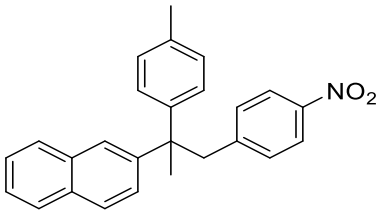
2-(1-(4-fluorophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kaa). The optimized procedure was followed by using 16.8 mg of 2-(prop-1-en-2-yl)naphthalene (**1k**) (0.10 mmol), 21.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.10 mmol), 16.3 mg of p-tolylboronic acid (**3a**) (0.12 mmol), 4.6 mg of $Pd_2(dba)_3$ (0.005 mmol), 8.9 mg of lithium carbonate (0.12 mmol) and 0.5mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 25.0 mg of the product as a slight yellow solid (70%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (t, *J* = 8.7 Hz, 2H),

7.74 – 7.68 (m, 2H), 7.48 (p, *J* = 6.9 Hz, 2H), 7.21 (d, *J* = 8.8 Hz, 1H), 7.08 (s, 4H), 6.89 – 6.70 (m, 2H), 6.60 – 6.50 (m, 2H), 3.51 (q, *J* = 12.7 Hz, 2H), 2.35 (s, 3H), 1.61 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.4 (d, *J* = 242.4 Hz), 146.4, 145.7, 135.4, 133.7 (d, *J* = 3.2 Hz), 133.0, 132.0 (d, *J* = 7.8 Hz), 131.8, 130.6, 128.7, 128.0, 127.6, 127.4 (d, *J* = 13.4 Hz), 125.9, 125.6, 124.9, 114.2, 114.0, 46.9, 46.5, 26.8, 20.9. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.5. HRMS (EI) m/z: calcd for: $C_{26}H_{24}O$: 354.1784; Found: 354.1794.



4kbi

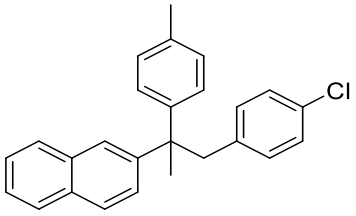
2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)naphthalene (4kbi). The optimized procedure was followed by using 33.6 mg of 2-(prop-1-en-2-yl)naphthalene (**1k**) (0.20 mmol), 41.2 mg of *p*-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1.0 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 200:1, v/v) to afford 66.1 mg of the product as a slight yellow oil (82%).^{1}H NMR (500 MHz, $CDCl_3$) δ 7.83 (dd, *J* = 8.8, 5.6 Hz, 2H), 7.75 (d, *J* = 9.4 Hz, 2H), 7.54 – 7.48 (m, 4H), 7.31 (d, *J* = 8.2 Hz, 2H), 7.17 (dd, *J* = 8.6, 1.9 Hz, 1H), 6.88 (d, *J* = 7.8 Hz, 2H), 6.52 (d, *J* = 7.9 Hz, 2H), 3.58 (d, *J* = 12.6 Hz, 1H), 3.51 (d, *J* = 12.6 Hz, 1H), 2.26 (s, 3H), 1.68 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 153.2, 145.7, 135.7, 134.1, 133.0, 131.9, 130.5, 128.2, 128.2, 128.0, 127.7, 127.4, 127.2, 126.1, 125.8, 125.6 (q, *J* = 272.3 Hz), 125.1, 124.8 (q, *J* = 3.7 Hz), 47.5, 46.8, 26.8, 20.9. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.2. HRMS (EI) m/z: calcd for: $C_{27}H_{23}F_3$: 404.1752; Found: 404.1749.



4kma

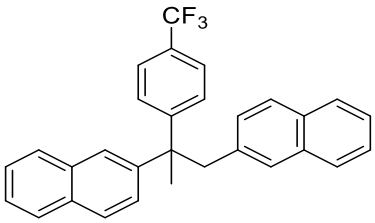
2-(1-(4-nitrophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kma). The optimized procedure was followed by using 33.6 mg of 2-(prop-1-en-2-yl)naphthalene (**1k**) (0.20 mmol), 47.4 mg of 4-nitrophenyldiazonium tetrafluoroborate (**2m**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA =40:1, v/v) to afford 40.6 mg of the product as a slight yellow oil (53%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.89 (d, *J* = 8.6 Hz, 2H), 7.82

– 7.79 (m, 1H), 7.78 – 7.75 (m, 1H), 7.72 (d, *J* = 8.7 Hz, 1H), 7.68 (s, 1H), 7.50 – 7.46 (m, 2H), 7.18 (dd, *J* = 8.6, 1.7 Hz, 1H), 7.06 (q, *J* = 8.3 Hz, 4H), 6.76 (d, *J* = 8.6 Hz, 2H), 3.62 (q, *J* = 12.3 Hz, 2H), 2.33 (s, 3H), 1.56 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 146.4, 146.2, 145.9, 145.7, 144.9, 135.7, 131.7, 131.3, 128.7, 127.9, 127.7, 127.4, 127.3, 127.1, 126.0, 125.7, 124.6, 122.4, 47.2, 47.0, 26.8, 20.8. HRMS (EI) m/z: calcd for: $C_{26}H_{23}NO_2$: 381.1729; Found: 381.1732.



4kfa

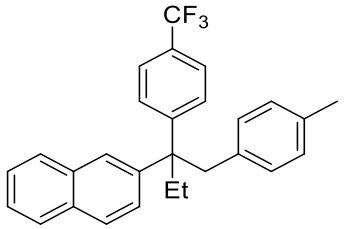
2-(1-(4-chlorophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kfa). The optimized procedure was followed by using 33.6 mg of 2-(prop-1-en-2-yl)naphthalene (**1k**) (0.20 mmol), 45.4 mg of 4-chlorophenyldiazonium tetrafluoroborate (**2f**) (0.20 mmol), 32.6 mg of *p*-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA =100:1, v/v) to afford 26.1 mg of the product as a slight yellow oil (35%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (dd, *J* = 7.1, 4.7 Hz, 2H), 7.71 (d, *J* = 8.0 Hz, 2H), 7.51 – 7.44 (m, 2H), 7.20 (ddd, *J* = 8.5, 5.8, 2.5 Hz, 1H), 7.06 (s, 4H), 7.04 – 6.98 (m, 2H), 6.54 (dd, *J* = 8.3, 2.7 Hz, 2H), 3.50 (q, *J* = 12.6 Hz, 2H), 2.33 (s, 3H), 1.59 (s, 3H).^{13}C NMR (125 MHz, $CDCl_3$) δ 146.3, 145.6, 136.5, 135.5 133.0, 132.4, 132.0, 131.8, 131.8, 131.8, 128.7, 128.0, 127.6, 127.5,127.4,127.4, 125.9, 125.6, 124.8, 46.9, 46.7, 26.8, 20.9. HRMS (EI) m/z: calcd for: $C_{26}H_{23}Cl$: 370.1488; Found: 370.1486.



4koi

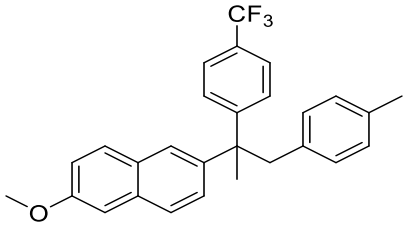
2,2'-(2-(4-(trifluoromethyl)phenyl)propane-1,2-diyl)dinaphthalene (4koi). The optimized procedure was followed by using 33.6 mg of 2-(prop-1-en-2-yl)naphthalene (**1k**) (0.20 mmol), 48.4 mg of 2-naphthalenediazonium tetrafluoroborate (**2o**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1.0 mL of *t*-Amy-OH and stirred at rt. After further 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 200:1, v/v) to afford 70.8 mg of the product as a slight yellow oil (80%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 – 7.84 (m, 1H), 7.80 (dt, *J* = 12.8, 6.1 Hz, 3H), 7.75 (dd, *J* = 5.6, 3.7 Hz, 1H), 7.62 – 7.58 (m, 1H), 7.52 (dt, *J* = 12.3, 8.6 Hz, 5H), 7.44 – 7.40 (m, 2H), 7.32 (d, *J* = 8.2 Hz, 2H), 7.23 – 7.18 (m, 2H), 6.62 (dd, *J* = 8.4, 1.5 Hz, 1H), 3.78 (d, *J* = 12.5 Hz, 1H), 3.71 (d, *J* =

12.5 Hz, 1H), 1.73 (s, 3H). ^{13}C NMR (126 MHz, $CDCl_3$) δ 153.0, 145.6, 135.0, 133.0, 132.9, 132.0, 131.9, 129.4, 129.0, 128.3, 128.1, 127.8, 127.5, 127.4, 127.4, 127.2, 126.7, 126.1, 125.9, 125.8 (q, *J* = 213.8 Hz),125.7, 125.4, 125.1, 124.8 (q, *J* = 3.6 Hz), 47.8, 47.5, 26.8. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.2. HRMS (EI) m/z: calcd for: $C_{30}H_{23}F_3$: 440.1752; Found: 440.1747.



4lbi

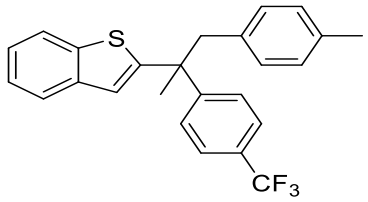
2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)butan-2-yl)naphthalene (4lbi). The optimized procedure was followed by using 36.4 mg of 2-(but-1-en-2-yl)naphthalene (**1l**) (0.20 mmol), 41.2 mg of *p*-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After further 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 41.1 mg of the product as a slight yellow oil (49%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.81 (dd, *J* = 6.4, 2.8 Hz, 2H), 7.75 – 7.70 (m, 2H), 7.52 – 7.46 (m, 4H), 7.22 (d, *J* = 8.2 Hz, 2H), 7.07 (dd, *J* = 8.7, 1.8 Hz, 1H), 6.85 (d, *J* = 7.8 Hz, 2H), 6.43 (d, *J* = 7.9 Hz, 2H), 3.55 (d, *J* = 12.8 Hz, 1H), 3.43 (d, *J* = 12.8 Hz, 1H), 2.24 (s, 3H), 2.18 – 2.06 (m, 2H), 0.79 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 152.4, 144.7, 135.7, 134.0, 132.9, 131.9, 130.2, 128.9, 128.2, 128.1, 128.1, 127.7, 127.6, 127.4, 126.7 (q, *J* = 294.9 Hz), 126.0 (d, *J* = 2.2 Hz), 125.8, 124.6 (q, *J* = 3.6 Hz), 123.2, 51.2, 42.1, 28.4, 21.0, 8.9. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.2. HRMS (EI) m/z: calcd for: $C_{28}H_{25}F_3$: 418.1908; Found: 418.1905.



4mbi

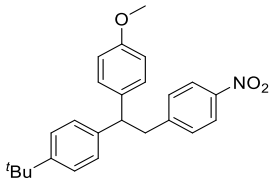
2-methoxy-6-(1-(p-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)naphthalene (4mbi). The optimized procedure was followed by using 39.8 mg of 2-methoxy-6-(prop-1-en-2-yl)naphthalene (**1m**) (0.20 mmol), 41.2 mg of *p*-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After further 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 51.2 mg of the product as a pale yellow oil (59%). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.70 (d, *J* = 8.9 Hz, 1H), 7.67 – 7.63 (m, 2H), 7.52 (dd, *J* = 13.2, 8.4 Hz, 2H), 7.30 (t, *J* = 7.2 Hz, 2H), 7.18 – 7.15 (m, 1H), 7.12 (d, *J* = 6.7 Hz, 2H), 6.87 (d, *J* = 7.8 Hz, 2H),

6.50 (d, *J* = 7.8 Hz, 2H), 3.93 (s, 3H), 3.58 – 3.45 (m, 2H), 2.25 (s, 3H), 1.64 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 157.7, 153.4, 143.4, 135.6, 134.2, 132.9, 130.9, 130.5, 129.6, 129.0 (d, *J* = 32.3Hz), 128.4, 128.2,128.2, 127.7, 126.6, 124.9, 124.74 (q, *J* = 3.7 Hz), 118.7, 105.5, 55.3, 47.3, 46.9, 26.8, 20.9. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.2. HRMS (EI) m/z: calcd for: $C_{28}H_{25}F_3O$: 434.1858; Found: 434.1857.

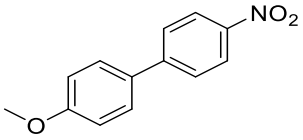


4nbi

2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)benzo[*b*]thiophene (4nbi). The optimized procedure was followed by using 34.8 mg of 2-(prop-1-en-2-yl)benzo[*b*]thiophene (**1n**) (0.20 mmol), 41.2 mg of *p*-tolyldiazonium tetrafluoroborate (**2b**) (0.20 mmol), 45.6 mg of (4-(trifluoromethyl)phenyl)boronic acid (**3i**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After further 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 44.4 mg of the product as a yellow oil (54%).^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 (dd, *J* = 7.8, 3.5 Hz, 1H), 7.71 (d, *J* = 7.8 Hz, 1H), 7.56 (dd, *J* = 15.1, 8.3 Hz, 2H), 7.42 (d, *J* = 9.6 Hz, 1H), 7.40 – 7.33 (m, 2H), 7.32 – 7.28 (m, 1H), 7.11 (d, *J* = 11.6 Hz, 1H), 6.90 (dd, *J* = 33.8, 7.9 Hz, 2H), 6.63 (d, *J* = 7.9 Hz, 2H), 3.55 (dt, *J* = 24.6, 8.5 Hz, 2H), 2.28 (s, 3H), 1.72 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 155.1, 151.3, 139.4, 136.1, 133.5, 130.8, 130.4, 128.4, 127.7, 127.6, 124.9 (q, *J* = 3.7 Hz), 124.2, 124.0, 123.3, 122.2, 122.1, 120.8, 48.2, 46.5, 27.4, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -62.3. HRMS (EI) m/z: calcd for: $C_{25}H_{21}F_3S$: 410.1316; Found: 410.1326.



4omb



mb

- **1-(*tert*-butyl)-4-(1-(4-methoxyphenyl)-2-(4-nitrophenyl)ethyl)benzene (4omb).** The procedure was followed by using 474 mg of *p*-nitrophenyldiazonium tetrafluoroborate (**2m**) (2.0 mmol), 365mg of (4-methoxyphenyl)boronic acid (**3b**) (2.4 mmol), 46 mg of $Pd_2(dba)_3$ (0.05 mmol), 178 mg of lithium carbonate (2.4 mmol), 160 mg of 1-(*tert*-butyl)-4-vinylbenzene (1o) (1mmol) and 6 mL of *t*-Amy-OH and stirred at 40 ^{o}C. After further 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:3, v/v) to afford 60.5 mg of the product with byproduct (mb) as a yellow solid (7% analyzed by NMR). HRMS (EI) m/z: calcd for: $C_{25}H_{27}NO_3$: 389.1991; Found: 389.1996.
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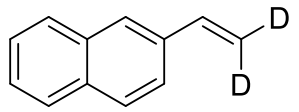
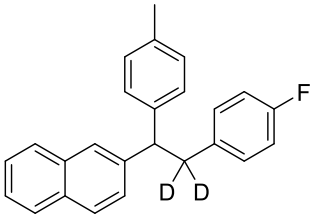


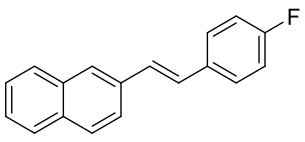
1a-D$_2$

2-(vinyl-2,2-*d*$_2$)naphthalene (1a-D$_2$).[2] The operation process was on the basis of reference 2. The desired product was got as a white solid (39%, 71% D). And the determination of the rates of deuteriation was based on the peak area of ^{1}H NMR of the corresponding 1H. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 – 7.83 (m, 3H), 7.80 (s, 1H), 7.69 (dd, *J* = 8.5, 1.5 Hz, 1H), 7.54 – 7.47 (m, 2H), 6.97 – 6.91 (m, 1H), 5.96 – 5.90 (m, 0.29H), 5.39 (dd, *J* = 10.9, 7.4 Hz, 0.29H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.8 (dd, *J* = 13.7, 10.9 Hz), 134.9, 133.5, 133.1, 128.1, 128.0, 127.6, 126.3, 126.2, 125.9, 123.1, 114.1.



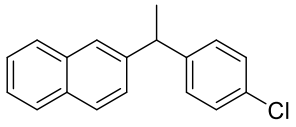
4aaa-D$_2$

2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl-2,2-*d*$_2$)naphthalene (4aaa-D$_2$). The optimized procedure was followed by using 31.2 mg of 2-(vinyl-2,2-*d*$_2$)naphthalene **1a-D$_2$** (0.20 mmol), 42.0 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (0.20 mmol), 32.6 mg of p-tolylboronic acid (**3a**) (0.24 mmol), 9.2 mg of $Pd_2(dba)_3$ (0.01 mmol), 17.8 mg of lithium carbonate (0.24 mmol) and 1 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 41.1 mg of the product as a yellowish oil (60%, 2x71% D). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 8.6, 7.3 Hz, 2H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.65 (s, 1H), 7.45 (pd, *J* = 6.8, 1.4 Hz, 2H), 7.33 (dd, *J* = 8.5, 1.3 Hz, 1H), 7.14 (d, *J* = 8.0 Hz, 2H), 7.09 (d, *J* = 8.0 Hz, 2H), 7.00 – 6.95 (m, 2H), 6.91 – 6.80 (m, 2H), 4.37 – 4.29 (m, 1H), 3.48 – 3.38 (m, 0.58H), 2.31 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, *J* = 243.4 Hz), 141.8, 141.0, 135.8, 133.4, 132.1, 130.4 (d, *J* = 7.8 Hz), 129.1, 127.96 (d, *J* = 8.4 Hz), 127.7, 127.5, 126.8, 125.9 (d, *J* = 10.7 Hz), 125.4, 114.9, 114.7, 52.8, 52.7, 21.0. ^{19}F NMR (471 MHz, $CDCl_3$) δ -117.4. HRMS (EI) m/z: calcd for: $C_{25}H_{19}D_2F$:342.1753; Found: 342.1762.



5

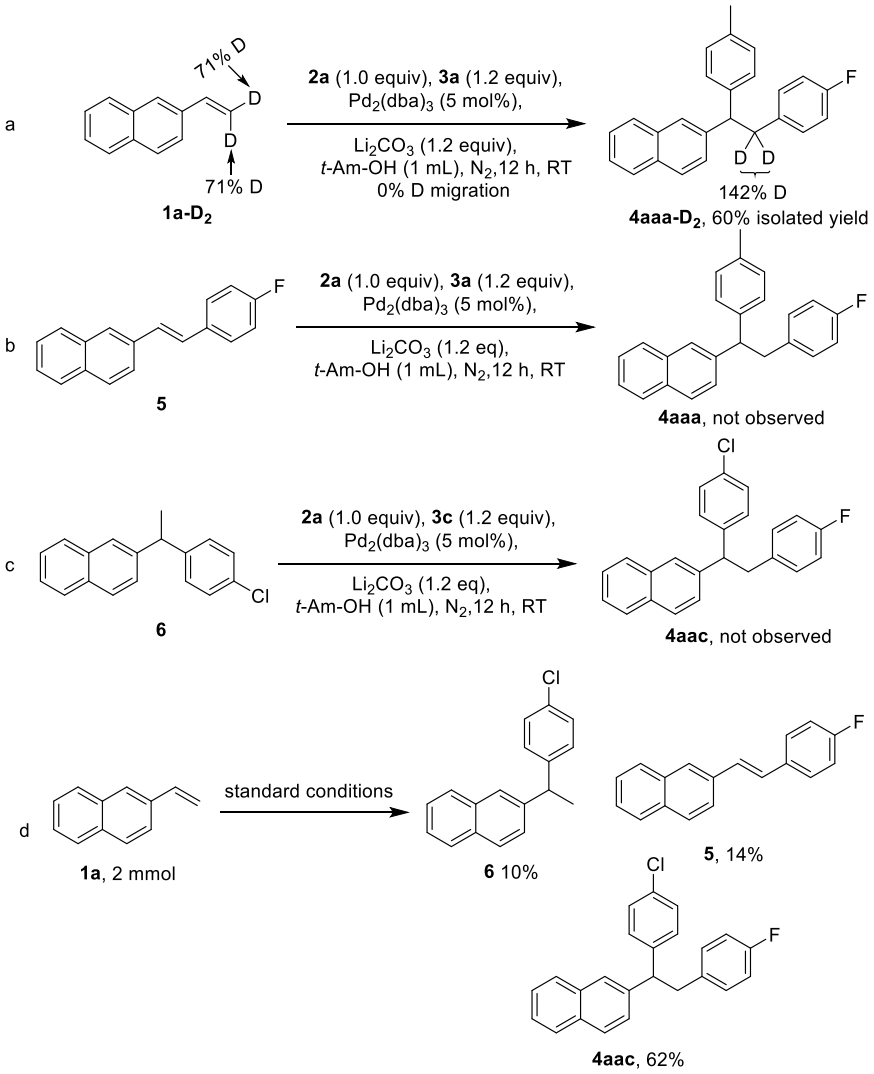
(E)-2-(4-fluorostyryl)naphthalene (5).[3] The optimized procedure was followed by using 303 mg of 2-vinylnaphthalene (**1a**) (2.0 mmol), 420 mg of 4-fluorophenyldiazonium tetrafluoroborate (**2a**) (2.0 mmol), 394 mg of (4-propylphenyl)boronic acid (**3d**) (2.4 mmol), 91.5 mg of $Pd_2(dba)_3$ (0.1 mmol), 178 mg of lithium carbonate (2.4 mmol) and 8 mL of *t*-Amy-OH and stirred at rt. After 12 h, the reaction mixture was extracted water/EA. Then the organic layers were dried with Na_2SO_4, and concentrated to dryness. The crude product was purified by silica gel chromatography (silica gel, PE: EA = 100:1, v/v) to afford 446 mg of the product as a slight yellow solid (62%) along with 10% of the byproduct (**6**) as a slight yellow oil and 14% of Heck-type product (**5**) as a white solid .^{1}H NMR (500 MHz, $CDCl_3$) δ 7.84 (dd, *J* = 8.4, 4.1 Hz, 4H), 7.73 (dd, *J* = 8.6, 1.7 Hz, 1H), 7.55 – 7.51 (m, 2H), 7.47 (ddd, *J* = 8.3, 7.2, 1.5 Hz, 2H), 7.20 (s, 2H), 7.12 – 7.06 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 162.3 (d, *J* = 246.3 Hz), 134.6, 133.7, 133.5 (d, J = 3.4 Hz), 133.0, 128.5 (d, *J* = 2.4 Hz), 128.3, 128.0, 128.0, 127.7 (d, *J* = 9.2 Hz), 126.6, 126.4, 125.9, 123.4, 115.7, 115.6.



6

2-(1-(4-chlorophenyl)ethyl)naphthalene (6).[4] ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.2 Hz, 2H), 7.75 (d, *J* = 8.5 Hz, 1H), 7.68 (s, 1H), 7.46 (tdd, *J* = 9.3, 6.9, 1.4 Hz, 2H), 7.29 – 7.26 (m, 2H), 7.26 – 7.25 (m, 1H), 7.21 – 7.16 (m, 2H), 4.29 (q, *J* = 7.2 Hz, 1H), 1.72 (d, *J* = 7.2 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 144.7, 143.2, 133.5, 132.1, 131.8, 129.1, 128.5, 128.1, 127.7, 127.6, 126.6, 126.1, 125.5, 125.3, 44.2, 21.7.

4. Preliminary mechanistic studies



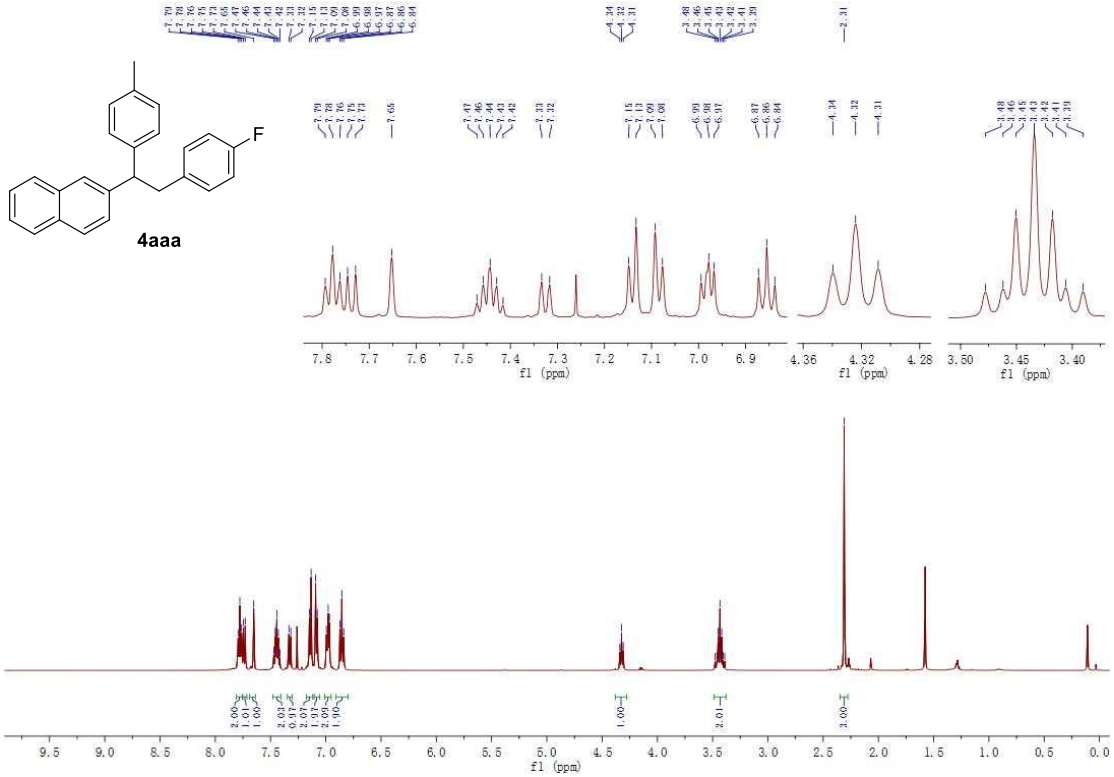
The reaction (eq a) was carried out under the optimized conditions with the D-labeled 2-vinylnaphthalene **1a-D$_2$** (71% D). Subsequently, the compound **4aaa-D$_2$** was isolated as a yellow oil in 60% yield with 71% D. By deuterium label experiments, we found that the deuterium ratio of β was almost no change, and the α was no deuterium replacement.

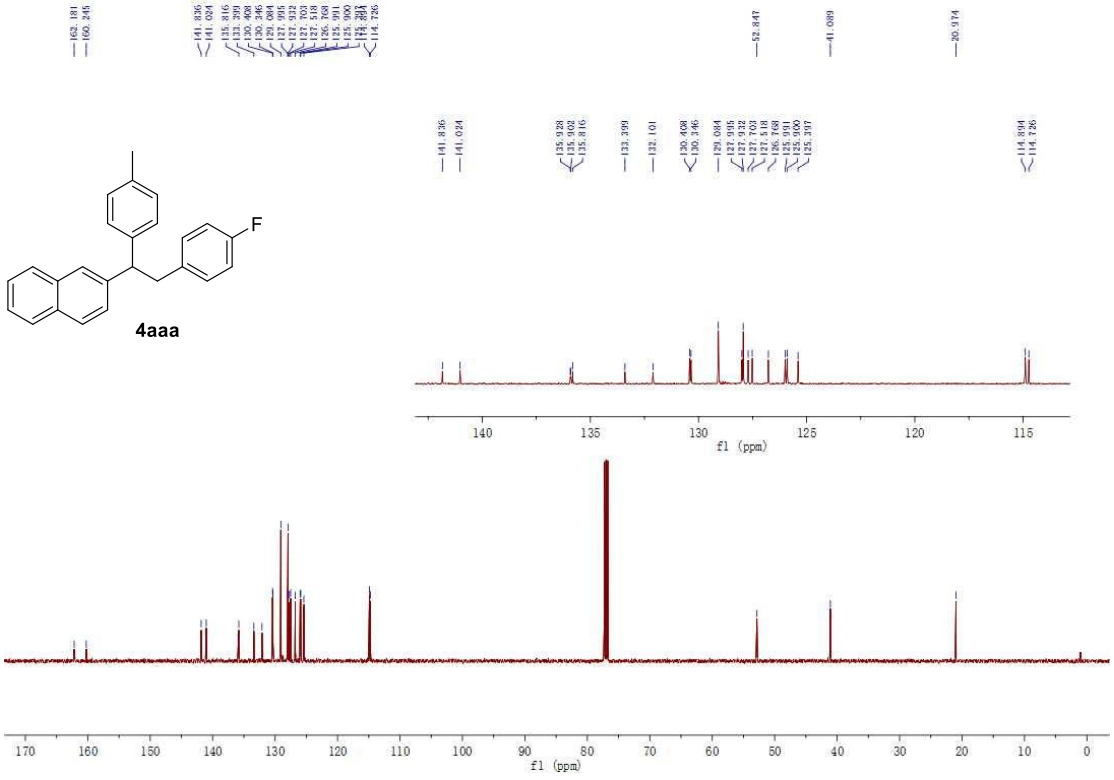
In the process of optimizing conditions, we found the Heck byproduct and hydroarylation byproduct were detected, so we prepared these two products accordingly and subjected them to the standard conditions (compounds **5** and **6** in eq b and eq c), no corresponding desired products were detected. These results suggested that the above two byproducts were not key intermediates for this transformation.

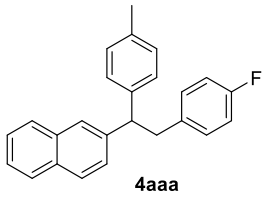
To understand the mechanism of this transformation, a scale-up reaction was conducted with 2 mmol of **1a** with **2a** and **3c** under the standard condition, the corresponding desired product **4aac** was obtained in 62% yield along with 10% of 2-(1-(4-chlorophenyl)ethyl)naphthalene (**6**) and 14% of Heck-type product **5** (eq d), and the structures of both **5** and **6** were verified by corresponding spectroscopic analysis.

5. NMR spectroscopic data

2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aaa)

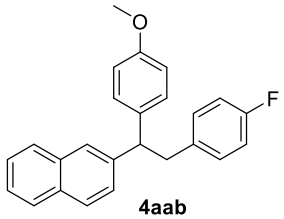




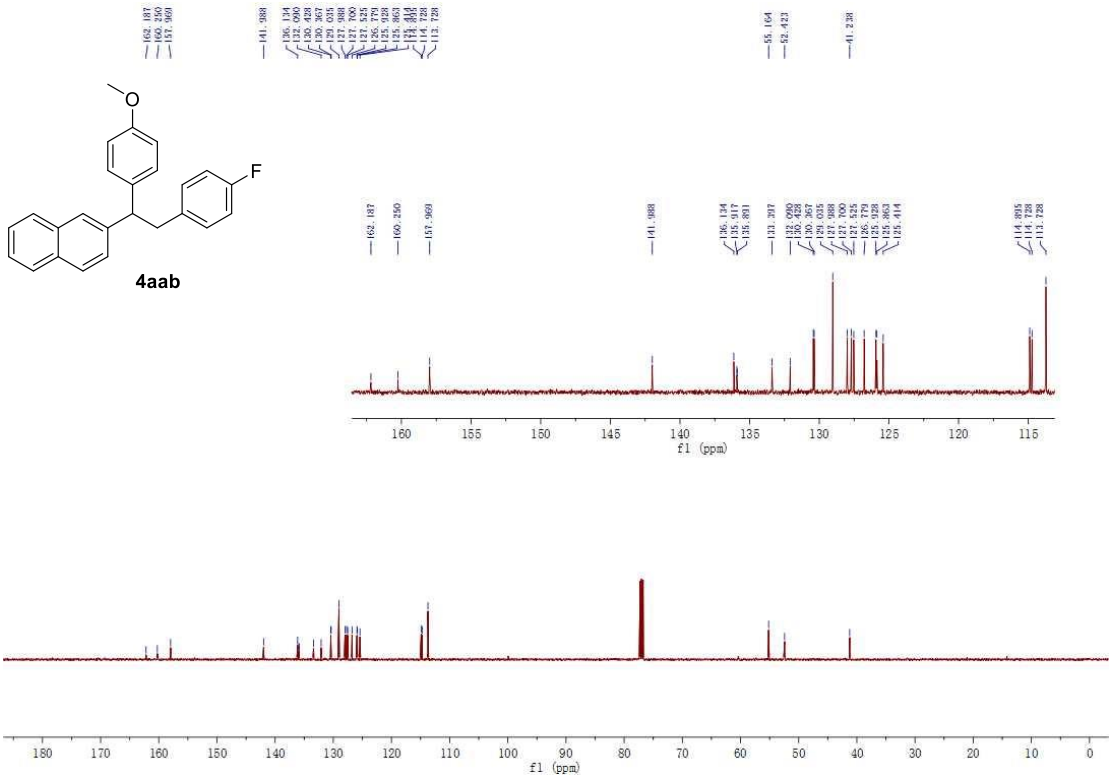


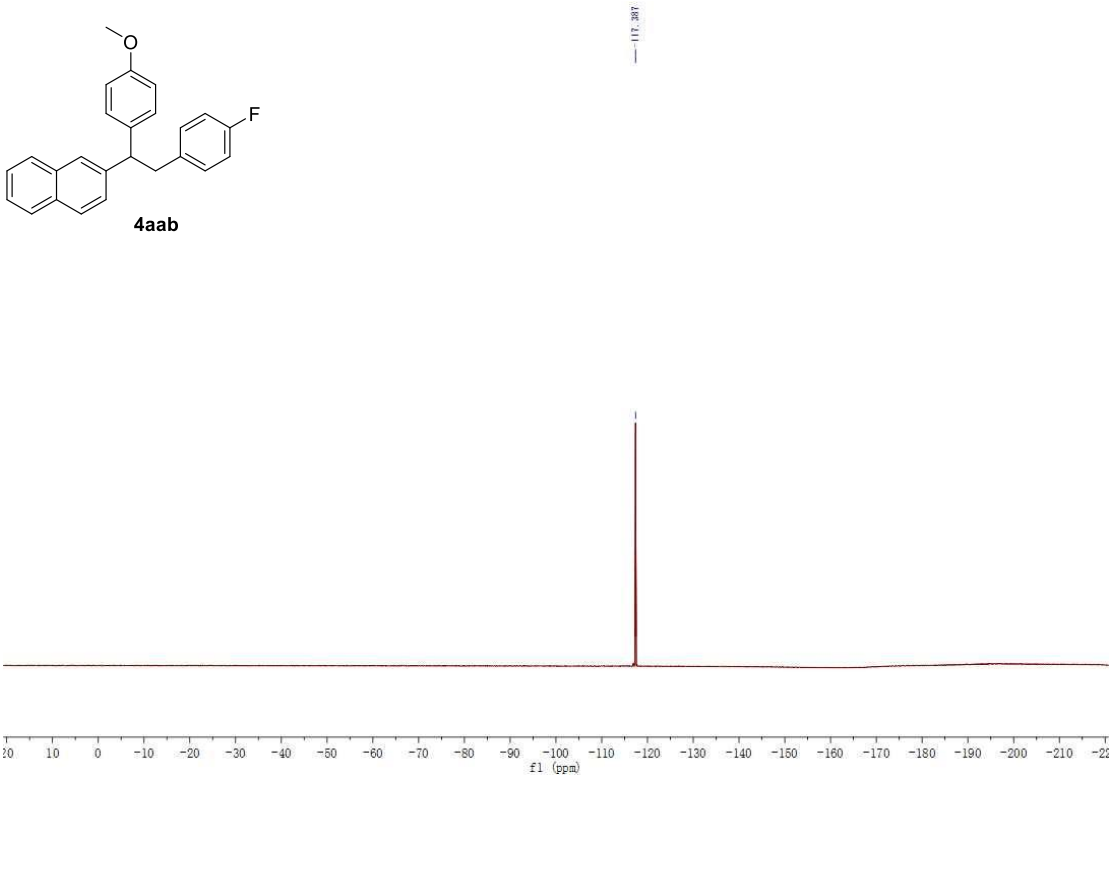
4aaa

2-(2-(4-fluorophenyl)-1-(4-methoxyphenyl)ethyl)naphthalene (4aab)

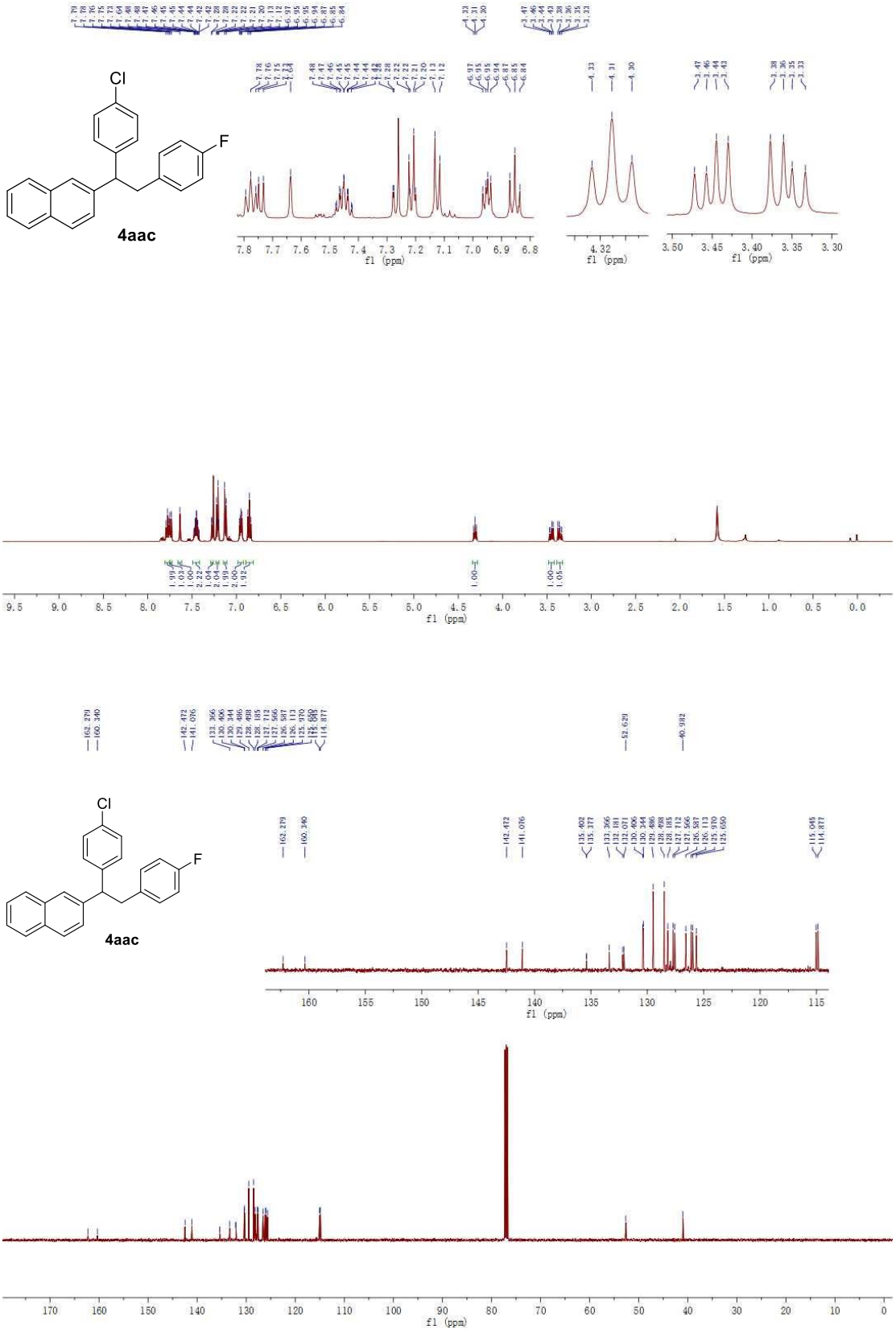


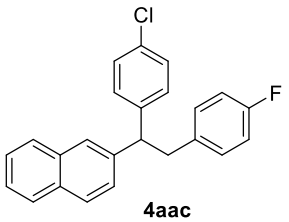
4aab


O
F
4aab
f1 (ppm)


O
F
4aab
f1 (ppm)

2-(1-(4-chlorophenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aac)

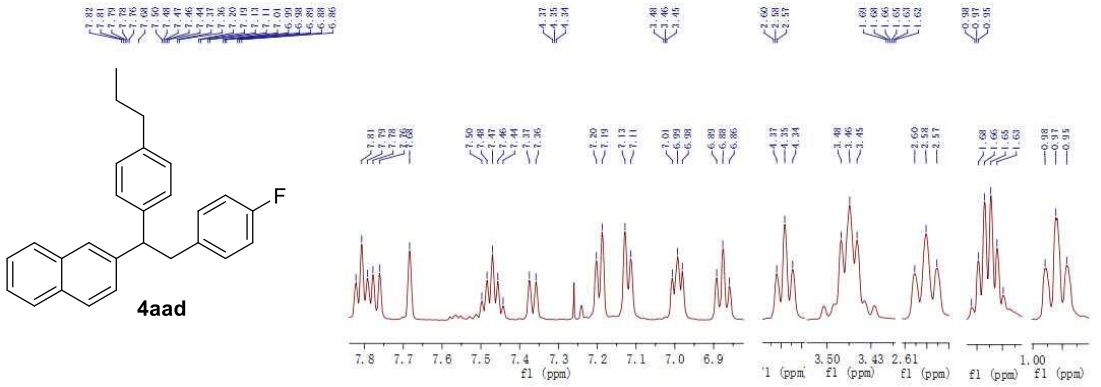


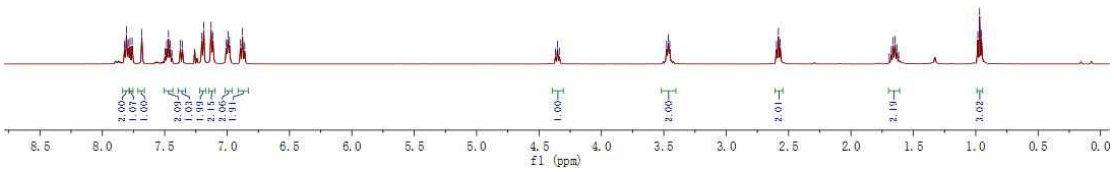

Cl
F

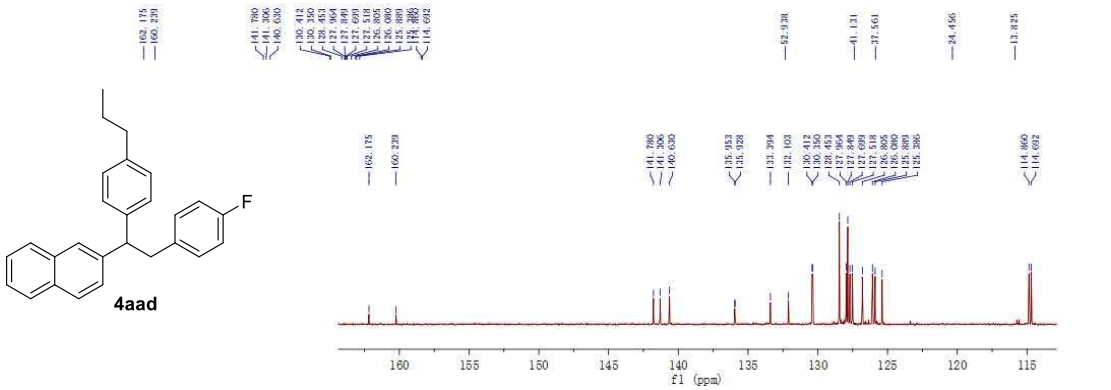
4aac

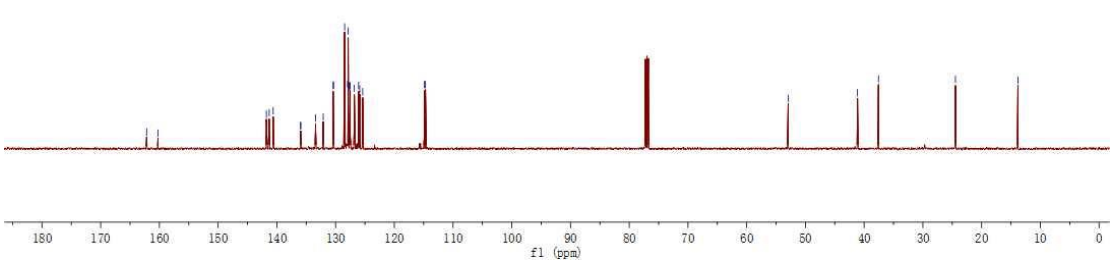
-117.036
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

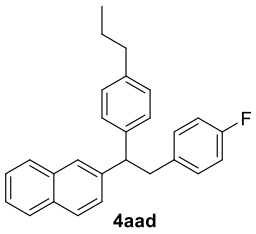
2-(2-(4-fluorophenyl)-1-(4-propylphenyl)ethyl)naphthalene (4aad)







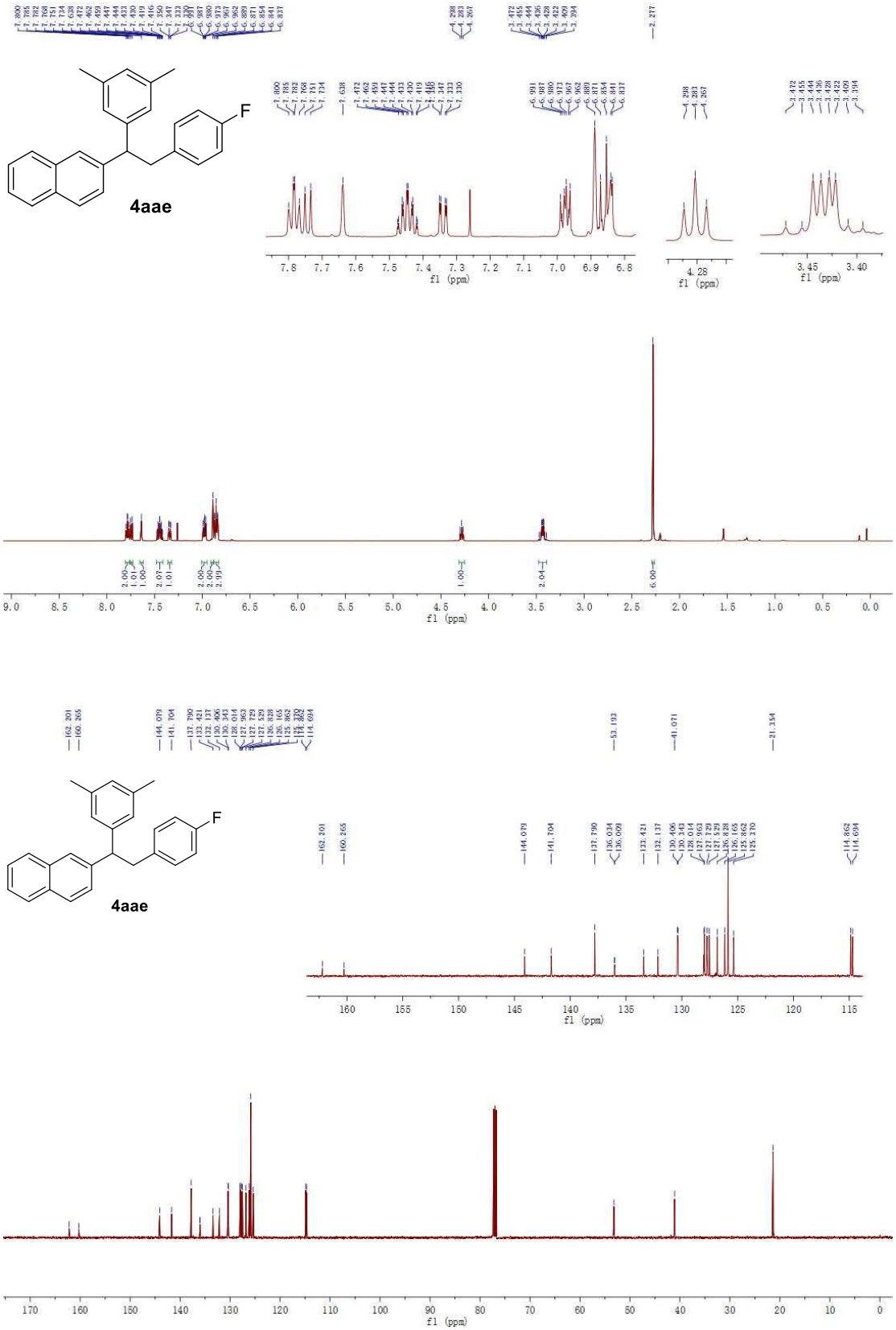


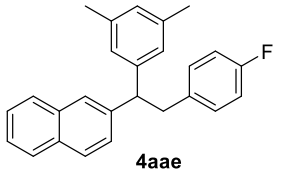

F

4aad

-117.484
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-(1-(3,5-dimethylphenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aae)

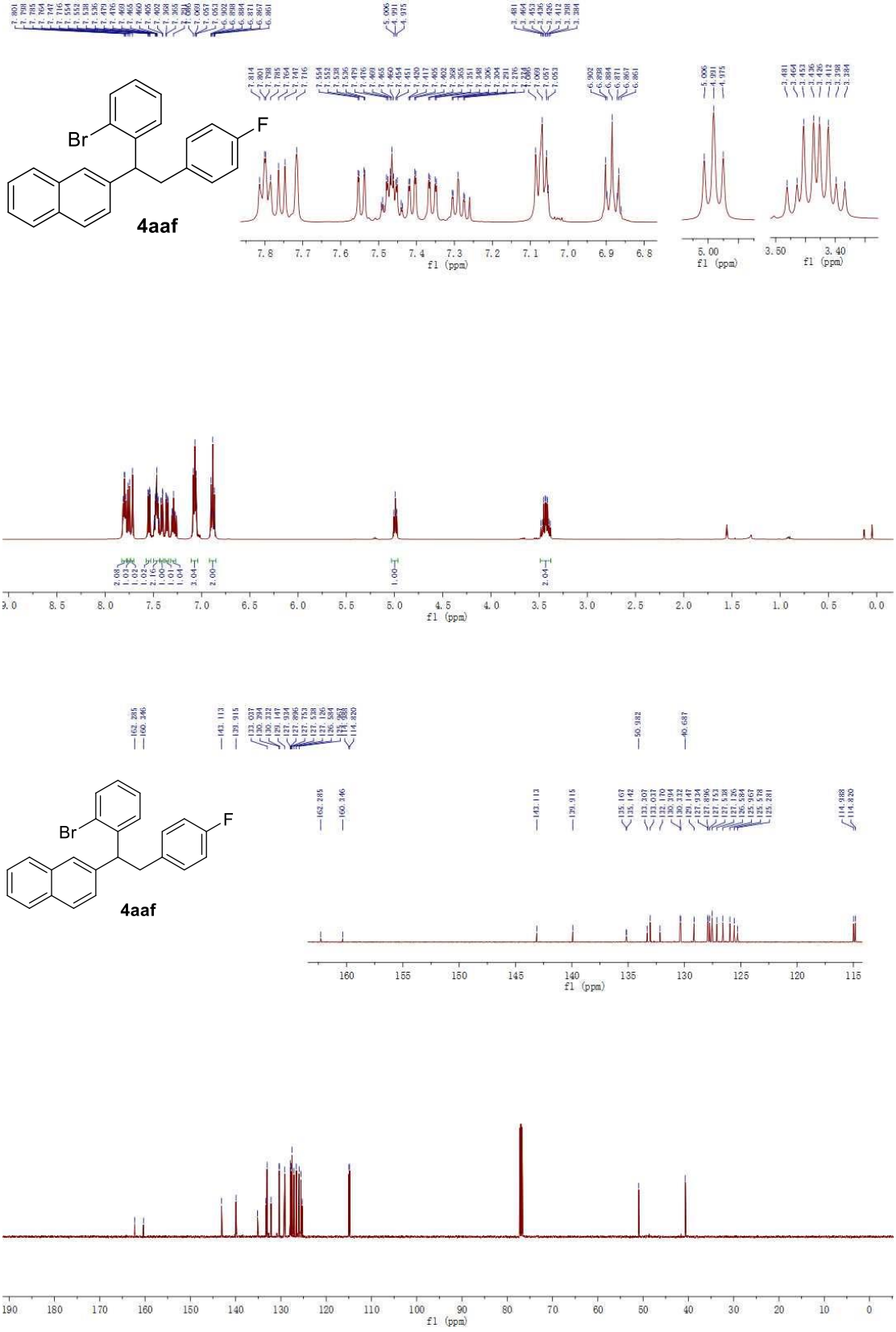


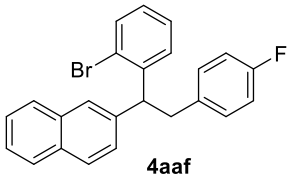

F

4aae

-117.557
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-(1-(2-bromophenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aaf)

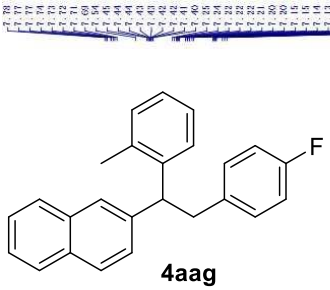


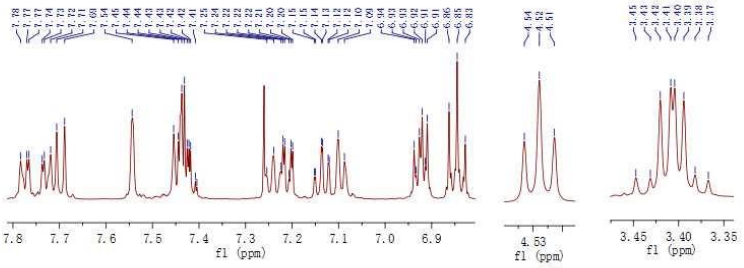

Br
F

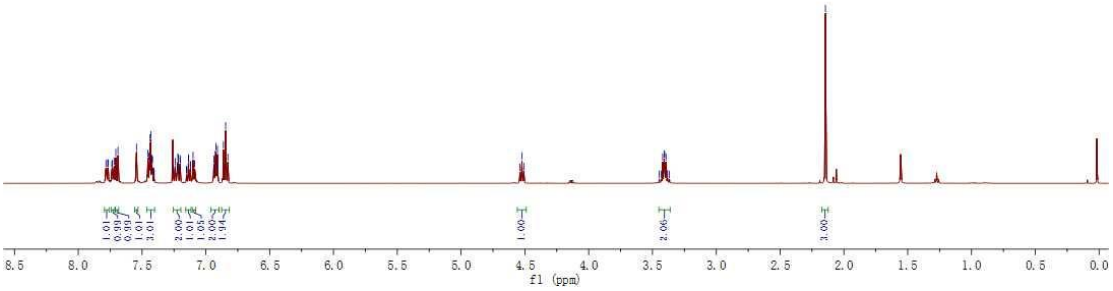
4aaf

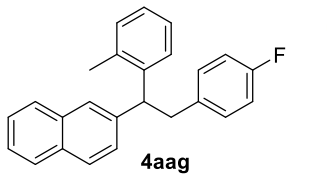
-117.054
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

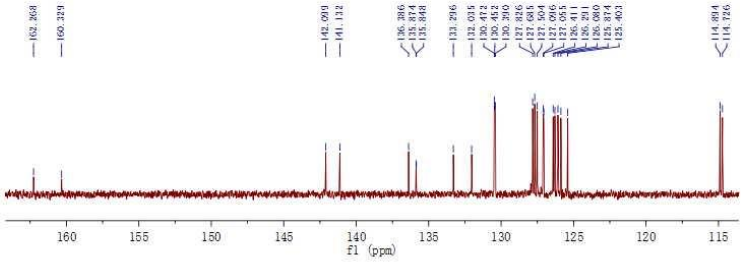
2-(2-(4-fluorophenyl)-1-(*o*-tolyl)ethyl)naphthalene (4aag)

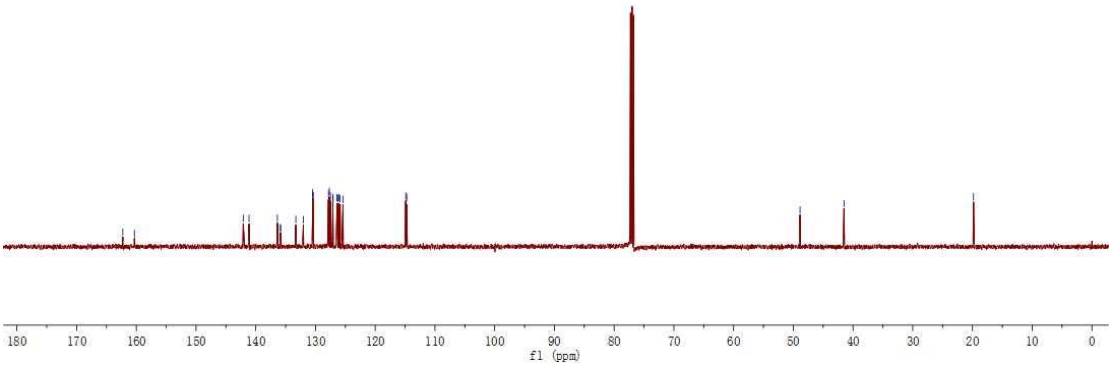


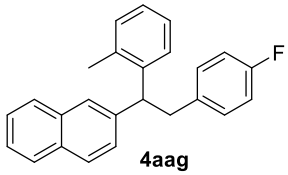






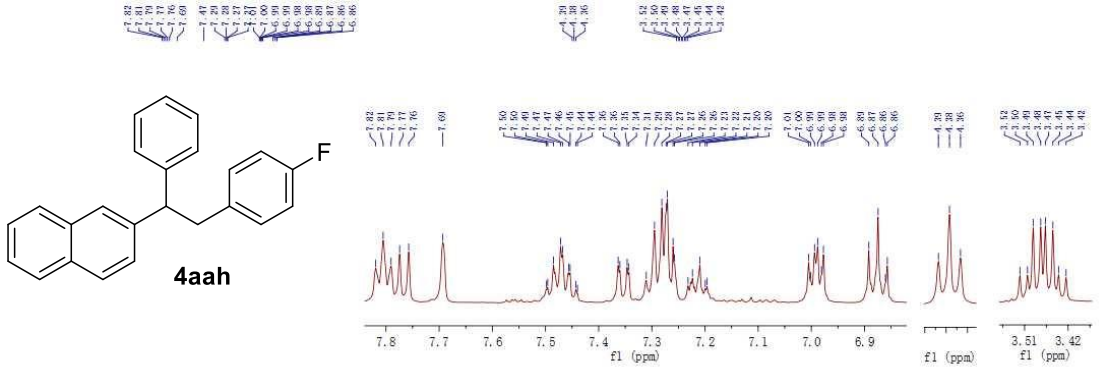


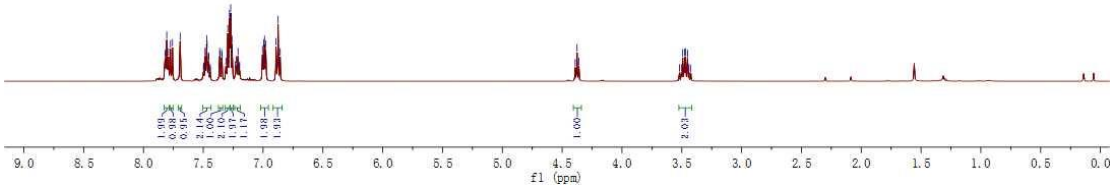


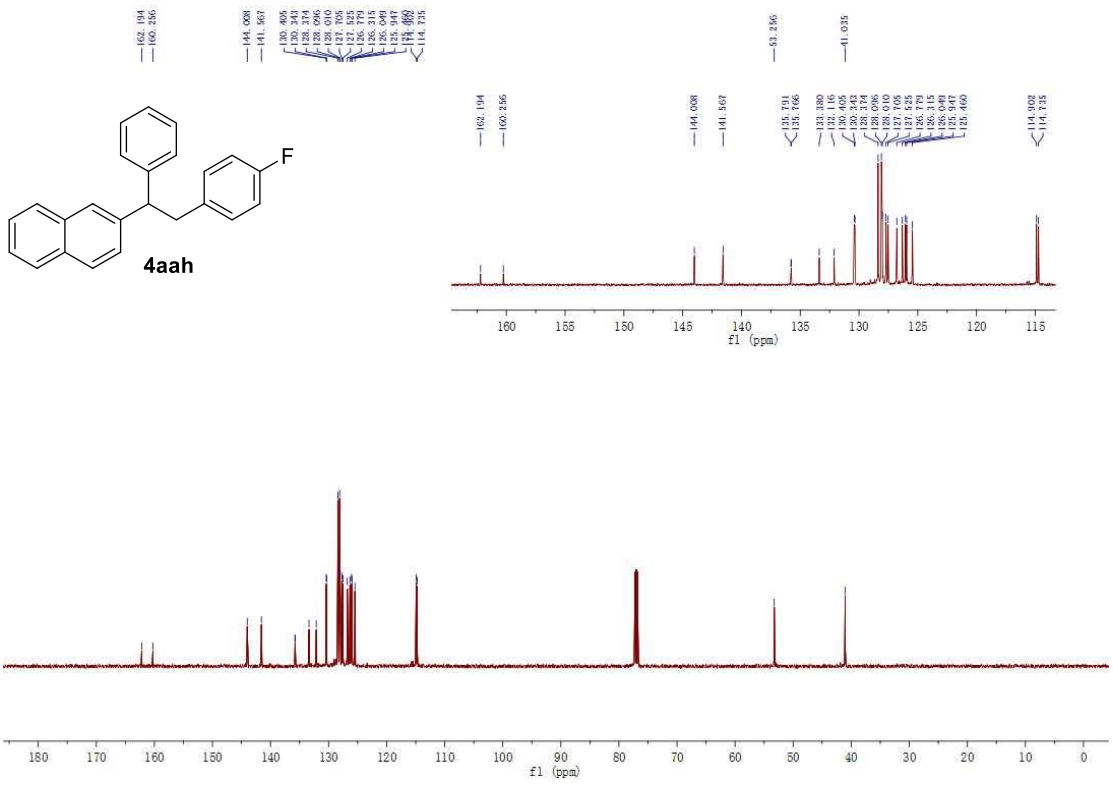


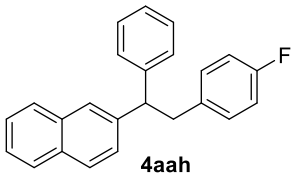
4aag

2-(2-(4-fluorophenyl)-1-phenylethyl)naphthalene (4aah)





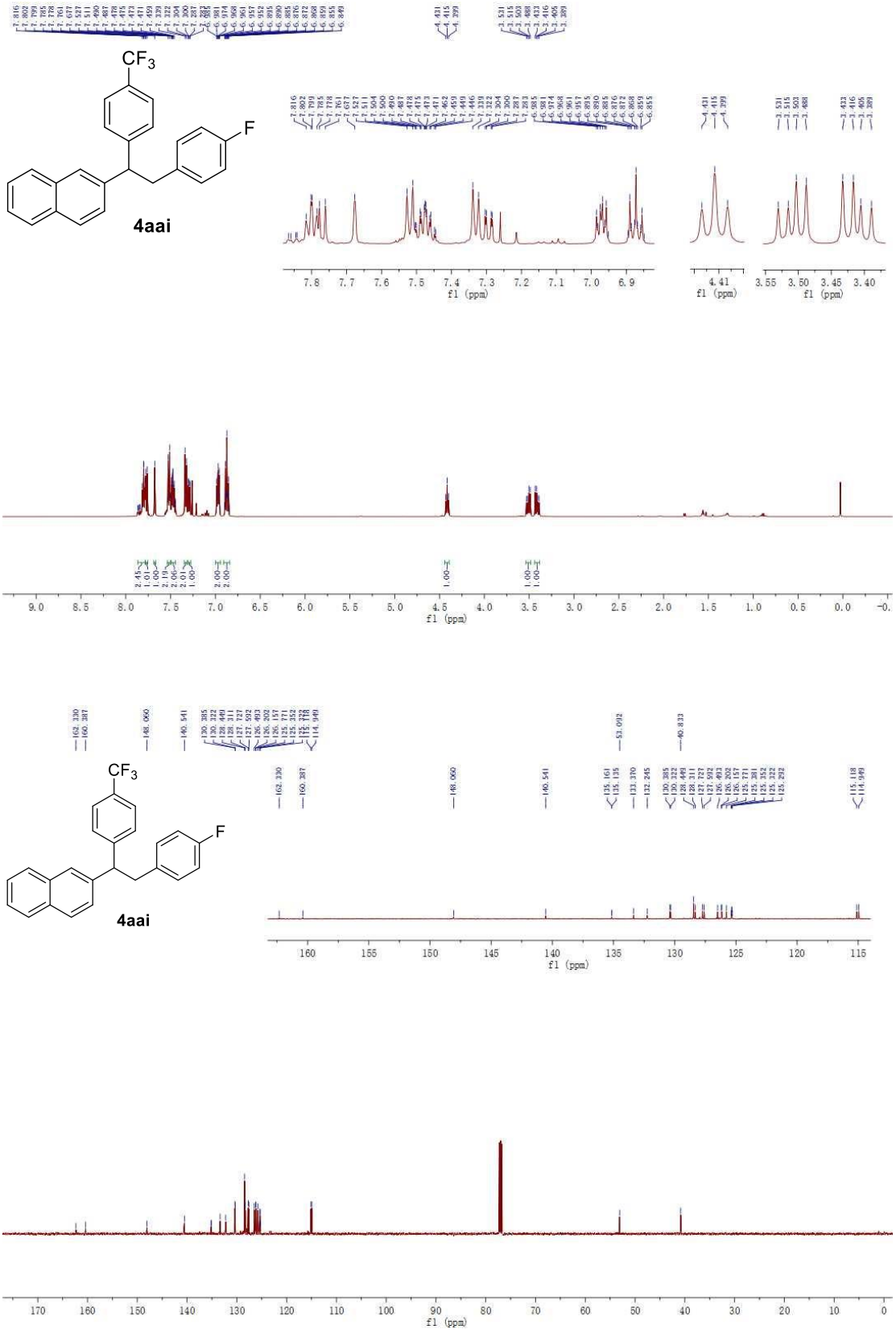


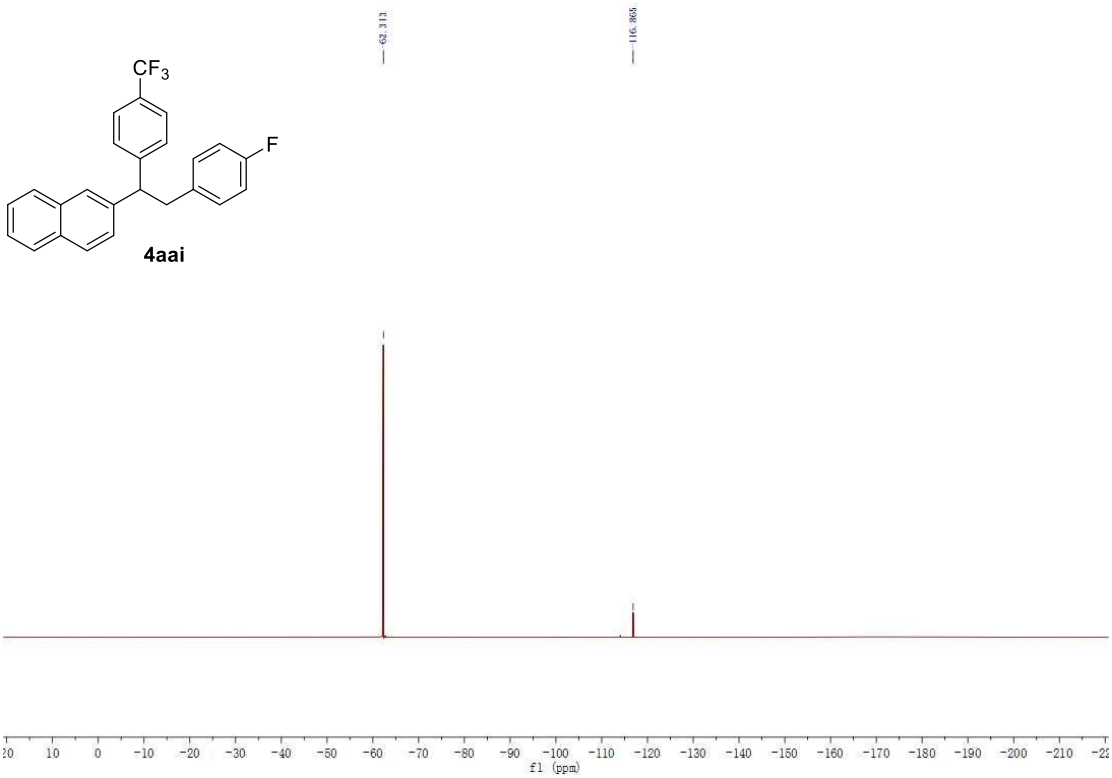

F

4aah

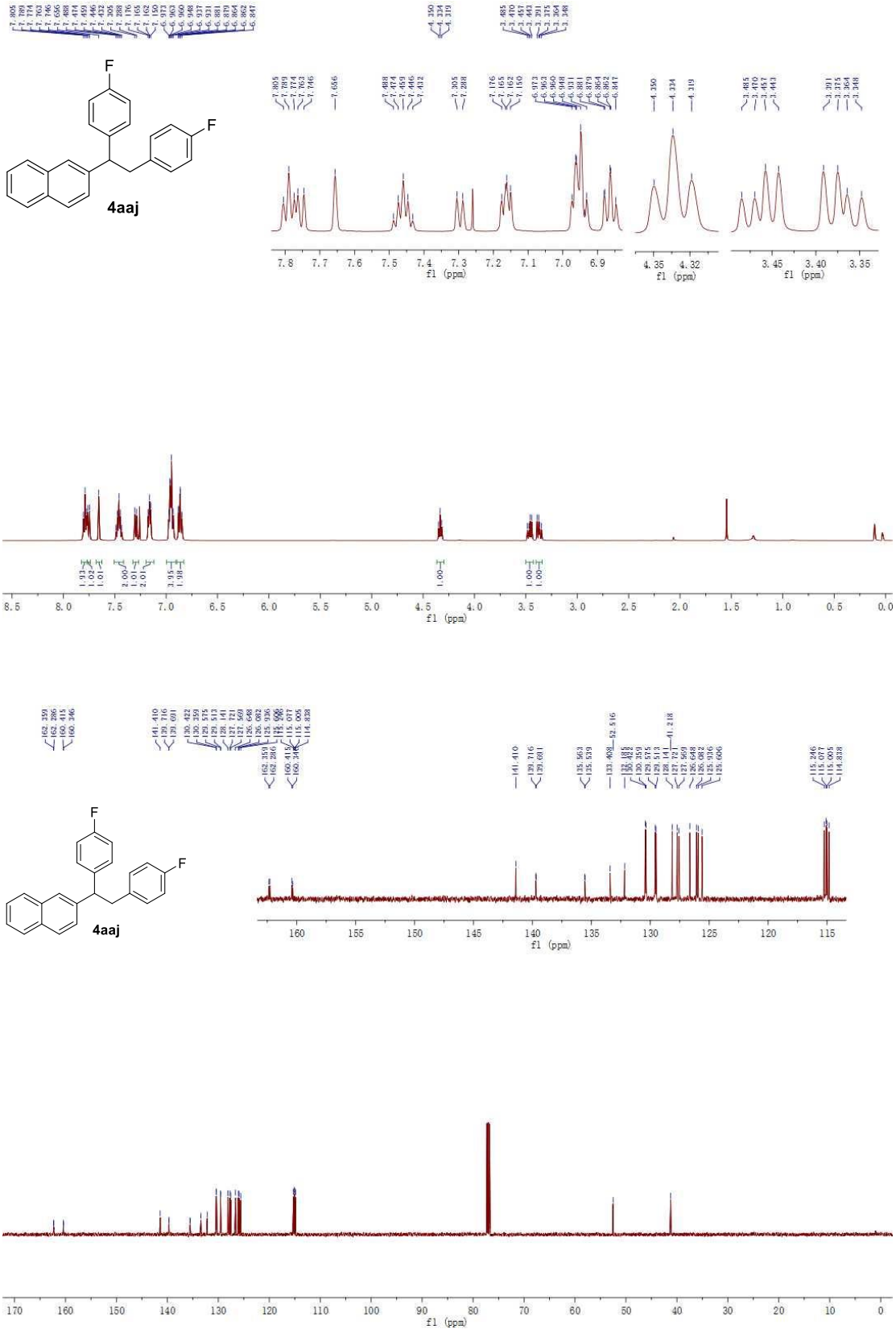
-117.410
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

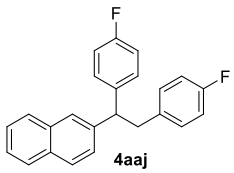
2-(2-(4-fluorophenyl)-1-(4-(trifluoromethyl)phenyl)ethyl)naphthalene (4aai)




CF3
F
-62.313
-116.865
4aai
f1 (ppm)

2-(1,2-bis(4-fluorophenyl)ethyl)naphthalene (4aaj)

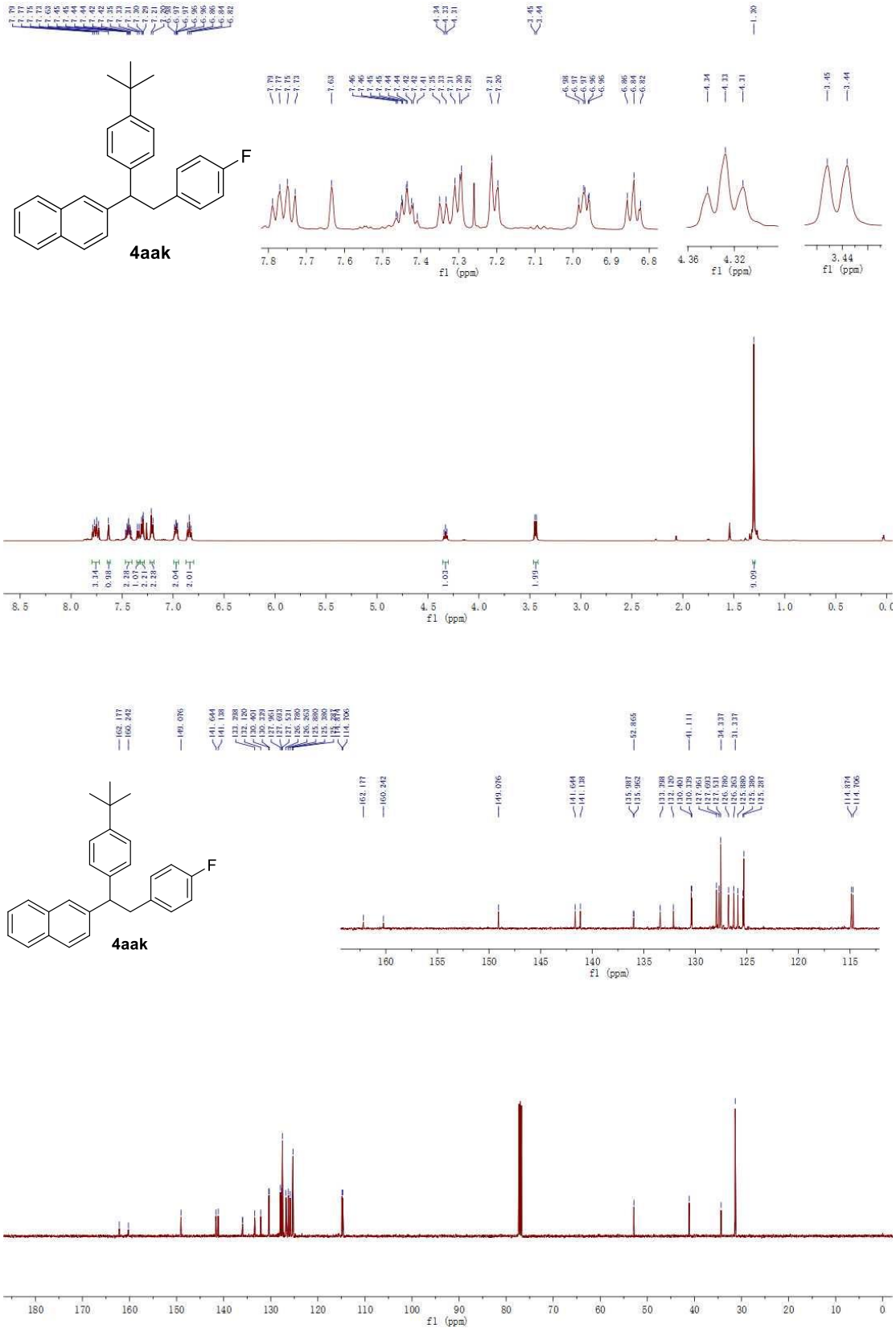


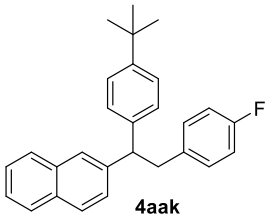

F
F

4aaj

116.718
117.163
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-(1-(4-(*tert*-butyl)phenyl)-2-(4-fluorophenyl)ethyl)naphthalene (4aak)

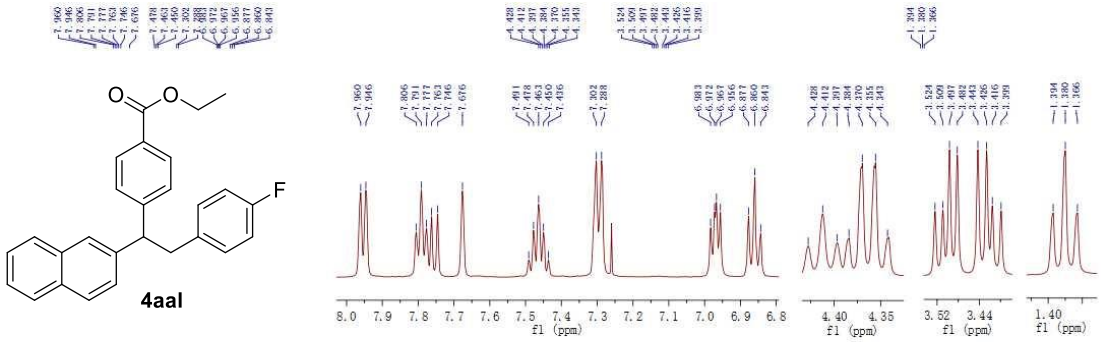


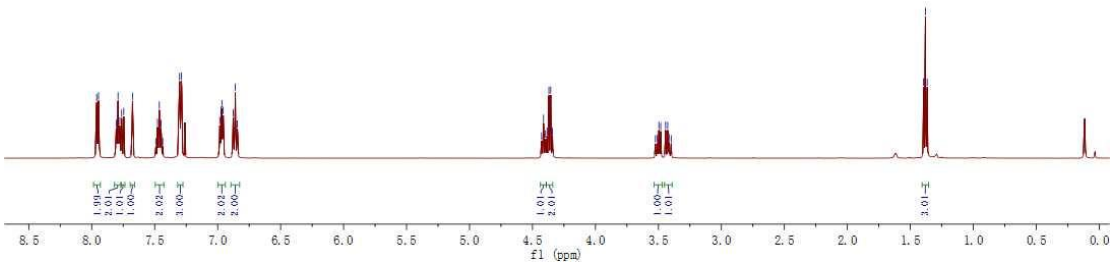

F

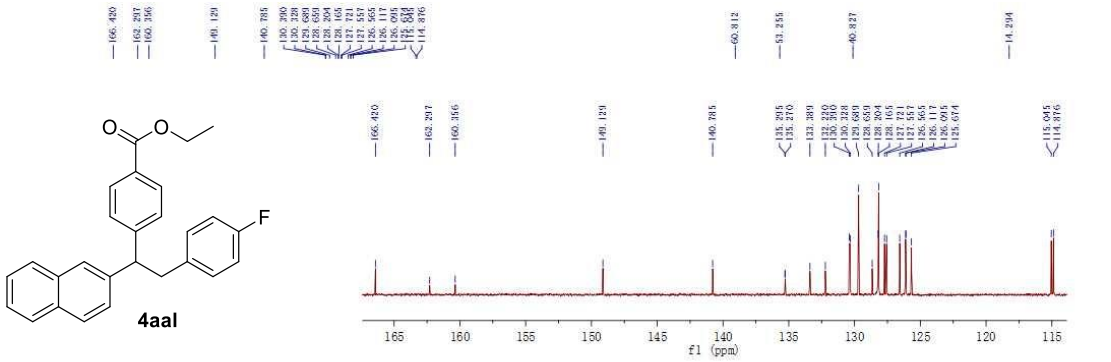
4aak

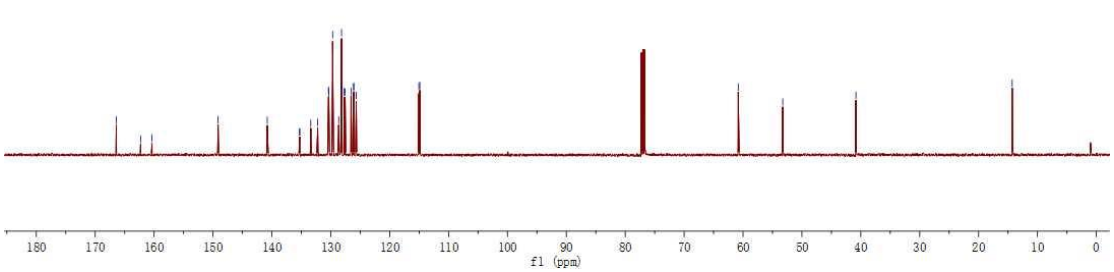
-117.466
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

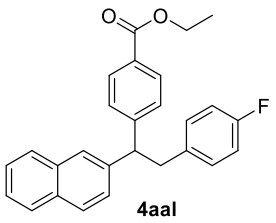
ethyl 4-(2-(4-fluorophenyl)-1-(naphthalen-2-yl)ethyl)benzoate (4aal)







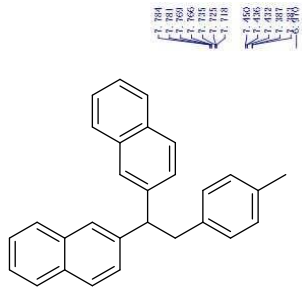



O
O
F

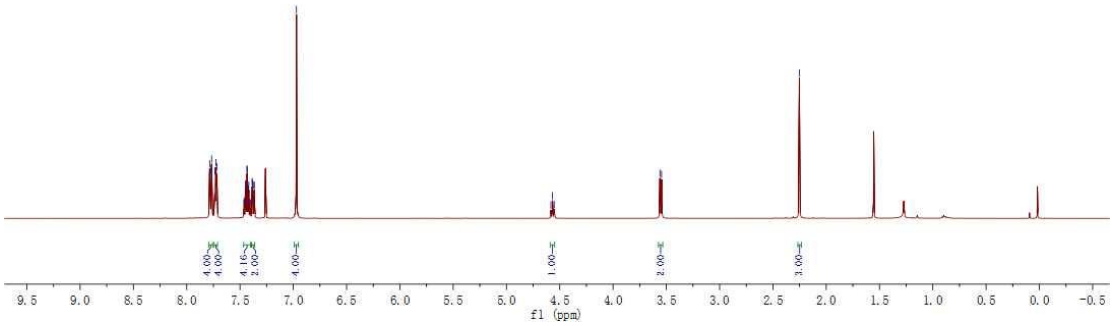
4aal

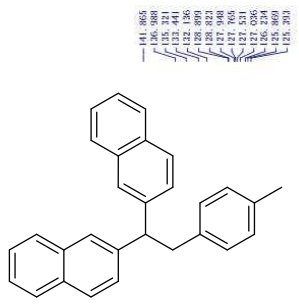
-116.991
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2,2'-(2-(*p*-tolyl)ethane-1,1-diyl)dinaphthalene(4abm)

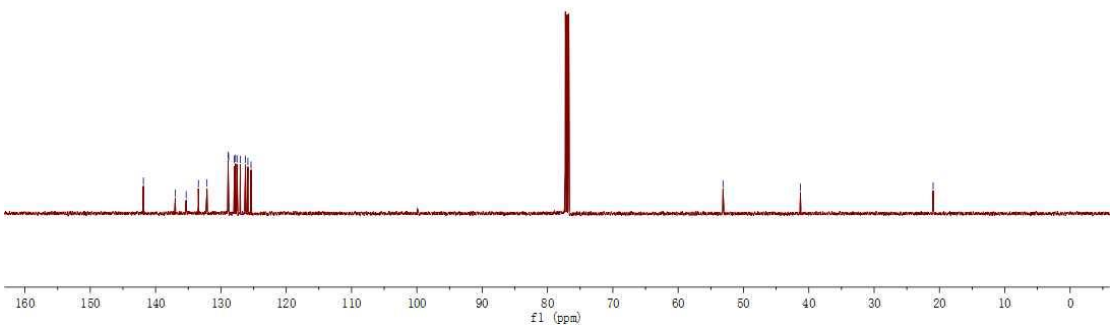


4abm

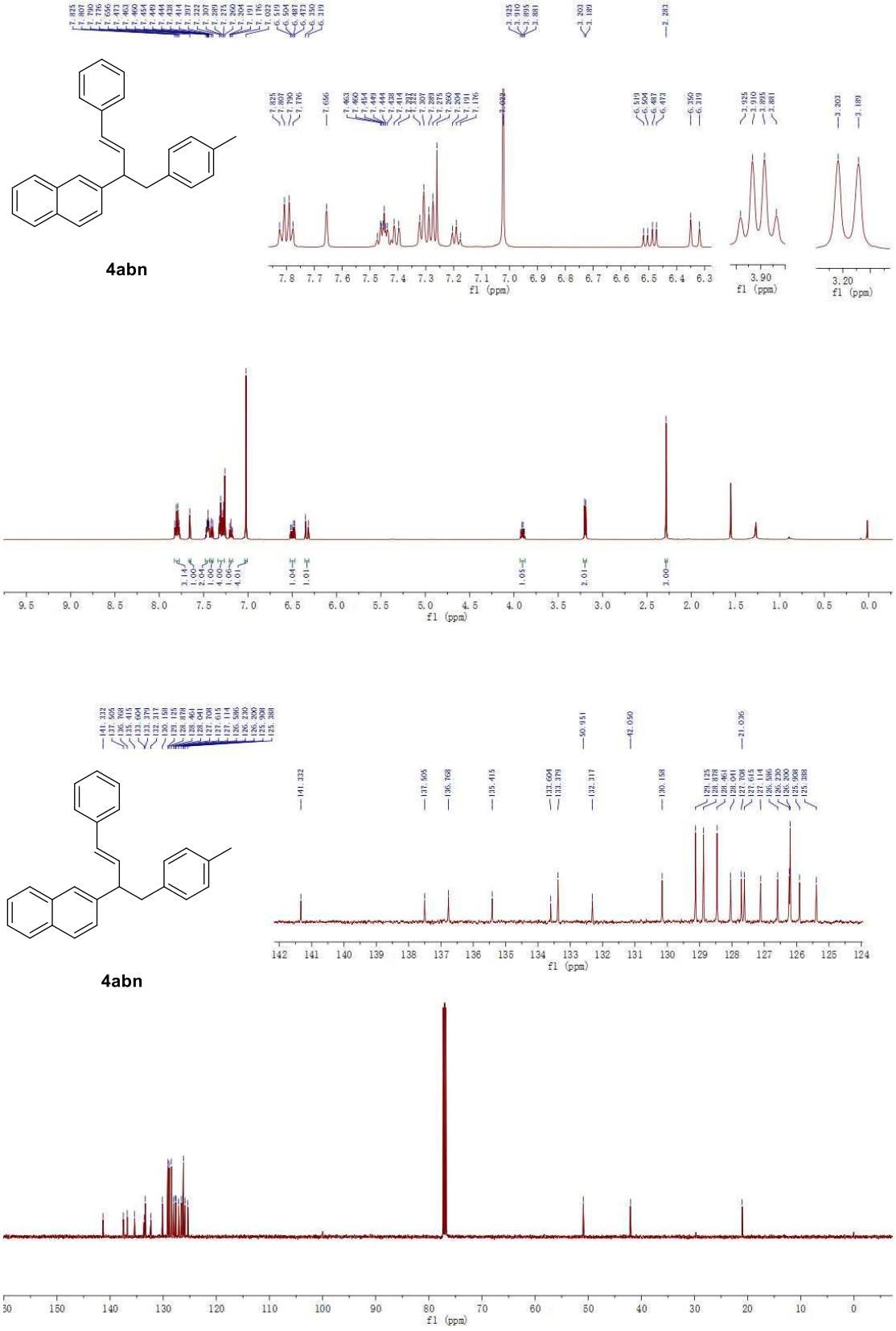




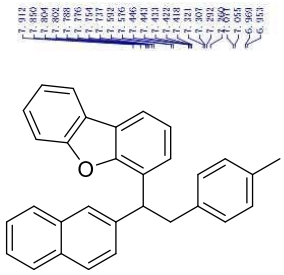
4abm



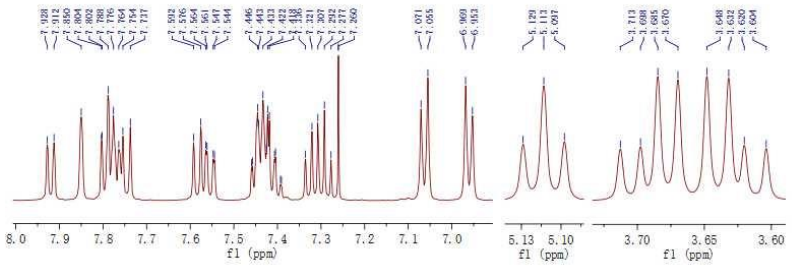
(*E*)-2-(4-phenyl-1-(*p*-tolyl)but-3-en-2-yl)naphthalene(4abn)

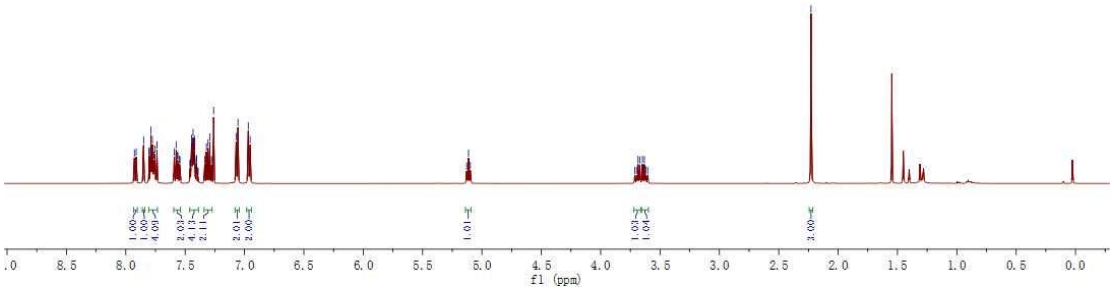


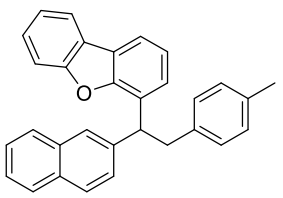
4-(1-(naphthalen-2-yl)-2-(*p*-tolyl)ethyl)dibenzo[*b,d*]furan(4abo)



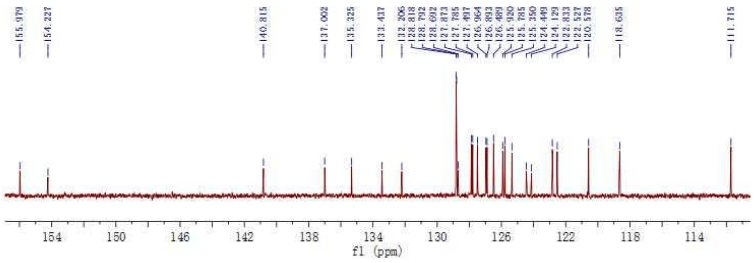
4abo

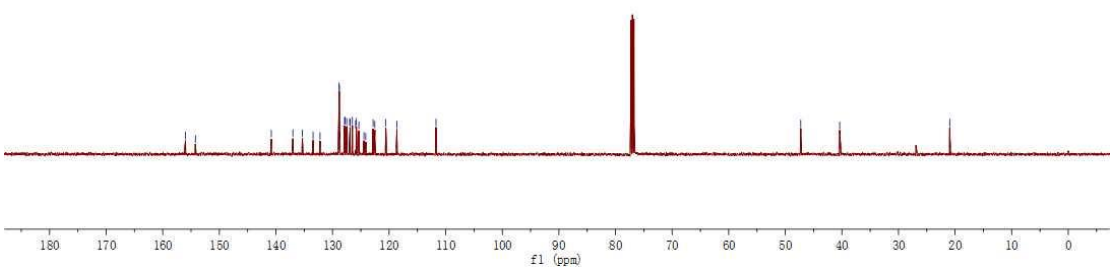




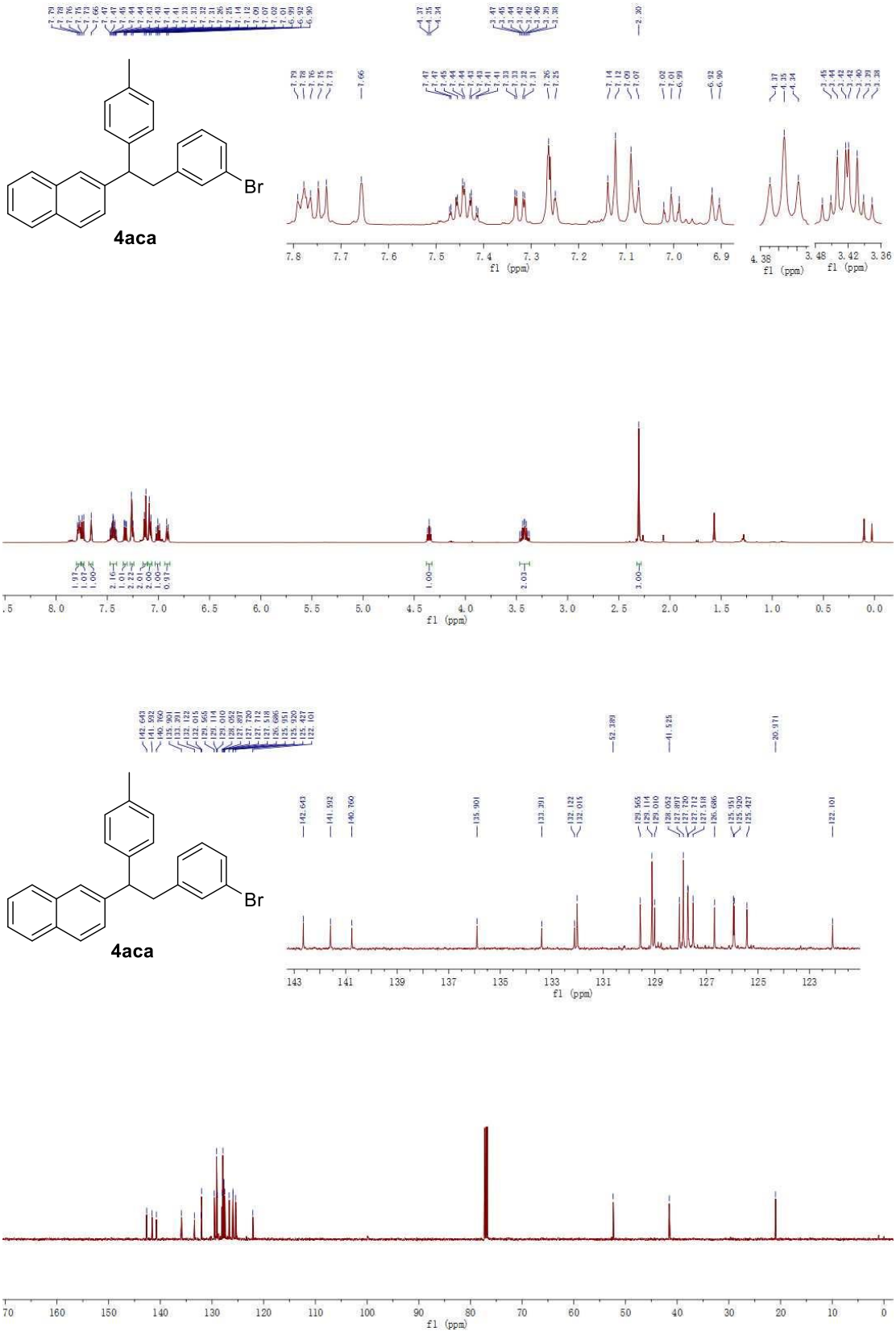


4abo

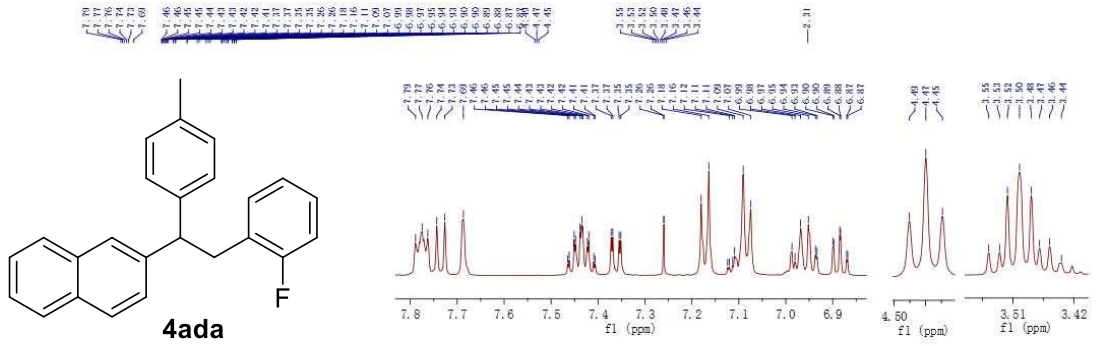


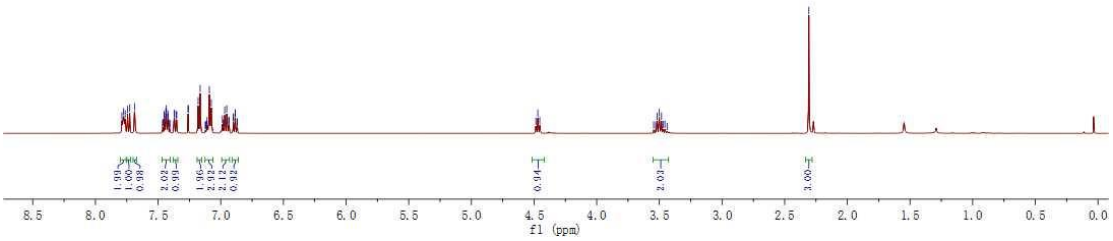


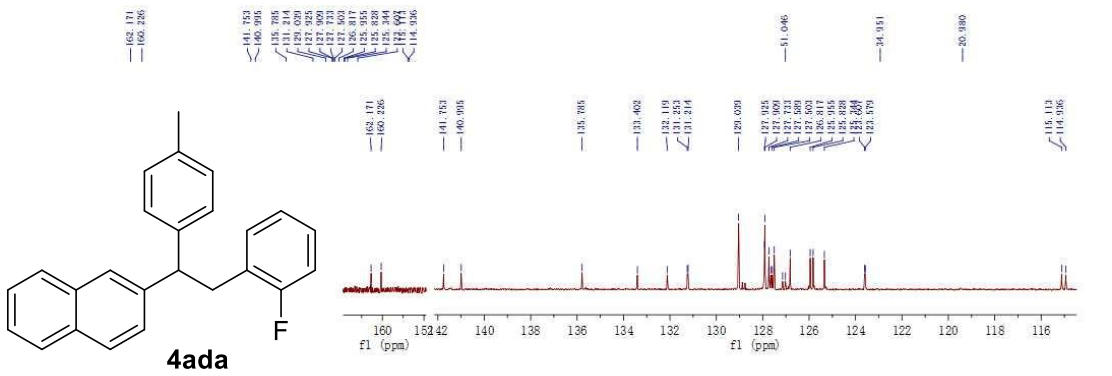
2-(2-(3-bromophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aca)

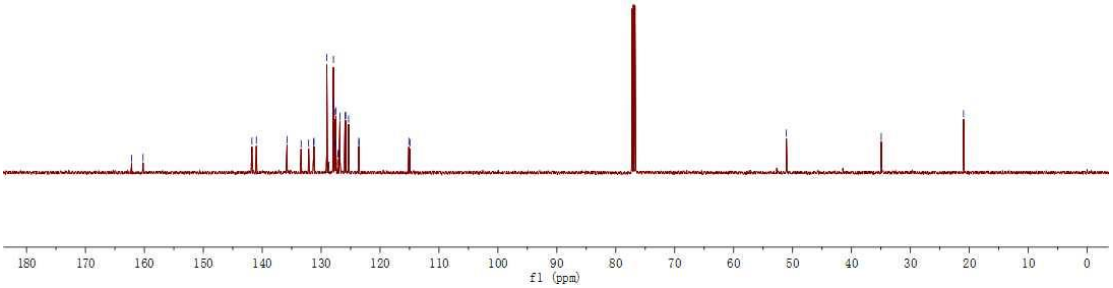


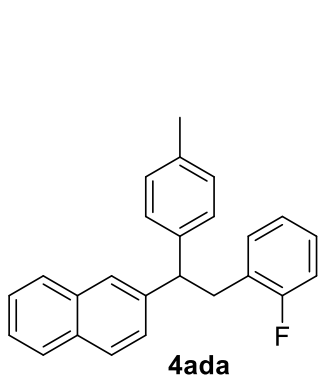
2-(2-(2-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4ada)





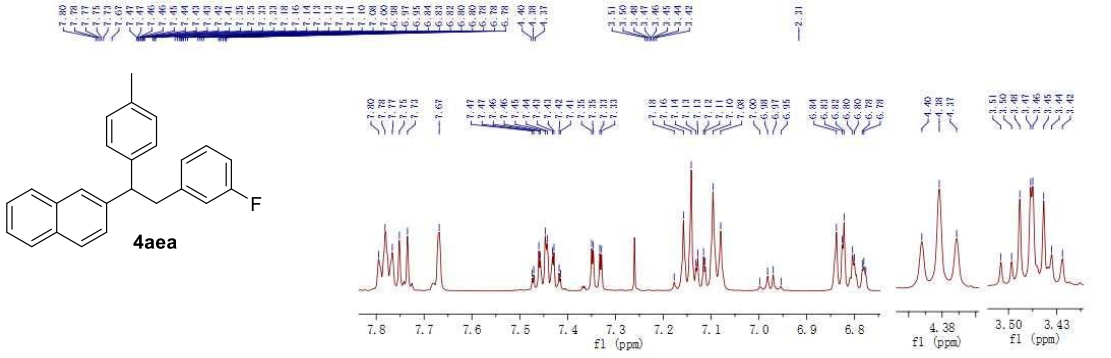


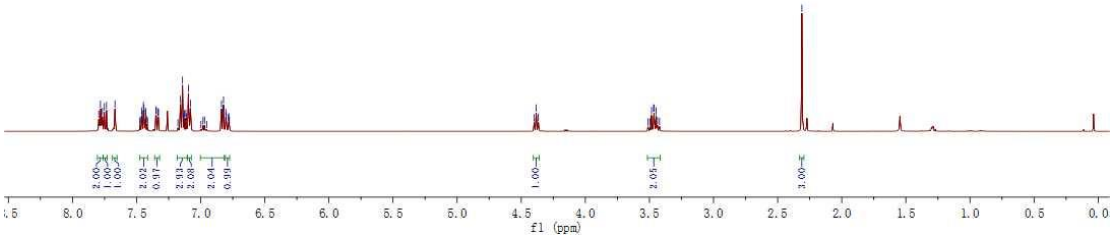


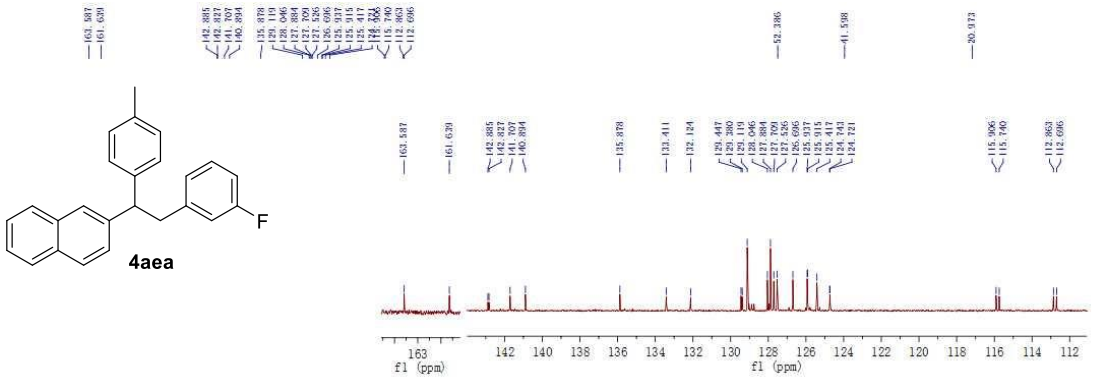


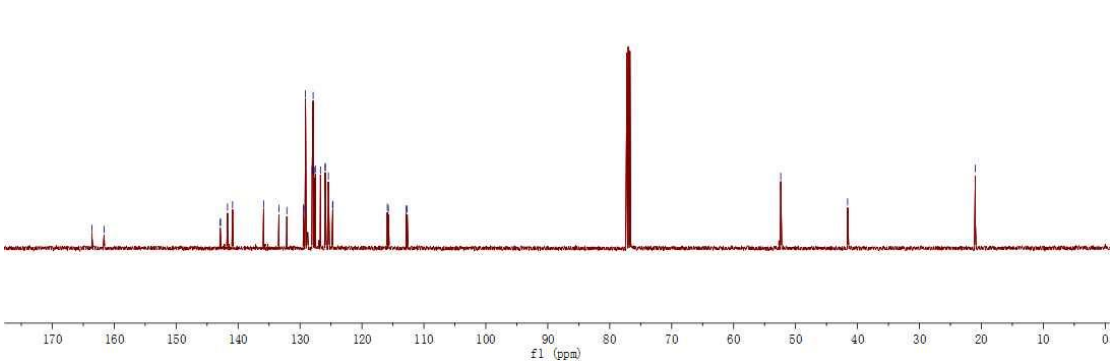
4ada

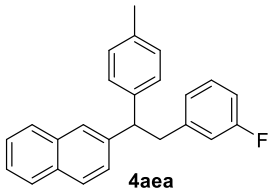
2-(2-(3-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aea)







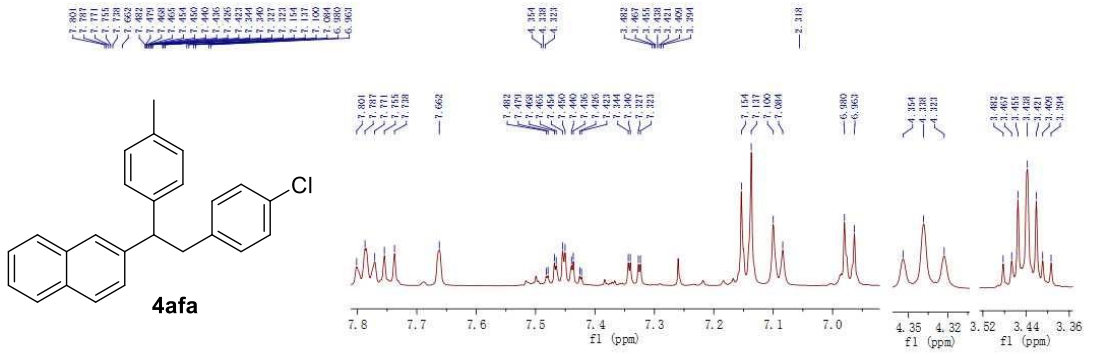


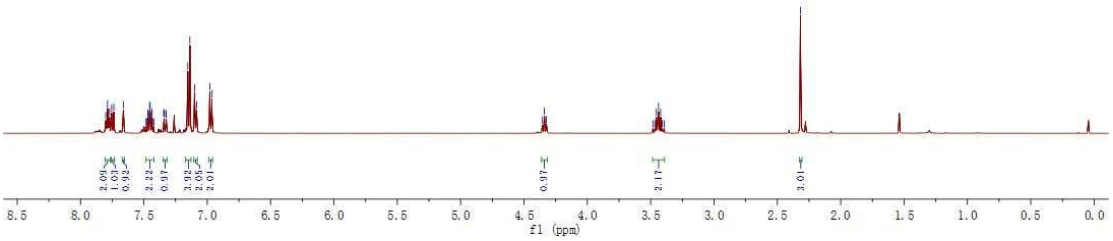

F

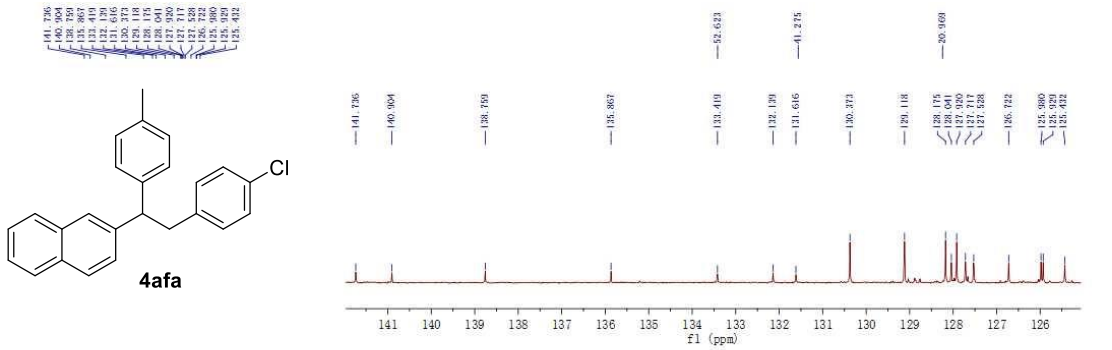
4aea

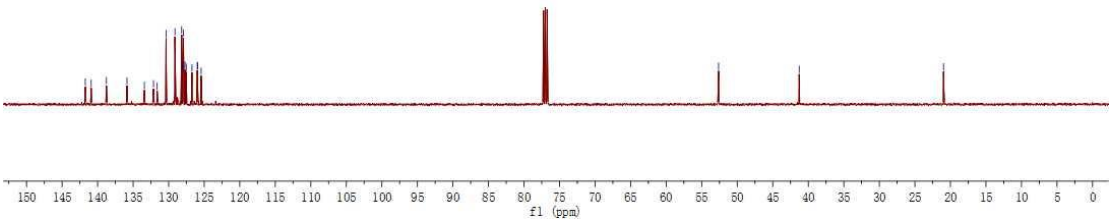
-117.557
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-(2-(4-chlorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4afa)

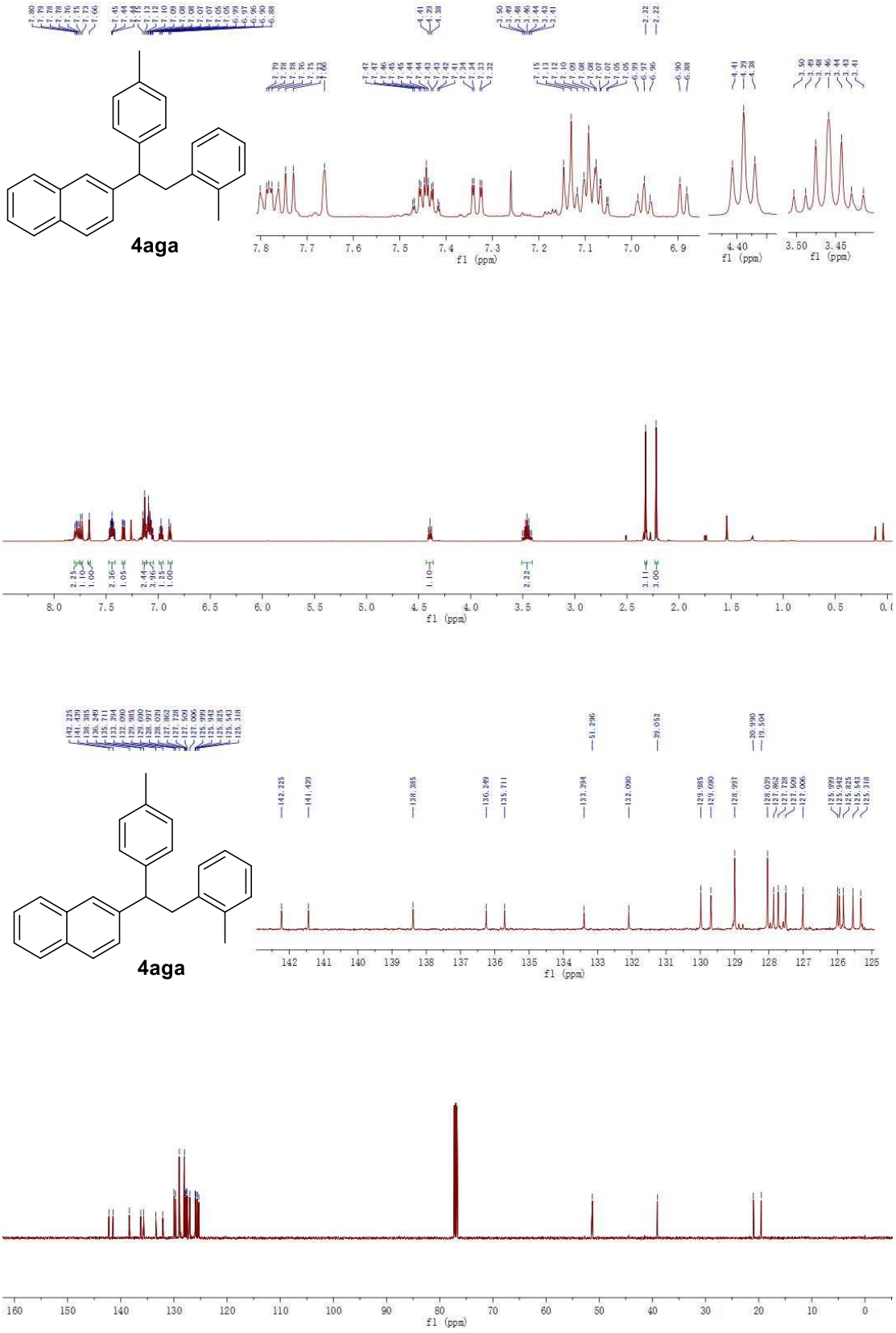




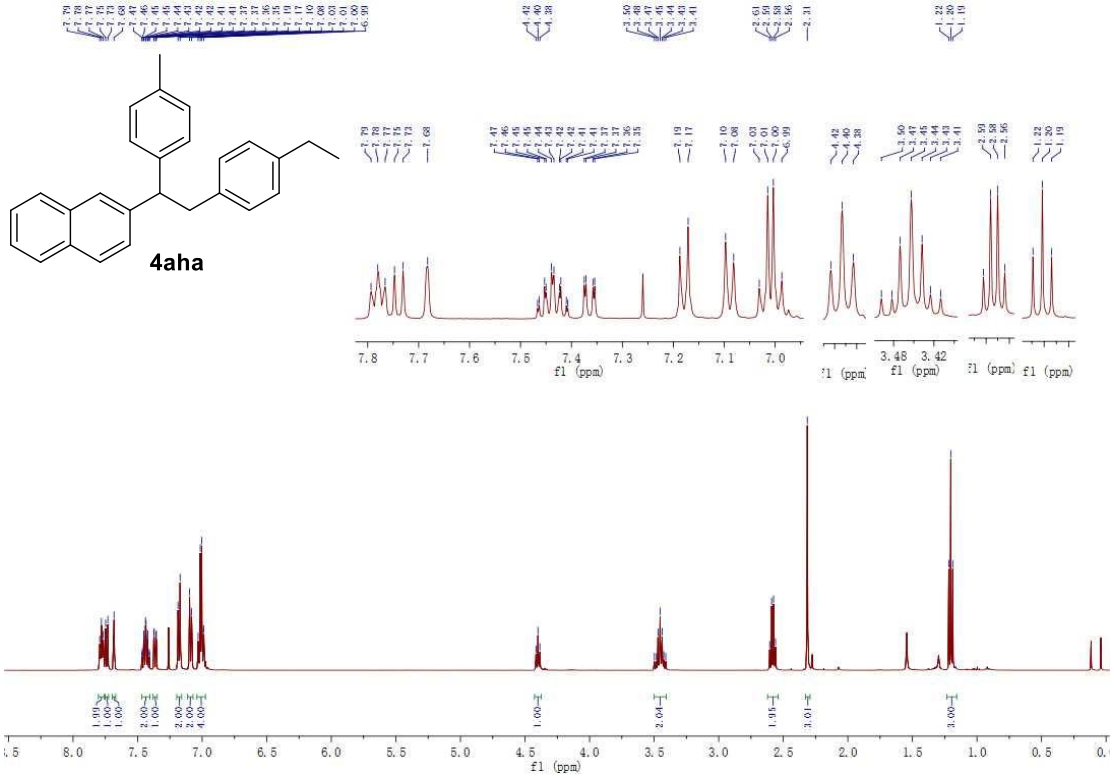


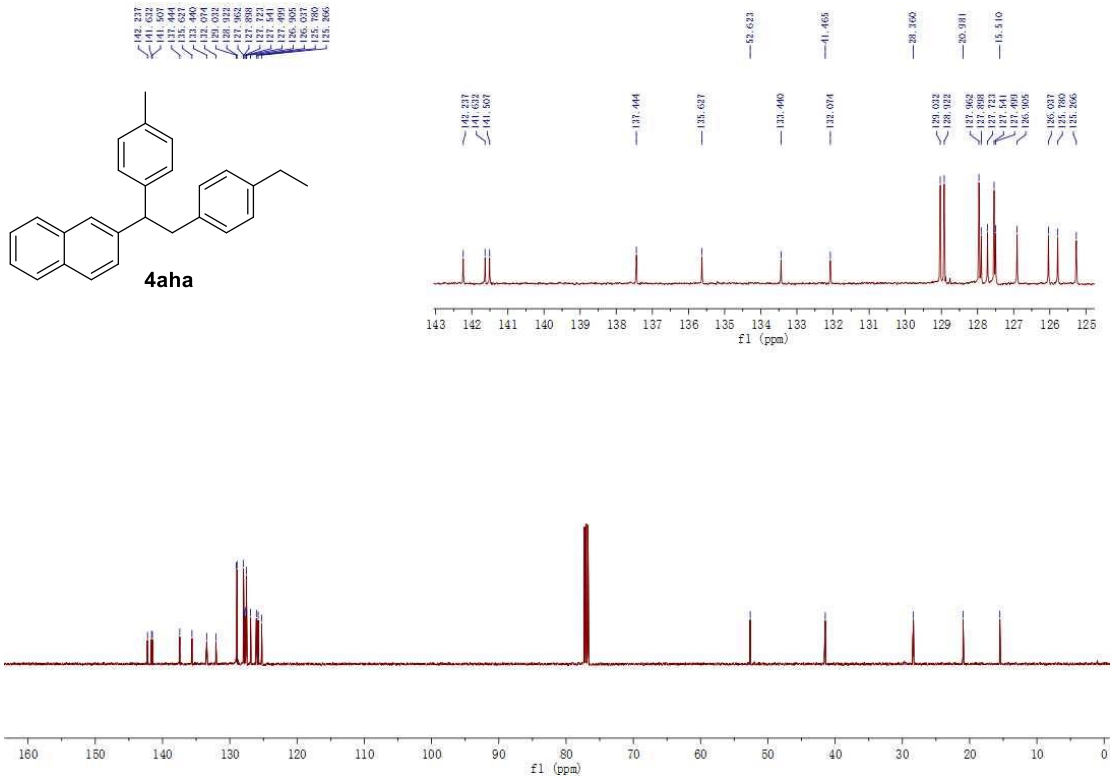


2-(2-(o-tolyl)-1-(*p*-tolyl)ethyl)naphthalene (4aga)

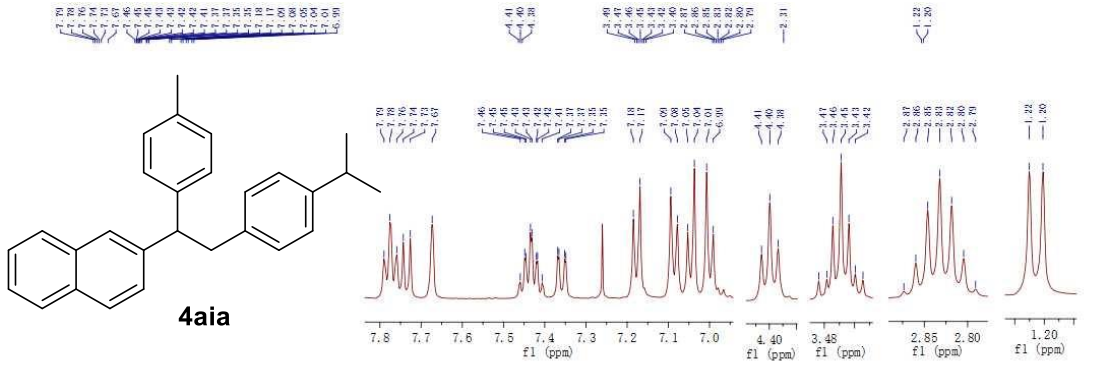


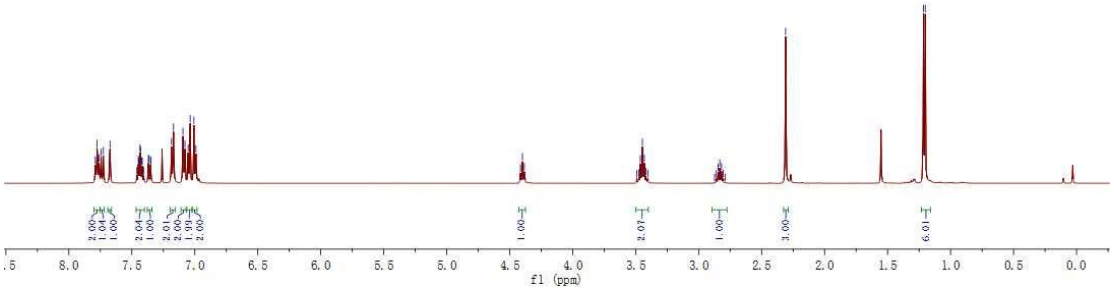
2-(2-(4-ethylphenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aha)

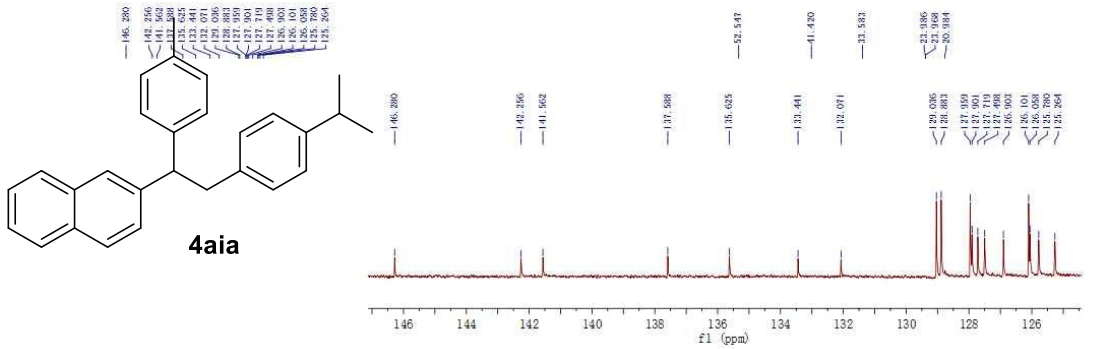


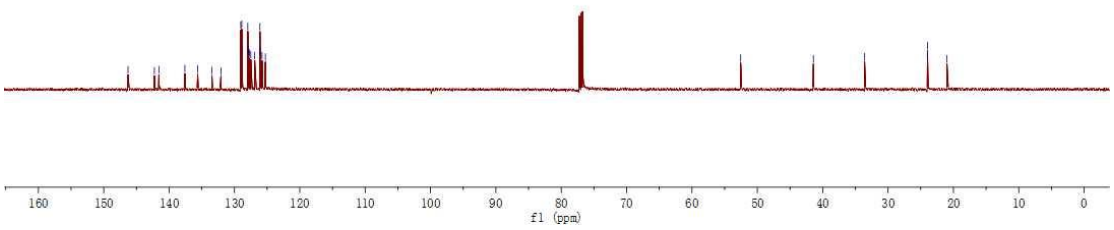


2-(2-(4-isopropylphenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aia)

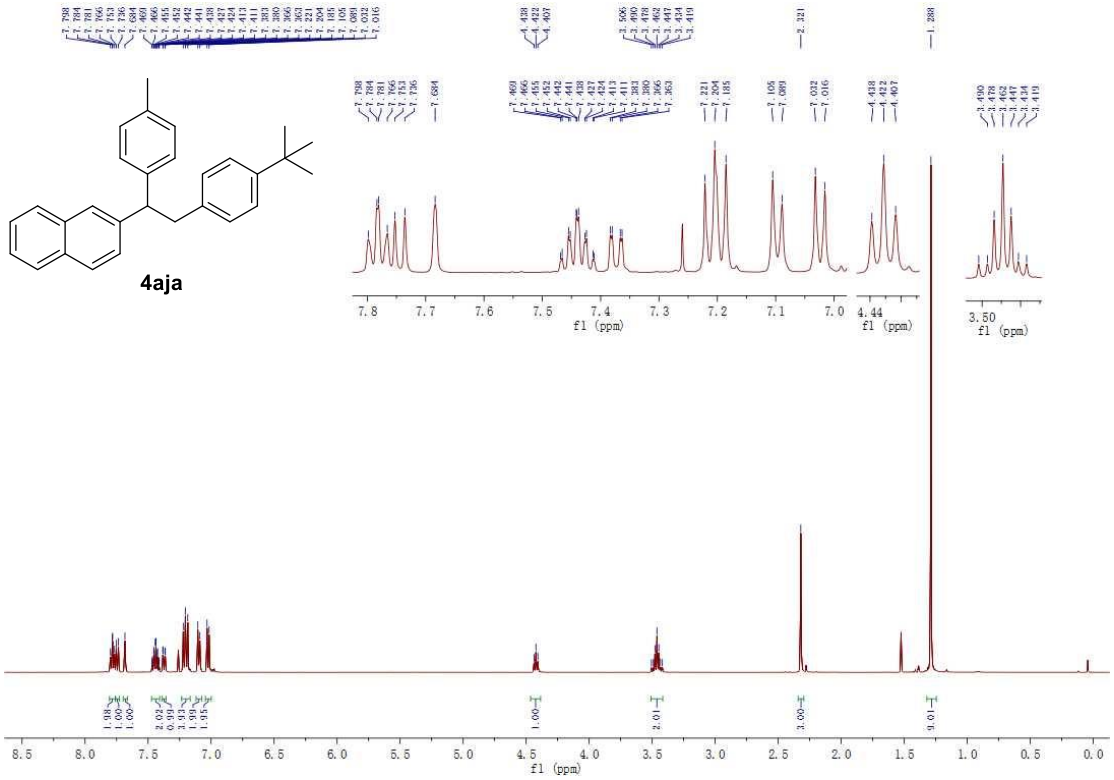


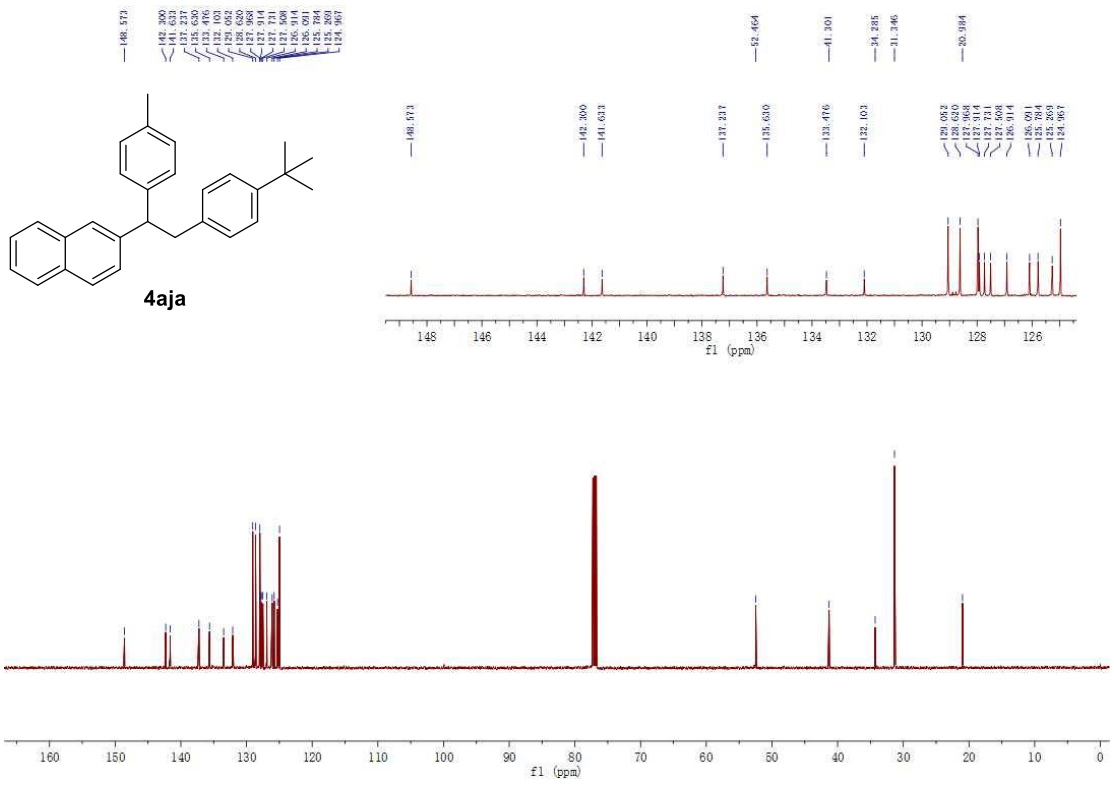




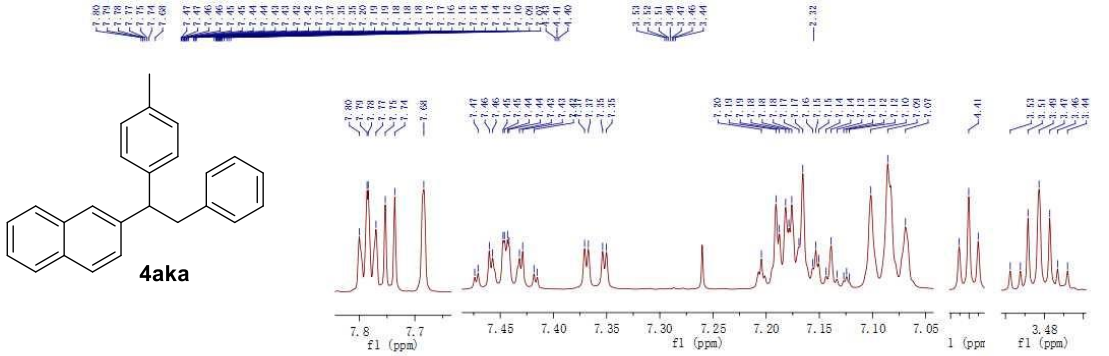


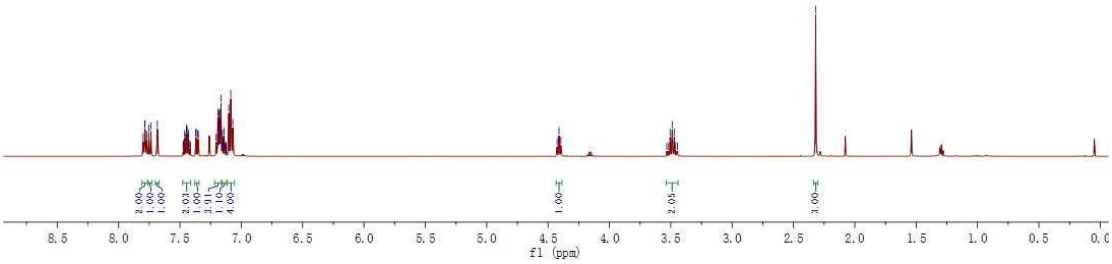
2-(2-(4-(*tert*-butyl)phenyl)-1-(*p*-tolyl)ethyl)naphthalene (4aja)

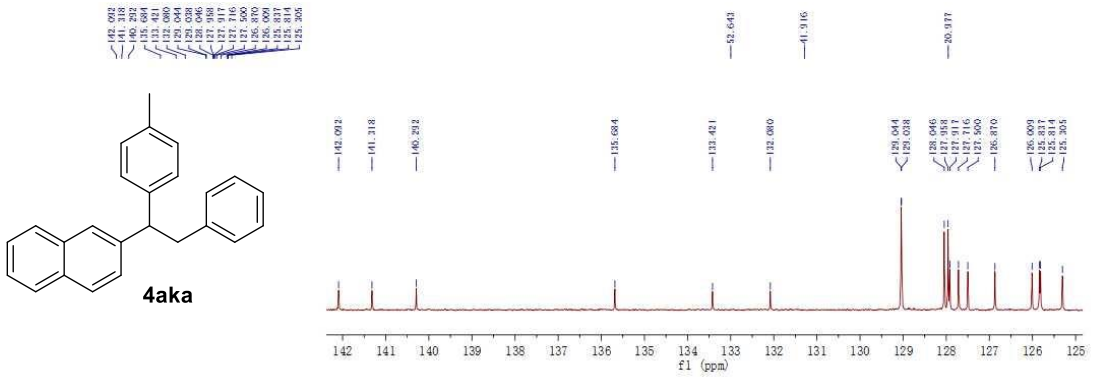


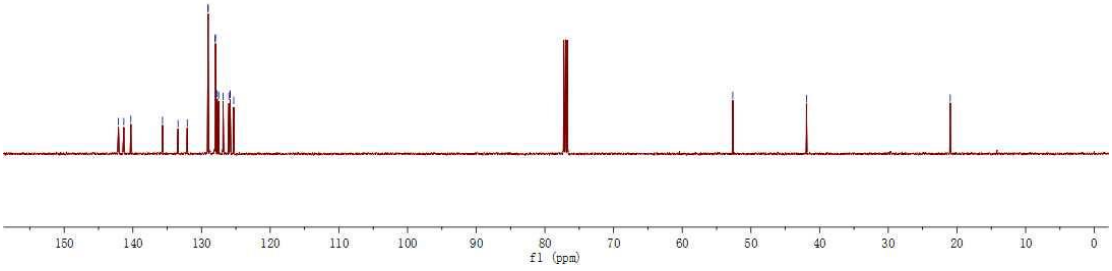


2-(2-phenyl-1-(*p*-tolyl)ethyl)naphthalene (4aka)

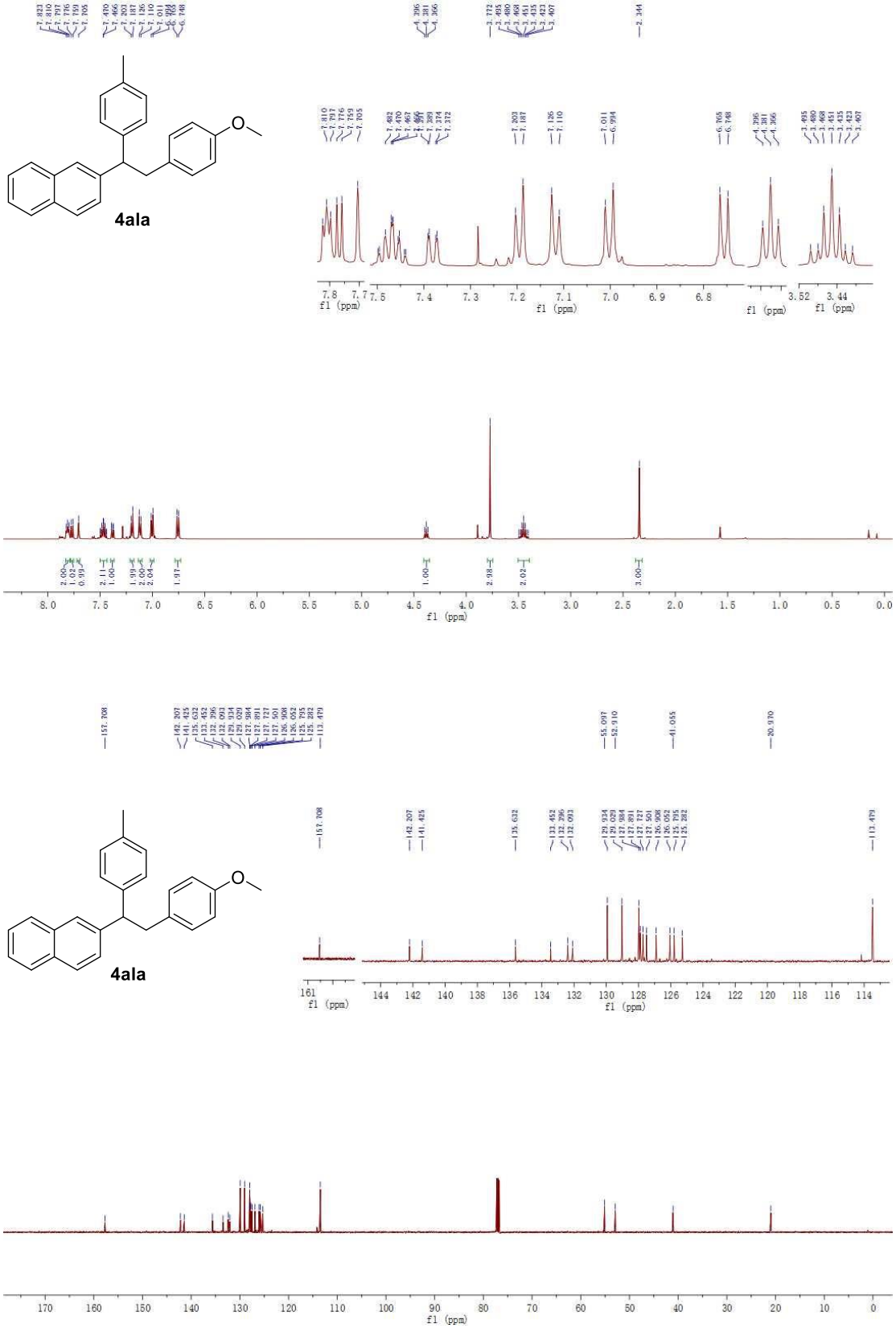




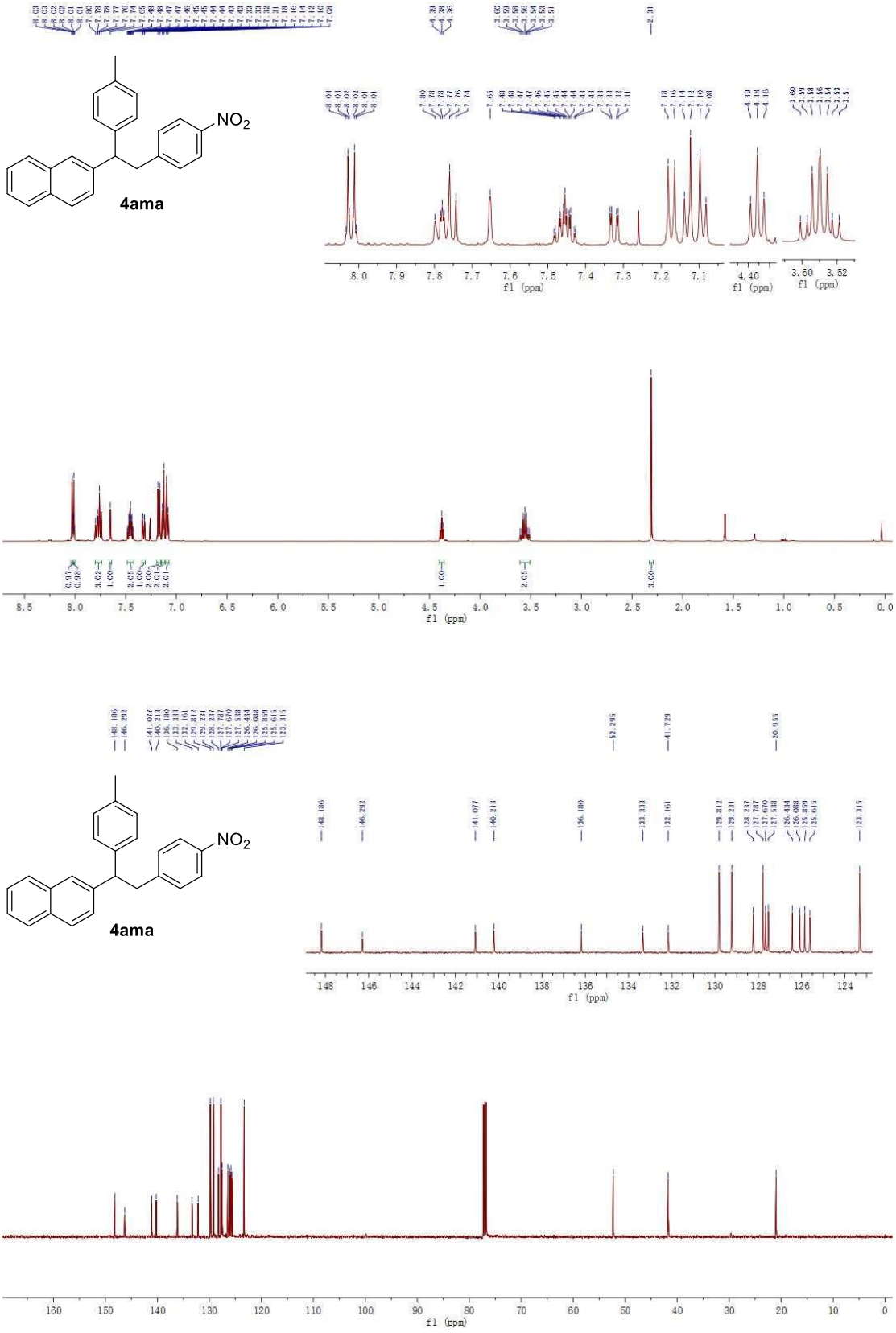




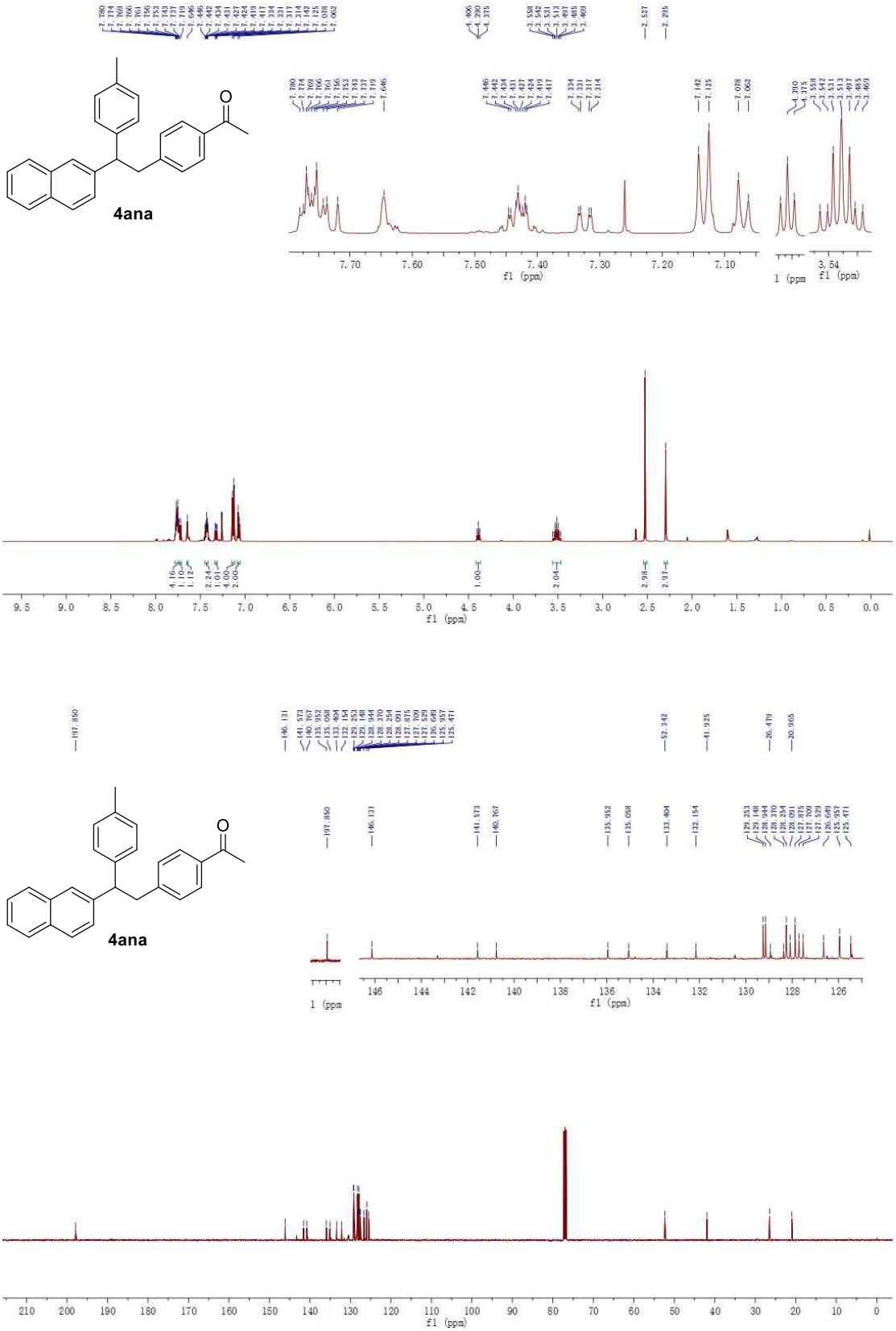
2-(2-(4-methoxyphenyl)-1-(*p*-tolyl)ethyl)naphthalene (4ala)



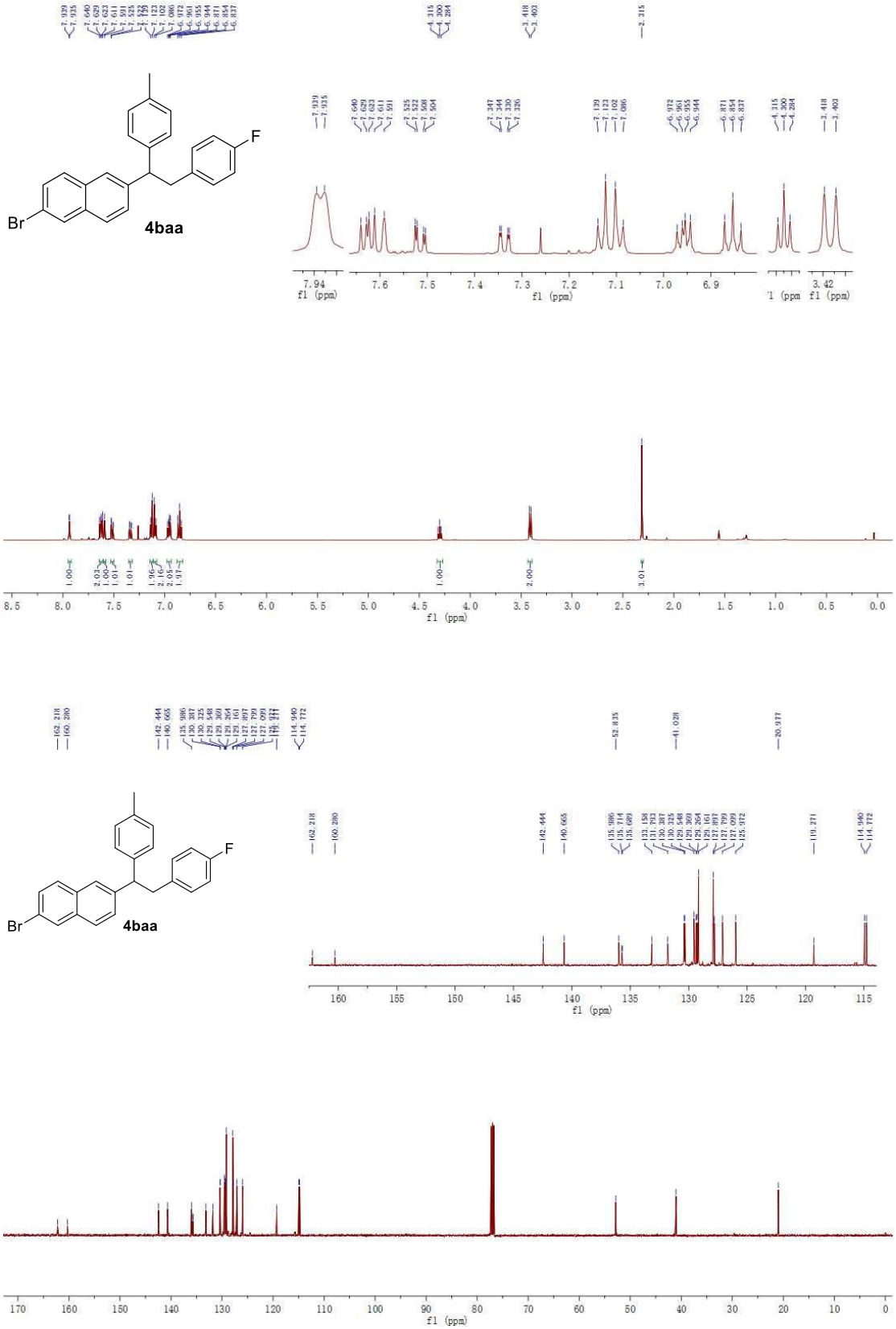
2-(2-(4-nitrophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4ama)

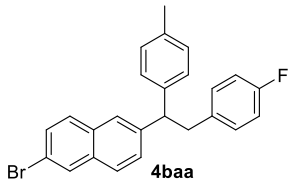


1-(4-(2-(naphthalen-2-yl)-2-(*p*-tolyl)ethyl)phenyl)ethan-1-one (4ana)

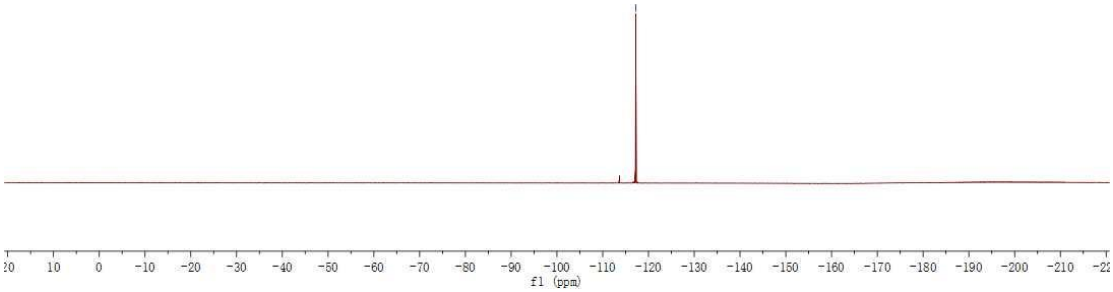


2-bromo-6-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4baa)

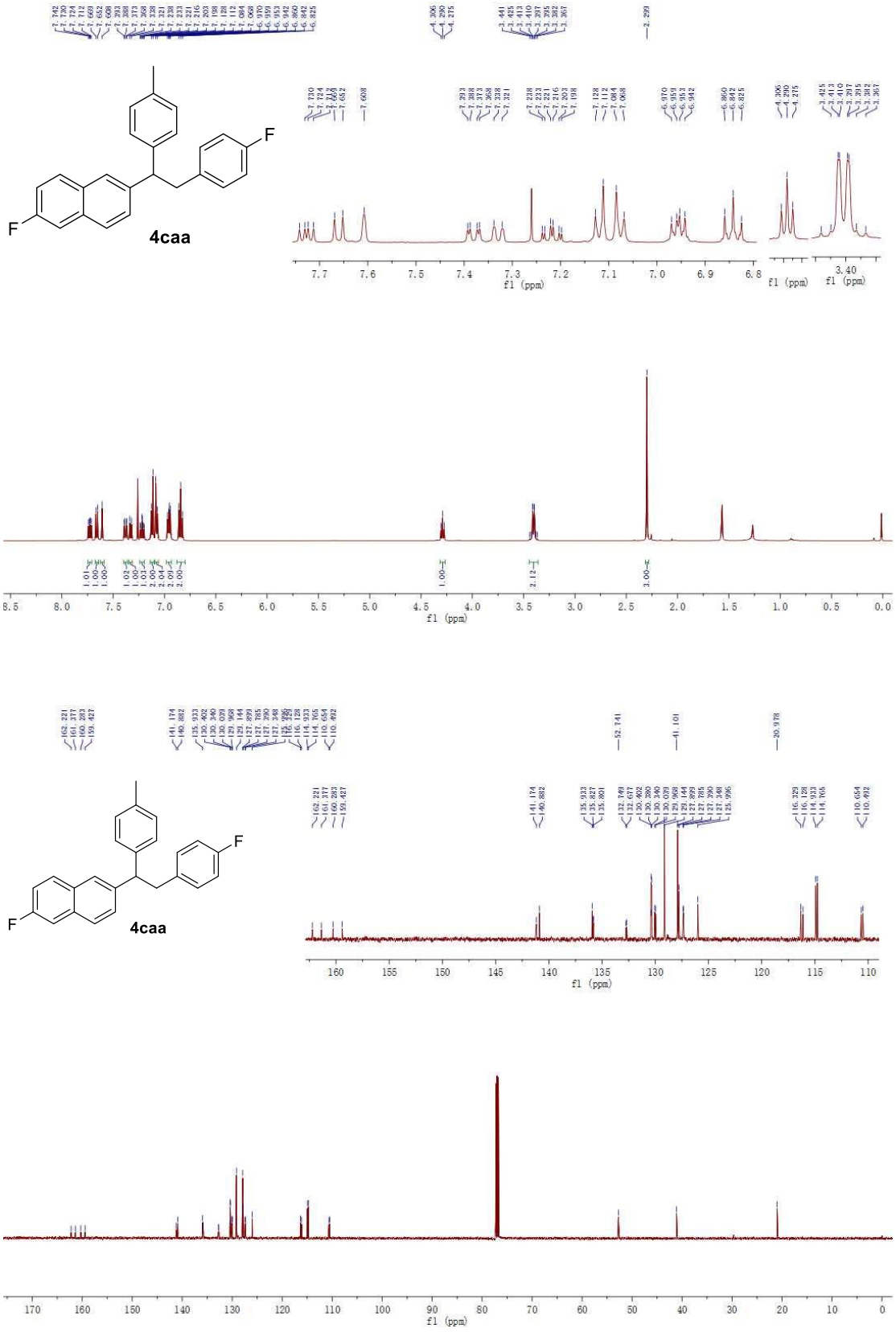


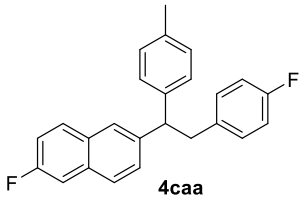


4baa



2-fluoro-6-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4caa)

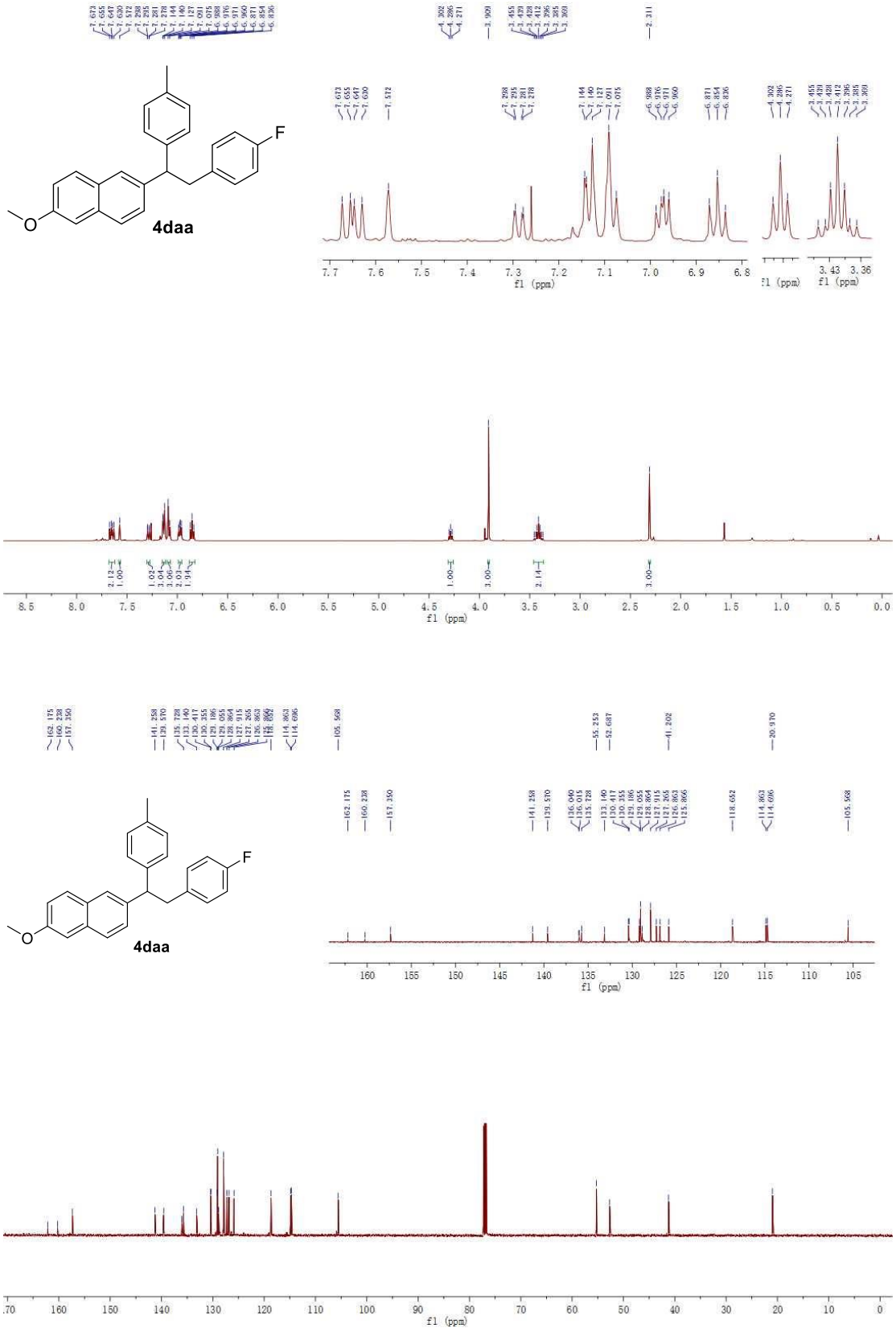


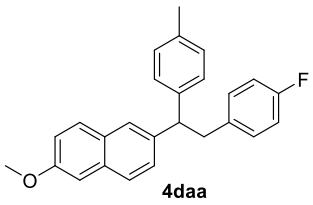

F
F

4caa

115.474
117.304
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

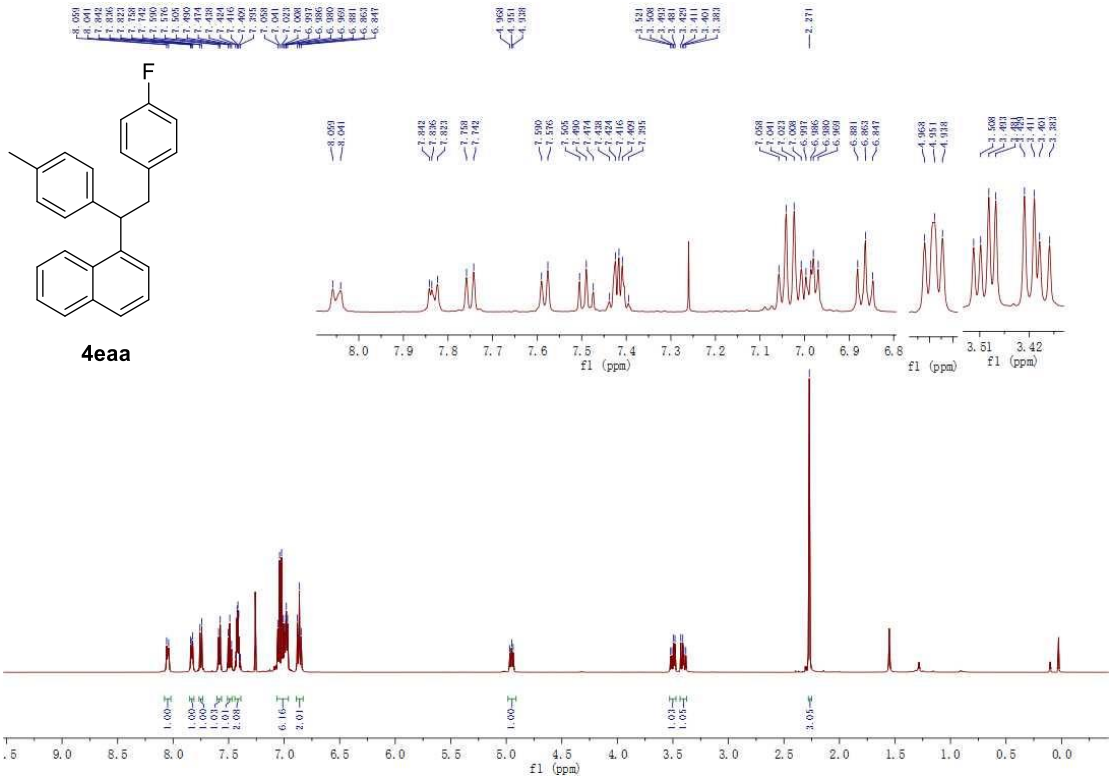
2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)-6-methoxynaphthalene (4daa)

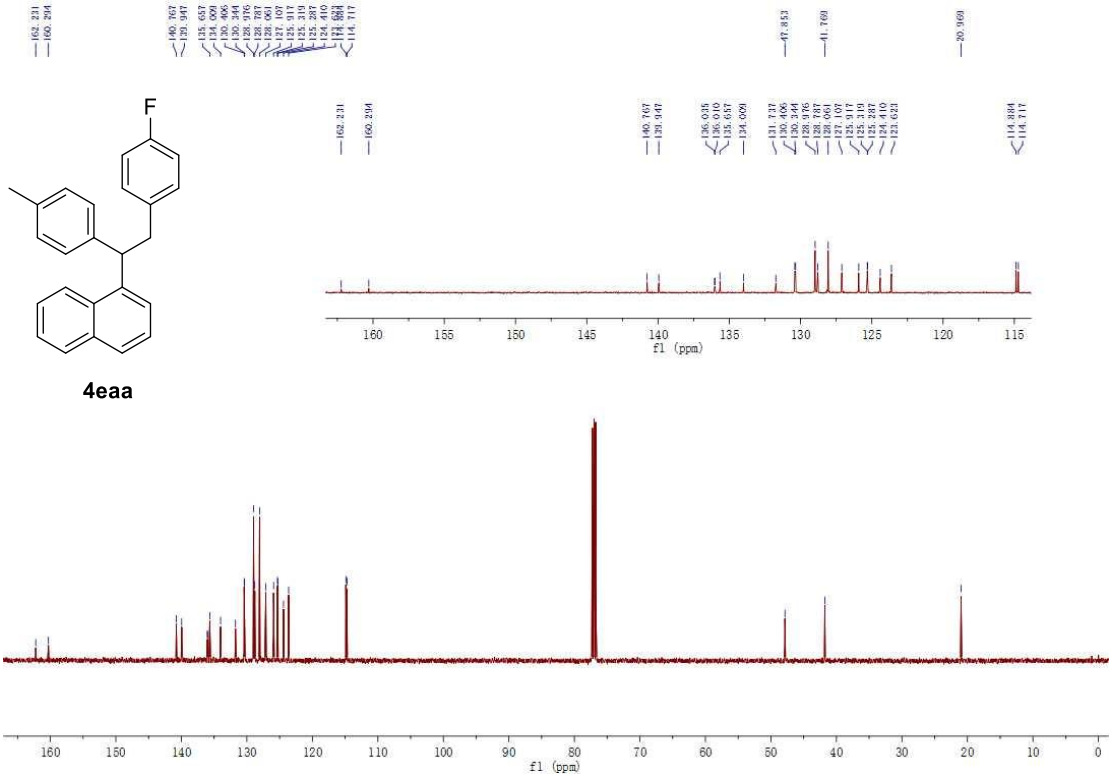


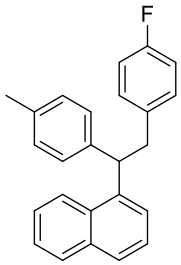


4daa

1-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)naphthalene (4eaa)

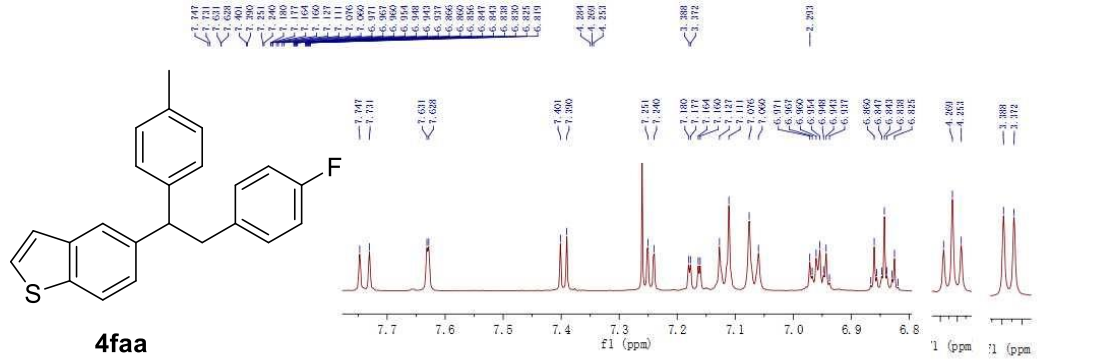


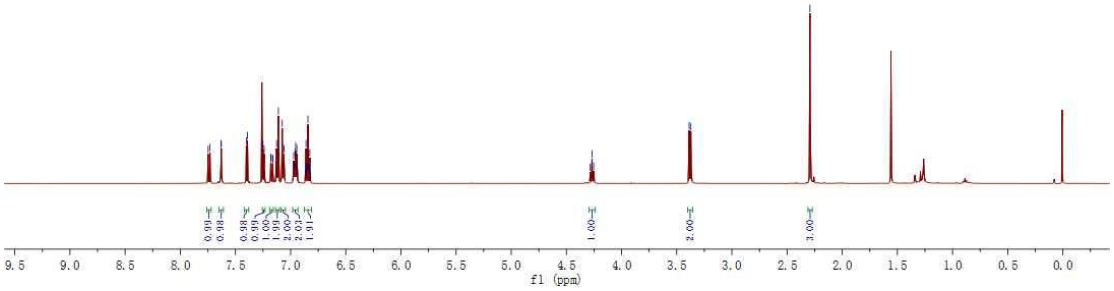


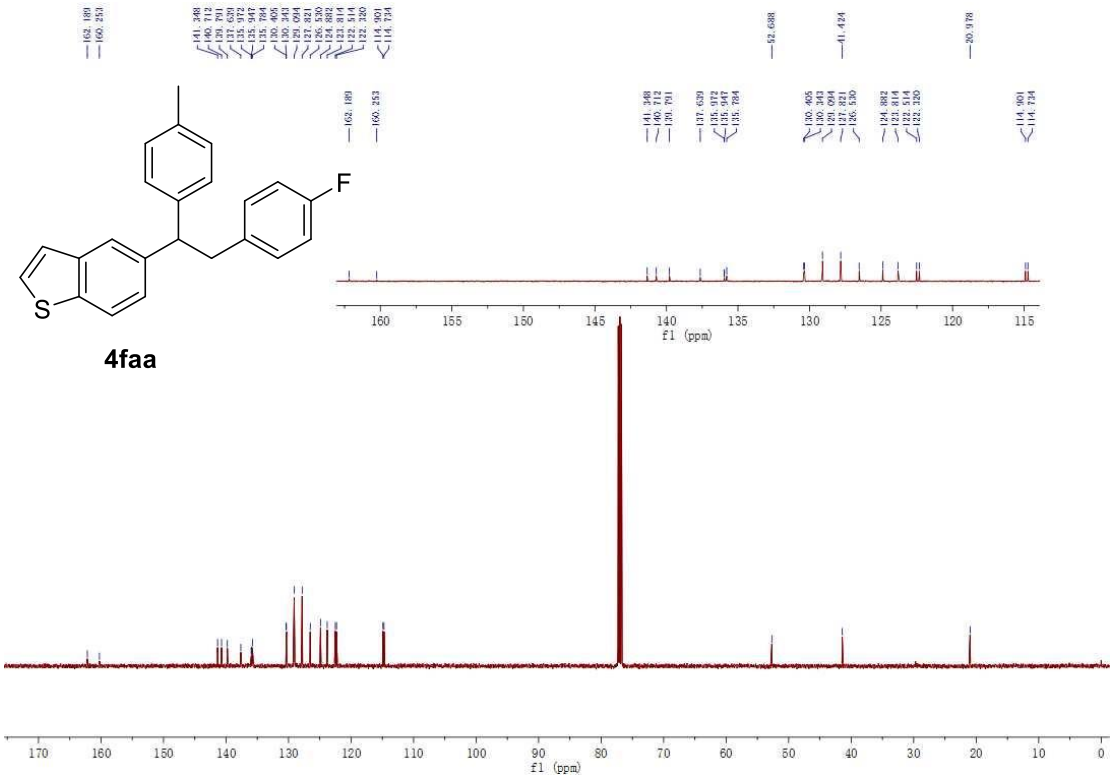


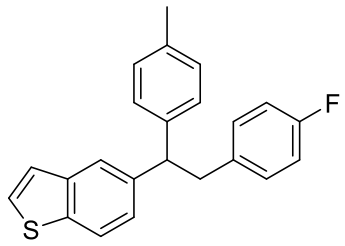
4eaa

5-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)benzo[*b*]thiophene (4faa)





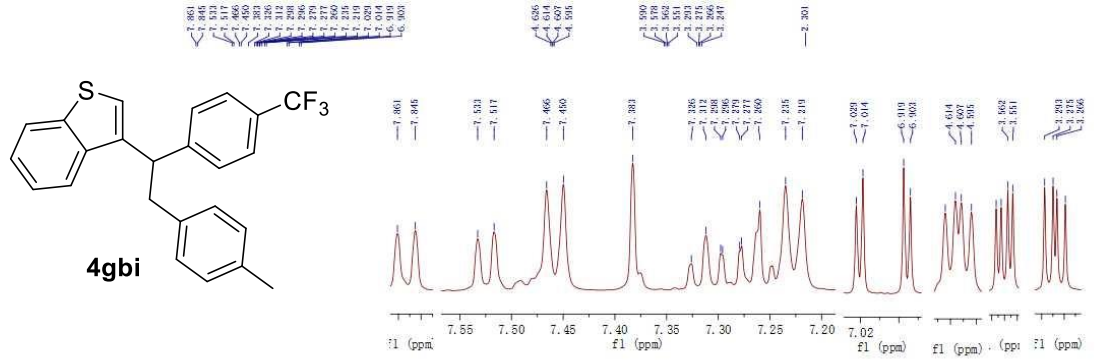


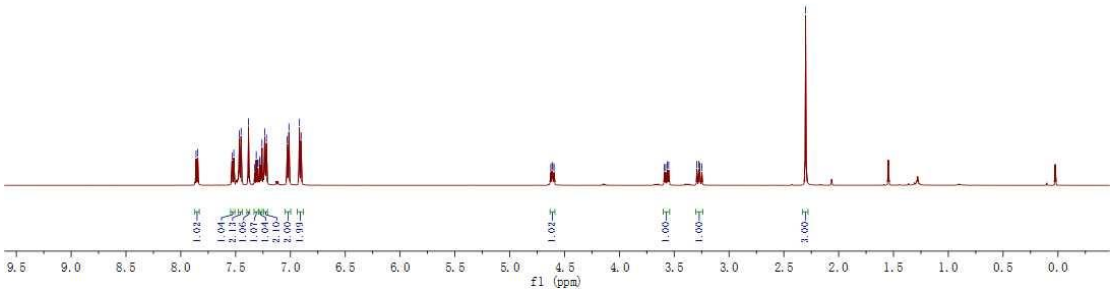

F
S

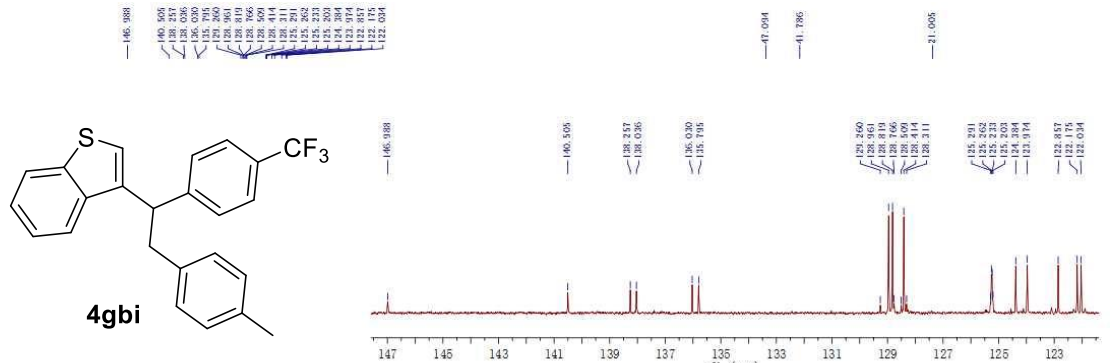
4faa

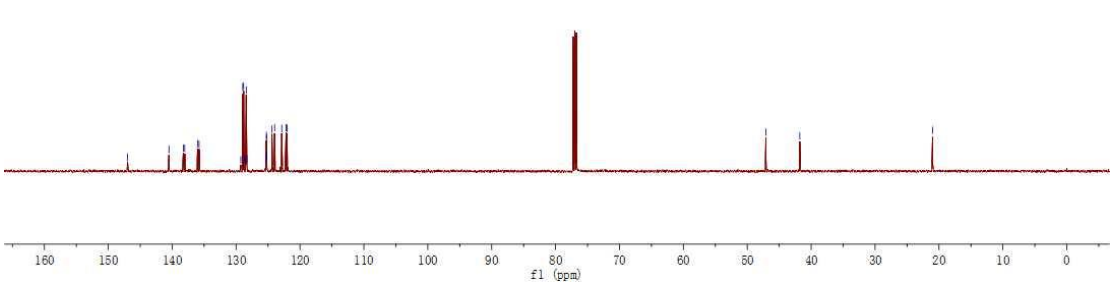
-117.909
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

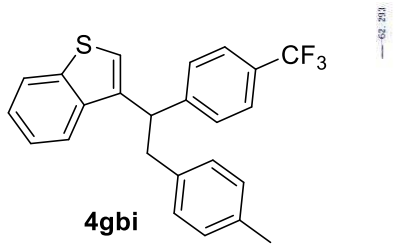
3-(*2*-(*p*-tolyl)-1-(4-(trifluoromethyl)phenyl)ethyl)benzo[*b*]thiophene (4gbi).



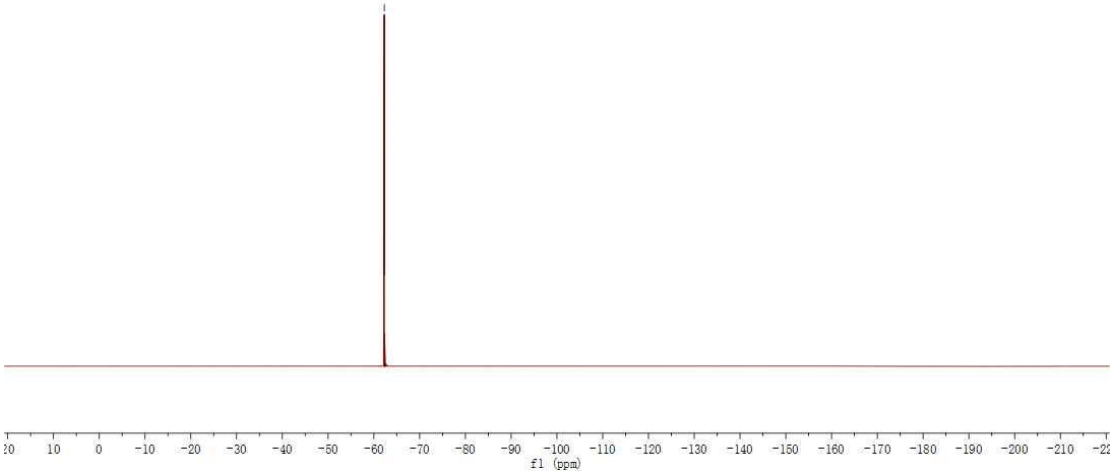




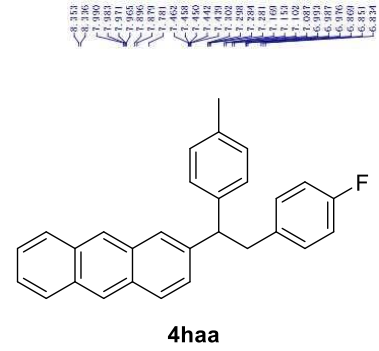




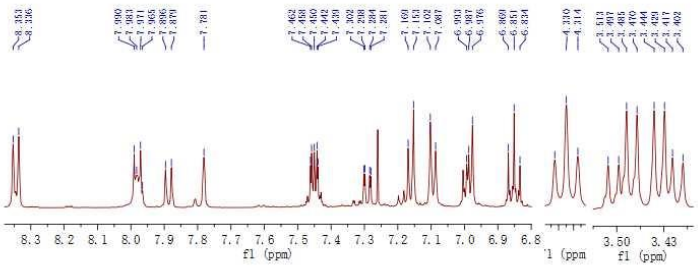
4gbi

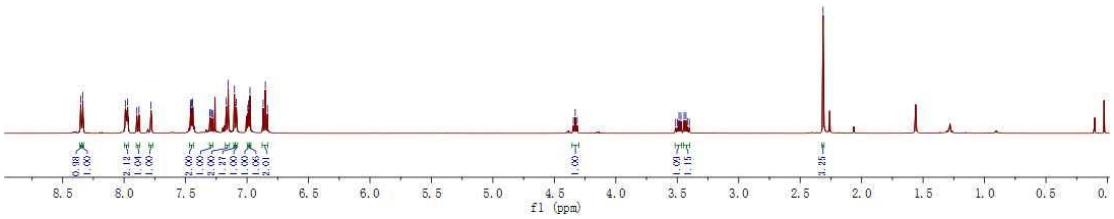


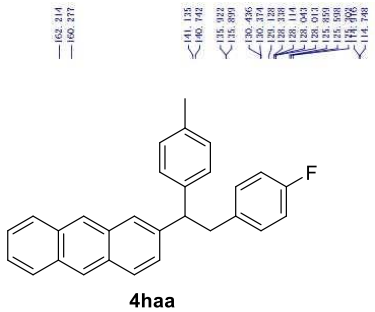
2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)anthracene (4haa)



4haa







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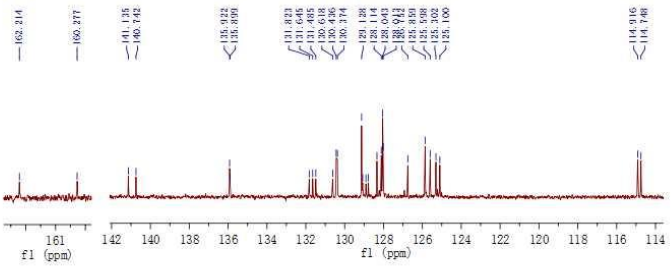

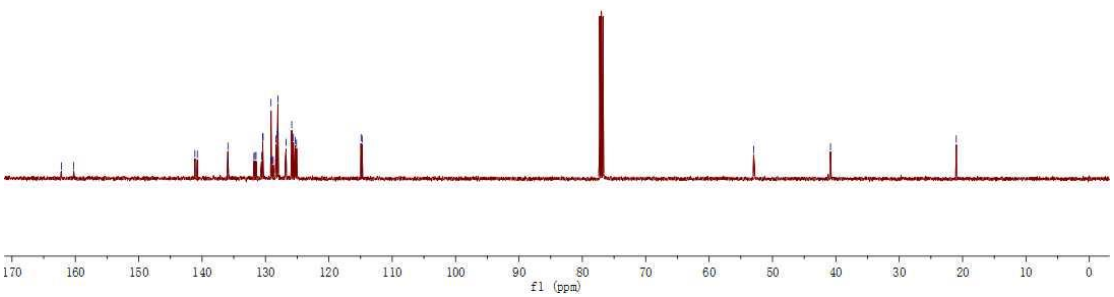

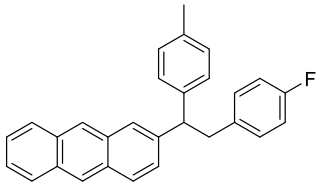
F

4haa

117.425
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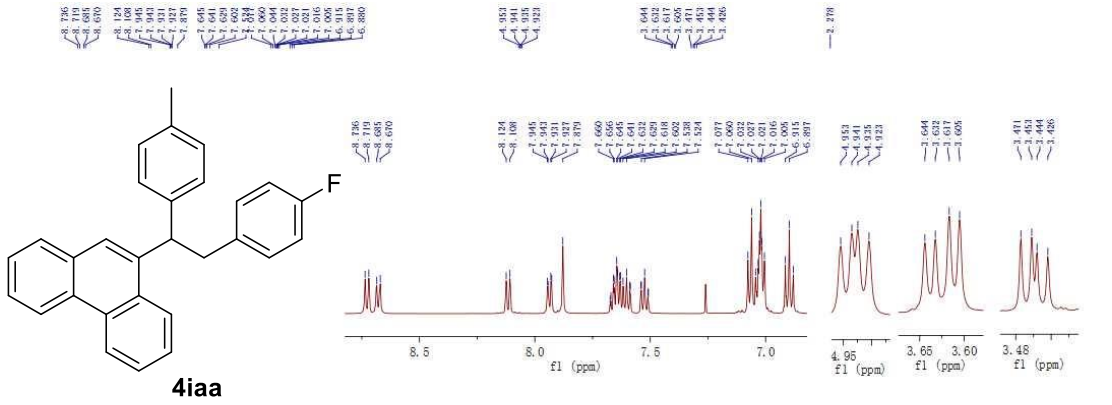
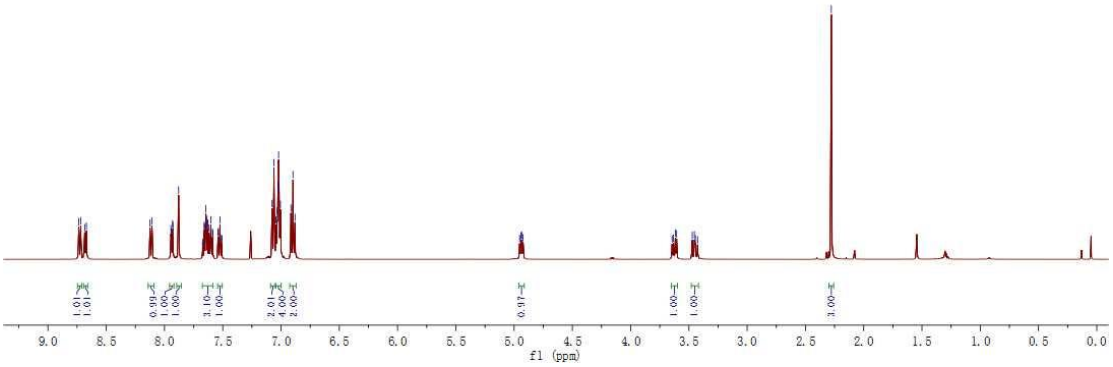
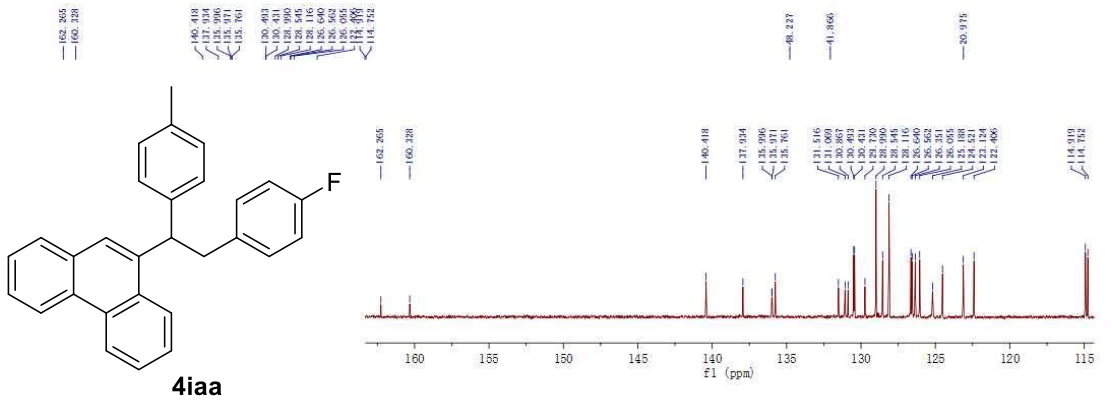
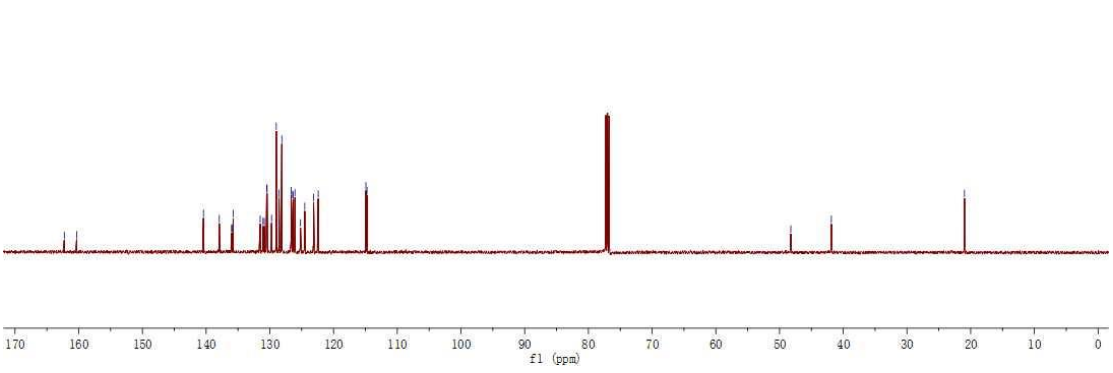
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

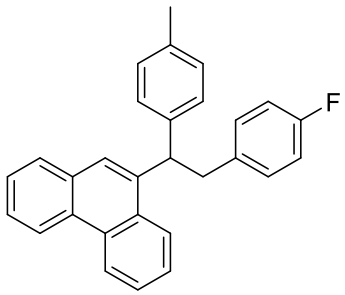
9-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl)phenanthrene (4iaa)





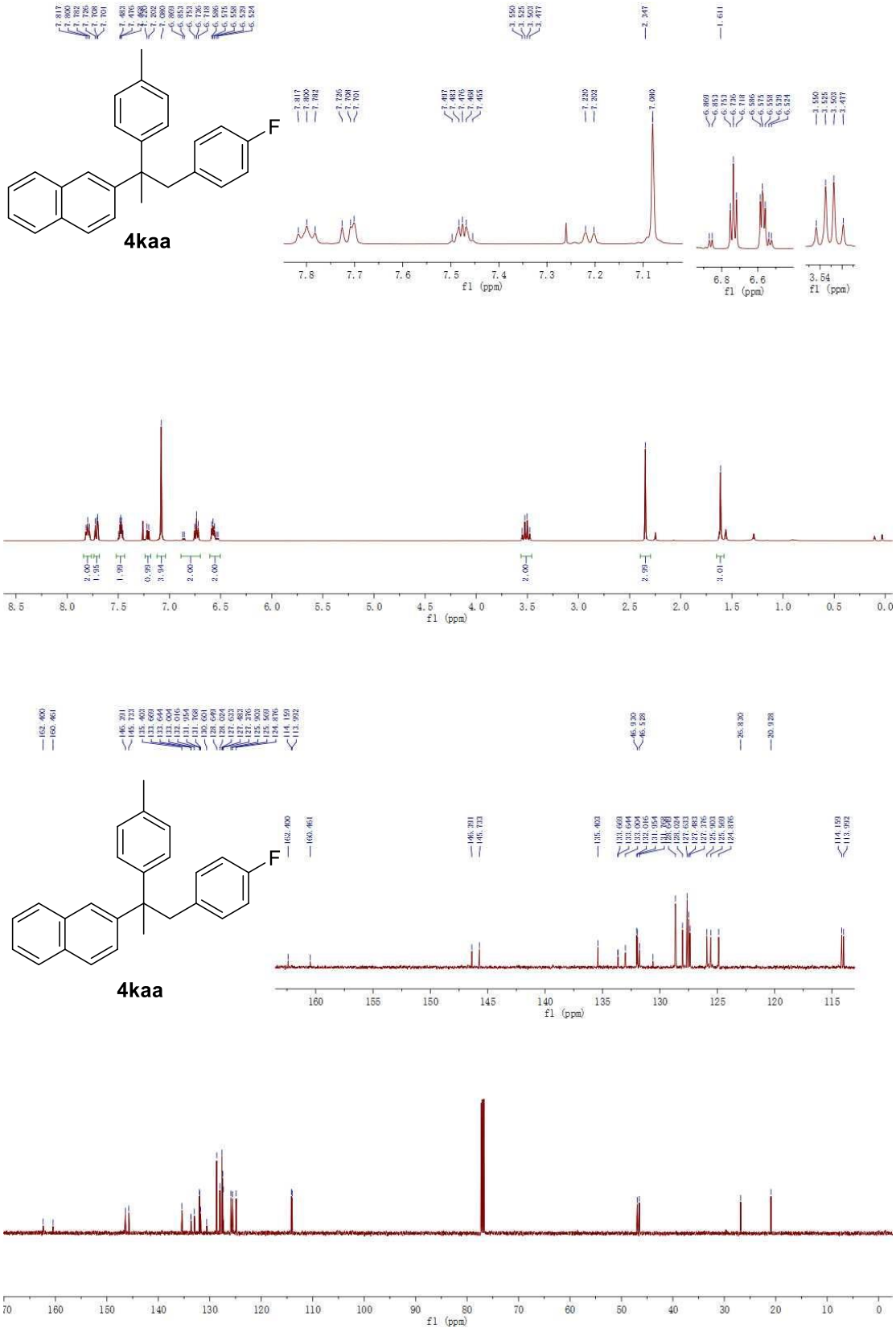


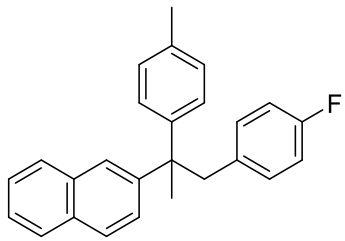




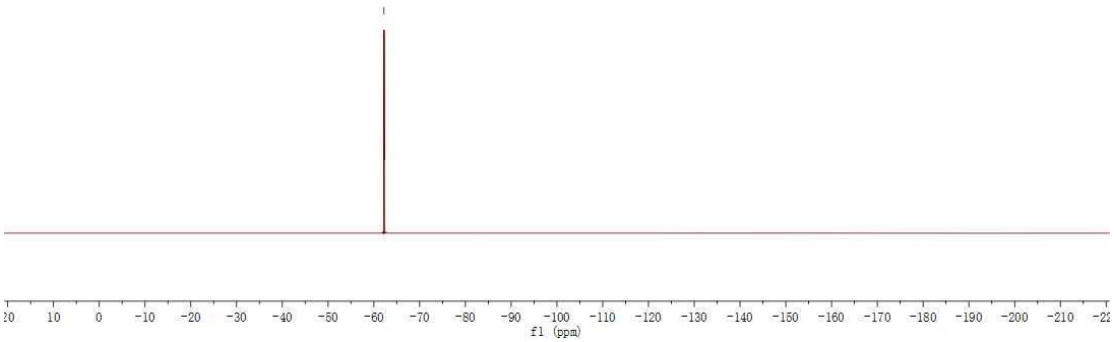
4iaa

2-(1-(4-fluorophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kaa)

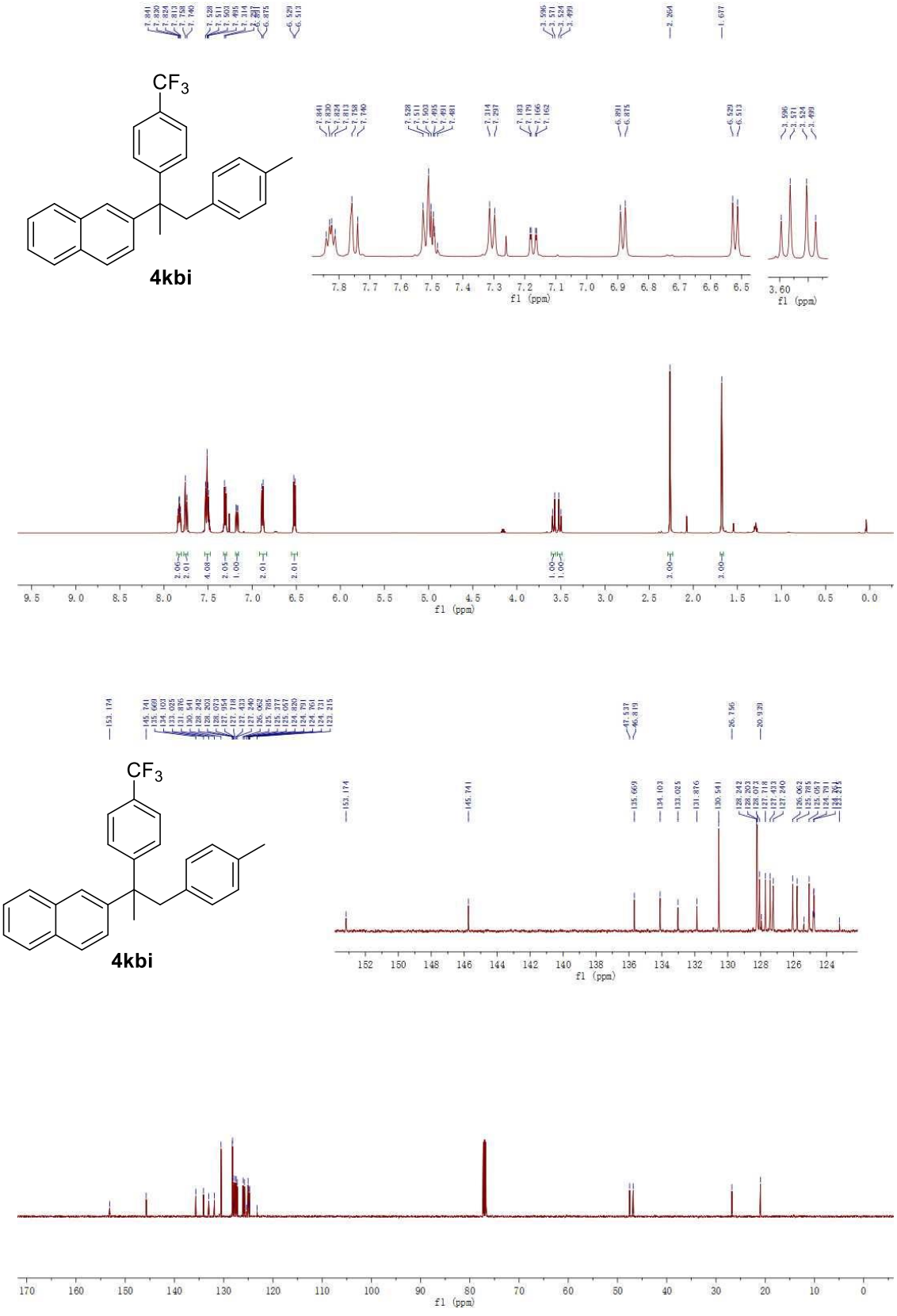


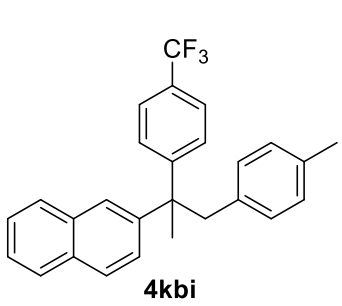

F

4kaa

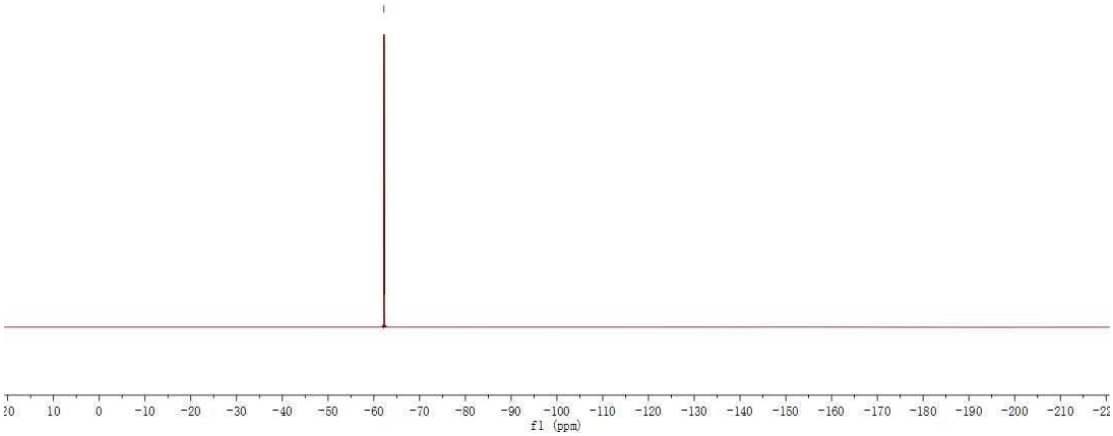

20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)naphthalene (4kbi)




CF3

4kbi


10
0
-10
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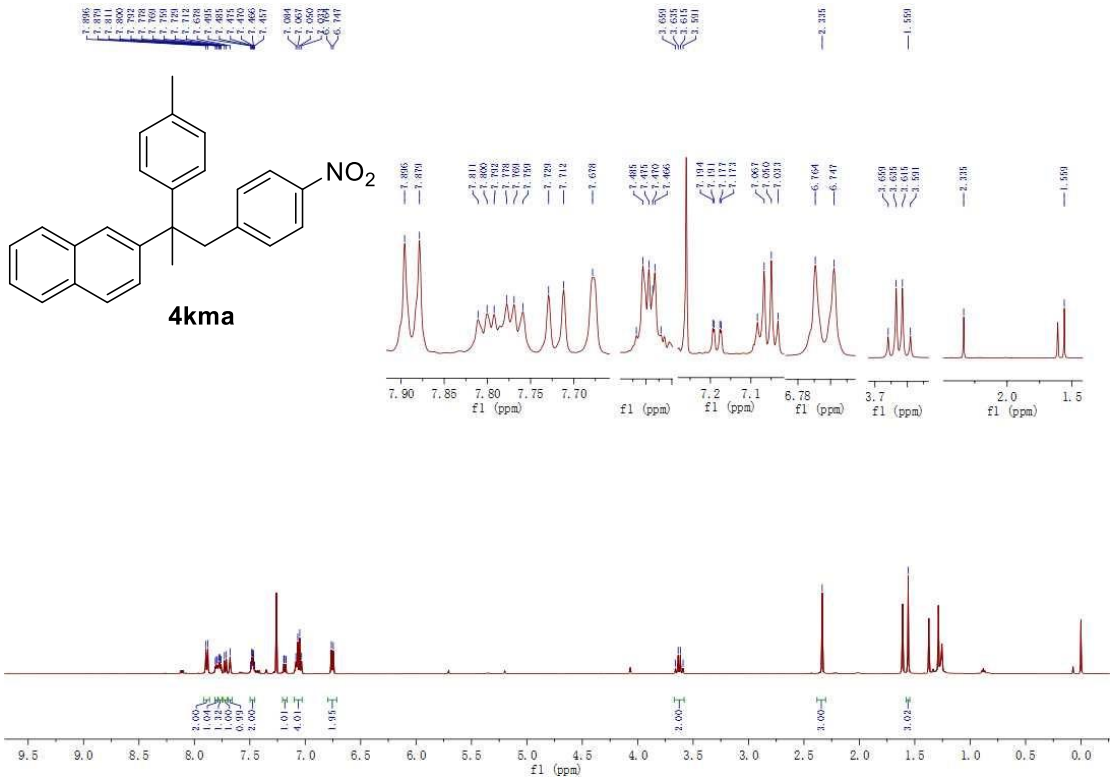
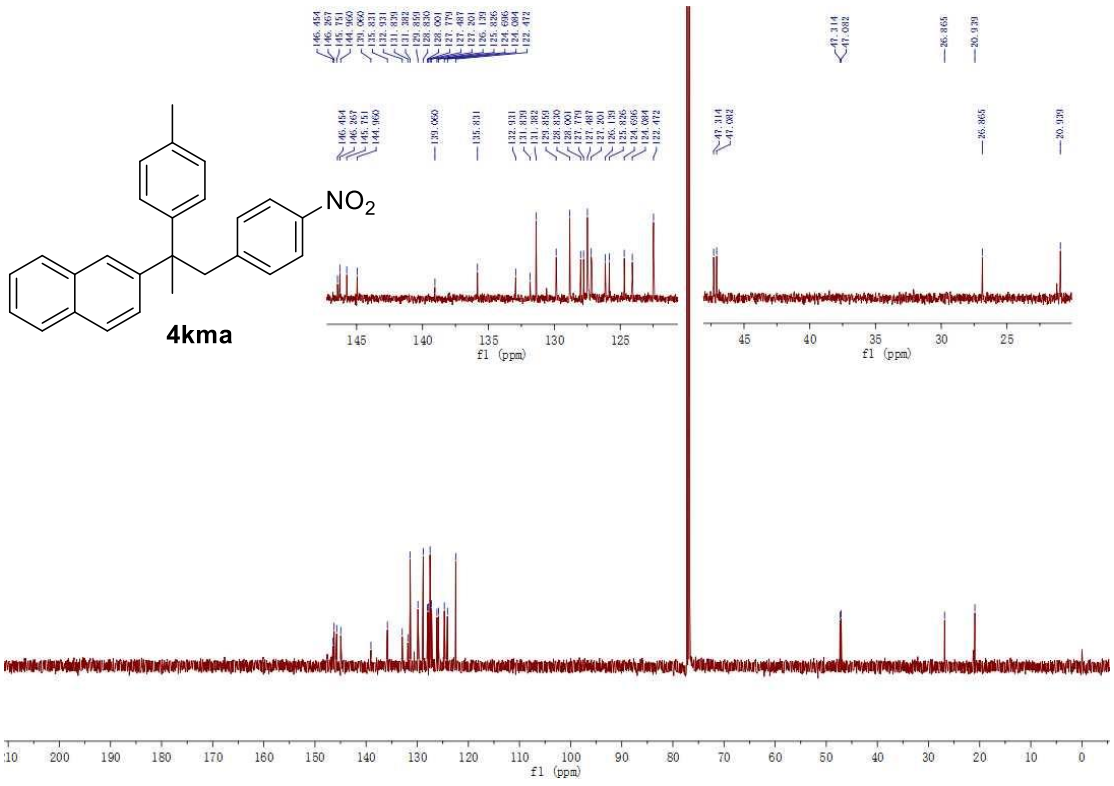
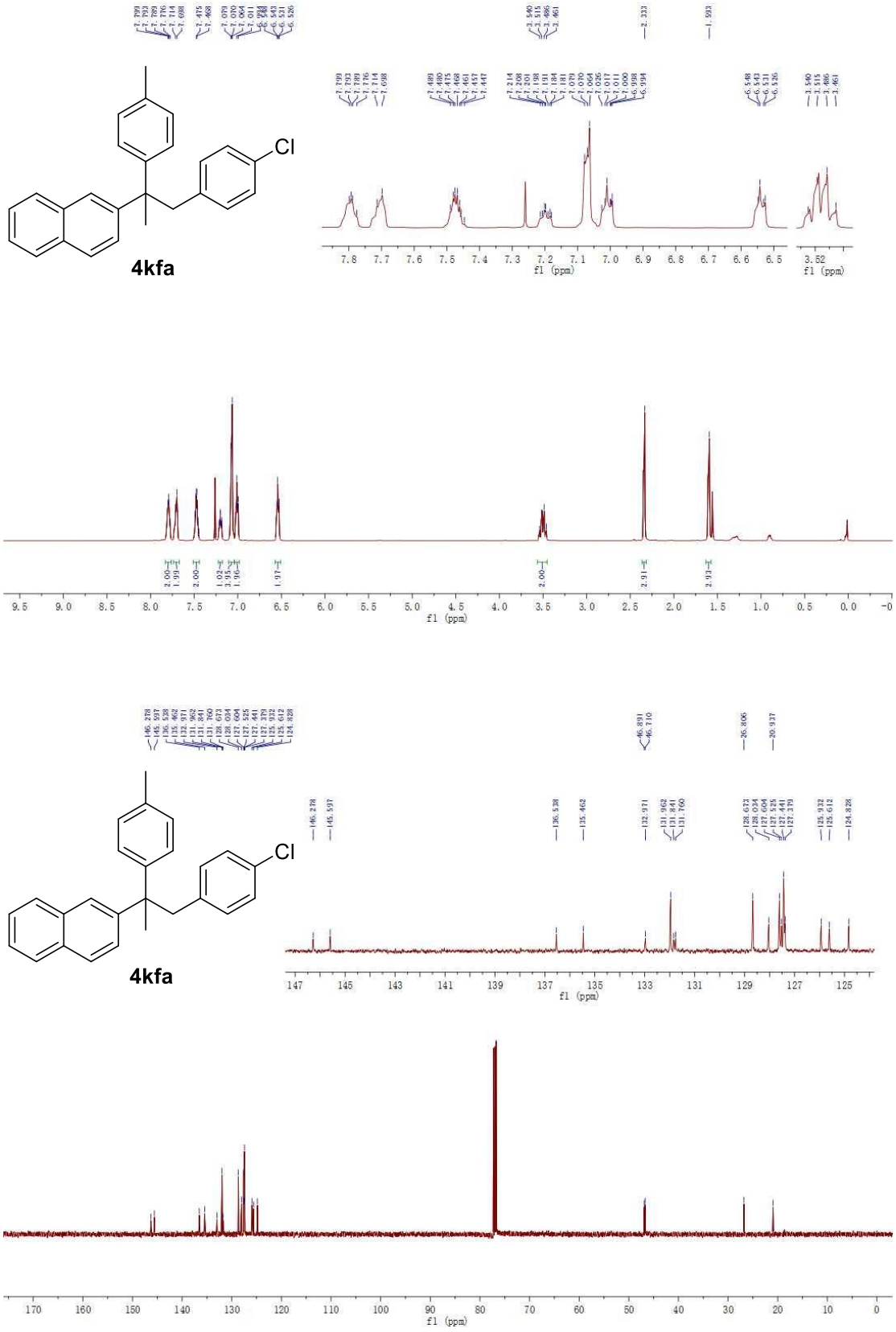
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-(1-(4-nitrophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kma)

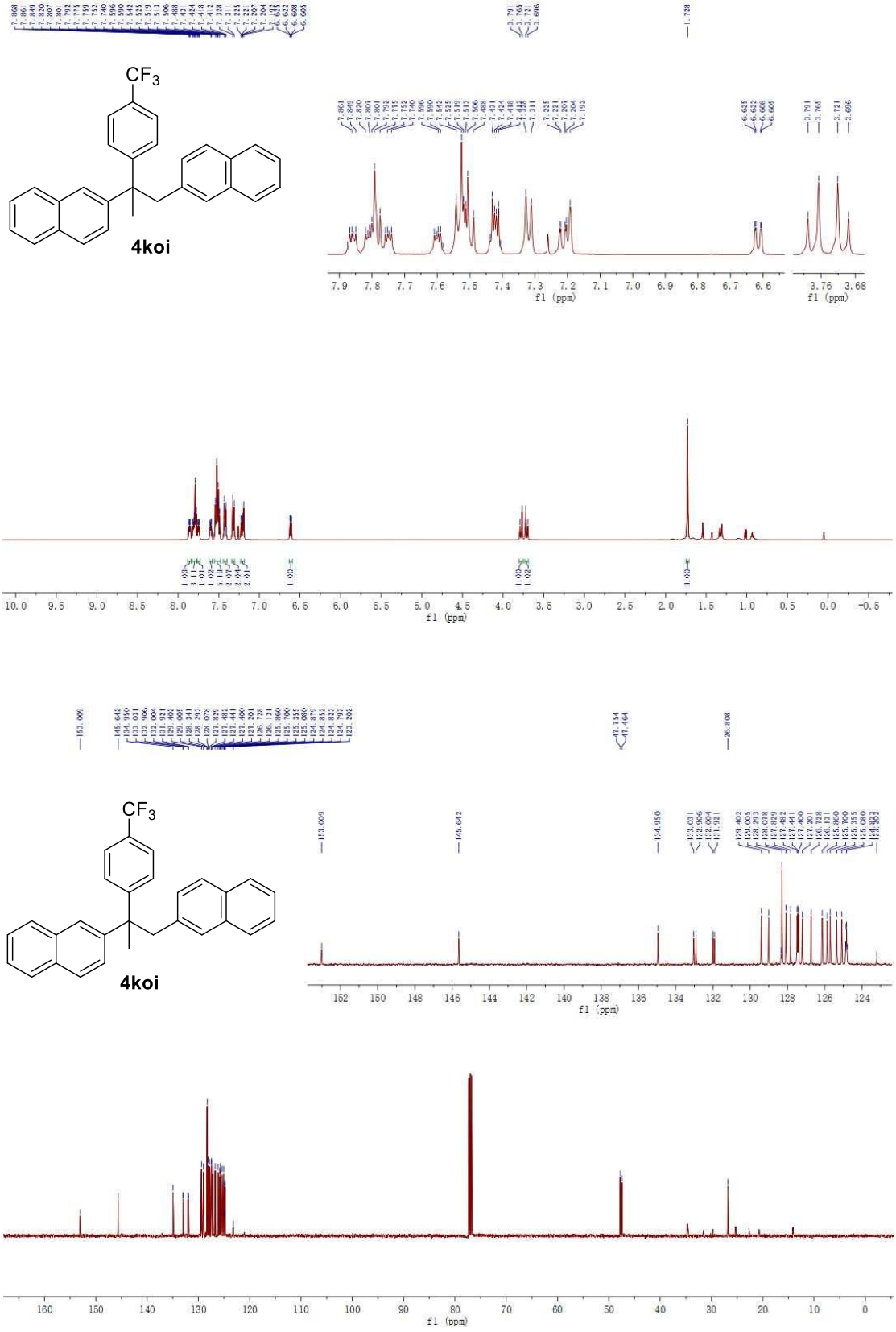


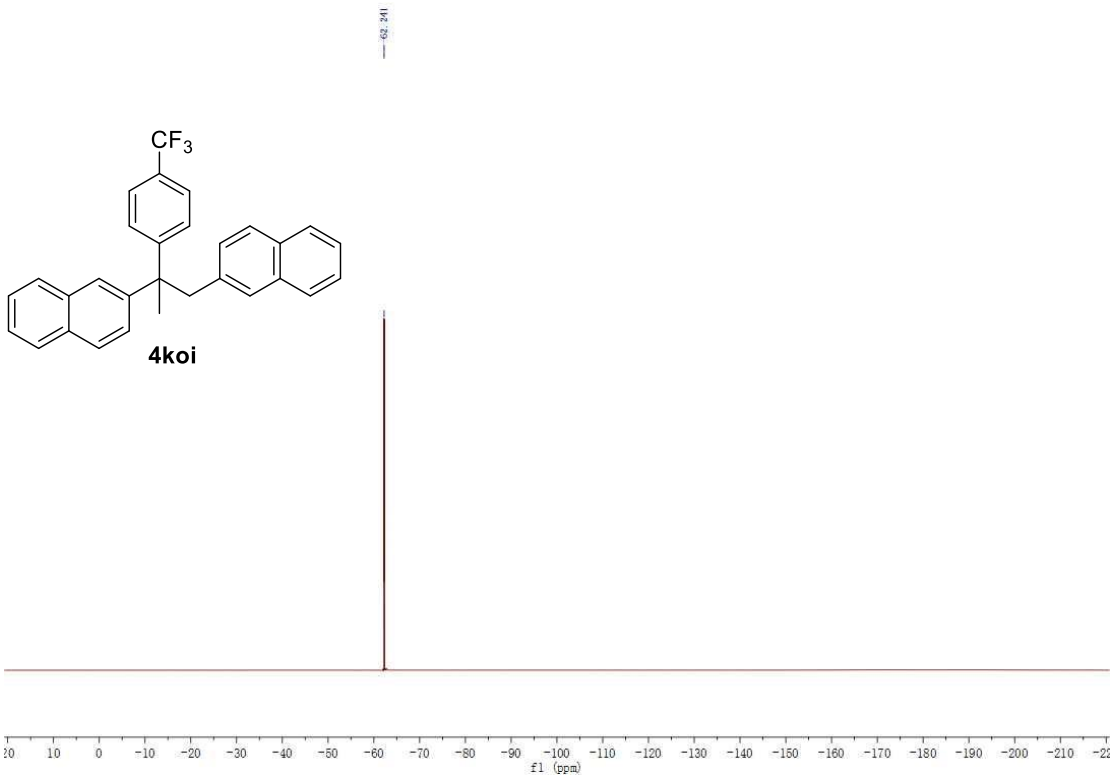


2-(1-(4-chlorophenyl)-2-(*p*-tolyl)propan-2-yl)naphthalene (4kfa)

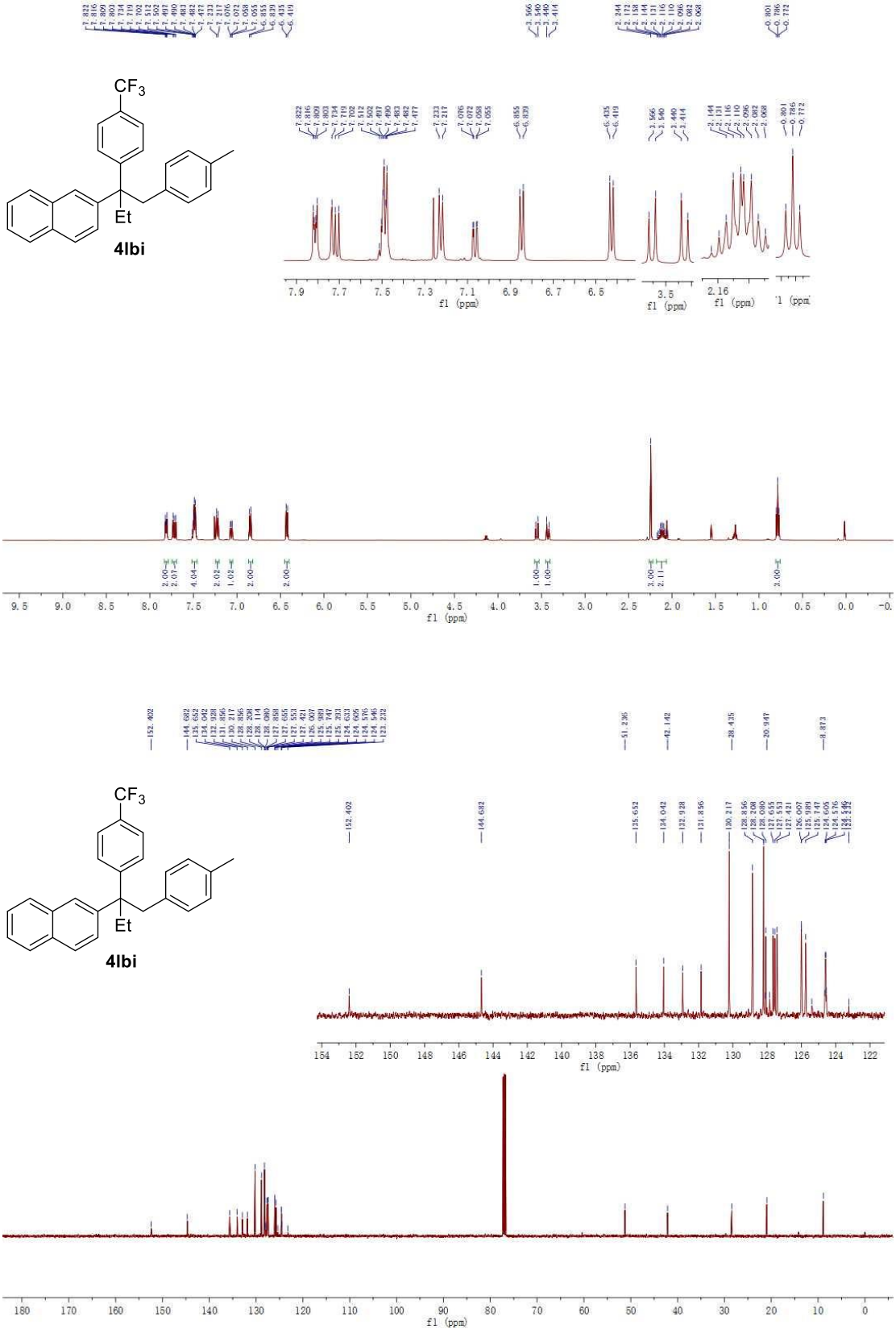


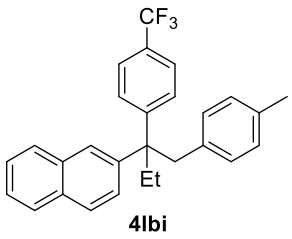
2,2'-(2-(4-(trifluoromethyl)phenyl)propane-1,2-diyl)dinaphthalene (4koi)




CF3
4koi
-62.241
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)butan-2-yl)naphthalene (4lbi)




CF3
Et

4lbi

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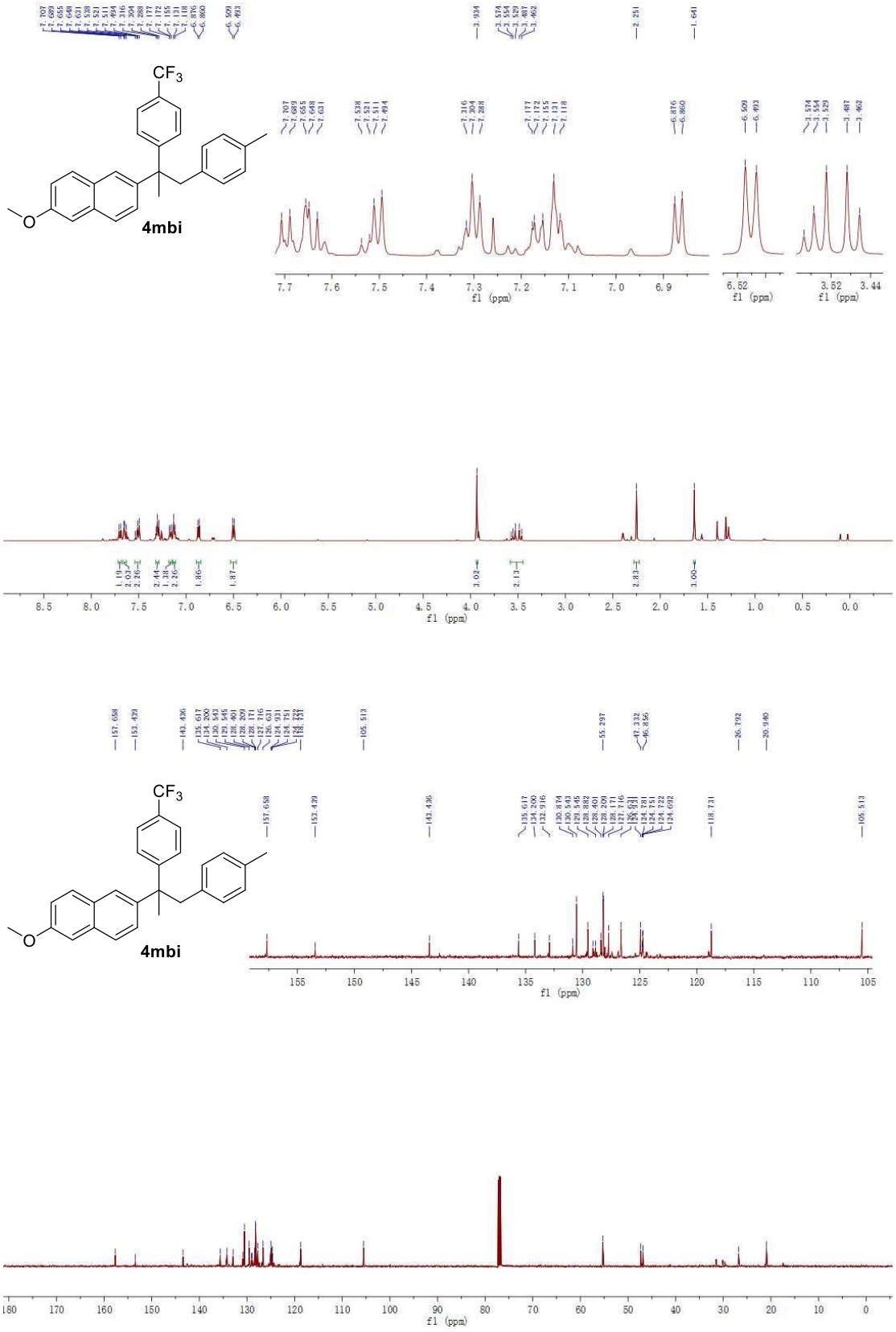
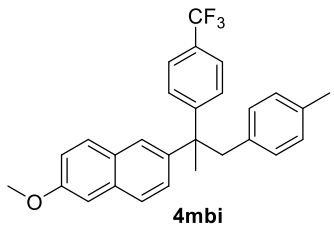
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

2-methoxy-6-(1-(p-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)naphthalene (4mbi)

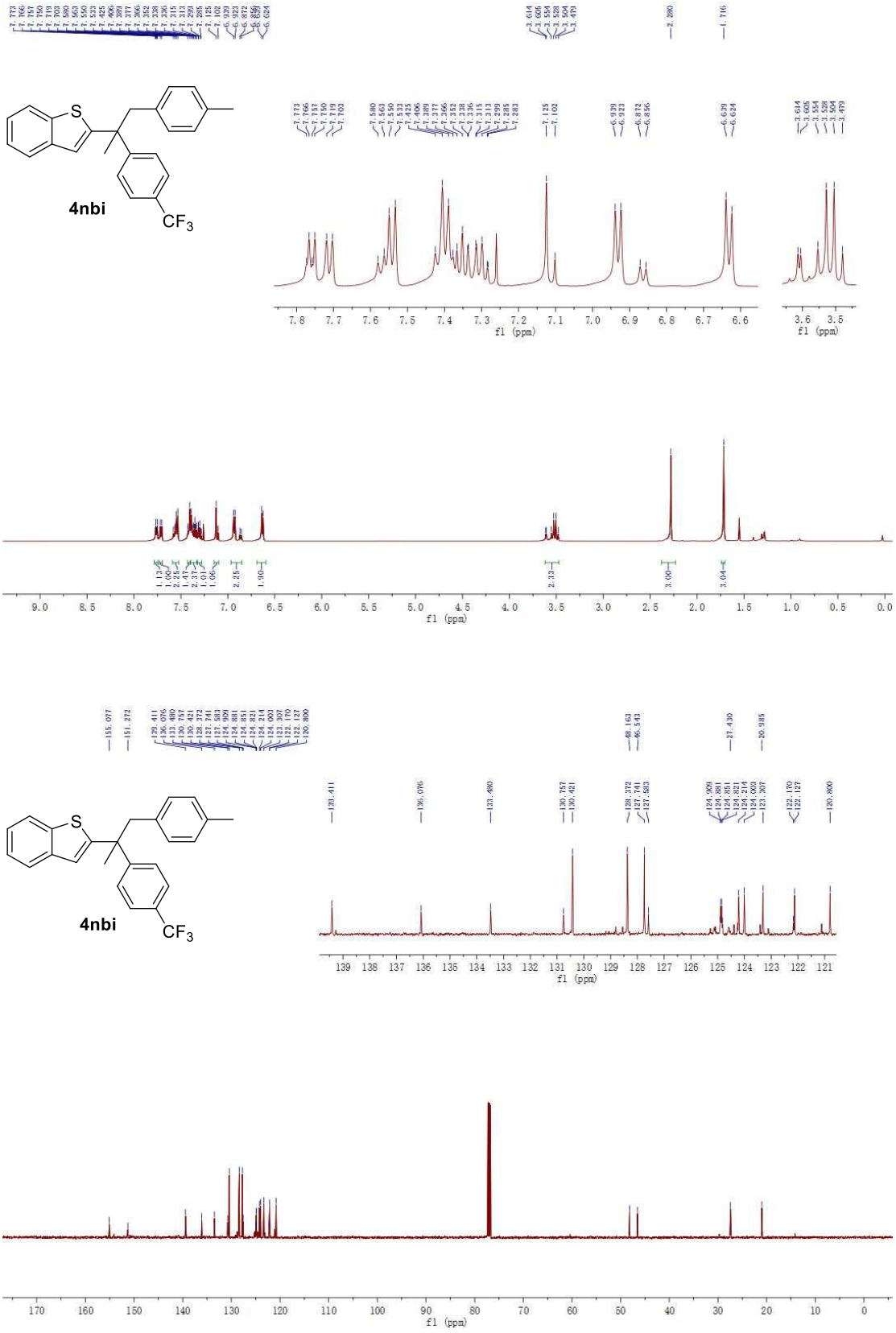


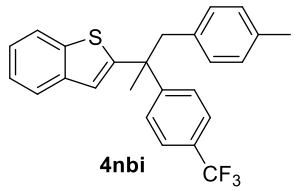

CF3
O

4mbi

-62.208
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

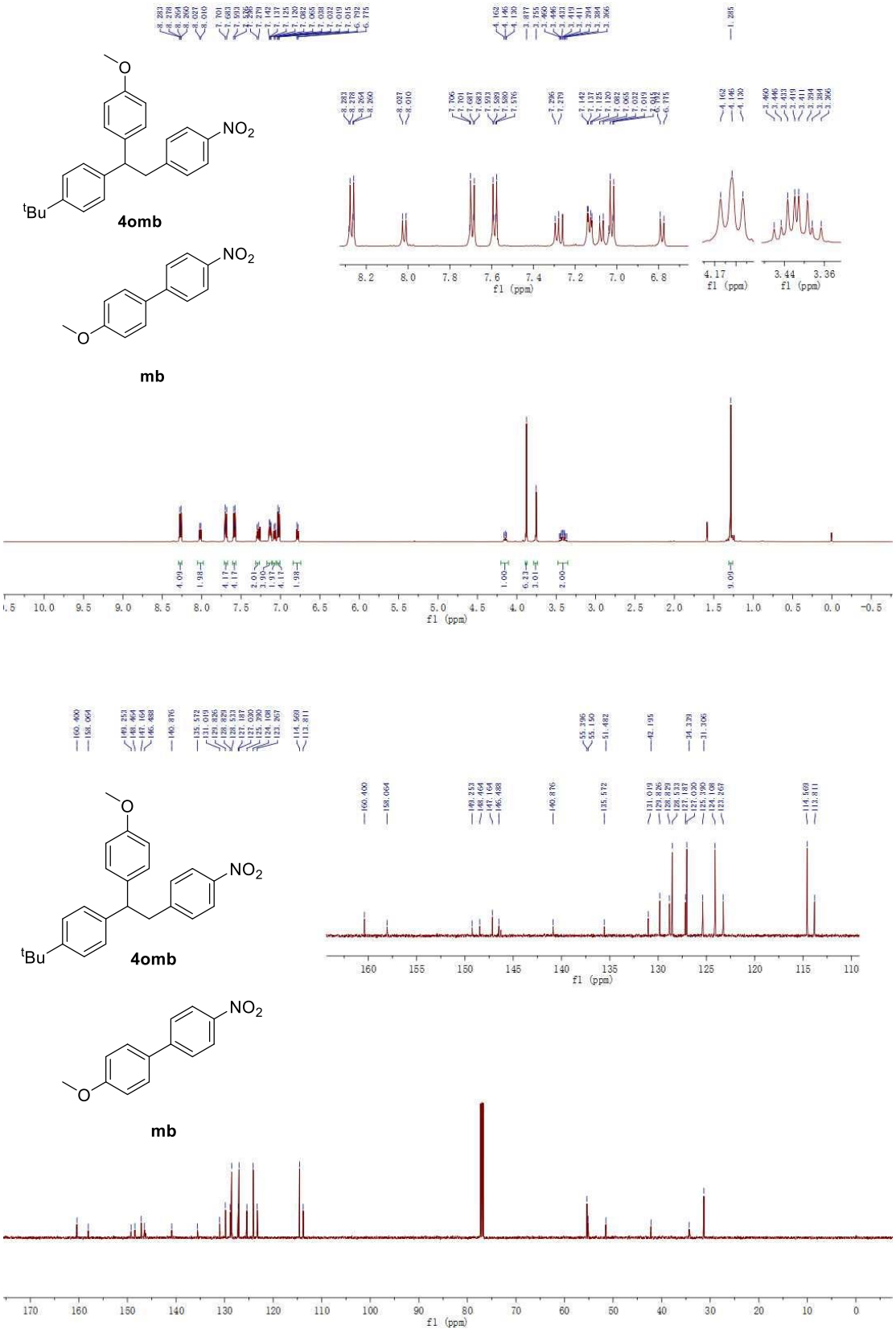
2-(1-(*p*-tolyl)-2-(4-(trifluoromethyl)phenyl)propan-2-yl)benzo[*b*]thiophene (4nbi)



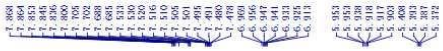


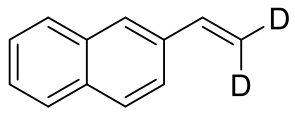
4nbi

1-(*tert*-butyl)-4-(1-(4-methoxyphenyl)-2-(4-nitrophenyl)ethyl)benzene (4omb)

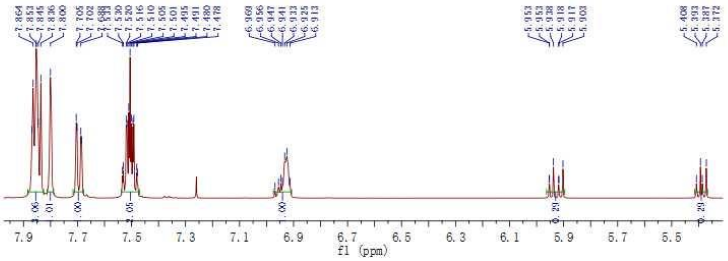


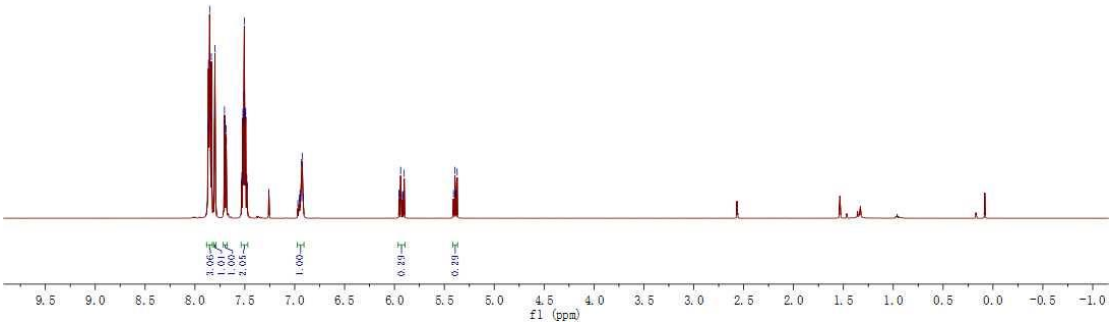
2-(vinyl-2,2-d_2)naphthalene (1a-D_2)

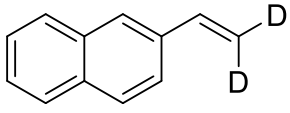




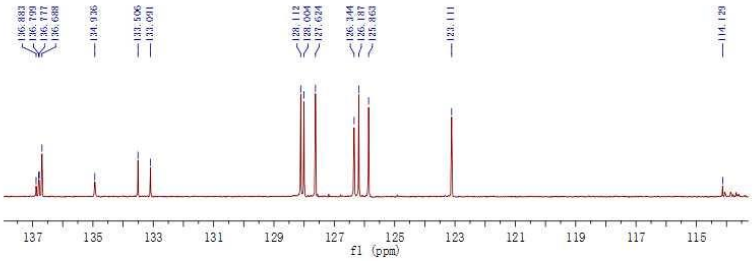
1a-D_2

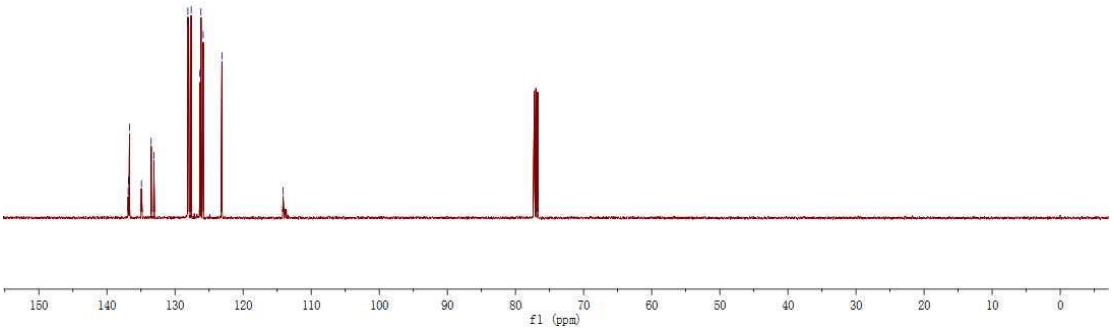




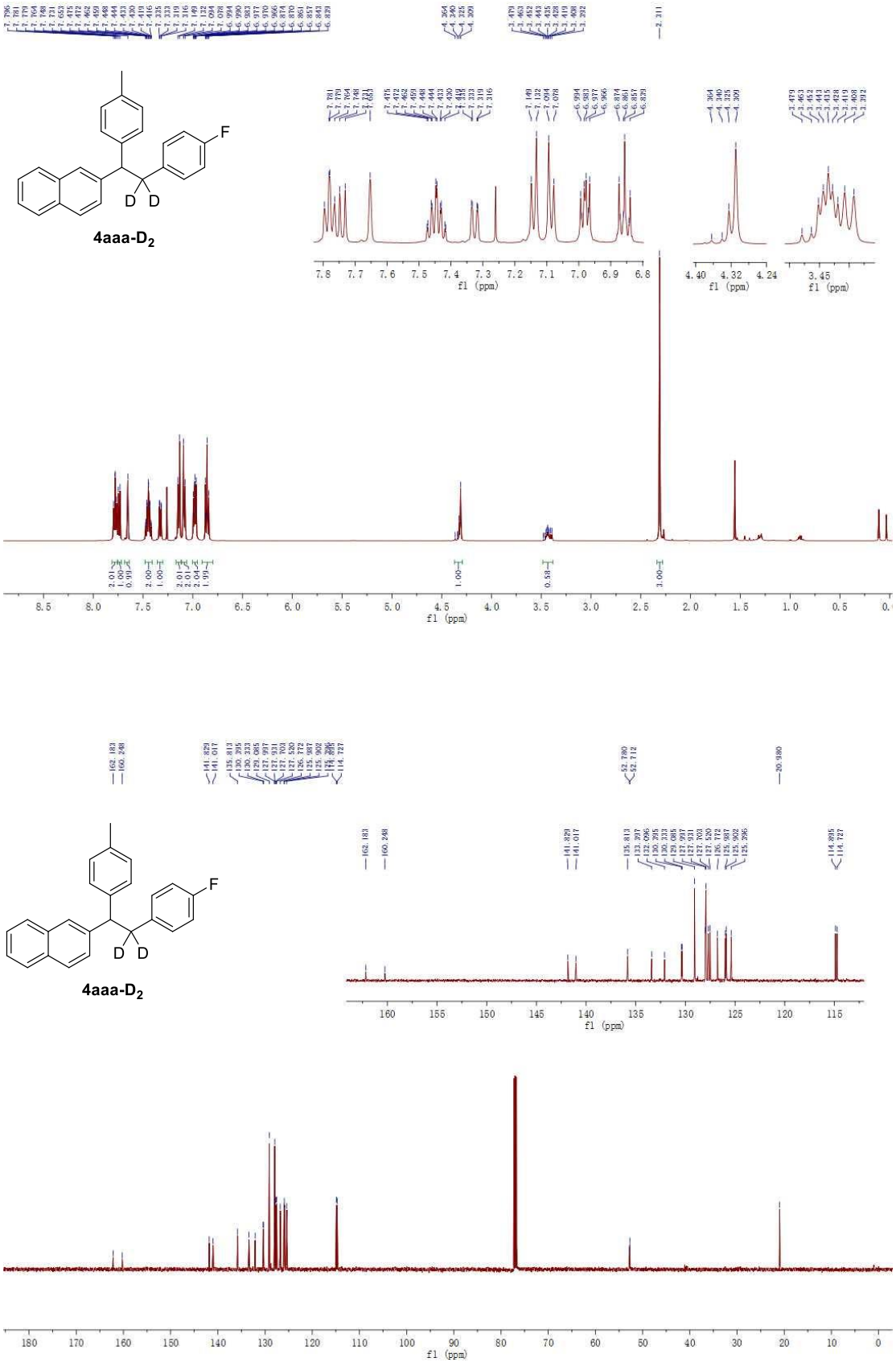


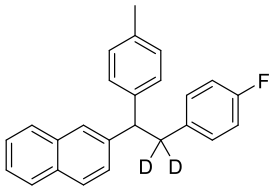
1a-D_2





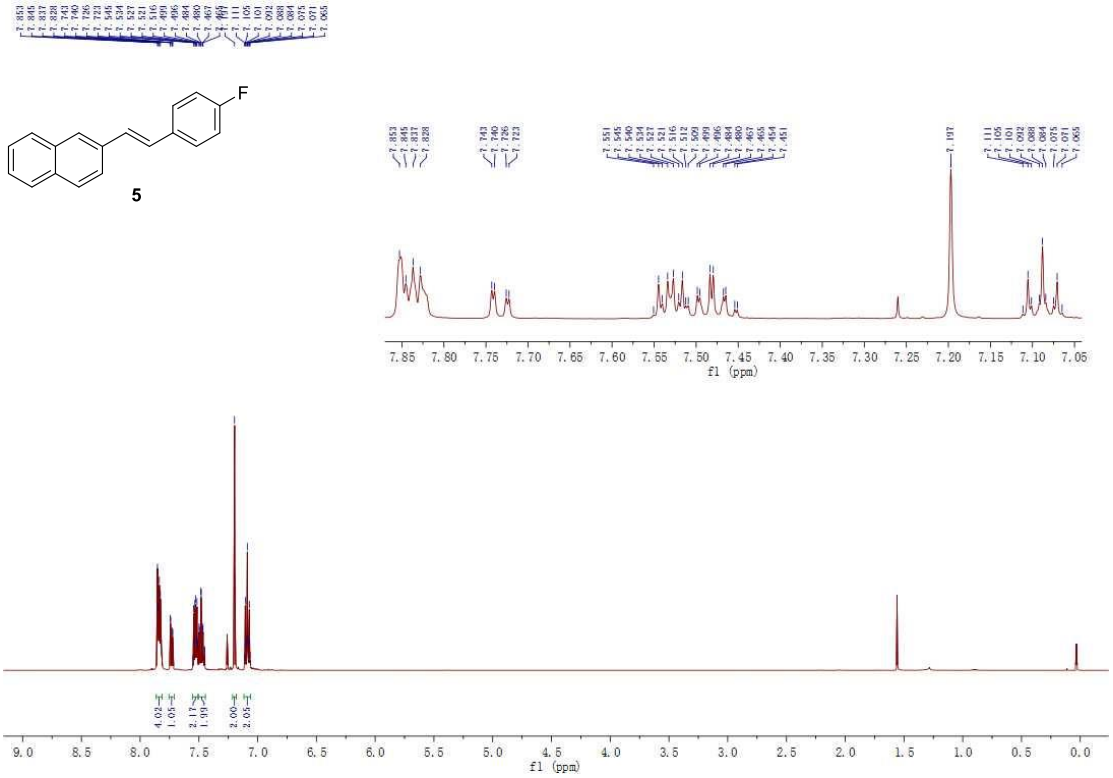
2-(2-(4-fluorophenyl)-1-(*p*-tolyl)ethyl-2,2-d_2)naphthalene (4aaa-D_2)

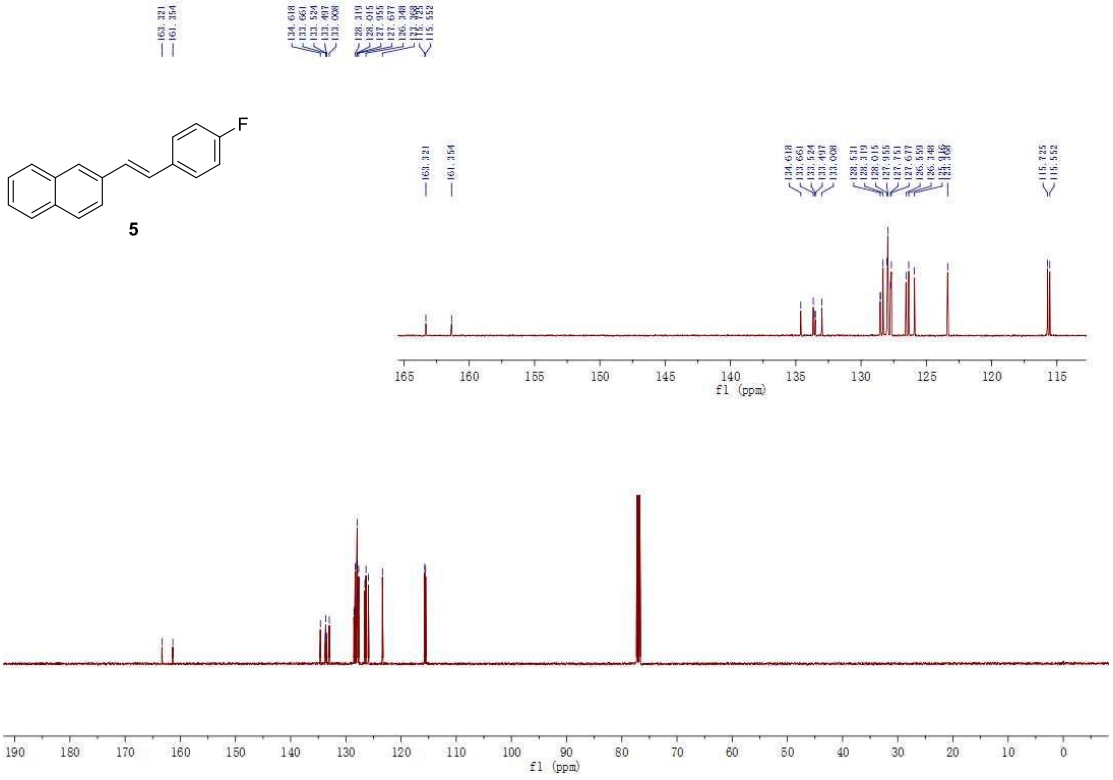




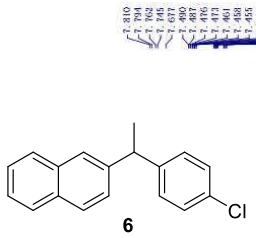
4aaa-D_2

(E)-2-(4-fluorostyryl)naphthalene (5)





2-(1-(4-chlorophenyl)ethyl)naphthalene (6)



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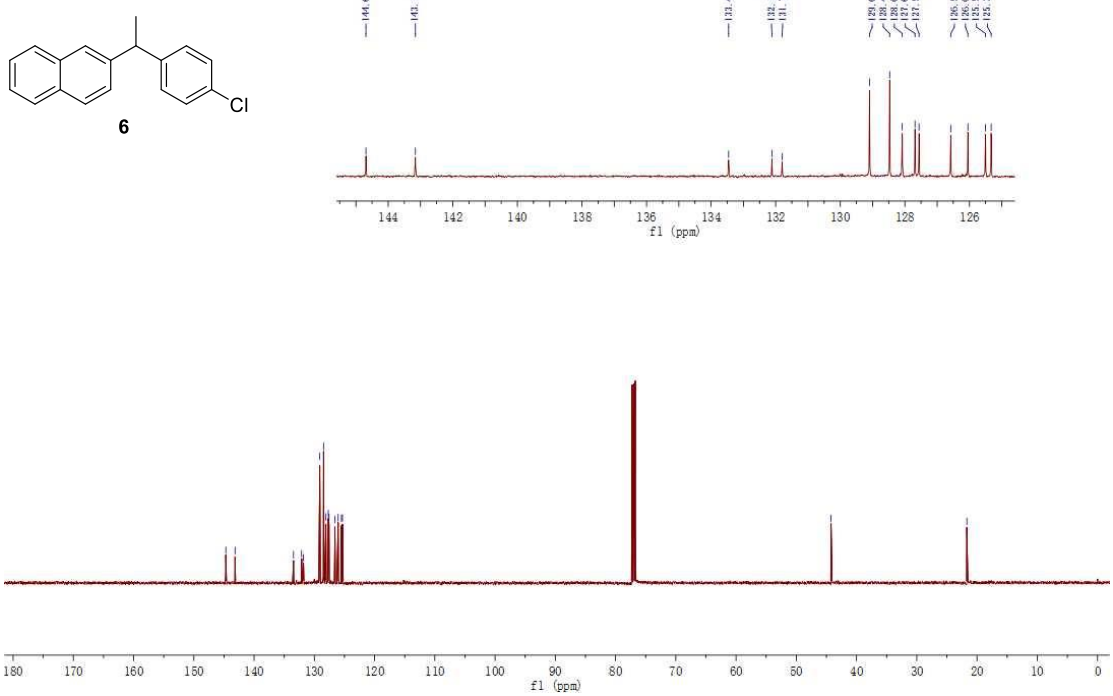

6. References

(1) Stokes, B. J.; Liao, L.; de Andrade, A. M.; Wang, Q.; Sigman, M. S. *Org. Lett*. **2014**, *16*, 4666.

(2) Di Giuseppe, A.; Castarlenas, R.; Pérez-Torrente, J. J.; Lahoz, F. J.; Polo, V.; Oro, L. A. *Angew. Chem. Int. Ed.* **2011**, *50*, 3938.

(3) Lautens, M.; Roy, A.; Fukuoka, K.; Fagnou, K.; Martín-Matute, B. *J. Am. Chem. Soc.* **2001**, *123*, 5358.

(4) Duan, H.; Meng, L.; Bao, D.; Zhang, H.; Li, Y.; Lei, A. *Angew. Chem. Int. Ed.* **2010**, *49*, 6387.