Supporting Information

Alkylarylation of Styrenes *via* Direct C(sp^3)-Br/C(sp^2)-H Functionalization Mediated by Photordox and Copper Cooperative Catalysis

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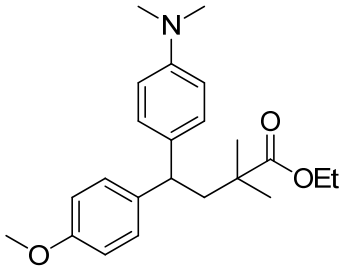
(A) Typical experimental procedure

To a Schlenk tube were added alkenes **1** (0.2 mmol), α-carbonyl alkyl bromides **2** (0.4 mol), *N*,*N*-Disubstituted Anilines **3** (0.4 mmol), CuCl (10 mol%), $[Ru(bpy)_3]Cl_2 \cdot 6H_2O$ (2 mol%), K_2CO_3 (2 equiv) and MeCN (2 mL), the tube was then charged with argon. The mixture was stirred at room temperature until complete consumption of starting material as monitored by TLC and/or GC-MS analysis (about 2 h). After the reaction was finished, the reaction mixture was concentrated in vacuum, and the resulting residue was purified by silica gel column chromatography (Petroleum Ether/ethyl acetate) to afford the desired product **4**.

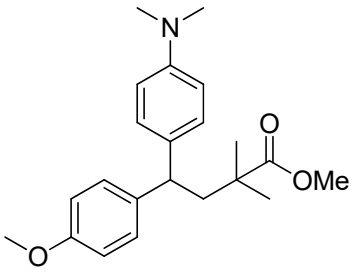
(B) Analytical data

Methyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethyl butanoate (4aaa):



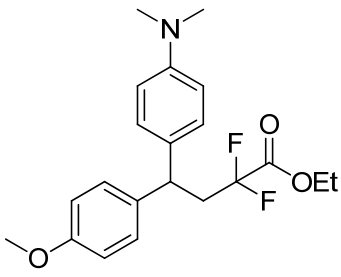
62.7 mg, 85% yield; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.14 (d, *J* = 8.0 Hz, 2H), 7.08 (d, *J* = 8.0 Hz, 2H), 6.77 (d, *J* = 8.4 Hz, 2H), 6.63 (d, *J* = 8.0 Hz, 2H), 3.87 (t, *J* = 7.2 Hz, 1H), 3.74 (s, 3H), 3.70-3.65 (m, 2H), 2.87 (s, 6H), 2.39-2.29 (m, 2H), 1.15 (s, 6H), 1.10 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 157.6, 149.0, 138.1, 133.9, 128.7, 128.3, 113.6, 112.8, 60.1, 55.2, 46.7, 46.3, 42.0, 40.8, 26.2, 25.9, 14.0; LRMS (EI, 70eV) *m/z* (%): 369 (M^+, 21), 240 (100), 225 (9); HRMS *m/z* (ESI) calcd for $C_{23}H_{32}NO_3$ ($[M+H]^+$) 370.2377 , found 370.2386.

Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aab):



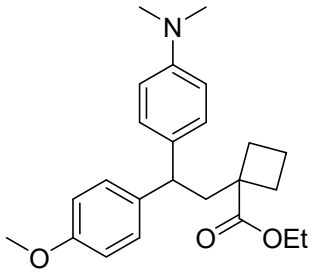
53.8 mg, 76% yield; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.14 (d, *J* = 8.0 Hz, 2H), 7.08 (d, *J* = 8.4 Hz, 2H), 6.77 (d, *J* = 8.4 Hz, 2H), 6.64 (d, *J* = 8.4 Hz, 2H), 3.87 (t, *J* = 6.8 Hz, 1H), 3.74 (s, 3H), 3.24 (s, 3H), 2.87 (s, 6H), 2.39-2.29 (m, 2H), 1.17 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.8, 157.6, 149.0, 138.0, 133.8, 128.7, 128.3, 113.6, 112.8, 55.2, 51.3, 46.8, 46.3, 42.0, 40.8, 26.2, 25.9; LRMS (EI, 70eV) *m/z* (%): 355 (M^+, 21), 240 (100), 225 (9); HRMS *m/z* (ESI) calcd for $C_{22}H_{30}NO_3$ ($[M+H]^+$) 356.2220, found 356.2230.

Ethyl 4-(4-(dimethylamino)phenyl)-2,2-difluoro-4-(4-methoxyphenyl)butanoate (4aac):



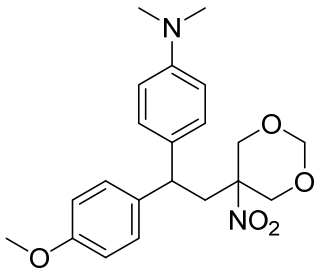
59.5 mg, 79% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.13 (d, *J* = 8.4 Hz, 2H), 7.07 (d, *J* = 8.4 Hz, 2H), 6.79 (d, *J* = 8.4 Hz, 2H), 6.66 (d, *J* = 8.4 Hz, 2H), 4.13 (t, *J* = 7.2 Hz, 1H), 3.88-3.83 (m, 2H), 3.75 (s, 3H), 2.88 (s, 6H), 2.86-2.78 (m, 2H), 1.17 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 164.0, 158.1, 149.2, 135.8, 131.6, 128.6, 128.2, 113.8, 113.0, 62.7, 55.2, 43.1, 43.1, 43.0, 40.8, 40.7, 40.5, 13.7; ^{19}F NMR (471 MHz, $CDCl_3$) δ: -104.48; LRMS (EI, 70eV) *m/z* (%): 377 (M^+, 25), 240 (100), 225 (10); HRMS *m/z* (ESI) calcd for $C_{21}H_{26}F_2NO_3$ ($[M+H]^+$) 378.1875 , found 378.1883.

Ethyl 1-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)cyclobutane-1-carboxylate (4aad):



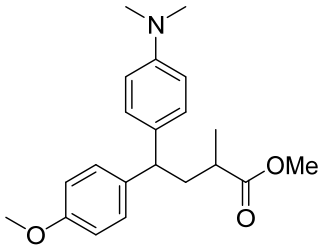
38.6 mg, 50% yield; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.13-7.01 (m, 4H), 6.77 (d, *J* = 8.4 Hz, 2H), 6.65 (d, *J* = 8.8 Hz, 2H), 3.80-3.75 (m, 2H), 3.74 (s, 3H), 3.72 (t, *J* = 3.6 Hz, 1H), 2.87 (s, 6H), 2.55 (d, *J* = 7.2 Hz, 2H), 2.34-2.26 (m, 2H), 1.89-1.76 (m, 4H), 1.12 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 176.8, 157.8, 149.1, 137.8, 133.6, 128.8, 128.4, 113.6, 112.8, 60.1, 55.2, 47.8, 46.4, 44.4, 40.8, 22.7, 15.9, 14.0; LRMS (EI, 70eV) *m/z* (%): 381 (M^+, 12), 240 (100), 121 (2); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_3$ ($[M+H]^+$) 382.2377, found 382.2384.

4-(1-(4-methoxyphenyl)-2-(5-nitro-1,3-dioxan-5-yl)ethyl)-*N,N*-dimethylaniline (4aae):



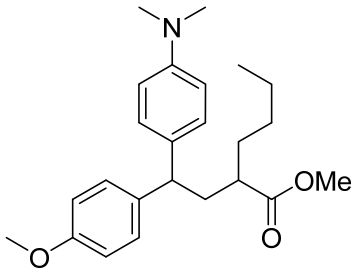
41.7 mg, 54% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 2:1); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.10 (d, *J* = 9.0 Hz, 2H), 7.04 (d, *J* = 8.5 Hz, 2H), 6.80 (d, *J* = 9.0 Hz, 2H), 6.64 (d, J = 8.5 Hz, 2H), 4.89 (d, *J* = 6.0 Hz, 1H), 4,57 (d, *J* = 6.5 Hz, 1H), 4.42 (d, *J* = 12.5 Hz, 2H), 3.75 (s, 3H), 3.72 (t, *J* = 6.5 Hz, 1H), 3.57-3.53 (m, 2H), 2.89 (s, 6H), 2.45-2.43 (m, 2H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 158.22, 149.43, 135.80, 130.71, 128.20, 127.90, 114.03, 112.72, 93.64, 86.97, 71.06, 70.87, 55.17, 44.55, 40.47, 40.10; LRMS (EI, 70eV) *m/z* (%): 386 (M^+, 13), 240 (100), 120 (21); HRMS *m/z* (ESI) calcd for $C_{21}H_{27}N_2O_5$ ($[M+H]^+$) 387.1914 , found 387.1919.

Methyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2-methylbutanoate (4aaf):



60.8 mg, 89% yield; dr = 1:1.1; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.05 (t, *J* = 8.0 Hz, 2H), 7.00 (t, *J* = 8.4 Hz, 2H), 6.72 (d, *J* = 8.0 Hz, 2H), 6.59 (d, *J* = 8.4 Hz, 2H), 3.75 (t, *J* = 8.0 Hz, 1H), 3.67 (s, 3H), 3.54 (s, 3H), 2.81 (s, 6H), 2.40-2.22 (m, 2H), 1.95-1.87 (m, 1H), 1.08 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.2 (2C), 157.8, 149.1 (2C), 137.4, 137.0, 132.8, 132.3, 128.6, 128.3, 113.7, 112.8 (2C), 55.2, 51.5, 47.0, 46.9, 40.7 (2C), 39.9, 39.8, 37.5, 37.5, 17.3, 17.2; LRMS (EI, 70eV) *m/z* (%): 341 (M^+, 10), 195 (98), 167 (100), 117 (49), 91(74); HRMS *m/z* (ESI) calcd for $C_{21}H_{28}NO_3$ ($[M+H]^+$) 342.2064 , found 342.2075.

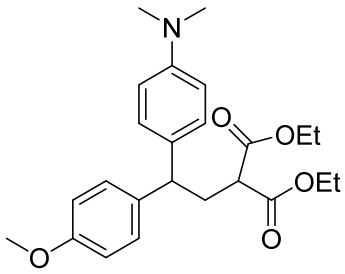
Methyl 2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)hexanoate (4aag):



62.8 mg, 82% yield; dr =1:1.1; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (500 MHz, $CDCl_3$) δ: 7.13-7.11 (m, 2H), 7.07-7.05 (m, 2H), 6.82-6.78 (m, 2H), 6.68-6.65 (m, 2H), 3.76 (d, *J* = 6.0 Hz, 4H), 3.61 (d, J = 3.0 Hz, 3H), 2.90 (s, 3H), 2.89 (s, 3H), 2.36-2.26 (m, 2H), 2.10-2.04 (m, 1H), 1.62-1.57 (m, 4H), 1.52-1.45 (m, 2H), 0.84 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 176.8 (2C), 157.8, 157.7, 149.1 (2C), 137.6, 137.0, 132.5, 130.3 (2C), 128.8, 128.6, 128.4, 128.2, 113.8, 113.7, 112.8, 55.2, 55.2, 51.3 (2C), 47.4, 47.3, 43.7 (2C), 40.8, 40.7, 38.5 (2C), 32.5, 32.4, 29.3, 22.6, 22.6, 13.9; LRMS (EI, 70eV) *m/z*

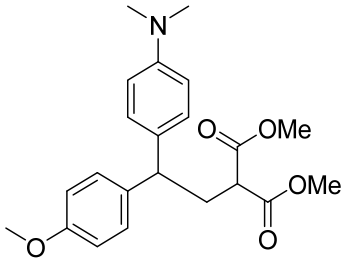
(%): 383 (M^+, 17), 240 (100), 225 (8); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_3$ ($[M+H]^+$) 384.2533 , found 384.2542.

Diethyl 2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)enthyl)malonate (4aah):



41.3 mg, 50% yield; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 5:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.06 (d, *J* = 7.2 Hz, 2H), 7.01 (d, *J* = 7.2 Hz, 2H),6.73 (d, *J* = 7.2 Hz, 2H), 6.59 (d, *J* = 7.2 Hz, 2H), 4.12-4.06 (m, 4H), 3.74 (t, *J* = 7.6 Hz, 1H), 3.68 (s, 3H), 3.17 (t, *J* = 6.0 Hz, 1H), 2.82(s, 6H), 2.50 (t, *J* = 7.2 Hz, 2H), 1.17 (t, *J* = 6.4 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 169.49, 157.88, 149.17, 136.35, 131.62, 128.68, 128.35, 113.76, 112.78, 61.26, 55.15, 50.35, 46.74, 40.64, 34.77, 14.02; LRMS (EI, 70eV) *m/z* (%): 413 (M^+, 17), 253 (38), 240 (100); HRMS *m/z* (ESI) calcd for $C_{24}H_{32}NO_5$ ($[M+H]^+$) 414.2275 , found 414.2286.

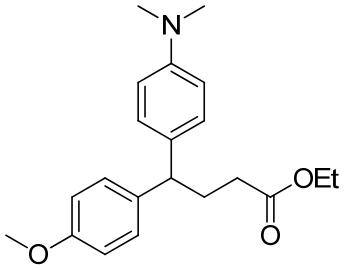
Dimethyl 2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)malonate (4aai):



40.0 mg, 52% yield; Colorless oil; R_f = 0.50 (Petroleum Ether/EtOAc = 4:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.13 (d, *J* = 8.4 Hz, 2H), 7.07 (d, *J* = 8.4 Hz, 2H), 6.81 (d, *J* = 8.4 Hz, 2H), 6.67 (d, *J* = 8.4 Hz, 2H), 3.79 (t, *J* = 8.4 Hz, 1H), 3.76 (s, 3H), 3.69 (s, 6H), 3.29 (t, *J* = 7.2 Hz, 1H), 2.90 (s, 6H), 2.58 (t, *J* = 7.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 169.9, 158.0, 149.2, 136.3, 131.6, 128.7, 128.4, 113.9, 112.9, 55.2, 52.4, 50.1, 46.9, 40.7, 34.9; LRMS (EI, 70eV) *m/z* (%): 385

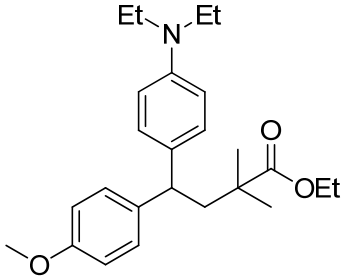
(M^+, 19), 253 (17), 240 (100); HRMS *m/z* (ESI) calcd for $C_{22}H_{28}NO_5$ ($[M+H]^+$) 386.1962 , found 386.1975.

Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)butanoate (4aaj):



34.8 mg, 51% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.14 (d, *J* = 7.2 Hz, 2H), 7.08 (d, *J* = 7.6 Hz, 2H), 6.81 (d, *J* = 7.6 Hz, 2H), 6.67 (d, *J* = 7.2 Hz ,2H), 4.11-4.06 (m, 2H), 3.80-3.76 (m, 4H), 2.89 (s, 6H), 2.35-2.26 (m, 4H), 1.22 (t, *J* = 6.0 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 173.67, 157.76, 149.07, 137.15, 132.53, 128.62, 128.29, 113.72, 112.78, 60.19, 55.17, 48.66, 40.70, 32.94, 30.93, 14.20; LRMS (EI, 70eV) *m/z* (%): 341 (M^+, 19), 240 (100), 225 (10); HRMS *m/z* (ESI) calcd for $C_{21}H_{28}NO_3$ ($[M+H]^+$) 342.2064 , found 342.2057.

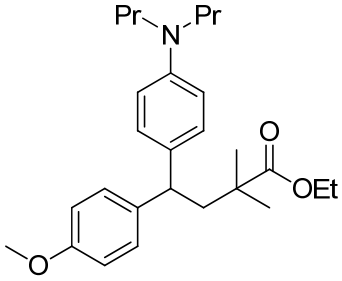
Ethyl 4-(4-(diethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aba):



42.1 mg, 53% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) *δ*: 7.08 (d, *J* = 8.8 Hz, 2H), 6.97 (d, *J* = 8.8 Hz, 2H), 6.70 (d, *J* =8.4 Hz, 2H), 6.49 (d, *J* = 8.8 Hz, 2H), 3.78 (t, *J* = 7.2 Hz, 1H), 3.67 (s, 3H), 3.59-3.57 (m, 2H), 3.23-3.18 (m, 4H), 2.31-2.21 (m, 2H), 1.08 (s, 3H), 1.07 (s, 3H), 1.05-1.00 (m, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) *δ*: 177.4, 157.7, 146.2, 138.3, 132.7, 128.8, 128.5, 113.6, 112.0, 60.1, 55.2, 46.8, 46.3, 44.3, 42.0, 26.1,

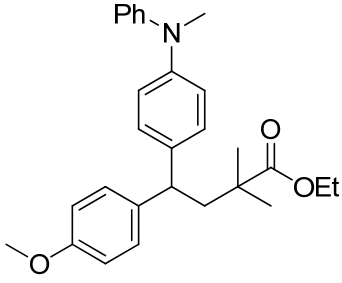
25.9, 14.0, 12.6; LRMS (EI, 70eV) *m/z* (%): 397 (M^+, 24), 268 (100), 134 (7); HRMS *m/z* (ESI) calcd for $C_{25}H_{36}NO_3$ ($[M+H]^+$) 398.2690, found 398.2698.

Ethyl 4-(4-(diethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aca):



62.8 mg, 74% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 9:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.16 (d, J = 8.4 Hz, 2H), 7.03 (d, J = 8.8 Hz, 2H), 6.77 (d, J = 8.4 Hz, 2H), 6.51 (d, J = 8.4 Hz, 2H), 3.84 (t, J = 6.8 Hz, 1H), 3.74 (s, 3H), 3.68-3.63 (m, 2H), 3.16 (t, J = 3.6 Hz, 4H), 2.38-2.28 (m, 2H), 1.60-1.50 (m, 6H), 1.16 (s, 2H), 1.14 (s, 2H), 1.09 (t, J = 5.2 Hz, 3H), 0.89 (t, J = 7.6 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.5, 157.6, 146.5, 138.2, 132.3, 128.8, 128.3, 113.6, 111.7, 60.1, 55.2, 53.0, 46.8, 46.3, 42.0, 26.1, 26.0, 20.4, 14.0, 11.4; LRMS (EI, 70eV) *m/z* (%): 425 (M^+, 31), 396 (63), 296 (100); HRMS *m/z* (ESI) calcd for $C_{27}H_{40}NO_3$ ($[M+H]^+$) 426.3003 , found 426.3013.

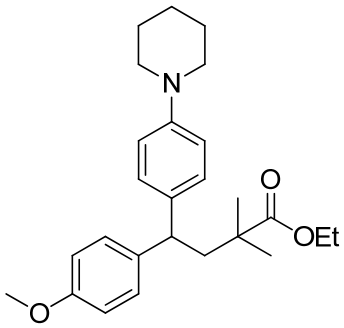
Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(methyl(phenyl)amino)phenyl)buta –noate (4ada):



45.7 mg, 53% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.15-7.06 (m, 6H), 6.87-6.79 (m, 5H), 6.72 (d, J = 7.2 Hz, 2H), 3.87-3.81 (m, 1H), 3.67 (s, 3H), 3.64-3.60 (m, 2H), 3.17 (s, 3H), 2.36-2.24 (m, 2H), 1.09 (s, 6H), 1.04 (t, J = 6.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ: 177.27, 157.75, 148.97, 146.85, 139.07, 137.48, 129.00, 128.75, 128.42,

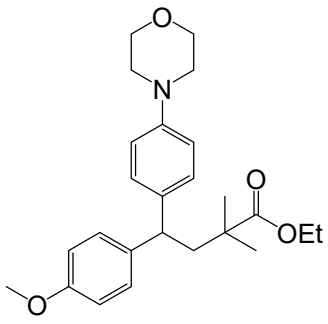
121.26, 120.39, 119.18, 113.61, 60.12, 55.16, 46.67, 46.53, 41.91, 40.17, 26.09, 25.95, 13.95; HRMS *m/z* (ESI) calcd for $C_{28}H_{34}NO_3$ ($[M+H]^+$) 432.2533, found 432.2524.

Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(piperidin-1-yl)phenyl)butanoate (4aea):



48.4 mg, 59% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.16-7.07 (m, 4H), 6.83-6.75 (m, 4H), 3.87 (t, J = 7.2 Hz, 1H), 3.74 (s, 3H), 3.70-3.65 (m, 2H), 3.06 (t, J = 5.2 Hz, 4H), 2.38-2.29 (m, 2H), 1.70-1.64 (m, 4H), 1.56-1.50 (m, 2H), 1.14 (s, 6H), 1.10 (t, J = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 157.8, 150.5, 138.0, 136.4, 128.8, 128.3, 116.5, 113.6, 60.1, 55.2, 50.9, 46.5, 42.1, 26.2, 25.9 (2C), 24.3, 14.0; LRMS (EI, 70eV) *m/z* (%): 409 (M^+, 12), 280 (100), 264 (7); HRMS *m/z* (ESI) calcd for $C_{26}H_{36}NO_3$ ($[M+H]^+$) 410.2690 , found 410.2703.

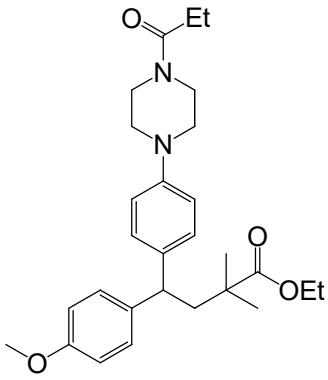
Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-morpholinophenyl)butanoate (4afa):



37.8 mg, 46% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 5:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.15-7.12 (m, 4H), 6.80-6.76 (m, 4H), 3.89 (t, J = 7.2 Hz, 1H), 3.82 (t, J = 4.8 Hz, 4H), 3.74 (s, 3H), 3.71-3.65 (m, 2H), 3.08 (t, J = 4.8 Hz, 4H), 2.39-2.29 (m, 2H), 1.14 (s, 6H), 1.10 (t, J = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.3, 157.8, 149.5, 137.8, 137.3, 128.7, 128.4, 115.7, 113.7, 66.9, 60.1, 55.2, 49.5, 46.6, 46.5, 42.0, 26.1, 25.9, 14.0; LRMS (EI, 70eV) *m/z*

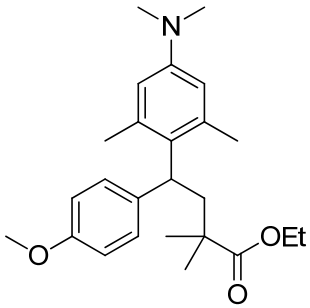
(%): 411(M^+, 19), 282(100), 112(13); HRMS *m/z* (ESI) calcd for $C_{25}H_{34}NO_4$ ([M+H]$^+$) 412.2482, found 412.2490.

Ethyl4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(4-propionylpiperazin-1-yl)phenyl)butanoate (4aga):



33.3 mg, 36% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 2:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.16-7.12 (m, 4H), 6.83-6.76 (m, 4H), 3.89 (t, *J* = 7.2 Hz, 1H), 3.77-3.73 (m, 5H), 3.70-3.65 (m, 2H), 3.58 (t, *J* = 5.2 Hz, 2H), 3.10-3.05 (m, 4H), 2.40-2.33 (m, 4H), 1.25-1.16 (m, 3H), 1.14 (s, 6H), 1.10 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.3, 172.3, 157.8, 149.1, 137.9, 137.7, 128.7, 128.5, 116.7, 113.7, 60.1, 55.2, 49.9, 49.6, 46.5, 45.6, 45.4, 42.0, 41.5, 26.5, 26.1, 26.0, 14.0, 9.5; LRMS (EI, 70eV) *m/z* (%): 466 (M^+, 23), 337 (100), 126 (9); HRMS *m/z* (ESI) calcd for $C_{28}H_{39}N_2O_4$ ([M+H]$^+$) 467.2904, found 467.2918.

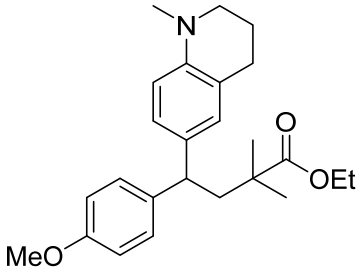
Ethyl 4-(4-(dimethylamino)-2,6-dimethylphenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aha):



54.7 mg, 68% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 10:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.07 (d, *J* = 8.8 Hz, 2H), 6.76 (d, *J* = 8.0 Hz, 2H), 6.40 (s, 2H), 4.36-4.33 (m, 1H), 3.88-3.80 (m, 1H), 3.75 (d, *J* = 1.2 Hz, 3H), 3.72-3.61 (m, 1H), 2.89 (d, *J* = 0.8 Hz, 6H), 2.56-2.17 (m, 6H), 2.10-2.07 (m, 2H), 1.26 (s, 3H), 1.13 (s, 3H), 1.11-1.07 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.6, 157.2,

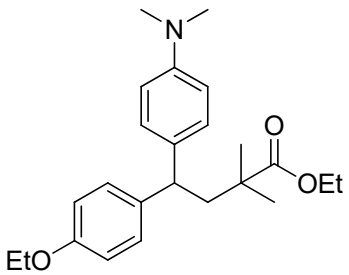
148.6, 137.1, 130.7, 128.2, 113.2, 60.3, 55.2, 44.2, 42.6, 40.7, 39.1, 26.3, 26.0, 22.1, 13.9; LRMS (EI, 70eV) *m/z* (%): 397 (M^+, 22), 268 (100), 134 (10); HRMS *m/z* (ESI) calcd for $C_{25}H_{36}NO_3$ ($[M+H]^+$) 398.2690, found 398.2683.

Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(1-methyl-1,2,3,4-tetrahydroquinolin-6-yl)butanoate (4aia):



49.0 mg, 62% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 9:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.08 (d, *J* = 8.0 Hz, 2H), 6.84 (d, *J* = 8.0 Hz, 1H), 6.71-6.68 (m, 3H),6.40 (d, *J* = 8.0 Hz, 1H), 3.75-3.71 (m, 1H), 3.66 (s, 3H), 3.62-3.56 (m, 2H), 3.06-3.03 (m, 2H),2.73 (s, 3H), 2.63-2.59 (m, 2H), 2.32-2.17 (m, 2H), 1.85-1.79 (m, 2H), 1.08 (s, 3H), 1.06 (s, 3H), 1.02 (t, *J* = 9.0 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.39, 157.53, 144.94, 137.94, 133.53, 128.72, 128.10, 125.89, 122.66, 113.47, 110.93, 60.04, 55.12, 51.23, 46.66, 46.33, 41.87, 39.18, 27.77, 26.33, 25.66, 22.45, 13.91; HRMS *m/z* (ESI) calcd for $C_{25}H_{34}NO_3$ ($[M+H]^+$) 396.2533 , found 396.2537.

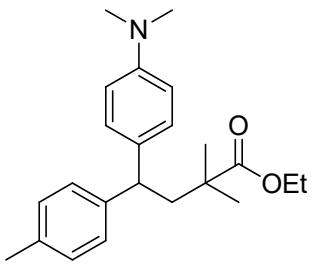
Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-ethoxyphenyl)-2,2-dimethylbutanoate (4baa):



70.6 mg, 92% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, CDCl3) δ: 7.13 (d, *J* = 8.4 Hz, 2H), 7.08 (d, *J* = 12.0 Hz, 2H), 676 (d, *J* = 8.8 Hz, 2H), 6.64 (d, *J* = 8.8 Hz, 2H), 3.99-3.94 (m, 2H), 3.86 (t, *J* = 7.2 Hz, 1H), 3.71-3.66 (m, 2H), 2.87 (s, 6H), 2.35-2.30 (m, 2H), 1.36 (t, *J*

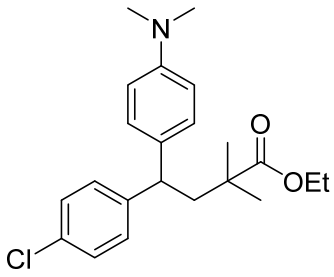
= 6.8 Hz, 3H), 1.14 (s, 6H), 1.10 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 157.1, 149.0, 138.1, 134.0, 128.7, 128.3, 114.3, 112.9, 63.4, 60.1, 46.7, 46.4, 42.0, 40.8, 26.2, 25.9, 14.9, 14.0; LRMS (EI, 70eV) *m/z* (%): 383 (M^+, 16), 254 (100), 226 (4); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_3$ ($[M+H]^+$) 384.2533, found 384.2545.

Ethyl4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(*p*-tolyl)butanoate (4caa):



43.9 mg, 62% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 9:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.06-6.95 (m, 6H), 6.56 (d, *J* = 8.8 Hz, 2H), 3.80 (t, *J* = 6.8 Hz, 1H), 3.63-3.57 (m, 2H), 2.79 (s, 6H), 2.28 (t, *J* = 3.6 Hz, 2H), 2.18 (s, 3H)，1.07 (s, 6H), 1.02 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 149.1, 143.1, 135.1, 133.8, 128.9, 128.4, 127.6, 112.9, 60.1, 46.9, 46.5, 42.1, 40.8, 26.1, 26.0, 20.9, 13.9; LRMS (EI, 70eV) *m/z* (%): 353 (M^+, 17), 237 (12), 224 (100); HRMS *m/z* (ESI) calcd for $C_{23}H_{32}NO_2$ ($[M+H]^+$) 354.2428, found 354.2440.

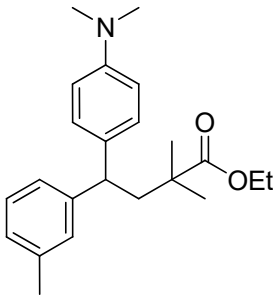
Ethyl 4-(4-chlorophenyl)-4-(4-(dimethylamino)phenyl)-2,2-dimethylbutanoate (4daa):



19.4 mg, 26% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.24-7.14 (m, 4H), 7.07 (d, *J* = 7.2 Hz, 2H), 6.64 (d, *J* = 7.6 Hz, 2H), 3.93-3.84 (m, 1H), 3.72-3.62 (m, 2H), 2.88 (s, 6H), 2.34-2.33 (m, 2H), 1.15 (s, 6H), 1.10 (t, *J* = 5.2 Hz, 3H);^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.24, 149.11, 144.44, 132.75, 131.43, 129.15, 1

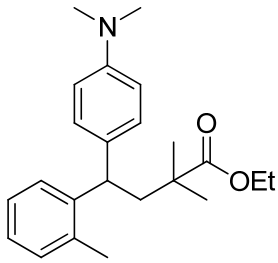
28.28, 128.26, 112.71, 60.18, 46.58, 46.29, 41.94, 40.69, 26.28, 25.78, 13.93 ; HRMS *m/z* (ESI) calcd for $C_{22}H_{29}ClNO_2$ ($[M+H]^+$) 374.1881 , found 374.1884.

Ethyl 4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(*m*-tolyl)butanoate (4eaa):



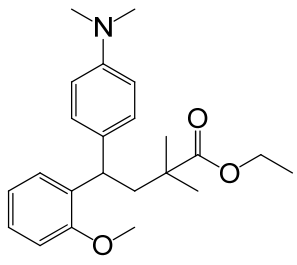
23.3 mg, 33% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 9:1); ^{1}H NMR (400 MHz, CDCl3) δ: 7.13-7.04 (m, 5H), 6.91 (d, *J* = 7.2 Hz, 1H), 6.64 (d, *J* = 8.8 Hz, 2H), 3.87 (t, *J* = 7.2 Hz, 1H), 3.69-3.64 (m, 2H), 2.87 (s, 6H), 2.37-2.35 (m, 2H), 2.28 (s, 3H), 1.15 (s, 6H), 1.09 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 149.1, 146.0, 137.7, 133.6, 128.6, 128.4, 128.1, 126.6, 124.8, 112.9, 60.1, 47.2, 46.5, 42.1, 40.8, 26.0, 21.5, 14.0; LRMS (EI, 70eV) *m/z* (%): 353 (M^+, 20), 237 (13), 224 (100); HRMS *m/z* (ESI) calcd for $C_{23}H_{32}NO_2$ ($[M+H]^+$) 354.2428 , found 354.2439.

Ethyl 4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(o-tolyl)butanoate (4faa):



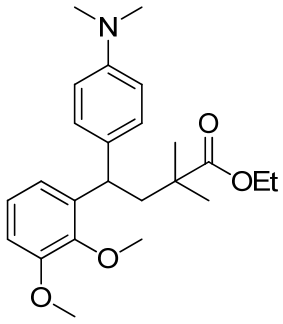
29.7 mg, 42% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 9:1); ^{1}H NMR (500 MHz, CDCl3) δ: 7.40 (d, *J* = 8.0 Hz, 1H), 7.18-7.14 (m, 1H), 7.09-7.02 (m, 4H), 6.62 (d, *J* = 8.5 Hz, 2H), 4.16 (t, *J* = 6.5 Hz, 1H), 3.68-3.57 (m, 2H), 2.86 (s, 6H), 2.39-2.31 (m, 5H), 1.17 (s, 3H), 1.14 (s, 3H), 1.09 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (125 MHz, $CDCl_3$) δ: 177.4, 149.0, 143.5, 135.6, 132.7, 130.4, 128.7, 126.7, 125.8, 125.7, 112.7, 60.1, 47.0, 42.1, 42.0, 40.7, 26.4, 25.8, 20.0, 14.0; LRMS (EI, 70eV) *m/z* (%): 353 (M^+, 23), 224 (100), 178 (9); HRMS *m/z* (ESI) calcd for $C_{23}H_{32}NO_2$ ($[M+H]^+$) 354.2428 , found 354.2434.

Ethyl 4-(4-(dimethylamino)phenyl)-4-(2-methoxyphenyl)-2,2-dimethylbutanoate (4gaa):



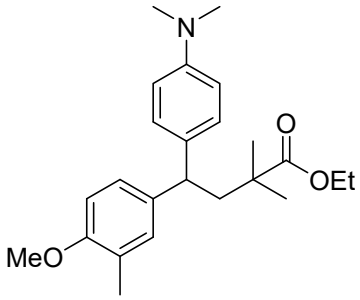
60.5 mg, 82% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, CDCl3) δ: 7.25-7.22 (m, 1H), 7.16-7.06 (m, 3H), 6.87-6.77 (m, 2H), 6.64 (d, *J* = 8.8 Hz, 2H), 4.49 (t, *J* = 7.2 Hz, 1H), 3.80 (s, 3H), 3.65-3.60 (m, 2H), 2.87 (s, 6H), 2.37-2.27 (m, 2H), 1.15 (s, 6H), 1.09 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.6, 156.5, 148.9, 134.5, 133.3, 128.8, 128.0, 126.7, 120.3, 112.7, 110.7, 60.0, 55.4, 45.7, 42.1, 40.8, 38.5, 25.9, 25.8, 13.9; LRMS (EI, 70eV) *m/z* (%): 369 (M^+, 24), 240 (100), 134 (69); HRMS *m/z* (ESI) calcd for $C_{23}H_{32}NO_3$ ($[M+H]^+$) 370.2377 , found 370.2387.

Ethyl 4-(2,3-dimethoxyphenyl)-4-(4-(dimethylamino)phenyl)-2,2-dimethyl butanoate (4haa):



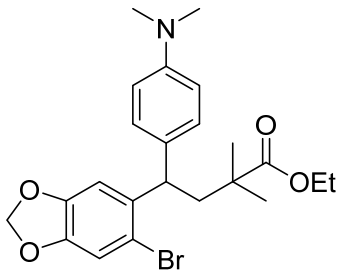
63.1 mg, 79% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 5:1); ^{1}H NMR (400 MHz, CDCl3) δ: 7.16 (d, *J* = 8.8 Hz, 2H), 7.00-6.95 (m, 2H), 6.71-6.62 (m, 3H), 4.48 (t, *J* = 7.2 Hz, 1H), 3.81 (s, 3H), 3.72 (s, 3H), 3.71-3.62 (m, 2H), 2.86 (s, 6H), 2.41-2.21 (m, 2H), 1.17-1.15 (m, 6H), 1.10 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.5, 152.7, 149.0, 146.3, 139.9, 133.3, 128.8, 123.5, 120.0, 112.8, 109.9, 60.5, 60.1, 55.6, 46.1, 42.1, 40.8, 39.1, 26.2, 25.5, 13.9; LRMS (EI, 70eV) *m/z* (%): 399 (M^+, 37), 270 (100), 134 (72); HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_4$ ($[M+H]^+$) 400.2482 , found 400.2492.

Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxy-3-methylphenyl)-2,2-dimethylbutanoate (4iaa):



49.8 mg, 65% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.02 (d, *J* = 9.0 Hz, 2H), 6.95-6.92 (m, 2H), 6.62-6.56 (m, 3H), 3.76 (t, *J* = 8.0 Hz, 1H), 3.67 (s, 3H), 3.61-3.56 (m, 2H),2.79 (s, 6H), 2.27-2.25 (m, 2H), 2.08 (s, 3H), 1.07 (s, 6H), 1.02 (t, *J* = 8.0 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.42, 155.79, 148.93, 137.68, 133.94, 130.06, 128.25, 126.07, 125.68, 112.79, 109.56, 60.05, 55.22, 46.62, 46.34, 41.93, 40.77, 26.05, 25.95, 16.35, 13.90; HRMS *m/z* (ESI) calcd for $C_{24}H_{34}NO_3$ ($[M+H]^+$) 384.2533 , found 384.2535.

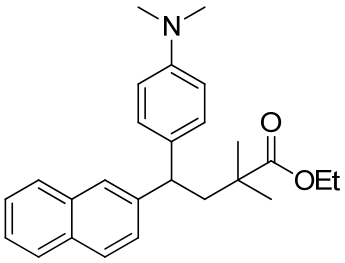
Ethyl 4-(6-bromobenzo[d][1,3]dioxol-5-yl)-4-(4-(dimethylamino)phenyl)-2,2-dimethylbutanoate (4jaa):



46.2 mg, 50% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 5:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.11 (d, *J* = 8.8 Hz, 2H), 6.86 (s, 1H), 6.80 (s, 1H),6.57 (d, *J* =7.2 Hz, 2H), 5.80 (d, *J* =21.6 Hz, 2H), 4.42 (t, *J* = 6.0 Hz, 1H), 3.71-3.66 (m, 2H), 2.80 (s, 6H), 2.29-2.14 (m, 2H), 1.10-1.05 (m, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.27, 149.11, 147.33, 146.17, 138.09, 132.08, 128.27, 114.32, 112.61, 112.48, 108.43, 101.47, 60.25, 46.17, 44.59, 42.05, 40.64, 26.03, 25.84, 13.92 ; HRMS *m/z* (ESI) calcd for $C_{23}H_{29}BrNO_4$ ($[M+H]^+$) 462.1274 , found 462.1279.

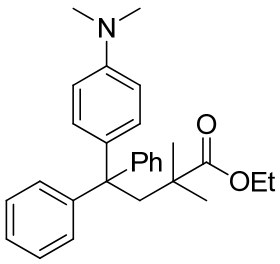
Ethyl 4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(naphthalen-2-yl)butanoate

(4kaa):



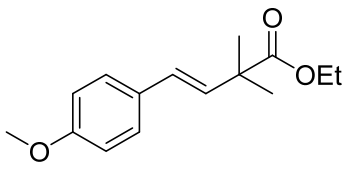
31.1 mg, 40% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 7:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.77-7.67 (m, 4H), 7.40-7.35 (m, 3H), 7.17-7.14 (m, 2H), 6.66-6.62 (m, 2H), 4.09 (t, *J* = 7.6 Hz, 1H), 3.60-3.54 (m, 2H), 2.87 (s, 6H), 2.54-2.42 (m, 2H), 1.20 (s, 3H), 1.18 (s, 3H), 1.02 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.4, 149.1, 143.5, 133.5, 133.3, 132.0, 128.6, 127.8, 127.7, 127.6, 126.9, 125.7, 125.6, 125.1, 112.8, 60.1, 47.3, 46.2, 42.1, 40.7, 26.2, 26.0, 13.9; LRMS (EI, 70eV) *m/z* (%): 389 (M^+, 20), 260 (100), 215 (18); HRMS *m/z* (ESI) calcd for $C_{26}H_{32}NO_2$ ($[M+H]^+$) 390.2428 , found 390.2417.

Ethyl 4-(4-(dimethylamino)phenyl)-2,2-dimethyl-3,3-diphenylbutanoate (4laa):



45.6 mg, 55% yield; Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 8:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.29 (d, *J* =7.2 Hz, 4H), 7.14-7.10 (m, 6H), 7.03 (t, *J* = 7.2 Hz, 2H), 6.52 (d, *J*= 8.8 Hz, 2H), 3.41-3.35 (m, 2H), 3.08 (s, 2H), 2.83 (s, 6H), 1.01 (s, 6H), 0.91 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 177.1, 148.3, 147.7, 134.7, 130.2, 129.4, 127.4, 125.5, 111.6, 60.0, 55.0, 47.8, 42. 0, 40.5, 28.1, 13.7; HRMS *m/z* (ESI) calcd for $C_{28}H_{34}NO_2$ ($[M+H]^+$) 416.2584 , found 416.2595.

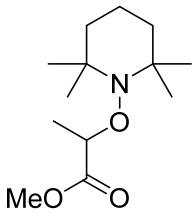
Ethyl (E)-4-(4-methoxyphenyl)-2,2-dimethylbut-3-enoate (5):



15.9 mg, 32% Yellow oil; R_f = 0.50 (Petroleum Ether/EtOAc = 10:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.31 (d, *J* = 8.8 Hz, 2H), 6.85 (d, *J* = 8.8 Hz, 2H), 6.38 (d, *J* =

16.0 Hz, 1H), 6.26 (d, *J* = 16.0 Hz, 1H), 4.17-4.11 (m, 2H), 3.80 (s, 3H), 1.39 (s, 6H), 1.25 (t, *J* =6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 176.40, 159.05, 132.38, 129.94, 127.41, 127.28, 113.92, 60.68, 55.24, 44.25, 25.11, 14.13, 14.05; HRMS *m/z* (ESI) calcd for $C_{15}H_{21}O_3$ ($[M+H]^+$) 249.1485 , found 249.1489 .

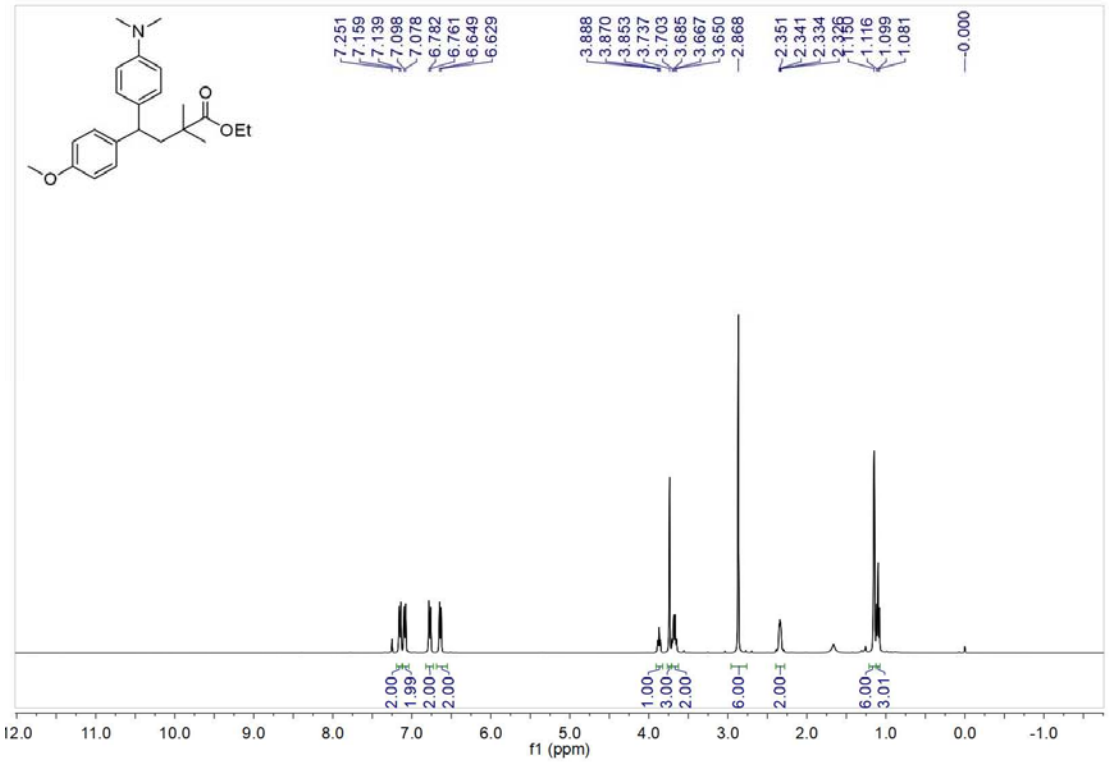
Methyl 2-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)propanoate (6):

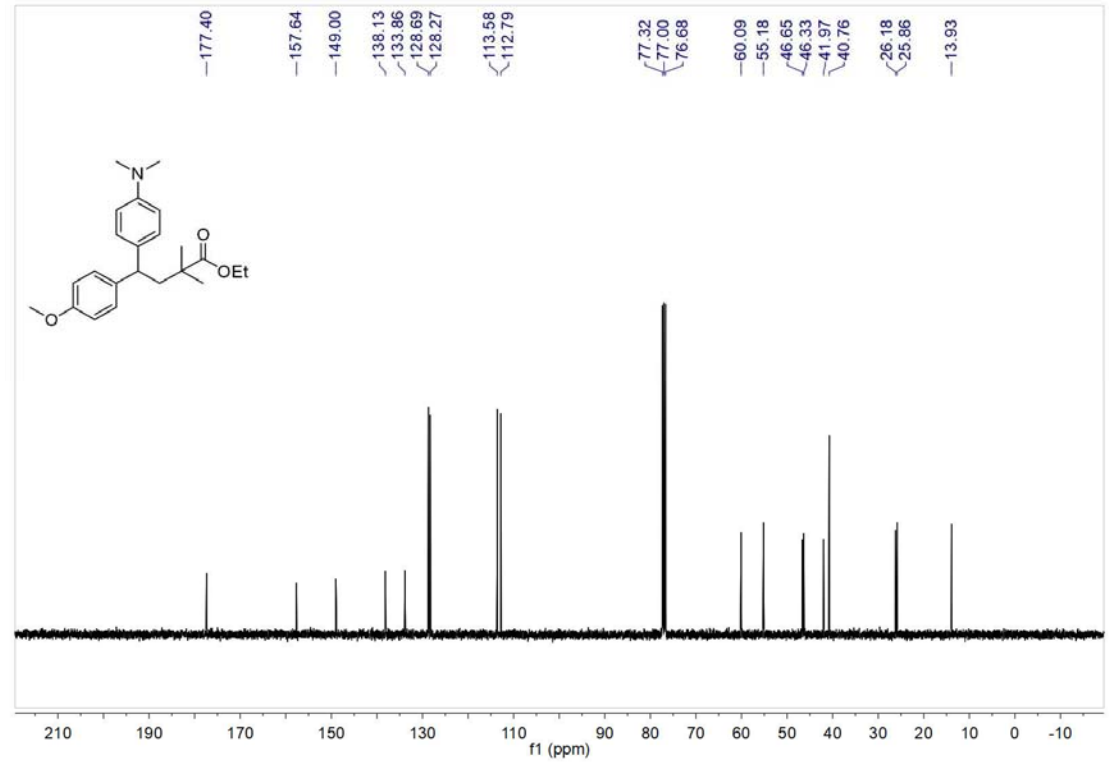


37.9 mg, 78% yield; Colorless oil; ^{1}H NMR (500 MHz, $CDCl_3$) δ: 4.36-4.31 (m, 1H), 3.71 (s, 3H), 1.58-1.51 (m, 1H), 1.41-1.39 (m, 7H), 1.29 (t, *J* = 14 Hz, 1H), 1.81 (s, 3H), 1.12 (s, 6H), 1.02 (s, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 174.56, 81.56, 60.03, 59.42, 51.45, 40.23, 40.02, 33.56, 32.80, 20.15, 20.00, 18.09, 17.06; HRMS *m/z* (ESI) calcd for $C_{13}H_{26}NO_3$ ($[M+H]^+$) 244.1907, found 244.1915.

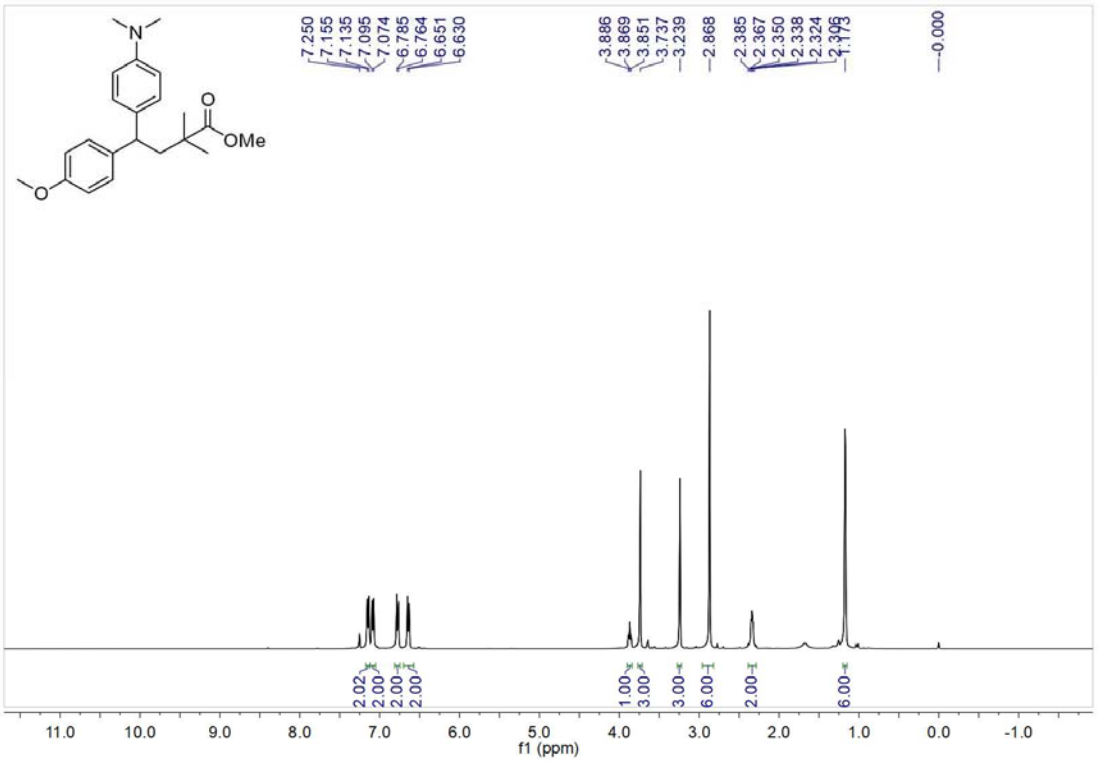
(C) Spectra

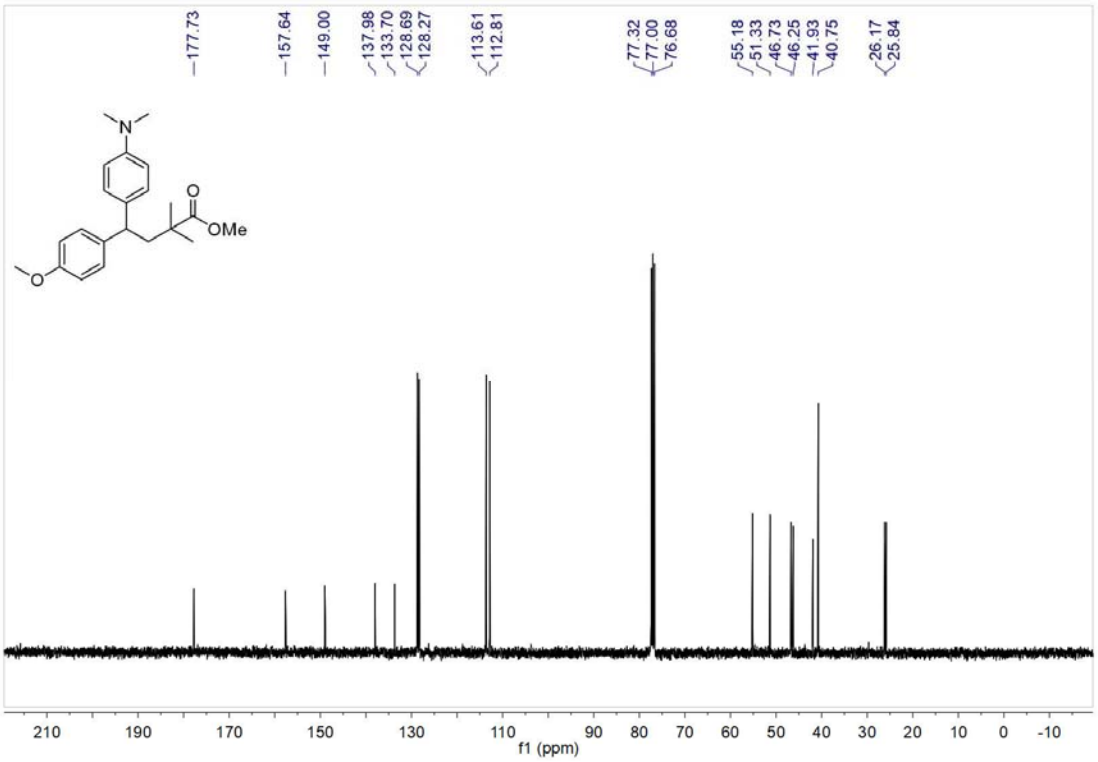
4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aaa)



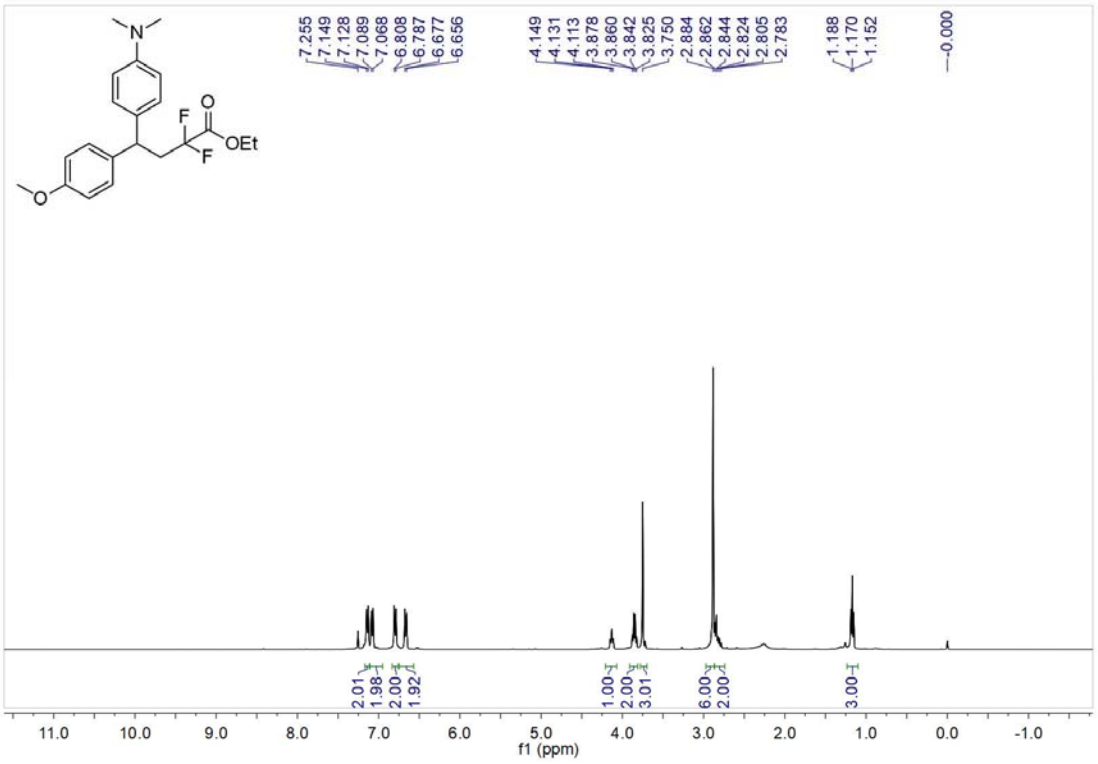


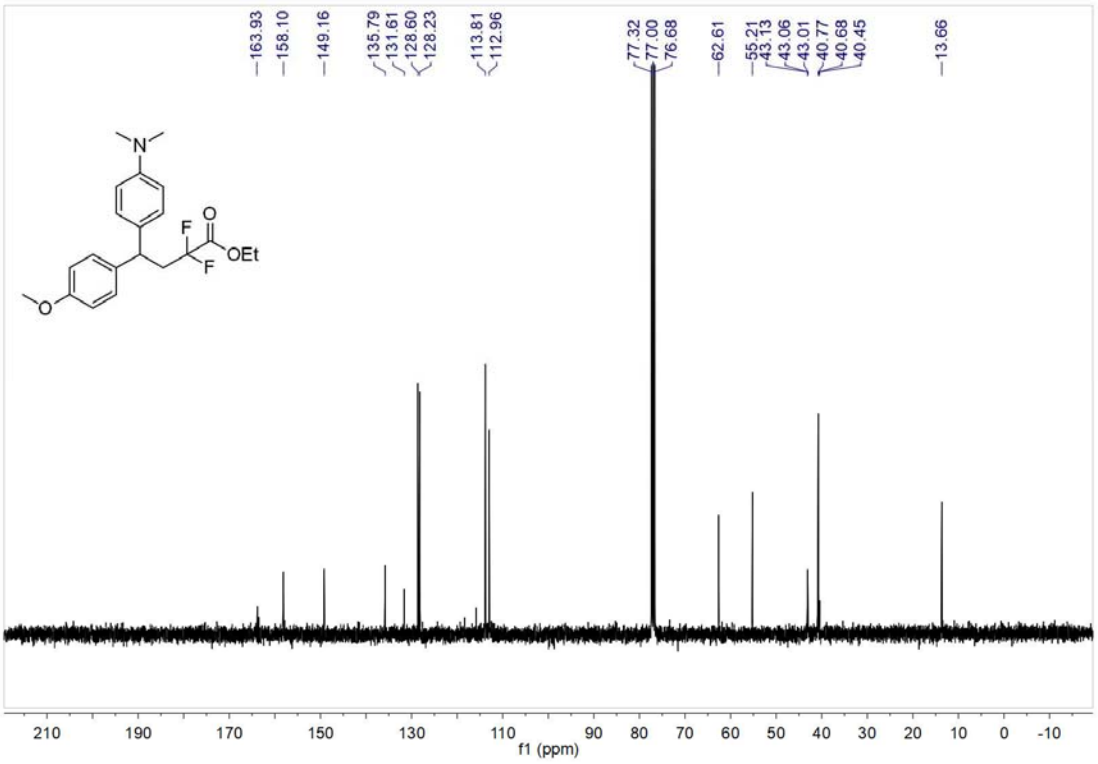
4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aab)





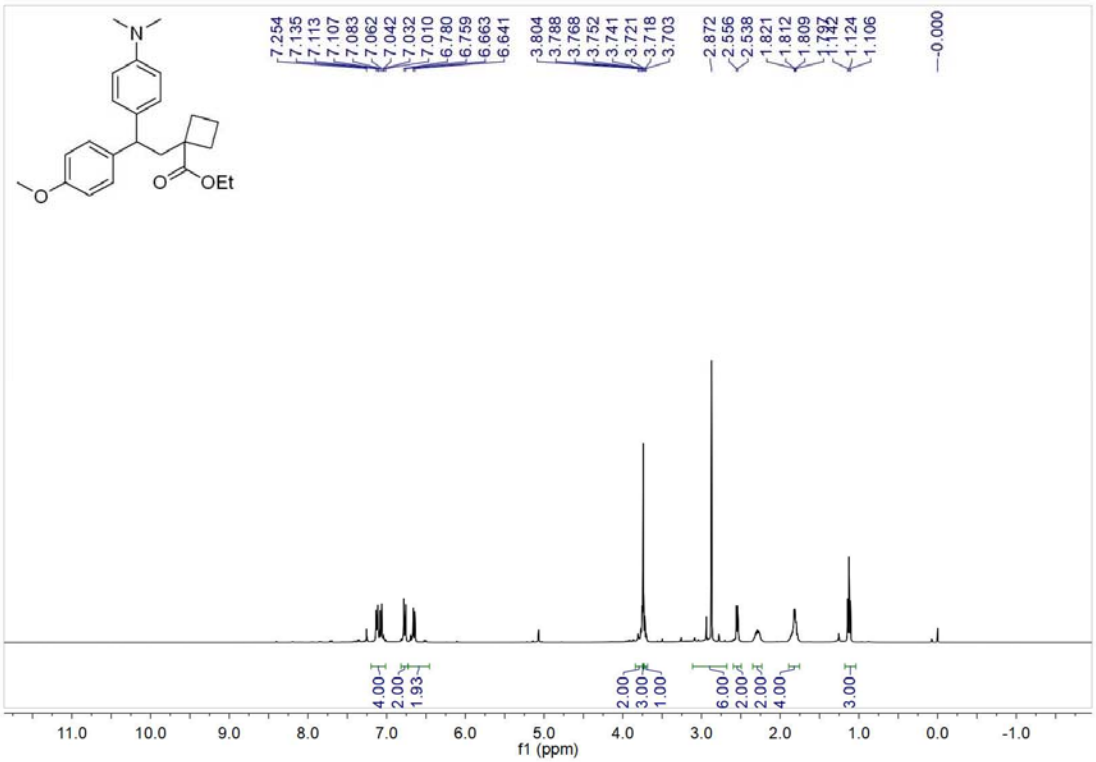
Ethyl 4-(4-(dimethylamino)phenyl)-2,2-difluoro-4-(4-methoxyphenyl)butanoate (4aac):

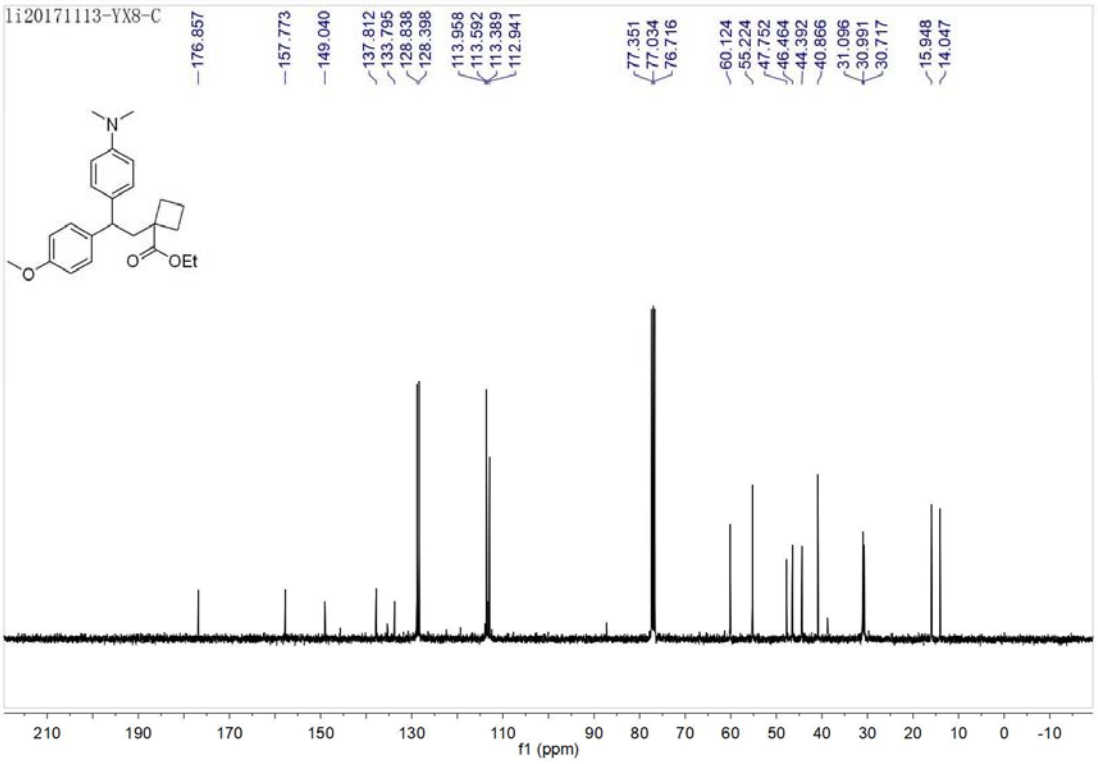




Ethyl 1-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)

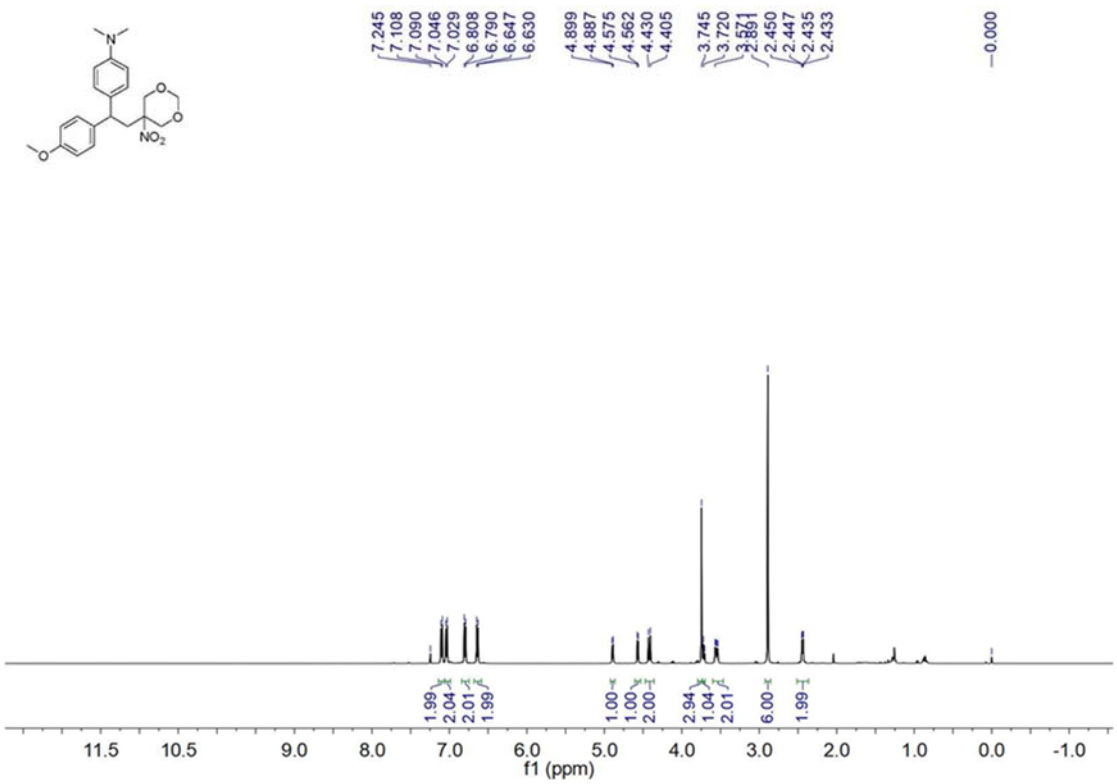
cyclobutanecarboxylate (4aad)

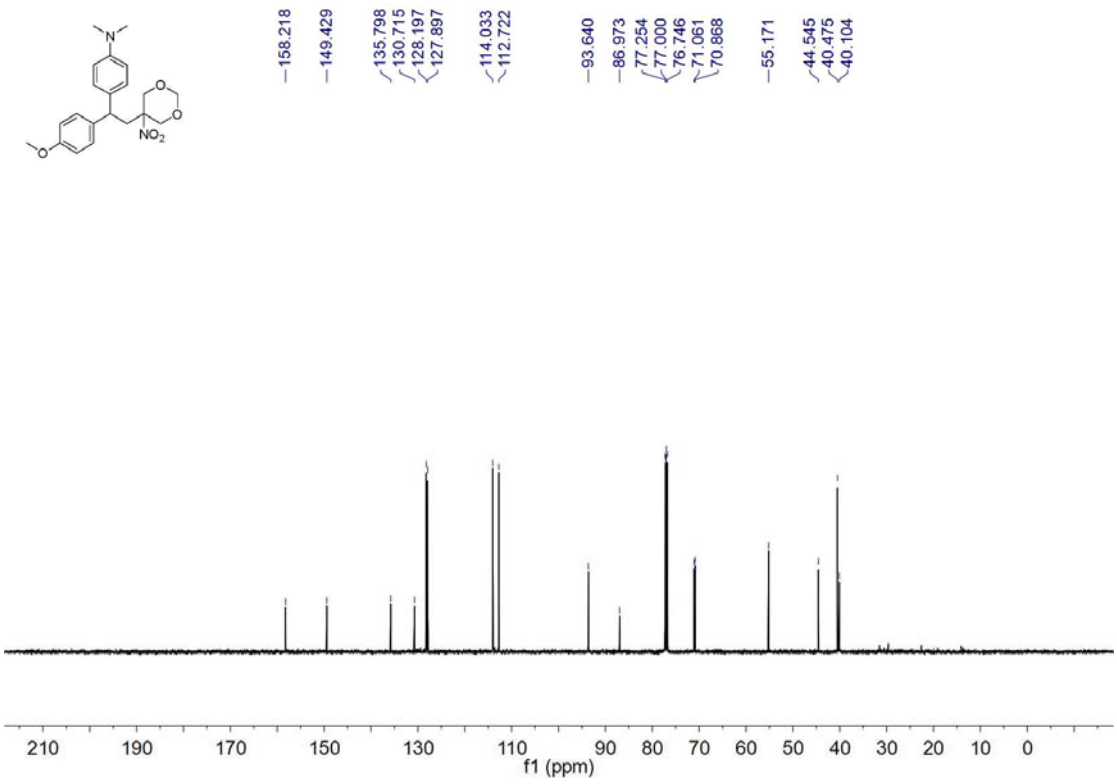




4-(1-(4-methoxyphenyl)-2-(5-nitro-1,3-dioxan-5-yl)ethyl)-*N*,*N*-dimethylaniline

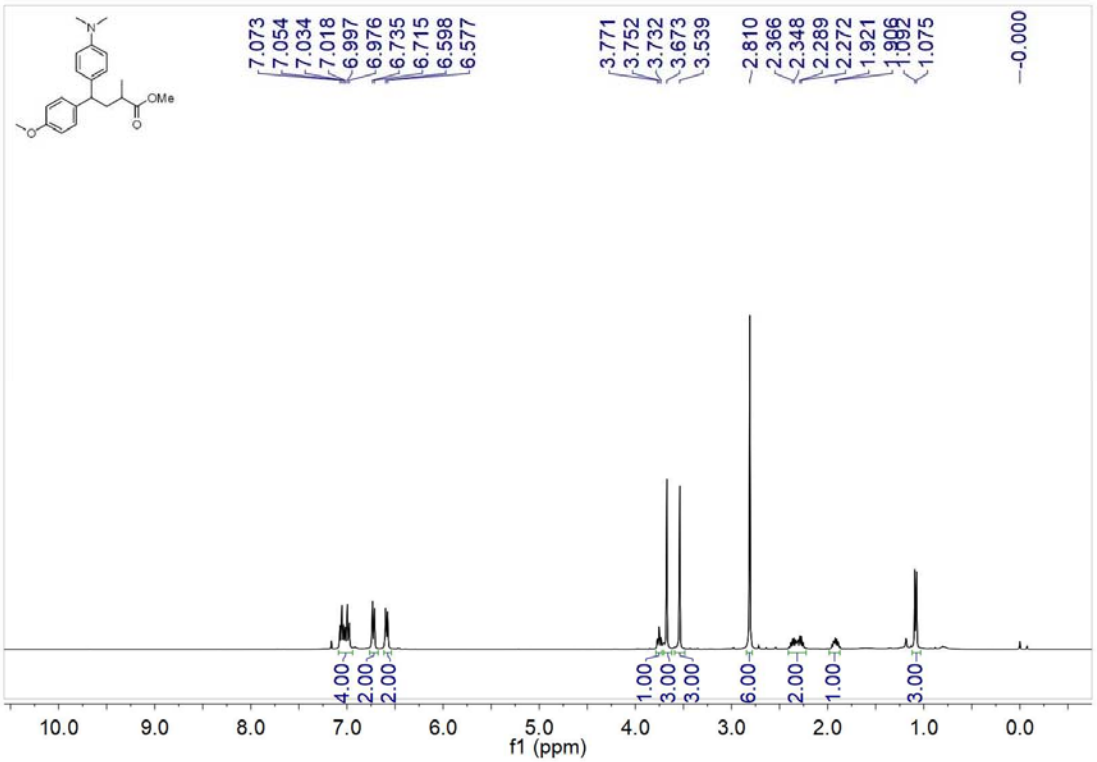
(4aae)

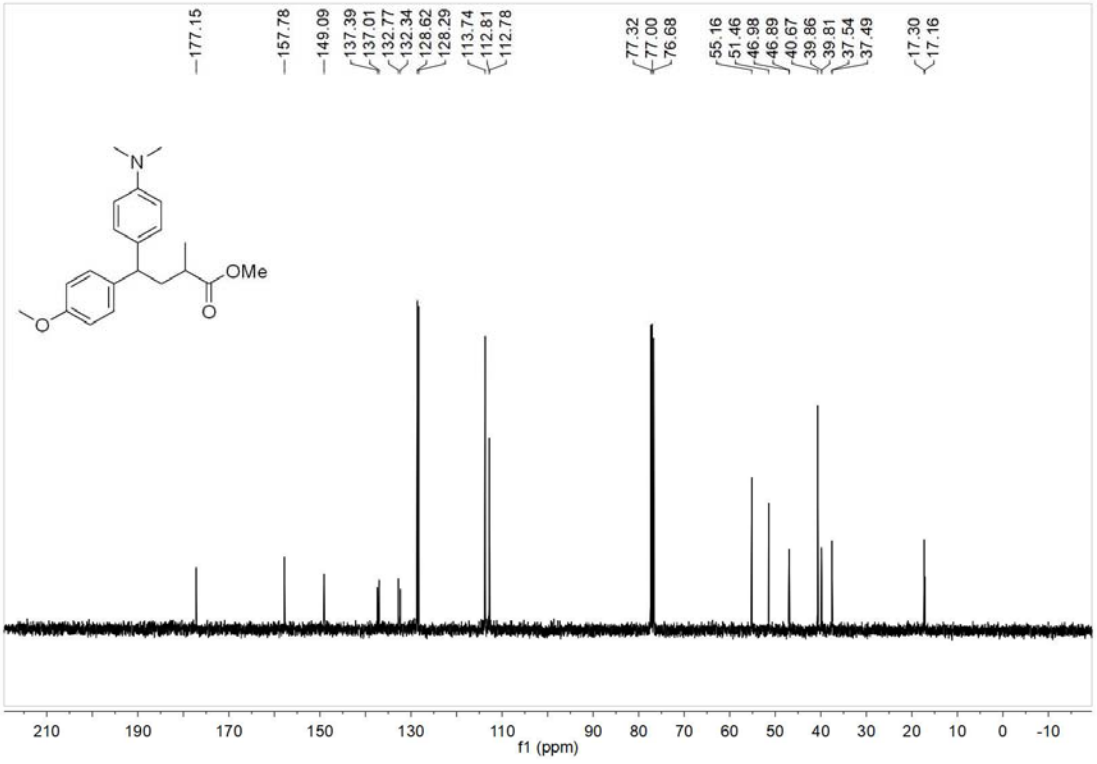




Methyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)-2-methylbutanoate

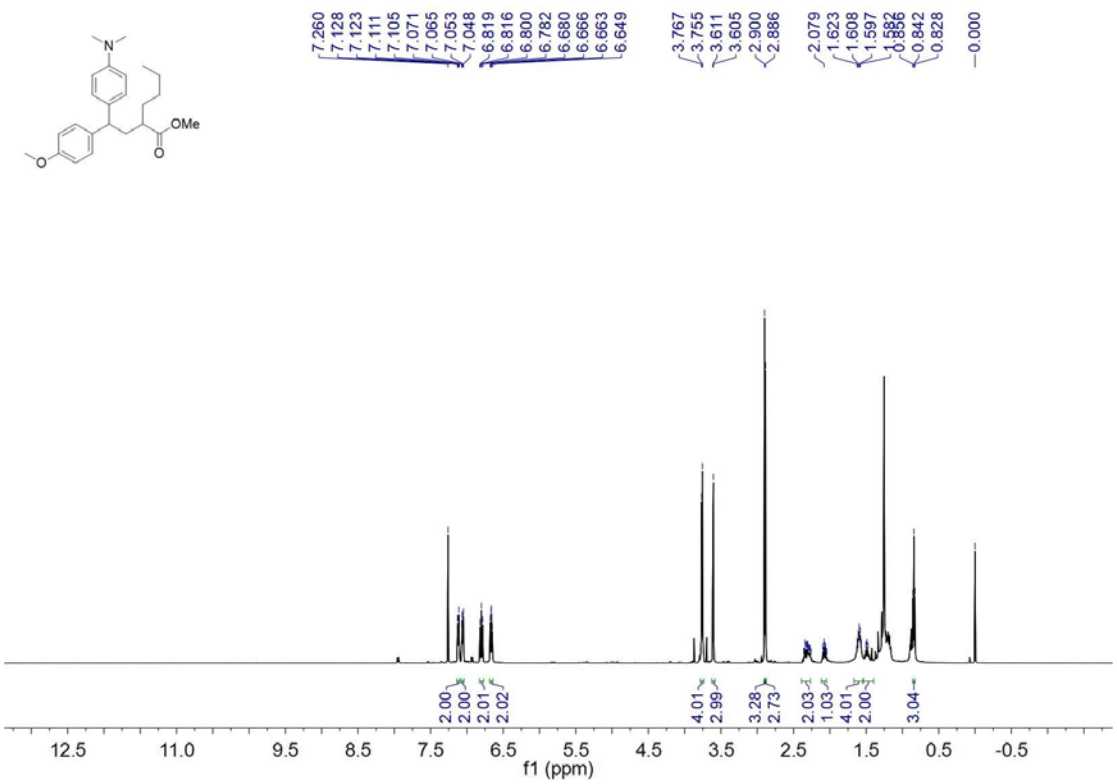
(4aaf)

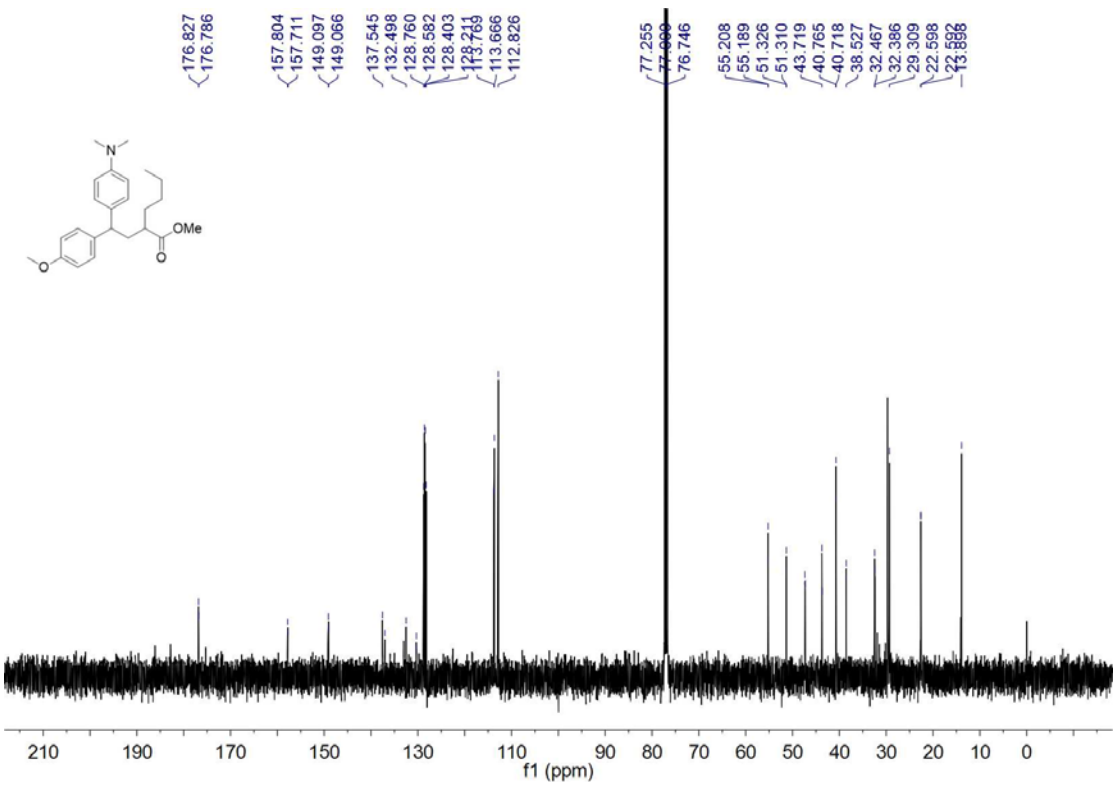




Methyl 2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)hexanoate

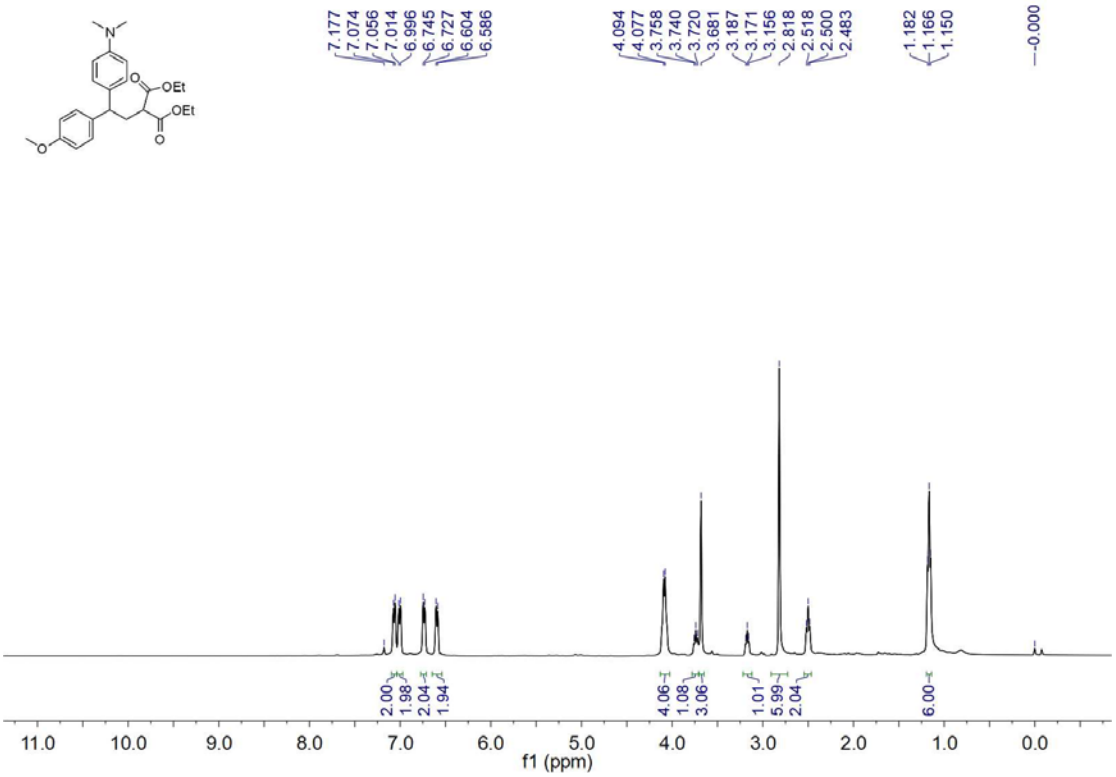
(4aag)

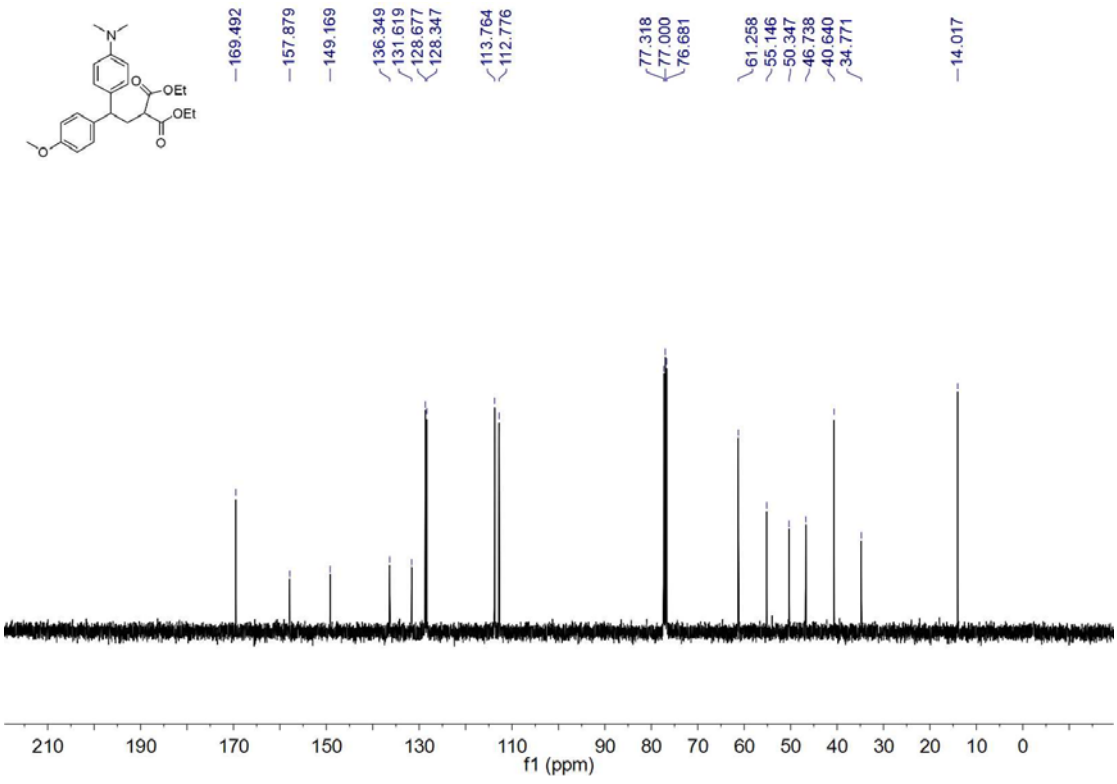




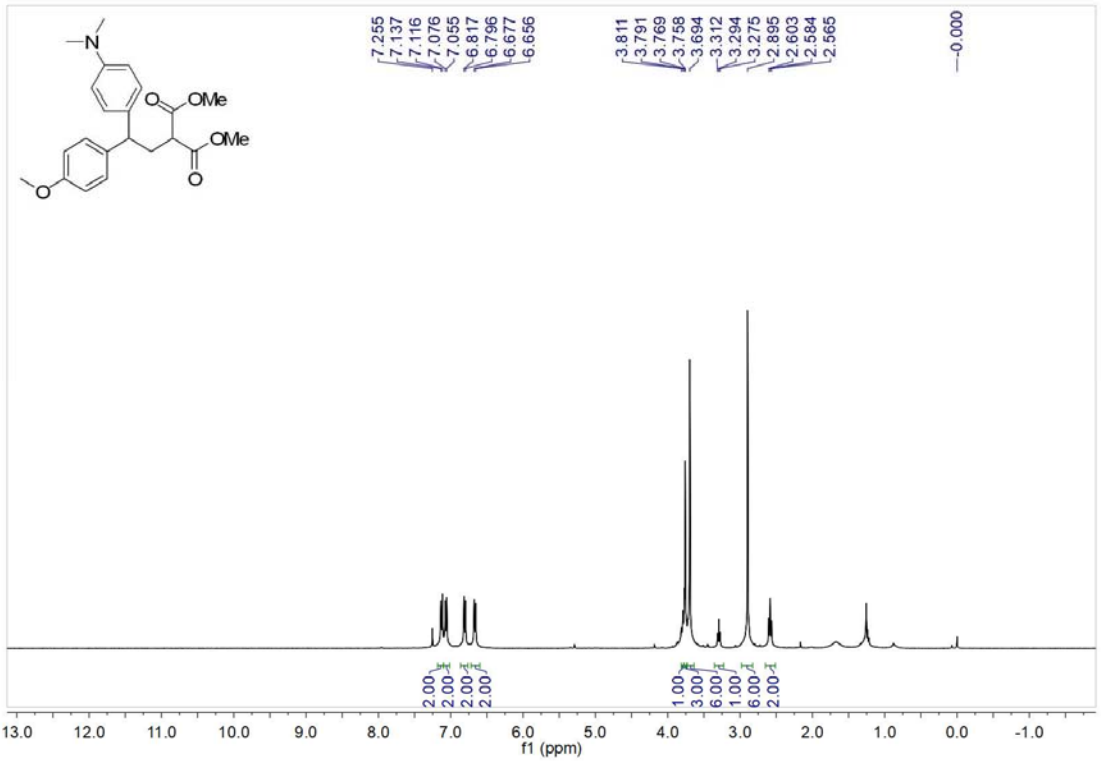
Iethyl 2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)malonate

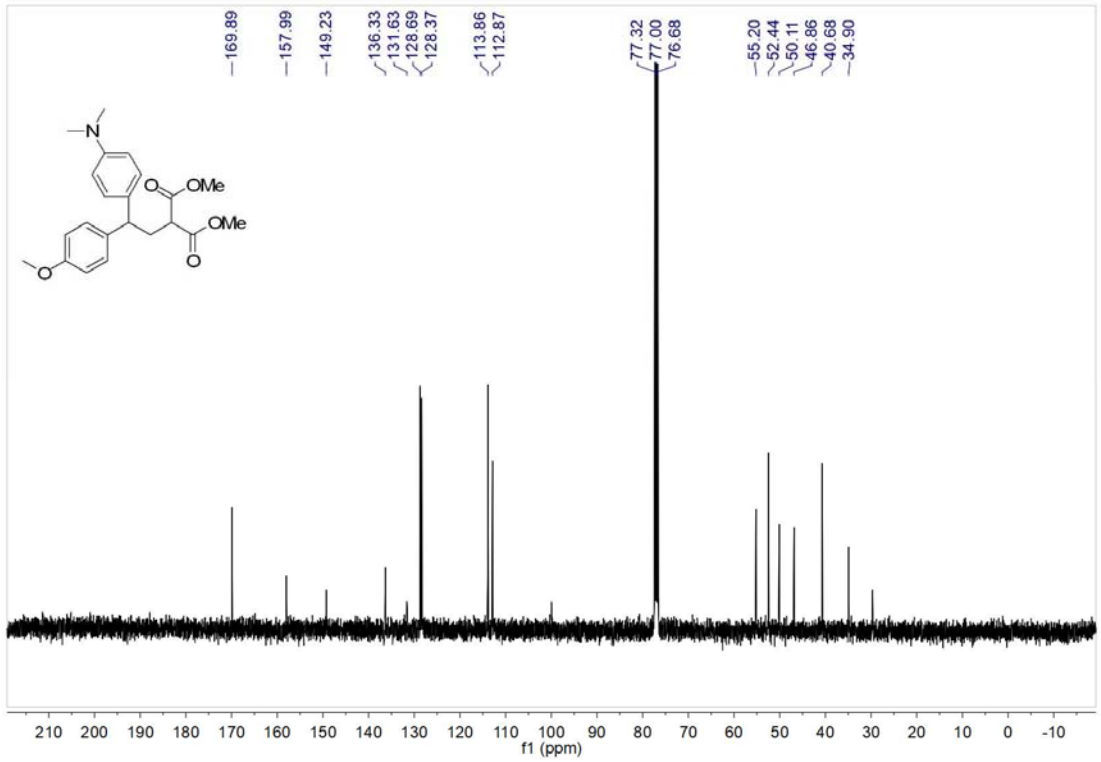
(4aah)



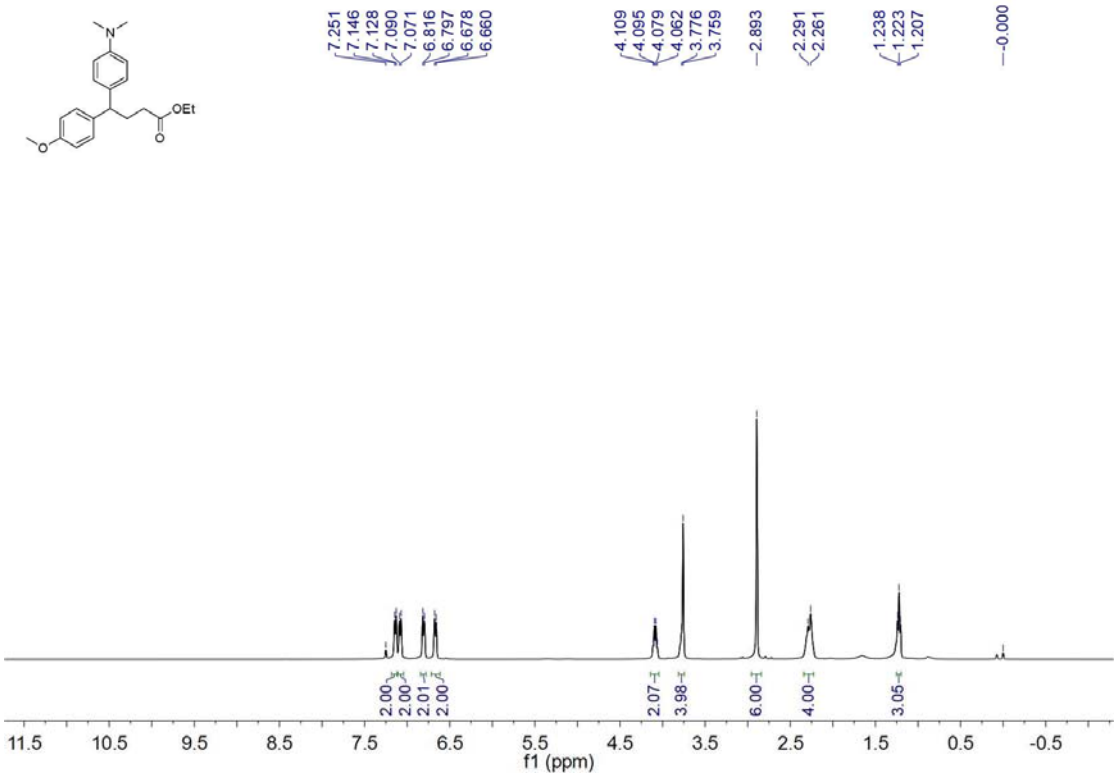


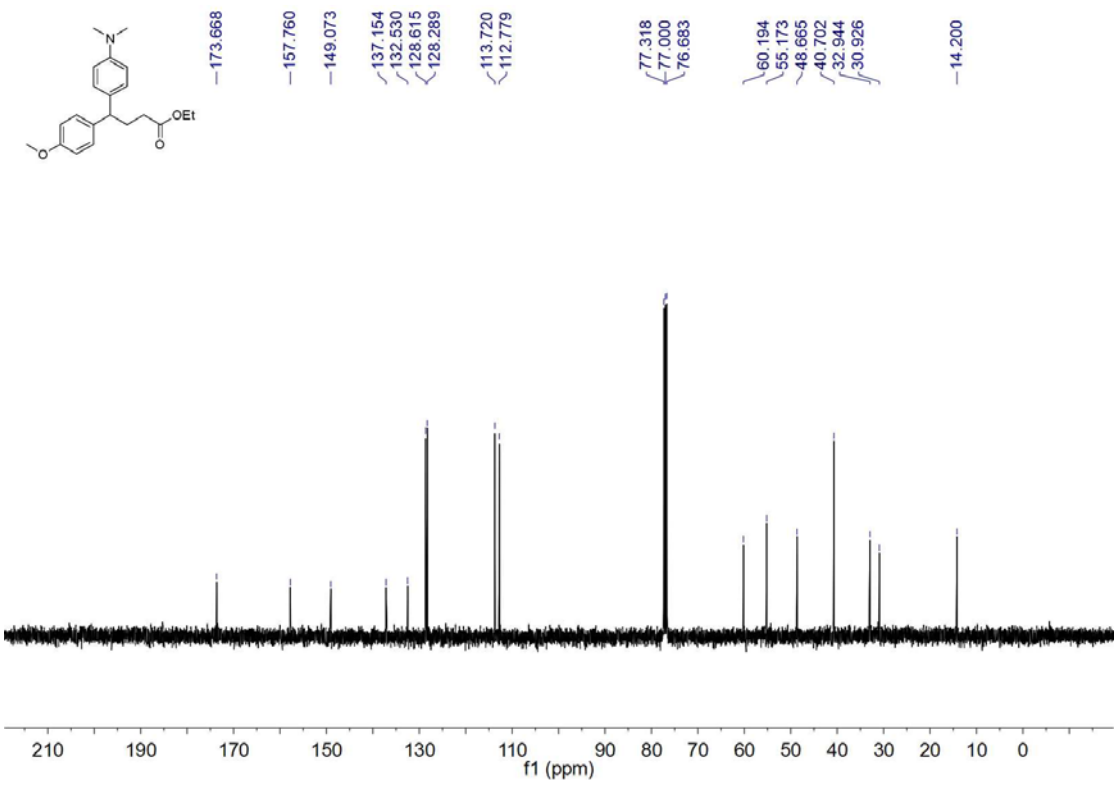
2-(2-(4-(dimethylamino)phenyl)-2-(4-methoxyphenyl)ethyl)malonate (4aai)



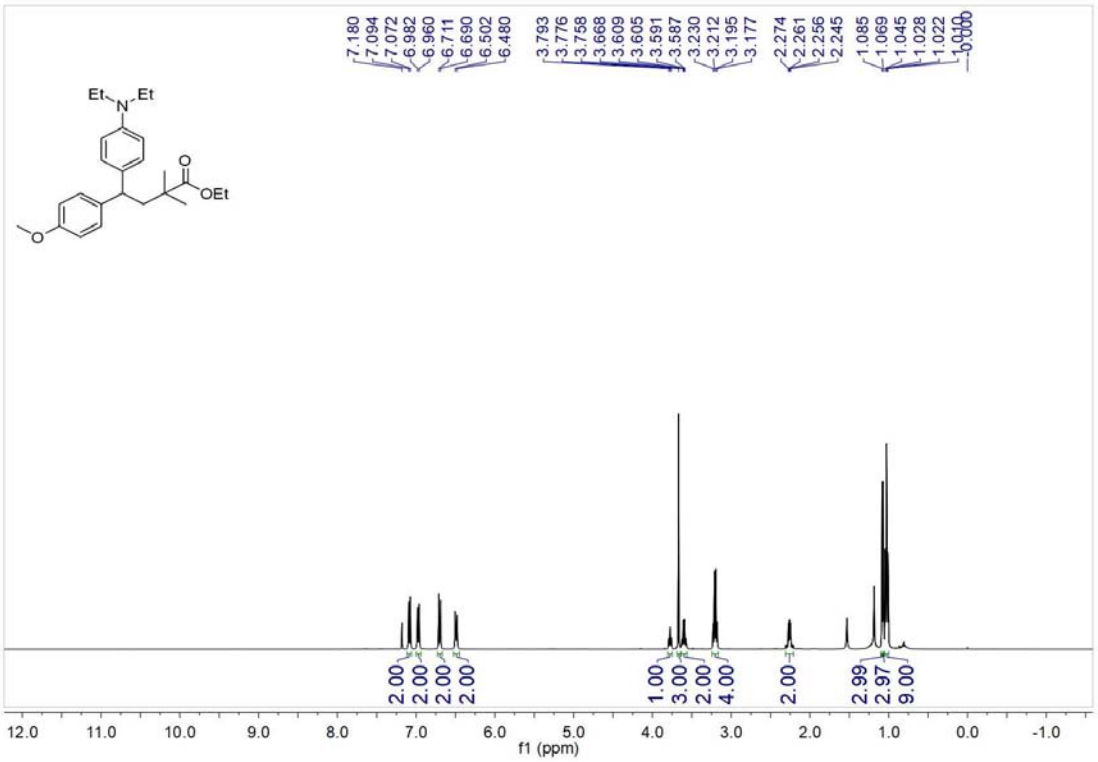


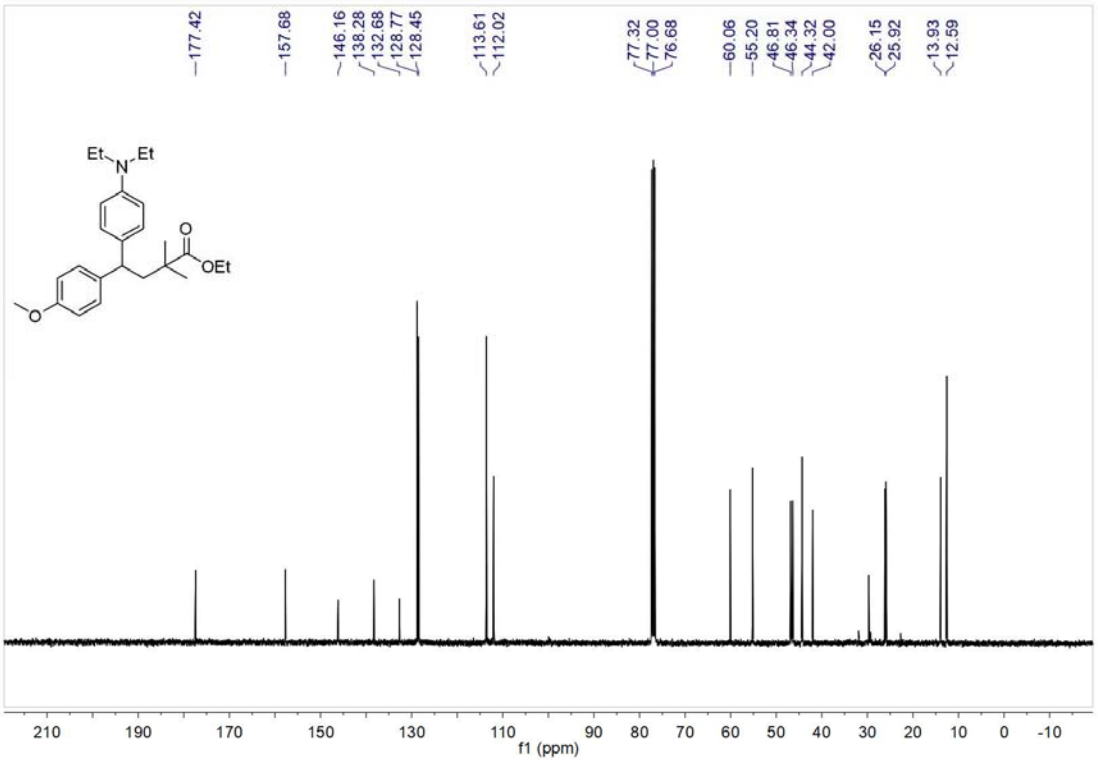
Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxyphenyl)butanoate (4aaj)



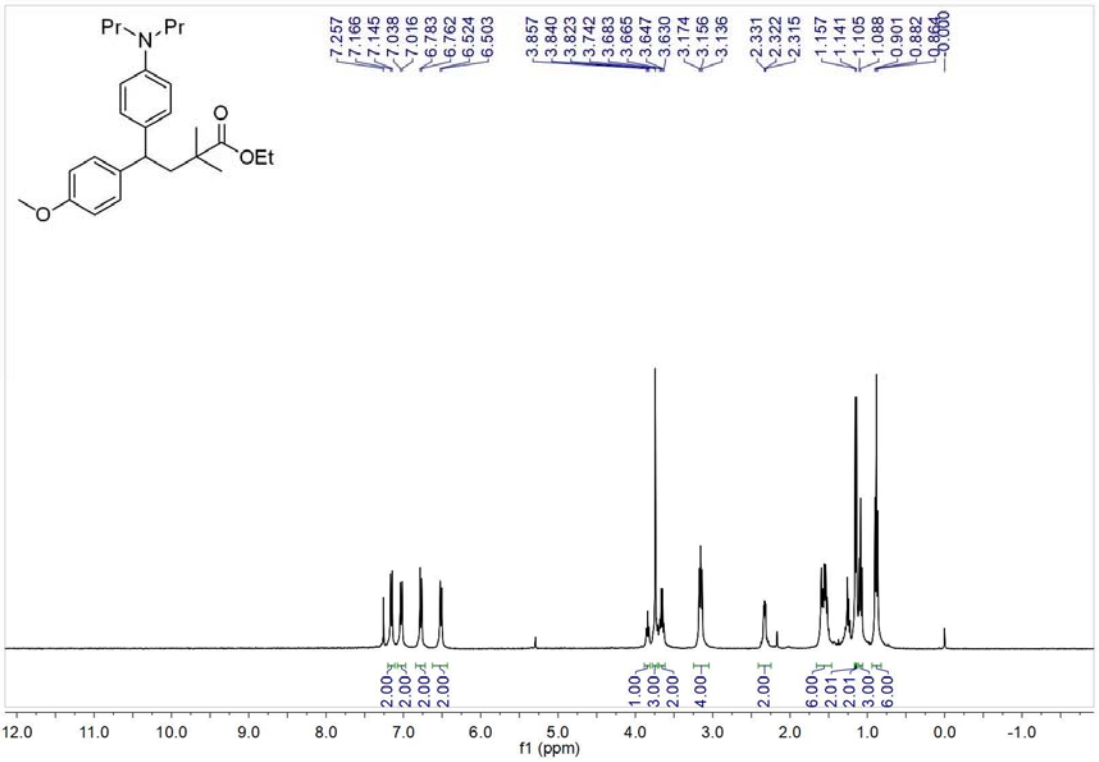


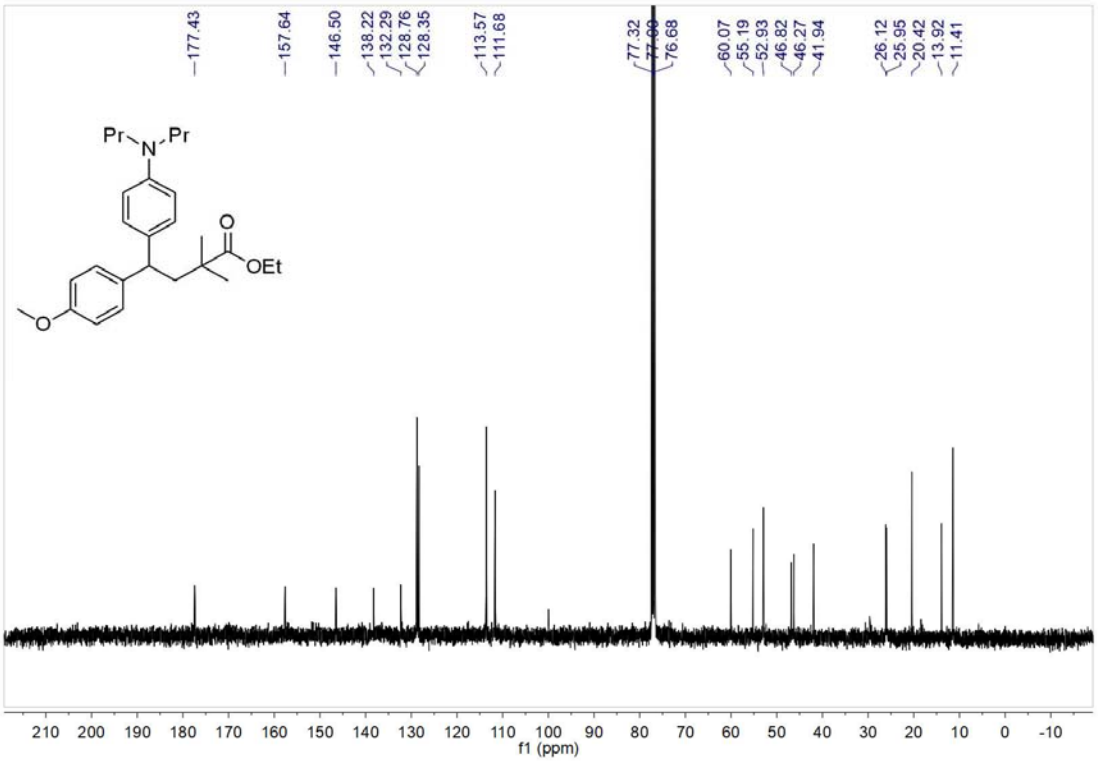
4-(4-(diethylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aba)





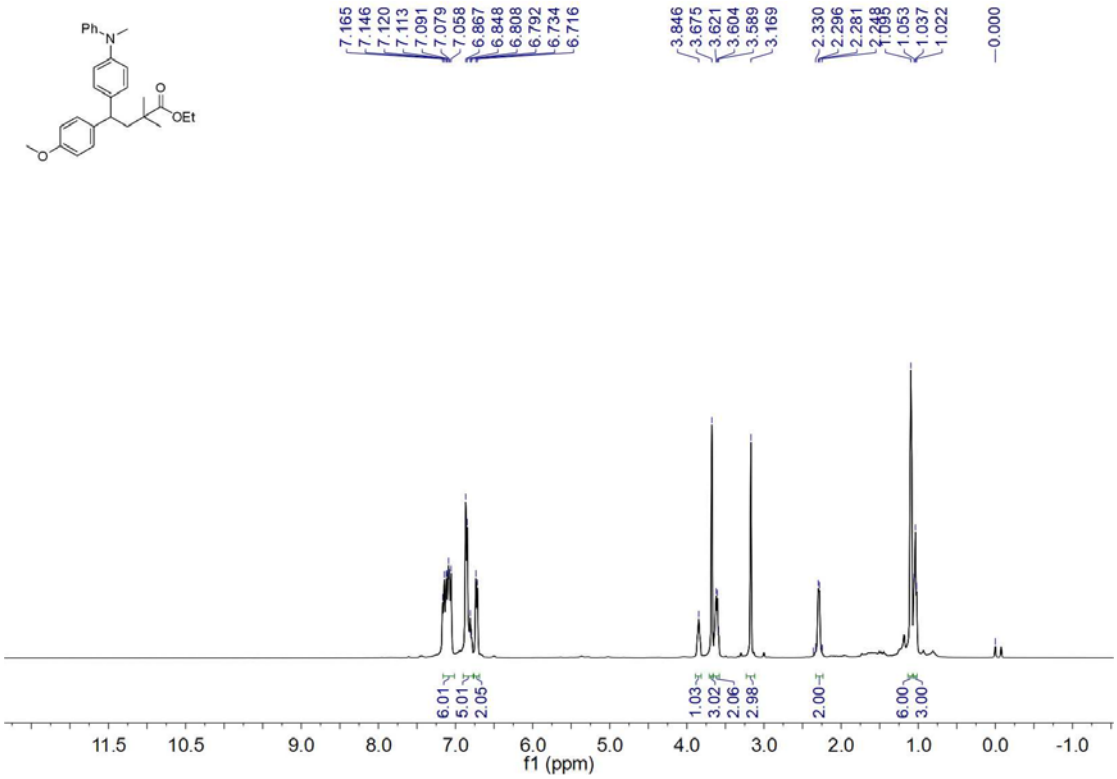
4-(4-(dipropylamino)phenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aca)

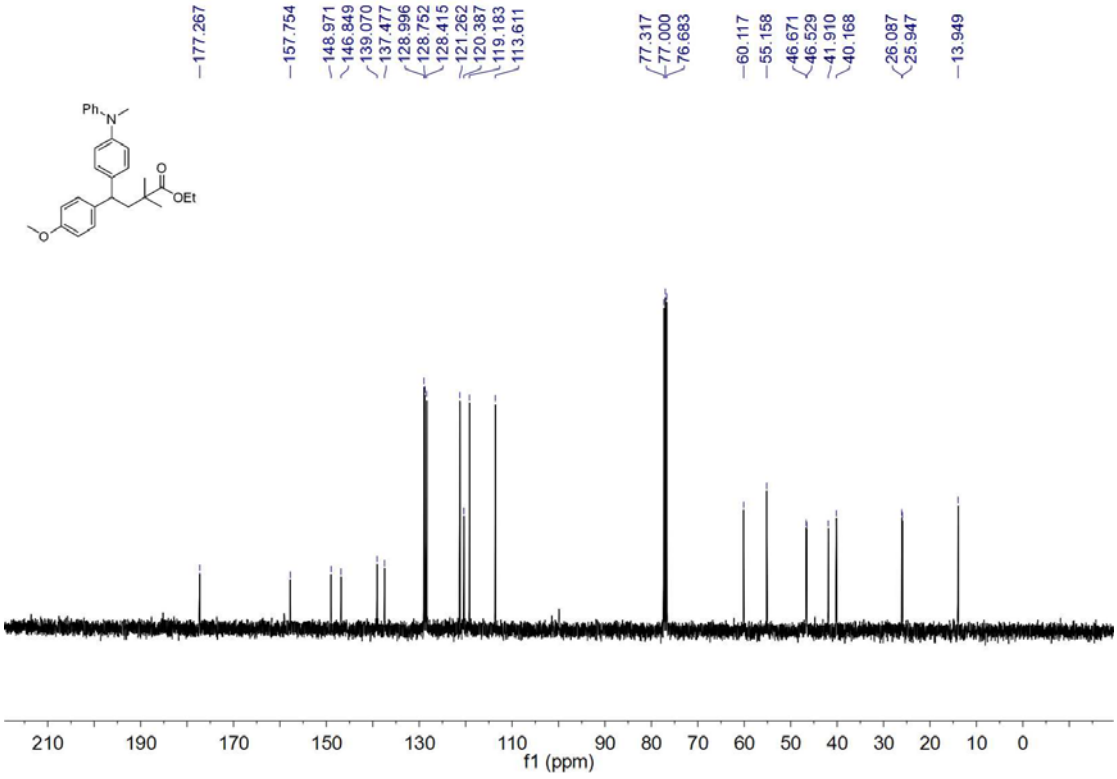




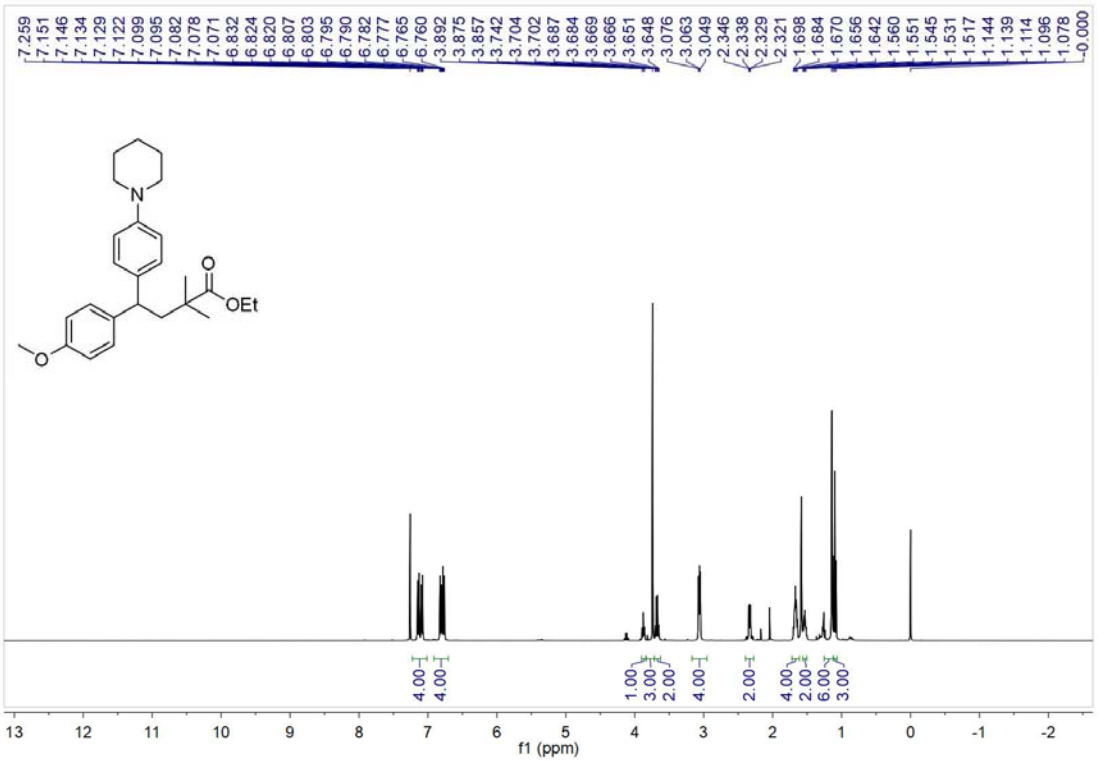
4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(methyl(phenyl)amino)phenyl)butanoate

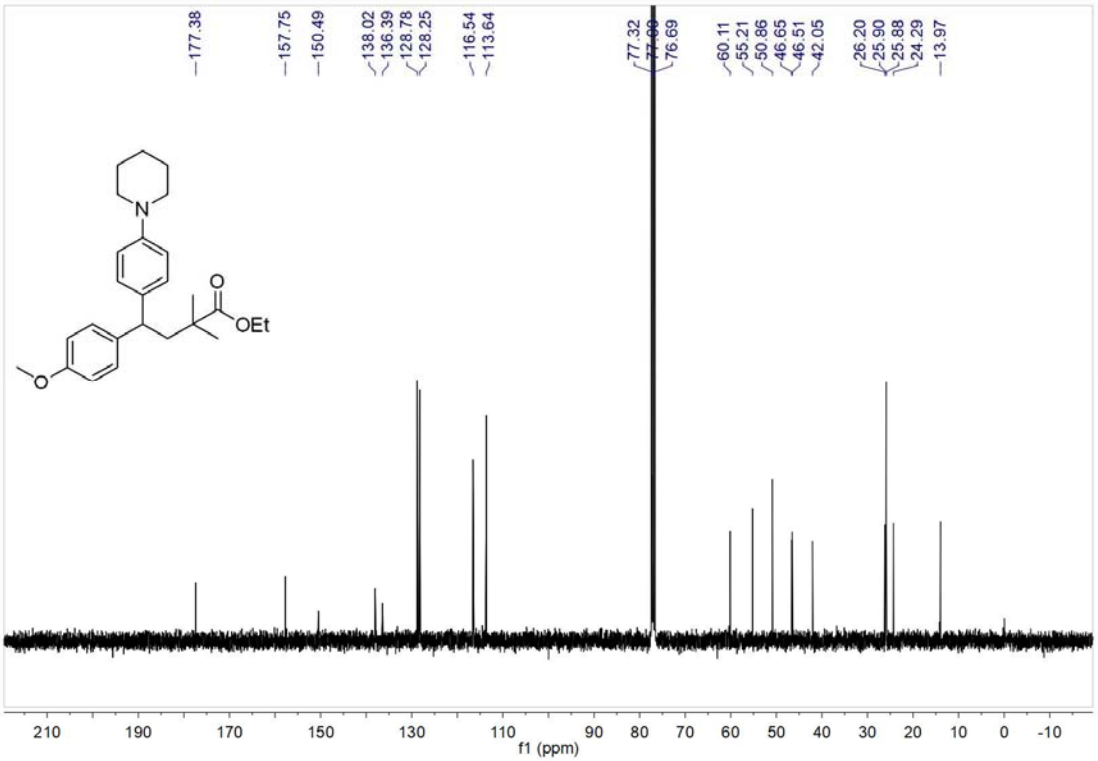
(4ada)





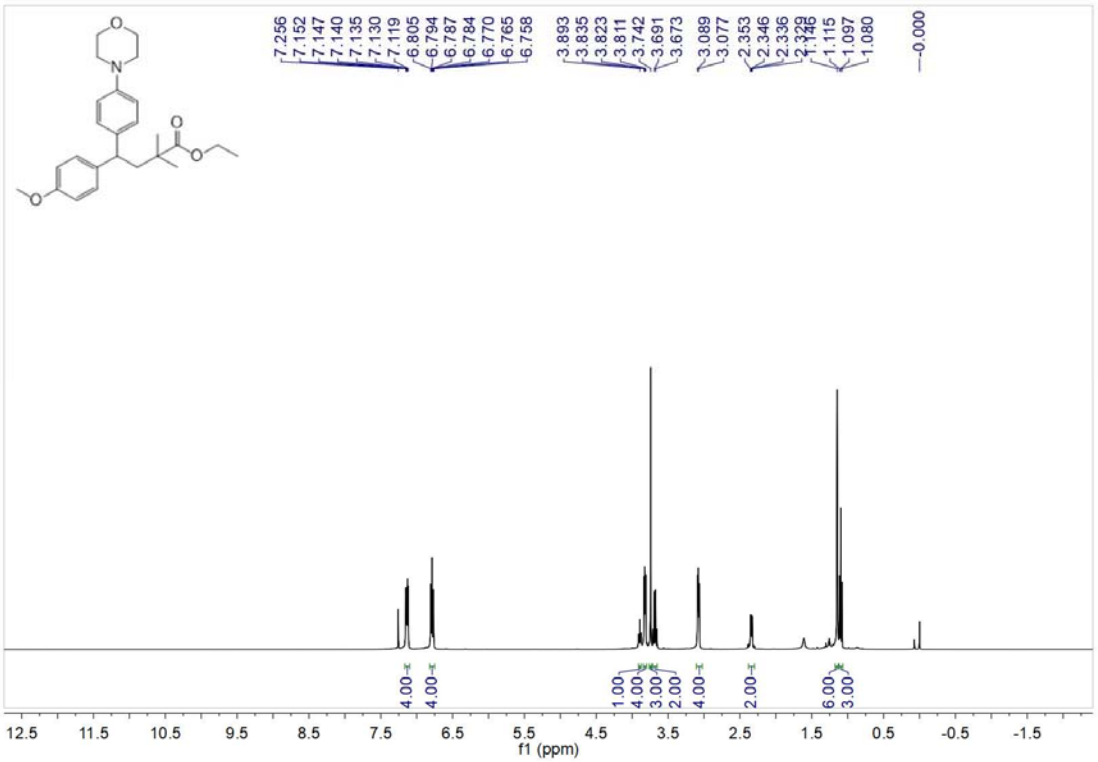
4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(piperidin-1-yl)phenyl)butanoate (4aea)

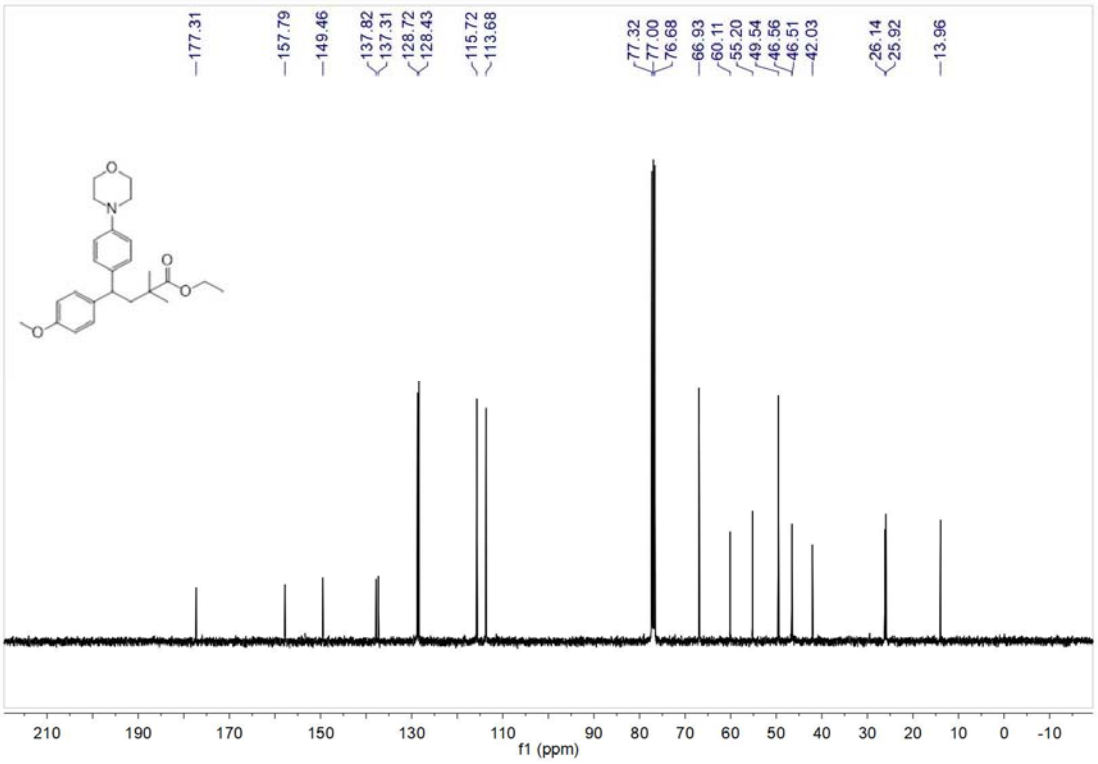




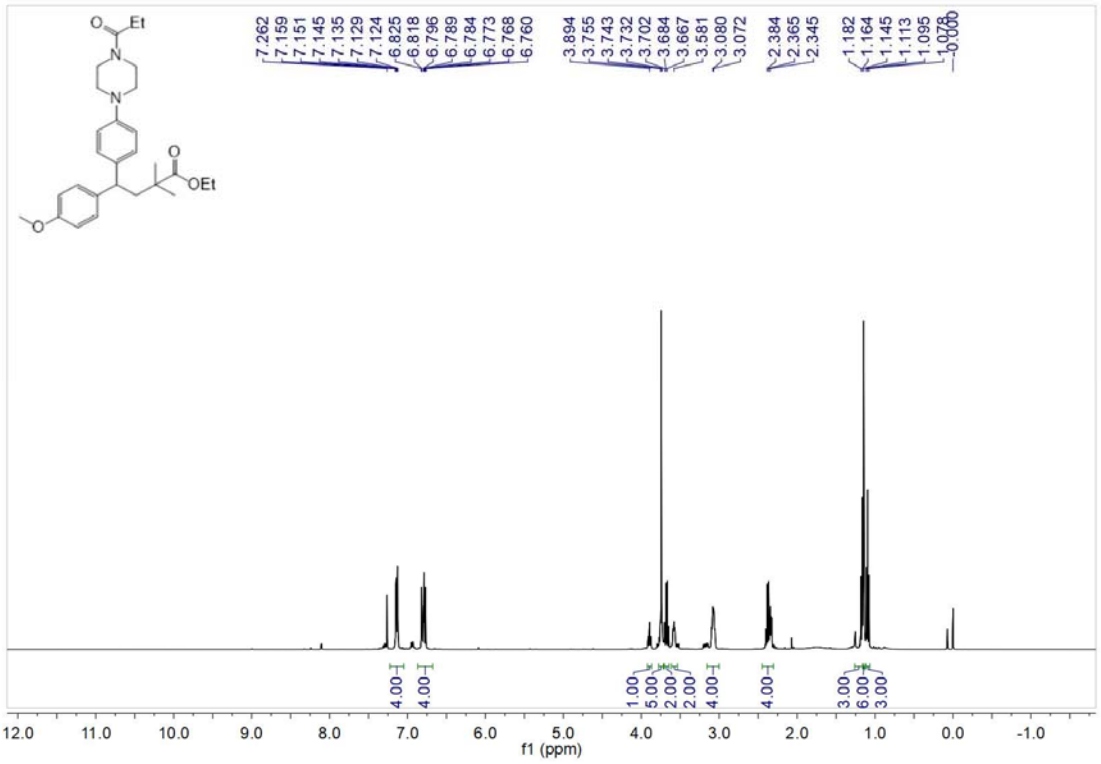
Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-morpholinophenyl)butanoate

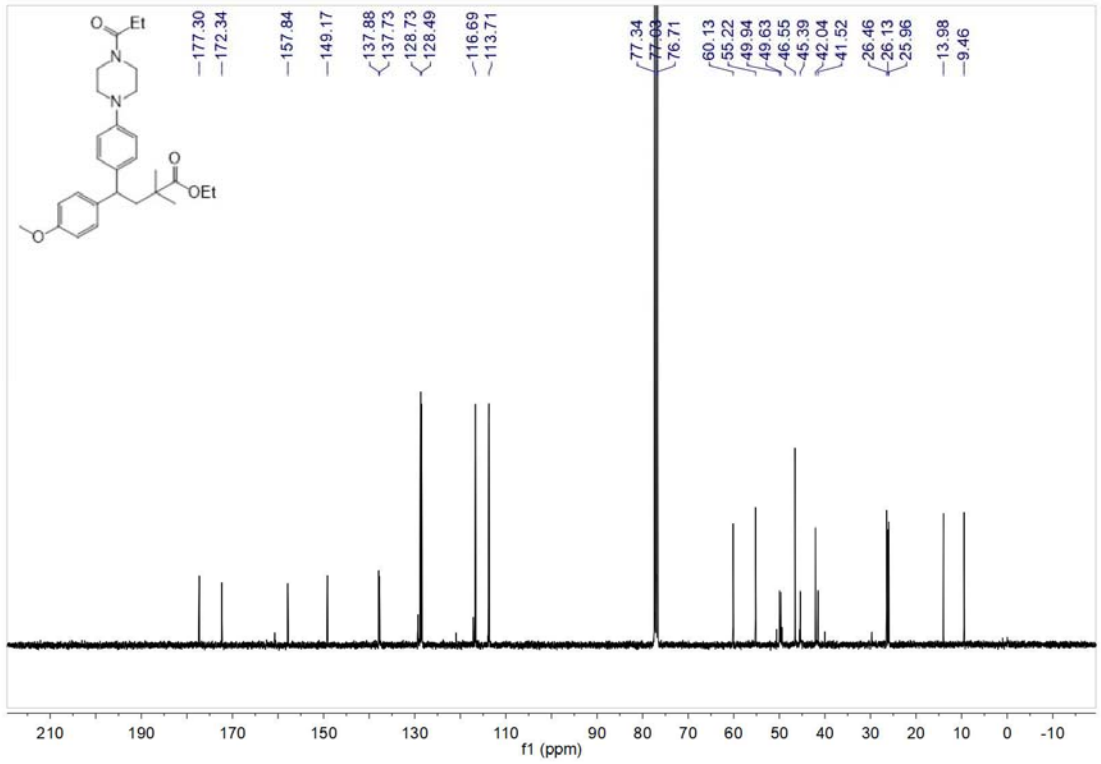
(4afa)



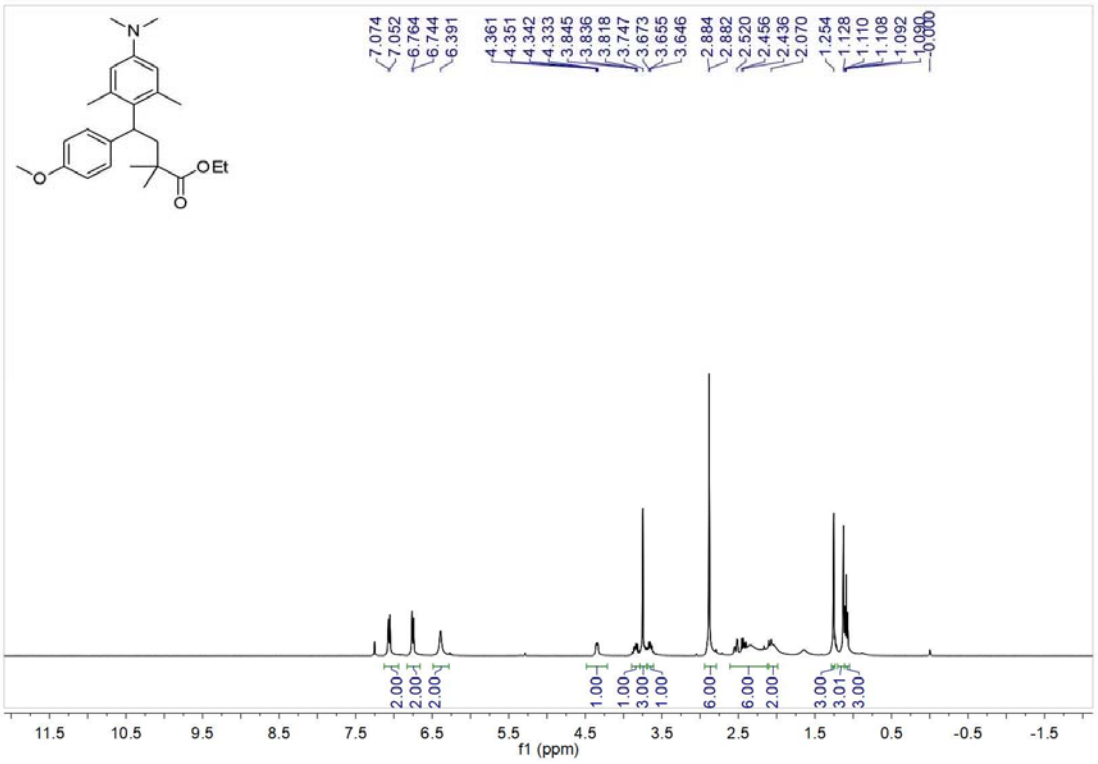


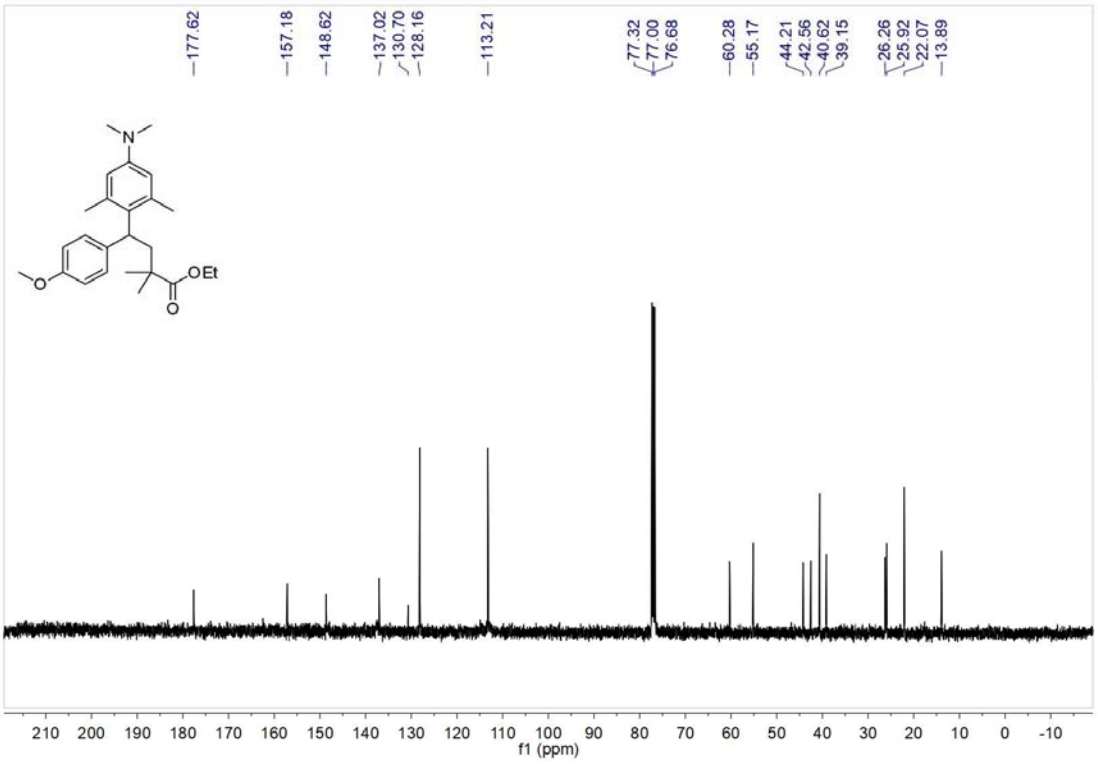
Ethyl4-(4-methoxyphenyl)-2,2-dimethyl-4-(4-(4-propionylpiperazin-1-yl)phenyl)butanoate (4aga)



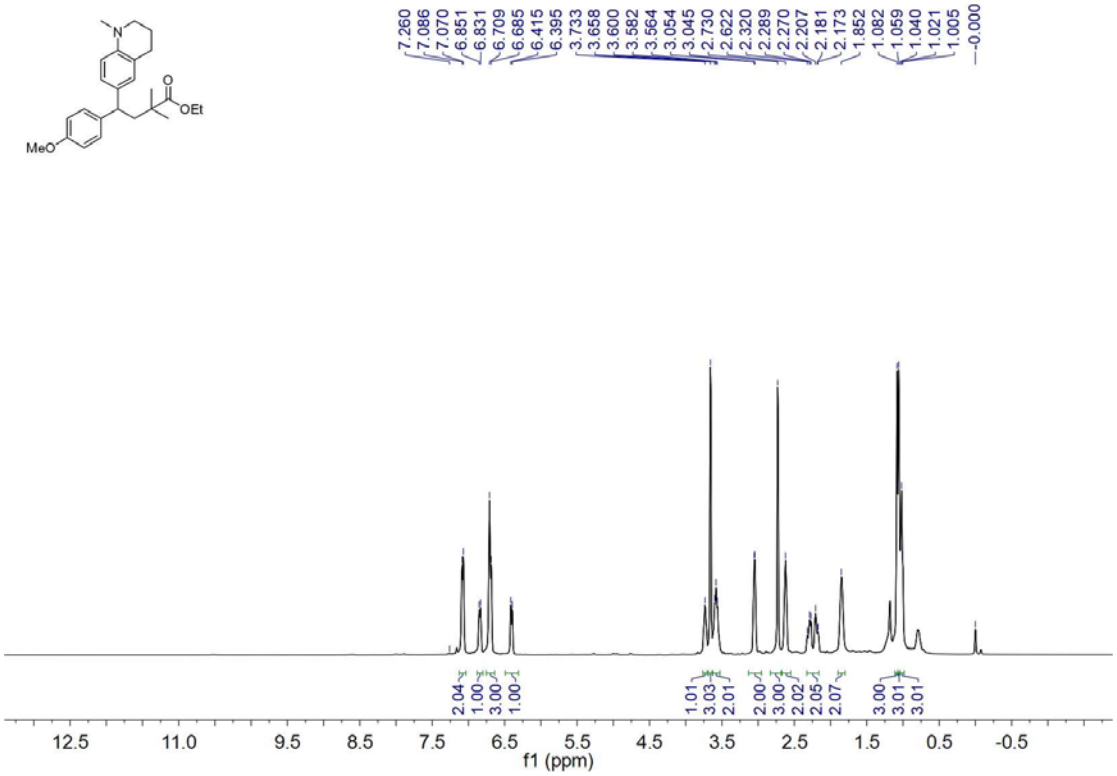


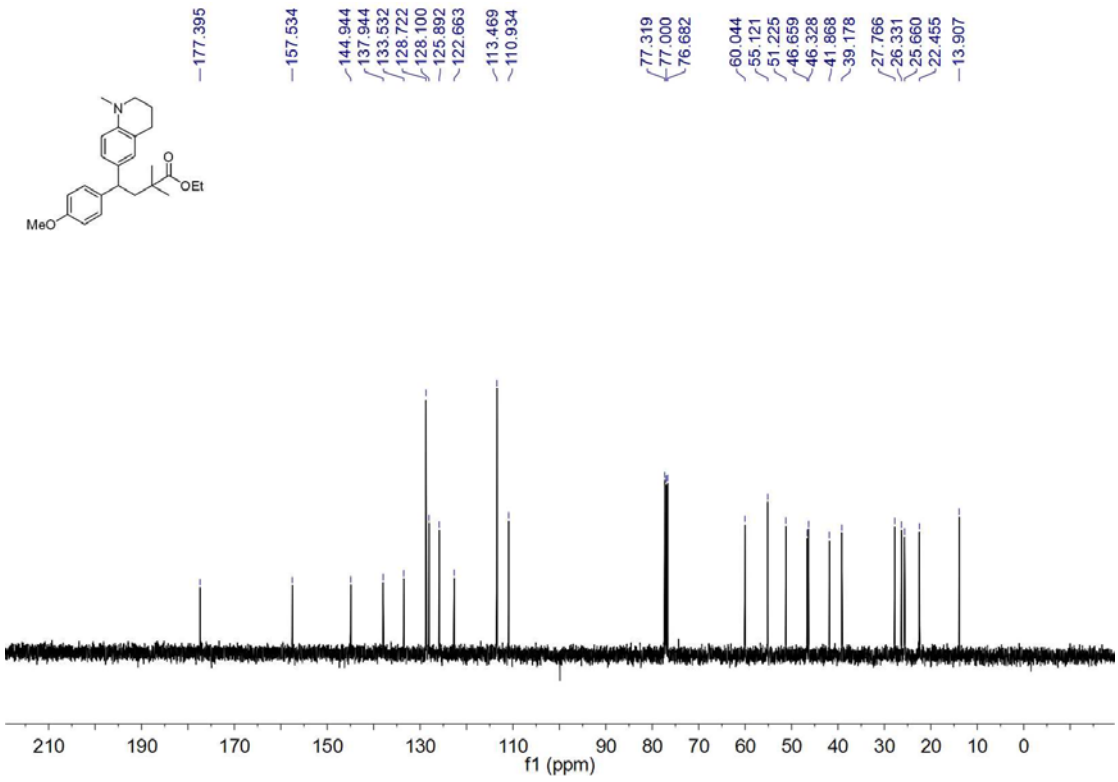
4-(4-(dimethylamino)-2,6-dimethylphenyl)-4-(4-methoxyphenyl)-2,2-dimethylbutanoate (4aha)



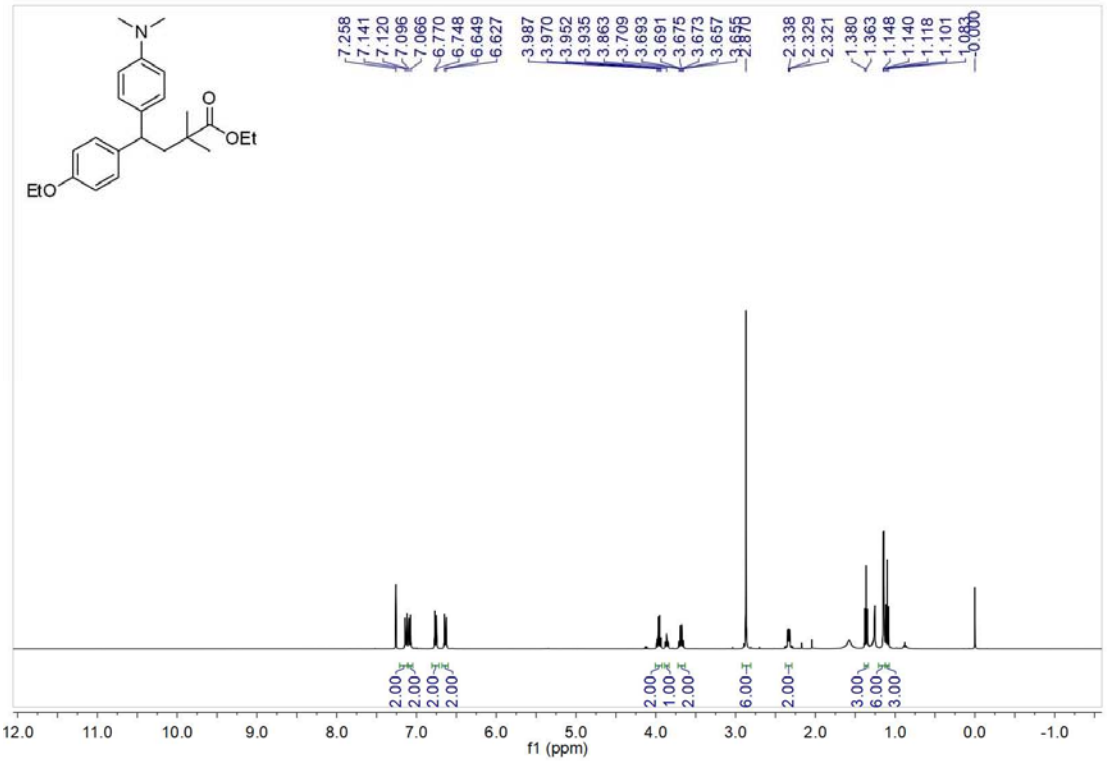


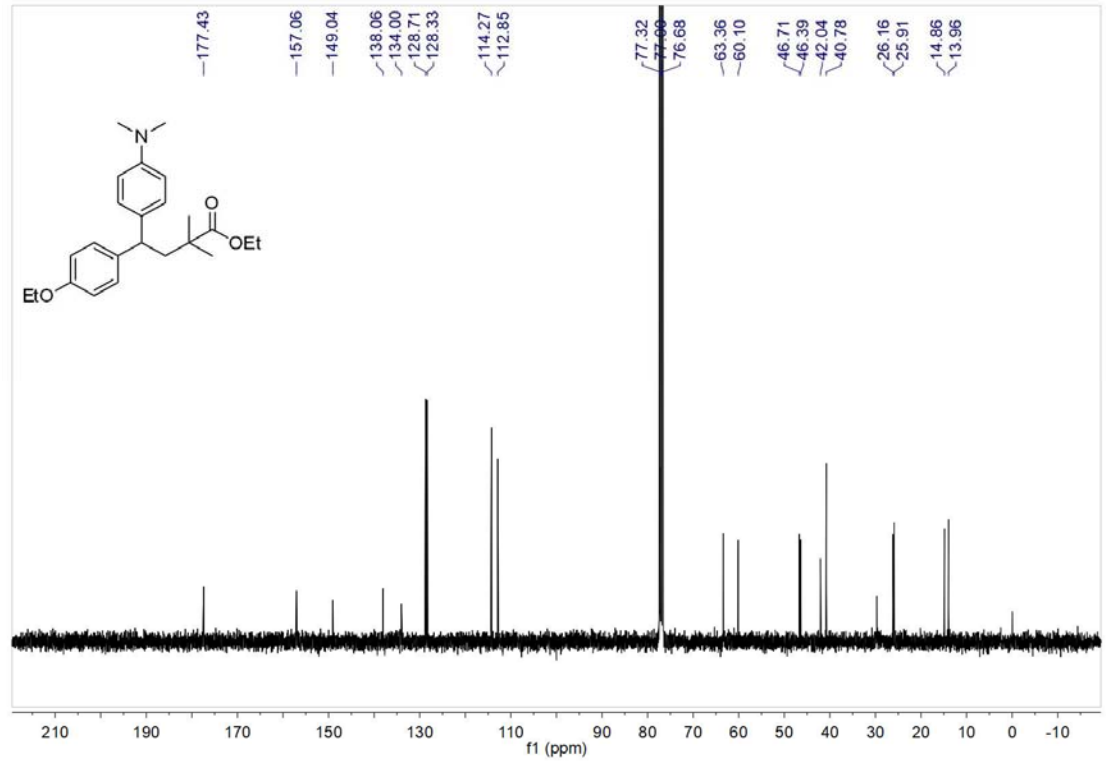
Ethyl 4-(4-methoxyphenyl)-2,2-dimethyl-4-(1-methyl-1,2,3,4-tetrahydroquinolin-6-yl)butanoate (4aia)



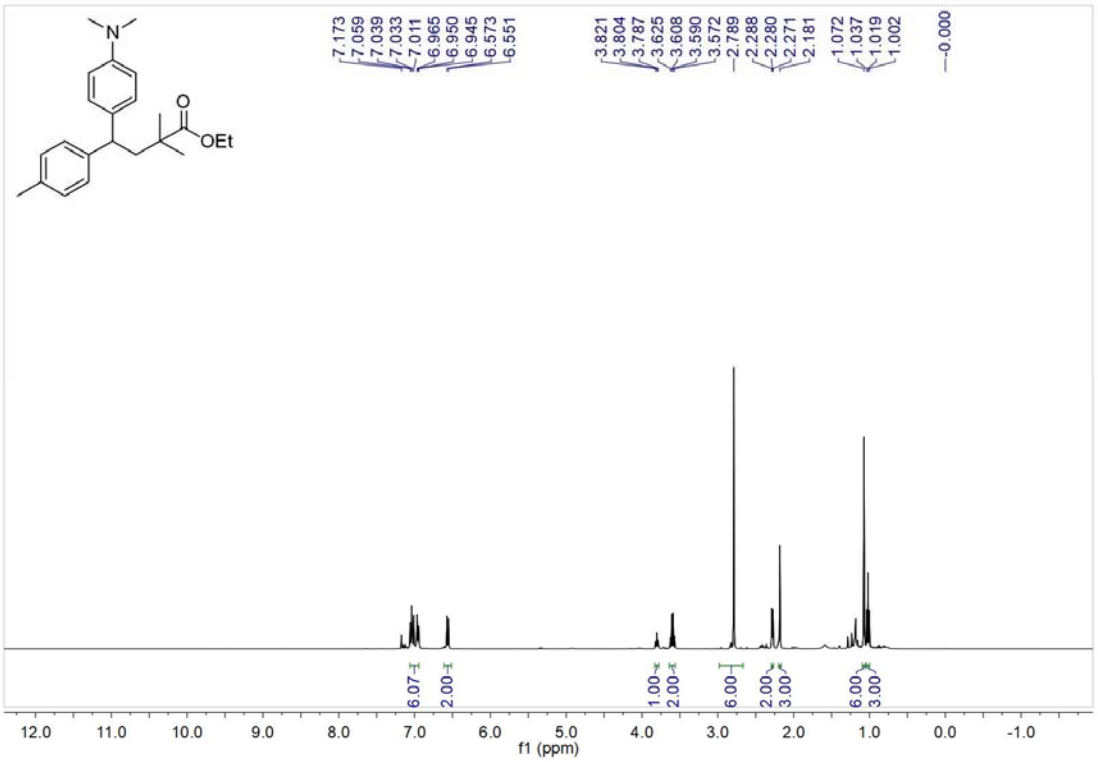


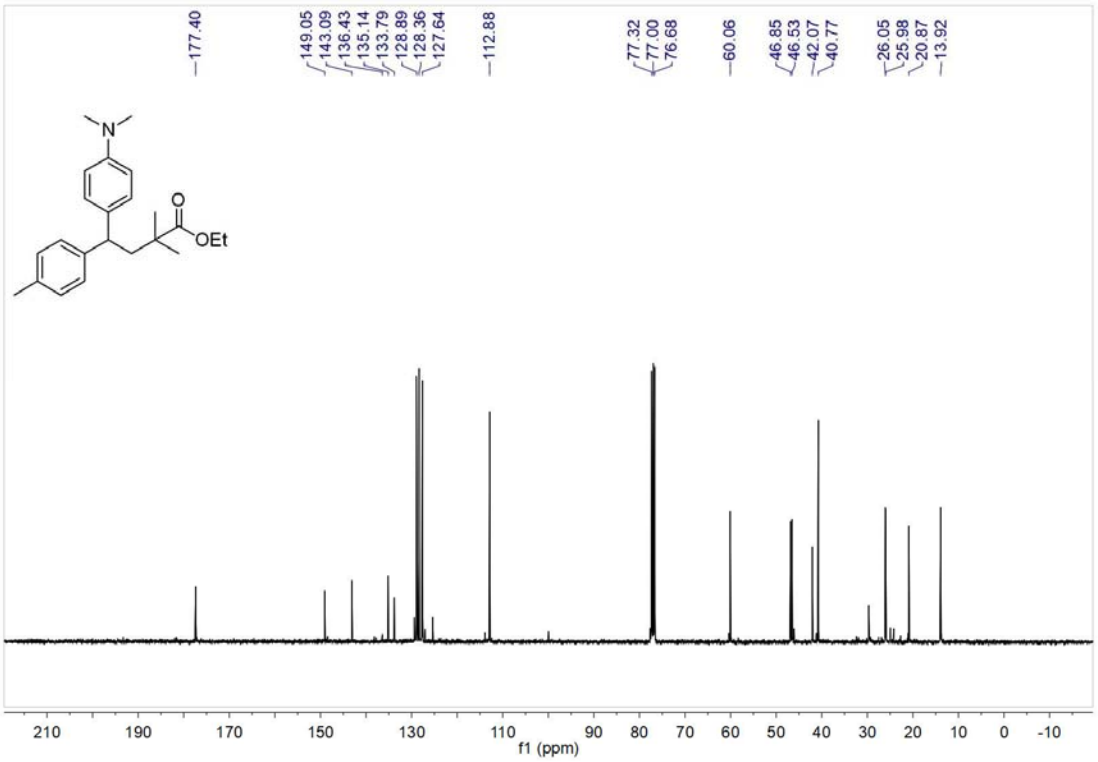
4-(4-(dimethylamino)phenyl)-4-(4-ethoxyphenyl)-2,2-dimethylbutanoate (4baa)



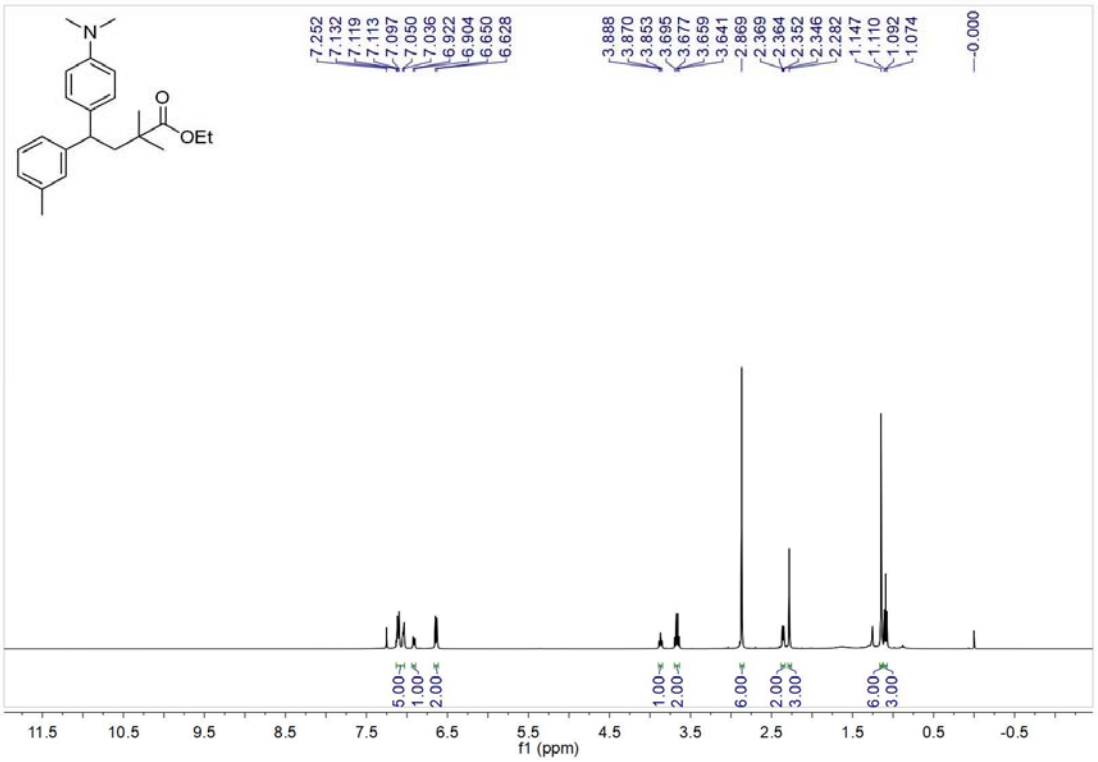


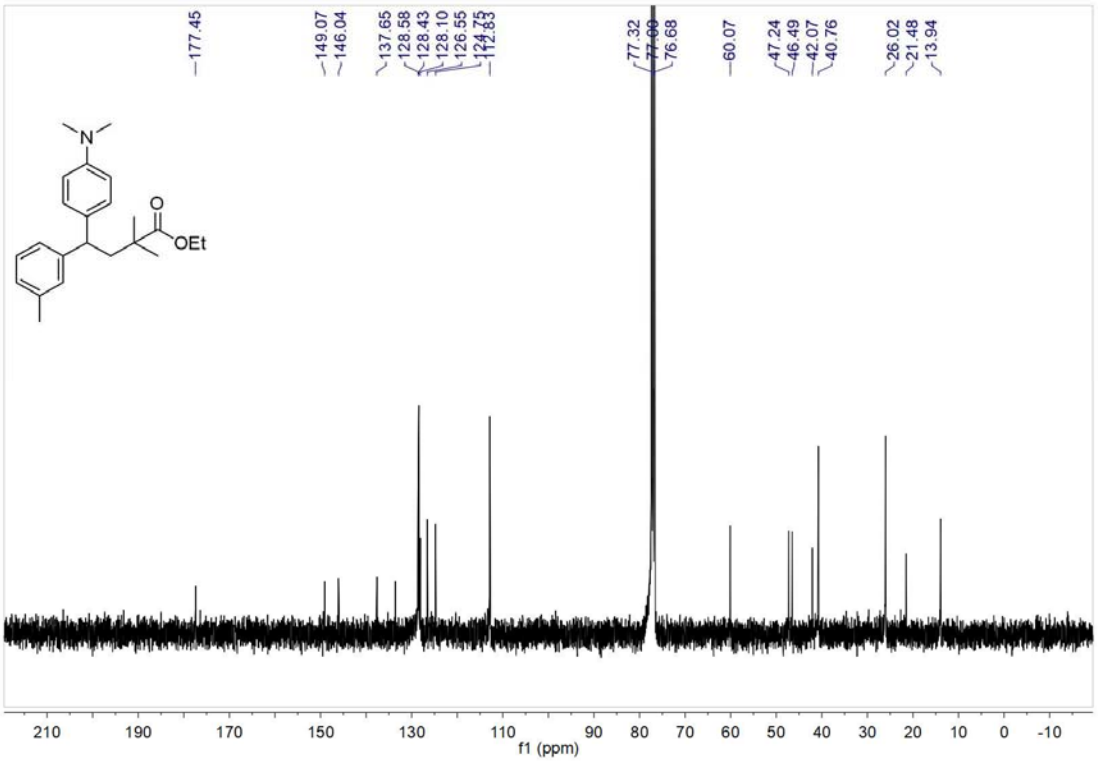
4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(*p*-tolyl)butanoate (4caa)



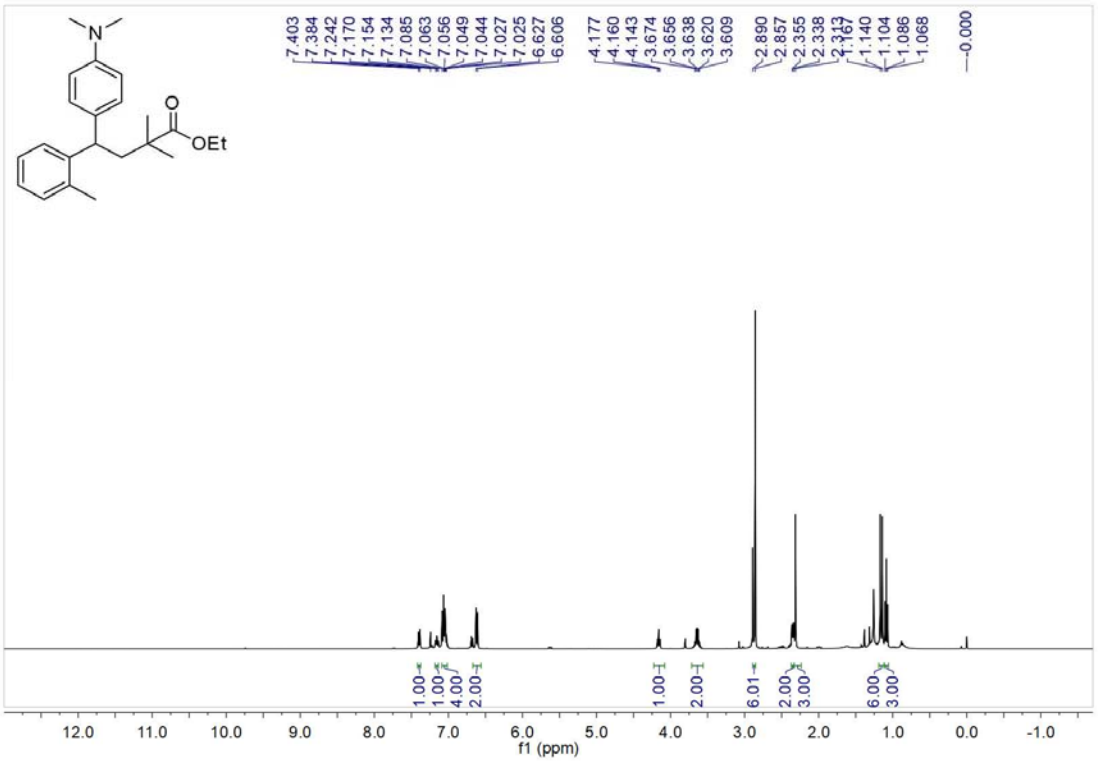


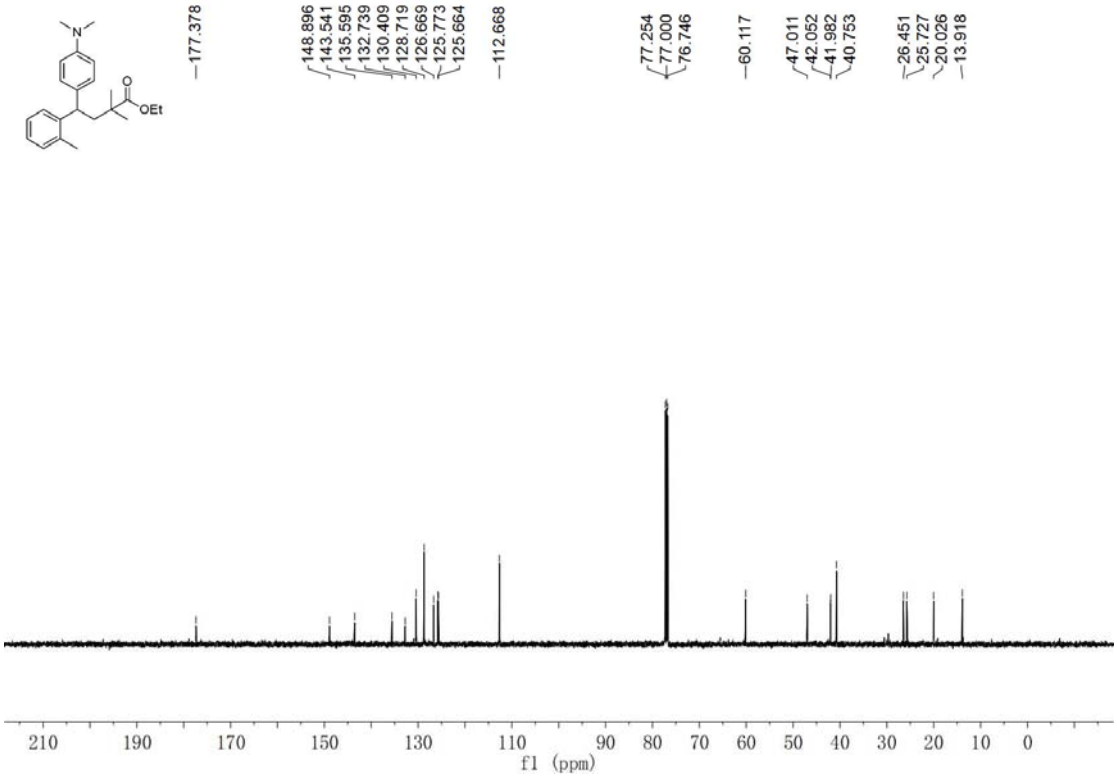
4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(*m*-tolyl)butanoate (4eaa)





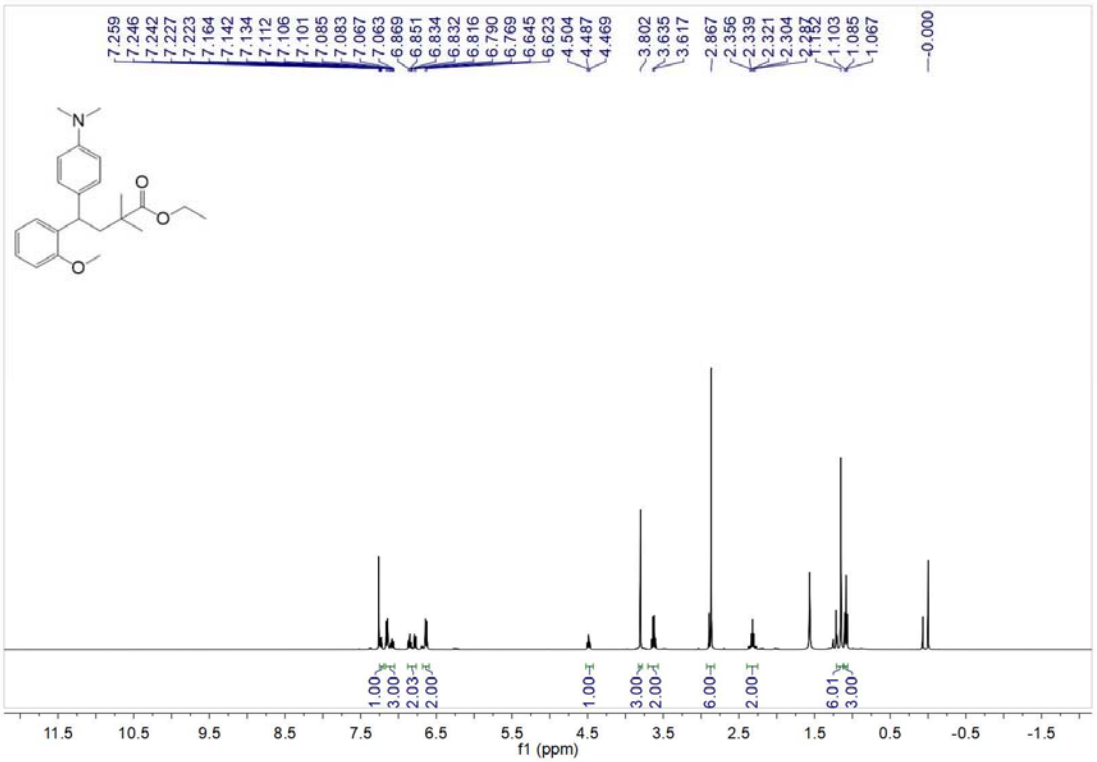
4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(*o*-tolyl)butanoate (4faa)

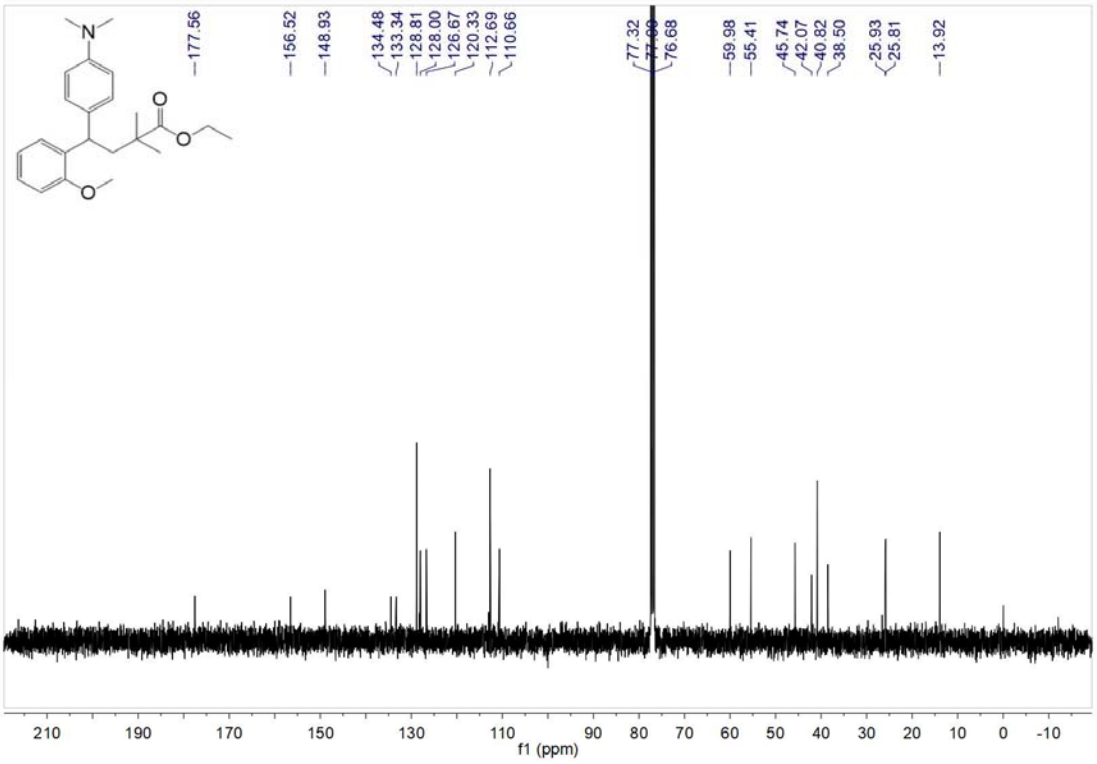




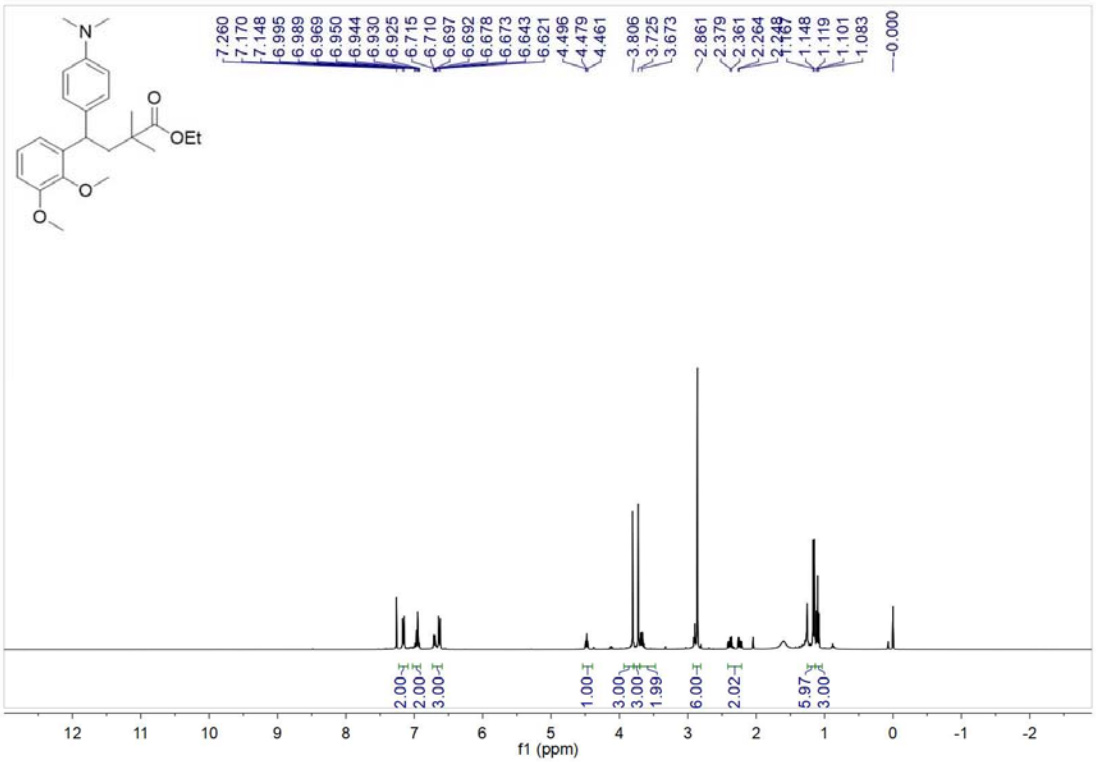
Ethyl 4-(4-(dimethylamino)phenyl)-4-(2-methoxyphenyl)-2,2-dimethylbutanoate

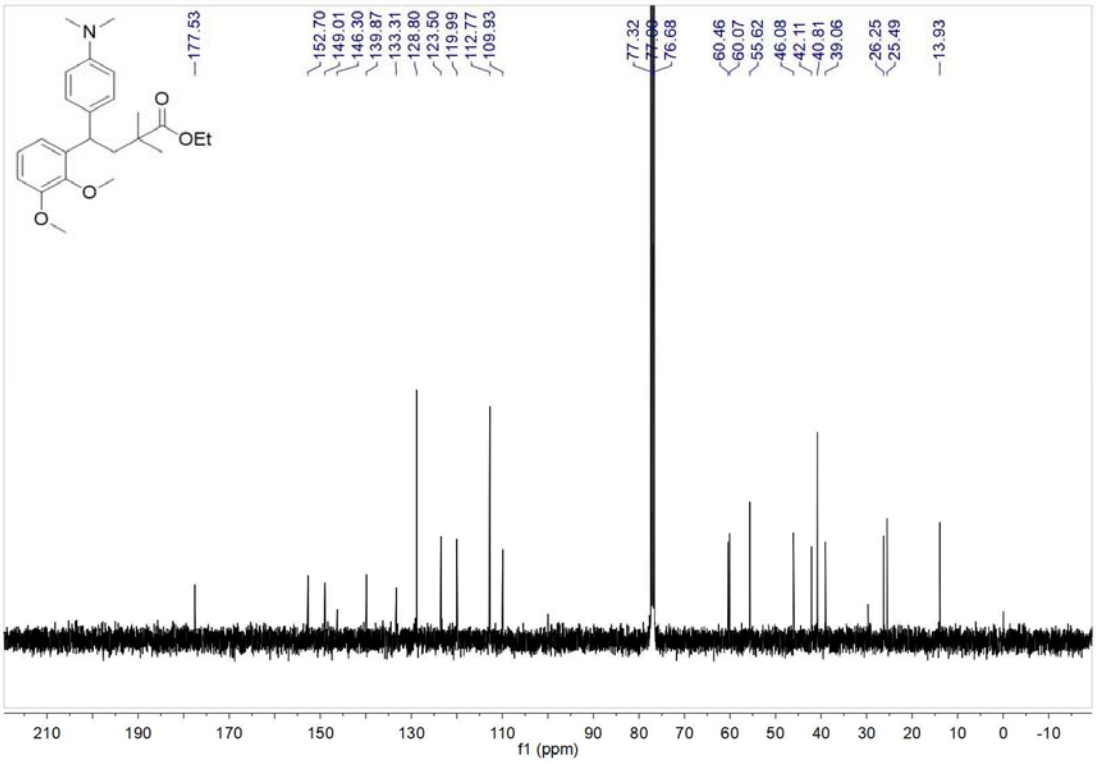
(4gaa)



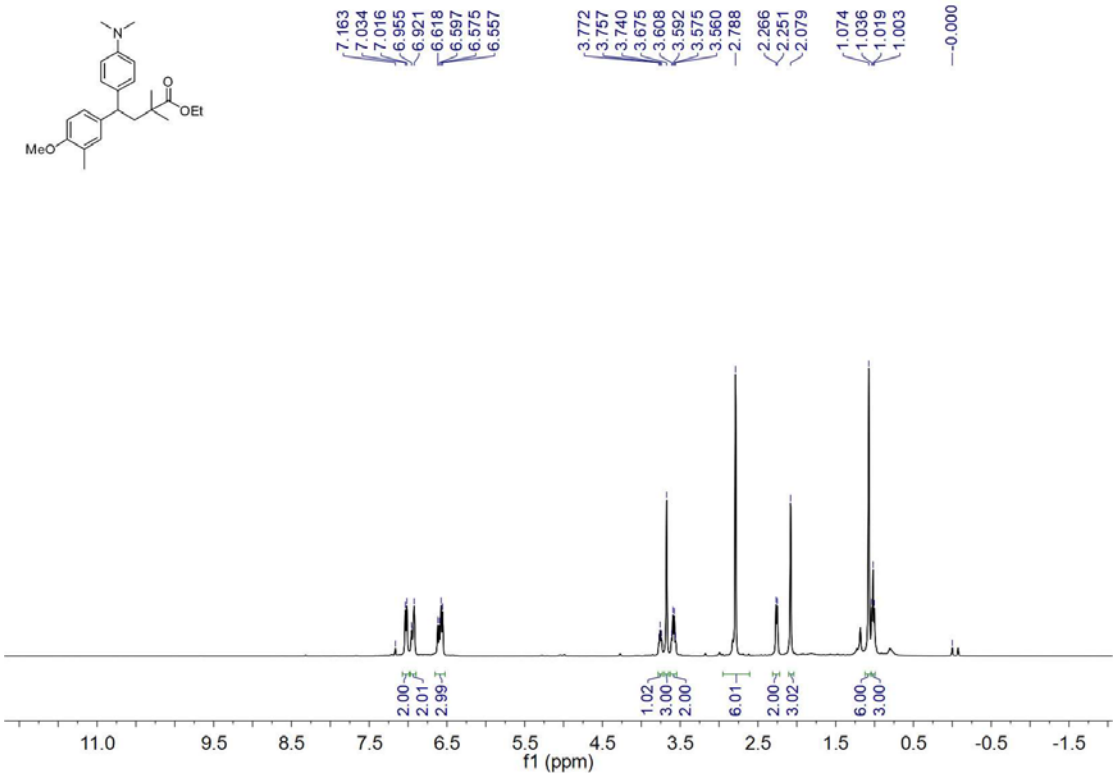


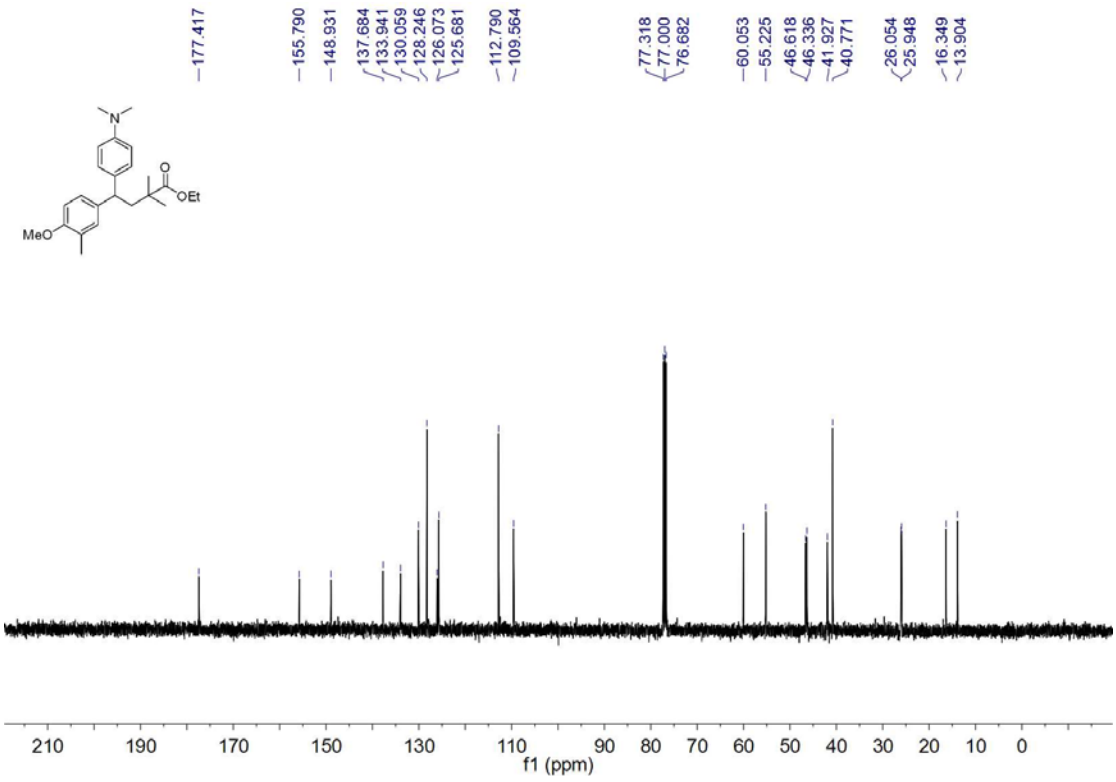
Ethyl 4-(2,3-dimethoxyphenyl)-4-(4-(dimethylamino)phenyl)-2,2-dimethyl butanoate (4haa)



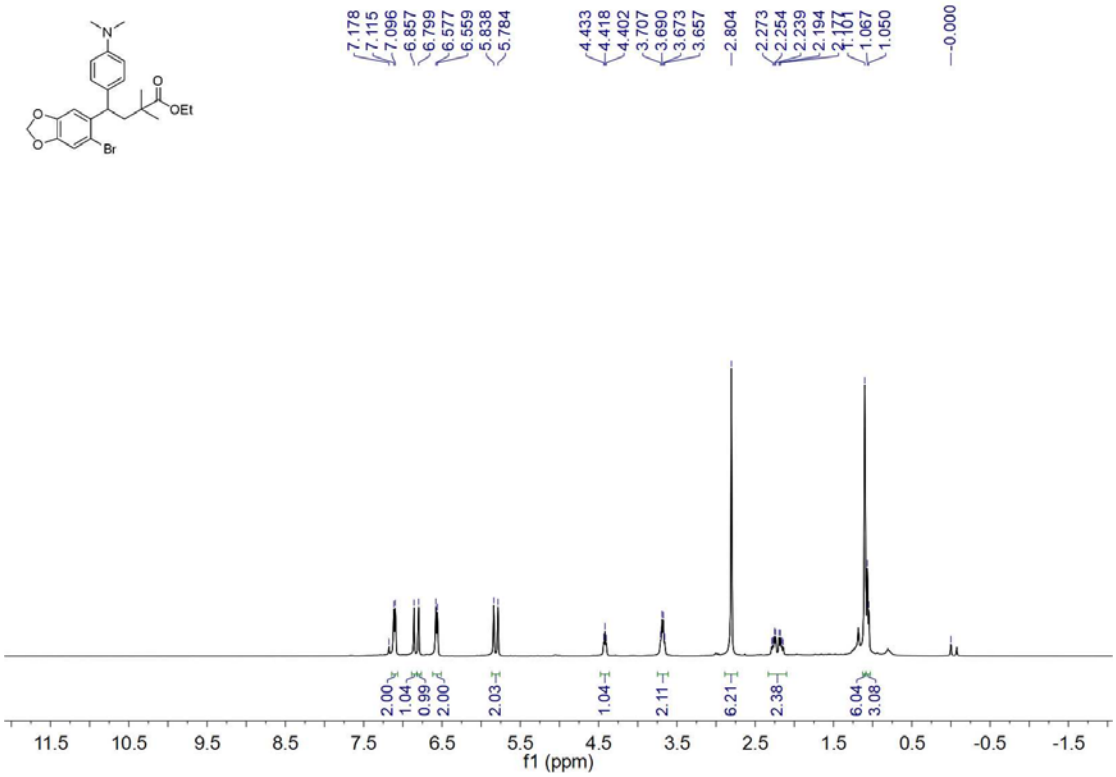


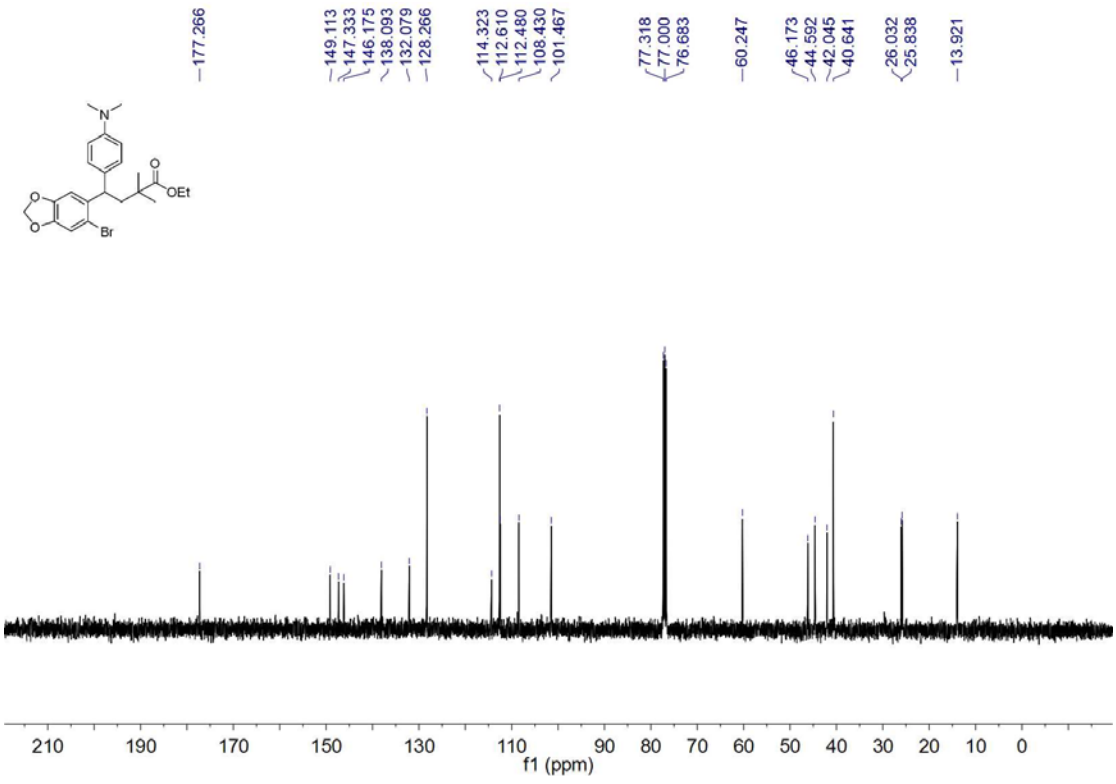
Ethyl 4-(4-(dimethylamino)phenyl)-4-(4-methoxy-3-methylphenyl)-2,2-dimethylbutanoate (4laa)



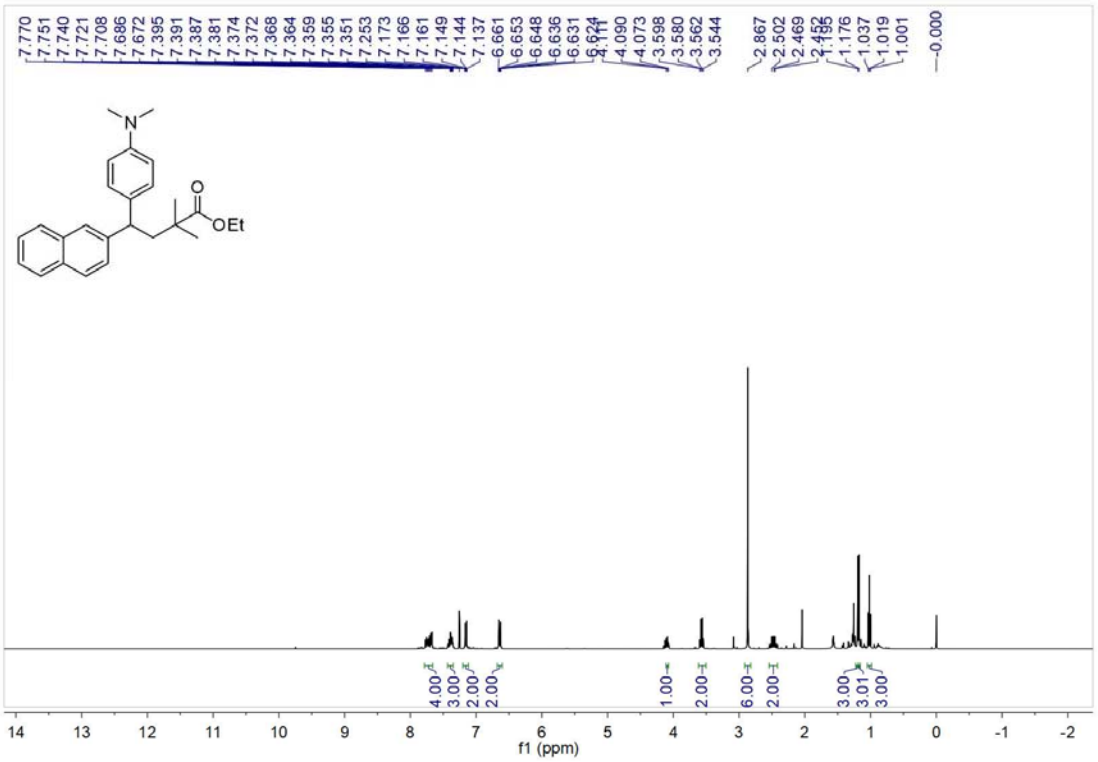


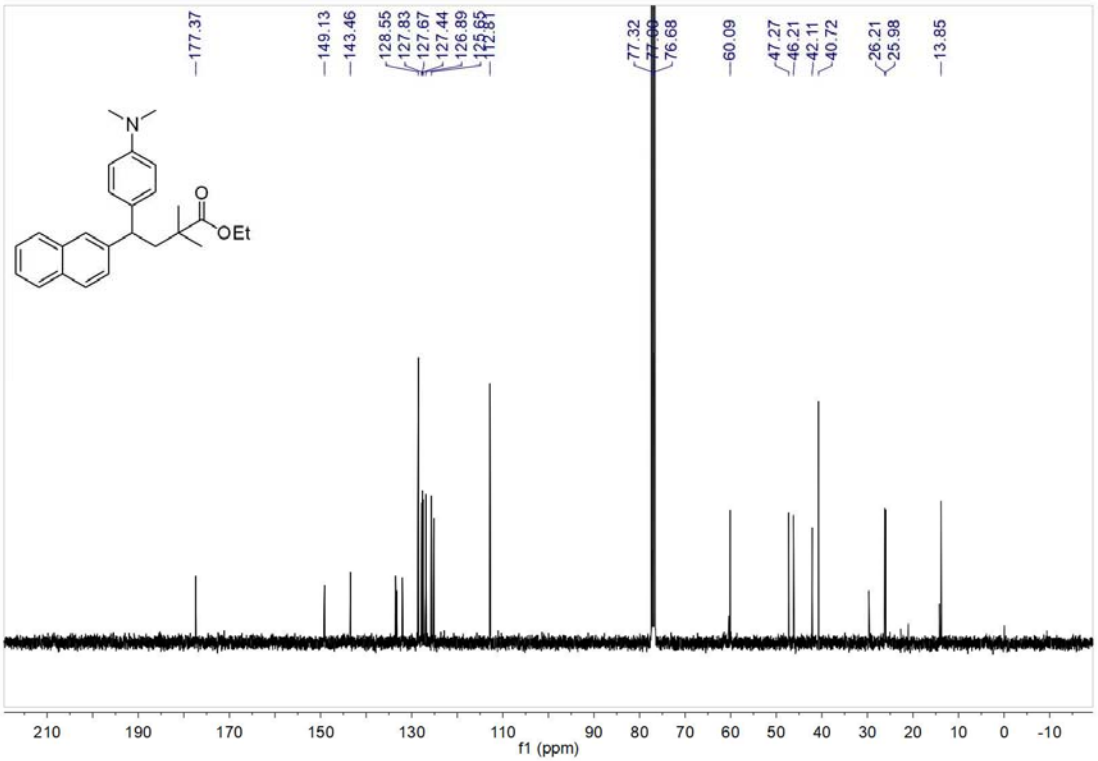
Ethyl 4-(6-bromobenzo[d][1,3]dioxol-5-yl)-4-(4-(dimethylamino)phenyl)-2,2-dimethylbutanoate (4jaa)



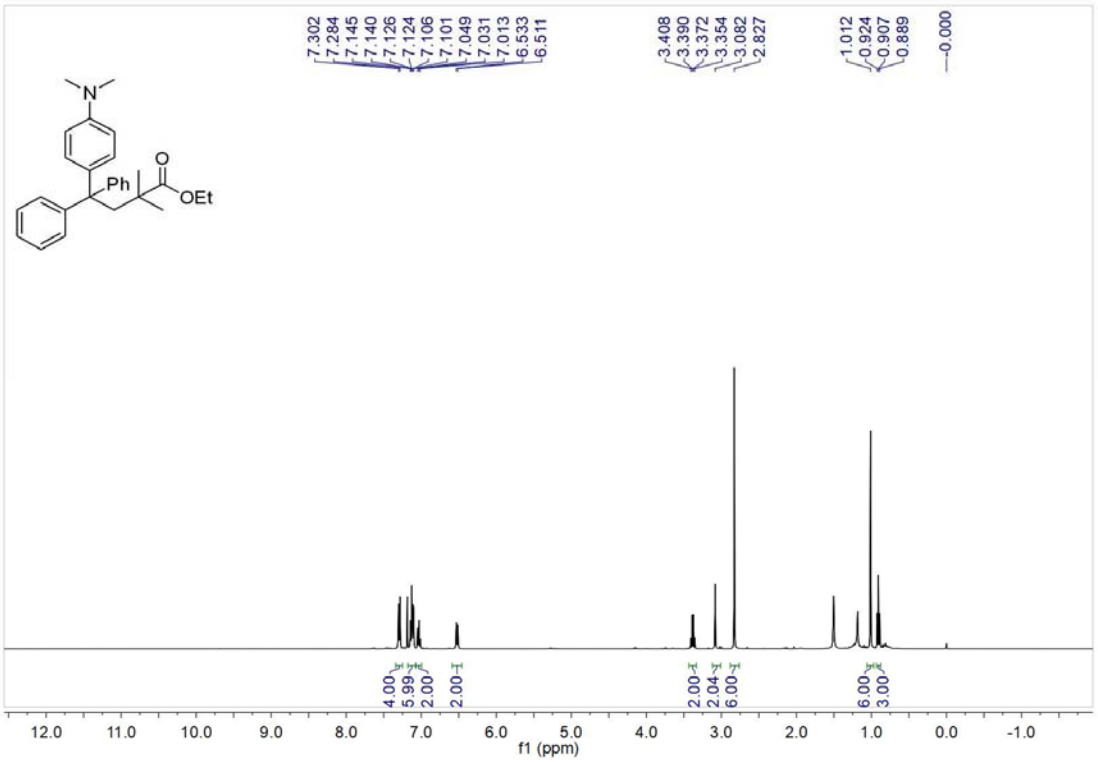


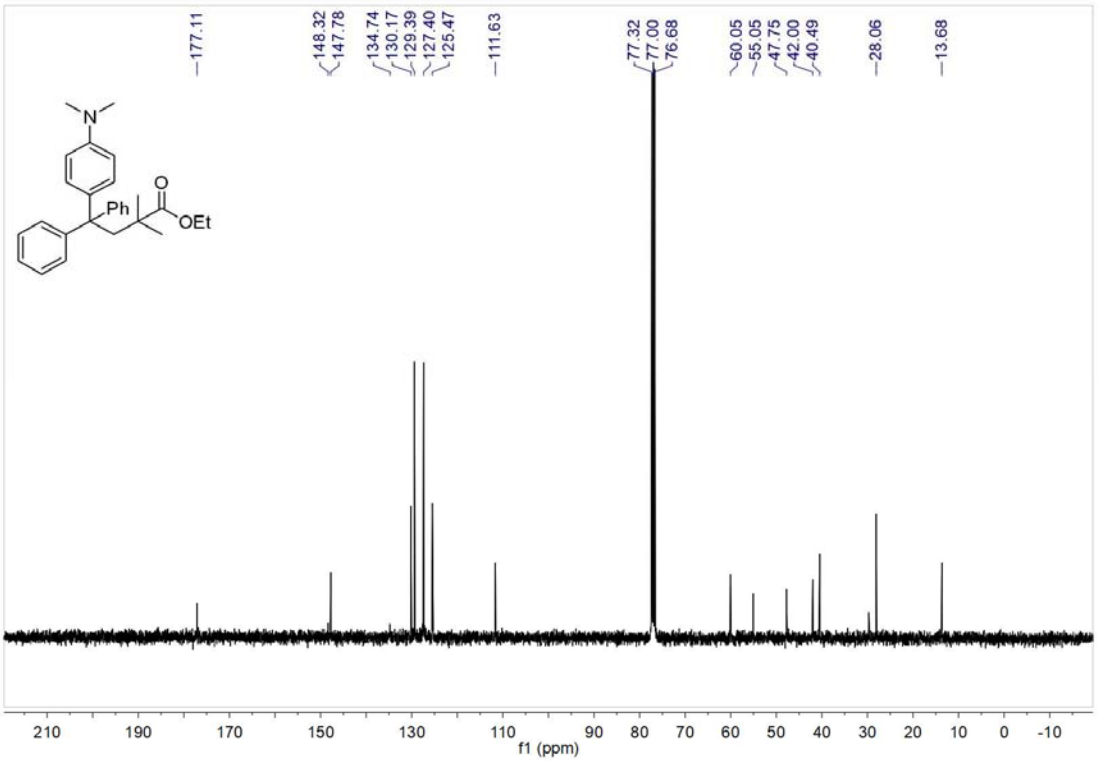
4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4-(naphthalen-2-yl)butanoate (4kaa)



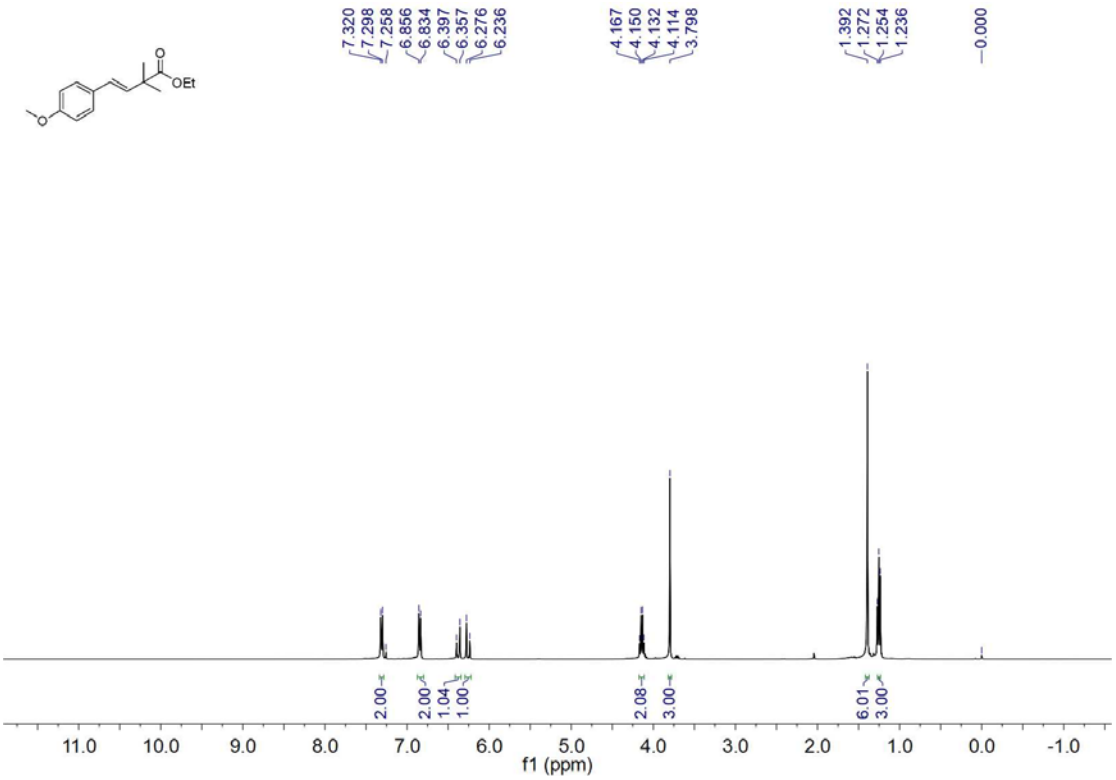


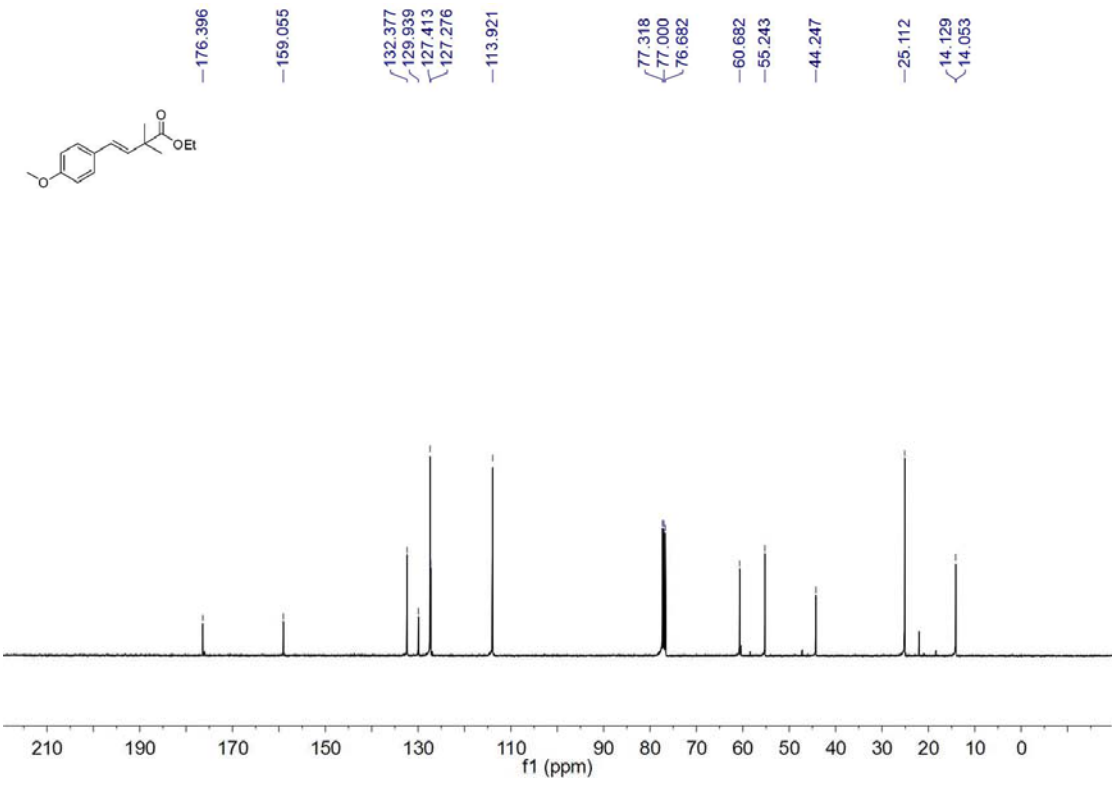
4-(4-(dimethylamino)phenyl)-2,2-dimethyl-4,4-diphenylbutanoate (4laa)





Ethyl (E)-4-(4-methoxyphenyl)-2,2-dimethylbut-3-enoate (5)





Methyl 2-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)propanoate (6)