SUPPORTING INFORMATION

Gold-catalyzed *para*-selective C-H bond alkylation of benzene derivatives with donor/acceptor-substituted diazo compounds

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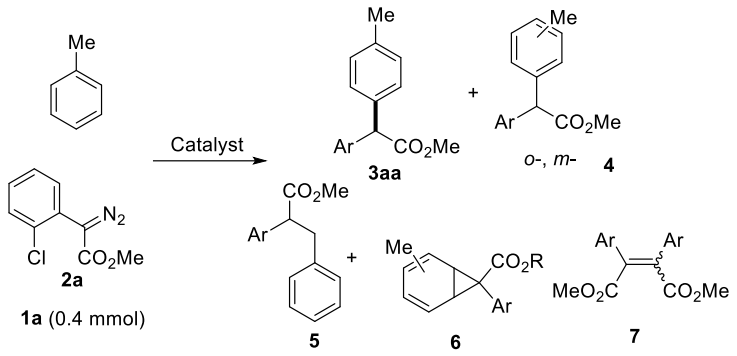
1. General Information:

Unless otherwise noted, all reactions were carried out in standard Schlenk techniques with magnetic stirring bar under air. Materials obtained from commercial suppliers were used directly without further purification. ^{1}H NMR spectra were recorded on a BRUKER 500 (500 MHz), BRUKER 400 (400 MHz) spectrometer or a Bruker 300 MHz spectrometer in $CDCl_3$. Chemical shifts are reported in ppm with tetramethylsilane (TMS: 0 ppm) with the solvent resonance as the internal standard. Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constants (Hz), and integration. ^{13}C NMR spectra were recorded on a BRUKER 500 (125 MHz), BRUKER 400 (100 MHz) spectrometer and a Bruker 300 (75.0 MHz) spectrometer in $CDCl_3$ with complete proton decoupling. Chemical shifts are reported in ppm with the deuterium solvent as the internal standard (e.g. $CDCl_3$: 77.0 ppm).

Anhydrous tetrahydrofuran (THF), toluene, dioxane, 1,2-Dimethoxyethane (DME) and diethyl ether (Et_2O) were distilled from sodium and benzophenone to use; AgOTf, $AgSbF_6$, $AgNTf_2$, $AgBF_4$, and $AgPF_6$ were purchased from Alfa-Aesar Company and used directly .

Reactions were monitored by thin layer chromatography (TLC) using silicycle pre-coated silica gel plates. Flash column chromatography was performed on silica gel 60 (particle size 200-400 mesh ASTM, purchased from Yantai, China) and eluted with hexane/ethyl acetate or hexane/ CH_2Cl_2.

2. **Table S1**. Optimization of Reaction Conditions. [a]



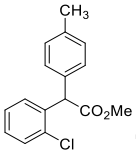
Entry	Catalyst	Condition	Time	Conv. (%)	Yield (%)[b] **3/4/5/6/7**
1	$Cu(CH_3CN)_4BF_4$	110 °C	24 h	75	0/0/0/0/70
2	$Cu(CH_3CN)_4ClO_4$	110 °C	24 h	78	0/0/0/0/75
3	$Cu(CH_3CN)_4PF_6$	110 °C	24 h	85	0/0/0/0/76
4	CuOTf	110 °C	24 h	100	0/0/0/0/86
5	$Pd(PPh_3)_4$	rt	48 h	100	0/0/0/0/(72)
6	$PPh_3Ru(SbF_6)_2$	110 °C	8 h	87	0/0/0/0/56
7	$Ir(COD)_2(SbF_6)_2$	110 °C	8 h	55	0/0/0/0/27
8	$Ni(COD)_2$	110 °C	12 h	10	-
9	$Rh(OAc)_2$	rt	5 min	100	0/0/57/0/18
10	$Fe(OTf)_2$	110 °C	3 h	100	15/4/9/43/0
11	$In(OTf)_3$	110 °C	3 h	100	36/20/12/0/23
12	$Sc(OTf)_3$	110 °C	3 h	100	36/30/17/0/16
13	$Mn(OTf)_2$	110 °C	2 h	100	0/0/0/16/74
14	$AuCl_3$	110 °C	24 h	-	-
15	$(2,4\text{-}^tBu_2C_6H_3O)_3PAuOTf$	rt	3 min	100	(44)/0/0/0/(46)
16	$(2,4\text{-}^tBu_2C_6H_3O)_3PAu(PhCN)OTf$	rt	3 min	100	(56)/0/0/0/(40)
17	IPrAuOTf	rt	5 min	100	3/0/0/0/90
18	PPh_3AuOTf	rt	3 min	100	(98)/0/0/0/1
19	JohnPhosAuOTf	rt	10 min	100	5/0/0/0/89
20	AgOTf	rt	24 h	100	0/0/0/(56)/34
21	PPh_3AuSbF_6	rt	10 min	100	(40)/0/0/0/50
22	PPh_3AuNTf_2	rt	24 h	20	(20)/0/0/0/73
23	PPh_3AuClO_4	rt	24 h	5	-
24	PPh_3AuBF_4	rt	24 h	-	-
25	PPh_3AuPF_6	rt	24 h	-	-
26[c]	PPh_3AuOTf	rt	3 min	100	(76)/0/0/0/(10)

[a] Reaction conditions: **1a** (0.4 mmol), catalyst (5 mol%) in toluene (0.5 mL) at room temperature under Ar. [b] Determined by NMR of crude products (^1H NMR spectroscopy using 1,3,5-trimethoxybenzene as internal standard.). [c] Toluene (2 equiv.) was used in DCM (1 mL). The numbers in parenthesis are isolate yields.

3. General procedure for the synthesis of 3.

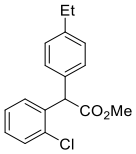
In a dried glass tube, a solution of Ph_3PAuCl (10.97 mg, 0.022 mmol, 5.5 mol%), AgOTf (5.13 mg, 5 mol%) in DCM (2 mL) was stirred at room temperature for 15 mins. After solvent was removed under reduced pressure, arenes 0.2 mL was added to the reaction mixture at room temperature. Then a solution of methyl 2-(2-chlorophenyl)-2-diazoacetate **1a** (84 mg, 0.4 mmol) dissolved in 0.8 mL arenes was introduced into the reaction mixture by a syringe in 1 mins. The resulting mixture was continually stirred at room temperature for 3 min and **1a** was consumed completely determined by TLC analysis. After being filtrated through celite and concentrated, the residue was purified by column chromatography on silica gel to afford the desired product.

1) Methyl 2-(2-chlorophenyl)-2-(p-tolyl)acetate (3aa)



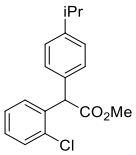
The general procedure was followed using **2a** (0.4 mmol) and use toluene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3aa** (110 mg, 98%) was obtained as a white solid, m.p. 60-61°C. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32-7.28 (m, 1H), 7.17-7.07 (m, 7H), 5.36 (s, 1H), 3.67 (s, 3H), 2.26 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 137.3, 136.7, 134.1, 133.9, 130.0, 129.5, 129.4, 128.7, 128.5, 126.9, 53.4, 52.5, 21.1; **MS** (EI): m/z (%): 274 (M^+, 20.50), 276 ($[M+2]^+$, 6.85), 215 (100); **HRMS** (EI) calculated for [$C_{16}H_{15}O_2Cl$]: 274.0761, found: 274.0764.

2) Methyl 2-(2-chlorophenyl)-2-(4-ethylphenyl)acetate (3ba)



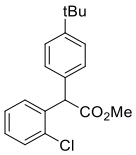
The general procedure was followed using **2a** (0.4 mmol) and use ethylbenzene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ba** (113 mg, 98%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.30-7.28 (m, 1H), 7.16-7.08 (m, 7H), 5.37 (s, 1H), 3.66 (s, 3H), 2.55 (dd, *J* = 15.2, 7.6 Hz, 2H), 1.15 (t, *J* = 7.6 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 143.5, 136.7, 134.1, 130.0, 129.5, 128.8, 128.5, 128.2, 126.9, 53.4, 52.4, 28.4, 15.3; **MS** (EI): m/z (%): 288 (M^+, 17.05), 290 ($[M+2]^+$, 5.54), 229 (100),; **HRMS** (EI) calculated for [$C_{17}H_{17}O_2Cl$]: 288.0917, found: 288.0914.

3) Methyl 2-(2-fluorophenyl)-2-(4-isopropylphenyl)acetate (3ca)



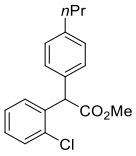
The general procedure was followed using **2a** (0.4 mmol) and cumene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ca** (111 mg, 92%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.38-7.35 (m, 1H), 7.26-7.06 (m, 7H), 5.46 (s, 1H), 3.73 (s, 3H), 2.92-2.85 (m, 1H), 1.23 (d, *J* = 6.8 Hz, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 148.1, 136.8, 134.3, 134.2, 130.1, 129.5, 128.7, 128.5, 126.9, 126.8, 53.3, 52.4, 33.7, 23.9; **MS** (EI): m/z (%): 302 (M^+, 3.22), 304 ($[M+2]^+$, 13.56), 184 (100); **HRMS** (ESI) calculated for $[C_{18}H_{19}O_2ClNa][M+Na]^+$: 325.0966, found: 325.0968.

4) Methyl 2-(4-(tert-butyl)phenyl)-2-(2-chlorophenyl)acetate (3da)



The general procedure was followed using **2a** (0.4 mmol) and *tert*-butylbenzene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3da** (96 mg, 76%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32-7.28 (m, 3H), 7.18-7.11 (m, 5H), 5.38 (s, 1H), 3.67 (s, 3H), 1.23 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.6, 150.3, 136.7, 134.1, 133.9, 130.1, 129.5, 128.5, 128.4, 126.9, 125.7, 53.2, 52.4, 34.5, 32.3; **MS** (EI): m/z (%): 316 (M^+, 20.11), 318 ($[M+2]^+$, 7.48), 257 (100); **HRMS** (EI) calculated for $[C_{19}H_{21}O_2Cl]$: 316.1227, found: 316.1230.

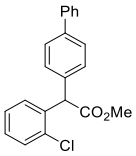
5) Methyl 2-(2-chlorophenyl)-2-(4-propylphenyl)acetate (3ea)



The general procedure was followed using **2a** (0.4 mmol) and propylbenzene (1 mL) as slovent. After purification by column chromatography (PE/EtOAc 30 :1), **3ea** (101 mg, 83%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.30-7.27 (m, 1H), 7.16-7.06 (m, 7H), 5.37 (s, 1H), 3.66 (s, 3H), 2.49 (t, *J* = 7.6 Hz, 2H), 1.60-1.49 (m, 2H), 0.86 (t, *J* = 7.6 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 142.0, 136.8, 134.2, 134.1, 130.0, 129.5, 128.8, 128.7, 128.5, 126.9, 53.4, 52.4, 37.6, 24.4, 13.9; **MS** (EI): m/z (%): 302 (M^+, 18.43), 244 (100); **HRMS** (EI)

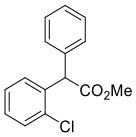
calculated for [$C_{18}H_{19}ClO_2$]: 302.1074, found: 302.1076.

6) Methyl 2-([1,1'-biphenyl]-4-yl)-2-(2-chlorophenyl)acetate (3fa)



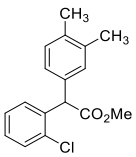
The general procedure was followed using **2a** (0.4 mmol), 1,1'-biphenyl (0.8 mmol, 124 mg, 2 equiv) and use DCM as slovent. After purification by column chromatography (PE/EtOAc 30 :1), **3fa** (97 mg, 72%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.0 Hz, 4H), 7.45-7.29 (m, 4H), 7.24-7.21 (m, 2H), 5.53 (s, 1H), 3.77 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.4, 140.5, 140.4, 136.4, 136.0, 134.2, 130.0, 129.6, 129.3, 128.8, 128.7, 127.5, 127.4, 127.1, 127.0, 53.4, 52.6; **MS** (EI): m/z (%): 336 (M^+, 16.69), 249 (100); **HRMS** (EI) calculated for [$C_{21}H_{17}ClO_2$]: 336.0917, found: 336.0915.

7) Methyl 2-(2-chlorophenyl)-2-phenylacetate (3ga)



The general procedure was followed using **2a** (0.4 mmol). After purification by column chromatography (PE/EtOAc 30 :1), **3bh** (76 mg, 73%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32-7.29 (m, 3H), 7.28-7.20 (m, 3H), 7.16-7.11 (m, 3H), 5.41 (s, 1H), 3.67 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.4, 137.0, 136.5, 134.2, 130.0, 129.6, 128.9, 128.7, 128.6, 127.5, 126.9, 53.7, 52.5; **MS** (EI): m/z (%): 260 (M^+, 15.00), 202 (100); **HRMS** (EI) calculated for [$C_{15}H_{13}ClO_2$]: 260.0604, found: 260.0603.

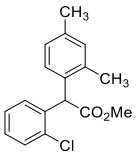
8) Methyl 2-(2-chlorophenyl)-2-(3,4-dimethylphenyl)acetate (3ha)



The general procedure was followed using **2a** (0.4 mmol) and use o-xylene (1 mL) as a solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ha** (113 mg, 98%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 2.8 Hz, 1H), 7.28-7.09 (m, 3H), 7.03 (d, *J* = 7.6 Hz, 1H), 6.97-6.92 (m, 2H), 5.33 (s, 1H), 3.65 (s, 3H), 2.16 (s, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.6, 137.0, 136.7, 136.0, 134.2, 134.1, 130.1, 130.0, 129.9, 129.4, 128.4, 126.8, 126.2, 53.4, 52.4, 19.8, 19.4; **MS** (EI): m/z (%): 288 (M^+, 21.67), 290 ([M+2]$^+$, 7.38), 229

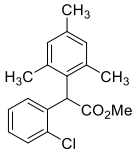
(100),; **HRMS** (EI) calculated for [$C_{17}H_{17}O_2Cl$]: 288.0915, found: 288.0917.

9) Methyl 2-(2-chlorophenyl)-2-(2,4-dimethylphenyl)acetate (3ia)



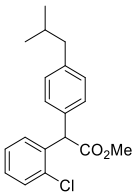
The general procedure was followed using **2a** (0.4 mmol) and use *m*-xylene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ia** (103 mg, 89%) was obtained as a white solid, m.p. 67-68 °C. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.17-7.07 (m, 2H), 6.95-6.92 (m, 4H), 5.46 (s, 1H), 3.68 (s, 3H), 2.24 (s, 3H), 2.09 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.8, 137.3, 136.5, 136.0, 134.4, 132.5, 131.7, 130.1, 129.4, 128.5, 127.9, 126.9, 126.8, 52.5, 50.8, 21.0, 19.4; **MS** (EI): m/z (%): 288 (M^+, 22.01), 290 ([M+2]$^+$, 7.45), 229 (100),; **HRMS** (EI) calculated for [$C_{17}H_{17}O_2Cl$]: 288.0917, found: 288.0918.

10) Methyl 2-(2-chlorophenyl)-2-mesitylacetate (3ja)



The general procedure was followed using **2a** (0.4 mmol) and use mesitylene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ja** (111 mg, 92%) was obtained as a white solid, m.p. 109-110 °C. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.47 (dd, *J* = 8.0 Hz, 1.6 Hz, 1H), 7.24 (ddd, *J* = 1.6 Hz, 1H), 7.15 (ddd, *J* = 1.2 Hz, 1H), 6.96 (s, 2H), 6.86 (dd, *J* = 7.6, 1.2 Hz, 1H), 5.64 (s, 1H), 3.77 (s, 3H), 2.33 (s, 3H), 2.22 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.7, 137.3, 137.1, 135.5, 134.4, 131.8, 130.0, 129.5, 129.4, 128.5, 126.8, 52.4, 49.6, 20.9, 20.6; **MS** (EI): m/z (%): 302 (M^+, 35.99), 290 ([M+2]$^+$, 11.37), 243 (100),; **HRMS** (EI) calculated for [$C_{18}H_{19}O_2Cl$]: 302.1074, found: 302.1072.

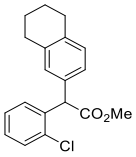
11) Methyl 2-(2-chlorophenyl)-2-(4-propylphenyl)acetate (3ka)



The general procedure was followed using **2a** (0.4 mmol) and use isobutylbenzene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3ka** (110 mg, 87%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.31-7.28 (m, 1H), 7.16-7.10 (m,

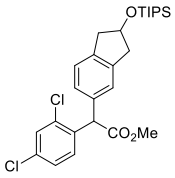
5H), 7.05-7.03 (m, 2H), 5.38 (s, 1H), 3.67 (s, 3H), 2.38 (d, *J* = 7.2 Hz, 2H), 1.90-1.69 (m, 1H), 0.82 (d, *J* = 6.4 Hz, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 141.0, 136.8, 134.2, 134.1, 130.1, 129.5, 129.4, 128.6, 128.5, 126.9, 53.4, 52.4, 45.0, 30.1, 22.4; **MS** (EI): m/z (%): 316 (M^+, 11.33), 258 (100); **HRMS** (EI) calculated for [$C_{19}H_{21}ClO_2$]: 316.1230, found: 316.1228.

12) Methyl 2-(2-chlorophenyl)-2-(5,6,7,8-tetrahydronaphthalen-2-yl)acetate (3la)



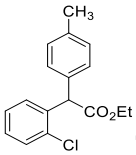
The general procedure was followed using **2a** (0.4 mmol) use 1,2,3,4-tetrahydronaphthalene (1 mL) as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3la** (110 mg, 87%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.43-7.41 (m, 1H), 7.31-7.22 (m, 3H), 7.10-7.04 (m, 3H), 5.46 (s, 1H), 3.79 (s, 3H), 2.79 (s, 4H), 1.83 (d, *J* = 1.2 Hz, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.6, 137.6, 136.8, 136.5, 134.1, 133.8, 130.1, 129.5, 129.46, 129.43, 128.41, 126.8, 125.8, 53.4, 52.4, 29.4, 29.0, 23.1, 23.0; **MS** (EI): m/z (%): 314 (M^+, 22.43), 316 ([M+2]$^+$, 7.46), 255 (100); **HRMS** (EI) calculated for [$C_{19}H_{19}O_2Cl$]: 314.1074, found: 314.1070.

13) Methyl 2-([1,1'-biphenyl]-4-yl)-2-(2-chlorophenyl)acetate (3mm)



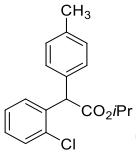
The general procedure was followed using **2g** (0.4 mmol), **1l** (1.2 mmol, 348 mg, 3 equiv) and use DCM as solvent. After purification by column chromatography (PE/EtOAc 30 :1), **3mm** (158 mg, 78%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.43 (s, 1H), 7.20-7.17 (m, 3H), 7.10-7.05 (m, 2H), 5.40 (s, 1H), 4.85-4.76 (m, 1H), 3.78 (s, 3H), 3.19 (dd, *J* = 21.2, 9.2 Hz, 2H), 2.94 (dd, *J* = 21.2, 8.0 Hz, 2H), 1.11 (m, 21H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.2, 142.2, 141.2, 141.0, 135.5, 134.7, 133.7, 131.1, 129.3, 127.2, 127.0, 126.4, 124.5, 73.9, 53.1, 52.6, 42.9, 42.6, 18.0, 12.1; **MS** (EI): m/z (%): 506 (M^+, 17.19), 334 (100); **HRMS** (EI) calculated for [$C_{27}H_{36}O_2Cl_2Si$]: 507.1811, found: 507.1813.

14) Ethyl 2-(2-chlorophenyl)-2-(p-tolyl)acetate (3ab)



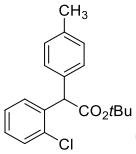
The general procedure was followed using **2b** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ab** (106 mg, 92%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29-7.27 (m, 1H), 7.13-7.08 (m, 7H), 5.33 (s, 1H), 4.12 (dd, *J* = 9.6, 7.2 Hz, 2H), 2.24 (s, 3H), 1.15 (t, *J* = 7.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.0, 137.1, 136.9, 134.2, 134.1, 130.0, 129.5, 129.4, 128.8, 128.4, 126.8, 61.3, 53.5, 21.0, 14.1; **MS** (EI): m/z (%): 288 (M^+, 21.25), 249 (100); **HRMS** (EI) calculated for [$C_{17}H_{17}O_2Cl$]: 288.0917, found: 288.0915.

15) Isopropyl 2-(2-chlorophenyl)-2-(p-tolyl)acetate (3ac)



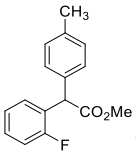
The general procedure was followed using **2c** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ac** (92 mg, 76%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29-7.26 (m, 1H), 7.14-7.05 (m, 7H), 5.29 (s, 1H), 5.04-4.98 (m, 1H), 2.24 (s, 3H), 1.13 (dd, *J* = 15.2, 6.0 Hz, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.5, 137.1, 137.0, 134.2, 130.0, 129.4, 129.3, 128.7, 128.3, 126.7, 68.7, 53.7, 21.6, 21.5, 21.0; **MS** (EI): m/z (%): 302 (M^+, 33.65), 268 (100); **HRMS** (EI) calculated for [$C_{18}H_{19}O_2Cl$]: 302.1074, found: 302.1076.

16) Tert-butyl 2-(2-chlorophenyl)-2-(p-tolyl)acetate (3ad)



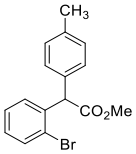
The general procedure was followed using **2d** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ad** (96 mg, 76%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29-7.26 (m, 1H), 7.10-7.05 (m, 7H), 5.23 (s, 1H), 2.25 (s, 3H), 1.36 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.2, 137.4, 136.9, 134.5, 134.2, 130.0, 129.4, 129.3, 128.8, 128.2, 126.7, 81.4, 54.5, 27.9, 21.0; **MS** (EI): m/z (%): 316(M^+, 17.21), 282 (100); **HRMS** (EI) calculated for [$C_{19}H_{21}O_2Cl$]: 316.1230, found: 316.1232.

17) Methyl 2-(2-fluorophenyl)-2-(p-tolyl)acetate (3ae)



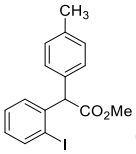
The general procedure was followed using **2e** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ae** (92 mg, 89%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.18-7.11 (m, 4H), 7.07 (d, *J* = 8.4 Hz, 2H), 7.01-6.93 (m, 2H), 5.18 (s, 1H), 3.65 (s, 3H), 2.25 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 160.4 (d, *J* = 245 Hz), 137.2, 134.0, 129.8 (d, *J* = 4 Hz), 129.4, 128.9 (d, J = 8 Hz), 128.6, 126.3 (d, *J* = 14 Hz), 124.1 (d, *J* = 4 Hz), 115.3 (d, *J* = 22 Hz), 52.4, 49.4, 21.0; **MS** (EI): m/z (%): 258 (M^+, 17.50), 199 (100); **HRMS** (EI) calculated for [$C_{16}H_{15}O_2F$]: 258.1056, found: 258.1055.

18) Methyl 2-(2-bromophenyl)-2-(p-tolyl)acetate (3af)



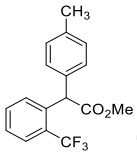
The general procedure was followed using **2f** (0.4 mmol) and toluene (1mL). After purification by column chromatography (PE/EtOAc 30 :1), **3af** (115 mg, 90%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.49 (d, *J* = 7.6 Hz, 1H), 7.17-7.15 (m, 1H), 7.11-7.01 (m, 6H), 5.37 (s, 1H), 3.66 (s, 3H), 2.25 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 138.3, 137.2, 134.1, 132.9, 130.2, 129.5, 128.8, 128.7, 127.5, 125.0, 55.9, 52.5, 21.1; **MS** (EI): m/z (%): 318 (M^+, 6.80), 320 ([M+2]$^+$, 7.18), 165 (100); **HRMS** (EI) calculated for [$C_{16}H_{15}O_2Br$]: 318.0255, found: 318.0259.

19) Methyl 2-(2-iodophenyl)-2-(p-tolyl)acetate (3ag)



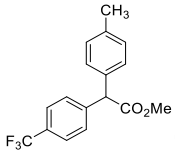
The general procedure was followed using **2g** (0.4 mmol). After purification by column chromatography (PE/EtOAc 30 :1), **3bd** (133 mg, 91%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 0.8 Hz, 1H), 7.77-7.15 (m, 2H), 7.10-7.05 (m, 4H), 6.88-6.83 (m, 1H), 5.29 (s, 1H), 3.66 (s, 3H), 2.25 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 141.4, 139.7, 137.1, 134.4, 129.7, 129.4, 128.9, 128.7, 128.3, 101.6, 60.6, 52.4, 21.0; **MS** (EI): m/z (%): 366 (M^+, 10.57), 165 (100); **HRMS** (EI) calculated for [$C_{16}H_{15}O_2I$]: 366.0117, found: 366.0115.

20) Methyl 2-(p-tolyl)-2-(2-(trifluoromethyl)phenyl)acetate (3ah)



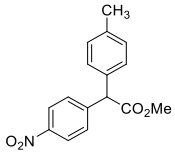
The general procedure was followed using **2h** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ah** (101 mg, 82%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.66 (d, *J* = 7.6 Hz, 1H), 7.48-7.47 (m, 2H), 7.36-7.32 (m, 1H), 7.14 (s, 4H), 5.49 (s, 1H), 3.73 (s, 3H), 2.32 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 137.2, 137.1, 135.0, 131.9, 131.5, 129.5, 128.3, 128.4 (q, *J* = 29 Hz), 127.2, 125.7 (q, *J* = 6 Hz), 124.4 (q, *J* = 272 Hz), 52.5, 51.7, 21.0; **MS** (EI): m/z (%): 308 (M^+, 16.50), 218 (100); **HRMS** (EI) calculated for [$C_{17}H_{15}O_2F_3$]: 308.1024, found: 308.1026.

21) Methyl 2-(p-tolyl)-2-(4-(trifluoromethyl)phenyl)acetate (3ai)



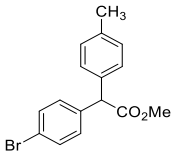
The general procedure was followed using **2i** (0.4 mmol) and 5 mol% catalyst. After purification by column chromatography (PE/EtOAc 30 :1), **3ai** (107 mg, 87%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.46 (d, *J* = 8.4 Hz, 2H), 7.33 (d, *J* = 8.4 Hz, 2H), 7.07 (dd, *J* = 19.2, 8.0 Hz, 4H), 4.94 (s, 1H), 3.63 (s, 3H), 2.21 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.4, 142.8, 137.4, 134.8, 129.4 (q, *J* = 32 Hz), 129.5, 128.9, 128.3, 125.4 (q, *J* = 4 Hz), 125.1 (q, *J* = 271 Hz), 56.3, 52.4, 20.9; **MS** (EI): m/z (%): 308 (M^+, 17.22), 249 (100); **HRMS** (EI) calculated for [$C_{17}H_{15}O_2F_3$]: 308.1024, found: 308.1023.

22) Ethyl 2-(4-nitrophenyl)-2-(p-tolyl)acetate (3aj)



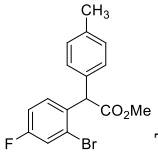
The general procedure was followed using **3j** (0.4 mmol) and 10 mol% catalyst. After purification by column chromatography (PE/EtOAc 10 :1), **3aj** (94 mg, 82%) was obtained as a yellow oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.17-8.14 (m, 2H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.17 (dd, *J* = 10.8, 8.4 Hz, 4H), 5.08 (s, 1H), 3.76 (s, 3H), 2.33 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.9, 147.1, 146.1, 137.7, 134.2, 129.6, 129.5, 128.3, 123.6, 56.2, 52.6, 21.0; **HRMS** (ESI) calculated for [$C_{16}H_{15}NO_4Na$][M+Na]$^+$: 308.0899, found: 308.0893.

23) Methyl 2-(4-bromophenyl)-2-(p-tolyl)acetate (3bi)



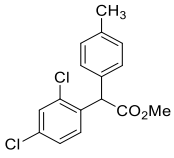
The general procedure was followed using **2k** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3ak** (57 mg, 45%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.33 (d, *J* = 8.4 Hz, 2H), 7.13-7.02 (m, 6H), 4.85 (s, 1H), 3.63 (s, 3H), 2.22 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.6, 137.8, 137.2, 135.0, 131.6, 130.2, 129.4, 128.2, 121.2, 55.9, 52.3, 21.0; **MS** (EI): m/z (%): 318 (M^+, 8.65), 320 ($[M+2]^+$, 15.1), 259 (100); **HRMS** (EI) calculated for [$C_{16}H_{15}O_2Br$]: 318.0255, found: 318.0253.

24) Methyl 2-(2-bromo-4-fluorophenyl)-2-(p-tolyl)acetate (3al)



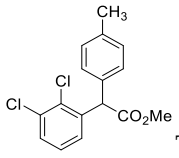
The general procedure was followed using **2l** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3al** (103 mg, 76%) was obtained as a colorless oil. **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.36 (dd, *J* = 8.5, 2.5 Hz, 1H), 7.35-7.17 (m, 5H), 7.02-6.98 (m, 1H), 5.43 (s, 1H), 3.78 (s, 3H), 2.37 (s, 3H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 172.4, 161.0 (d, *J* = 248.75 Hz), 137.4, 134.4 (d, *J* = 3.75 Hz), 134.1, 131.2 (d, *J* = 7.5 Hz), 129.6, 128.6, 124.8 (d, *J* = 8.75 Hz), 120.0 (d, *J* = 25 Hz), 114.6 (d, *J* = 21.25 Hz), 55.1, 52.5, 21.1; **^{19}F NMR** (282 MHz, $CDCl_3$) δ -113.187; **MS** (EI): m/z (%): 336 (M^+, 8.65), 338 ($[M+2]^+$, 9.00),183 (100); **HRMS** (EI) calculated for [$C_{16}H_{14}O_2FBr$]: 336.0161, found: 336.0158.

25) Methyl 2-(2,4-dichlorophenyl)-2-(p-tolyl)acetate (3am)



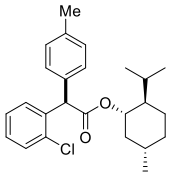
The general procedure was followed using **2m** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3am** (107 mg, 87%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 (d, *J* = 1.6 Hz, 1H), 7.26-7.13 (m, 6H), 5.37 (s, 1H), 3.75 (s, 3H), 2.34 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.1, 137.4, 135.4, 134.7, 133.6, 133.5, 130.9, 129.6, 129.2, 128.6, 127.1, 52.8, 52.5, 21.0; **MS** (EI): m/z (%): 308 (M^+, 18.95), 249 (100); **HRMS** (EI) calculated for [$C_{16}H_{14}O_2Cl_2$]: 308.0371, found: 308.0369.

26) Methyl 2-(2,3-dichlorophenyl)-2-(p-tolyl)acetate (3an)



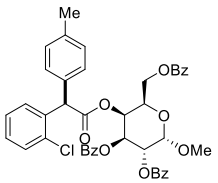
The general procedure was followed using **2n** (0.4 mmol) and toluene (1 mL). After purification by column chromatography (PE/EtOAc 30 :1), **3an** (116 mg, 94%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.37 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.35-7.08 (m, 6H), 5.45 (s, 1H), 3.75 (s, 3H), 2.34 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.1, 139.1, 137.5, 133.5, 133.2, 132.5, 129.5, 129.3, 128.7, 128.2, 127.1, 54.2, 52.5, 21.0; **MS** (EI): m/z (%): 308 (M^+, 18.95), 249 (100); **HRMS** (EI) calculated for [$C_{16}H_{14}O_2Cl_2$]: 308.0371, found: 308.0369.

27) (1S,2R,5S)-2-isopropyl-5-methylcyclohexyl (R)-2-(2-chlorophenyl)-2-(p-tolyl)acetate (3ao)



The general procedure was followed using **2o** (0.4 mmol) and toluene as solvent (2 mL). After purification by column chromatography (PE/EtOAc 30:1), **3ai** (142 mg, 89%, 1.12:1 dr) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.27-7.25 (m, 2H), 7.12-7.04 (m, 16H), 5.33 (s, 1H), 5.28 (s, 1H), 4.68-4.61 (m, 2H), 2.23 (s, 6H), 2.00-1.91 (m, 3H), 1.76-1.72 (m, 1H), 1.56-1.22 (m, 12H), 0.95-0.83 (m, 5H), 0.79 (t, *J* = 6.4 Hz, 6H), 0.73 (d, *J* = 7.2 Hz, 4H), 0.63 (t, *J* = 7.2 Hz, 6H), 0.55 (d, *J* = 6.4 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.5 (171.4), 137.1 (137.0), 134.3 (134.2), 134.1 (134.0), 129.4, 129.3, 129.2, 128.8 (128.7), 128.3 (128.2), 75.21 (75.20), 54.1 (54.0), 53.73 (53.70), 46.9 (46.8), 34.2 (34.1), 31.4 (31.3), 25.8 (25.7), 23.3 (23.2), 22.0, 21.0, 20.6 (20.5), 16.0; **HRMS** (ESI) calculated for [$C_{25}H_{32}ClO_2$][M+H]$^+$: 399.2082, found: 399.2085.

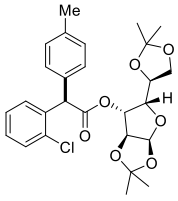
28) (2S,3R,4S,5S,6R)-6-((benzoyloxy)methyl)-5-((R)-2-(2-chlorophenyl)-2-(p-tolyl)acetoxy)-2-methoxytetrahydro-2H-pyran-3,4-diyl dibenzoate (3ap)



The general procedure was followed using **2p** (0.4 mmol) and toluene as solvent (2 mL). After purification by column chromatography (PE/EtOAc 30:1), **3ai** (267 mg, 89%, 1.78:1 dr) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.00-7.97 (m, 3H),

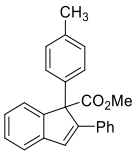
7.78-7.76 (m, 4H), 7.57-7.34 (m, 16H), 7.30-7.13 (m, 10H), 7.10-6.98 (m, 8H), 5.90-5.85 (m, 4H), 5.64-5.57 (m, 3H), 5.49 (dd, *J* = 10.0, 3.6 Hz, 1H), 5.19 (dd, *J* = 10.0, 3.6 Hz, 2H), 4.48-4.43 (m, 3H), 4.35 (dd, *J* = 10.8, 6.8 Hz, 1H), 4.11-4.05 (m, 1H), 3.94 (dd, *J* = 10.8, 6.8 Hz, 1H), 3.42 (d, *J* = 2.8 Hz, 6H), 2.29 (d, *J* = 3.2 Hz); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.23 (170.96), 165.88 (165.80), 165.72 (165.69), 137.46 (137.00), 136.12 (135.89), 134.16 (134.05), 133.60 (133.48), 133.28 (133.18), 133.03 (132.96), 130.24 (129.39), 129.85 (129.82), 129.78, 129.76 (129.67), 129.57 (129.30), 129.53 (129.49), 129.22 (129.19), 128.74 (128.60), 128.71, 128.45 (128.39), 128.24 (128.16), 126.97 (126.89), 97.53, 69.53 (69.46), 68.98 (68.89), 68.46, 66.62 (66.57), 62.07 (61.79), 55.63, 53.56 (53.17), 21.05; **HRMS** (ESI) calculated for $[C_{43}H_{37}ClNaO_{10}][M+Na]^+$: 771.1973, found: 771.1967.

29) (3aS,5S,6R,6aS)-5-((S)-2,2-dimethyl-1,3-dioxolan-4-yl)-2,2-dimethyltetrahydrofuro[2,3-d][1,3]dioxol-6-yl (R)-2-(2-chlorophenyl)-2-(p-tolyl)acetate



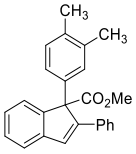
The general procedure was followed using **2q** (0.4 mmol) and toluene as solvent (1 mL). After purification by column chromatography (PE/EtOAc 30:1), **3ai** (171 mg, 85%, 1.37:1 dr) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40-7.37 (m, 2H), 7.22-7.14 (m, 16H), 5.84 (d, *J* = 3.6 Hz, 1H), 5.72 (d, *J* = 3.6 Hz, 1H), 5.42 (d, *J* = 4.4 Hz, 2H), 5.36 (d, *J* = 2.8 Hz, 2H), 4.50 (d, *J* = 3.6 Hz, 1H), 4.44 (d, *J* = 3.6 Hz, 1H), 4.20-4.17 (m, 2H), 3.98-3.80 (m, 7H), 2.25 (s, 3H), 2.34 (s, 4H), 1.50 (d, *J* = 2.0 Hz, 7H), 1.38 (d, *J* = 8.0 Hz, 7H), 1.29 (m, 10H), 1.18 (s, 4H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.6 (170.5), 137.44 (137.39), 136.36 (136.35), 134.1 (134.0), 133.4 (133.2), 130.1(130.0), 129.5 (128.8), 129.5 (128.8), 129.4 (128.7), 127.0 (126.9), 112.4, 109.2 (109.1), 105.1 (105.0), 83.1 (82.9), 80.0, 76.6 (76.5), 72.1 (72.0), 67.2 (66.9), 53.7 (53.6), 26.7 (26.6), 26.2, 25.1 (24.9), 21.0; **MS** (EI): m/z (%): 502 (M^+, 39.41), 249 (100); **HRMS** (EI) calculated for $[C_{27}H_{31}ClO_7]$: 502.1758, found: 502.1756.

30) Methyl 2-phenyl-1-(p-tolyl)-1H-indene-1-carboxylate (9a)



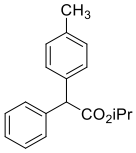
The general procedure was followed using **8** (0.4 mmol) and 10 mol% catalyst was used. After purification by column chromatography (PE/EtOAc 10 :1), **3aa** (98.0 mg, 72%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ7.47-7.41 (m, 5H), 7.33-7.17 (m, 7H), 7.05 (d, *J* = 6.8 Hz, 2H), 3.64 (s, 3H), 2.30 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ172.4, 150.3, 149.1, 142.7, 136.8, 135.5, 134.3, 129.5, 129.1, 128.2, 127.9, 127.6, 127.4, 127.2, 126.3, 123.9, 121.5, 68.5, 52.6, 21.0; **MS** (EI): m/z (%): 340 (M^+, 12.66), 282 (100); **HRMS** (EI) calculated for [$C_{24}H_{20}O_2$]: 340.1463, found: 340.1466.

31) Methyl 1-(3, 4-dimethylphenyl)-2-phenyl-1H-indene-1-carboxylate) (9h)



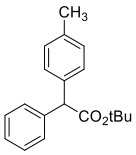
The general procedure was followed using **8** (0.4 mmol) and 10 mol% catalyst was used. After purification by column chromatography (PE/EtOAc 10:1), **3ai** (84.7 mg, 60%) was obtained as a white solid, m.p. 99-100 ºC. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.44-7.36 (m, 5H), 7.27-7.06 (m, 7H), 6.96 (d, *J* = 7.6 Hz, 1H), 3.58 (d, *J* = 2.8 Hz, 3H), 2.14 (d, *J* = 4.8 Hz, 6H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.4, 150.2, 149.2, 142.6, 136.4, 135.8, 135.5, 134.4, 129.6, 129.5, 128.5, 128.1, 127.8, 127.5, 127.2, 126.2, 124.9, 123.9, 121.4, 68.6, 52.6, 20.0, 19.3; **MS** (EI): m/z (%): 354 (M^+, 39.49), 295 (100); **HRMS** (EI) calculated for [$C_{25}H_{22}O_2$]: 354.1620, found: 354.1616.

32) Isopropyl 2-phenyl-2-(p-tolyl)acetate



The general procedure was followed using **1a** (0.4 mmol). After purification by column chromatography (PE/EtOAc 30 :1), **3al** (32 mg, 30%) was obtained as a colorless oil. **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.37 (t, *J* = 3.5 Hz, 4H), 7.32-7.26 (m, 3H), 7.19 (d, J = 7.0 Hz, 2H), 5.15 (m, 1H), 5.01 (s, 1H), 2.38 (s, 3H), 1.29 (d, *J* = 6.0 Hz, 6H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 172.1, 139.1, 136.7, 135.9, 129.2, 128.5, 128.42, 128.40, 127.0, 68.4, 56.9, 21.6, 21.0; **MS** (EI): m/z (%): 268 (M^+, 5.88), 181 (100); **HRMS** (EI) calculated for [$C_{18}H_{20}O_2$]: 268.1463, found: 268.1460.

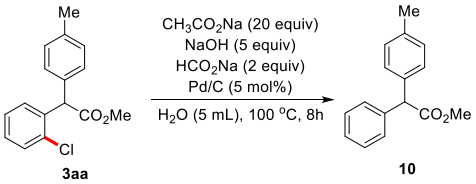
33) Tert-butyl 2-phenyl-2-(p-tolyl)acetate



The general procedure was followed using **2m** (0.4 mmol). After purification by column chromatography (PE/EtOAc 30 :1), **3am** (48 mg, 43%) was obtained as a colorless oil. **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.37-7.35 (m, 4H), 7.32-7.26 (m, 3H), 7.18 (d, *J* = 8.0 Hz, 2H), 4.95 (s, 1H), 2.38 (s, 3H), 1.51 (s, 9H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 171.8, 139.4, 136.5, 136.2, 129.1, 128.5, 128.4, 128.3, 126.8, 81.1, 57.6, 27.9, 21.0; **MS** (EI): m/z (%): 282 (M^+, 0.67), 181 (100); **HRMS** (ESI) calculated for $[C_{19}H_{22}O_2Na][M+Na]^+$: 305.1512, found: 305.1522.

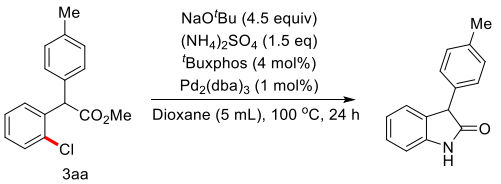
4. Synthetic Application

1) Methyl 2-phenyl-2-(p-tolyl)acetate (10) [1]



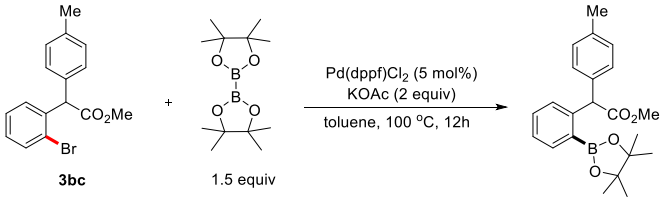
In a Schlenk tube, CH_3CO_2Na (1.7 g, 20 mmol) was firstly dissolved in water (5 ml) at 100 °C in an oil bath equipped with magnetic stirring and reflux concentration. Then, HCO_2Na (136 mg, 2 mmol), sodium hydroxide (200 mg, 5 mmol), Pd/C (5 wt%, 10 mg), and **3aa** (1 mmol, 274 mg) were added in the salts solutions. After the reaction was completed, filtered, extraction with additional CH_2Cl_2, and evaporated in vacuo, purified by column chromatography on silica gel to give the desired product as a colorless oil (182 mg, 76%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.35-7.17 (m, 9H), 5.05 (s, 1H), 3.78 (s, 3H), 2.36 (s, 3H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 173.1, 138.8, 137.0, 135.6, 129.3, 128.6, 128.5, 128.4, 127.2, 56.6, 52.3, 21.0; **MS** (EI): m/z (%): 240 (M^+, 17.01), 181 (100); **HRMS** (EI) calculated for $[C_{16}H_{16}O_2]$: 240.1150, found: 240.1154.

2) 3-(*p*-Tolyl)indolin-2-one (11) [2]



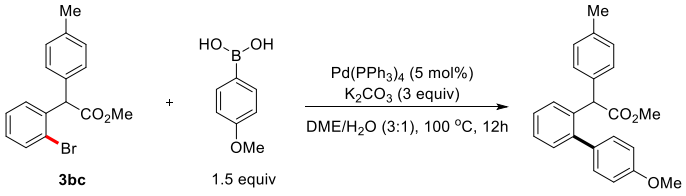
In a dried seal tube, **3aa** (274 mg, 1 mmol), NaO^{t}Bu (432 mg, 4.5 mmol, 4.5 equiv), $(NH_4)_2SO_4$ (198 mg, 1.5 mmol, 1.5 equiv), ^{t}BuXphos (16.98 mg, 0.04 mmol) and $Pd_2(dba)_3$ (10.4 mg, 0.01 mmol) dissolved in dried 1,4-dioxane (5 mL), the resulting mixture was heated to 100 ^{o}C for 24 h. After cooling, filtered, evaporated the solvent in vacuo. The residue was purified by column chromatography on silica gel (PE/EA = 5:1) to give the desired product as a white solid (174 mg, 78%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 9.40 (br, 1H), 7.22-7.08 (m, 6H), 7.02-6.98 (m, 1H), 6.90 (d, *J* = 3.6 Hz, 2H), 4.59 (s, 1H), 2.32 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 179.5, 141.7, 137.3, 133.4, 129.8, 129.6, 128.3, 125.1, 122.6, 110.1, 52.4, 21.0; **MS** (EI): m/z (%): 223 (M^+, 29.36), 194 (100).

3) Methyl 2-(2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl)-2-(p-tolyl)acetate (12) [3]



In a dried Schlenk tube, to a solution of **3bc** (318 mg, 1 mmol), $Pd(dppf)Cl_2$ (40.8 mg, 5 mol%), bis(pinacolato)diboron (381 mg, 1.5 mmol, 1.5 equiv) in toluene (5 mL) was added KOAc (196 mg, 2 mmol, 2 equiv) at 100 ^{o}C and the reaction maintained 12 hours, filtered. The combined organic layer was washed with brine, dried over Na_2SO_4 and concentrated under reduced pressure. The residue was purified by silica chromatography (PE/EtOAc 20:1), **9a** (264 mg, 72%) was obtained as a colorless oil. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 7.2 Hz, 1H), 7.38-7.34 (m, 1H), 7.27-7.16 (m, 4H), 7.10 (d, *J* = 8.0 Hz, 2H), 6.00 (s, 1H), 3.69 (s, 3H), 2.30 (s, 3H), 1.30 (d, *J* = 2.4 Hz, 12H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 170.4, 145.0, 136.6, 136.3, 136.2, 131.0, 129.0, 128.3, 128.8, 126.2, 83.7, 54.3, 51.9, 24.8, 21.0; **MS** (EI): m/z (%): 334 (M^+, 33.46), 252 (100); **HRMS** (EI) calculated for [$C_{22}H_{27}BO_4$]: 366.2002, found: 366.1998.

4) Methyl 2-(4'-methoxy-[1,1'-biphenyl]-2-yl)-2-(p-tolyl)acetate (13) [4]



3bc (318 mg, 1.0 mmol) and $Pd(PPh_3)_4$ (57 mg, 0.05 mmol) were dissolved in DME (5 mL; dimethoxyethane) in a dried 25 mL Schlenk tube. K_2CO_3 (413 mg, 3.0 mmol, 3.0 equiv) in distilled water (3 mL) was added to the stirred solution. After 5 min, the corresponding boronic acid (1.5 mmol, 1.5 equiv) in 5 mL of DME was added, and the resulting mixture was heated to 100 °C for 12 h. After cooling, DME was partially evaporated under reduced pressure and the mixture was poured into water followed by an extraction with additional CH_2Cl_2 (20 mL). The combined organic layers were dried over $MgSO_4$, filtered, evaporated in vacuo, and the residue was purified by column chromatography on silica gel to give the desired product as a colorless oil (332 mg, 96%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.38 (d, *J* = 1.2 Hz, 1H), 7.36-7.11 (m, 3H), 7.04 (d, *J* = 8.4 Hz, 2H), 6.96 (d, *J* = 8.0 Hz, 2H), 6.90 (d, *J* = 8.0 Hz, 2H), 6.81 (d, *J* = 8.4 Hz, 2H), 5.07 (s, 1H), 3.71 (s, 3H), 3.52 (s, 3H), 2.18 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 173.5, 158.8, 142.0, 136.5, 136.3, 136.0, 133.3, 130.4, 129.1, 128.7, 128.4, 127.3, 126.9, 113.5, 55.1, 52.8, 52.0, 20.9; **MS** (EI): m/z (%): 346 (M^+, 33.46), 195 (100); **HRMS** (EI) calculated for [$C_{23}H_{22}O_3$]: 346.1569, found: 346.1572.

5 Reference

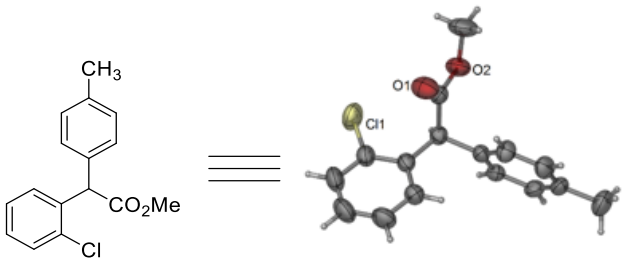
[1] Z. Xue, X. Zhao, J. Wang, T. Mu. *RSC Adv.*, 2016, **6**, 102193;

[2] C. W. Cheung, D.S. Surry, S. L. Buchwald, *Org. Lett*., 2013, **15**, 3734;

[3] L. Wang, J. Li, X. Cui, Y. Wu, Z. Zhu, Y. Wu, *Adv. Synth. Catal.*, 2010, **352**, 2002;

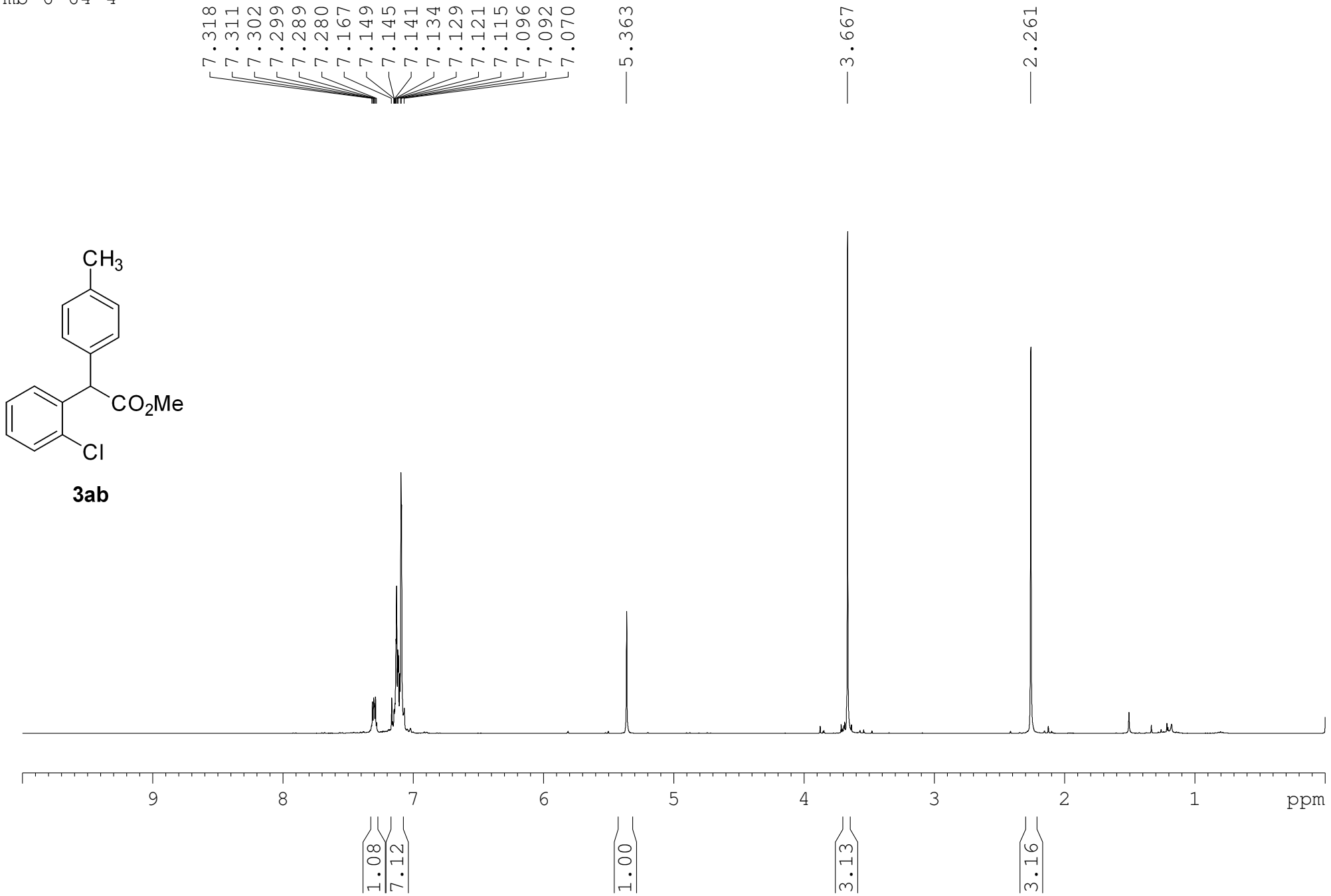
[4] J. Kim, Y. Ohk, S. H. Park, Y. Jung, S. Chang. *Chem. Asian J*. 2011, **6**, 2040.

6 X-ray crystal structure of 3aa



7 NMR spectra of new compounds

mb-6-64-4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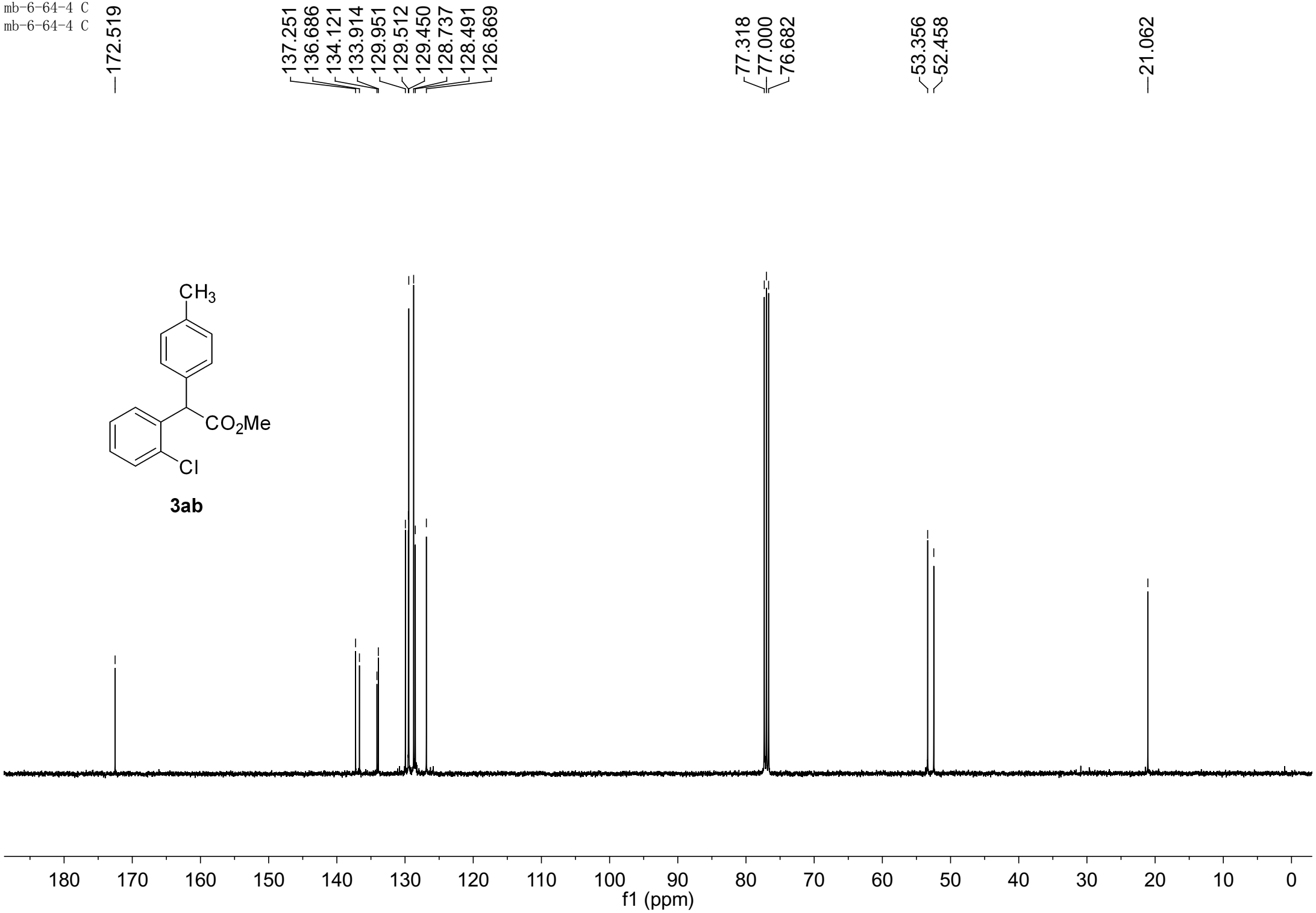

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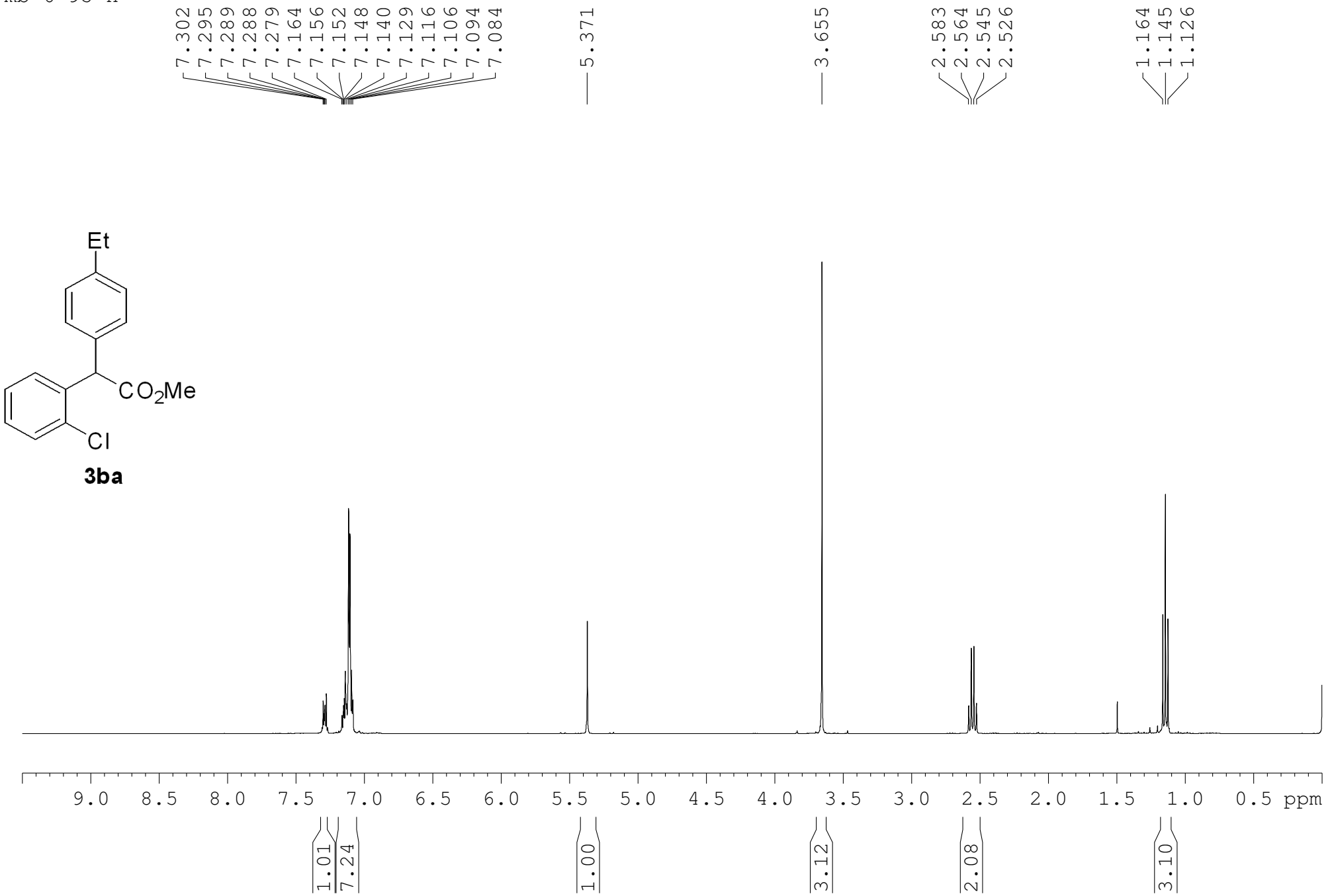
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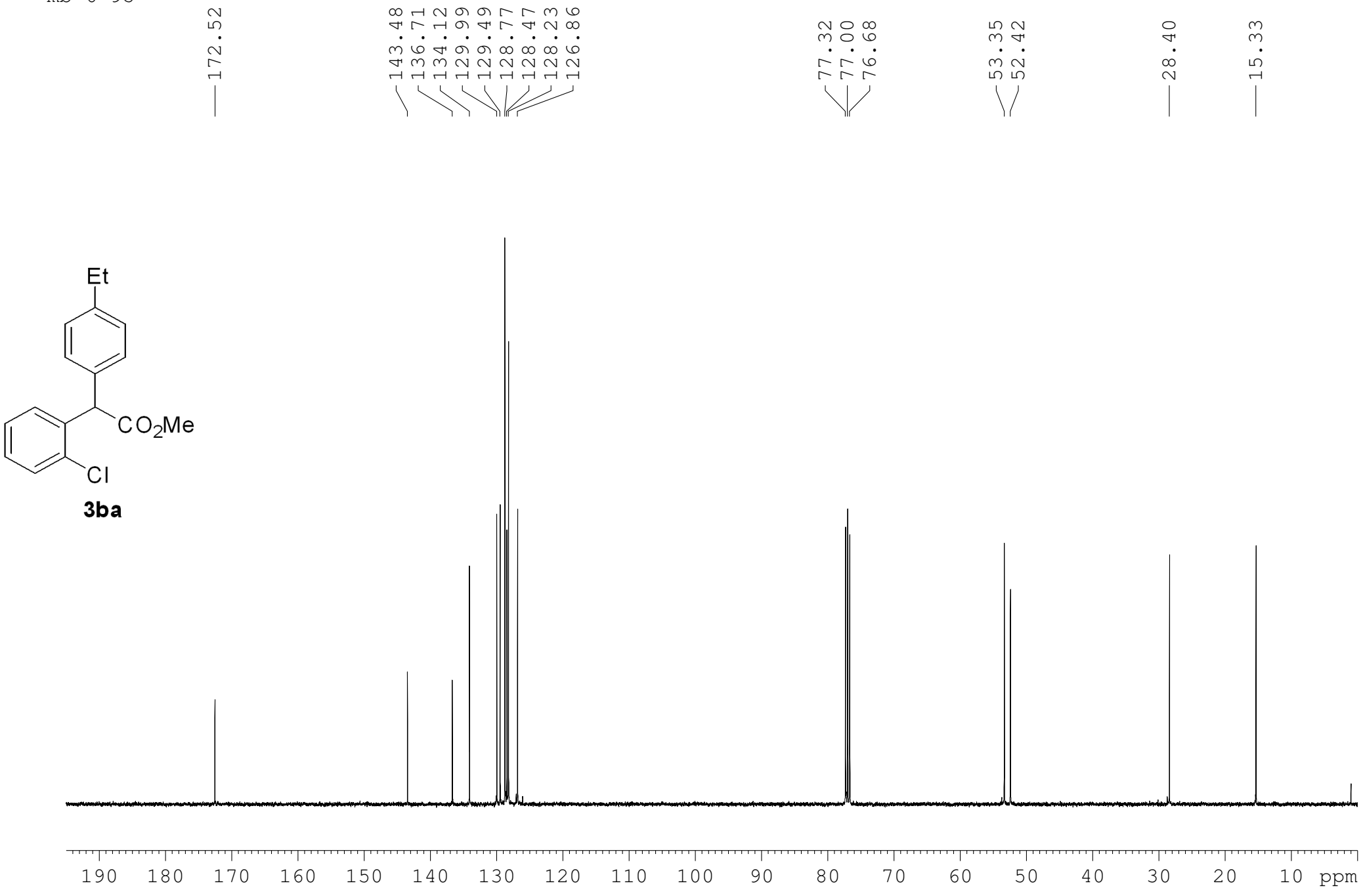
mb-6-95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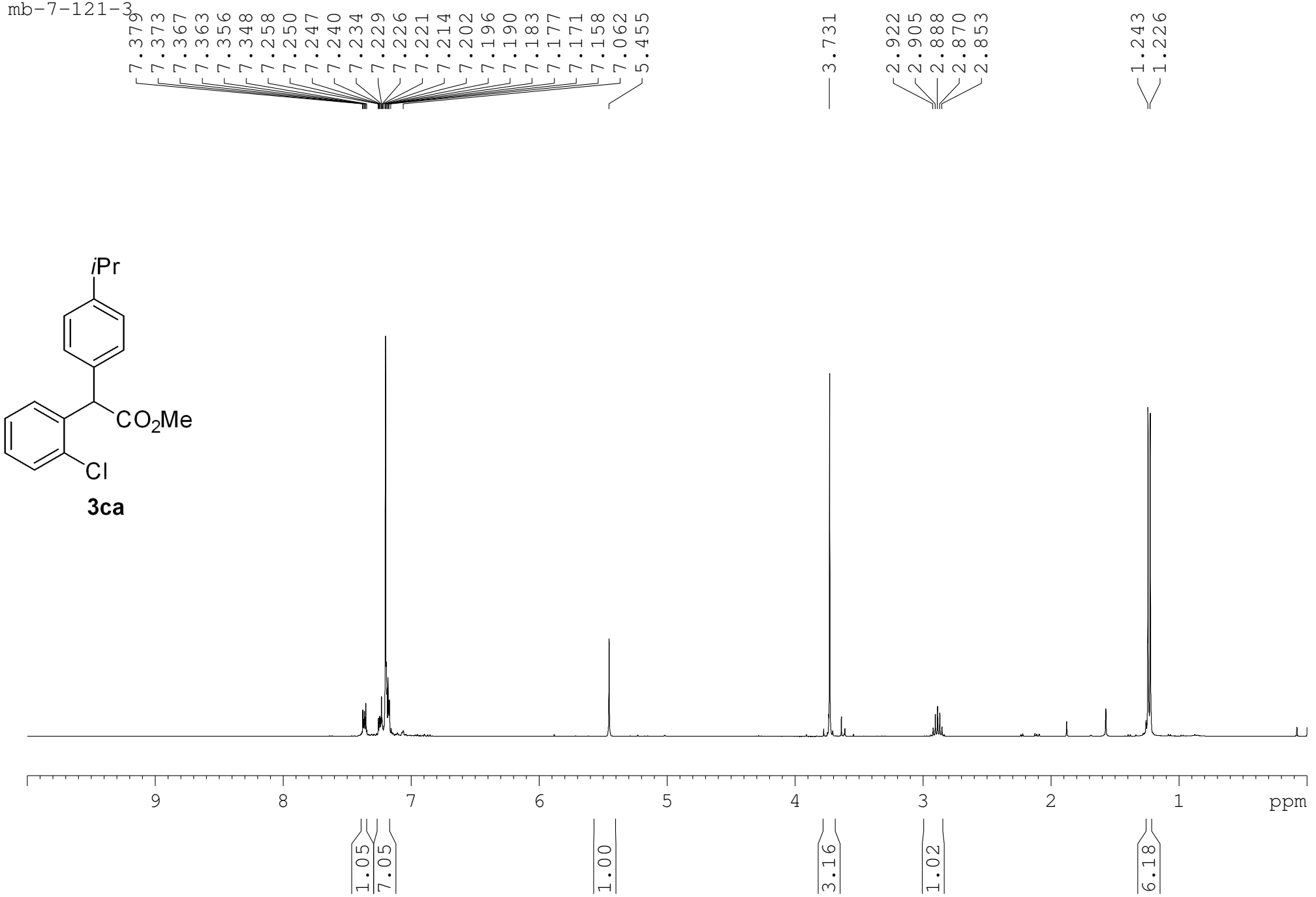
mb-7-121-3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mb-7-121-3

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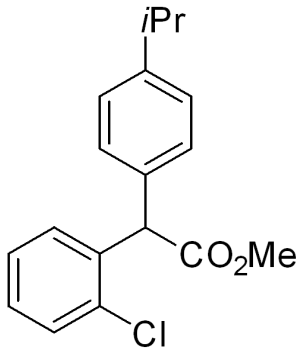

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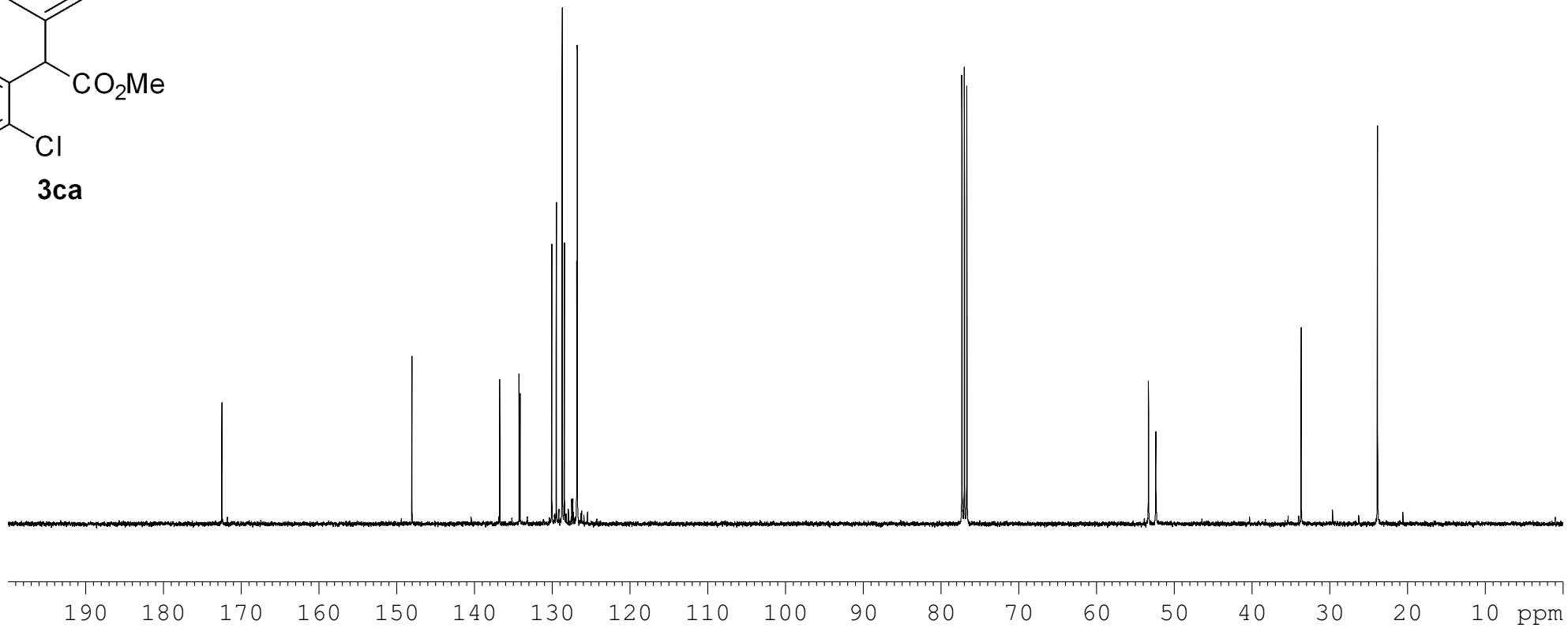
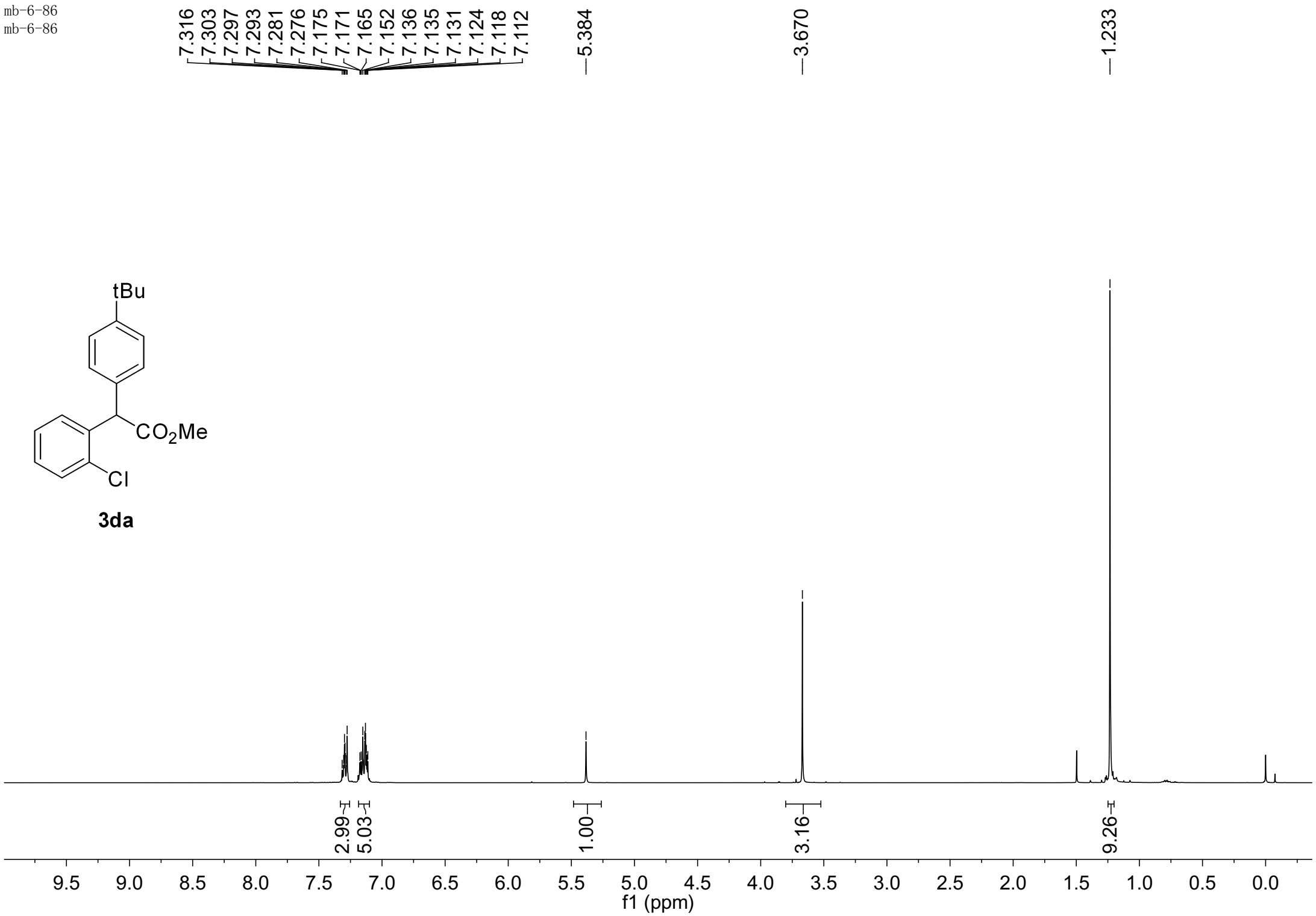


mb-6-86
mb-6-86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mb-6-86-c
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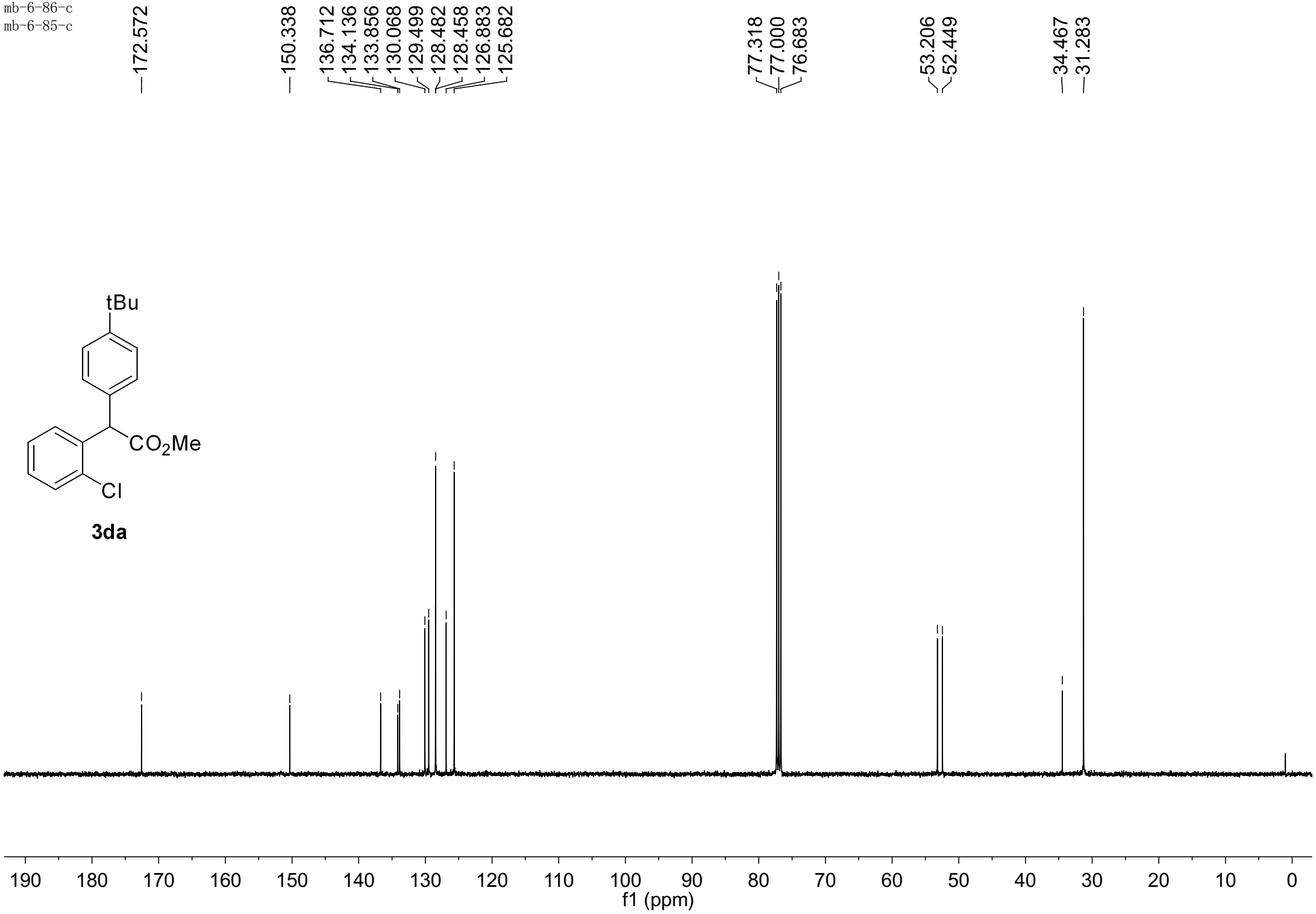
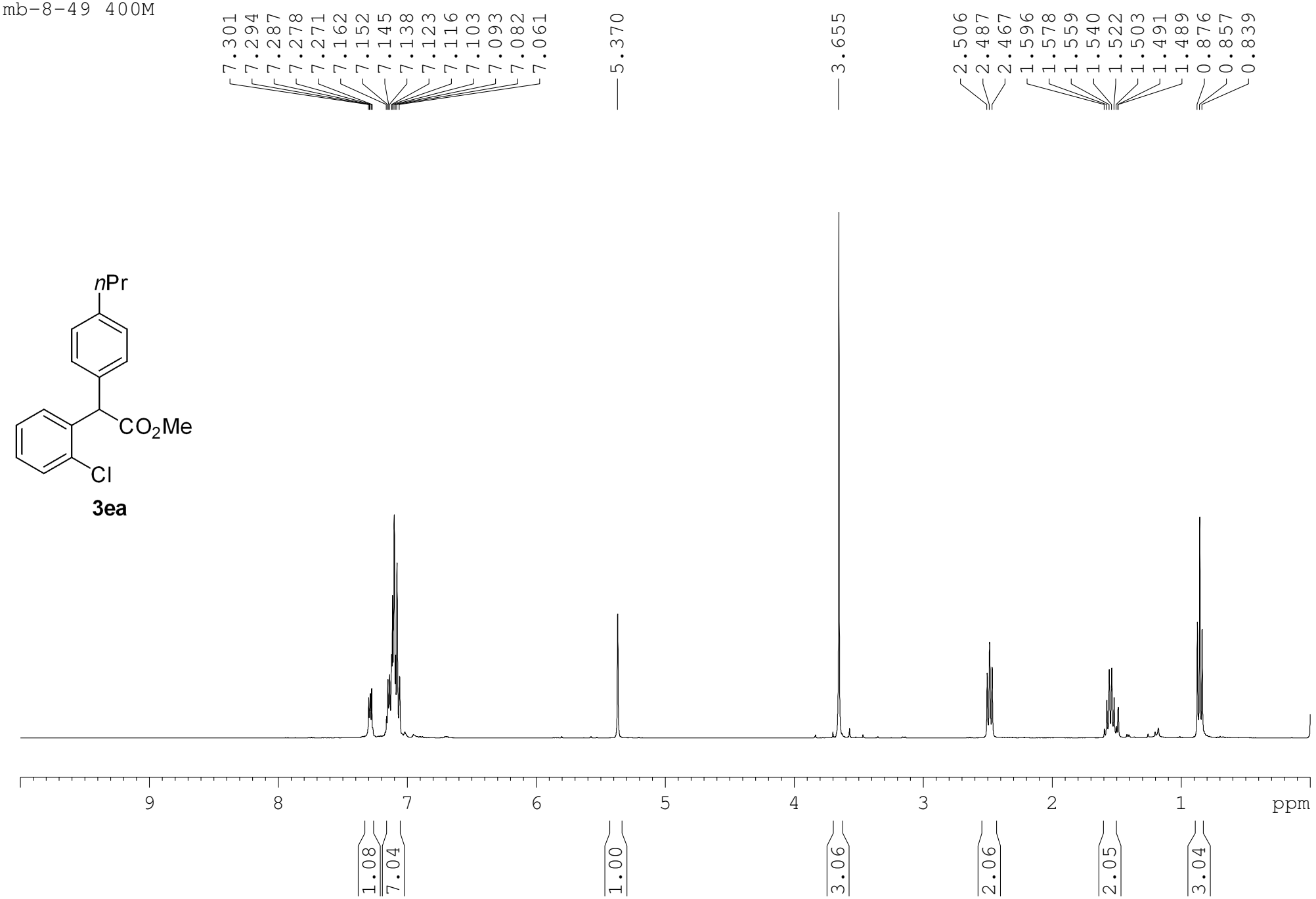
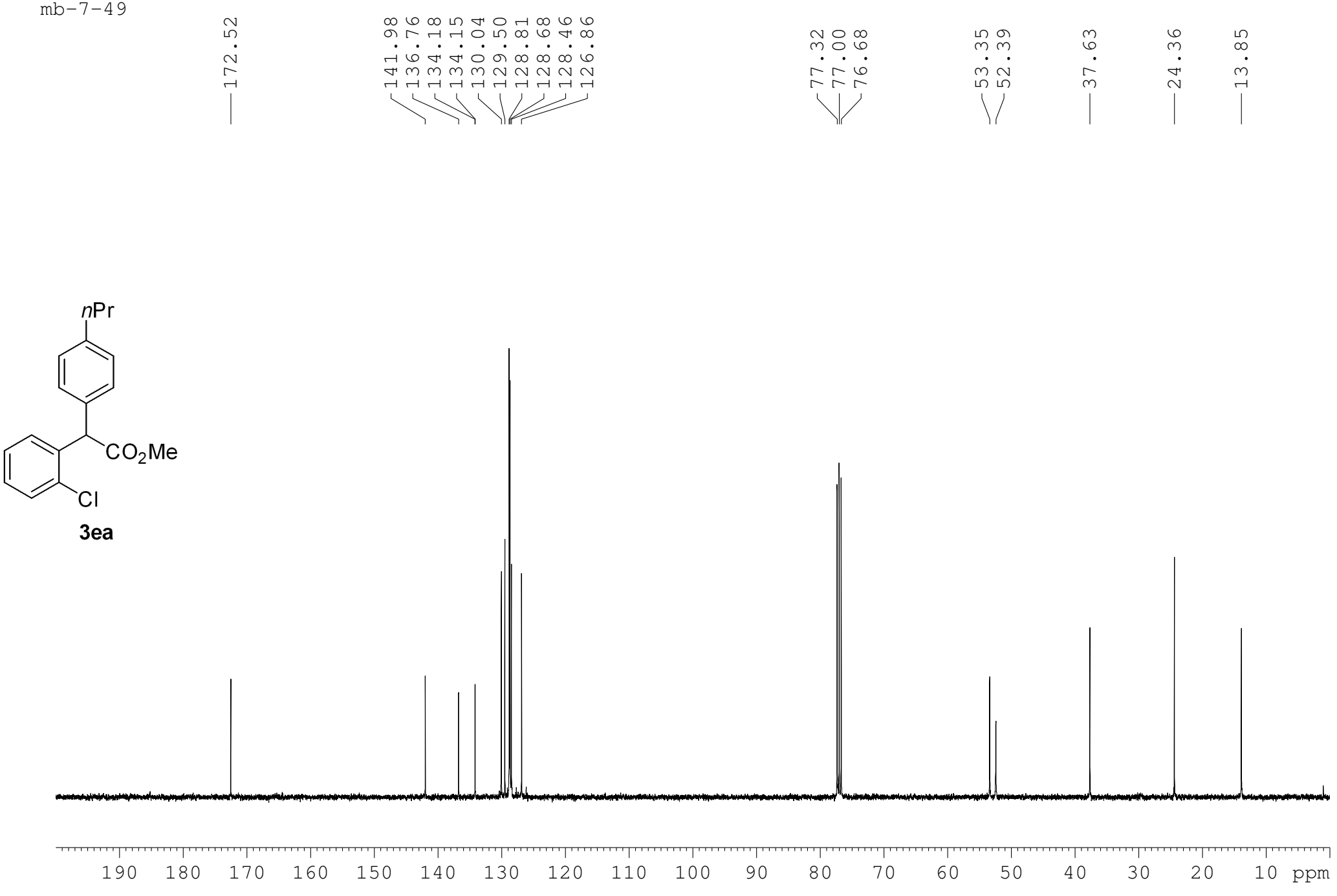


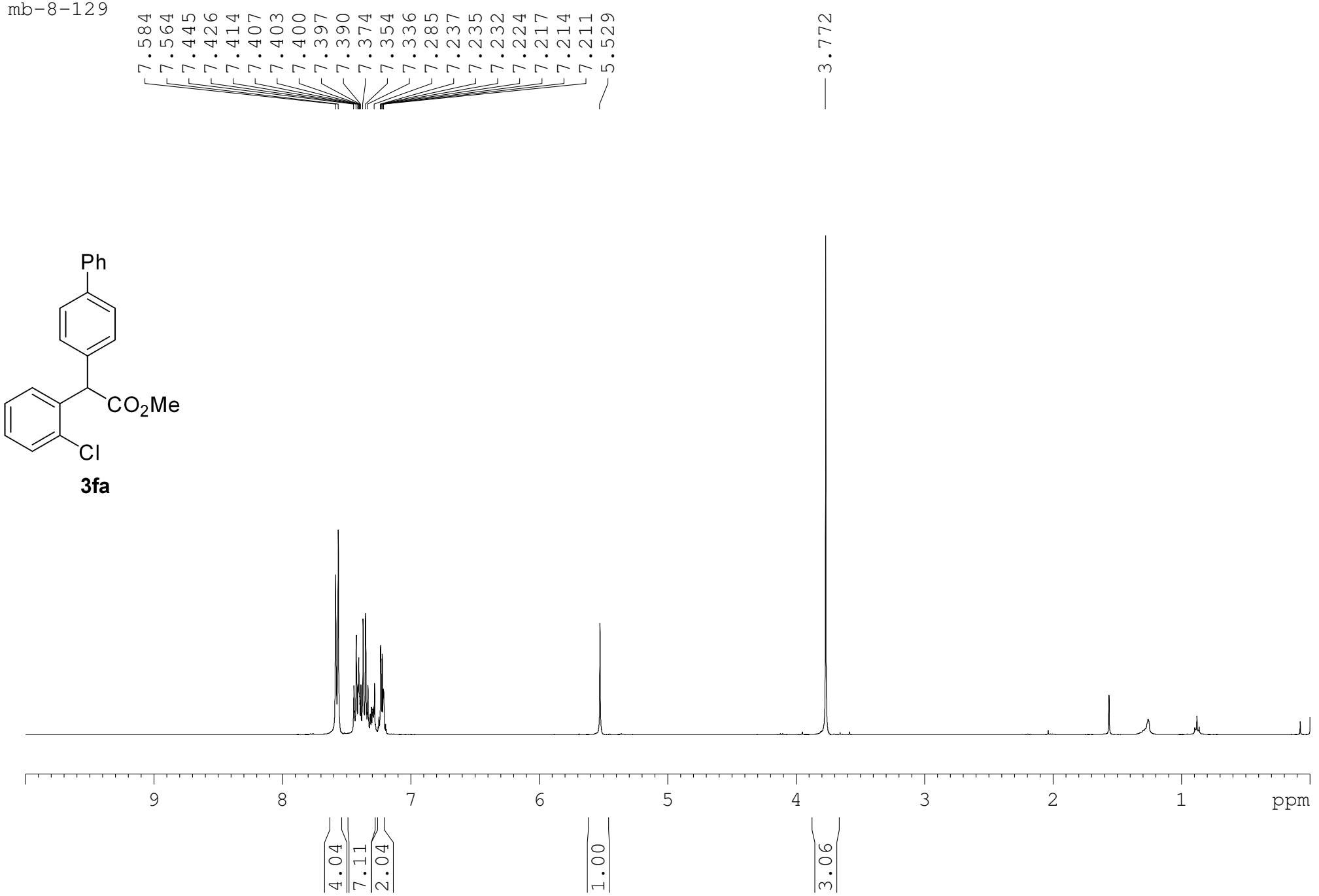
mb-8-49 400M


7.301
7.294
7.287
7.278
7.271
7.162
7.152
7.145
7.138
7.123
7.116
7.103
7.093
7.082
7.061
5.370
3.655
2.506
2.487
2.467
1.596
1.578
1.559
1.540
1.522
1.503
1.491
1.489
0.876
0.857
0.839
nPr
CO2Me
Cl
3ea
9
8
7
6
5
4
3
2
1
ppm
1.08
7.04
1.00
3.06
2.06
2.05
3.04

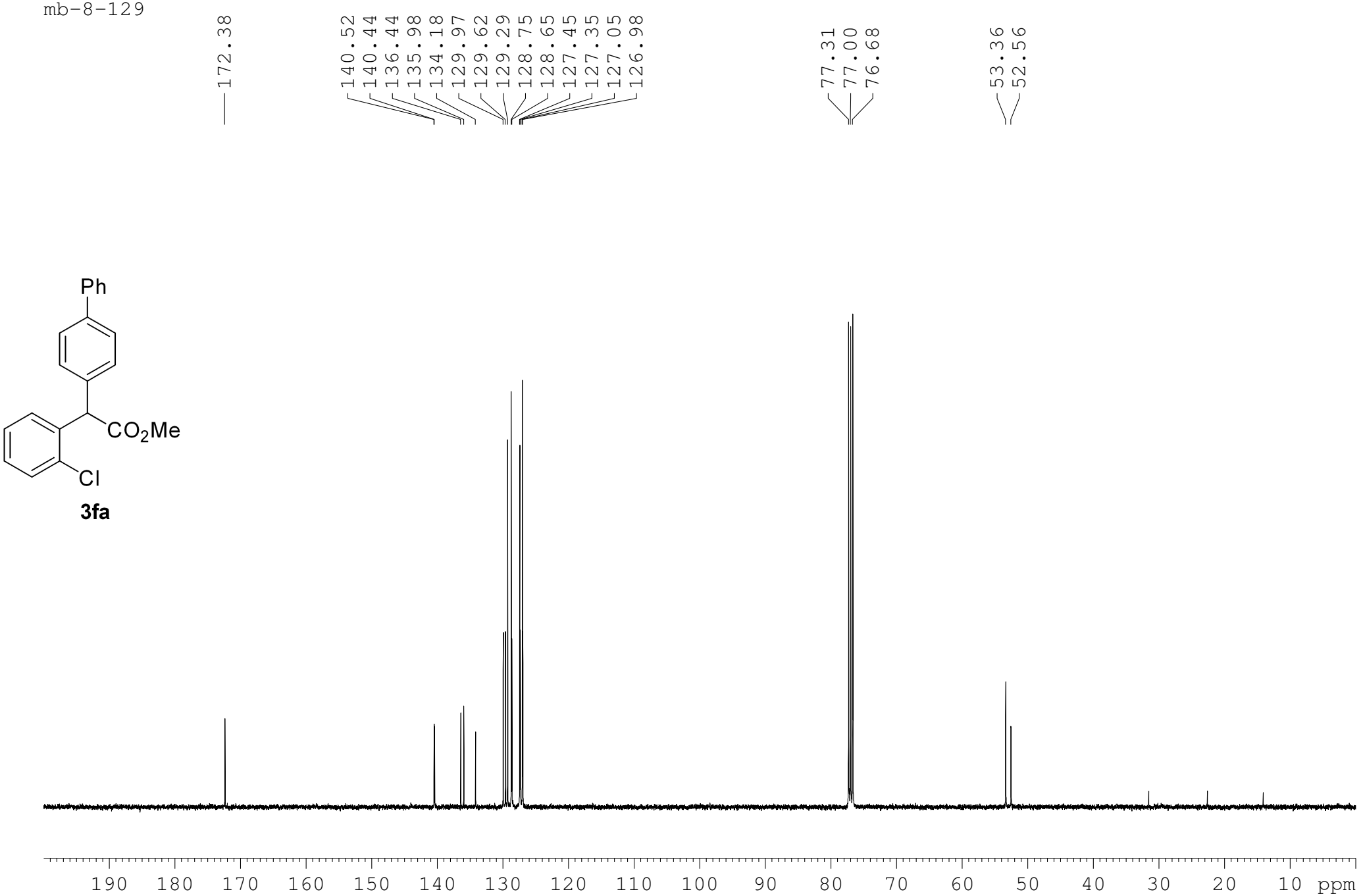
mb-7-49


172.52
141.98
136.76
134.18
134.15
130.04
129.50
128.81
128.68
128.46
126.86
77.32
77.00
76.68
53.35
52.39
37.63
24.36
13.85
nPr
CO2Me
Cl
3ea
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

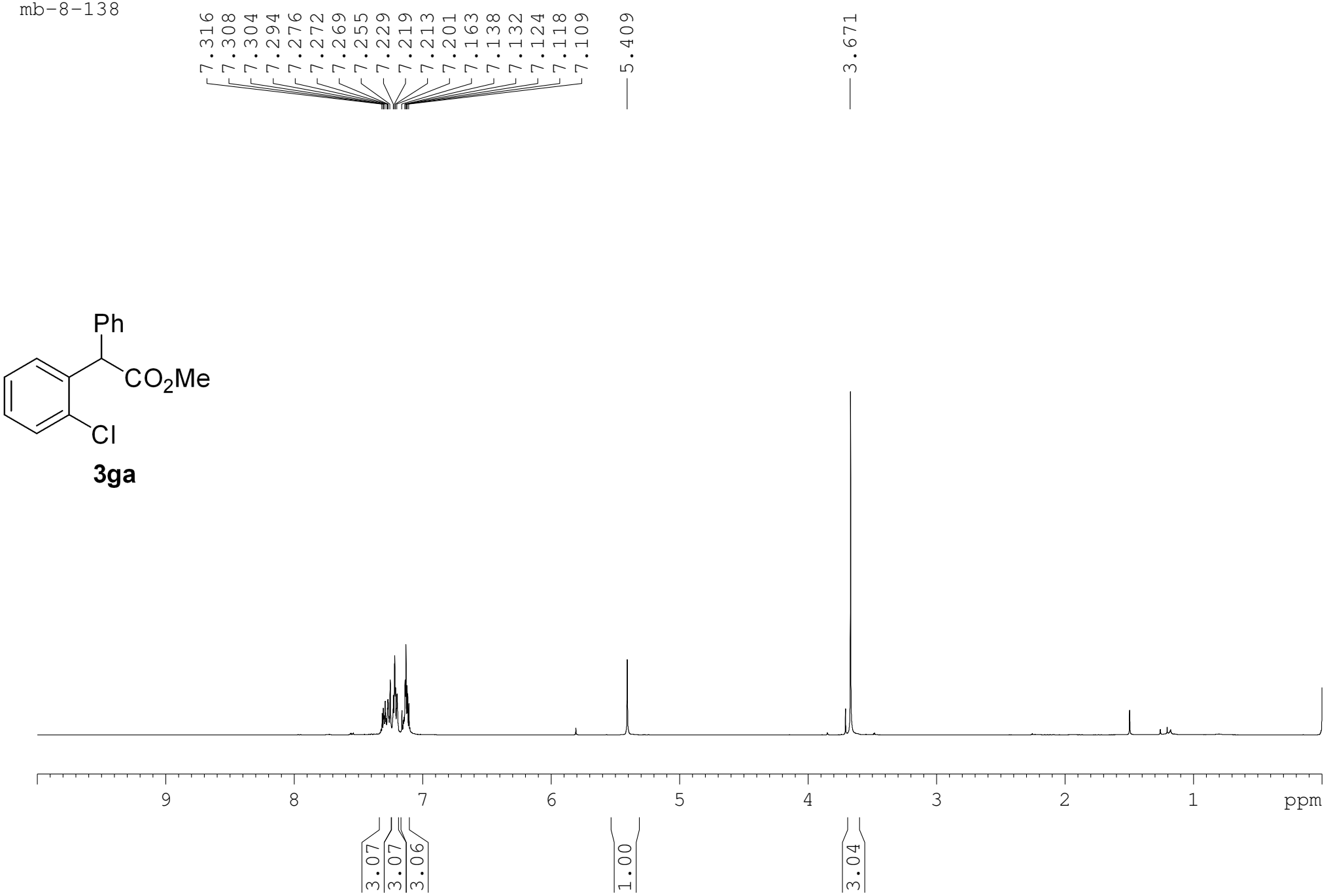
mb-8-129


7.584
7.564
7.445
7.426
7.414
7.407
7.403
7.400
7.397
7.390
7.374
7.354
7.336
7.285
7.237
7.235
7.232
7.224
7.217
7.214
7.211
5.529
3.772
Ph
CO2Me
Cl
3fa
9
8
7
6
5
4
3
2
1
ppm
4.04
7.11
2.04
1.00
3.06

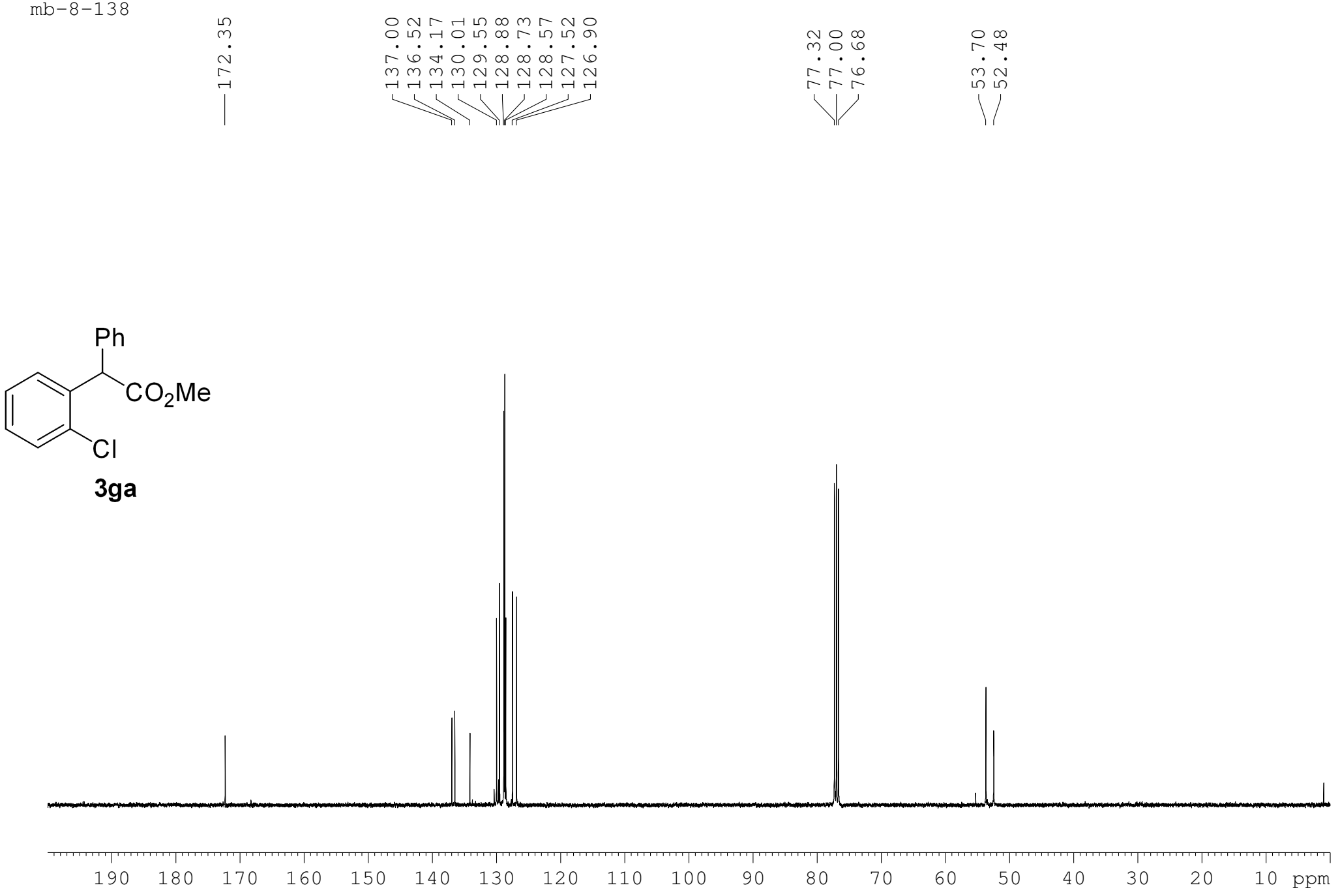
mb-8-129

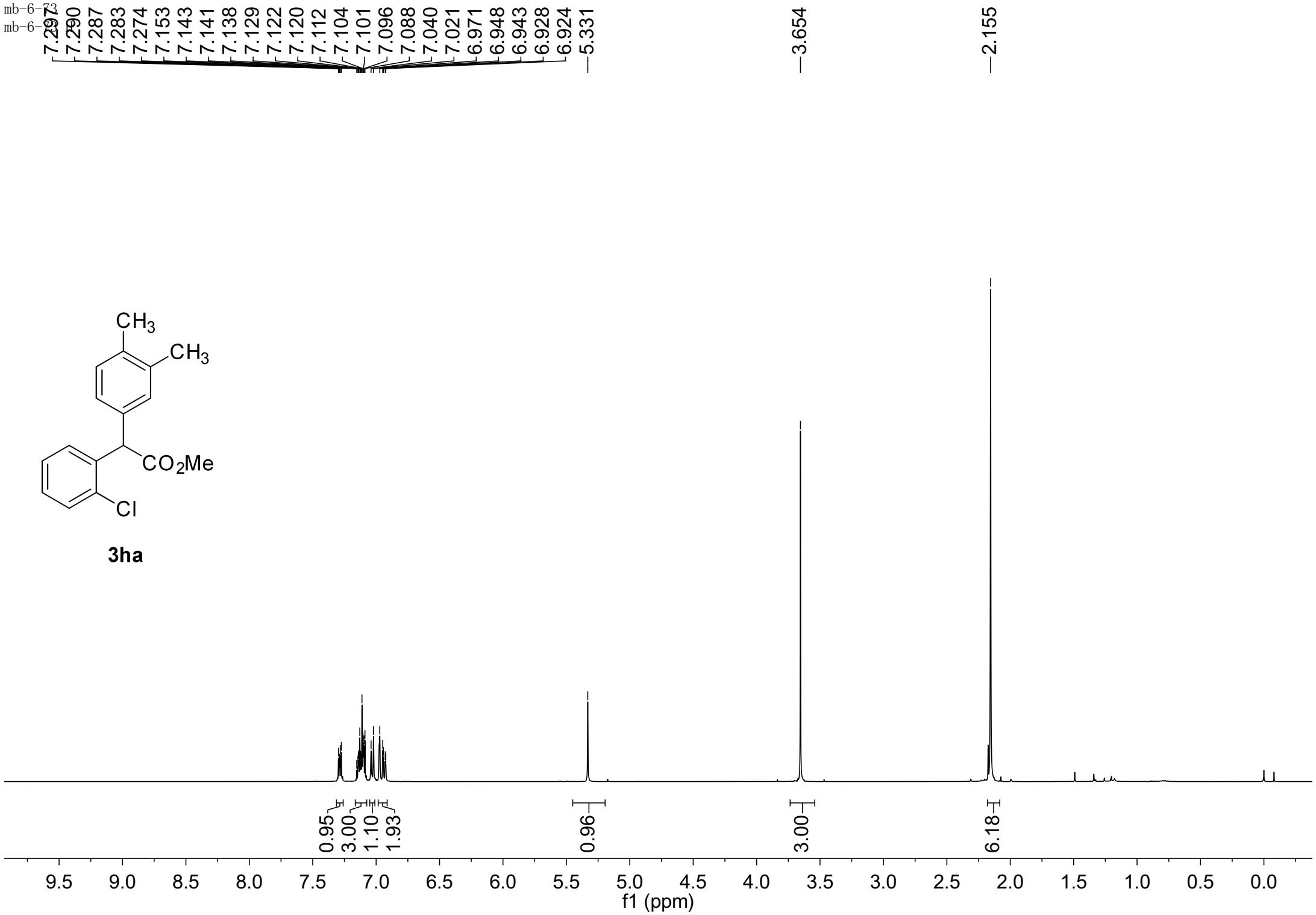

172.38
140.52
140.44
136.44
135.98
134.18
129.97
129.62
129.29
128.75
128.65
127.45
127.35
127.05
126.98
77.31
77.00
76.68
53.36
52.56
Ph
CO2Me
Cl
3fa
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

mb-8-138


7.316
7.308
7.304
7.294
7.276
7.272
7.269
7.255
7.229
7.219
7.213
7.201
7.163
7.138
7.132
7.124
7.118
7.109
5.409
3.671
Ph
CO2Me
Cl
3ga
9
8
7
6
5
4
3
2
1
ppm
3.07
3.07
3.06
1.00
3.04

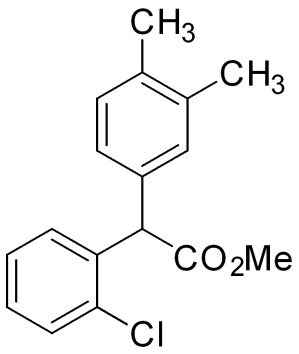
mb-8-138


172.35
137.00
136.52
134.17
130.01
129.55
128.88
128.73
128.57
127.52
126.90
77.32
77.00
76.68
53.70
52.48
Ph
CO2Me
Cl
3ga
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


mb-6-73
mb-6-29
7.297
7.290
7.287
7.283
7.274
7.153
7.143
7.141
7.138
7.129
7.122
7.120
7.112
7.104
7.101
7.096
7.088
7.040
7.021
6.971
6.948
6.943
6.928
6.924
5.331
3.654
2.155
CH3
CH3
CO2Me
Cl
3ha
0.95
3.00
1.10
1.93
0.96
3.00
6.18
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

mb-6-73
mb-6-73 H

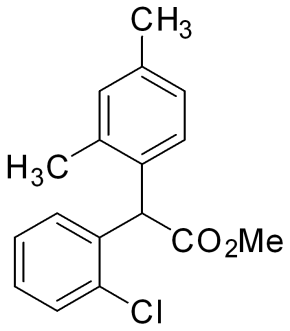
172.568
137.024
136.741
135.951
134.240
134.093
130.043
130.031
129.978
129.447
128.430
126.833
126.174
77.318
77.000
76.682
53.366
52.429
19.830
19.392



3ha

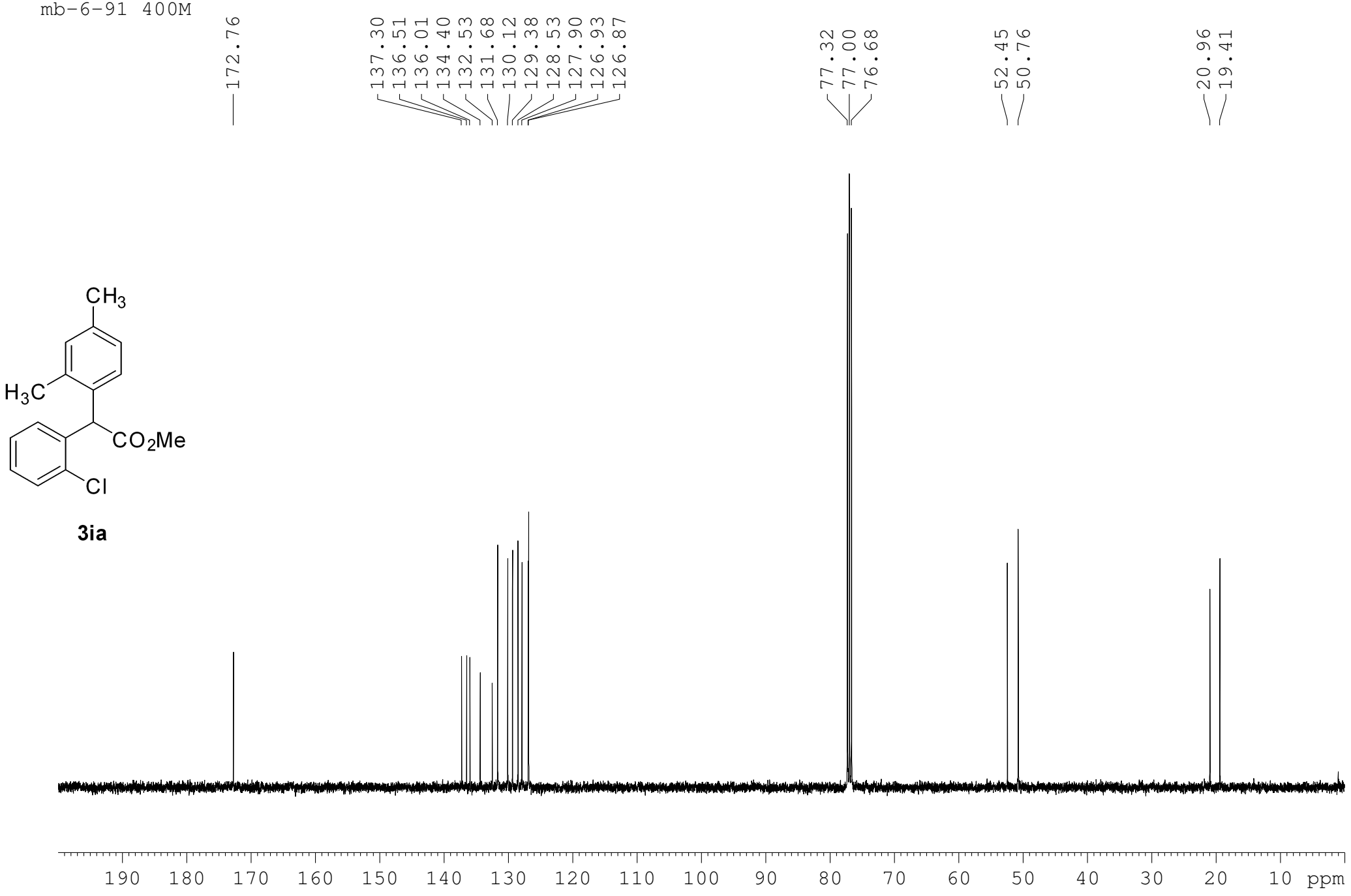
mb-6-91 400M

7.322
7.318
7.303
7.299
7.167
7.147
7.143
7.129
7.124
7.110
7.105
7.102
7.087
7.083
7.069
7.065
6.949
6.939
6.935
6.921
6.916
5.461
3.678
2.237
2.091

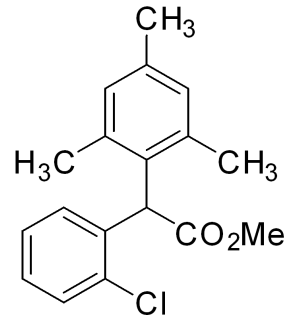


3ia

mb-6-91 400M

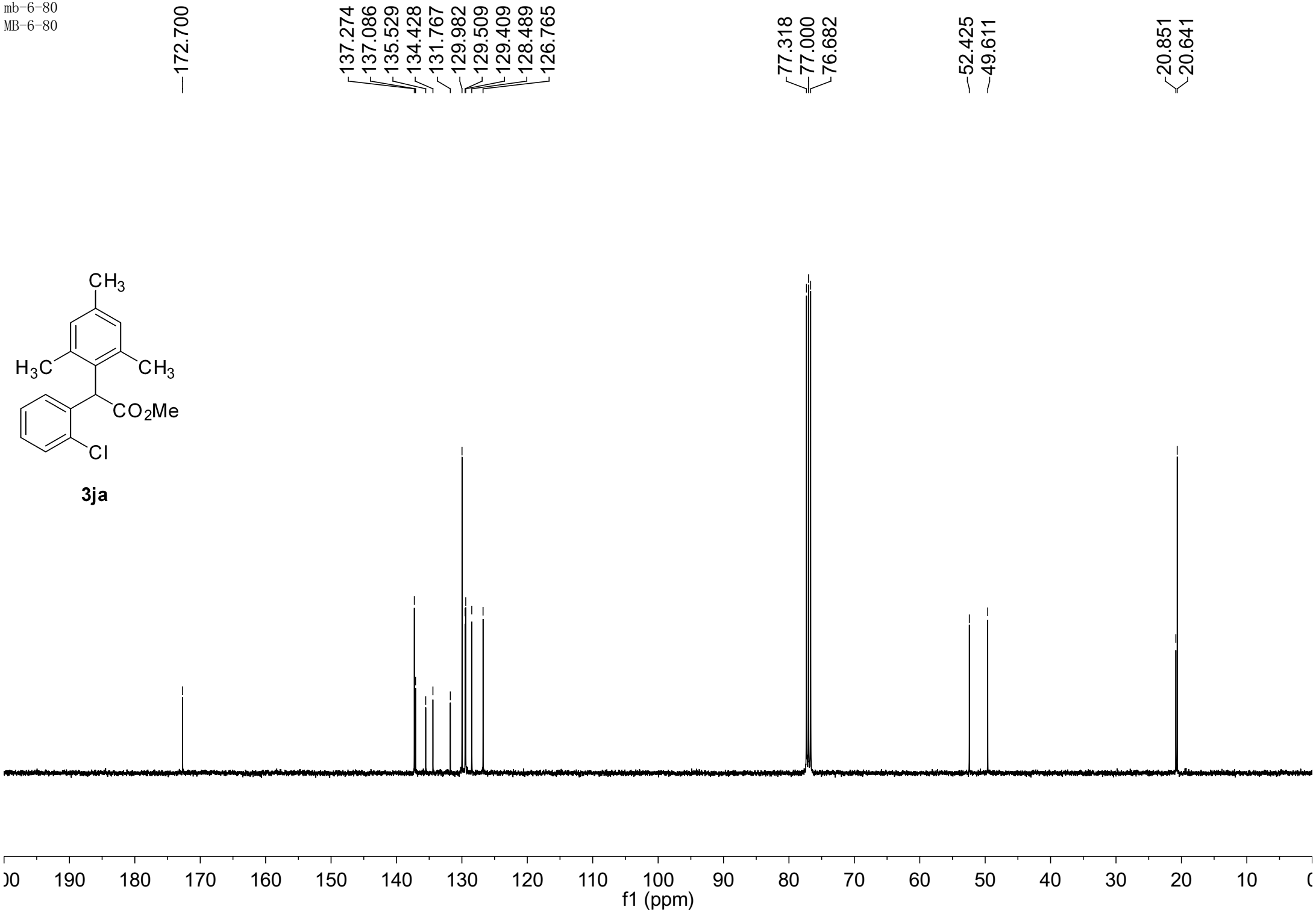

172.76
137.30
136.51
136.01
134.40
132.53
131.68
130.12
129.38
128.53
127.90
126.93
126.87
77.32
77.00
76.68
52.45
50.76
20.96
19.41
CH3
H3C
CO2Me
Cl
3ia
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

mb-6-80
MB-6-80

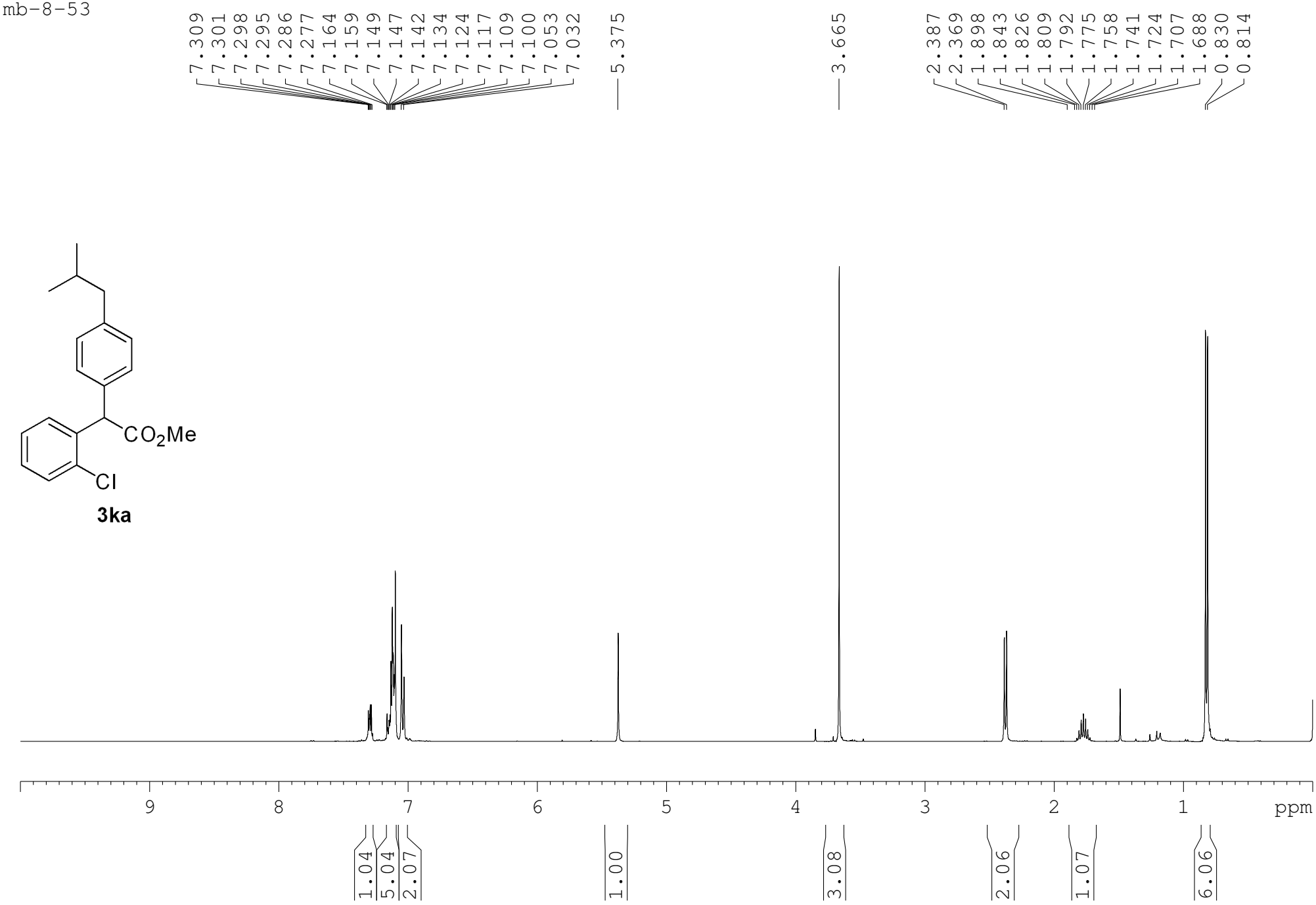


3ja

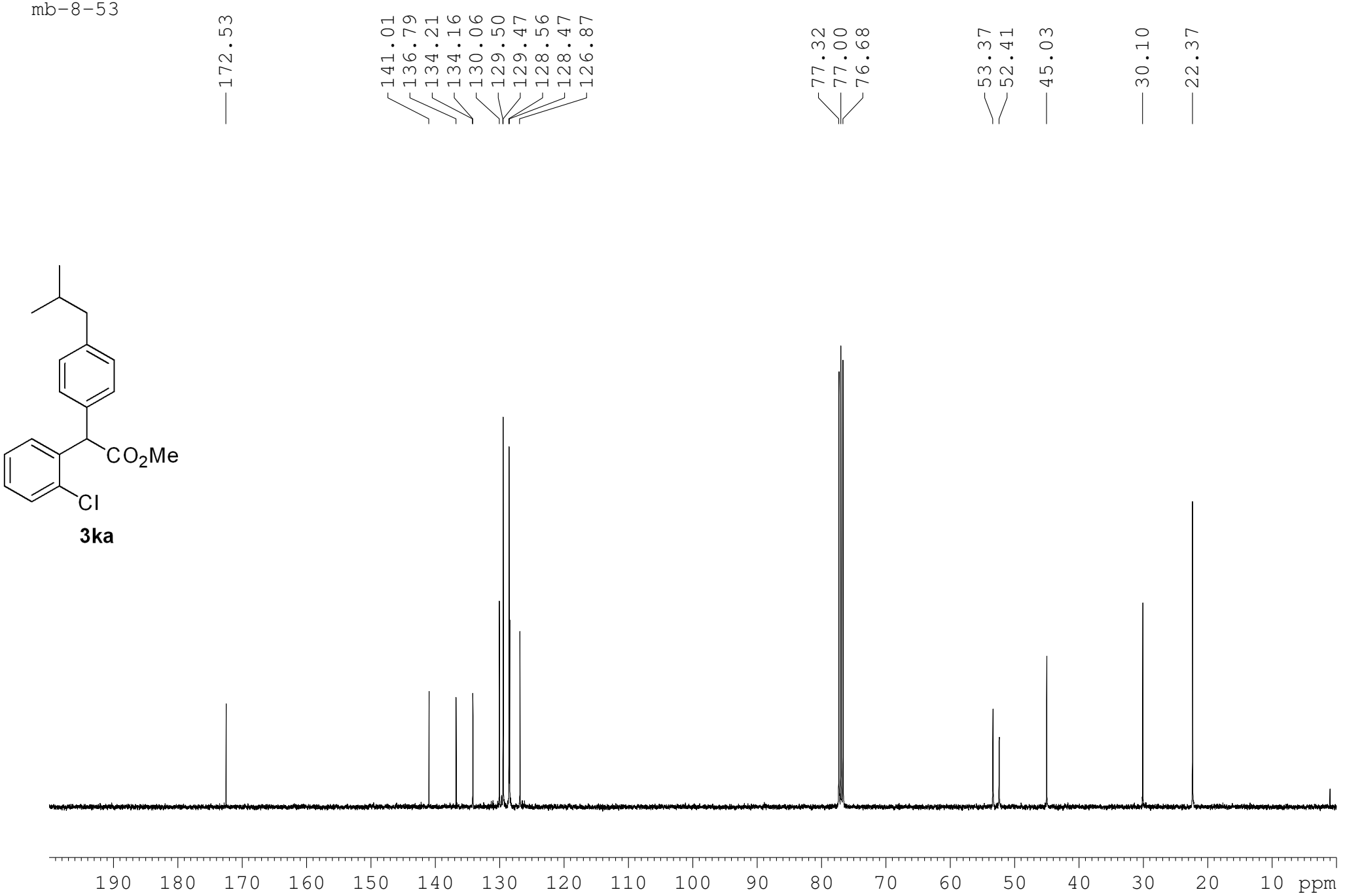
mb-6-80
MB-6-80


172.700
137.274
137.086
135.529
134.428
131.767
129.982
129.509
129.409
128.489
126.765
77.318
77.000
76.682
52.425
49.611
20.851
20.641
CH3
H3C
CH3
CO2Me
Cl
3ja
f1 (ppm)

mb-8-53


7.309
7.301
7.298
7.295
7.286
7.277
7.164
7.159
7.149
7.147
7.142
7.134
7.124
7.117
7.109
7.100
7.053
7.032
5.375
3.665
2.387
2.369
1.898
1.843
1.826
1.809
1.792
1.775
1.758
1.741
1.724
1.707
1.688
0.830
0.814
CO2Me
Cl
3ka
9
8
7
6
5
4
3
2
1
ppm
1.04
5.04
2.07
1.00
3.08
2.06
1.07
6.06

mb-8-53


172.53
141.01
136.79
134.21
134.16
130.06
129.50
129.47
128.56
128.47
126.87
77.32
77.00
76.68
53.37
52.41
45.03
30.10
22.37
CO2Me
Cl
3ka
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

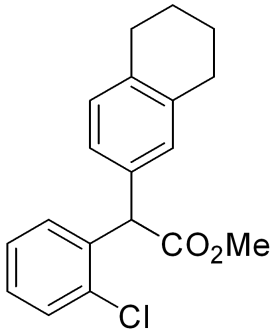
MB-6-122

7.434
7.430
7.426
7.421
7.416
7.413
7.312
7.308
7.301
7.298
7.293
7.286
7.264
7.260
7.250
7.243
7.239
7.233
7.223
7.219
7.103
7.087
7.066
7.050
7.036
5.463

3.794

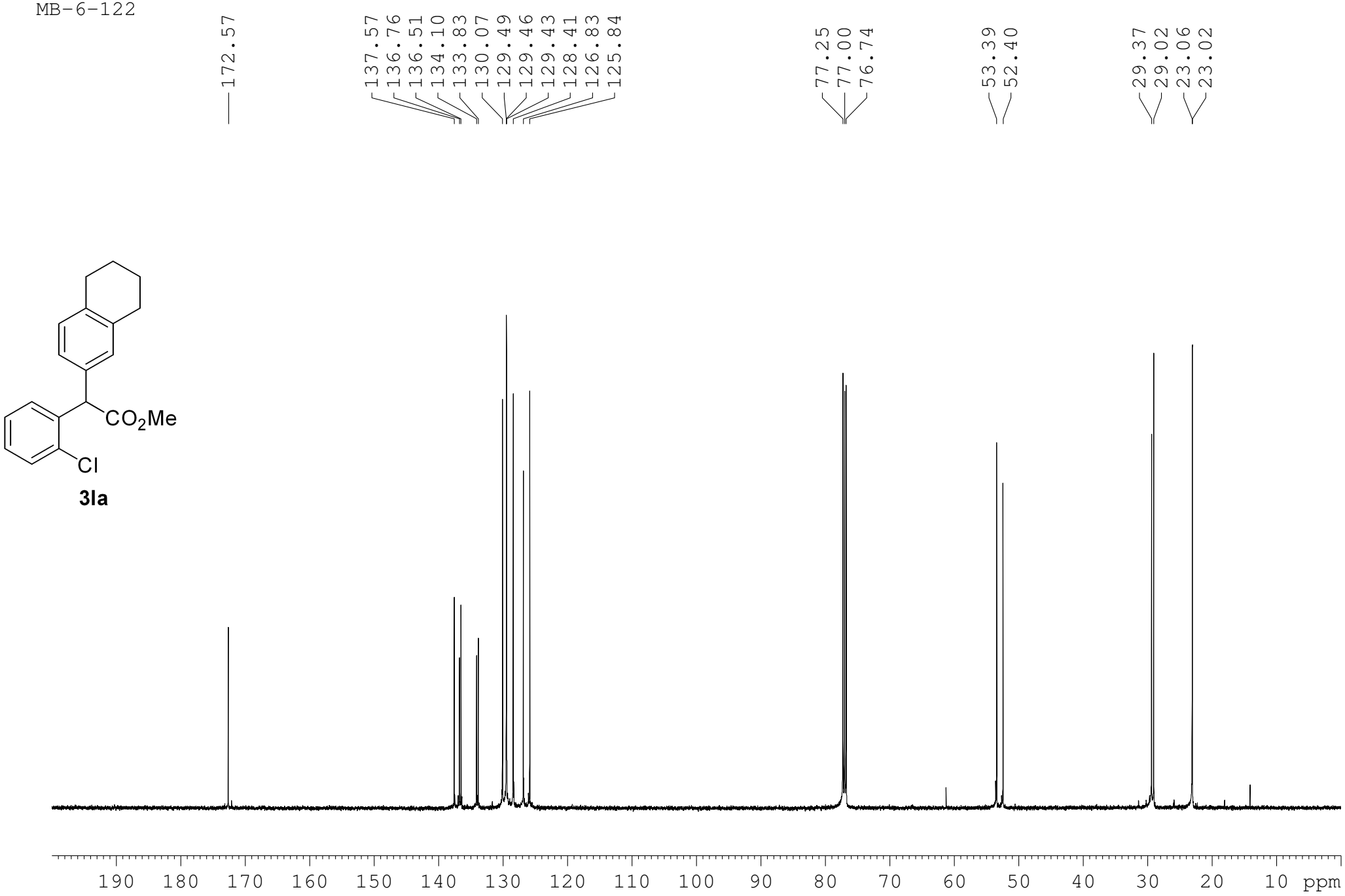
2.793

1.832
1.829

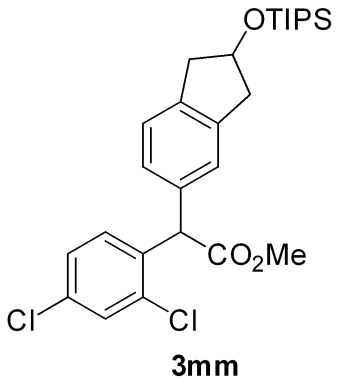


3la

MB-6-122


172.57
137.57
136.76
136.51
134.10
133.83
130.07
129.49
129.46
129.43
128.41
126.83
125.84
77.25
77.00
76.74
53.39
52.40
29.37
29.02
23.06
23.02
CO2Me
Cl
3la
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

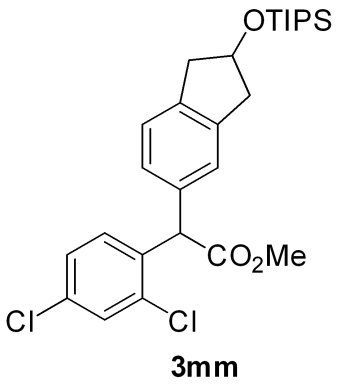
MB-9-85(2)
MB-9-85(2)



3mm

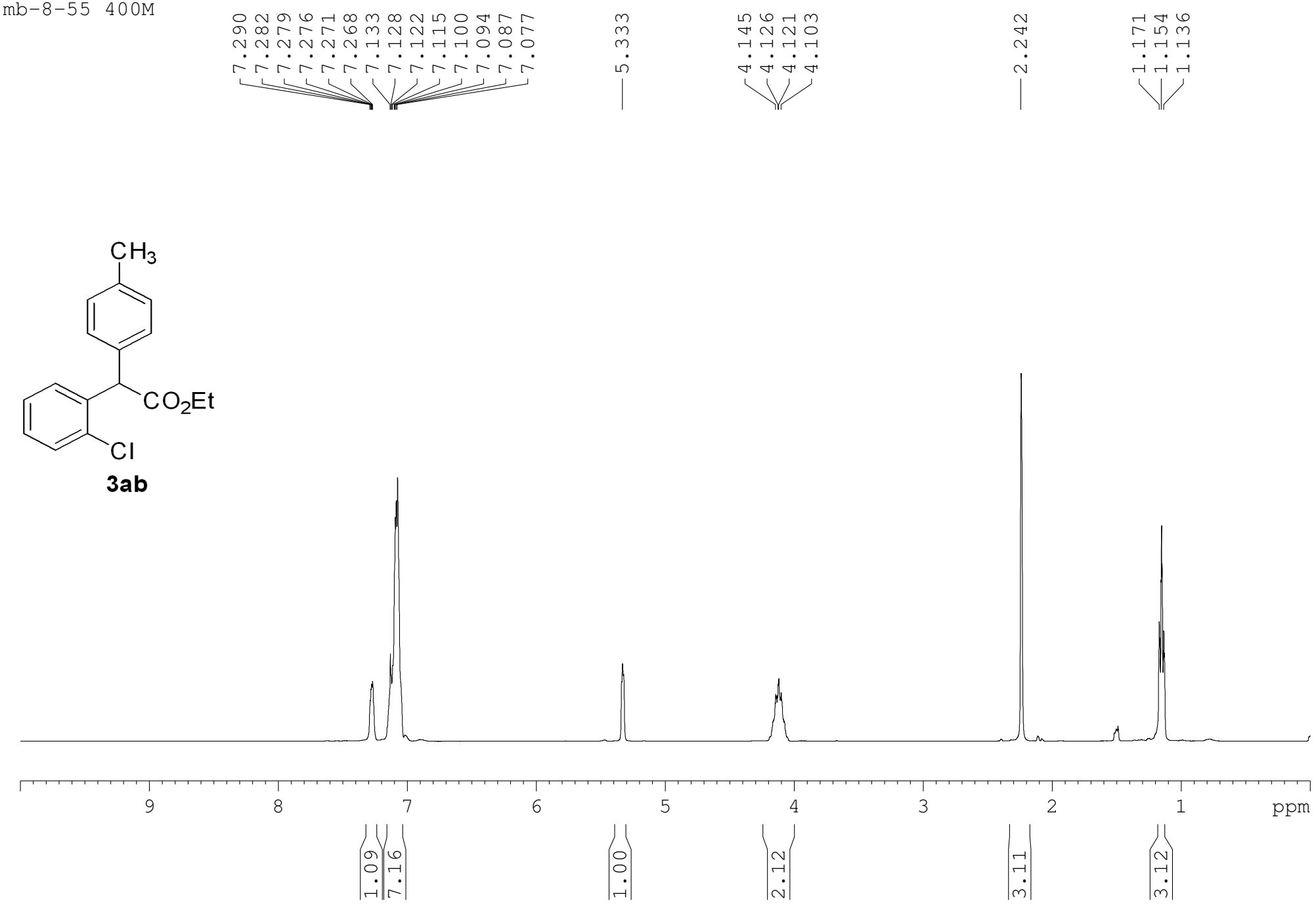
mb-9-85-C

172.24
142.15
141.20
140.98
135.54
134.70
133.66
131.07
129.25
127.19
126.98
126.35
124.49
77.32
77.00
76.68
73.93
53.14
52.58
42.88
42.60
17.98
12.13



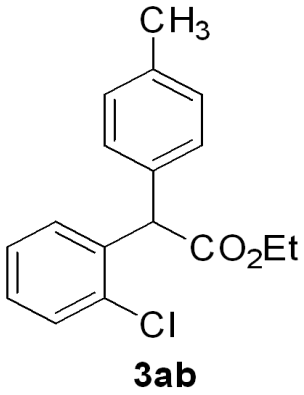
3mm

mb-8-55 400M


7.290
7.282
7.279
7.276
7.271
7.268
7.133
7.128
7.122
7.115
7.100
7.094
7.087
7.077
5.333
4.145
4.126
4.121
4.103
2.242
1.171
1.154
1.136
CH3
CO2Et
Cl
3ab
9
8
7
6
5
4
3
2
1
ppm
1.09
7.16
1.00
2.12
3.11
3.12

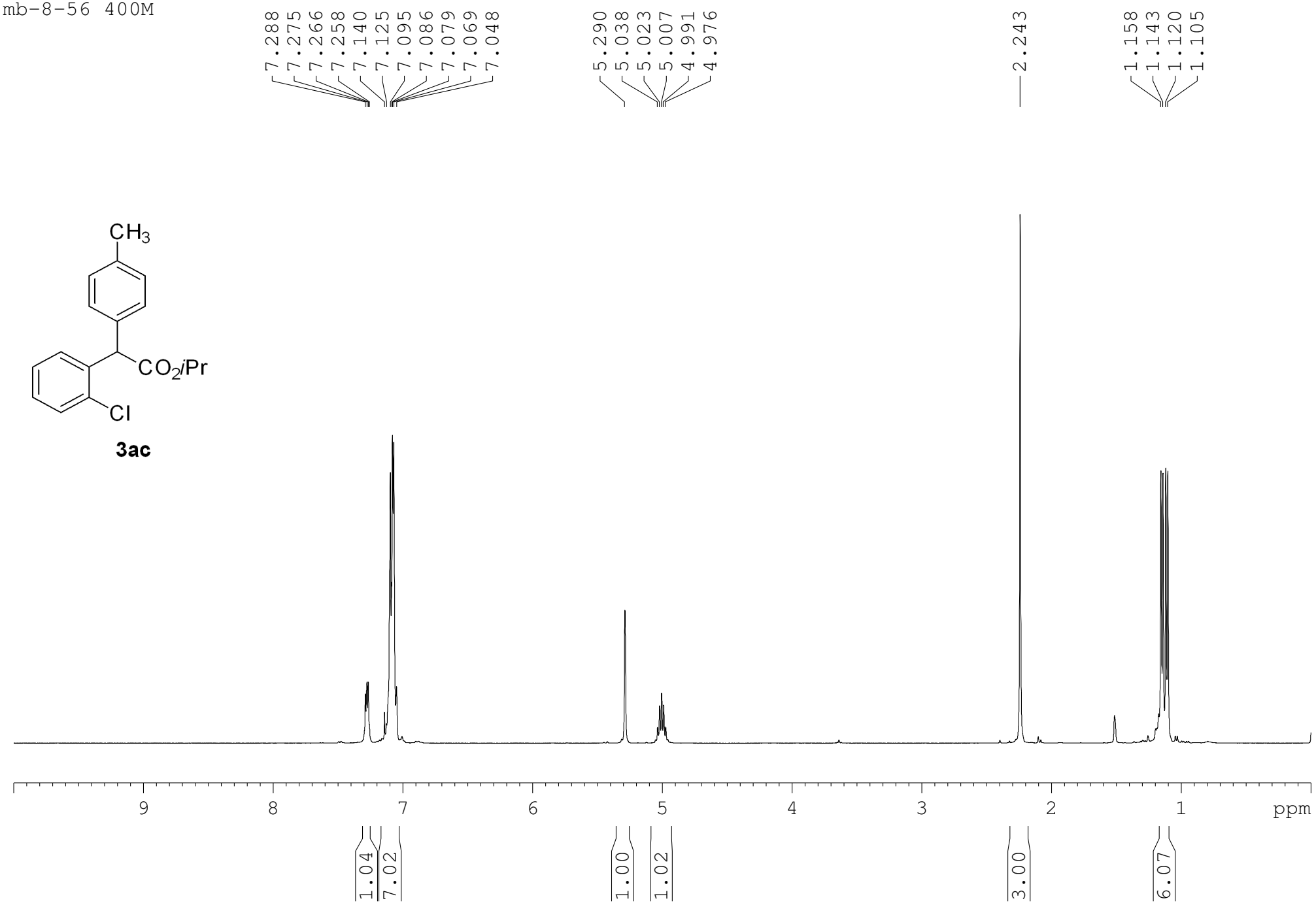
mb-8-55 400M

171.97
137.11
136.89
134.17
134.11
129.98
129.47
129.39
128.75
128.39
126.80
77.32
77.00
76.68
61.27
53.52
21.02
14.06



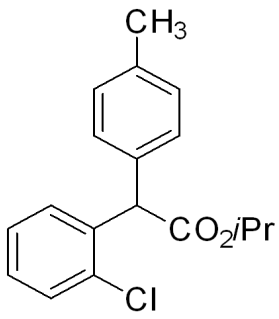
3ab

mb-8-56 400M


7.288
7.275
7.266
7.258
7.140
7.125
7.095
7.086
7.079
7.069
7.048
5.290
5.038
5.023
5.007
4.991
4.976
2.243
1.158
1.143
1.120
1.105
CH3
CO2iPr
Cl
3ac
9
8
7
6
5
4
3
2
1
ppm
1.04
7.02
1.00
1.02
3.00
6.07

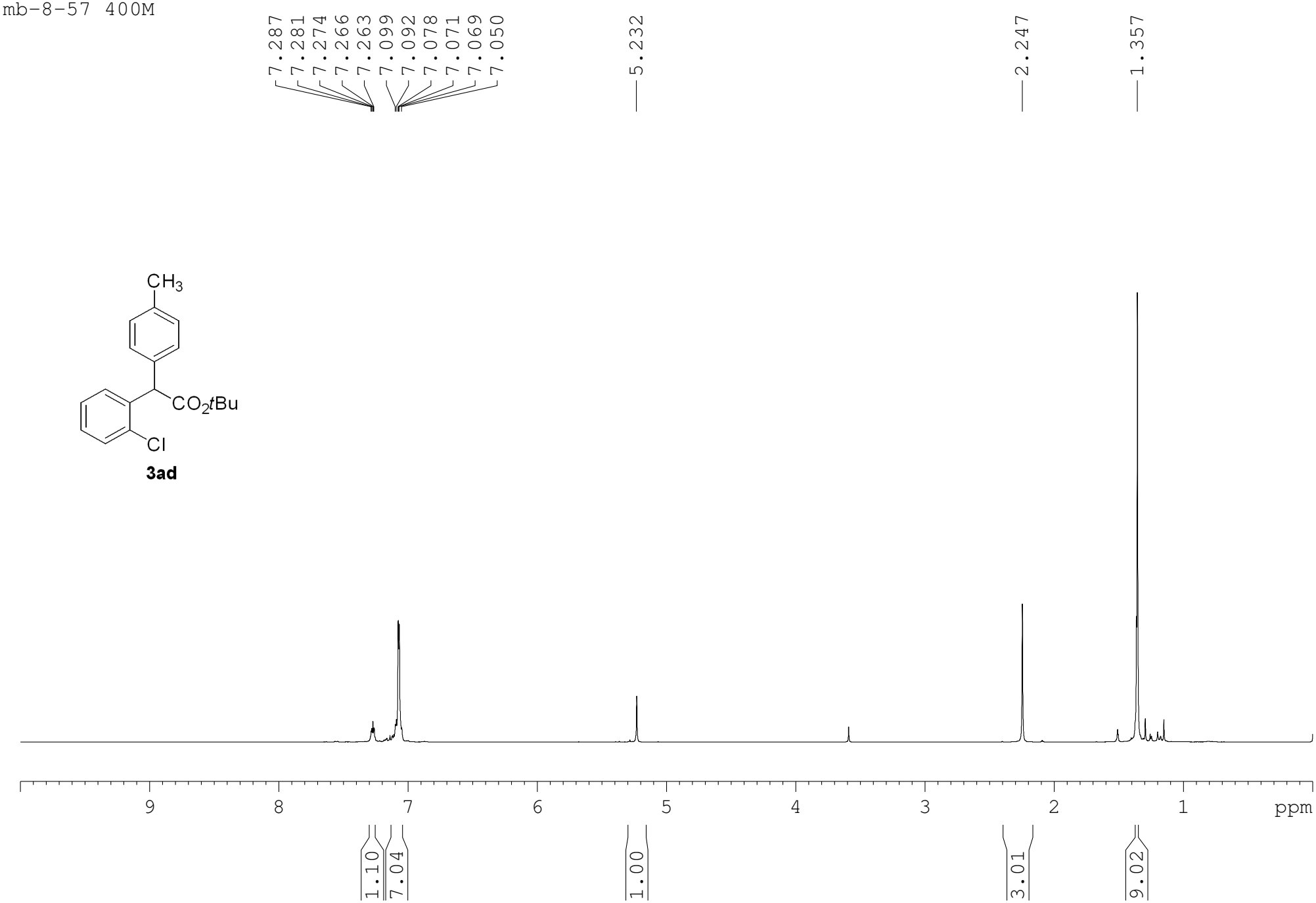
mb-8-56 400M

171.46
137.06
136.99
134.19
129.99
129.43
129.34
128.74
128.31
126.74
77.32
77.00
76.68
68.67
53.74
21.61
21.53
21.03



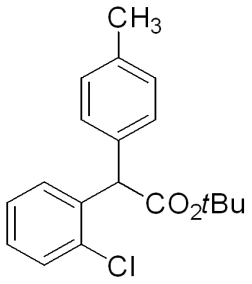
3ac

mb-8-57 400M


7.287
7.281
7.274
7.266
7.263
7.099
7.092
7.078
7.071
7.069
7.050
5.232
2.247
1.357
CH3
CO2tBu
Cl
3ad
9
8
7
6
5
4
3
2
1
ppm
1.10
7.04
1.00
3.01
9.02

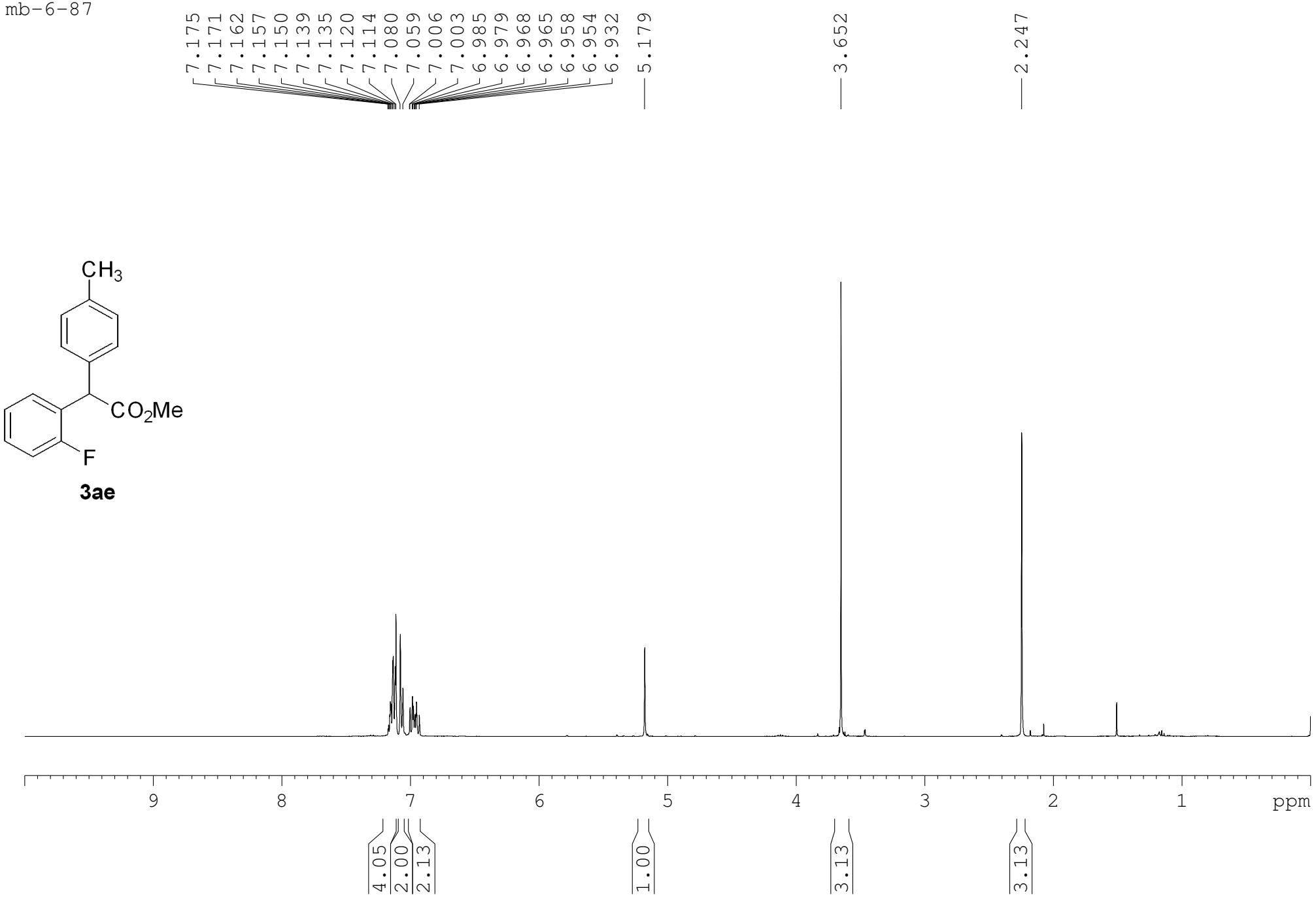
mb-8-57 400M

171.15
137.44
136.86
134.50
134.21
129.96
129.38
129.32
128.77
128.19
126.68
81.35
77.32
77.00
76.68
54.50
27.86
21.04

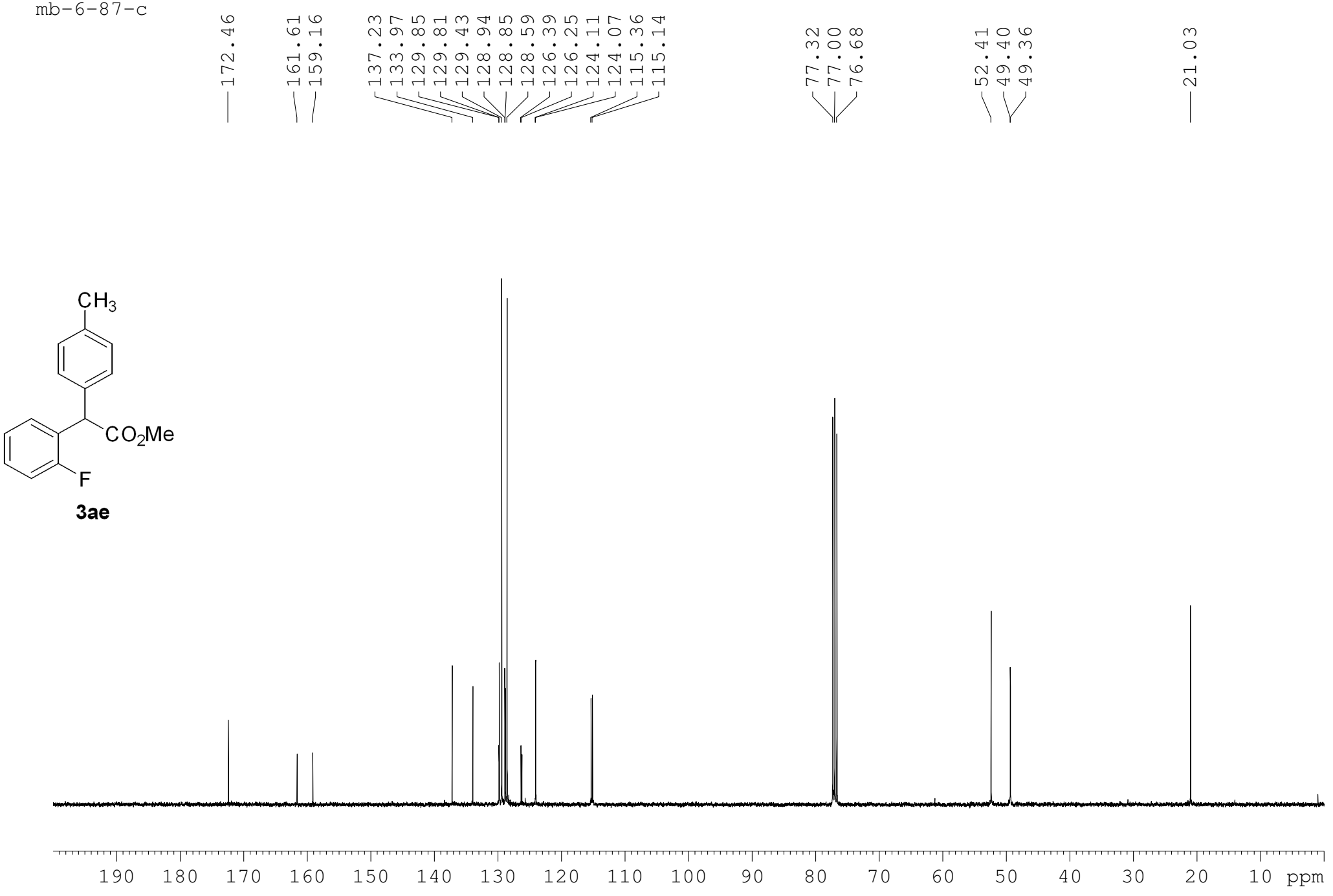


3ad

mb-6-87

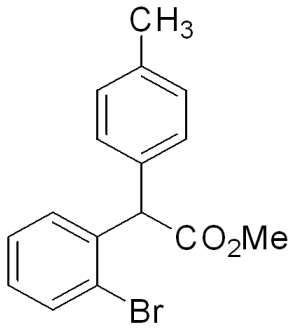

7.175
7.171
7.162
7.157
7.150
7.139
7.135
7.120
7.114
7.080
7.059
7.006
7.003
6.985
6.979
6.968
6.965
6.958
6.954
6.932
5.179
3.652
2.247
CH3
CO2Me
F
3ae
9
8
7
6
5
4
3
2
1
ppm
4.05
2.00
2.13
1.00
3.13
3.13

mb-6-87-c

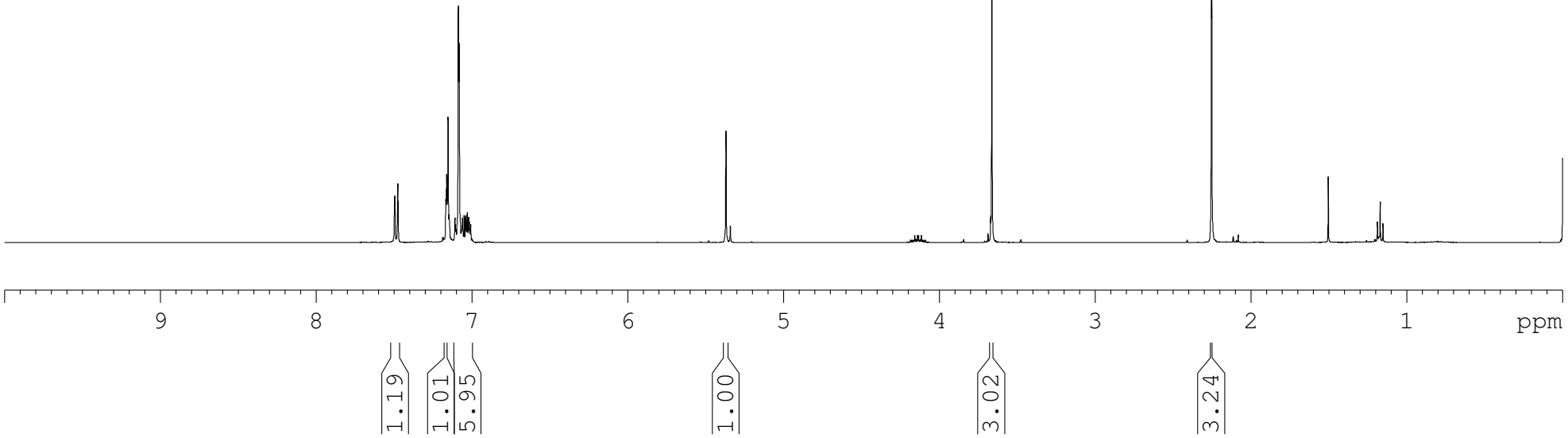

172.46
161.61
159.16
137.23
133.97
129.85
129.81
129.43
128.94
128.85
128.59
126.39
126.25
124.11
124.07
115.36
115.14
77.32
77.00
76.68
52.41
49.40
49.36
21.03
CH3
CO2Me
F
3ae
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

mb-6-85 H

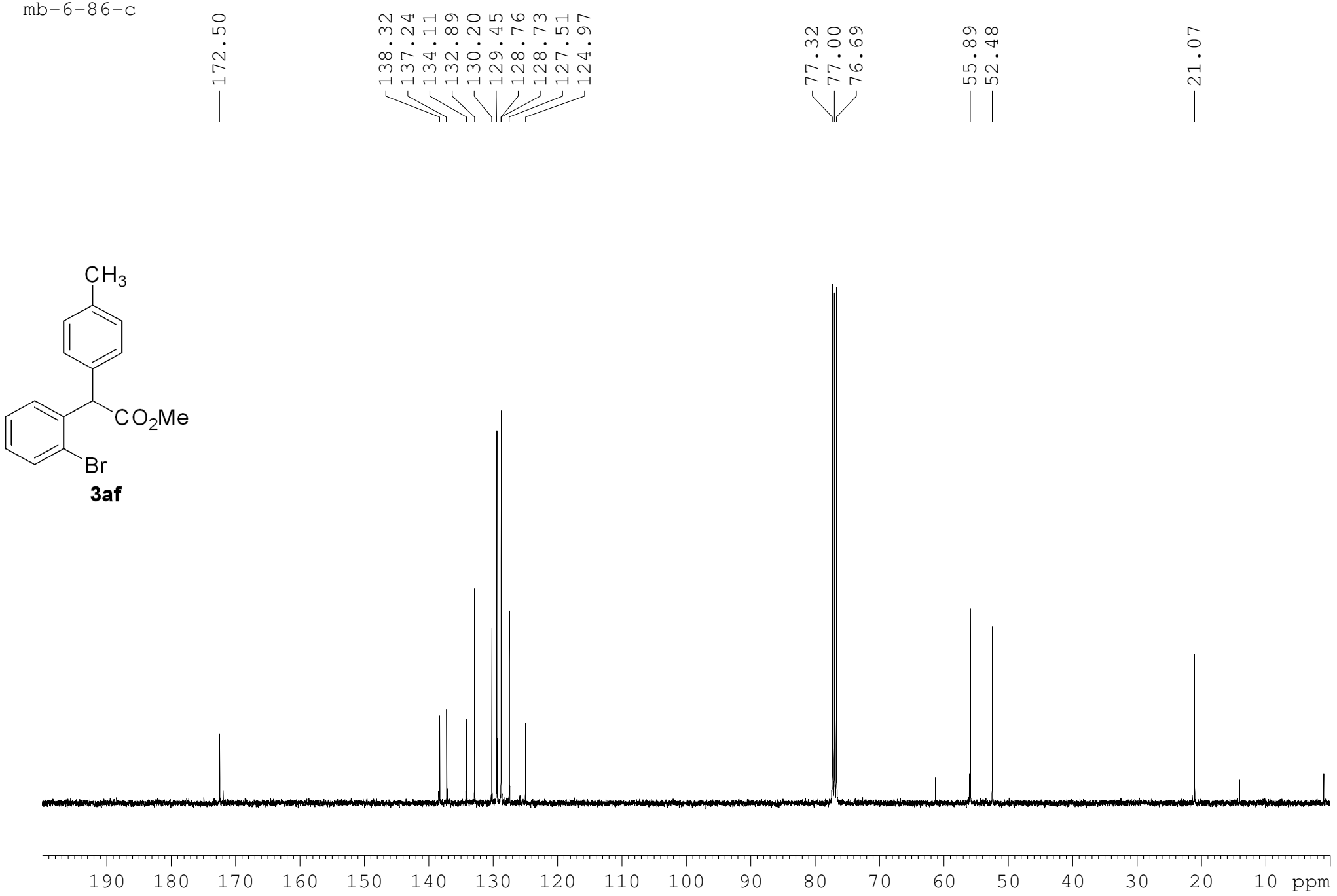
7.497
7.478
7.170
7.167
7.164
7.160
7.156
7.154
7.149
7.147
7.111
7.104
7.096
7.089
7.084
7.063
7.052
7.043
7.037
7.032
7.029
7.022
7.019
7.009
5.371
3.664
2.254



3af

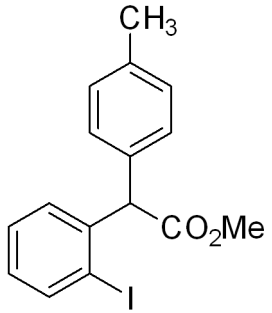


mb-6-86-c


172.50
138.32
137.24
134.11
132.89
130.20
129.45
128.76
128.73
127.51
124.97
77.32
77.00
76.69
55.89
52.48
21.07
CH3
CO2Me
Br
3af
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

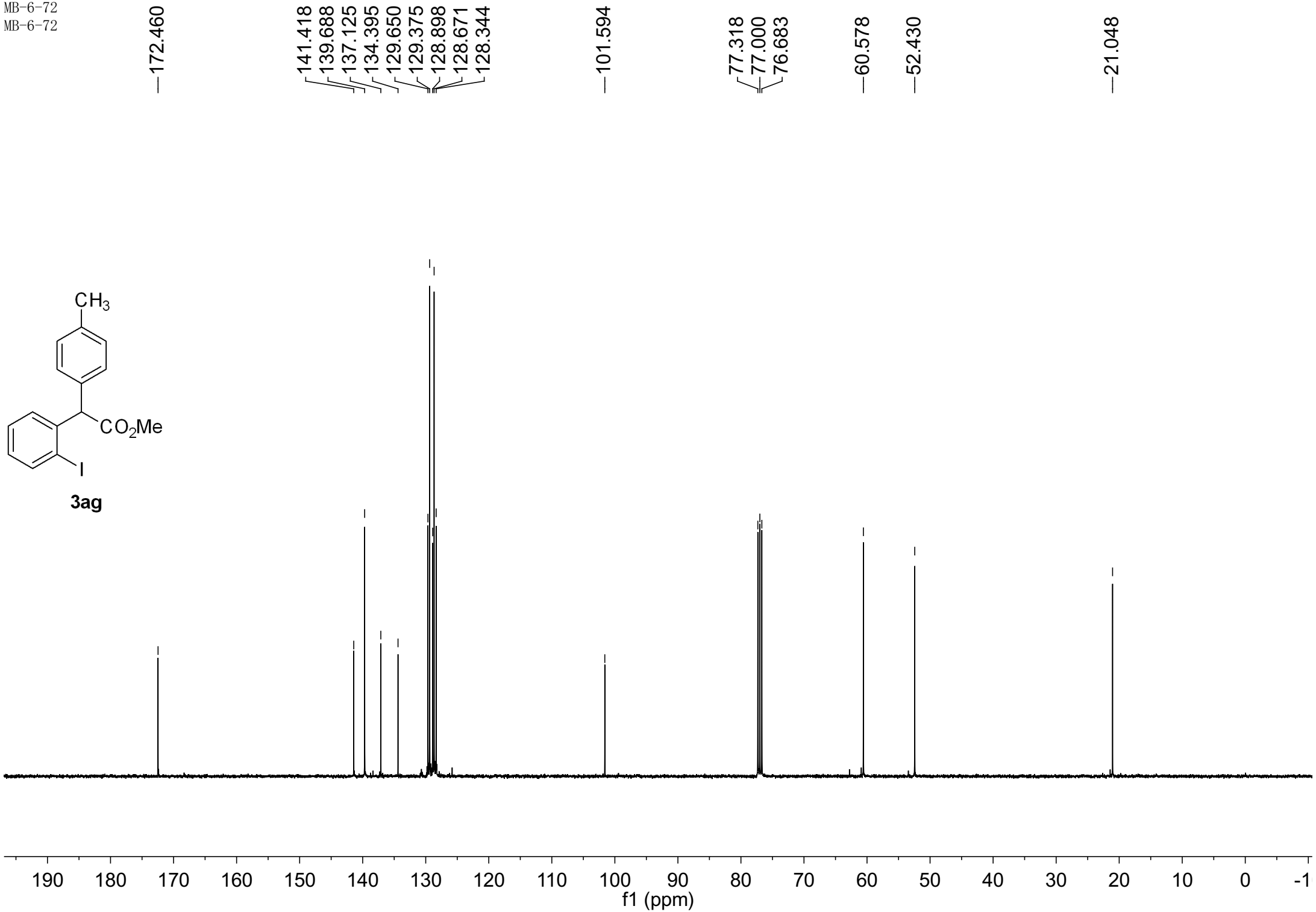
MB-6-72

7.785
7.783
7.765
7.763
7.226
7.224
7.207
7.204
7.188
7.183
7.169
7.163
7.153
7.100
7.093
7.078
7.074
7.057
7.052
6.876
6.871
6.859
6.856
6.854
6.851
6.840
6.834
5.285
3.663
2.245

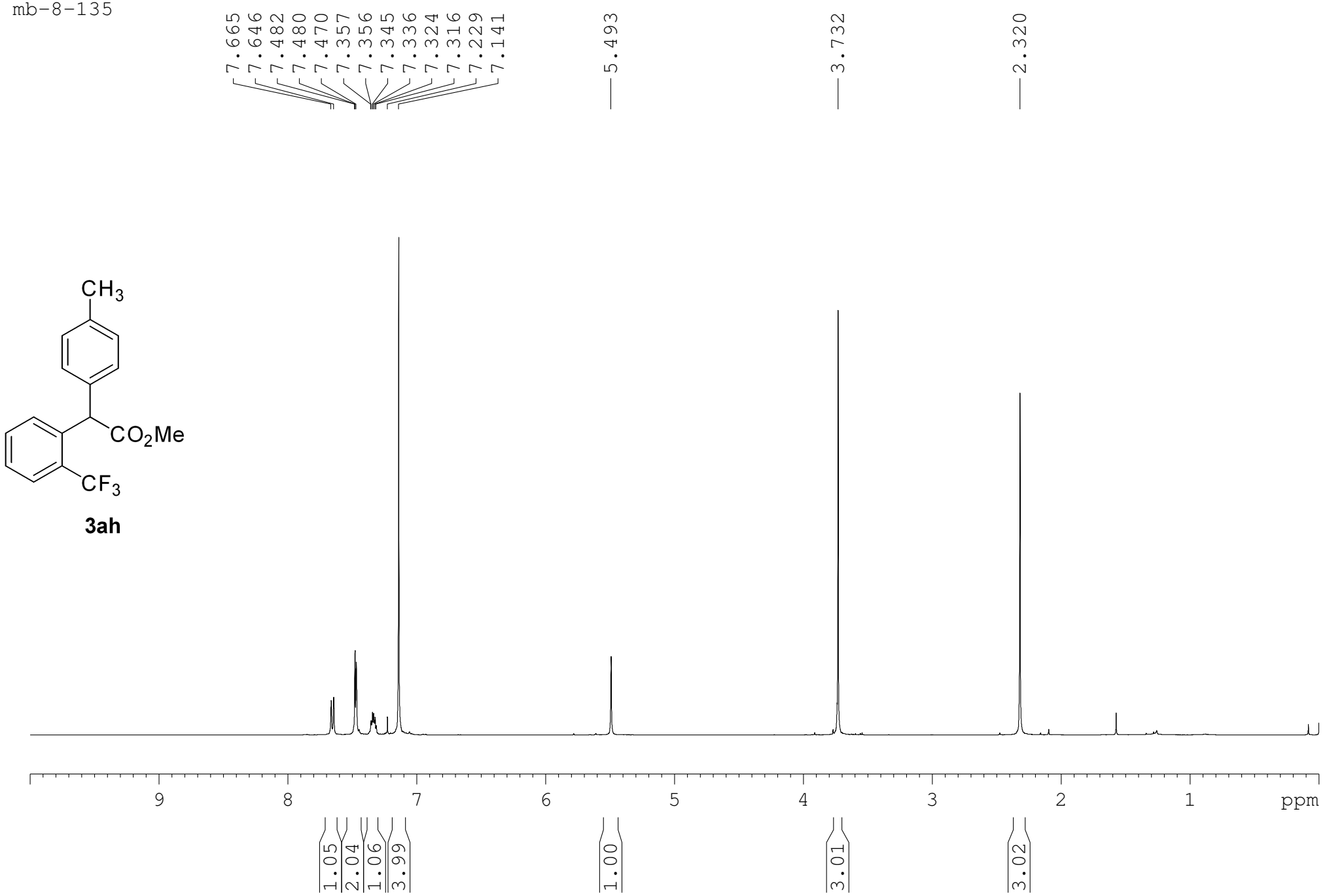


3ag

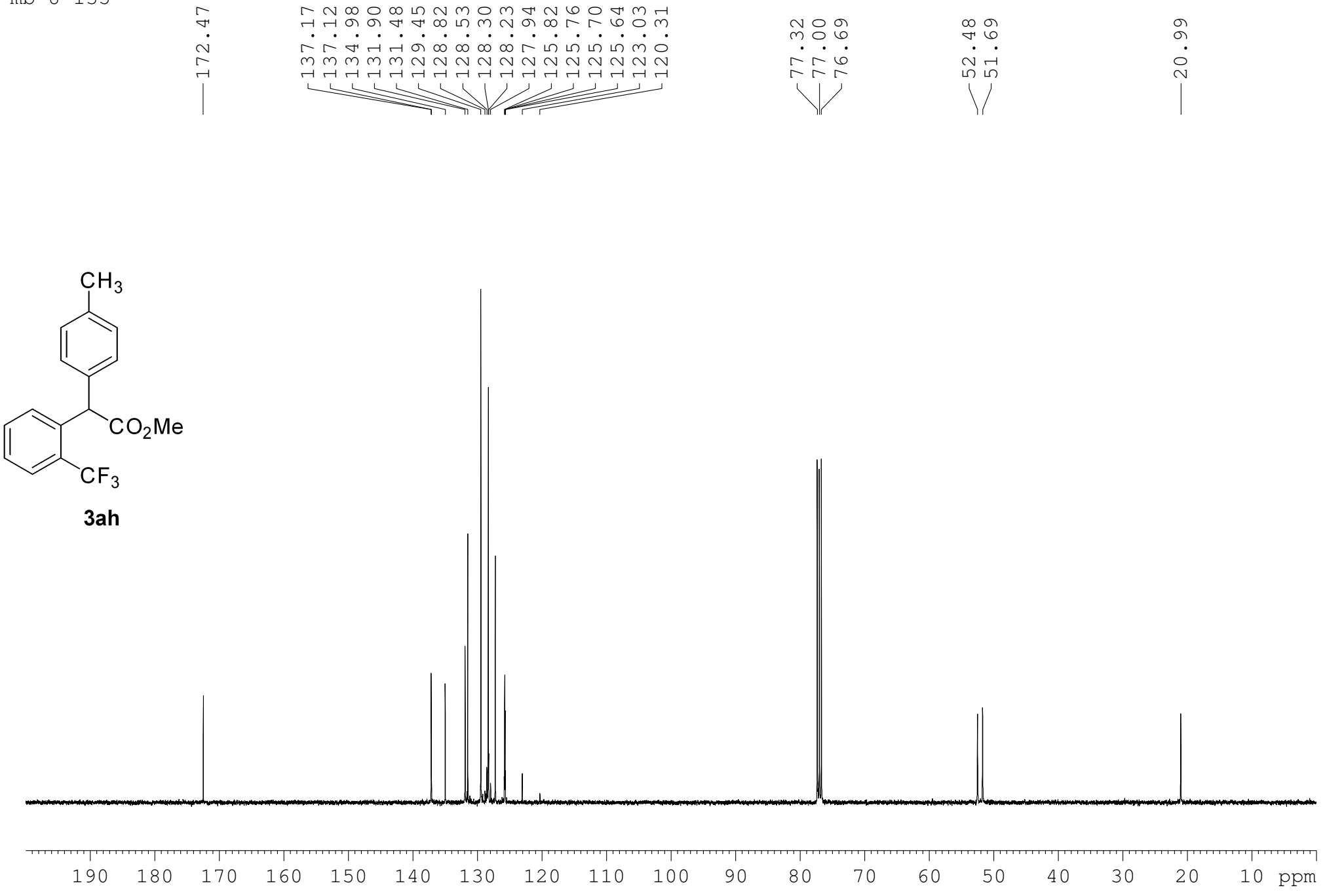
MB-6-72
MB-6-72


172.460
141.418
139.688
137.125
134.395
129.650
129.375
128.898
128.671
128.344
101.594
77.318
77.000
76.683
60.578
52.430
21.048
CH3
CO2Me
I
3ag
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-1
f1 (ppm)

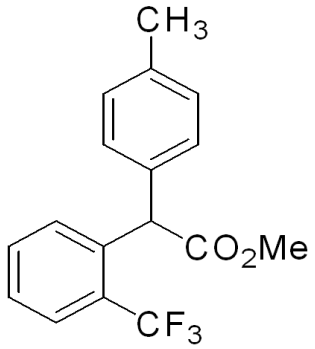
mb-8-135


7.665
7.646
7.482
7.480
7.470
7.357
7.356
7.345
7.336
7.324
7.316
7.229
7.141
5.493
3.732
2.320
CH3
CO2Me
CF3
3ah
9
8
7
6
5
4
3
2
1
ppm
1.05
2.04
1.06
3.99
1.00
3.01
3.02

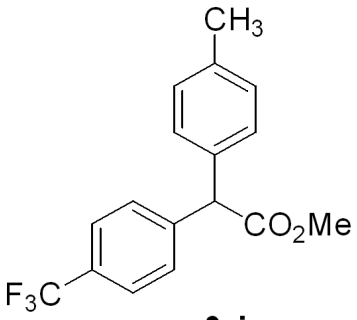
mb-8-135


172.47
137.17
137.12
134.98
131.90
131.48
129.45
128.82
128.53
128.30
128.23
127.94
125.82
125.76
125.70
125.64
123.03
120.31
77.32
77.00
76.69
52.48
51.69
20.99
CH3
CO2Me
CF3
3ah
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

mb-8-135
mb-8-135



mb-8-144

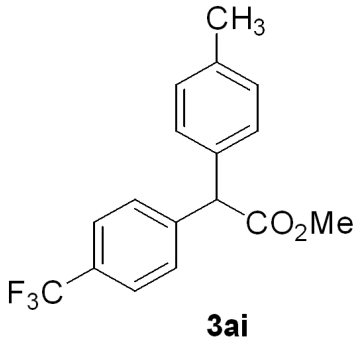

CH3
CO2Me
F3C

3ai

7.468
7.447
7.336
7.315
7.099
7.079
7.051
7.031
4.944
3.634
2.213
9
8
7
6
5
4
3
2
1
ppm
2.06
2.01
4.02
1.00
3.09
3.00

mb-8-144

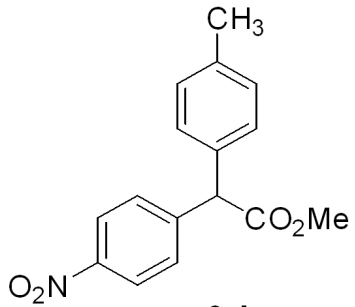
172.42
142.79
137.39
134.76
129.90
129.58
129.50
129.25
128.93
128.29
125.49
125.45
125.41
125.38
122.71
120.00
77.32
77.00
76.68
56.30
52.39
20.94



3ai

mb-7-90 400M

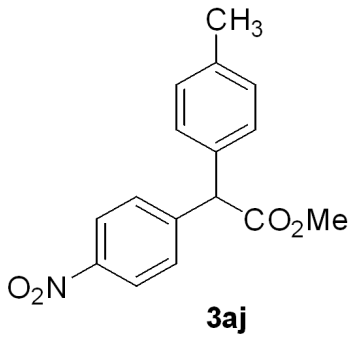
8.165
8.147
8.143
7.489
7.468
7.192
7.171
7.166
7.144
5.082
3.759
2.329



3aj

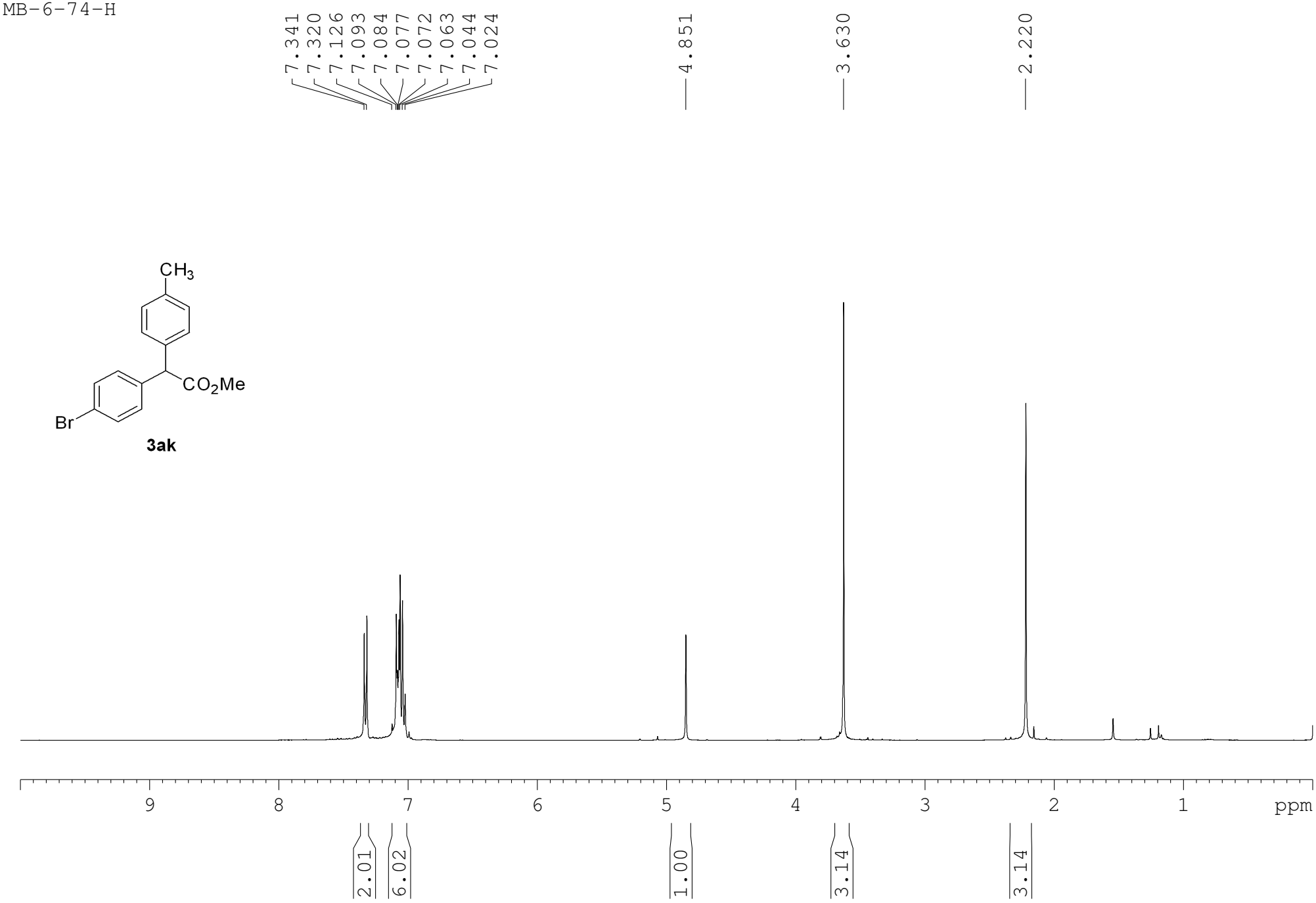
mb-7-90 400M

171.93
147.05
146.06
137.68
134.21
129.64
129.52
128.25
123.64
77.32
77.00
76.68
56.23
52.56
20.97



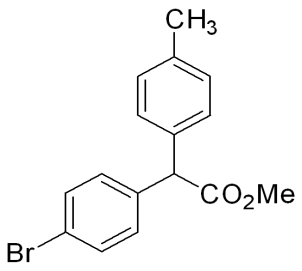
3aj

MB-6-74-H


7.341
7.320
7.126
7.093
7.084
7.077
7.072
7.063
7.044
7.024
4.851
3.630
2.220
CH3
CO2Me
Br
3ak
9
8
7
6
5
4
3
2
1
ppm
2.01
6.02
1.00
3.14
3.14

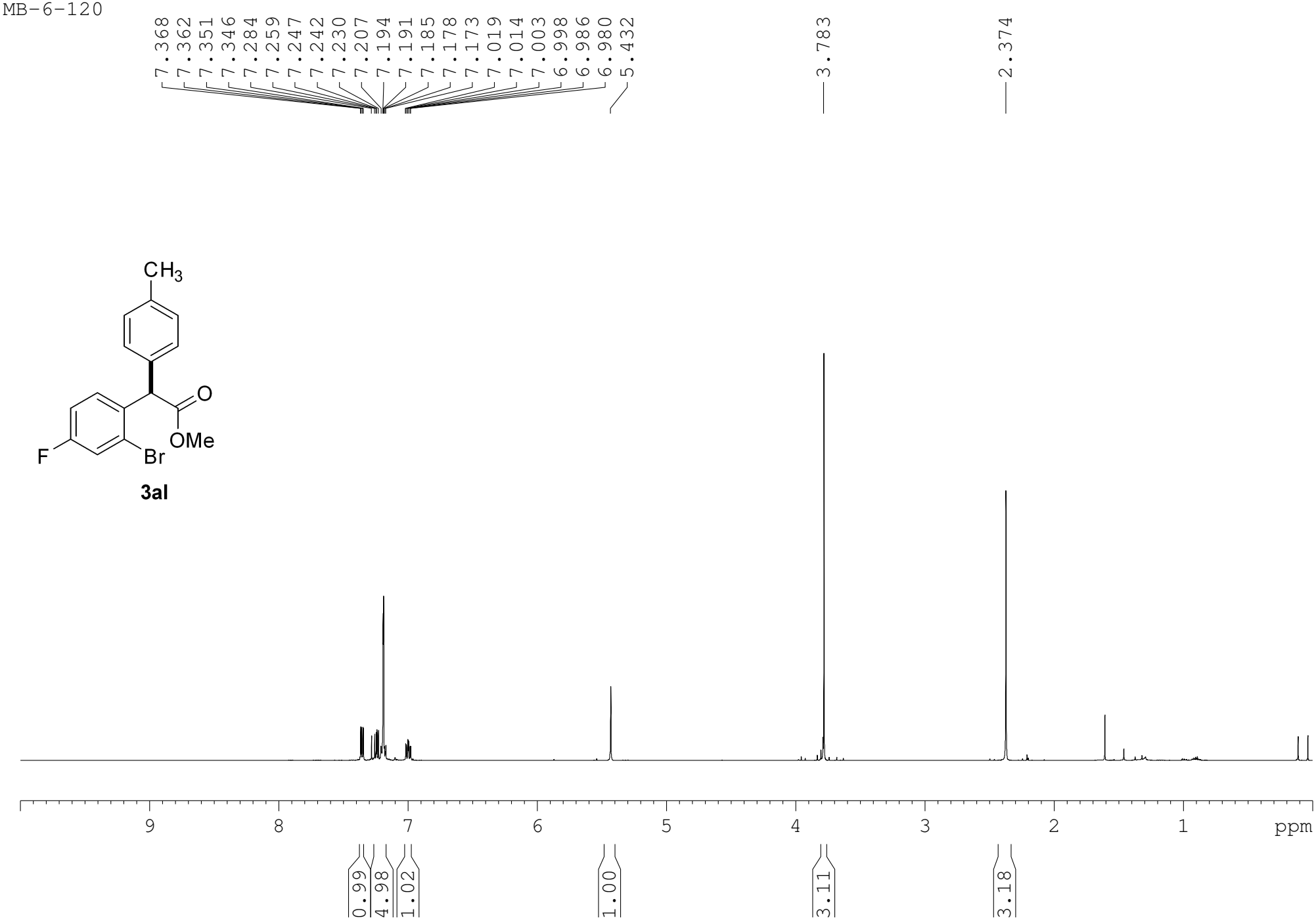
MB-6-74-C

172.61
137.78
137.15
135.02
131.57
130.24
129.37
128.22
121.22
77.32
77.00
76.68
55.90
52.33
20.97



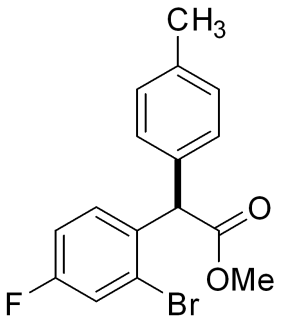
3ak

MB-6-120


7.368
7.362
7.351
7.346
7.284
7.259
7.247
7.242
7.230
7.207
7.194
7.191
7.185
7.178
7.173
7.019
7.014
7.003
6.998
6.986
6.980
5.432
3.783
2.374
CH3
O
OMe
F
Br
3al
9
8
7
6
5
4
3
2
1
ppm
0.99
4.98
1.02
1.00
3.11
3.18

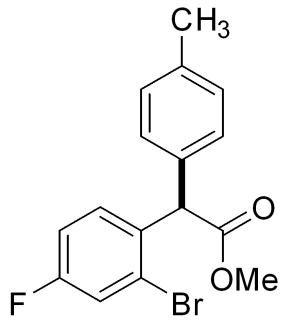
MB-6-120 C 500M

172.35
162.35
160.35
137.42
134.45
134.42
134.06
131.25
131.18
129.57
128.57
124.81
124.74
120.10
119.91
114.70
114.54
77.25
77.00
76.74
55.13
52.52
21.06



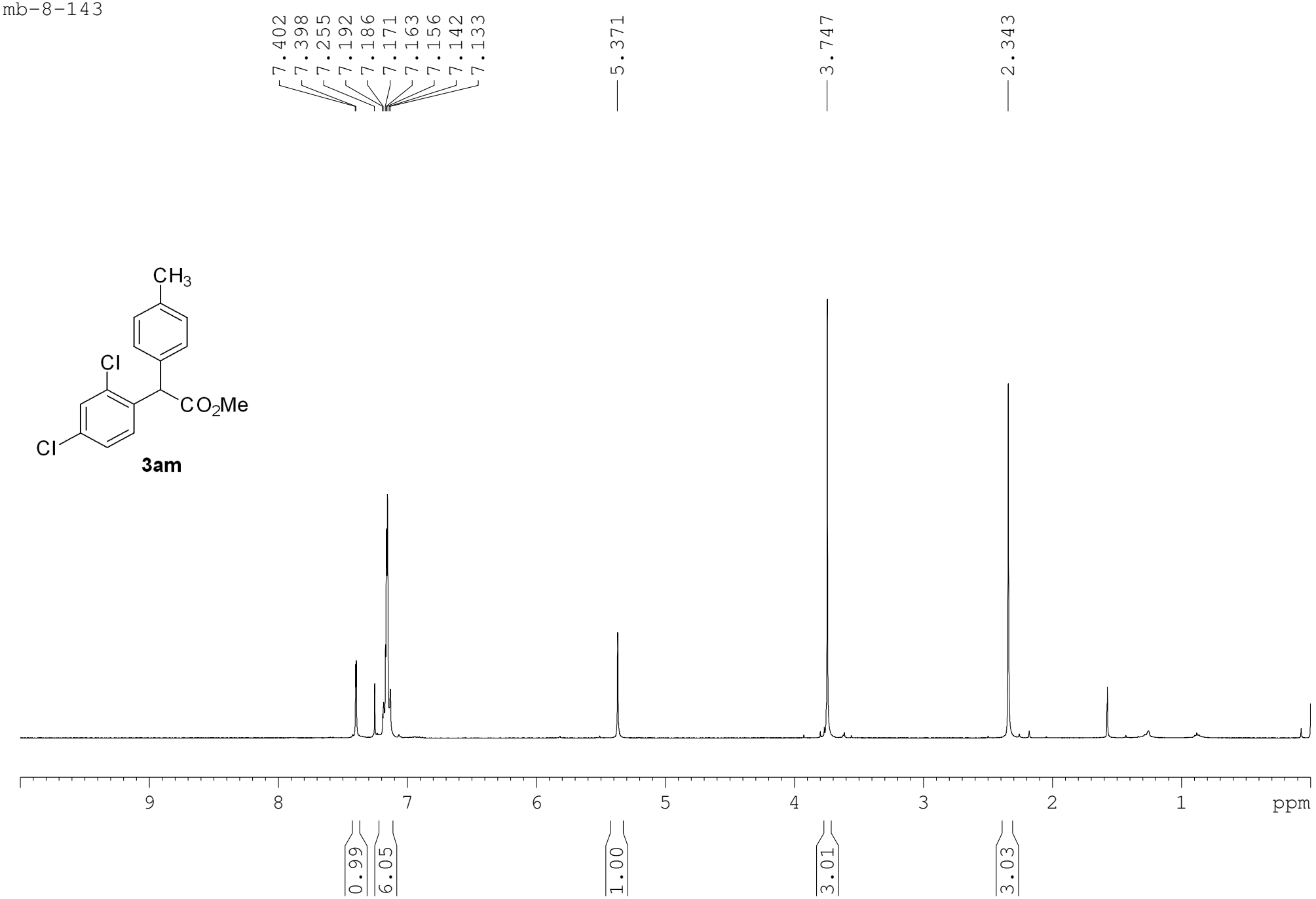
3al

mb-6-120 F
mb-6-120 F

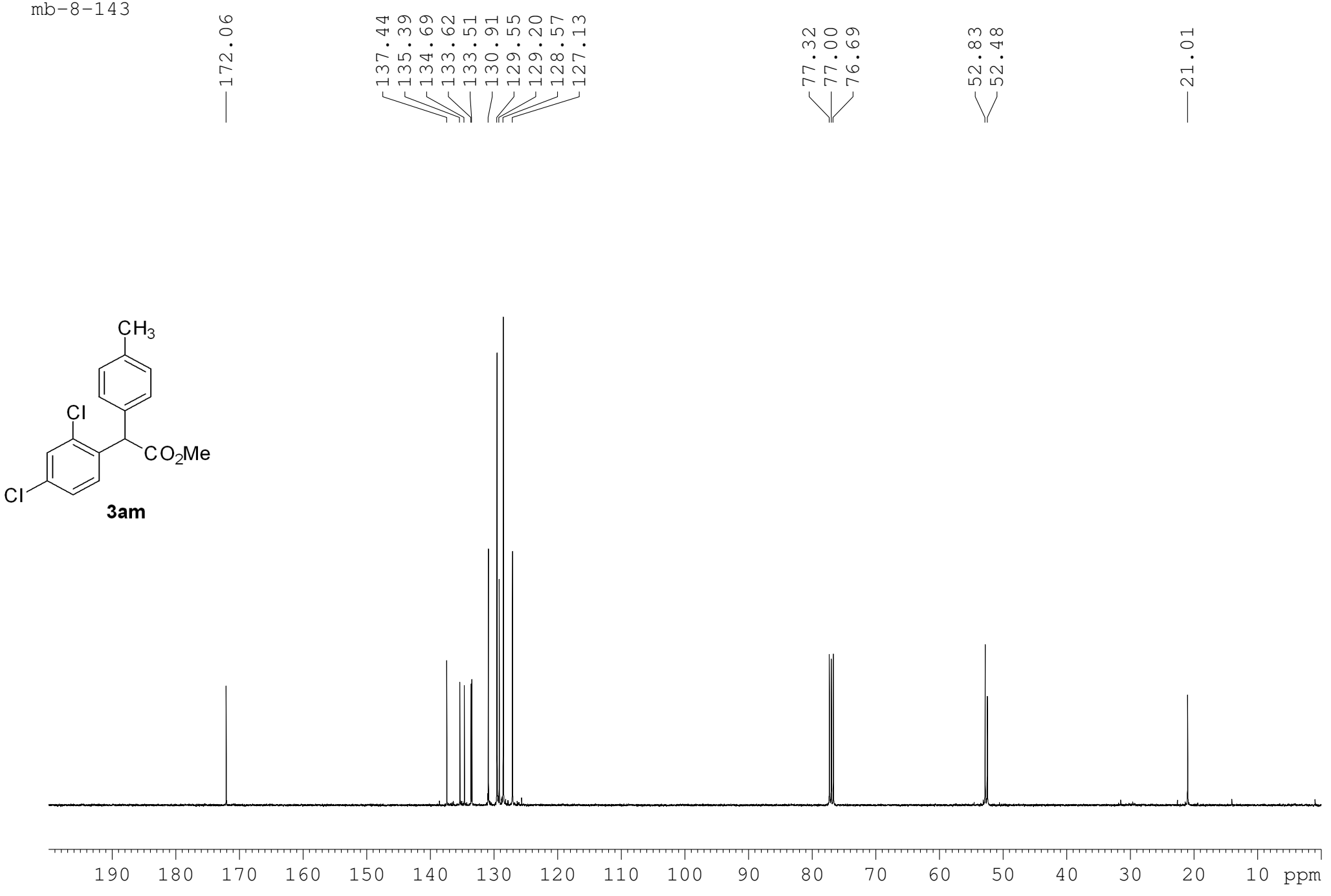


3al

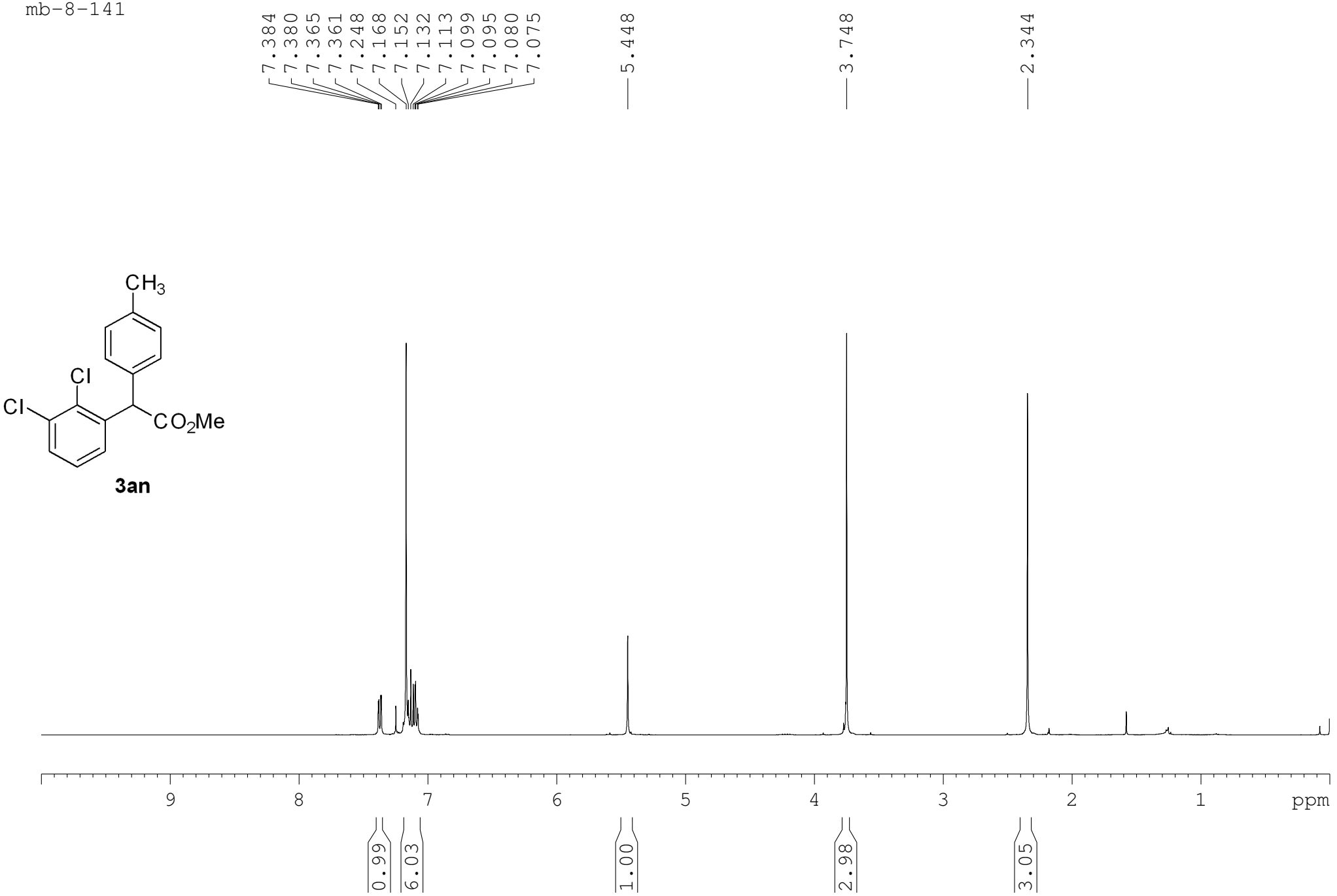
mb-8-143


7.402
7.398
7.255
7.192
7.186
7.171
7.163
7.156
7.142
7.133
5.371
3.747
2.343
CH3
Cl
CO2Me
Cl
3am
9
8
7
6
5
4
3
2
1
ppm
0.99
6.05
1.00
3.01
3.03

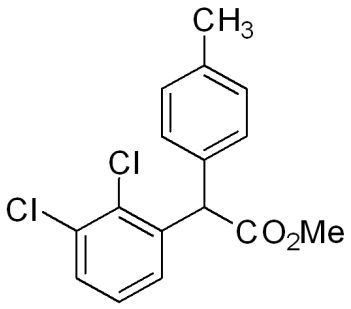
mb-8-143


172.06
137.44
135.39
134.69
133.62
133.51
130.91
129.55
129.20
128.57
127.13
77.32
77.00
76.69
52.83
52.48
21.01
CH3
Cl
CO2Me
Cl
3am
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

mb-8-141


7.384
7.380
7.365
7.361
7.248
7.168
7.152
7.132
7.113
7.099
7.095
7.080
7.075
5.448
3.748
2.344
CH3
Cl
Cl
CO2Me
3an
9
8
7
6
5
4
3
2
1
ppm
0.99
6.03
1.00
2.98
3.05

mb-8-142

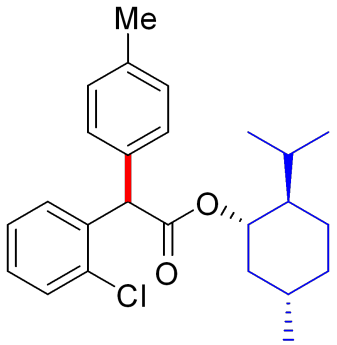

CH3
Cl
Cl
CO2Me

3an

172.08
139.08
137.48
133.46
133.20
132.46
129.53
129.26
128.71
128.18
127.11
77.32
77.00
76.68
54.21
52.51
21.02
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 ppm

mb-9-13p

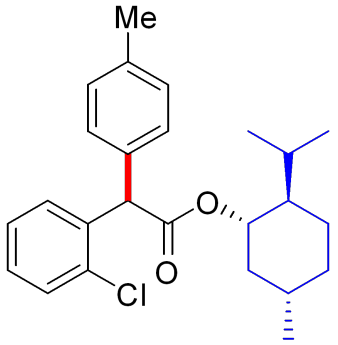
7.272
7.271
7.262
7.255
7.251
7.249
7.118
7.096
7.076
7.066
7.057
7.043
7.036
5.326
5.281
4.672
4.665
4.655
4.645
4.638
4.627
4.618
4.611
4.600
2.231
2.003
1.974
1.938
1.910
1.758
1.747
1.741
1.730
1.723
1.564
1.556
1.537
1.509
1.501
1.382
1.374
1.367
1.254
1.227
0.945
0.915
0.887
0.835
0.806
0.790
0.773
0.737
0.719
0.647
0.632
0.616
0.557
0.539



3ao

mb-9-13p

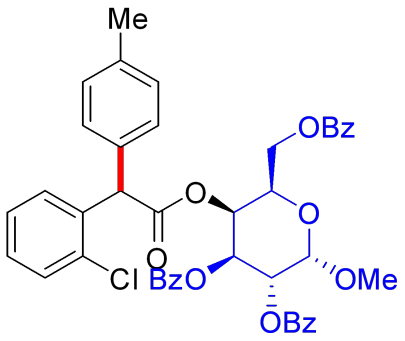
171.47
171.39
137.10
137.03
136.98
136.88
134.27
134.23
134.16
134.03
130.09
129.37
129.29
129.25
128.83
128.72
128.30
128.24
126.65
77.32
77.00
76.68
75.21
75.20
54.09
54.06
53.73
53.70
46.91
46.84
40.51
40.33
34.21
34.19
31.34
31.32
25.84
25.72
23.26
23.21
21.96
21.01
20.62



3ao

mb-9-25p

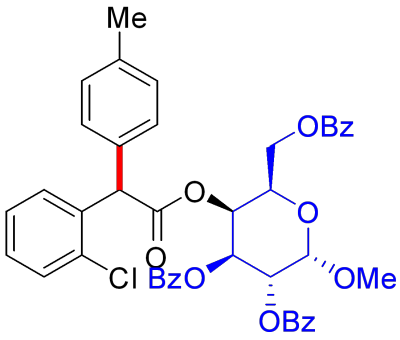
8.004 7.987 7.972 7.785 7.779 7.777 7.767 7.764 7.759 7.574 7.560 7.555 7.508 7.489 7.452 7.447 7.433 7.390 7.372 7.354 7.338 7.300 7.281 7.261 7.249 7.226 7.200 7.180 7.157 7.152 7.137 7.103 7.100 7.096 7.093 7.065 7.046 6.995 6.975 5.898 5.875 5.864 5.848 5.643 5.612 5.603 5.569 5.511 5.502 5.484 5.476 5.203 5.194 5.178 5.169 4.479 4.462 4.447 4.366 4.339 4.086 4.075 3.956 3.938 3.928 3.421 3.414 2.288 2.280



3ap

mb-9-25p

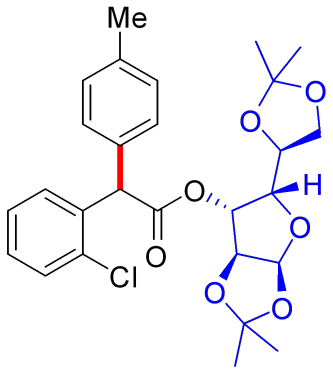
171.23
170.96
165.88
165.80
165.72
165.69
137.46
137.00
136.12
135.89
134.16
134.05
133.60
133.48
133.28
133.18
133.03
132.96
130.24
129.85
129.82
129.78
129.76
129.67
129.57
129.53
129.49
129.39
129.30
129.22
129.19
128.74
128.71
128.60
128.53
128.45
128.38
128.24
128.16
126.97
126.89
97.53
77.32
77.00
76.68
69.54
69.46
68.98
68.89
68.46
66.62
66.57
62.07
61.79
55.63
53.56
53.17
21.05



3ap

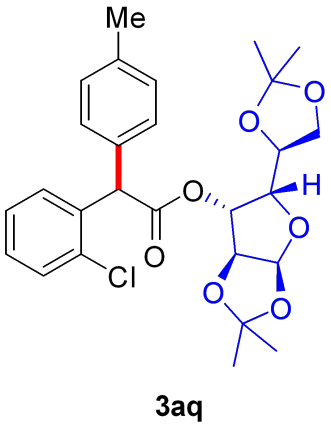
mb-9-24

7.404 7.398 7.389 7.384 7.381 7.366 7.222 7.216 7.210 7.207 7.198 7.194 7.189 7.182 7.177 7.165 7.161 7.146 7.141 5.848 5.839 5.726 5.717 5.422 5.410 5.369 5.362 5.354 4.508 4.499 4.440 4.431 4.200 4.193 4.184 4.175 4.166 3.976 3.955 3.916 3.903 3.894 3.885 3.876 3.871 3.816 3.796 3.790 2.350 2.336 1.506 1.501 1.396 1.375 1.300 1.287 1.277 1.182



3aq

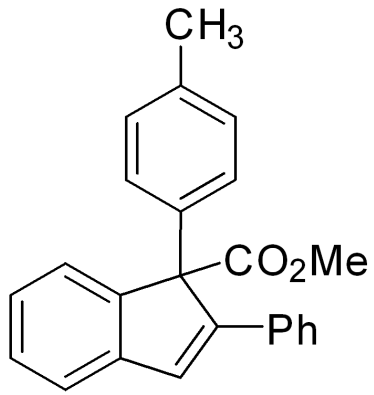
mb-9-24


Me
O
O
H
O
O
O
O
O
Cl

3aq

170.55
170.53
137.44
137.39
136.36
136.35
134.12
134.09
133.43
133.18
130.14
129.96
129.52
129.48
129.42
128.82
128.78
128.68
126.95
126.86
112.35
109.21
109.08
105.10
105.06
83.09
82.94
80.02
77.32
77.00
76.68
76.60
76.57
72.12
72.06
67.21
66.93
53.70
53.62
26.74
26.65
26.21
25.10
24.91
21.06
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

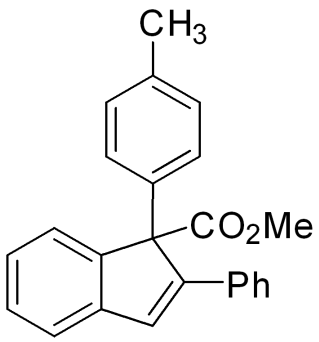
mb-6-43
mb-6-43



9a

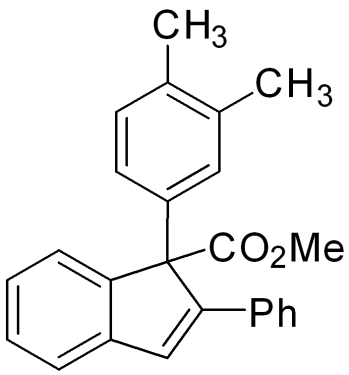
mb-6-43

172.40
150.25
149.13
142.65
136.76
135.45
134.30
129.48
129.06
128.15
127.87
127.55
127.39
127.16
126.25
123.86
121.46
77.25
77.00
76.75
68.54
52.64
20.97



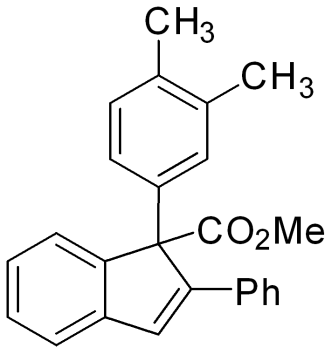
9a

mb-5-94-2-1
mb-5-94-2-1



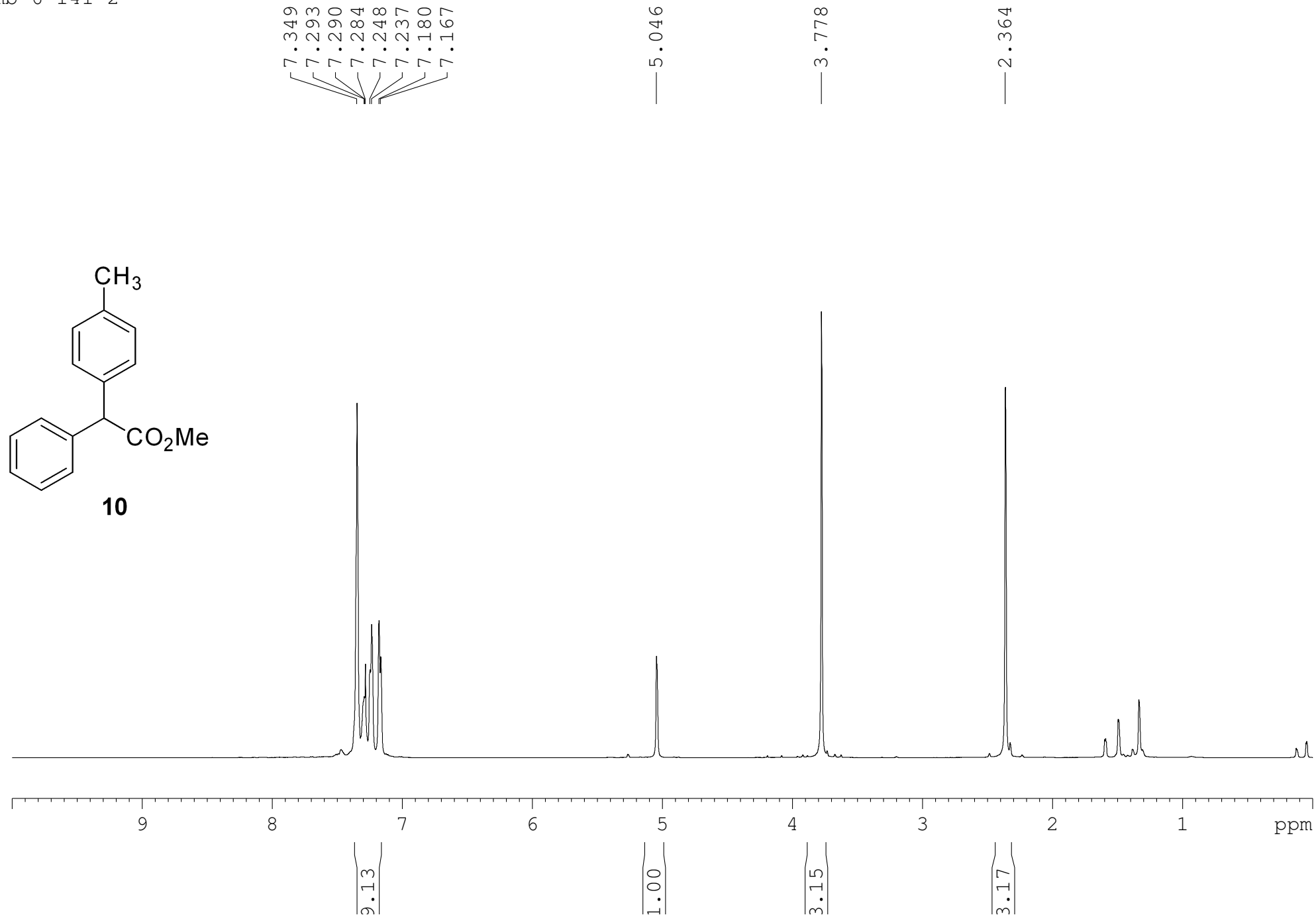
9h

mb-5-94-2
mb-5-94-2

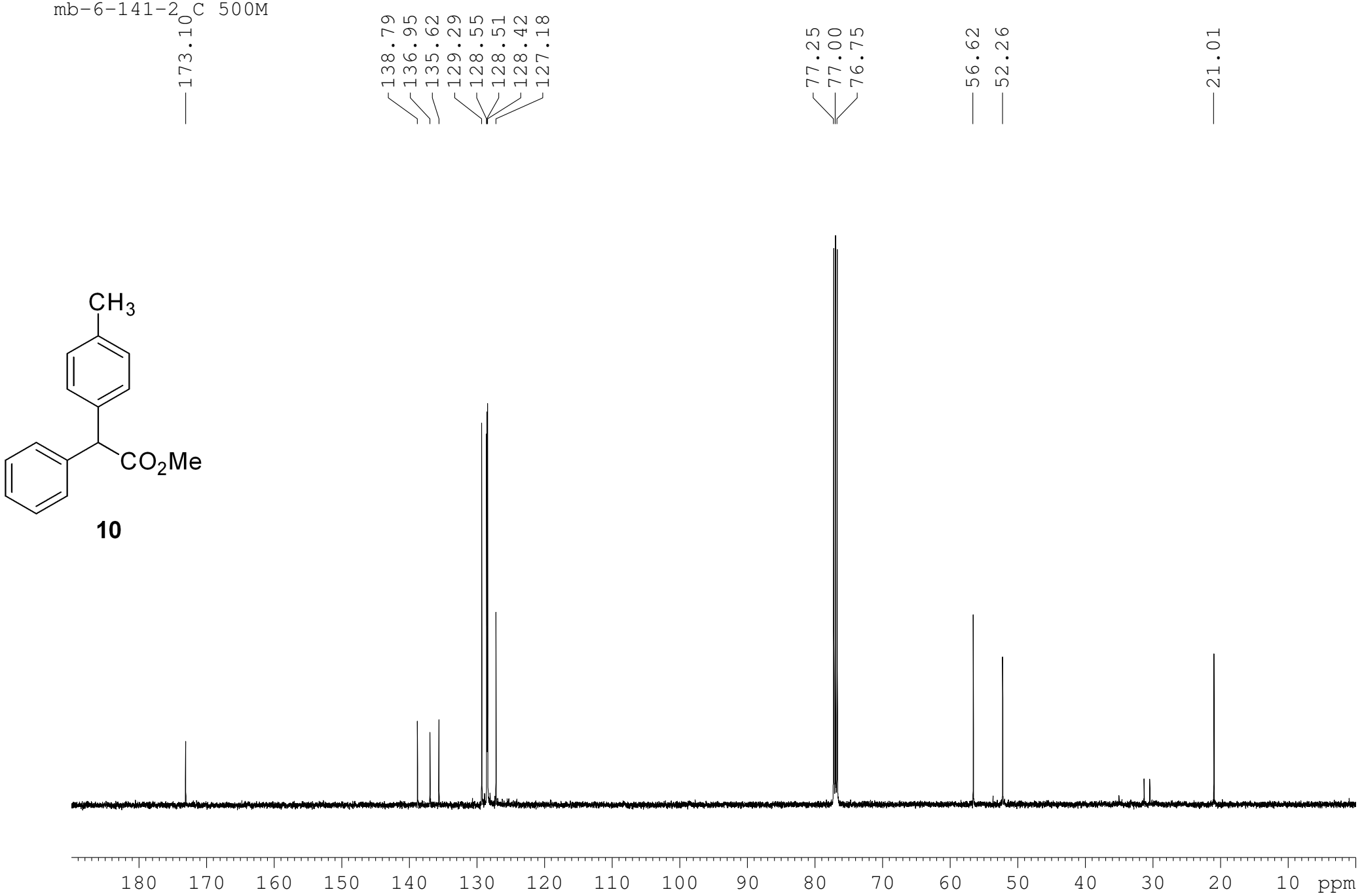


9h

mb-6-141-2

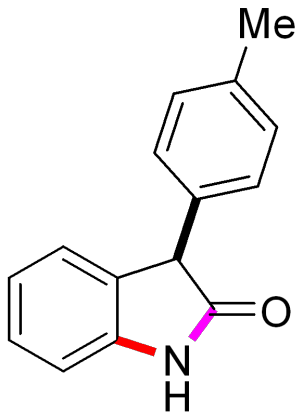

7.349
7.293
7.290
7.284
7.248
7.237
7.180
7.167
5.046
3.778
2.364
CH3
CO2Me
10
9
8
7
6
5
4
3
2
1
ppm
9.13
1.00
3.15
3.17

mb-6-141-2_C 500M



MB-9-146
MB-9-146

9.403
7.221
7.203
7.184
7.150
7.130
7.103
7.083
7.015
6.997
6.978
6.910
6.891
4.586
2.318



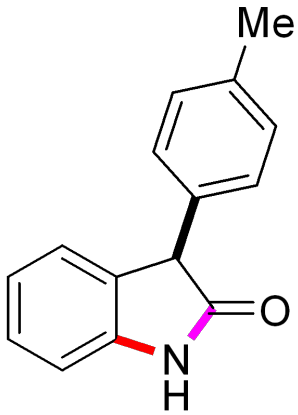
11

1.00
6.04
1.16
1.00
1.06
3.10

f1 (ppm)

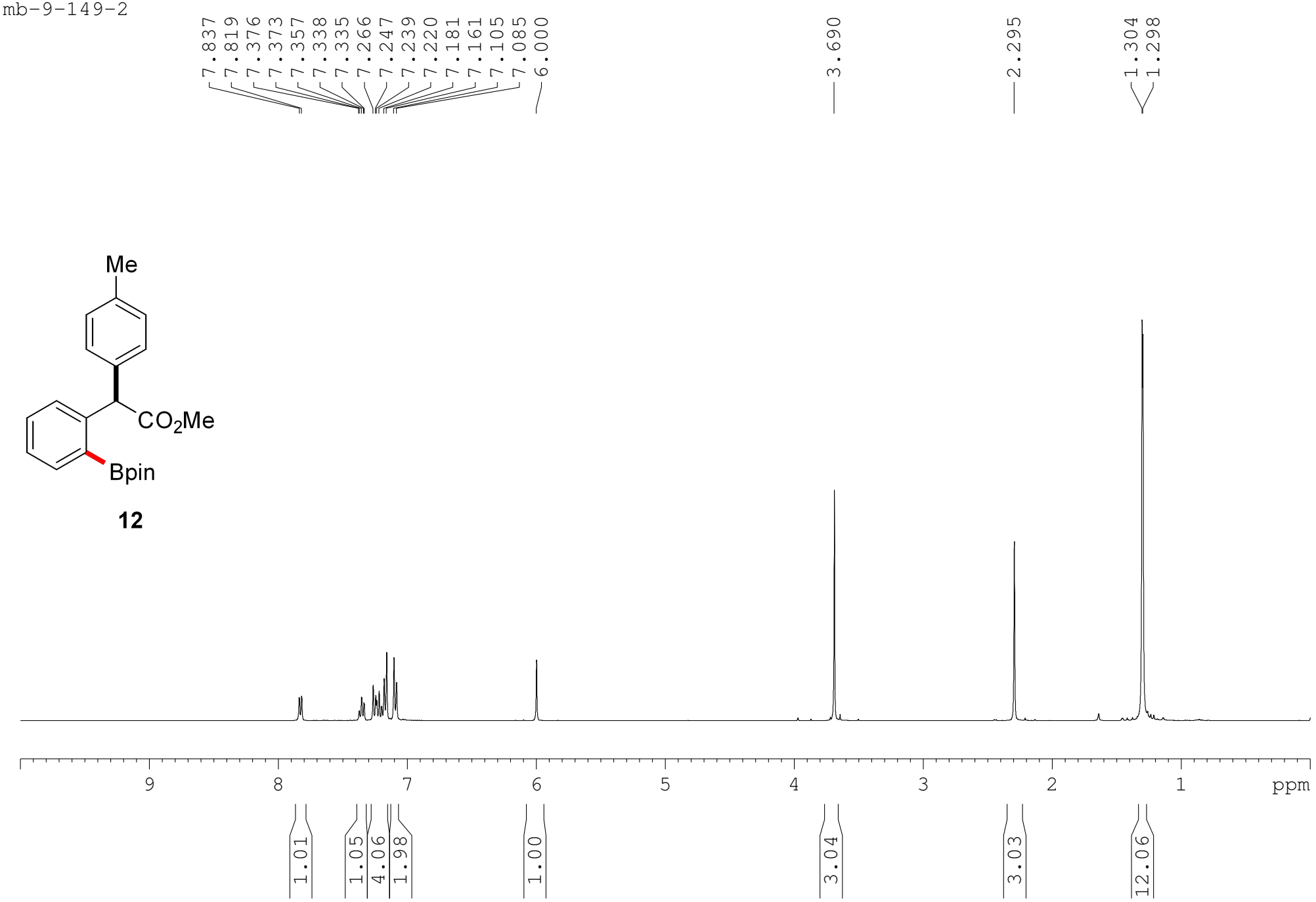
MB-9-146
MB-9-146

179.453
141.726
137.332
133.358
129.817
129.608
128.309
128.249
125.082
122.637
110.124
77.317
77.000
76.682
52.420
21.046

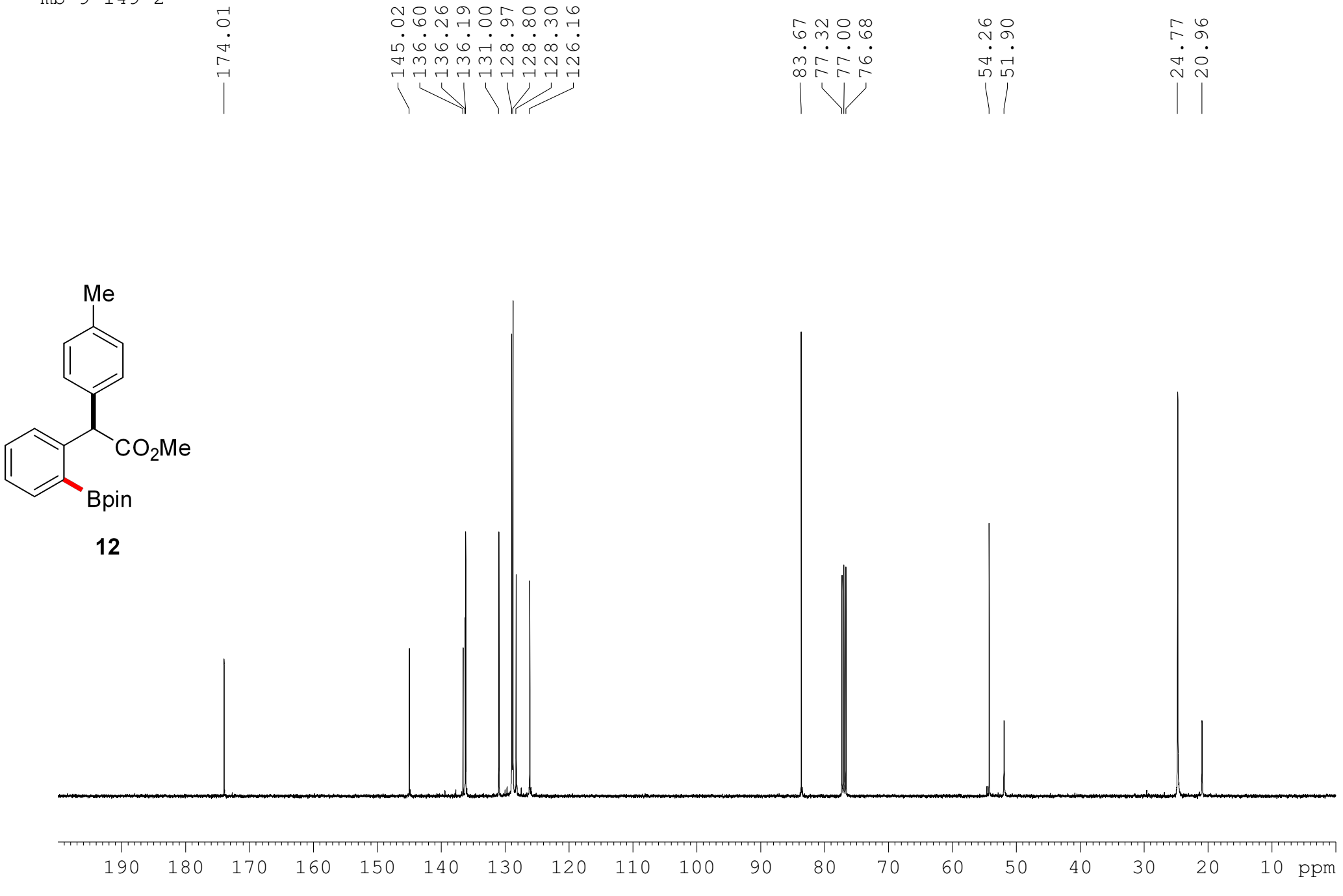


11

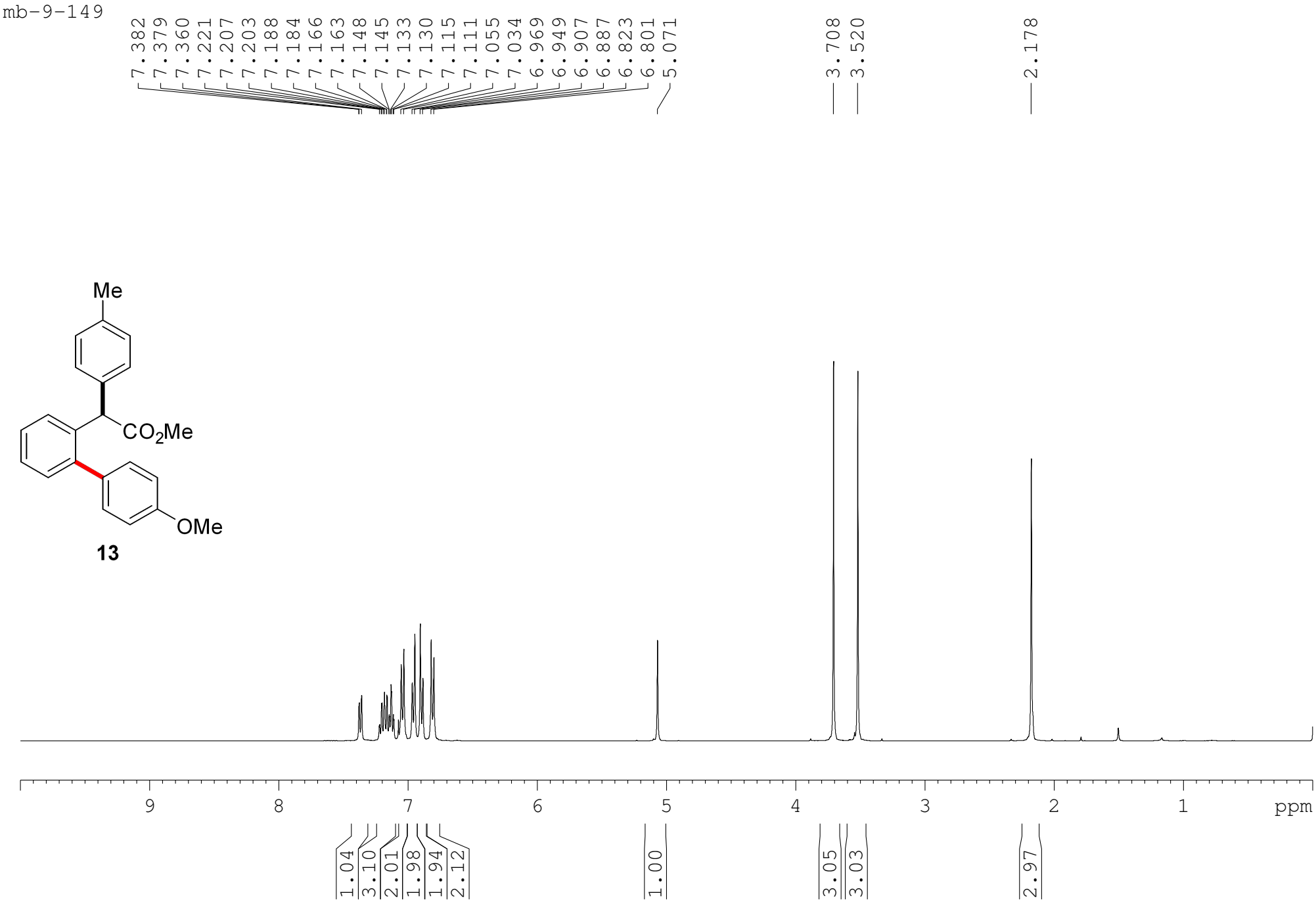
mb-9-149-2


7.837
7.819
7.376
7.373
7.357
7.338
7.335
7.266
7.247
7.239
7.220
7.181
7.161
7.105
7.085
6.000
3.690
2.295
1.304
1.298
Me
CO2Me
Bpin
12
9
8
7
6
5
4
3
2
1
ppm
1.01
1.05
4.06
1.98
1.00
3.04
3.03
12.06

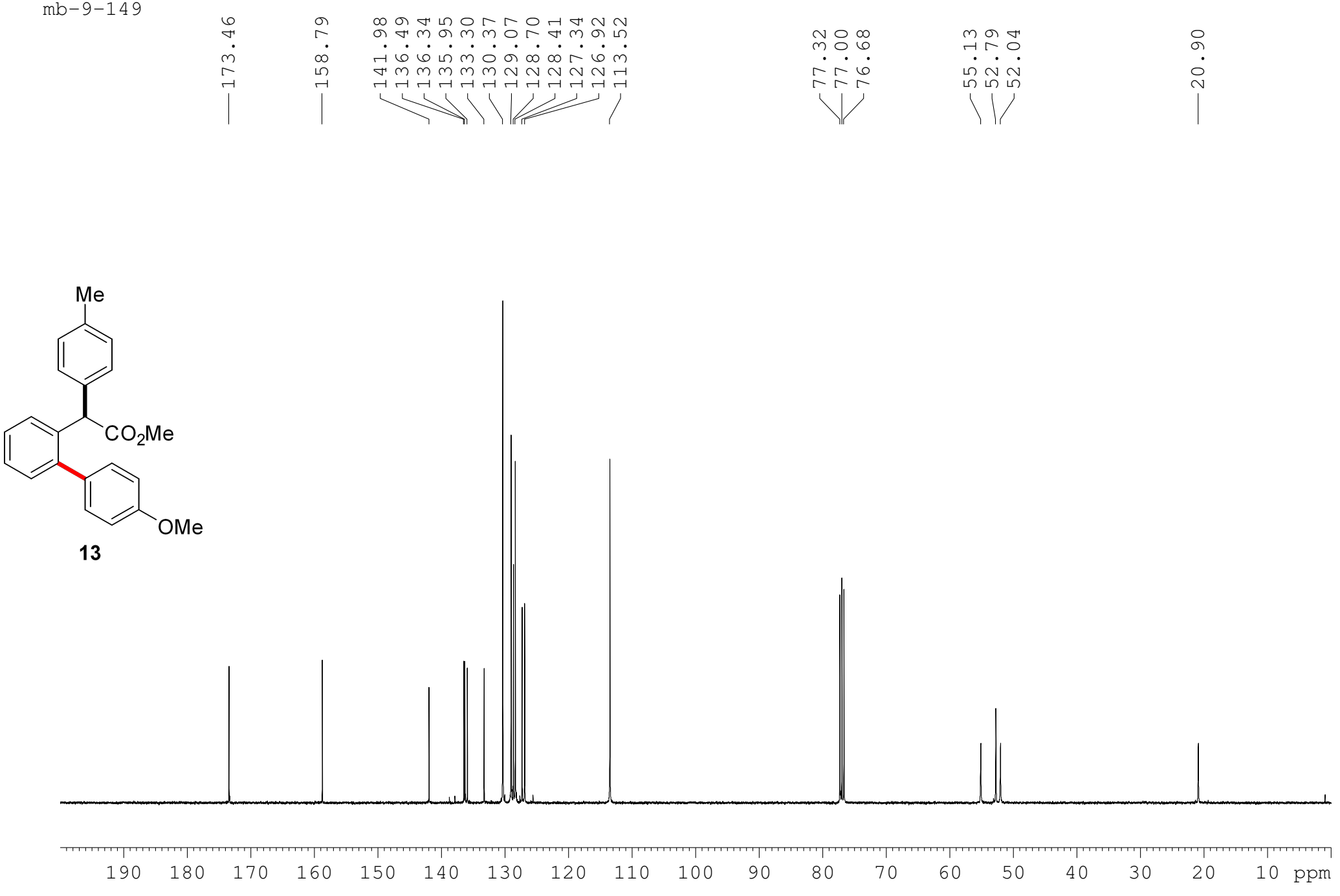
mb-9-149-2


174.01
145.02
136.60
136.26
136.19
131.00
128.97
128.80
128.30
126.16
83.67
77.32
77.00
76.68
54.26
51.90
24.77
20.96
Me
CO2Me
Bpin
12
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

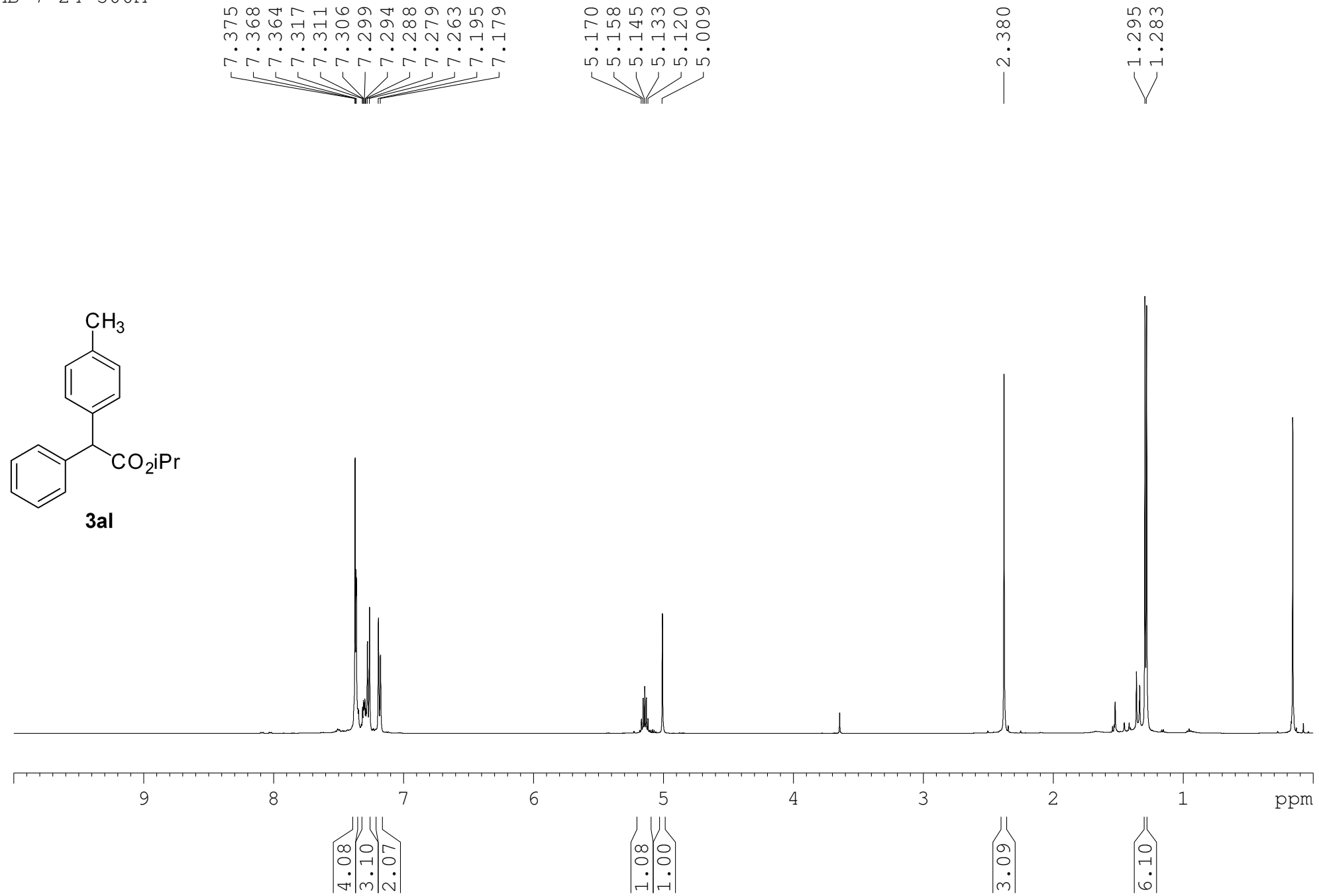
mb-9-149


7.382
7.379
7.360
7.221
7.207
7.203
7.188
7.184
7.166
7.163
7.148
7.145
7.133
7.130
7.115
7.111
7.055
7.034
6.969
6.949
6.907
6.887
6.823
6.801
5.071
3.708
3.520
2.178
Me
CO2Me
OMe
13
9
8
7
6
5
4
3
2
1
ppm
1.04
3.10
2.01
1.98
1.94
2.12
1.00
3.05
3.03
2.97

mb-9-149

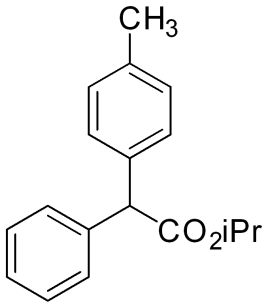

173.46
158.79
141.98
136.49
136.34
135.95
133.30
130.37
129.07
128.70
128.41
127.34
126.92
113.52
77.32
77.00
76.68
55.13
52.79
52.04
20.90
Me
CO2Me
OMe
13
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

MB-7-24 500M


7.375
7.368
7.364
7.317
7.311
7.306
7.299
7.294
7.288
7.279
7.263
7.195
7.179
5.170
5.158
5.145
5.133
5.120
5.009
2.380
1.295
1.283
CH3
CO2iPr
3al
9
8
7
6
5
4
3
2
1
ppm
4.08
3.10
2.07
1.08
1.00
3.09
6.10

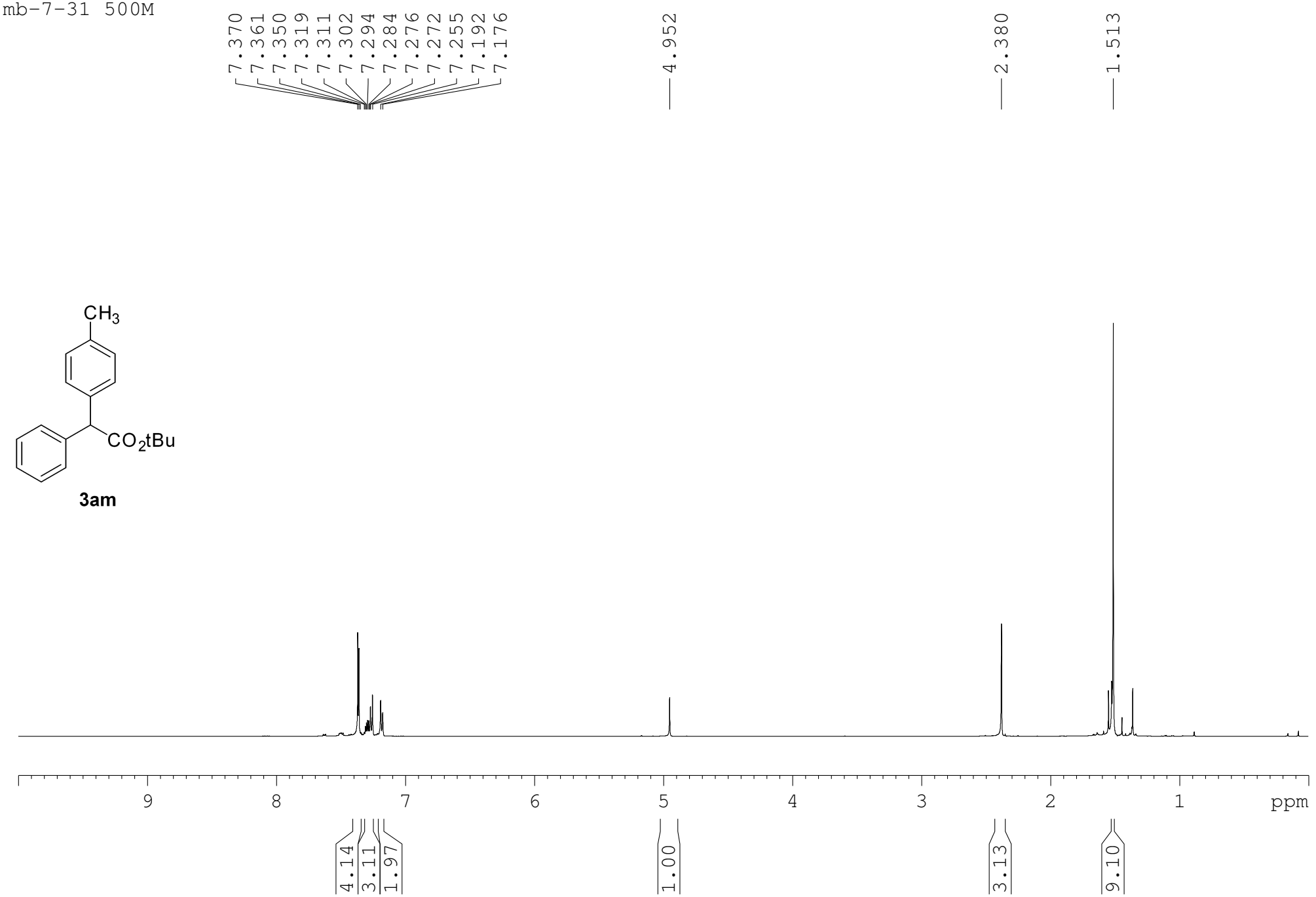
MB-7-24 500M C

172.07
139.08
136.69
135.88
129.17
128.48
128.42
128.40
126.99
77.25
77.00
76.74
68.43
56.86
21.62
20.98



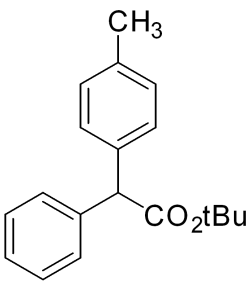
3al

mb-7-31 500M


7.370
7.361
7.350
7.319
7.311
7.302
7.294
7.284
7.276
7.272
7.255
7.192
7.176
4.952
2.380
1.513
CH3
CO2tBu
3am
9
8
7
6
5
4
3
2
1
ppm
4.14
3.11
1.97
1.00
3.13
9.10

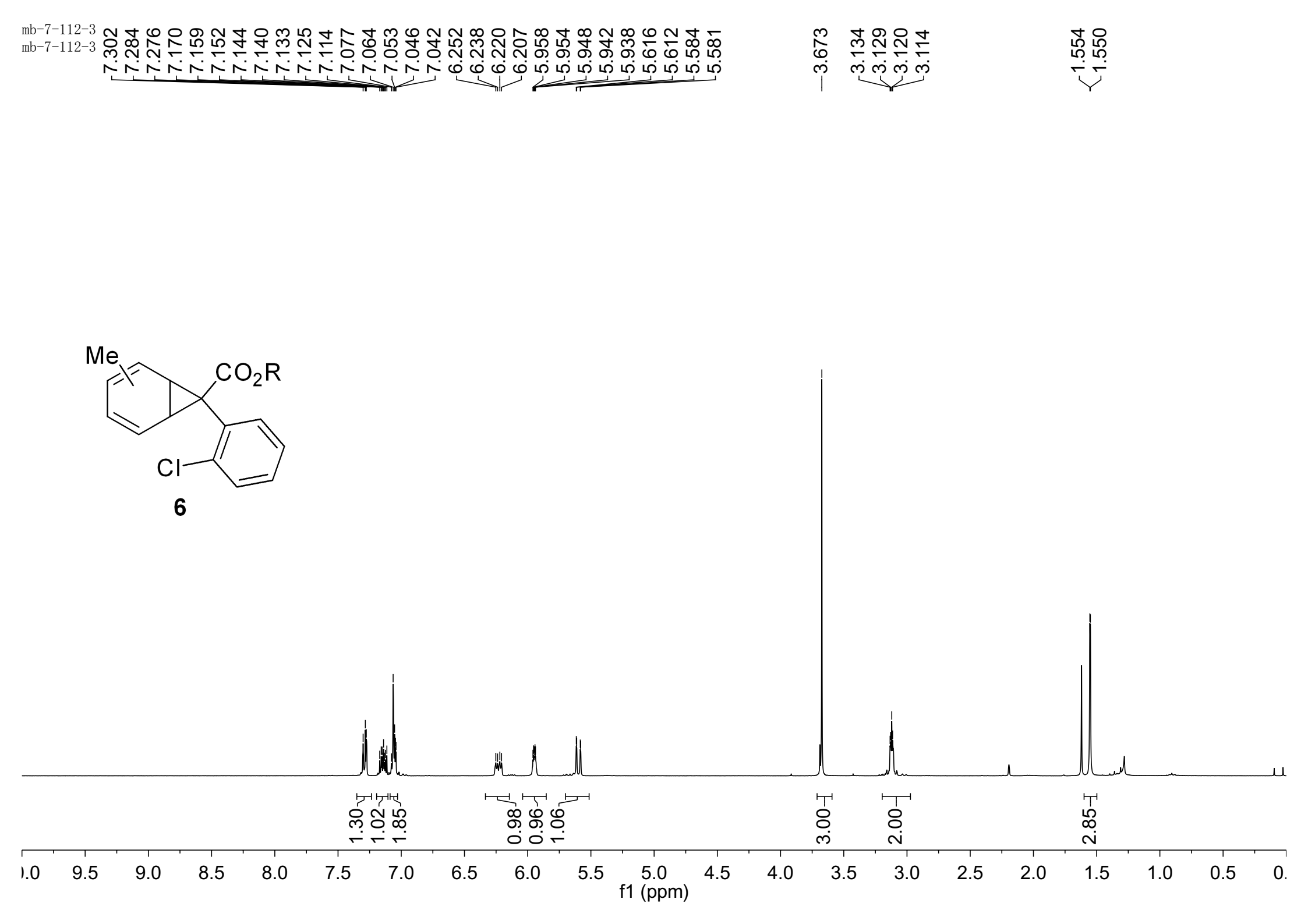
MB-7-31 500M-3

171.76
139.40
136.50
136.20
129.10
128.45
128.37
128.35
126.84
81.09
77.25
77.00
76.74
57.58
27.90
20.95



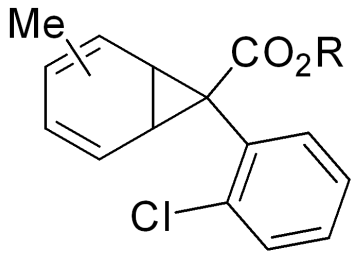
3am

mb-7-112-3
mb-7-112-3



mb-7-122-3
mb-7-122-3

176.210
136.892
135.333
133.171
130.816
129.363
128.597
128.248
124.794
124.296
119.028
77.318
77.000
76.683
52.855
37.637
36.728
24.263
21.084



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