

Nickel-Mediated Oxidative α -C(sp³)-H Functionalization of Amides with Allylic Alcohols Terminated by Radical 1,2-Aryl Migration

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Supporting Information

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(A) Typical experimental procedure

(a) General Considerations:

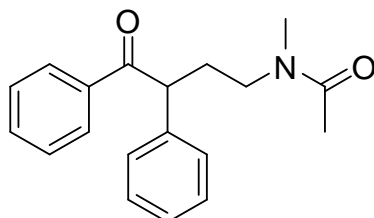
The ^1H , ^{13}C and ^{19}F NMR spectra were recorded in CDCl_3 solvent on a 400 MHz NMR spectrometer. Melting points are uncorrected. IR spectra were recorded with a FTIR spectrophotometer by using KBr optics. Mass spectra (MS) were measured on spectrometer by direct inlet at 70 eV with EI ion source and signals were given in m/z with relative intensity (%) in brackets. HRMS was measured on an electrospray ionization (ESI) apparatus using time-of-flight (TOF) mass spectrometry.

(b) Typical Procedures for the Synthesis of Substrates 1: All of compounds 1 were synthesized according to the literature.^[1]

(c) Typical Experimental Procedure for the Nickel-Catalyzed Oxidative $\text{C}(\text{sp}^3)\text{-H}$ Functionalization of Amides with α,α -Diaryl Allylic Alcohols *via* Radical 1,2-Aryl Migration:

Allylic alcohol **1** (0.2 mmol), N,N -substituted amides **2** (1 mL), DTBP (di-*tert*-butyl peroxide) (0.6 mmol) was stirred at 150 °C (oil bath temperature) under air for the indicated time until complete consumption of starting material as monitored by TLC and GC-MS analysis. After the reaction was finished, the reaction mixture was diluted in Et_2O , and washed with brine. The aqueous phase was re-extracted with diethyl ether. The combined organic extracts were dried over Na_2SO_4 and concentrated in vacuum, and the resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to afford the product.

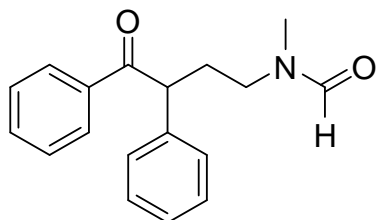
(B) Analytical data for 3 and 4



***N*-Methyl-*N*-(4-oxo-3,4-diphenylbutyl)acetamide (3aa):**

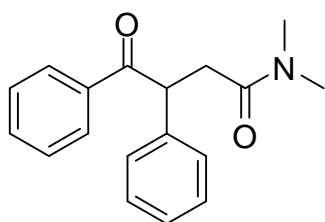
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.96-7.93 (m, 2H), 7.50-7.44 (m, 1H), 7.40-7.35 (m, 2H), 7.32-7.20 (m, 4H), 7.17 (t, $J = 7.2$ Hz, 1H), 4.68-4.50 (m, 1H), 3.56-3.22 (m, 2H), 2.89 (d,

$J = 9.2$ Hz, 3H), 2.57-2.42 (m, 1H), 2.11-1.89 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.1, 198.5, 170.7, 170.4, 139.2, 138.6, 136.3, 136.1, 133.1, 132.8, 129.2, 128.9, 128.6 (2C), 128.4, 128.0, 127.9, 127.4, 127.0, 51.1, 50.7, 48.8, 45.8, 35.8, 33.0, 32.3, 31.5, 21.6, 20.9; IR (KBr, cm^{-1}): 1679, 1639, 1598, 1492; LRMS (EI, 70 eV) m/z (%): 295 (M^+ , 4), 222 (17), 196 (27), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{19}\text{H}_{22}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 296.1645, found 296.1640.



***N*-Methyl-*N*-(4-oxo-3,4-diphenylbutyl)formamide (3ab):**

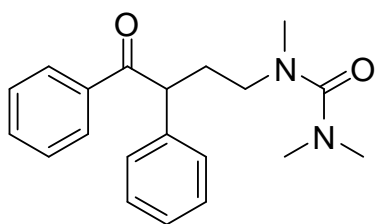
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.94-7.90 (m, 3H), 7.51-7.45 (m, 1H), 7.41-7.30 (m, 2H), 7.29-7.23 (m, 3H), 7.23-7.18 (m, 1H), 4.64-4.49 (m, 1H), 3.47-3.20 (m, 2H), 2.88 (d, $J = 8.0$ Hz, 3H), 2.55-2.43 (m, 1H), 2.13-1.97 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.0, 198.6, 162.7 (2C), 139.0, 138.2, 136.4, 136.1, 133.2, 133.0, 129.3, 129.1, 128.7 (2C), 128.6, 128.5, 128.1 (2C), 127.6, 127.2, 51.3, 50.2, 47.4, 42.7, 34.4, 31.8, 30.9, 29.4; IR (KBr, cm^{-1}): 1680, 1644, 1493, 1449; LRMS (EI, 70 eV) m/z (%): 281 (M^+ , 5), 236 (27), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{18}\text{H}_{19}\text{NNaO}_2$ ($[\text{M}+\text{Na}]^+$) 304.1308, found 304.1301.



***N,N*-Dimethyl-4-oxo-3,4-diphenylbutanamide (3ab'):**

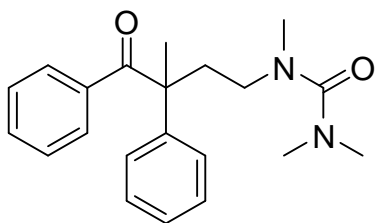
White solid, mp 112.2-113.1 $^\circ\text{C}$ (uncorrected); ^1H NMR (400 MHz, CDCl_3) δ : 8.01 (d, $J = 8.4$ Hz, 2H), 7.45 (t, $J = 7.2$ Hz, 1H), 7.38-7.28 (m, 6H), 7.20 (t, $J = 7.2$ Hz, 1H), 5.25 (dd, $J = 10.4$ Hz, 4.0 Hz, 1H), 3.52 (dd, $J = 16.4$ Hz, 10.4 Hz, 1H), 3.01 (s, 3H), 2.91 (s, 3H), 2.63 (dd, $J = 16.4$ Hz, 3.6 Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.5, 171.0, 138.7, 136.6, 132.7, 129.0, 128.9, 128.4, 128.2, 127.2, 49.5, 38.6, 37.1, 35.4; IR (KBr, cm^{-1}): 1682, 1646, 1494, 1449; LRMS (EI, 70 eV) m/z

(%): 281 (M^+ , 5), 236 (28), 105 (100); HRMS m/z (ESI) calcd for $C_{18}H_{19}NNaO_2$ ($[M+Na]^+$) 304.1303, found 304.1301.



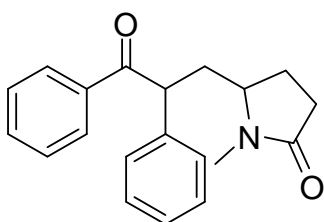
1,1,3-Trimethyl-3-(4-oxo-3,4-diphenylbutyl)urea (3ac):

Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.94 (d, $J = 8.8$ Hz, 2H), 7.49-7.45 (m, 1H), 7.38 (t, $J = 7.6$ Hz, 2H), 7.30-7.25 (m, 4H), 7.21-7.17 (m, 1H), 4.57 (t, $J = 7.2$ Hz, 1H), 3.27-3.10 (m, 2H), 2.78 (s, 3H), 2.62 (s, 6H), 2.53-2.45 (m, 1H), 2.08-2.00 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 199.2, 165.3, 139.3, 136.6, 132.9, 129.0, 128.7, 128.5, 128.1, 127.1, 51.1, 48.7, 38.5, 36.4, 31.8; IR (KBr, cm^{-1}): 1680, 1636, 1495, 1385; LRMS (EI, 70 eV) m/z (%): 324 (M^+ , 1), 280 (2), 252 (2), 196 (26), 129 (100); HRMS m/z (ESI) calcd for $C_{20}H_{25}N_2O_2$ ($[M+H]^+$) 325.1911, found 325.1902.



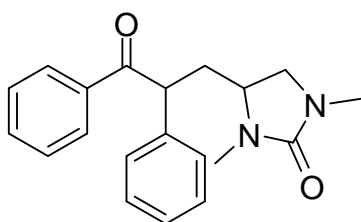
1,1,3-Trimethyl-3-(3-methyl-4-oxo-3,4-diphenylbutyl)urea (3gc):

Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.49 (d, $J = 8.4$ Hz, 2H), 7.43-7.41 (m, 6H), 7.26 (t, $J = 7.6$ Hz, 2H), 3.12-2.96 (m, 2H), 2.70 (s, 9H), 2.39-2.30 (m, 2H), 1.69 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 203.1, 165.3, 143.4, 136.4, 131.7, 129.5, 129.0, 128.0, 127.0, 126.1, 53.5, 46.6, 38.5, 37.3, 36.3, 23.7; IR (KBr, cm^{-1}): 1674, 1644, 1599, 1507; LRMS (EI, 70 eV) m/z (%): 338 (M^+ , 1), 294 (1), 210 (20), 129 (89), 115 (100); HRMS m/z (ESI) calcd for $C_{21}H_{27}N_2O_2$ ($[M+H]^+$) 339.2067, found 339.2060.

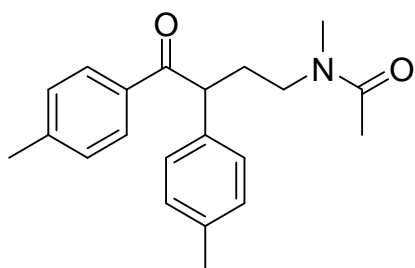


1-Methyl-5-(3-oxo-2,3-diphenylpropyl)pyrrolidin-2-one (3ad):

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 8.02-7.99 (m, 2H), 7.47-7.21 (m, 7H), 7.21-7.18 (m, 1H), 5.41-5.30 (m, 1H), 3.27-3.18 (m, 2H), 2.82, 2.66 (s, 3H), 2.39-2.07 (m, 4H), 1.71-1.58 (m, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ : 200.1 (2C), 176.7, 176.6, 139.5, 139.1, 137.0, 136.5, 132.8, 132.7, 128.9 (3C), 128.8 (2C), 128.5, 128.4, 128.3, 128.2, 127.0, 50.7, 50.2, 47.5, 39.3, 38.0, 36.5, 36.0, 29.6 (2C), 26.0, 25.9; IR (KBr, cm^{-1}): 1680, 1597, 1579, 1492; LRMS (EI, 70 eV) m/z (%): 307 (M^+ , 1), 196 (92), 98 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{22}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 308.1645, found 308.1635.

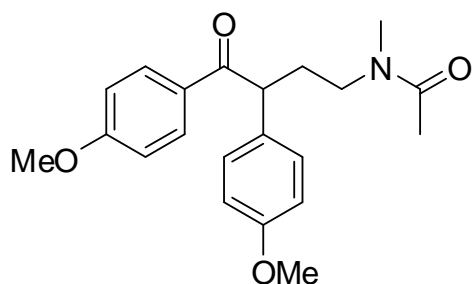
**1,3-Dimethyl-4-(3-oxo-2,3-diphenylpropyl)imidazolidin-2-one (3ae):**

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.96-7.93 (m, 2H), 7.50 (t, $J = 7.2$ Hz, 1H), 7.40 (t, $J = 7.6$ Hz, 2H), 7.32-7.20 (m, 5H), 4.63-4.58 (m, 1H), 3.45-3.40 (m, 1H), 3.38-3.16 (m, 1H), 2.93-2.73 (m, 4H), 2.70, 2.60 (s, 3H), 2.44-1.85 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.5, 161.6, 139.1, 138.3, 136.2 (2C), 133.2, 133.1, 129.2 (2C), 128.6 (2C), 128.1, 127.9, 127.5, 127.4, 126.0, 54.4, 54.1, 51.1, 49.6, 49.1, 36.4, 36.1, 31.1, 31.0, 29.8, 29.4; IR (KBr, cm^{-1}): 1687, 1597, 1498, 1448; LRMS (EI, 70 eV) m/z (%): 322 (M^+ , 1), 196 (65), 127 (76), 113 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{23}\text{N}_2\text{O}_2$ ($[\text{M}+\text{H}]^+$) 323.1754, found 323.1743.

**N-Methyl-N-(4-oxo-3,4-dip-tolylbutyl)acetamide (3ba):**

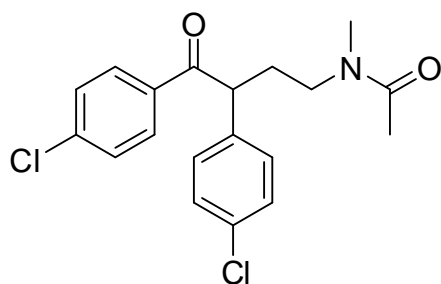
Colorless liquid; ^1H NMR (500 MHz, CDCl_3) δ : 7.86-7.83 (m, 2H), 7.19-7.14 (m, 4H), 7.11-7.06 (m, 2H), 4.61-4.43 (m, 1H), 3.56-3.22 (m, 2H), 2.90 (d, $J = 3.6$ Hz, 3H), 2.53-2.39 (m, 1H), 2.34 (d,

$J = 4.0$ Hz, 3H), 2.77 (d, $J = 8.4$ Hz, 3H), 2.06-1.90 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.9, 198.3, 170.6, 170.5, 144.0, 143.6, 137.1, 136.6, 136.4, 135.8, 133.9, 133.7, 129.9, 129.6, 129.3, 129.2, 128.8 (2C), 127.9, 127.8, 50.6, 50.1, 48.9, 45.9, 35.8, 33.1, 32.3, 31.4, 21.7, 21.5 (2C), 21.0, 20.9; IR (KBr, cm^{-1}): 1716, 1698, 1683, 1541; LRMS (EI, 70 eV) m/z (%): 323 (M^+ , 4), 250 (16), 235 (8), 224 (14), 119 (100); HRMS m/z (ESI) calcd for $\text{C}_{21}\text{H}_{26}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 324.1958, found 324.1948.



***N*-(3,4-Bis(4-methoxyphenyl)-4-oxobutyl)-*N*-methylacetamide (3ca):**

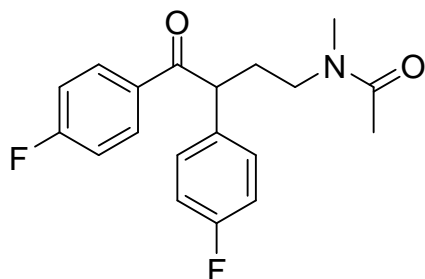
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.95-7.91 (m, 2H), 7.23-7.18 (m, 2H), 6.87-6.79 (m, 4H), 4.58-4.40 (m, 1H), 3.81-3.73 (m, 6H), 3.57-3.20 (m, 2H), 2.89 (d, $J = 4.8$ Hz, 3H), 2.50-2.39 (m, 1H), 2.06-1.90 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.9, 197.2, 170.6, 170.5, 163.4, 163.2, 158.8, 158.5, 131.6, 131.0 (2C), 129.3, 129.1, 129.0, 128.9, 114.6, 114.3, 113.8, 113.6, 55.4, 55.3, 55.2, 55.1, 49.8, 49.4, 48.8, 45.8, 35.8, 33.0, 32.3, 31.5, 21.6, 21.0; IR (KBr, cm^{-1}): 1669, 1640, 1600, 1510; LRMS (EI, 70 eV) m/z (%): 355 (M^+ , 9), 282 (13), 256 (6), 204 (10), 147 (40), 135 (100); HRMS m/z (ESI) calcd for $\text{C}_{21}\text{H}_{26}\text{NO}_4$ ($[\text{M}+\text{H}]^+$) 356.1856, found 356.1847.



***N*-(3,4-Bis(4-chlorophenyl)-4-oxobutyl)-*N*-methylacetamide (3da):**

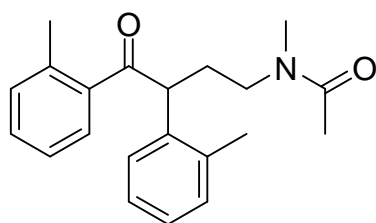
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.87-7.83 (m, 2H), 7.38-7.35 (m, 2H), 7.31-7.18 (m, 4H), 4.62-4.42 (m, 1H), 3.61-3.20 (m, 2H), 2.90 (s, 3H), 2.56-2.43 (m, 1H), 1.97-1.89 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.6, 197.0, 170.8, 170.4, 140.0, 139.5, 137.5, 136.8, 134.4, 134.1,

133.7, 133.2, 130.1, 130.0, 129.6, 129.3, 129.2, 129.1, 128.9, 50.5, 50.0, 48.6, 45.7, 35.8, 33.1, 32.1, 31.4, 21.6, 21.0; IR (KBr, cm^{-1}): 1681, 1639, 1590, 1490, 1401; LRMS (EI, 70 eV) m/z (%): 367 (M^++4 , 0.5), 365 (M^++2 , 4), 363 (M^+ , 2.8), 290 (12), 264 (12), 139 (100); HRMS m/z (ESI) calcd for $\text{C}_{19}\text{H}_{20}\text{Cl}_2\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 364.0866, found 364.0862.



***N*-(3,4-Bis(4-fluorophenyl)-4-oxobutyl)-*N*-methylacetamide (3ea):**

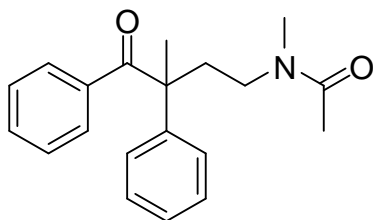
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.98-7.93 (m, 2H), 7.29-7.22 (m, 2H), 7.09-7.02 (m, 2H), 6.97 (t, $J = 8.4$ Hz, 2H), 4.64-4.44 (m, 1H), 3.61-3.21 (m, 2H), 2.90 (s, 3H), 2.56-2.42 (m, 1H), 2.06-1.90 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.5, 196.8, 170.7, 170.4, 166.9, 164.3, 163.1, 160.7, 134.9, 134.8, 134.2, 132.6, 131.4, 131.3, 129.6, 129.5 (2C), 129.4, 116.4, 116.2, 116.0, 115.8, 115.6, 50.3, 49.8, 48.7, 45.7, 35.8, 33.1, 32.4, 31.6, 21.6, 21.0; ^{19}F NMR (376 MHz, CDCl_3) δ : -104.2 (s, 1F), -105.0 (s, 1F), -114.2 (s, 1F), -115.2 (s, 1F); IR (KBr, cm^{-1}): 1680, 1638, 1597, 1508; LRMS (EI, 70 eV) m/z (%): 331 (M^+ , 5), 258 (M^+ , 20), 232 (17), 135 (27), 123 (100); HRMS m/z (ESI) calcd for $\text{C}_{19}\text{H}_{20}\text{F}_2\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 332.1457, found 332.1460.



***N*-Methyl-*N*-(4-oxo-3,4-dio-tolylbutyl)acetamide (3fa):**

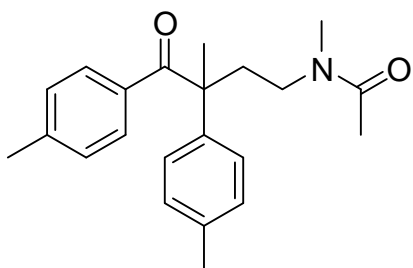
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.50-7.37 (m, 1H), 7.26-7.23 (m, 1H), 7.17-7.07 (m, 6H), 4.71-4.55 (m, 1H), 3.47-3.24 (m, 2H), 2.95 (d, $J = 11.6$ Hz, 3H), 2.57-2.45 (m, 1H), 2.34-2.26 (m, 6H), 2.06-1.85 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 203.5, 203.0, 170.7, 170.6, 138.9, 138.3, 138.0, 137.6, 136.8, 136.2, 135.8, 135.4, 131.8, 131.4, 131.1 (2C), 130.9, 130.7, 127.5, 127.4, 127.3, 127.0 (2C), 126.8, 126.4, 125.5, 125.4, 49.9, 48.9 (2C), 46.1, 35.9, 33.1, 31.2, 30.2,

21.8, 21.0, 20.7, 20.4, 19.8 (2C); IR (KBr, cm^{-1}): 1719, 1698, 1681, 1540; LRMS (EI, 70 eV) m/z (%): 323 (M^+ , 3), 250 (20), 204 (17), 188 (29), 131 (20), 119 (100); HRMS m/z (ESI) calcd for $\text{C}_{21}\text{H}_{26}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 324.1958, found 324.1948.



***N*-Methyl-*N*-(3-methyl-4-oxo-3,4-diphenylbutyl)acetamide (3ga):**

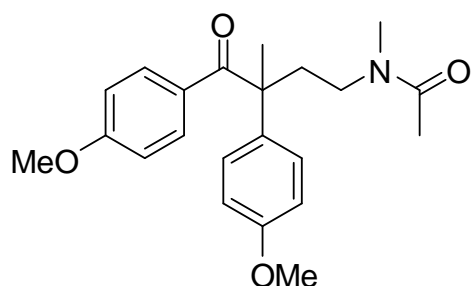
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.49-7.19 (m, 10H), 3.38-3.05 (m, 2H), 2.80 (d, $J = 3.6$ Hz, 3H), 2.25-2.20 (m, 2H), 1.96 (s, 1.4H), 1.83 (s, 1.6H), 1.68 (d, $J = 4.0$ Hz, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 203.2, 202.5, 170.2, 170.1, 143.2, 142.7, 136.5, 135.9, 132.0, 131.6, 129.5, 129.4, 129.2, 129.0, 128.1, 127.9, 127.4, 127.0, 126.0, 125.9, 53.4, 53.2, 46.9, 43.8, 39.0, 37.0, 35.8, 33.1, 23.6, 23.1, 21.7, 20.6; IR (KBr, cm^{-1}): 1681, 1638, 1596, 1490; LRMS (EI, 70 eV) m/z (%): 309 (M^+ , 1), 281 (3), 236 (16), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{24}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 310.1802, found 310.1795.



***N*-Methyl-*N*-(3-methyl-4-oxo-3,4-dip-tolylbutyl)acetamide (3ha):**

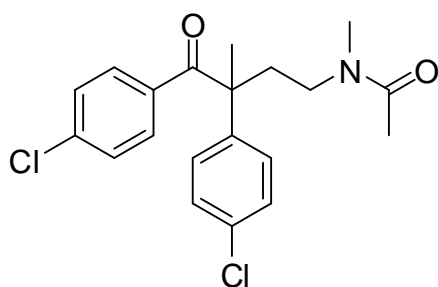
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.43-7.38 (m, 2H), 7.19-7.13 (m, 4H), 7.03 (t, $J = 8.0$ Hz, 2H), 3.35-3.04 (m, 2H), 2.80 (d, $J = 2.8$ Hz, 3H), 2.33 (d, $J = 7.6$ Hz, 3H), 2.30 (d, $J = 4.8$ Hz, 3H), 2.21-2.16 (m, 2H), 1.97 (s, 1.4H), 1.85 (s, 1.6H), 1.66, 1.65 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 202.9, 202.2, 170.3, 170.2, 142.8, 142.3, 140.5, 140.0, 137.0, 136.5, 133.7, 133.2, 129.8 (2C), 129.7, 129.6, 128.8, 128.6, 125.9, 125.8, 53.0, 52.8, 47.1, 43.9, 39.1, 37.2, 35.8, 33.1, 23.9, 23.3, 21.8, 21.4 (2C), 21.0, 20.7; IR (KBr, cm^{-1}): 1671, 1647, 1607, 1511; LRMS (EI, 70 eV) m/z

(%): 337 (M^+ , 3), 218 (49), 145 (35), 119 (100); HRMS m/z (ESI) calcd for $C_{21}H_{26}NO_2$ ($[M+H]^+$) 338.2103, found 338.2096.



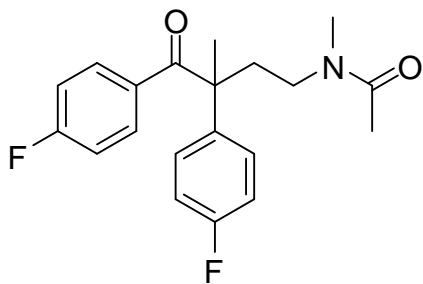
***N*-(3,4-Bis(4-methoxyphenyl)-3-methyl-4-oxobutyl)-*N*-methylacetamide (3ia):**

Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.54-7.50 (m, 2H), 7.22-7.17 (m, 2H), 6.92-6.87 (m, 2H), 6.74-6.70 (m, 2H), 3.81-3.76 (m, 6H), 3.34-3.03 (m, 2H), 2.82, 2.80 (s, 3H), 2.20-2.15 (m, 2H), 1.97 (s, 1.4H), 1.86 (s, 1.6H), 1.66, 1.65 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 201.7, 201.1, 170.3, 170.1, 162.5, 162.2, 158.6, 158.4, 135.8, 135.3, 132.1, 132.0, 128.8, 128.3, 127.1, 127.0, 114.4, 114.3, 113.2, 113.1, 55.3, 55.2 (3C), 52.5, 52.4, 47.1, 43.9, 39.3, 37.3, 35.9, 33.1, 24.2, 23.7, 21.8, 20.7; IR (KBr, cm^{-1}): 1663, 1644, 1601, 1511; LRMS (EI, 70 eV) m/z (%): 359 (M^+ , 1), 234 (44), 161 (61), 135 (100); HRMS m/z (ESI) calcd for $C_{22}H_{28}NO_4$ ($[M+H]^+$) 370.2013, found 370.2007.



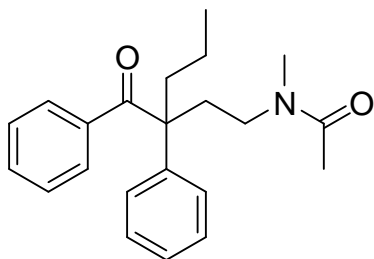
***N*-(3,4-Bis(4-chlorophenyl)-3-methyl-4-oxobutyl)-*N*-methylacetamide (3ja):**

Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.44-7.33 (m, 4H), 7.25-7.20 (m, 4H), 3.34-3.10 (m, 2H), 2.83 (d, $J = 12.8$ Hz, 3H), 2.24-2.13 (m, 2H), 1.97 (s, 1.7H), 1.91 (s, 1.2H), 1.67 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 201.2, 200.6, 170.2, 170.1, 141.6, 141.1, 138.7, 138.3, 134.2, 133.6 (2C), 133.2, 131.0, 130.9, 129.5, 129.3, 128.5, 128.4, 127.4, 127.3, 53.0, 52.8, 46.8, 43.7, 39.1, 37.0, 35.9, 33.1, 23.5, 23.1, 21.7, 20.7; IR (KBr, cm^{-1}): 1675, 1642, 1607, 1512; LRMS (EI, 70 eV) m/z (%): 379 (M^++2 , 1.1), 378 (0.5), 377 (M^+ , 1.5), 278 (5), 238 (25), 139 (48), 86 (100); HRMS m/z (ESI) calcd for $C_{20}H_{22}Cl_2NO_2$ ($[M+H]^+$) 378.1022, found 378.1021.



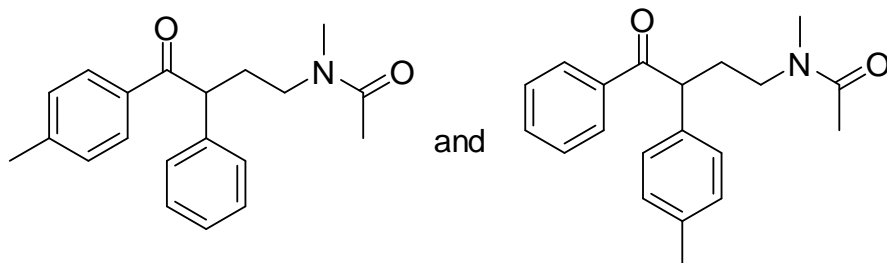
***N*-(3,4-Bis(4-fluorophenyl)-3-methyl-4-oxobutyl)-*N*-methylacetamide (3ka):**

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.54-7.47 (m, 2H), 7.29-7.24 (m, 2H), 7.12-7.04 (m, 2H), 6.96-6.89 (m, 2H), 3.35-3.09 (m, 2H), 2.83 (d, $J = 12.8$ Hz, 3H), 2.24-2.14 (m, 2H), 1.98 (s, 1.5H), 1.89 (s, 1.5H), 1.67 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 201.2, 200.5, 170.2 (2C), 166.1, 165.9, 163.6, 163.4, 163.2, 163.0, 160.7, 160.6, 139.0 (2C), 138.6 (2C), 132.3 (3C), 132.2, 132.1, 131.7, 127.7, 127.6 (3C), 116.4, 116.2, 116.1, 115.9, 115.4, 115.3, 115.2, 115.0, 52.9, 52.7, 46.9, 43.8, 39.3, 37.2, 35.9, 33.2, 23.8, 23.4, 21.8, 20.7; ^{19}F NMR (376 MHz, CDCl_3) δ : -105.6 (s, 1F), -106.3 (s, 1F), -114.3 (m, 1F), -115.1 (s, 1F); IR (KBr, cm^{-1}): 1675, 1644, 1599, 1507; LRMS (EI, 70 eV) m/z (%): 345 (M^+ , 2), 246 (13), 222 (33), 149 (29), 123 (68), 86 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{22}\text{F}_2\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 324.1594, found 324.1621.



***N*-(3-Benzoyl-3-phenylhexyl)-*N*-methylacetamide (3la):**

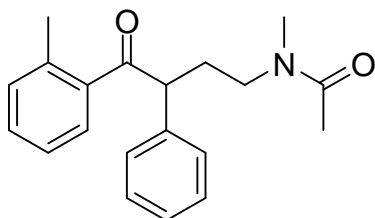
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.43-7.18 (m, 10H), 3.19-2.85 (m, 2H), 2.74 (s, 1.6H), 2.65 (s, 1.3H), 2.36-2.04 (m, 4H), 1.94 (s, 1.3H), 1.69 (s, 1.6H), 1.29-0.98 (m, 2H), 0.85-0.80 (m, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 203.4, 202.5, 170.2, 170.1, 142.4, 142.1, 137.0, 136.4, 132.1, 131.6, 129.3, 129.2, 129.1, 128.9, 128.1, 127.9, 127.5, 127.1, 126.7, 126.5, 57.0, 56.8, 46.5, 43.3, 37.1, 36.4, 35.7, 34.1, 33.1, 31.9, 21.8, 20.5, 17.1, 16.9, 14.7 (2C); IR (KBr, cm^{-1}): 1673, 1647, 1492, 1446; LRMS (EI, 70 eV) m/z (%): 337 (M^+ , 3), 238 (13), 232 (33), 105 (52), 86 (100); HRMS m/z (ESI) calcd for $\text{C}_{22}\text{H}_{28}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 338.2115, found 338.2114.



***N*-Methyl-*N*-(4-oxo-3-phenyl-4-*p*-tolylbutyl)acetamide (3ma) and**

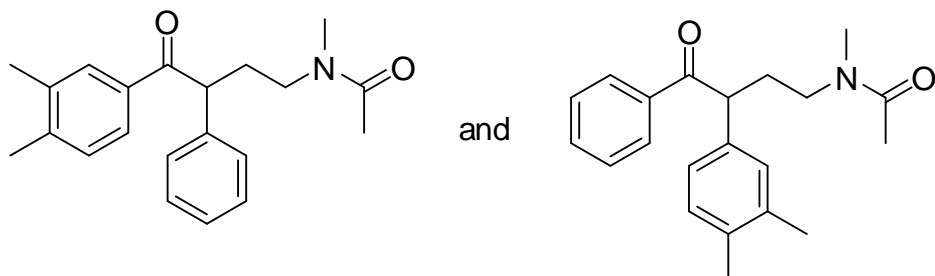
***N*-Methyl-*N*-(4-oxo-4-phenyl-3-*p*-tolylbutyl)acetamide (3ma'):**

3ma:3ma' = 1.8:1; Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.95-7.93 (m, 0.7H), 7.86-7.83 (m, 1.3H), 7.48-7.07 (m, 7H), 4.65-4.47 (m, 1H), 3.55-3.22 (m, 2H), 2.90-2.89 (m, 3H), 2.54-2.43 (m, 1H), 2.34 (d, $J = 4.0$ Hz, 2H), 2.27 (d, $J = 8.4$ Hz, 1H), 2.05-1.90 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.3, 198.8, 198.7, 198.2, 170.6, 170.5, 144.1, 143.7, 139.5, 138.9, 137.2, 136.7, 136.4, 136.2, 135.6, 133.9, 133.7, 133.1, 132.8, 130.0, 129.6, 129.3, 129.2 (2C), 128.9, 128.8 (2C), 128.7 (2C), 128.6, 128.4, 128.0, 127.9, 127.8, 127.4, 127.0, 51.0, 50.8, 50.5, 50.3, 48.8, 45.9, 35.8, 33.1, 32.3 (2C), 31.5 (2C), 21.6 (2C), 21.5, 21.0, 20.9; IR (KBr, cm^{-1}): 1676, 1641, 1492, 1449; LRMS (EI, 70 eV) m/z (%): 309 (M^+ , 12), 236 (63), 210 (27), 131 (77), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{24}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 310.1802, found 310.1795.



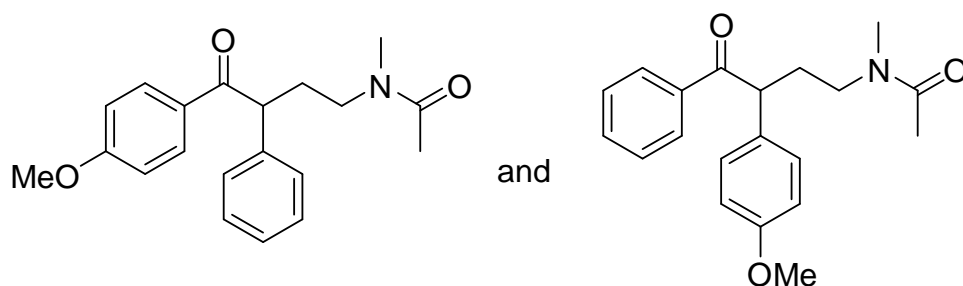
***N*-Methyl-*N*-(4-oxo-3-phenyl-4-*o*-tolylbutyl)acetamide (3na):**

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.59-7.53 (m, 1H), 7.31-7.10 (m, 8H), 4.49-4.33 (m, 1H), 3.49-3.20 (m, 2H), 2.92 (s, 3H), 2.56-2.46 (m, 1H), 2.32 (s, 1.3H), 2.26 (s, 1.7H), 2.11-1.94 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 203.1, 202.5, 170.6, 170.5, 138.4, 138.3 (2C), 137.9, 137.8 (2C), 131.8, 131.5, 131.2, 130.8, 129.1, 128.8, 128.3, 128.1, 128.0, 127.9, 127.5, 127.1, 125.5 (2C), 54.4, 53.5, 48.8, 45.9, 35.9, 33.0, 31.5, 30.4, 21.8, 21.0, 20.8, 20.6; IR (KBr, cm^{-1}): 1675, 1640, 1493; LRMS (EI, 70 eV) m/z (%): 309 (M^+ , 1), 236 (9), 221 (3), 210 (5), 190 (4), 174 (15), 119 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{24}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 310.1802, found 310.1795.



***N*-(4-(3,4-Dimethylphenyl)-4-oxo-3-phenylbutyl)-*N*-methylacetamide (30a) and *N*-(3-(3,4-Dimethylphenyl)-4-oxo-4-phenylbutyl)-*N*-methylacetamide (30a'):**

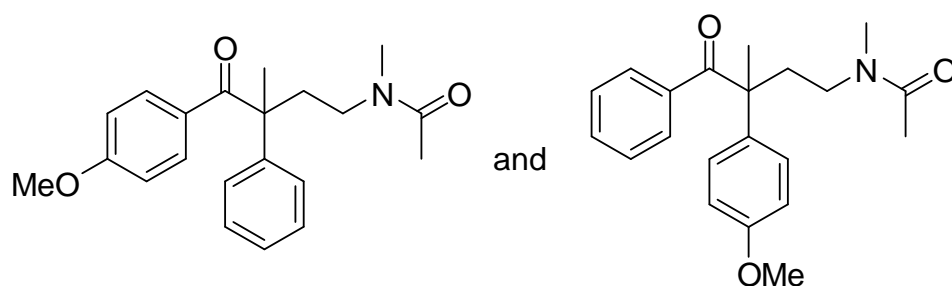
30a:30a' = 2:1; Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.96-7.65 (m, 2H), 7.46-7.01 (m, 6H), 4.65-4.48 (m, 1H), 3.53-3.22 (m, 2H), 2.90-2.89 (m, 3H), 2.51-2.44 (m, 1H), 2.25-2.17 (m, 6H), 2.06-1.90 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.3, 199.1, 198.7, 198.4, 170.6 (2C), 142.9, 142.5, 139.6, 139.0, 137.6, 137.1, 137.0, 136.8, 134.3, 134.1, 133.1, 132.8, 130.4, 130.1, 129.8, 129.7, 129.2, 129.1, 128.9 (2C), 128.7 (2C), 128.6, 128.4, 128.0, 127.9, 127.3, 126.9, 126.5 (2C), 125.5, 125.4, 51.0, 50.8, 50.4, 50.3, 48.9, 45.9, 35.8, 33.1, 32.3, 31.6, 31.5, 21.7, 21.6, 21.0, 19.9 (2C), 19.7, 19.3 (2C); IR (KBr, cm^{-1}): 1674, 1642, 1493, 1451; LRMS (EI, 70 eV) m/z (%): 323 (M^+ , 15), 250 (72), 224 (22), 145 (73), 105 (79), 86 (100); HRMS m/z (ESI) calcd for $\text{C}_{21}\text{H}_{26}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 324.1958, found 324.1951.



***N*-(4-(4-Methoxyphenyl)-4-oxo-3-phenylbutyl)-*N*-methylacetamide (3pa) and *N*-(3-(4-Methoxyphenyl)-4-oxo-4-phenylbutyl)-*N*-methylacetamide (3pa'):**

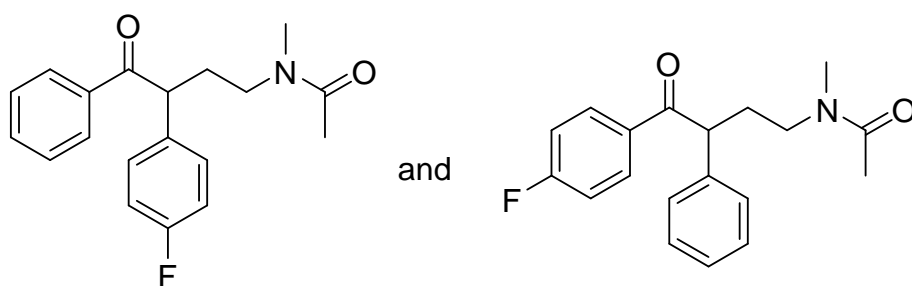
3pa:3pa' = 5:1; Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.95-7.92 (m, 2H), 7.37-7.15 (m, 5H), 6.87-6.79 (m, 2H), 4.63-4.45 (m, 1H), 3.81 (d, $J = 2.4$ Hz, 2.5H), 3.74 (d, $J = 6.4$ Hz, 0.5H), 3.56-3.23 (m, 2H), 2.90-2.89 (m, 3H), 2.54-2.45 (m, 1H), 2.05-1.89 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 197.6, 197.0, 170.6, 170.5, 139.7, 139.1, 131.0, 129.4, 129.2, 129.1, 129.0, 128.9, 128.7, 128.6, 128.4, 128.0, 127.8, 127.3, 126.9, 114.7, 114.3, 113.8, 113.7, 55.4, 55.3, 55.1, 50.8, 50.3, 48.9, 45.9, 35.8, 33.0, 32.4, 31.5, 21.6, 21.0; IR (KBr, cm^{-1}): 1663, 1644, 1601, 1511; LRMS (EI, 70

eV) m/z (%): 325 (M^+ , 2), 252 (8), 226 (26), 174 (18), 135 (100); HRMS m/z (ESI) calcd for $C_{20}H_{24}NO_3$ ($[M+H]^+$) 326.1751, found 326.1749.



***N*-(4-(4-Methoxyphenyl)-3-methyl-4-oxo-3-phenylbutyl)-*N*-methylacetamide (3qa) and *N*-(3-(4-Methoxyphenyl)-3-methyl-4-oxo-4-phenylbutyl)-*N*-methylacetamide (3qa'):**

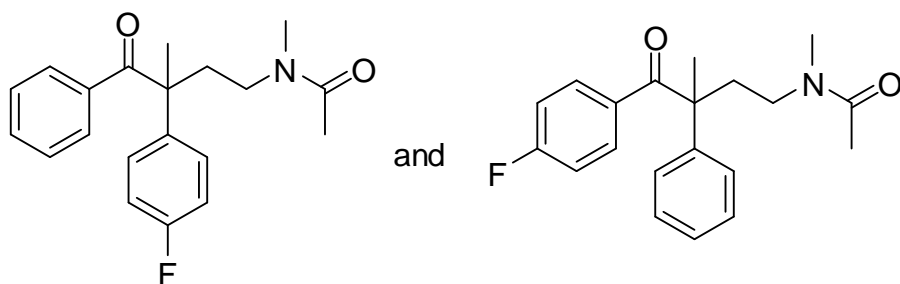
3qa:3qa' = 6:1; Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.55-7.51 (m, 2H), 7.50-7.20 (m, 5H), 6.94-6.91 (m, 0.29H), 6.74-6.69 (m, 1.75H), 3.81 (d, J = 6.0 Hz, 0.46H), 3.77 (d, J = 4.8 Hz, 2.65H), 3.33-3.08 (m, 2H), 2.81 (d, J = 3.2 Hz, 3H), 2.24-2.17 (m, 2H), 1.97 (s, 1.3H), 1.85 (d, J = 5.2 Hz, 1.7H), 1.69 (d, J = 5.6 Hz, 2.64H), 1.64 (d, J = 5.2 Hz, 0.45H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 201.4, 200.8, 170.3, 170.2, 162.6, 162.3, 144.0, 143.5, 132.2, 132.0, 129.5, 129.1, 129.0, 128.7, 128.2, 128.1, 128.0, 127.3, 127.2, 127.1, 126.9, 126.0 (2C), 114.6, 114.4, 113.3, 113.2, 55.3 (2C), 53.2, 53.1, 47.1, 43.9, 39.3, 37.3, 35.9, 33.2, 24.2, 23.6, 21.8, 20.7; IR (KBr, cm^{-1}): 1666, 1644, 1600, 1461; LRMS (EI, 70 eV) m/z (%): 339 (M^+ , 1), 337 (3), 238 (10), 218 (43), 145 (38), 119 (100); HRMS m/z (ESI) calcd for $C_{21}H_{26}NO_3$ ($[M+H]^+$) 340.1907, found 340.1900.



***N*-(3-(4-Fluorophenyl)-4-oxo-4-phenylbutyl)-*N*-methylacetamide (3ra) and *N*-(4-(4-Fluorophenyl)-4-oxo-3-phenylbutyl)-*N*-methylacetamide (3ra'):**

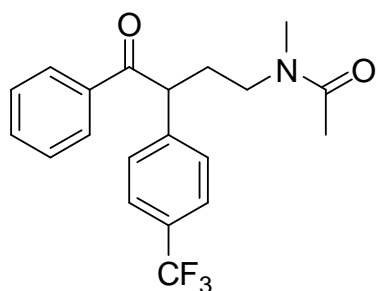
3ra:3ra' = 3.2:1; Colorless liquid; 1H NMR (400 MHz, $CDCl_3$) δ : 7.99-7.91 (m, 2H), 7.49-7.18 (m, 5H), 7.07-6.94 (m, 2H), 4.63-4.43 (m, 1H), 3.58-3.23 (m, 2H), 2.90 (d, J = 4.8 Hz, 3H), 2.55-2.45 (m, 1H), 2.07-1.90 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ : 197.6, 197.0, 170.7, 170.5,

166.9, 166.8, 164.3, 139.2, 138.5, 133.4, 133.0, 132.8, 132.5, 131.4, 131.3, 129.7, 129.6, 129.5, 129.4, 129.0, 128.7, 128.6, 128.0, 127.9, 127.6, 127.2, 115.9, 115.7, 115.5, 51.3, 50.8, 50.2, 48.8, 45.9, 45.8, 35.8, 33.1, 32.4, 32.3, 31.5, 21.6, 21.0; ^{19}F NMR (376 MHz, CDCl_3) δ : -104.5 (m, 1F), -105.4 (m, 1F), -114.5 (m, 1F), -115.4 (m, 1F); IR (KBr, cm^{-1}): 1681, 1640, 1597, 1451; LRMS (EI, 70 eV) m/z (%): 313 (M^+ , 3), 274 (5), 240 (18), 214 (33), 174 (11), 123 (100); HRMS m/z (ESI) calcd for $\text{C}_{19}\text{H}_{21}\text{FNO}_2$ ($[\text{M}+\text{H}]^+$) 314.1551, found 314.1546.



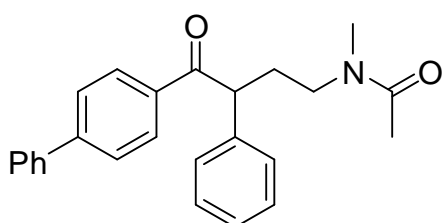
***N*-(3-(4-Fluorophenyl)-3-methyl-4-oxo-4-phenylbutyl)-*N*-methylacetamide (3sa) and *N*-(4-(4-Fluorophenyl)-3-methyl-4-oxo-3-phenylbutyl)-*N*-methylacetamide (3sa'):**

3sa:3sa' = 1.9:1; Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.55-7.40 (m, 4H), 7.38-7.22 (m, 3H), 7.12-7.04 (0.7H), 6.94-6.87 (m, 1.3H), 3.37-3.10 (m, 2H), 2.81 (d, $J = 5.6$ Hz, 3H), 2.23-2.18 (m, 2H), 1.97 (s, 1.5H), 1.86 (s, 1.5H), 1.68 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 202.2, 201.5, 200.8, 170.2, 163.5, 143.2, 142.7, 136.3, 135.8, 132.5, 132.4, 132.3 (2C), 132.2, 132.1, 131.9, 131.8, 129.5, 129.4, 129.3, 129.1, 128.2, 128.0, 127.8, 127.7, 127.6, 127.2, 126.0 (2C), 116.3, 116.1, 116.0, 115.8, 115.3, 115.2, 115.1, 114.9, 53.4, 53.2, 52.9, 52.7, 46.9, 43.8, 39.2, 39.1, 37.1, 35.9, 33.2, 23.9, 23.6, 23.3, 23.1, 21.8, 20.7; ^{19}F NMR (376 MHz, CDCl_3) δ : -105.9 (m, 1F), -106.7 (m, 1F), -114.6 (m, 1F), -115.4 (m, 1F); IR (KBr, cm^{-1}): 1674, 1642, 1598, 1506; LRMS (EI, 70 eV) m/z (%): 327 (M^+ , 1), 228 (21), 204 (27), 123 (57), 86 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{23}\text{FNO}_2$ ($[\text{M}+\text{H}]^+$) 328.1707, found 328.1699.



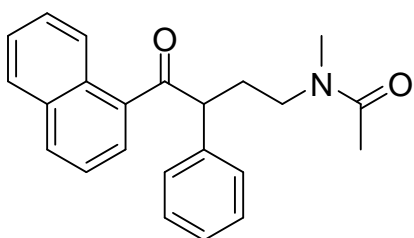
***N*-Methyl-*N*-(4-oxo-4-phenyl-3-(4-(trifluoromethyl)phenyl)butyl)acetamide (3ta):**

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.95-7.91 (m, 2H), 7.59-7.39 (m, 7H), 4.78-4.59 (m, 1H), 3.62-3.22 (m, 2H), 2.91 (d, $J = 6.4$ Hz, 3H), 2.61-2.49 (m, 1H), 2.08-1.88 (m, 4H); ^{13}C NMR (100 MHz, CDCl_3) δ : 198.6, 197.9, 170.8, 170.5, 143.3, 142.7, 136.0, 135.8, 133.6, 133.3, 128.8, 128.7 (2C), 128.5, 128.3, 126.3, 126.2, 125.9, 125.8 (2C), 50.8, 50.3, 48.8, 45.7, 35.9, 33.1, 32.4, 31.6, 21.6, 21.0; ^{19}F NMR (376 MHz, CDCl_3) δ : -62.6 (d, $J = 29.0$ Hz, 3F); IR (KBr, cm^{-1}): 1681, 1641, 1410, 1326; LRMS (EI, 70 eV) m/z (%): 363 (M^+ , 2), 290 (5), 264 (11), 241 (8), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{20}\text{H}_{21}\text{F}_3\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 364.1519, found 364.1512.



***N*-(4-(Biphenyl-4-yl)-4-oxo-3-phenylbutyl)-*N*-methylacetamide (3ua):**

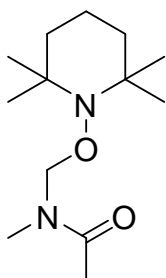
White solid, mp 142.9-144.3 $^\circ\text{C}$ (uncorrected); ^1H NMR (400 MHz, CDCl_3) δ : 7.98-7.96 (m, 2H), 7.55-7.47 (m, 5H), 7.43-7.30 (m, 7H), 4.73-4.55 (m, 1H), 3.62-3.26 (m, 2H), 2.92 (d, $J = 7.6$ Hz, 3H), 2.60-2.48 (m, 1H), 2.13-1.97 (m, 1H), 1.91 (s, 1.2H), 1.90 (s, 1.8H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.1, 198.5, 170.7, 170.5, 140.5, 140.4, 140.2, 139.9, 138.2, 137.6, 136.4, 136.2, 133.3, 133.0, 128.8, 128.7 (4C), 128.5 (2C), 128.4, 127.9, 127.6, 127.4, 127.3, 126.9; IR (KBr, cm^{-1}): 1678, 1640, 1597, 1487; LRMS (EI, 70 eV) m/z (%): 371 (M^+ , 19), 298 (88), 272 (17), 250 (21), 193 (48), 178 (27), 105 (100). HRMS m/z (ESI) calcd for $\text{C}_{25}\text{H}_{26}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 372.1958, found 372.1960.



***N*-Methyl-*N*-(4-(naphthalen-1-yl)-4-oxo-3-phenylbutyl)acetamide (3va):**

Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 7.99-7.96 (m, 2H), 7.82-7.72 (m, 4H), 7.48-7.40 (m, 4H), 7.38-7.33 (m, 2H), 4.85-4.66 (m, 1H), 3.64-3.25 (m, 2H), 2.92, 2.88 (s, 3H), 2.62-2.54 (m, 1H), 2.18-2.17 (m, 1H), 1.96, 1.89 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ : 199.1, 198.5, 170.7,

170.5, 136.7, 136.4, 136.2, 136.1, 133.6, 133.2, 132.9, 132.5, 132.4, 129.2, 128.8, 128.7, 128.6, 128.5, 127.7 (2C), 127.6, 127.5, 127.0, 126.5, 126.2, 126.0, 125.8, 125.6, 51.3, 50.8, 48.9, 45.9, 35.8, 33.1, 32.3, 31.5, 21.6, 21.0; IR (KBr, cm^{-1}): 1678, 1637, 1597, 1406; LRMS (EI, 70 eV) m/z (%): 345 (M^+ , 20), 272 (70), 224 (20), 105 (100); HRMS m/z (ESI) calcd for $\text{C}_{23}\text{H}_{24}\text{NO}_2$ ($[\text{M}+\text{H}]^+$) 346.1802, found 346.1797.



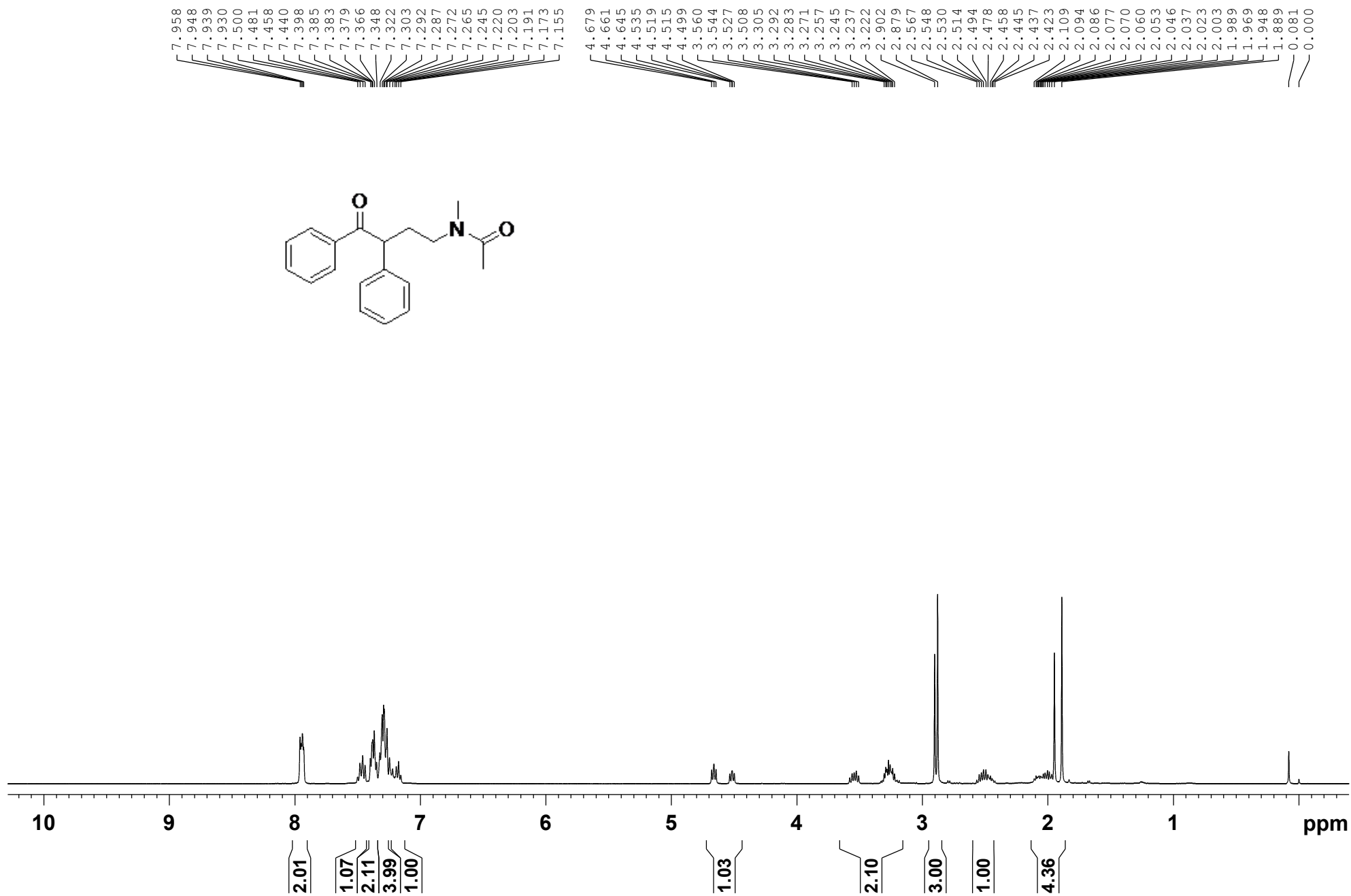
***N*-Methyl-*N*-((2,2,6,6-tetramethylpiperidin-1-yloxy)methyl)acetamide (4):**

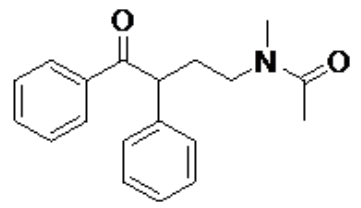
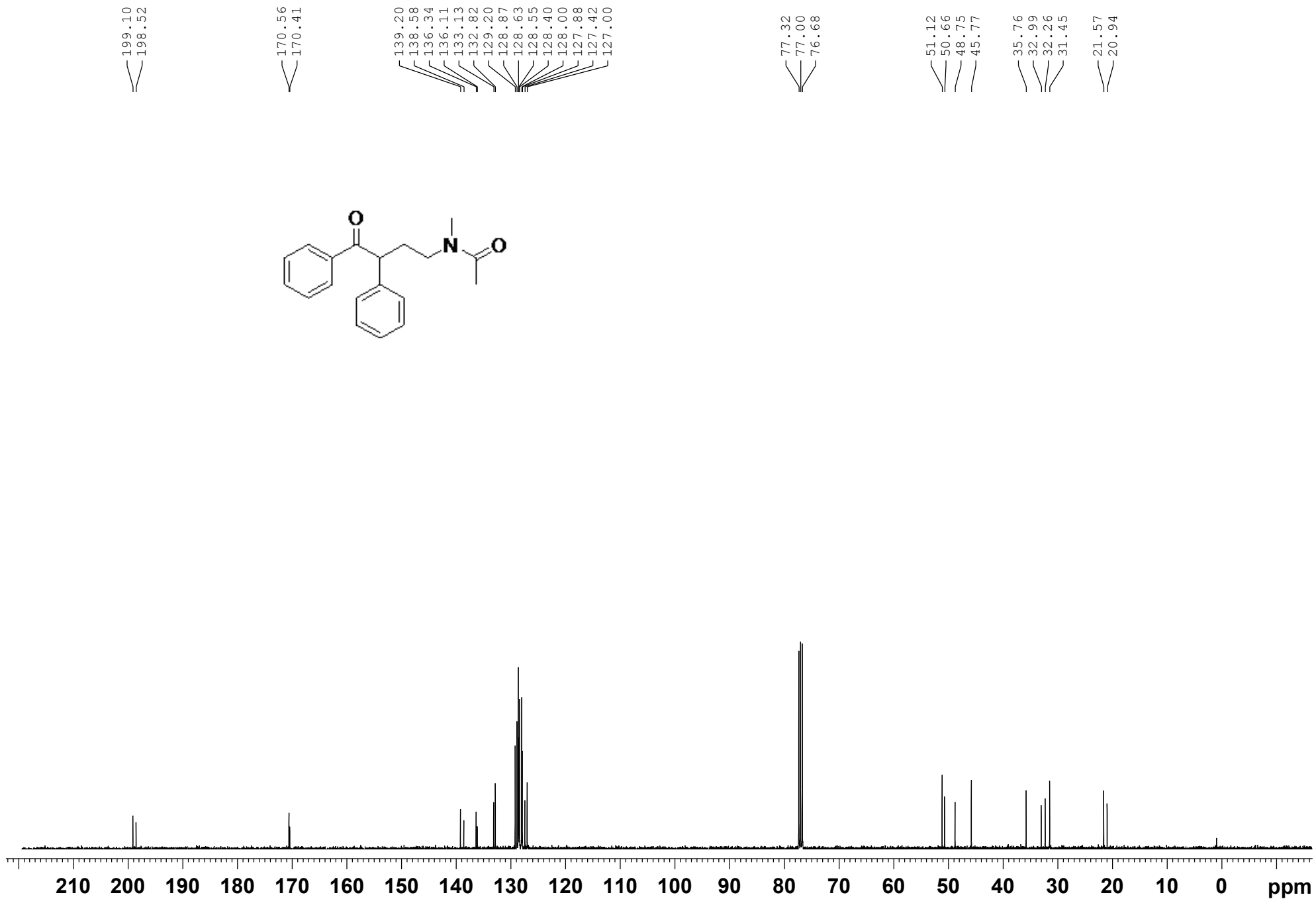
Colorless liquid; ^1H NMR (400 MHz, CDCl_3) δ : 4.96 (s, 0.4H), 4.91 (s, 1.6H), 3.11 (s, 0.6H), 3.04 (s, 2.4H), 2.22 (s, 2.4H), 2.10 (s, 0.6H), 1.59-1.52 (m, 1H), 1.48-1.44 (m, 4H), 1.36-1.32 (m, 1H), 1.17, 1.11 (s, 12H); ^{13}C NMR (100 MHz, CDCl_3) δ : 171.6, 171.1, 85.4, 81.4, 77.3, 77.0, 76.7, 59.9, 59.7, 39.8, 39.7, 35.9, 34.0, 33.1, 32.9, 22.0, 21.5, 20.0, 17.0 (2C); IR (KBr, cm^{-1}): 1651, 1466, 1441, 1374; LRMS (EI, 70 eV) m/z (%): 242 (M^+ , 1), 184 (2), 157 (6), 142 (166), 86 (100); HRMS m/z (ESI) calcd for $\text{C}_{13}\text{H}_{27}\text{N}_2\text{O}_2$ ($[\text{M}+\text{H}]^+$) 243.2067, found 243.2066.

(D) Reference

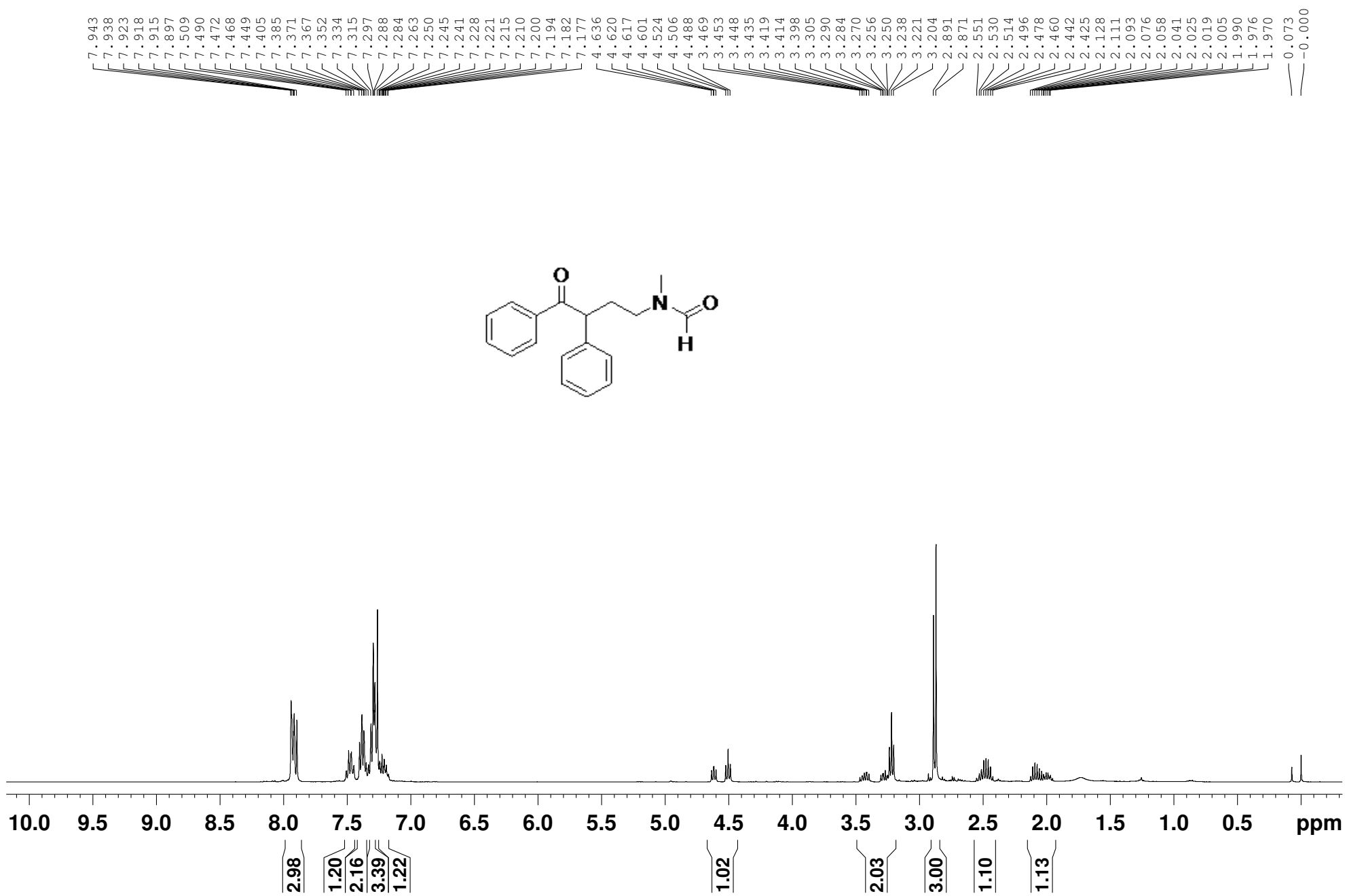
[1] H. Li, F.-M. Zhang, Y.-Q. Tu, Q.-W. Zhang, Z.-M. Chen, Z.-H. Chen, J. Li, *Chem. Sci.*, **2011**, 2, 1839.

N-Methyl-N-(4-oxo-3,4-diphenylbutyl)acetamide (3aa)





N-Methyl-N-(4-oxo-3,4-diphenylbutyl)formamide (3ab)

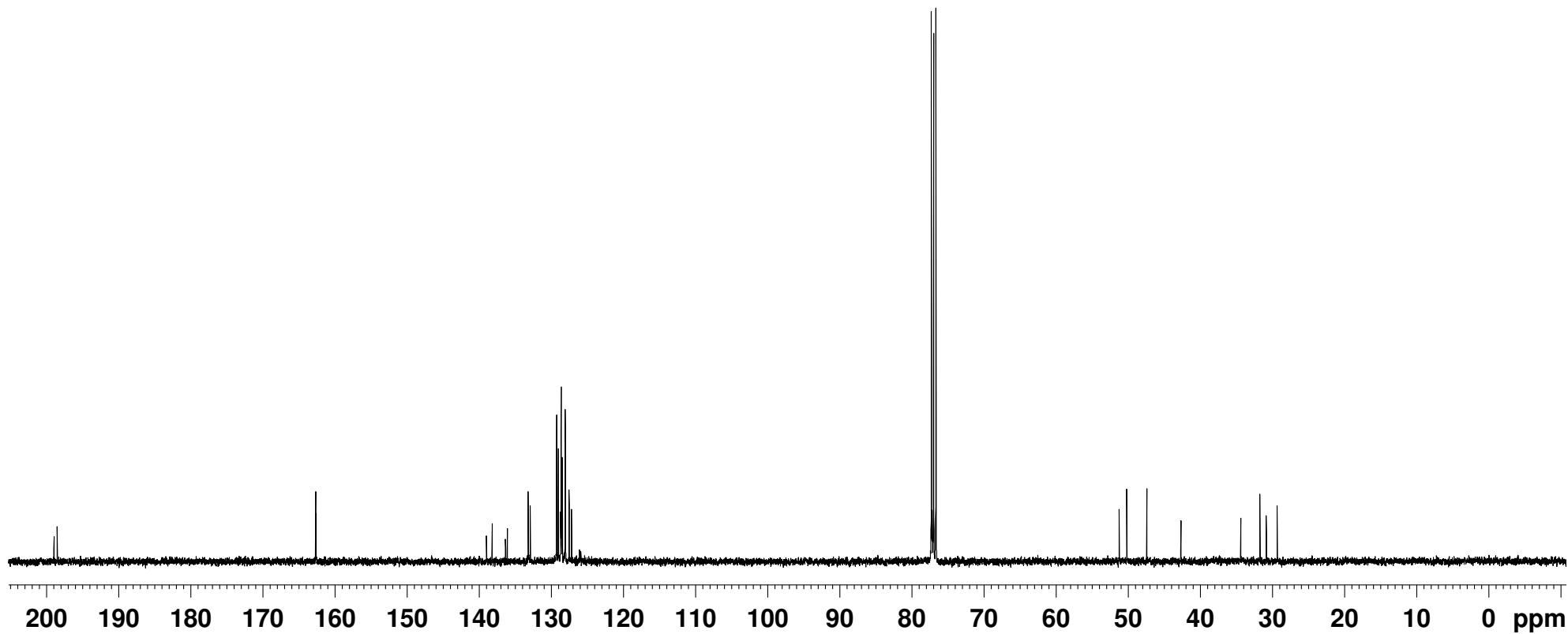
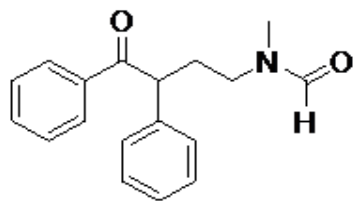


199.02
198.56

162.71
162.65
139.01
138.23
136.38
136.12
133.24
132.95
129.29
129.05
128.72
128.66
128.64
128.50
128.10
128.07
127.56
127.23

77.32
77.00
76.68

51.27
50.21
47.43
42.70
34.40
31.75
30.86
29.36



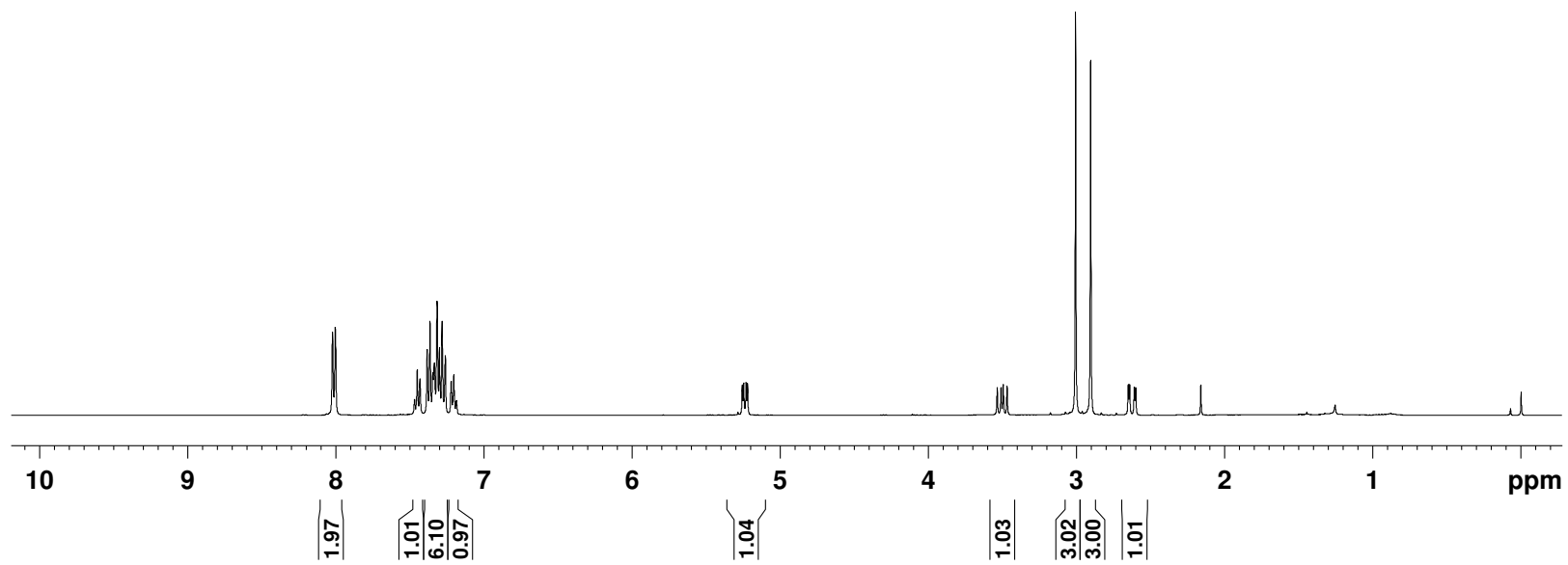
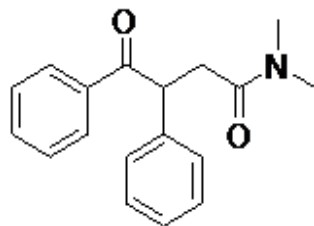
N,N-Dimethyl-4-oxo-3,4-diphenylbutanamide (3ab')

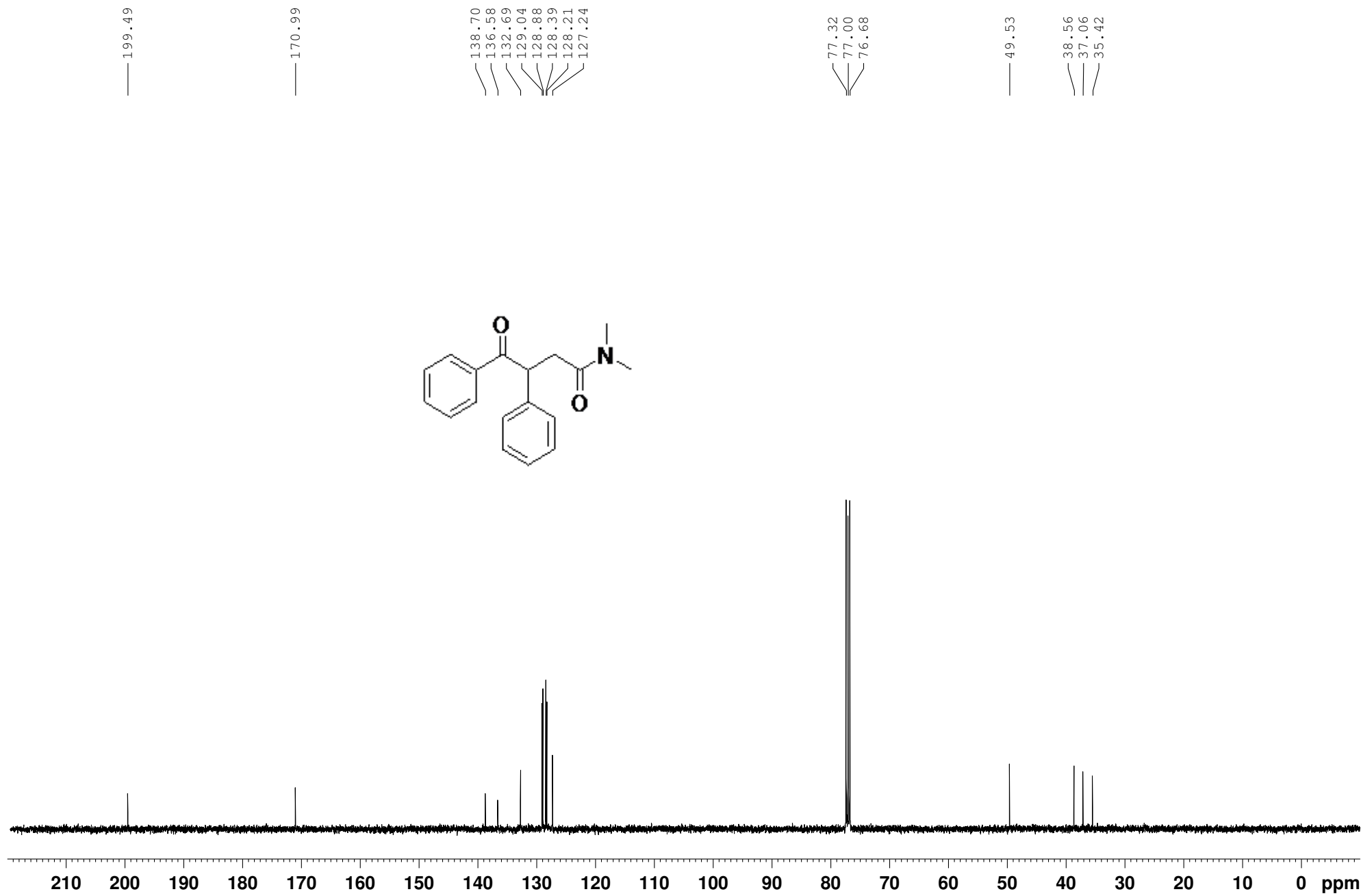
8.021
8.003
8.000
7.468
7.449
7.431
7.383
7.363
7.345
7.338
7.334
7.316
7.299
7.281
7.259
7.220
7.185

5.258
5.249
5.232
5.223

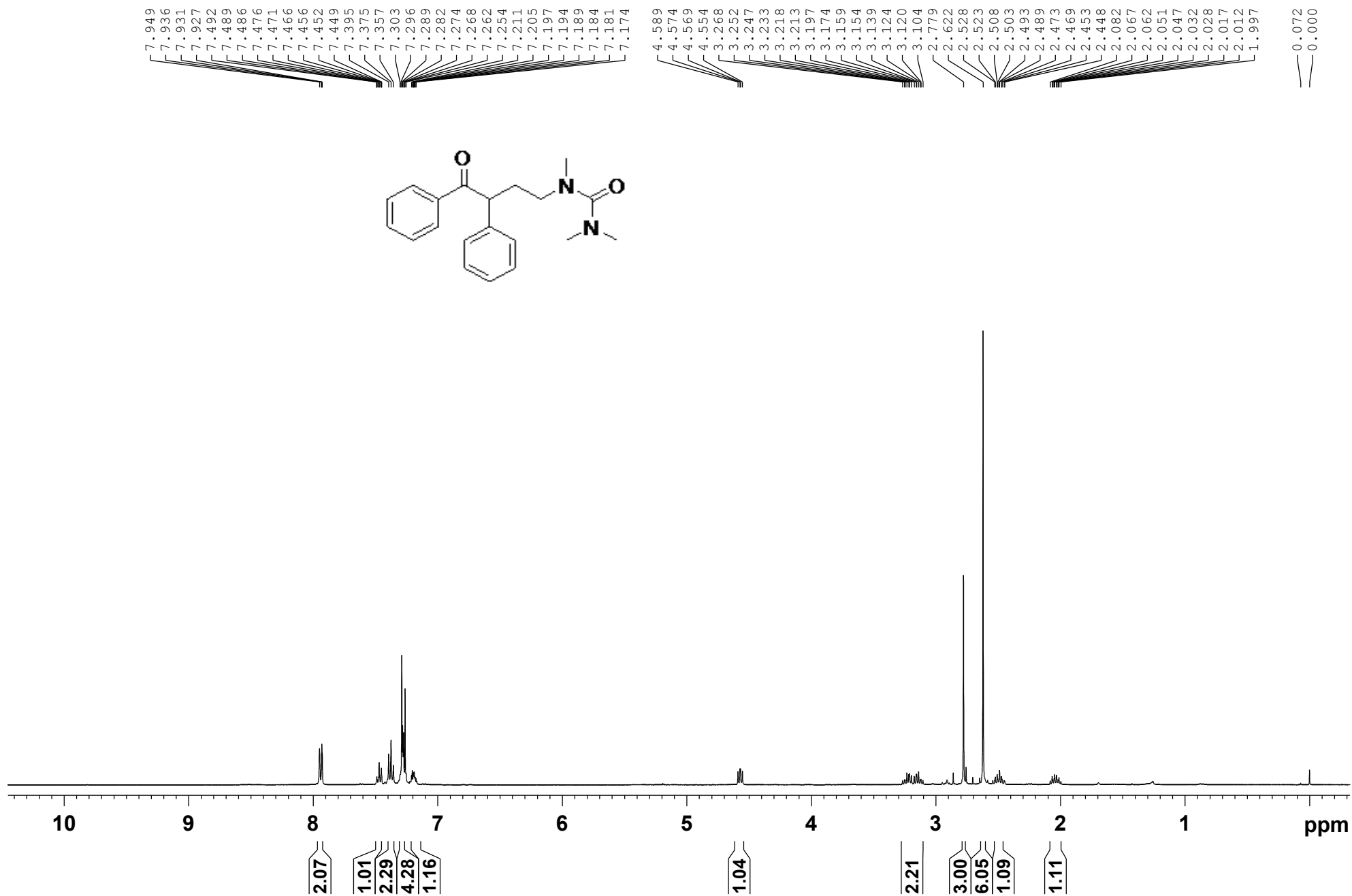
3.537
3.511
3.497
3.471
3.008
2.907
2.653
2.643
2.612
2.603

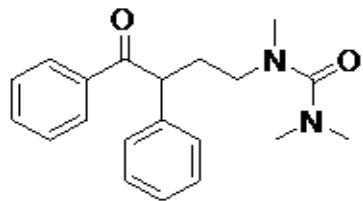
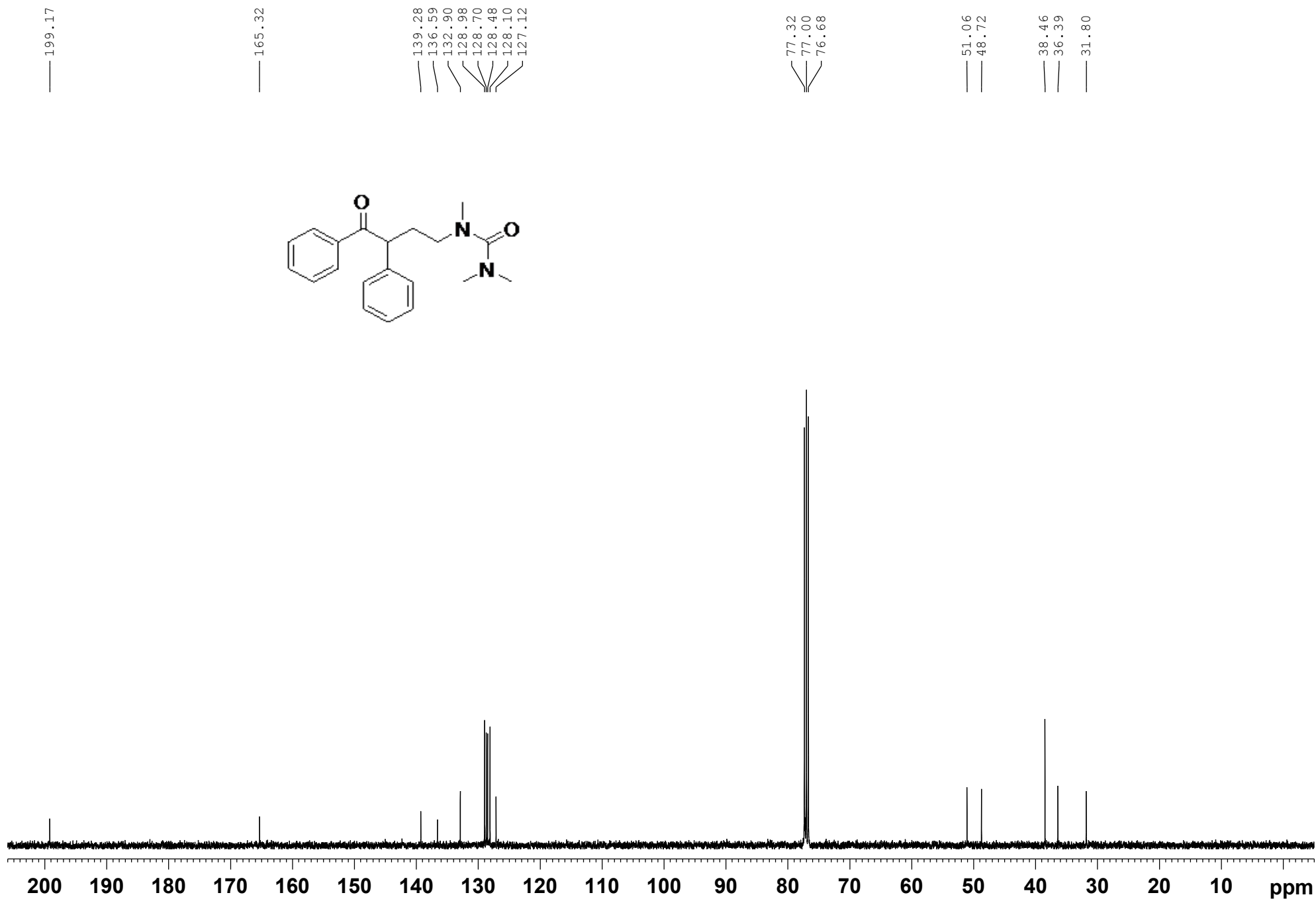
0.072
-0.000





1,1,3-Trimethyl-3-(4-oxo-3,4-diphenylbutyl)urea (3ac)



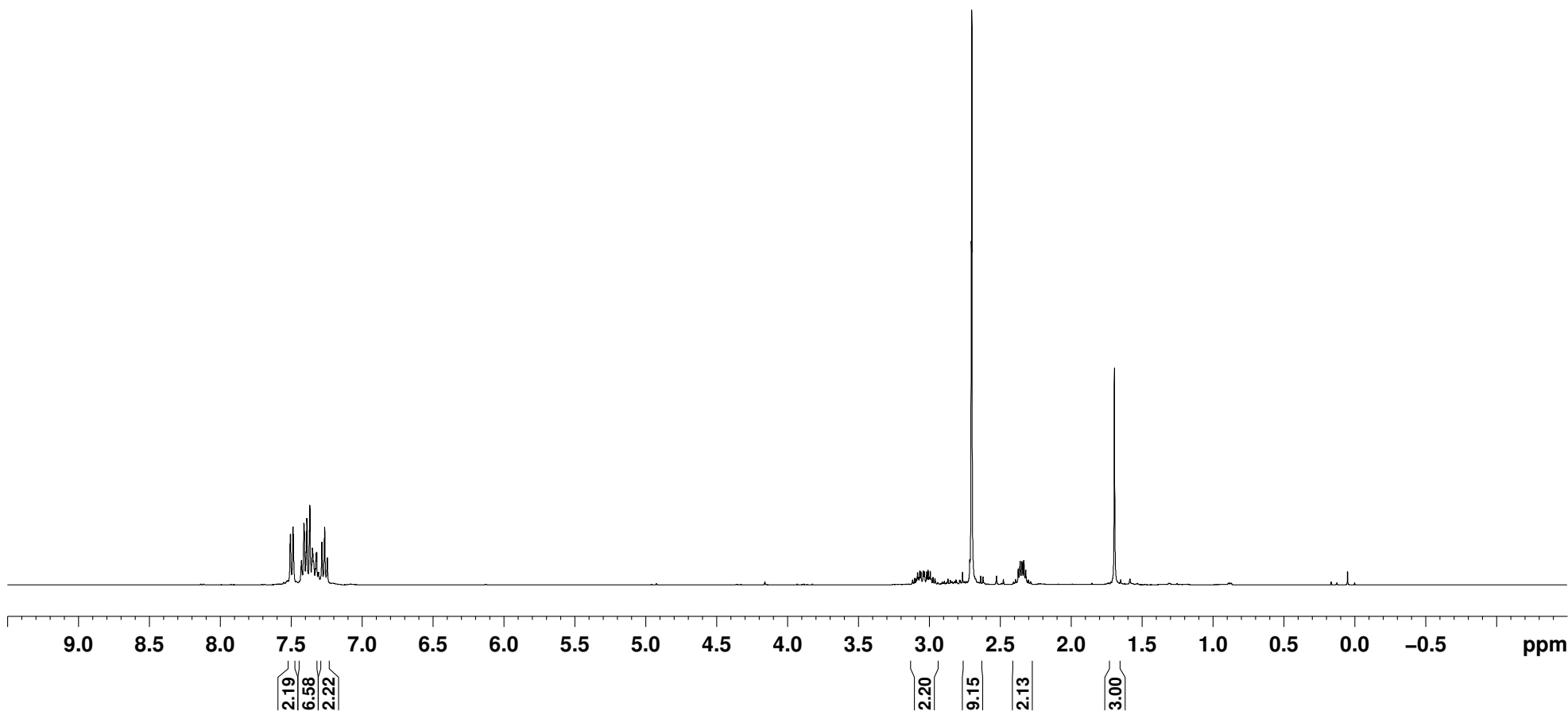
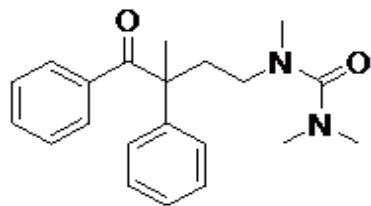


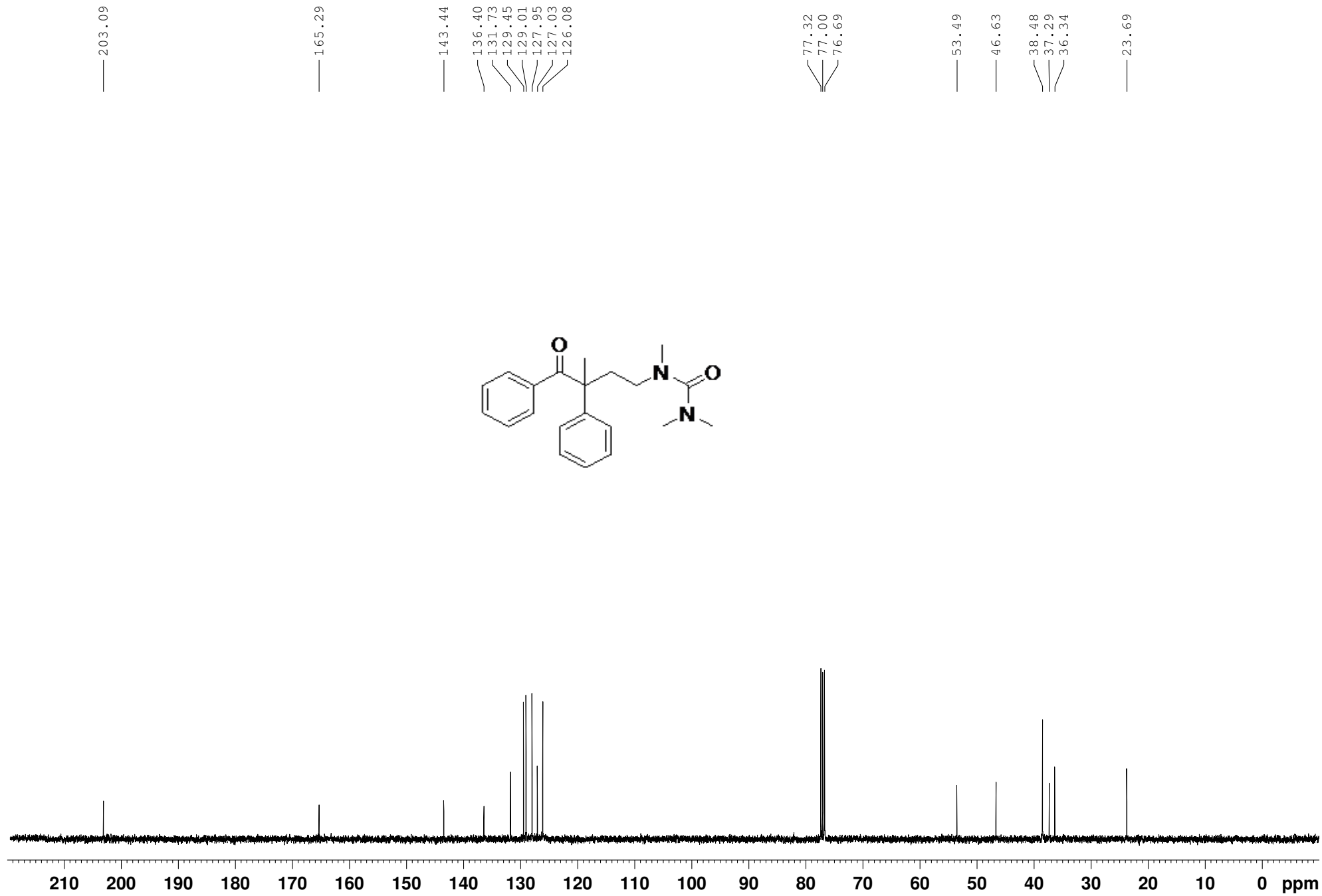
1,1,3-Trimethyl-3-(3-methyl-4-oxo-3,4-diphenylbutyl)urea (3gc)

7.505
7.487
7.484
7.429
7.427
7.410
7.408
7.395
7.390
7.372
7.368
7.351
7.347
7.342
7.329
7.324
7.320
7.311
7.307
7.284
7.264
7.245

3.116
3.102
3.091
3.083
3.076
3.066
3.058
3.042
3.033
3.017
3.008
2.999
2.993
2.985
2.973
2.959
2.703
2.699
2.405
2.391
2.372
2.359
2.346
2.344
2.333
2.319
2.300
2.285
1.694

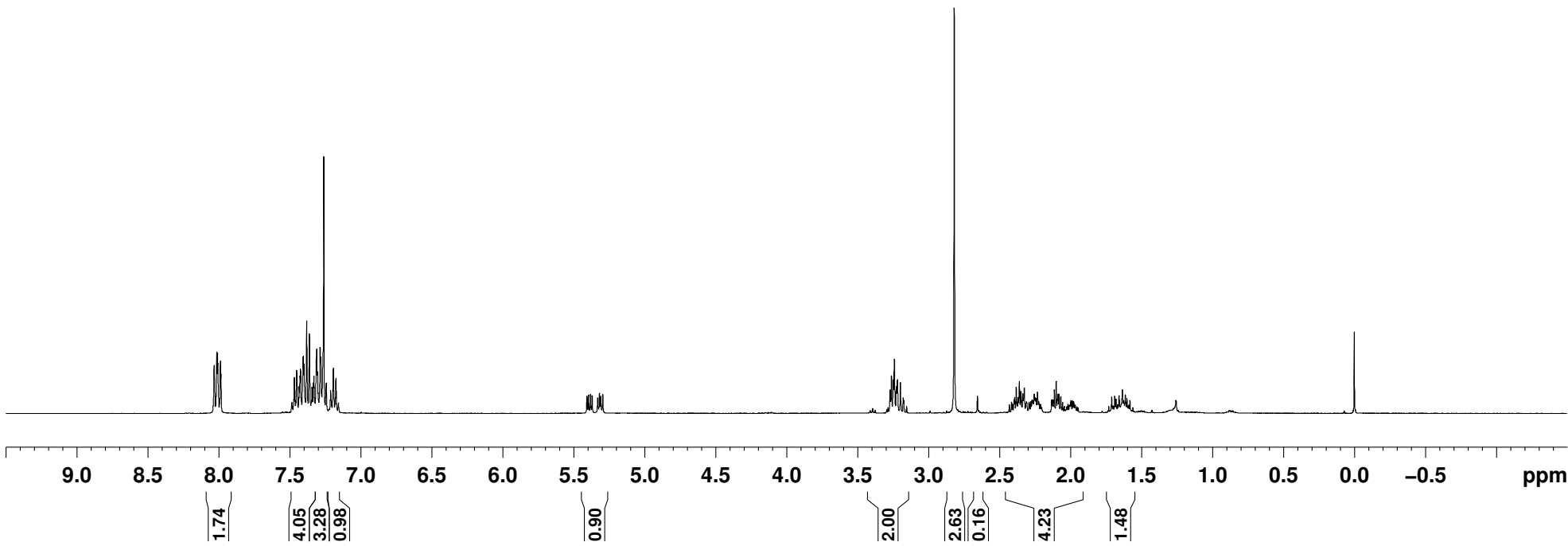
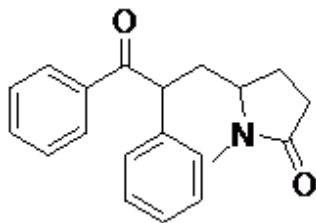
0.050
0.000





1-Methyl-5-(3-oxo-2,3-diphenylpropyl)pyrrolidin-2-one (3ad)

8.033
8.015
8.010
8.007
7.989
7.985
7.473
7.468
7.453
7.450
7.437
7.434
7.428
7.425
7.405
7.400
7.381
7.362
7.344
7.334
7.330
7.326
7.313
7.310
7.305
7.301
7.287
7.283
7.276
7.261
7.244
7.216
7.213
7.210
7.194
7.190
7.176
7.174
5.407
5.396
5.382
5.370
5.331
5.318
5.309
5.295
3.270
3.261
3.248
3.241
3.227
3.223
3.219
3.198
3.179
3.174
2.819
2.398
2.392
2.382
2.370
2.360
2.349
2.336
2.325
2.271
2.263
2.255
2.250
2.242
2.233
2.133
2.126
2.114
2.100
2.092
2.087
2.081
2.068
1.710
1.688
1.679
1.657
1.634
1.613
1.602
1.581
0.000



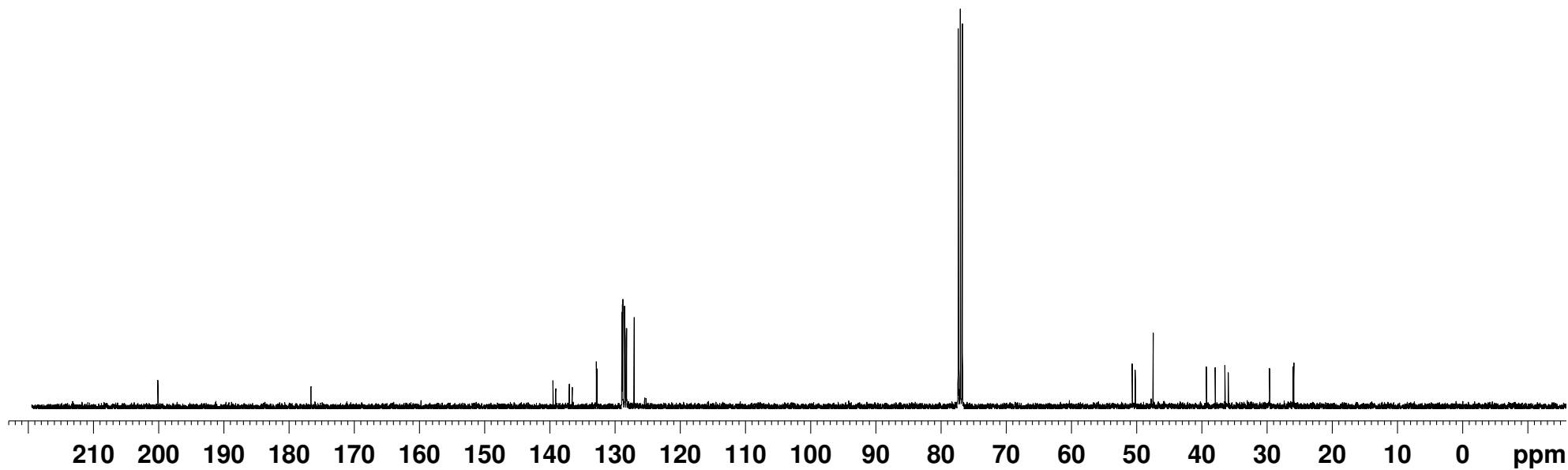
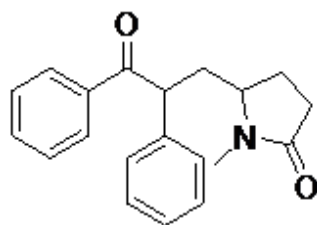
200.13
200.11

176.66
176.61

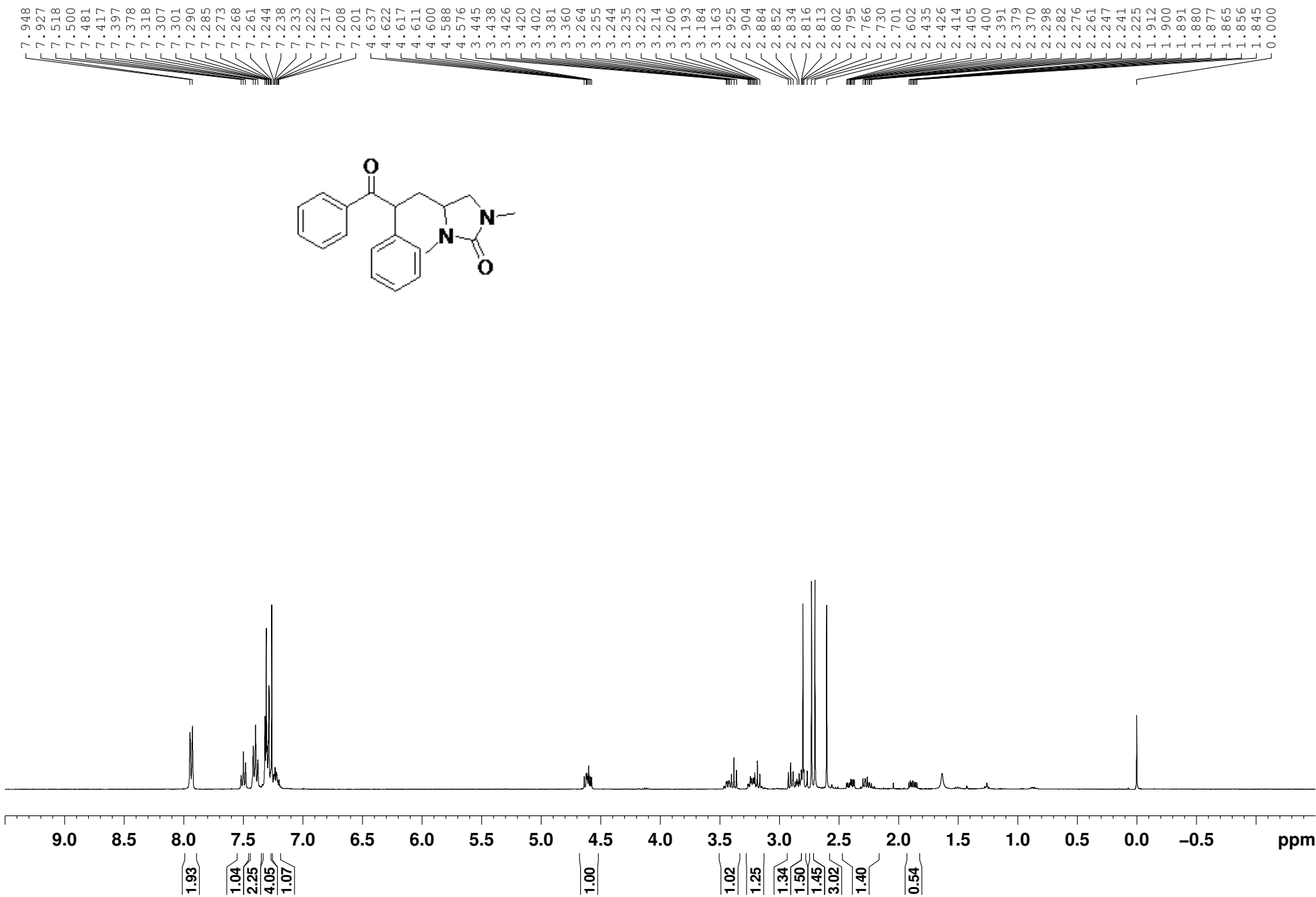
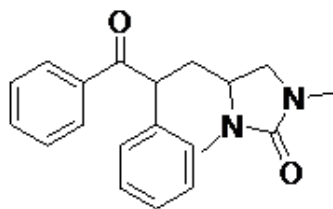
139.49
139.09
137.01
136.54
132.83
132.74
128.93
128.88
128.86
128.83
128.80
128.49
128.42
128.29
128.22
127.04

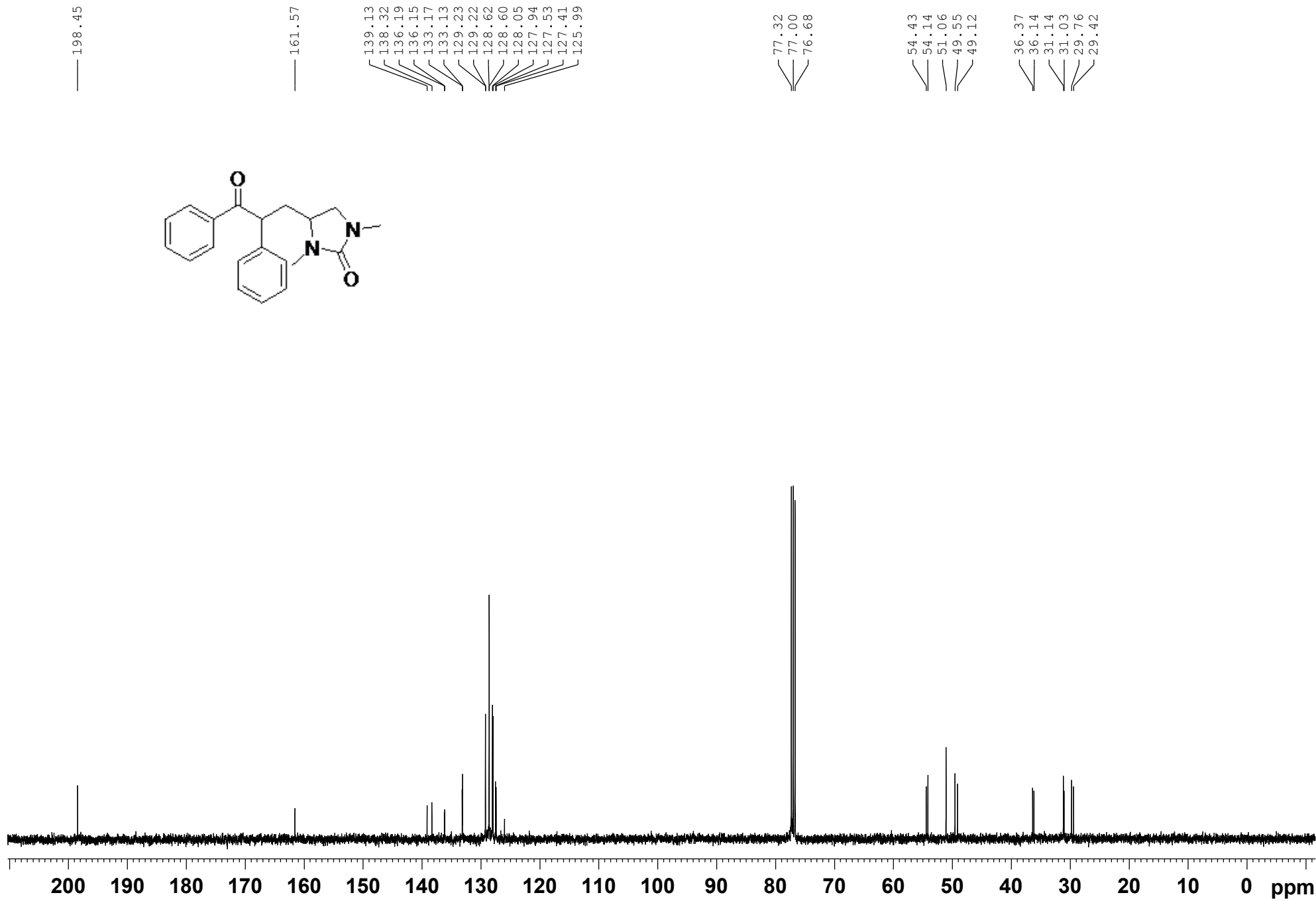
77.32
77.00
76.68

50.69
50.22
47.48
39.31
37.96
36.46
35.95
29.64
29.60
26.00
25.91

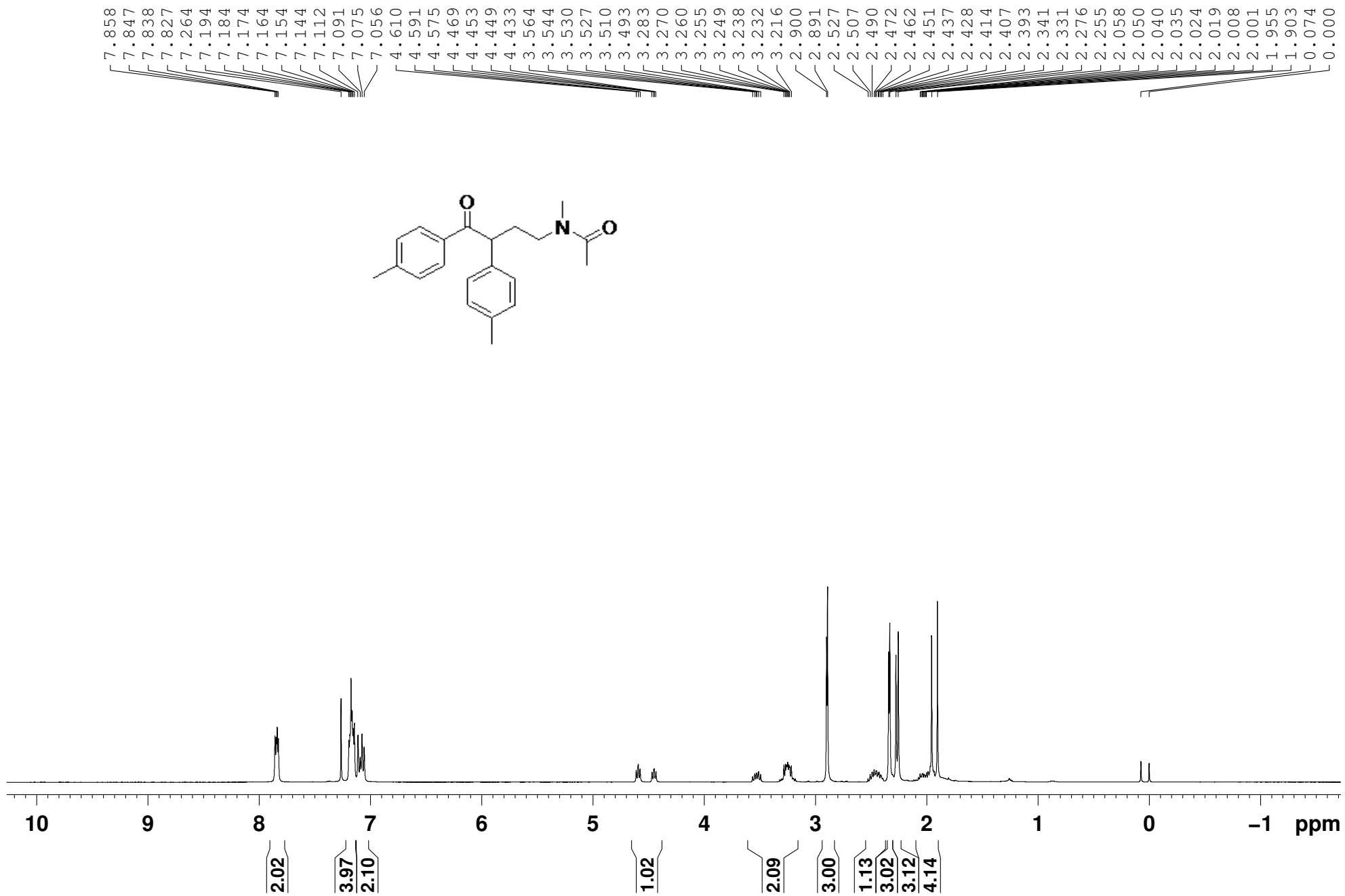
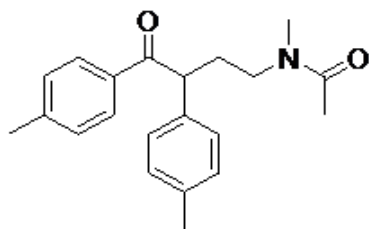


1,3-Dimethyl-4-(3-oxo-2,3-diphenylpropyl)imidazolidin-2-one (3ae)





N-Methyl-N-(4-oxo-3,4-dip-tolylbutyl)acetamide (3ba)

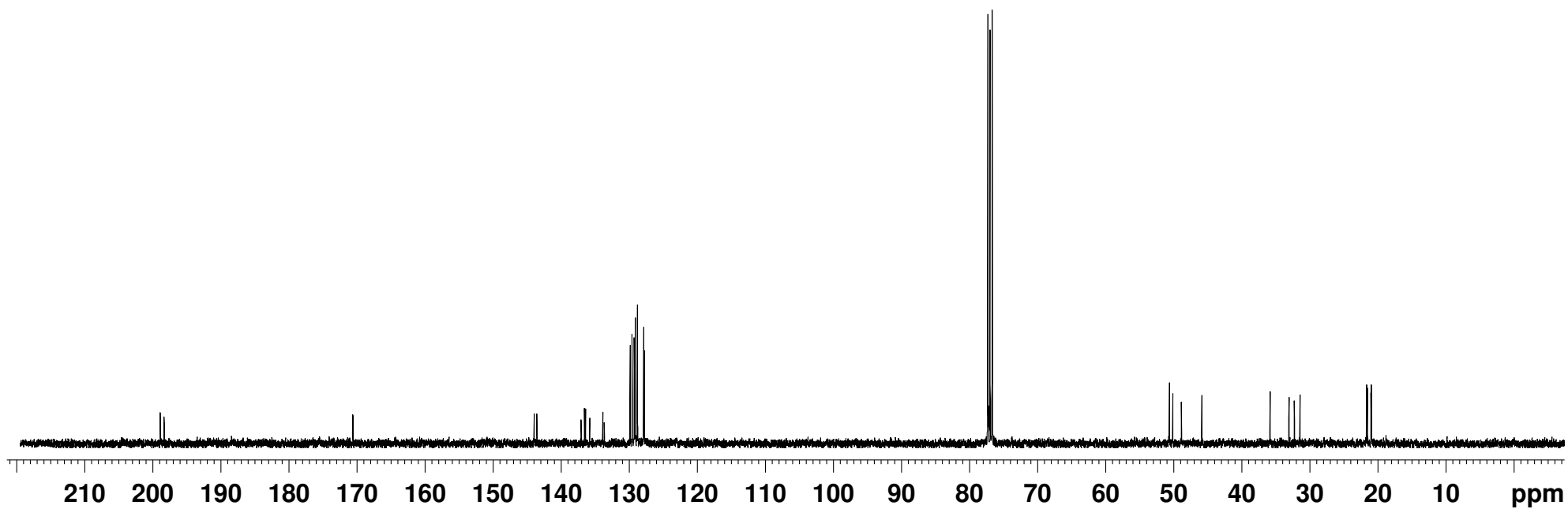
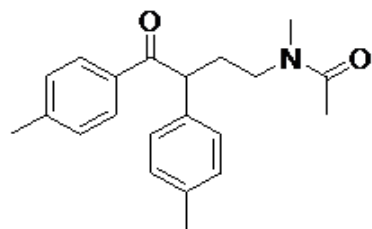


198.89
198.31

170.58
170.54
144.01
143.61
137.10
136.60
136.43
135.84
133.92
133.71
129.90
129.60
129.29
129.15
128.83
128.81
127.90
127.78

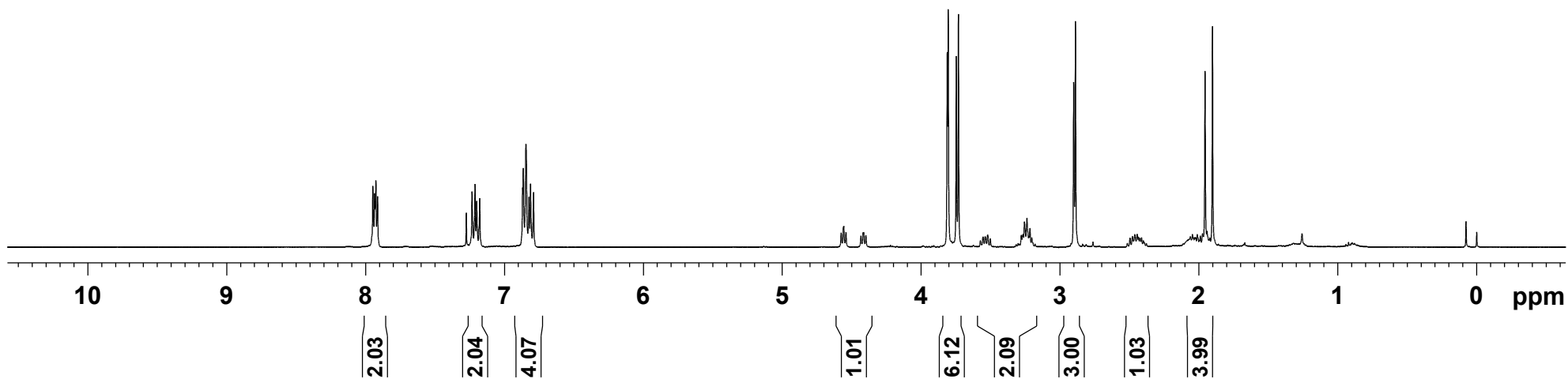
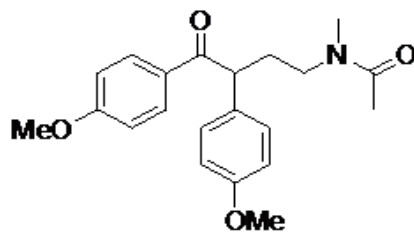
77.32
77.00
76.69

50.62
50.14
48.88
45.86
35.84
33.06
32.27
31.44
21.65
21.54
21.52
21.03
20.94



N-(3,4-Bis(4-methoxyphenyl)-4-oxobutyl)-N-methylacetamide (3ca)

7.948
7.936
7.931
7.926
7.918
7.914
7.275
7.234
7.212
7.200
7.178
6.870
6.865
6.846
6.823
6.813
6.791
4.576
4.558
4.541
4.434
4.418
4.413
4.398
3.812
3.805
3.747
3.731
3.574
3.553
3.539
3.520
3.502
3.302
3.279
3.271
3.266
3.256
3.238
3.224
3.216
3.203
3.196
2.901
2.889
2.496
2.478
2.461
2.445
2.435
2.425
2.413
2.400
2.392
2.062
2.046
2.039
2.030
2.023
2.011
1.989
1.974
1.956
1.941
1.927
1.920
1.902
0.076
-0.000



197.85
197.23

170.57
170.50
163.43
163.23
158.75
158.49

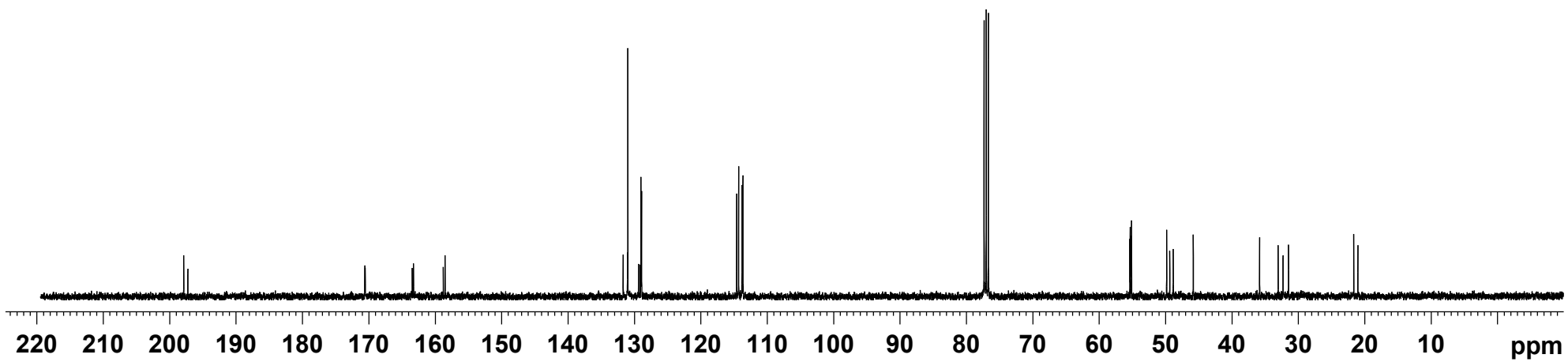
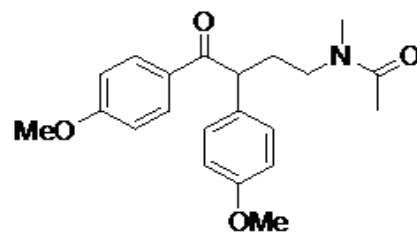
131.64
130.99
130.95
129.32
129.09
128.97
128.88
114.56
114.26
113.75
113.61

77.32
77.00
76.68

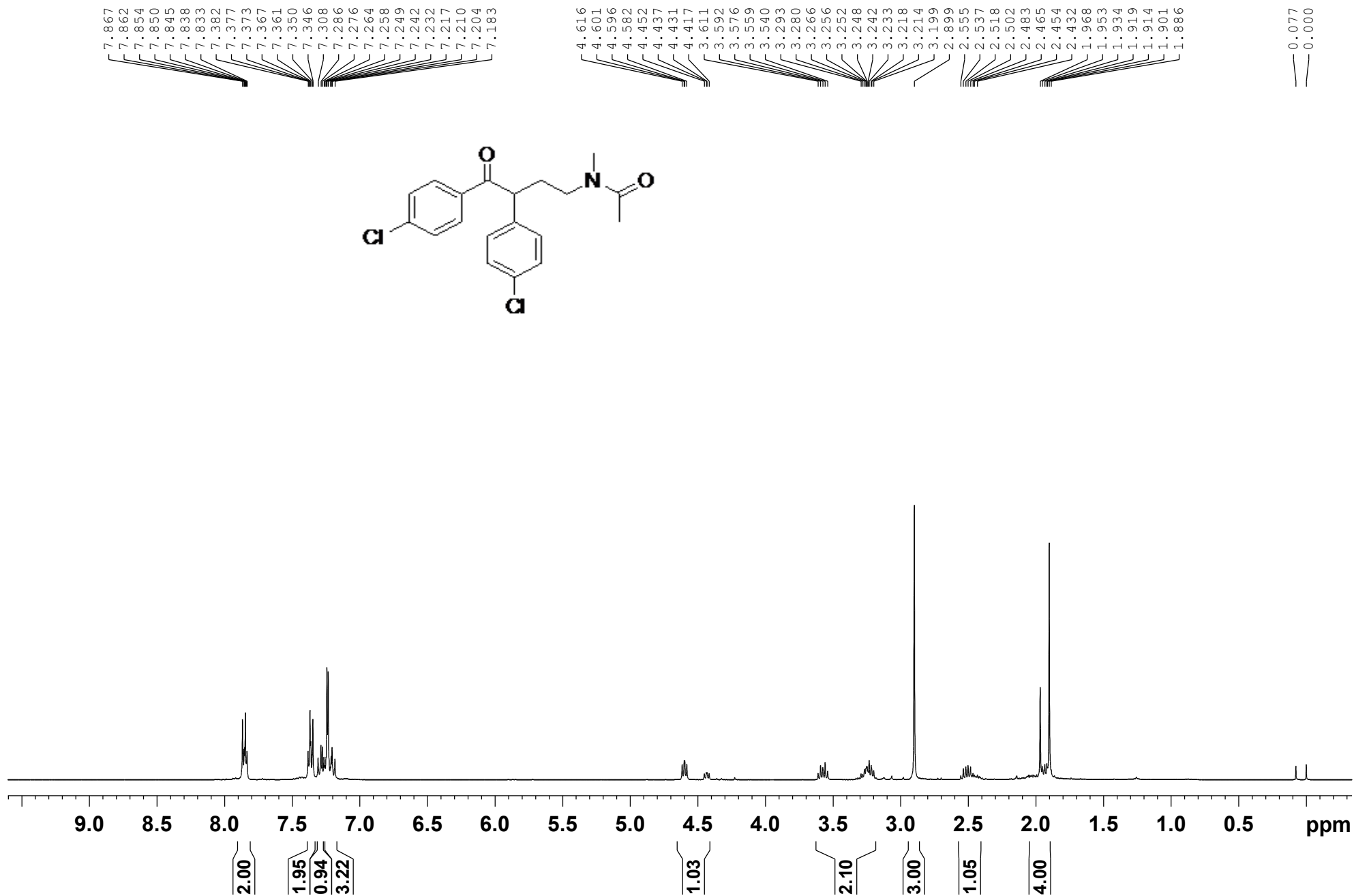
55.37
55.32
55.15
55.11
49.82
49.35
48.83
45.80

35.81
33.03
32.29
31.46

21.64
21.01



N-(3,4-Bis(4-chlorophenyl)-4-oxobutyl)-N-methylacetamide (3da)



197.64
196.96

170.76
170.40

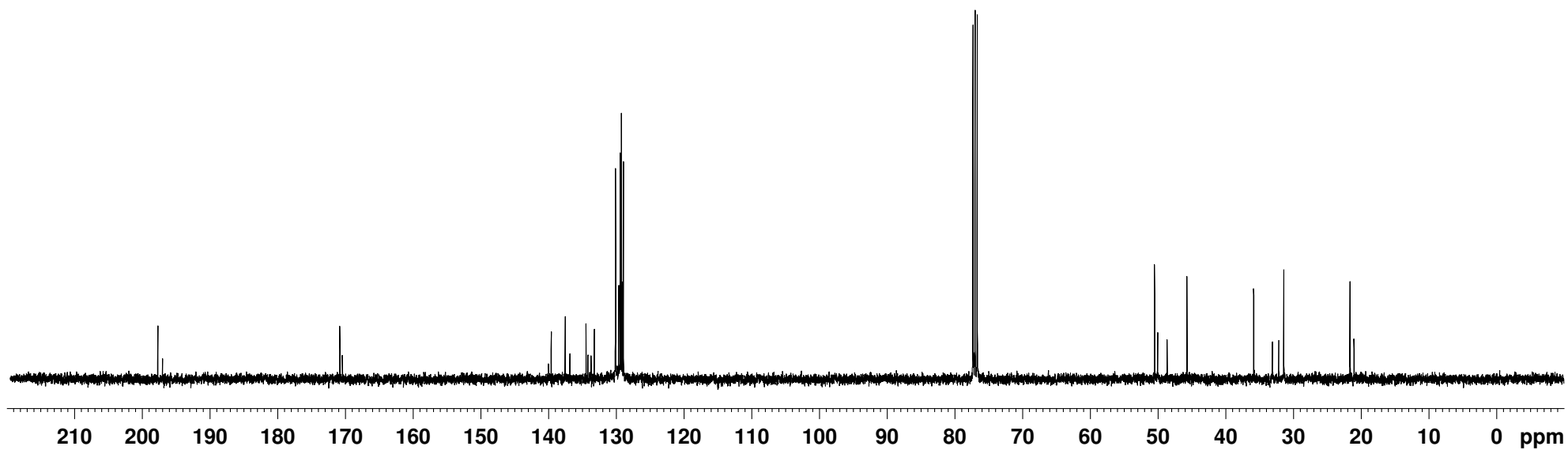
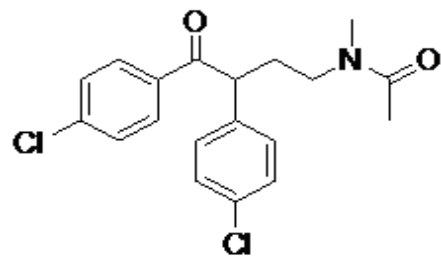
139.95
139.54
137.46
136.79
134.40
134.12
133.66
133.17
130.05
130.00
129.56
129.34
129.17
129.05
128.87

77.32
77.00
76.68

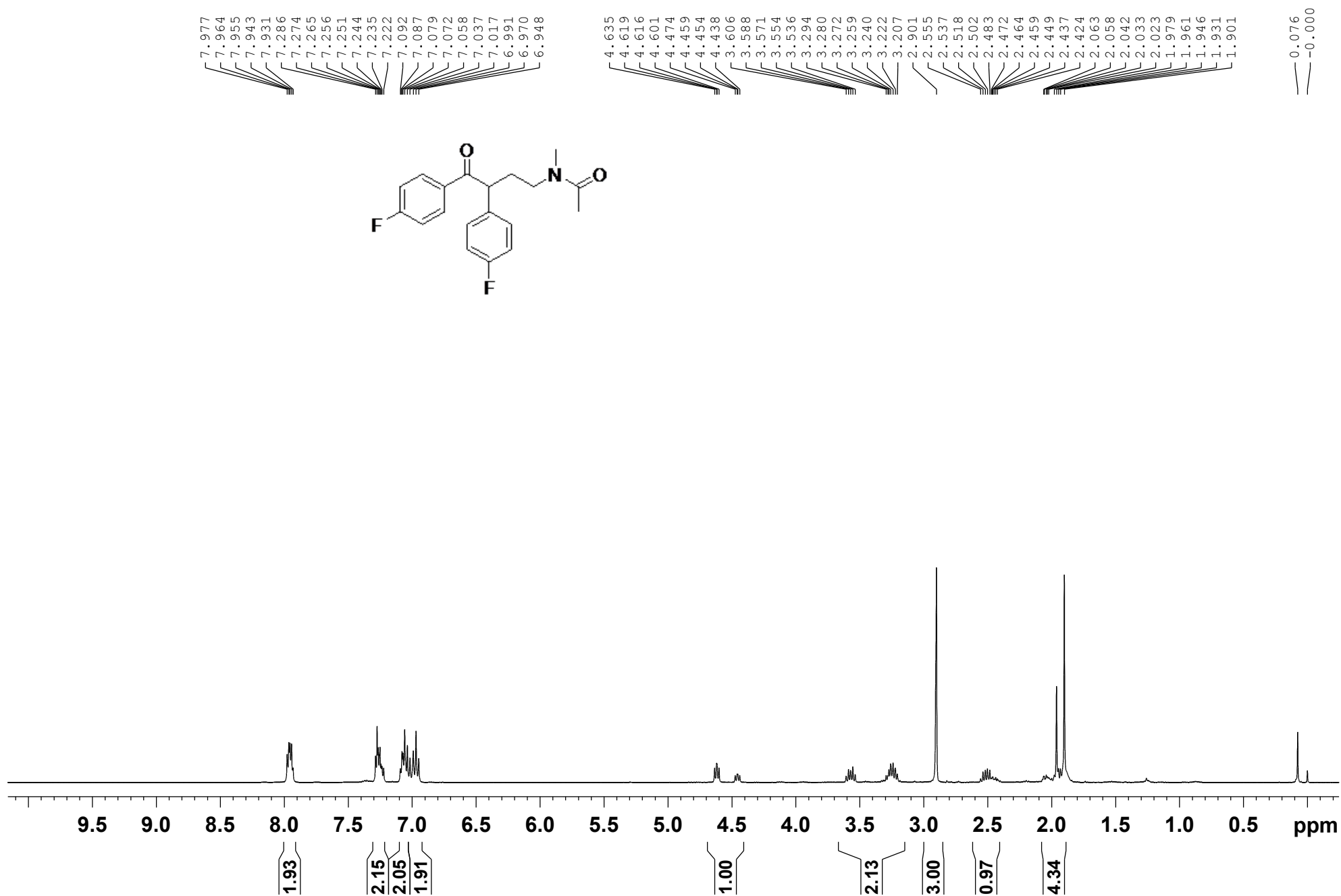
50.48
50.01
48.64
45.71

35.84
33.07
32.14
31.40

21.62
21.02



N-(3,4-Bis(4-fluorophenyl)-4-oxobutyl)-N-methylacetamide (3ea)



197.54
196.84

170.74
170.43
166.86
164.32
163.12
160.67

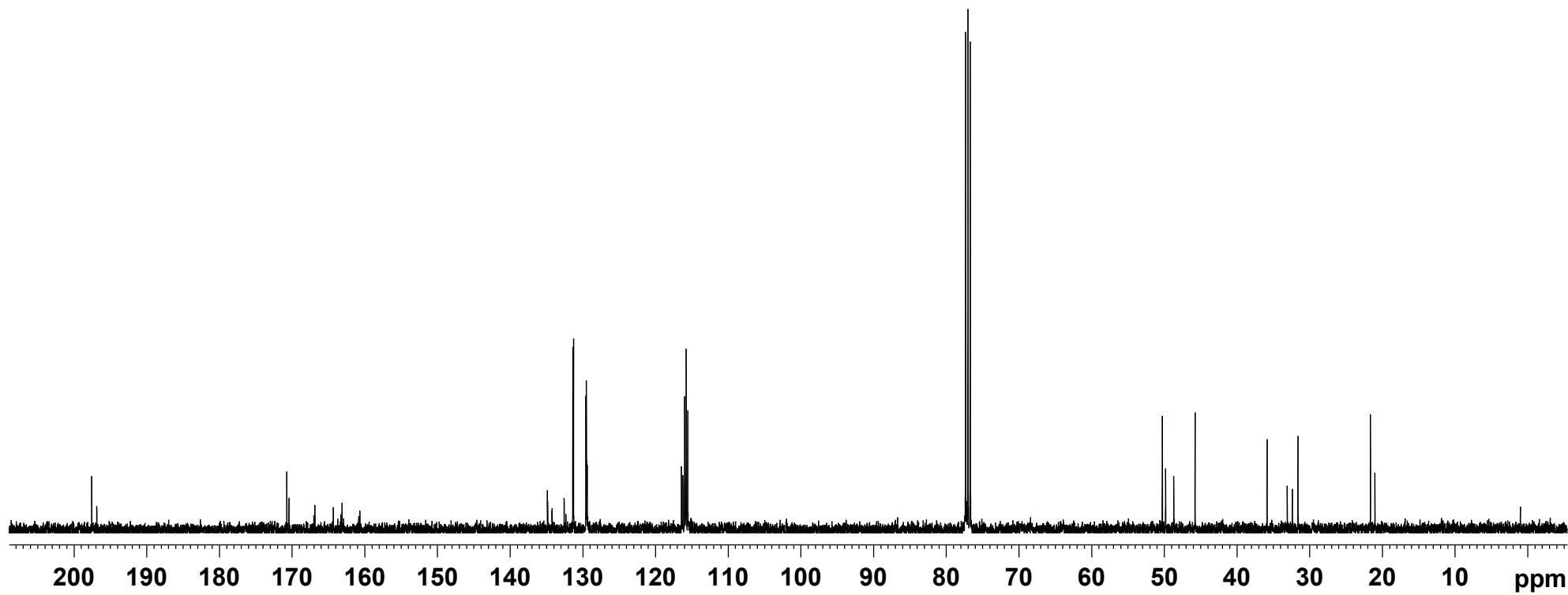
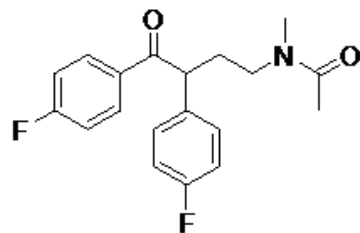
134.87
134.84
134.21
132.58
131.37
131.28
129.59
129.51
129.47
129.39
116.43
116.22
116.00
115.77
115.55

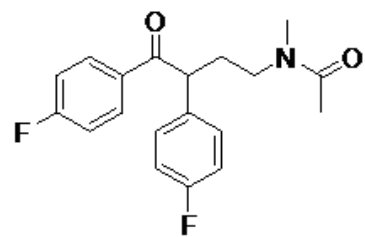
77.32
77.00
76.68

50.26
49.81
48.69
45.74

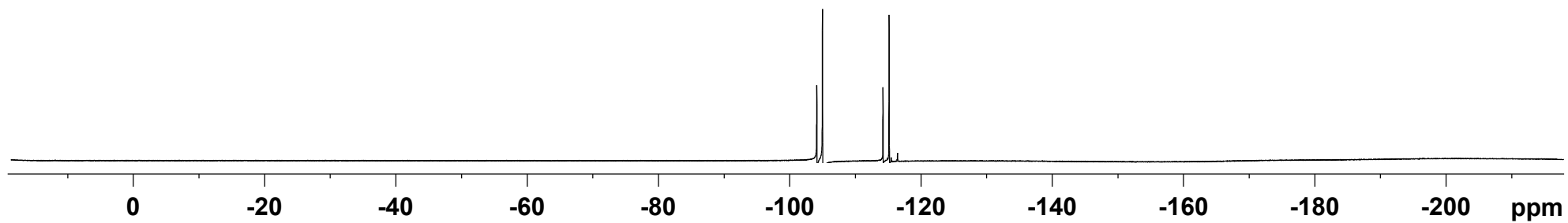
35.84
33.07
32.36
31.59

21.62
21.01



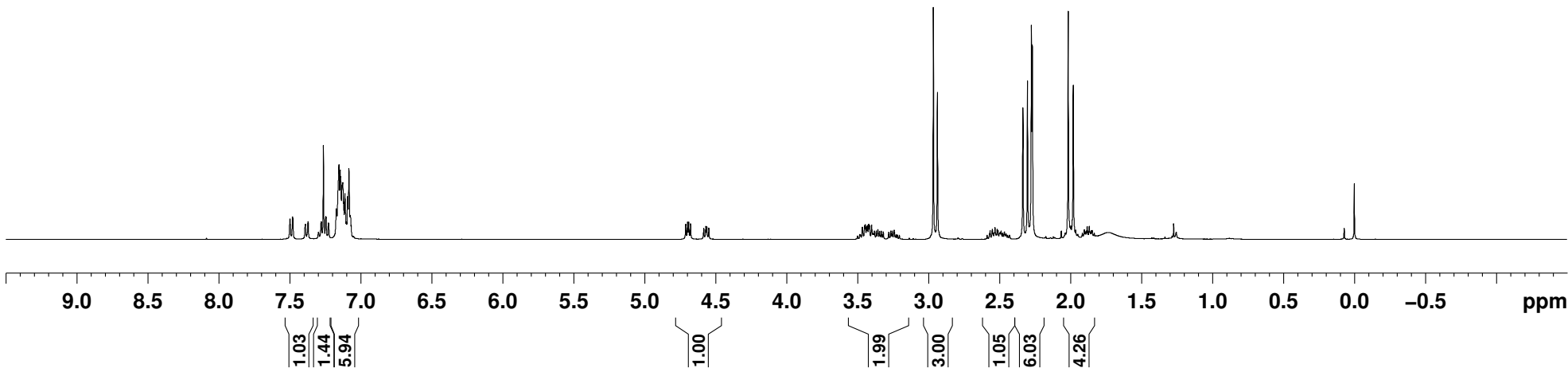
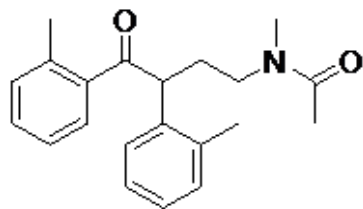


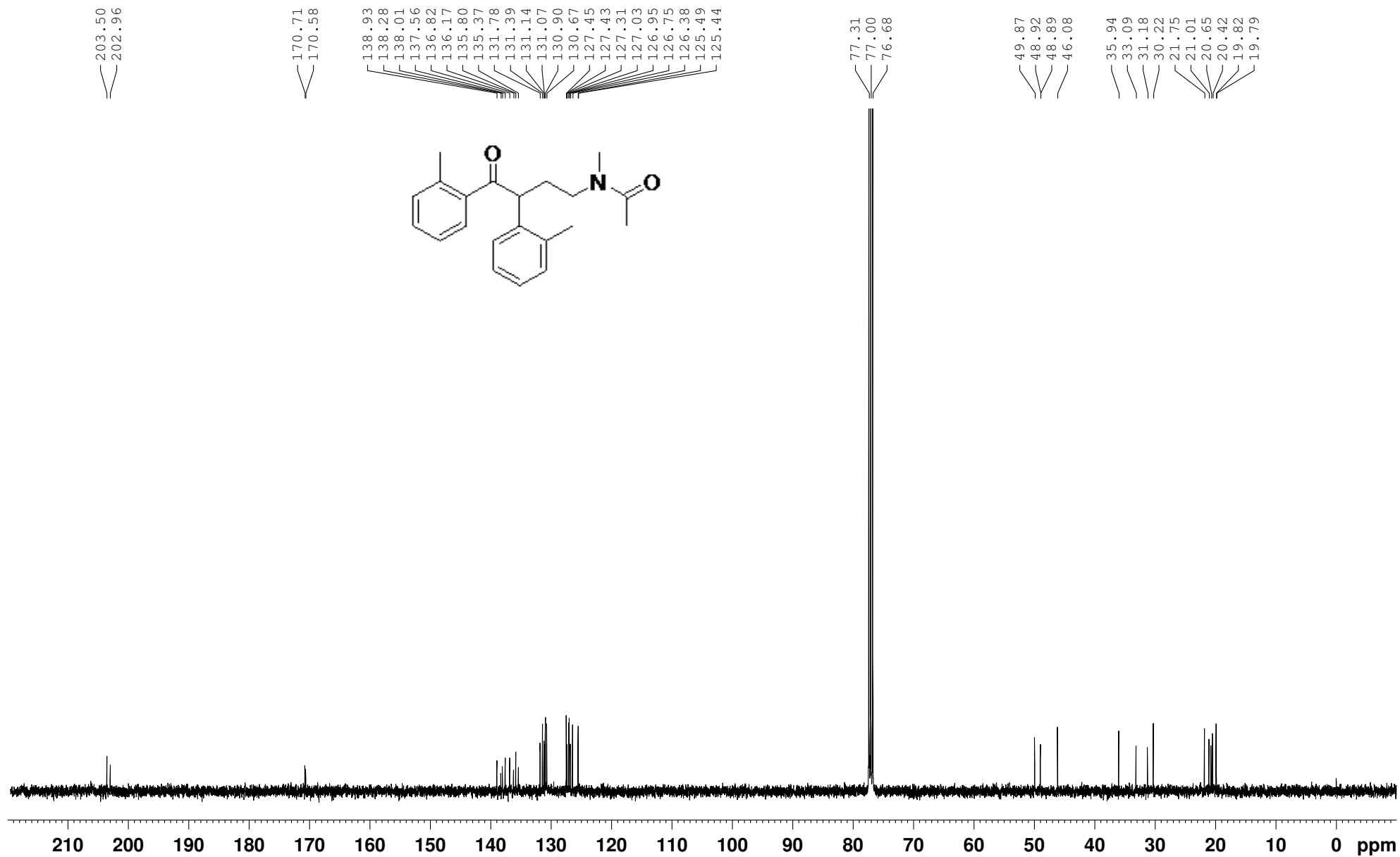
--104.155
--104.167
--105.019
--105.031
--114.243
--115.178
--115.190



N-Methyl-N-(4-oxo-3,4-dio-tolylbutyl)acetamide (3fa)

7.498
7.481
7.394
7.390
7.372
7.279
7.264
7.247
7.245
7.229
7.226
7.173
7.153
7.146
7.142
7.133
7.130
7.126
7.122
7.112
7.102
7.093
7.084
7.076
7.072
7.068
4.711
4.698
4.690
4.677
4.584
4.569
4.563
4.548
4.548
3.466
3.450
3.445
3.436
3.429
3.421
3.416
3.401
3.394
3.388
3.381
3.368
3.357
3.344
3.332
3.319
3.281
3.266
3.256
3.242
2.966
2.937
2.566
2.550
2.545
2.537
2.532
2.516
2.511
2.499
2.495
2.488
2.476
2.465
2.454
2.335
2.302
2.275
2.268
2.064
2.016
2.003
1.997
1.980
1.963
1.902
1.888
1.882
1.867
1.861
1.854
1.847
-0.000

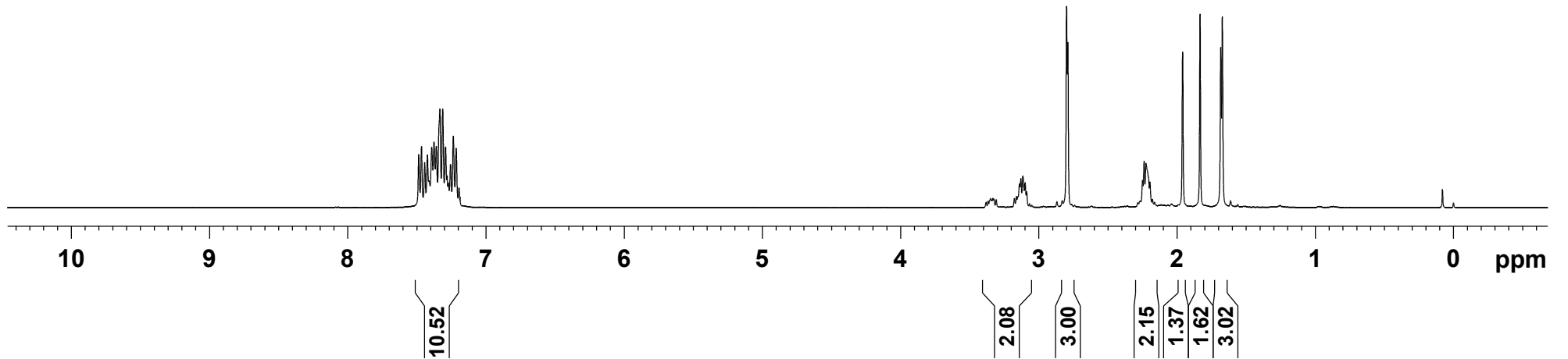
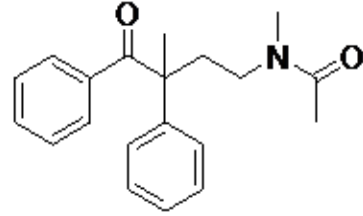




N-Methyl-N-(3-methyl-4-oxo-3,4-diphenylbutyl)acetamide (3ga)

7.485
7.465
7.442
7.422
7.411
7.391
7.374
7.357
7.332
7.311
7.290
7.279
7.270
7.255
7.234
7.214
7.193

3.382
3.367
3.349
3.341
3.333
3.325
3.308
3.177
3.162
3.151
3.140
3.130
3.116
3.099
3.088
3.068
3.052
2.799
2.790
2.249
2.238
2.224
2.196
1.960
1.833
1.683
1.673
0.079
0.000



203.15
202.48

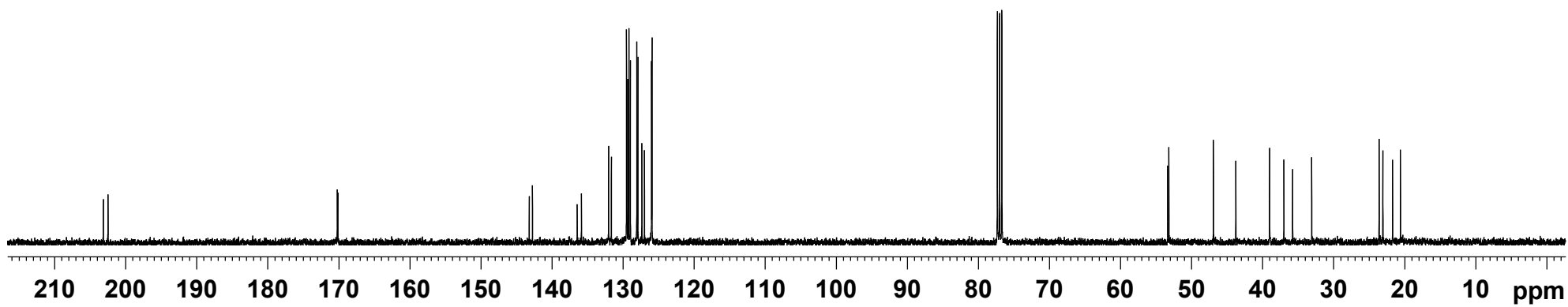
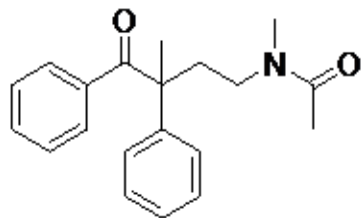
170.22
170.13

143.20
142.74
136.46
135.86
132.03
131.64
129.51
129.35
129.17
128.97
128.06
127.91
127.35
126.99
125.99
125.92

77.32
77.00
76.68

53.35
53.18
46.91
43.76
39.00
36.99
35.76
33.07

23.59
23.06
21.70
20.59

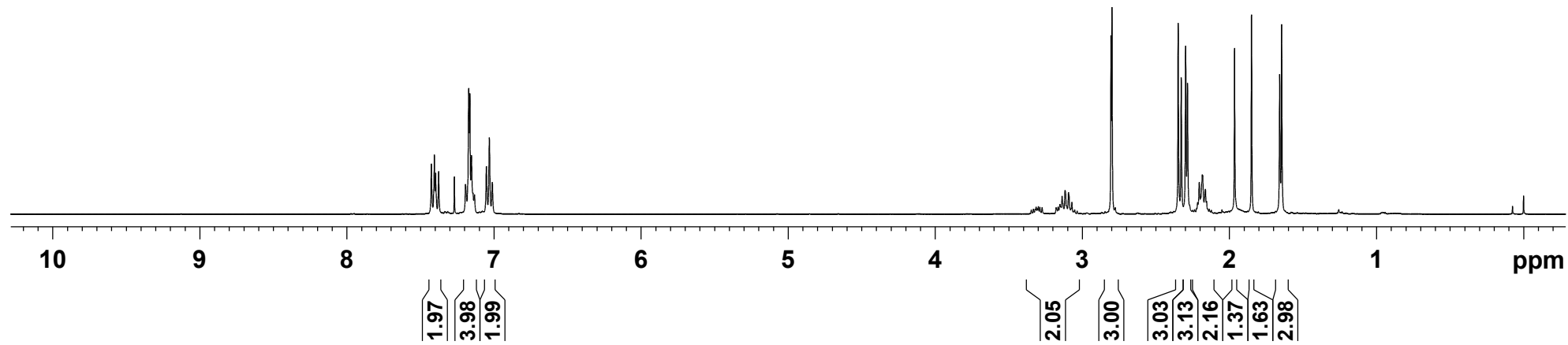
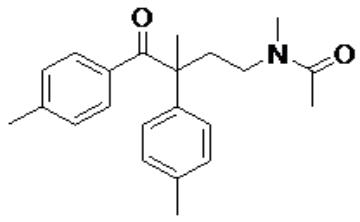


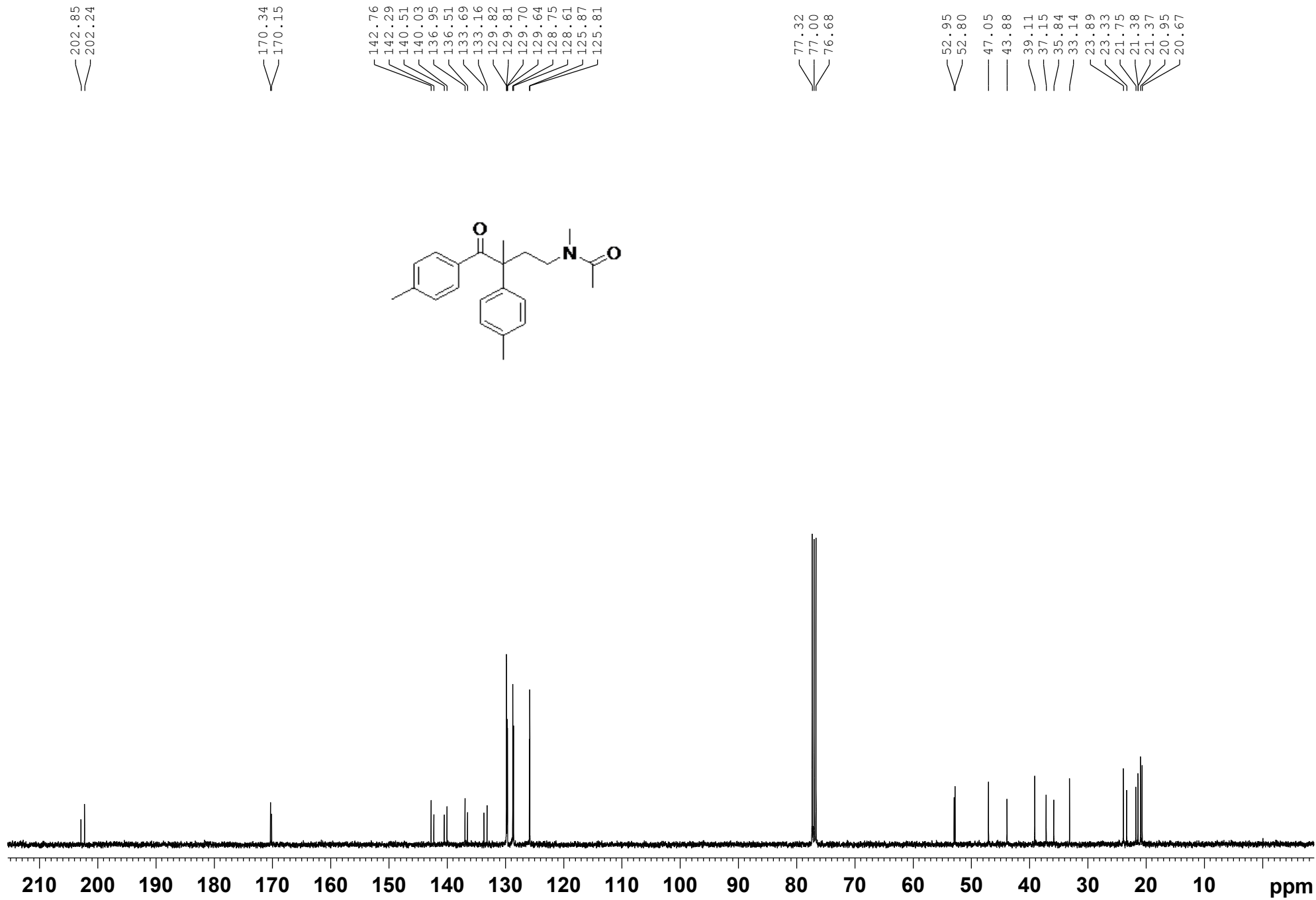
N-Methyl-N-(3-methyl-4-oxo-3,4-dip-tolylbutyl)acetamide (3ha)

7.426
7.406
7.397
7.376
7.270
7.193
7.171
7.164
7.153
7.142
7.133
7.052
7.032
7.011

3.347
3.332
3.320
3.314
3.306
3.299
3.289
3.273
3.178
3.173
3.164
3.152
3.146
3.137
3.118
3.106
3.094
3.077
3.071
3.059
3.052
3.035
2.805
2.798
2.348
2.327
2.297
2.285
2.205
2.196
2.184
2.181
2.163
2.155
1.965
1.849
1.658
1.645

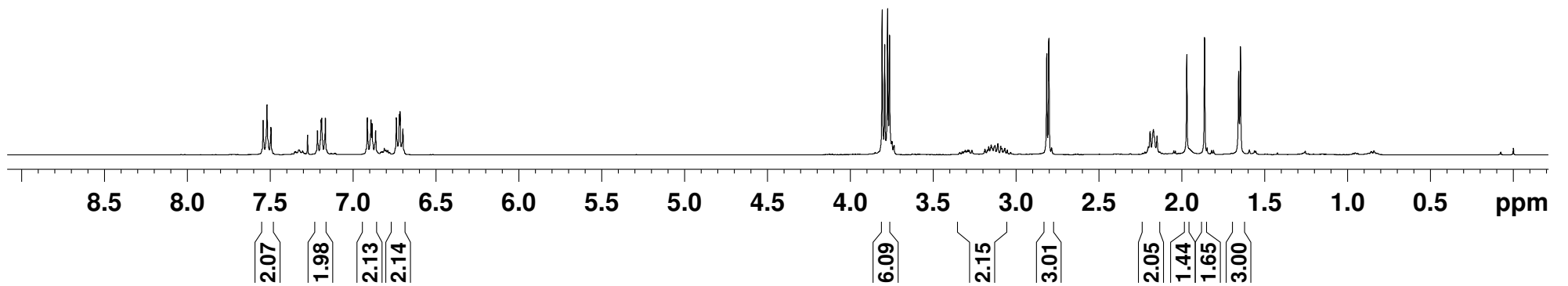
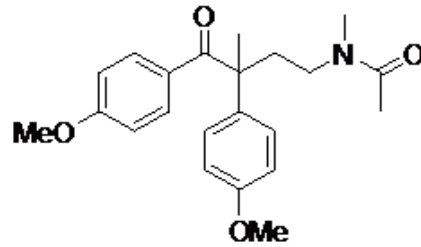
0.075
-0.000





N-(3,4-Bis(4-methoxyphenyl)-3-methyl-4-oxobutyl)-N-methylacetamide (3ia)

7.544
7.521
7.515
7.497
7.276
7.216
7.194
7.191
7.169
6.915
6.893
6.887
6.865
6.740
6.723
6.718
6.710
6.701
3.809
3.793
3.776
3.764
3.340
3.325
3.314
3.308
3.300
3.291
3.283
3.267
3.188
3.174
3.166
3.151
3.134
3.128
3.110
3.093
3.087
3.069
3.054
3.033
2.816
2.803
2.203
2.192
2.172
2.150
1.970
1.863
1.658
1.647
0.076
-0.000

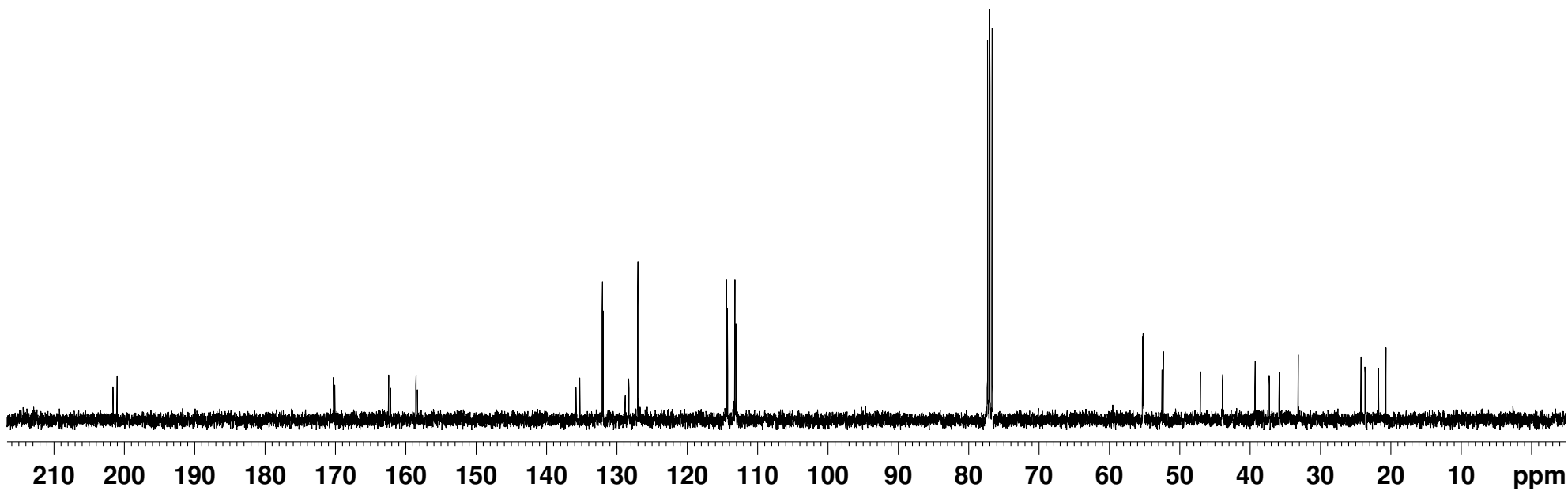
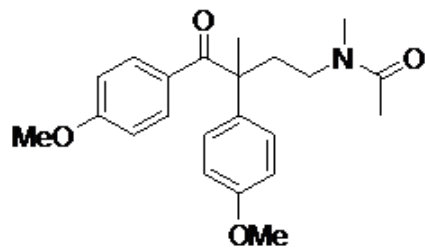


201.65
201.06

170.30
170.13
162.46
162.19
158.59
158.36

135.83
135.29
132.09
131.96
128.84
128.32
127.07
127.04
114.44
114.29
113.24
113.10

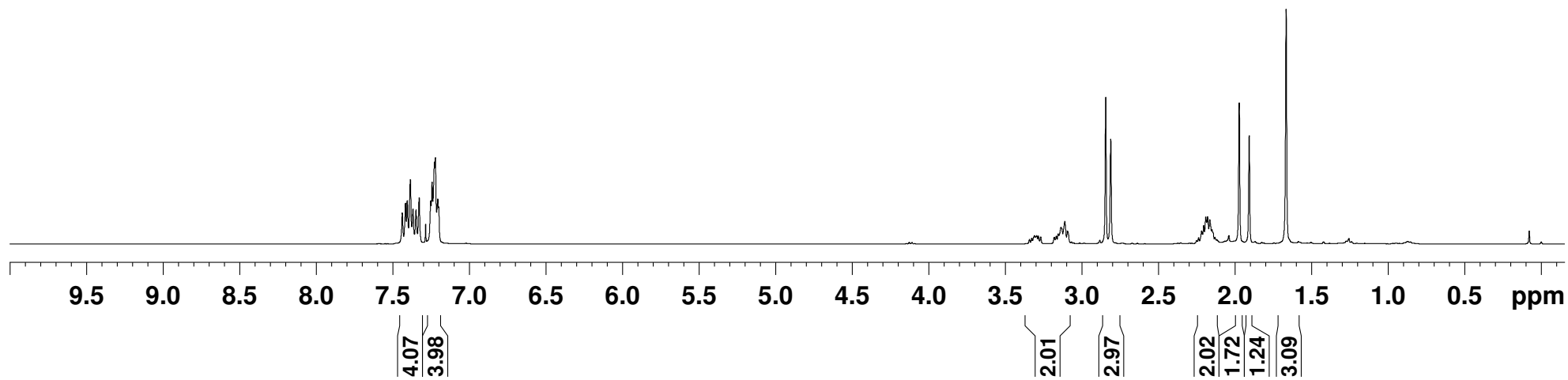
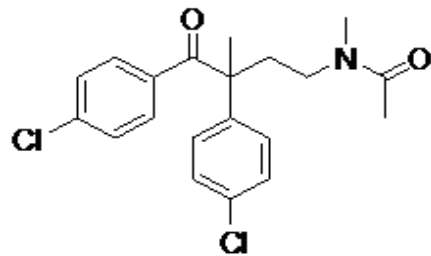
77.32
77.00
76.68
55.27
55.22
55.19
55.15
52.50
52.35
47.07
43.91
39.29
37.26
35.87
33.14
24.22
23.65
21.75
20.70



N-(3,4-Bis(4-chlorophenyl)-3-methyl-4-oxobutyl)-N-methylacetamide (3ja)

7.440
7.419
7.407
7.387
7.370
7.350
7.329
7.287
7.254
7.245
7.230
7.224
7.208
7.202

3.343
3.329
3.311
3.302
3.296
3.285
3.270
3.182
3.168
3.156
3.138
3.113
3.095
2.845
2.813
2.239
2.219
2.205
2.192
2.180
2.166
2.152
2.145
2.132
1.973
1.908
1.667
0.079
0.000

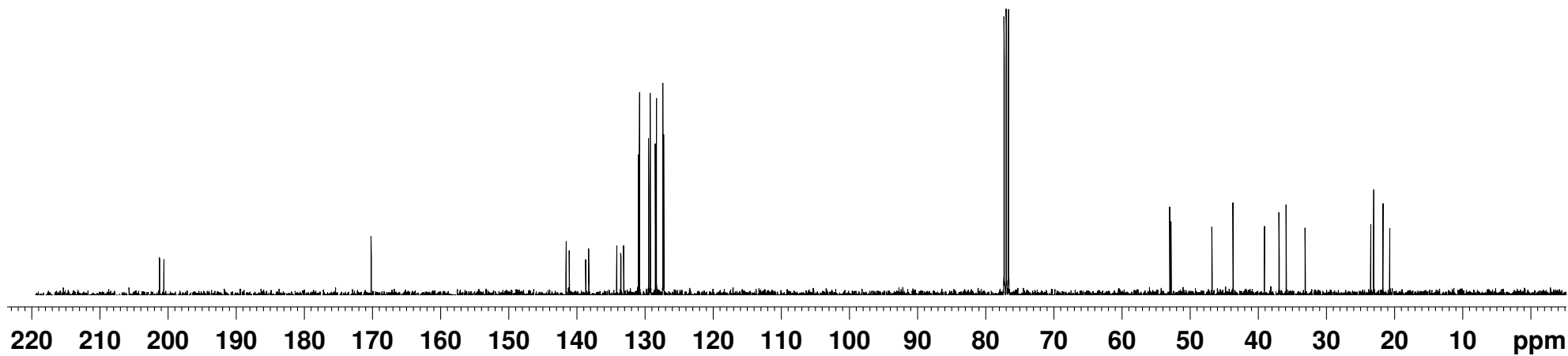
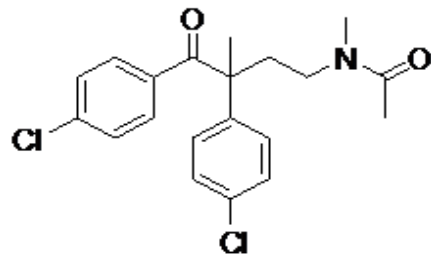


< 201.24
< 200.59

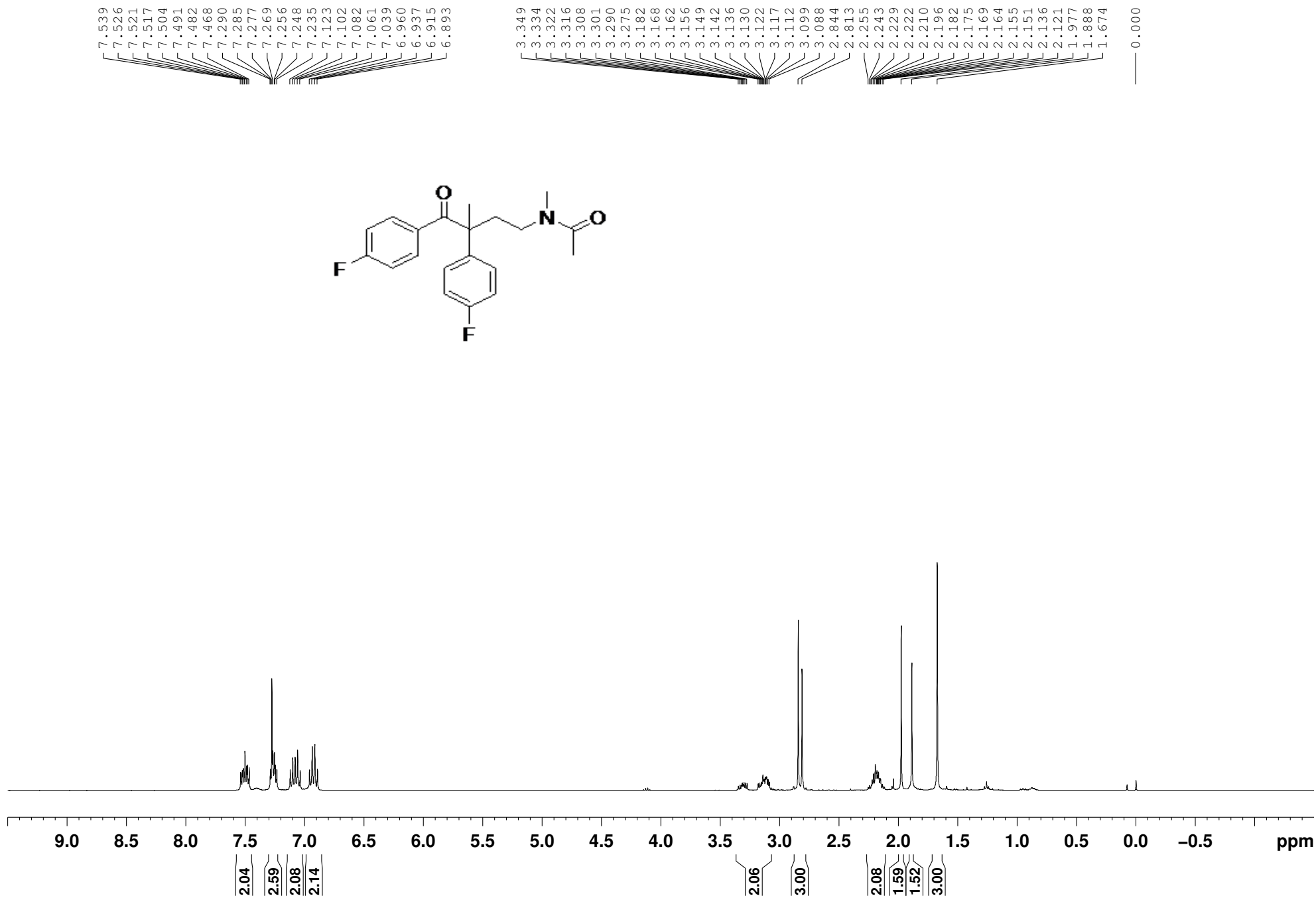
< 170.20
< 170.13
141.62
141.14
138.74
138.30
134.18
133.61
133.57
133.16
130.99
130.85
129.50
129.26
128.51
128.36
127.40
127.29

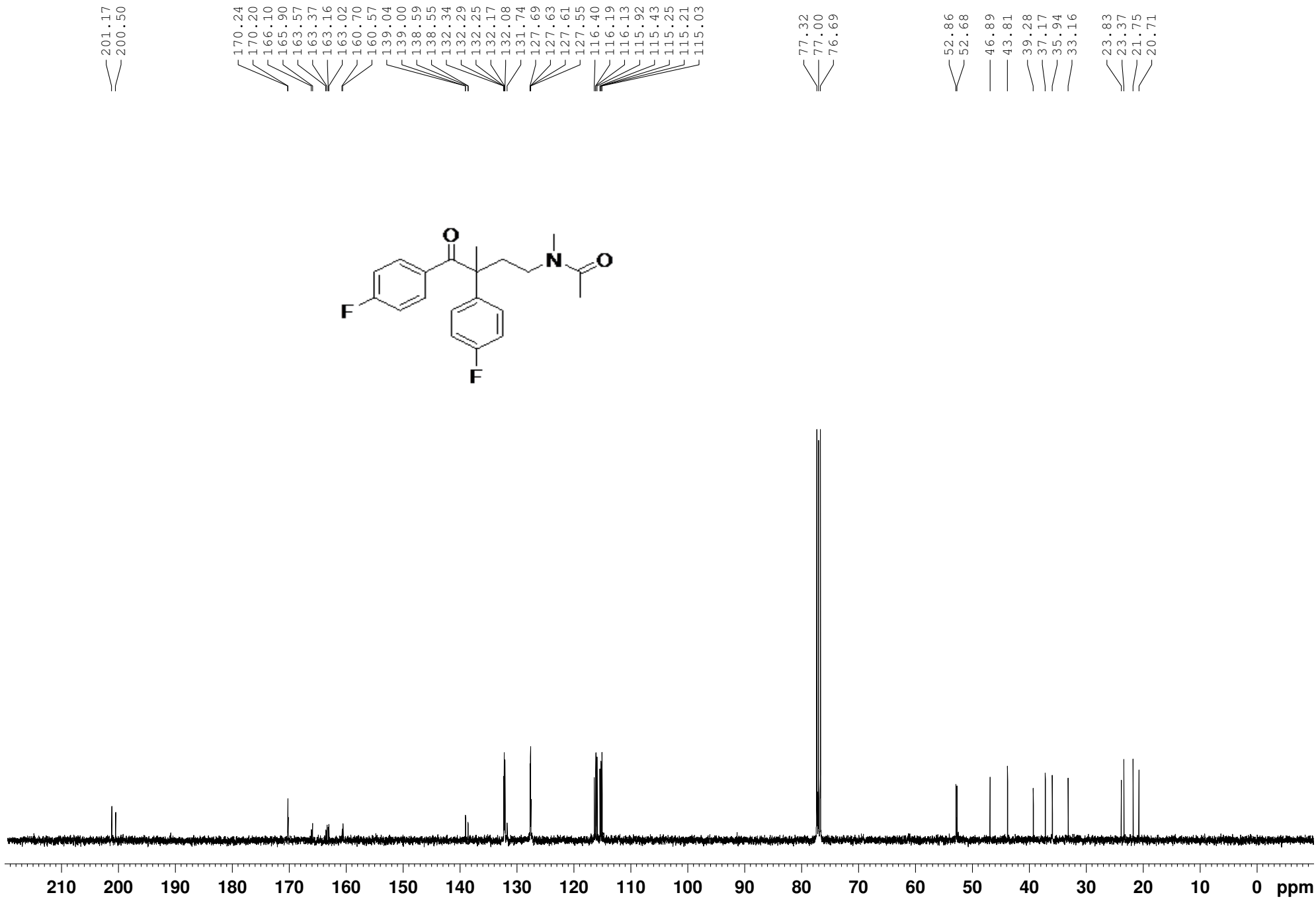
< 77.31
< 77.00
< 76.68

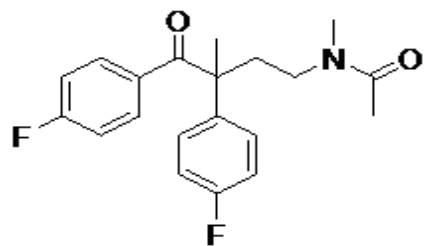
< 53.01
< 52.81
< 46.80
< 43.71
< 39.09
< 36.95
< 35.92
< 33.12
< 23.49
< 23.07
< 21.69
< 20.70



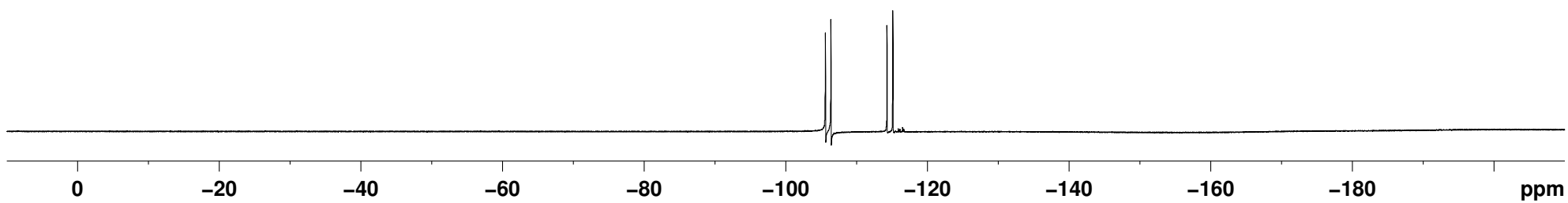
N-(3,4-Bis(4-fluorophenyl)-3-methyl-4-oxobutyl)-N-methylacetamide (3ka)



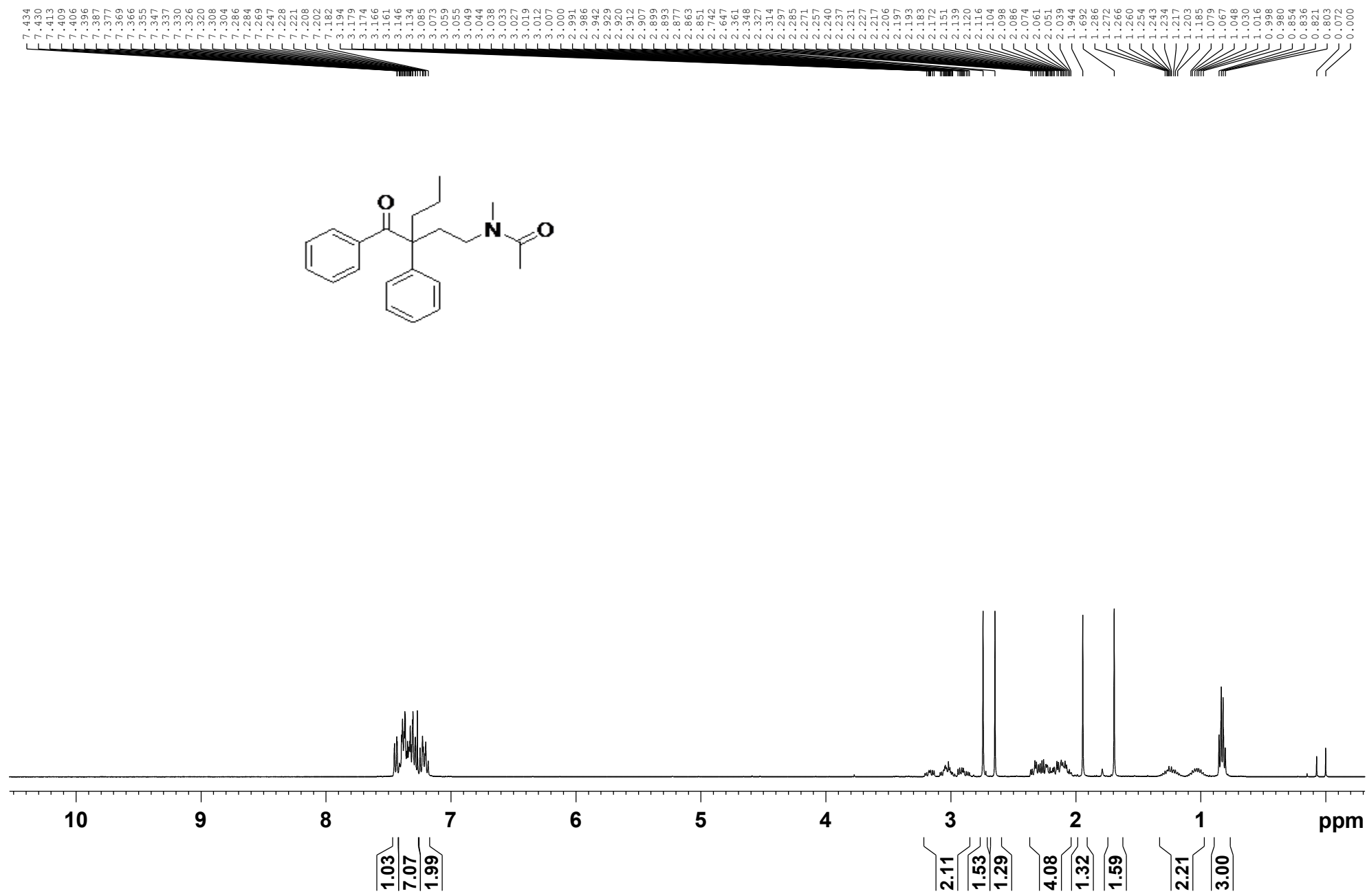
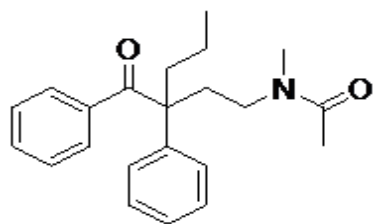


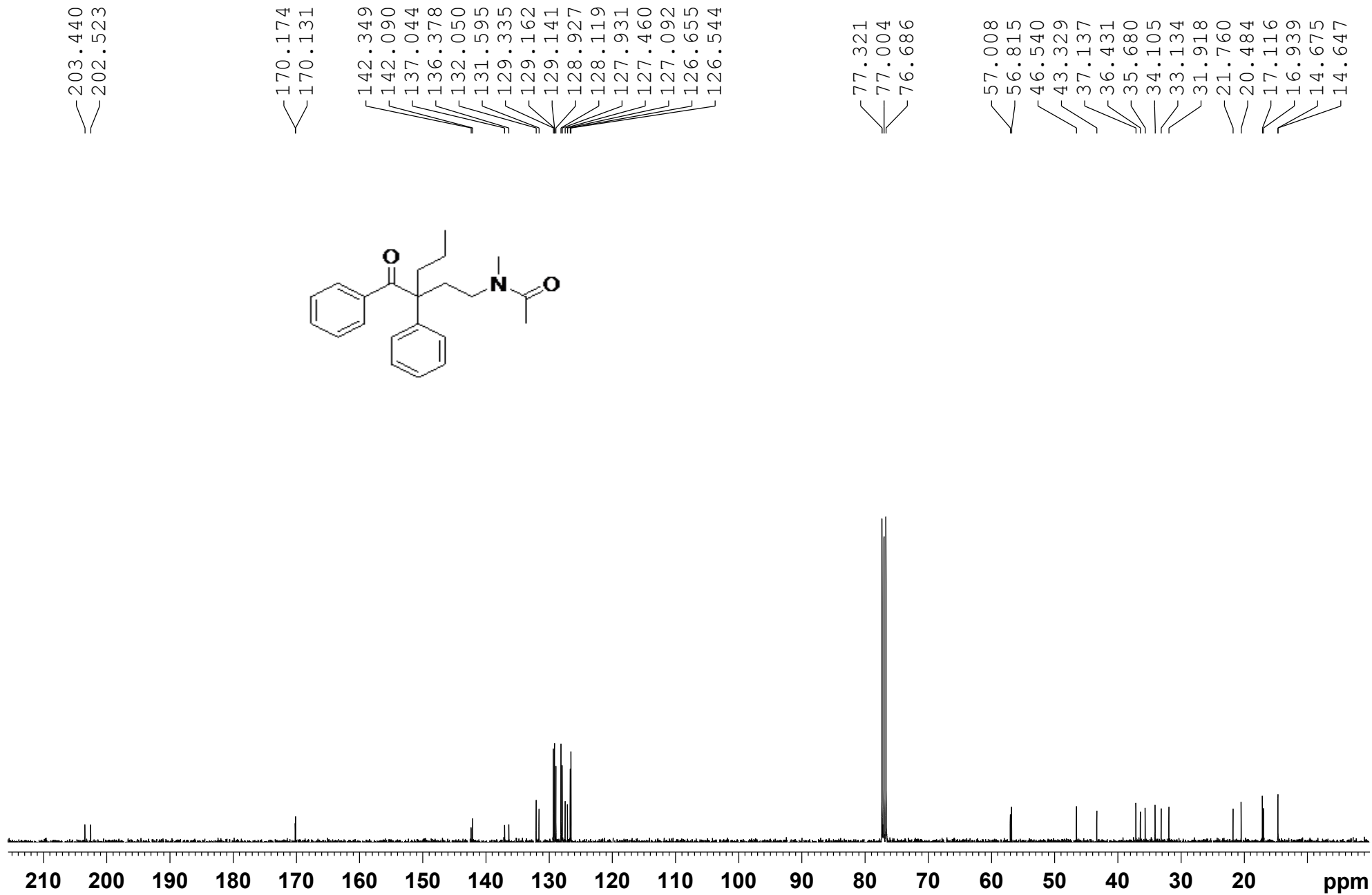


-105.559
-105.570
-106.338
-106.349
-114.256
-114.266
-114.276
-114.286
-115.090
-115.101



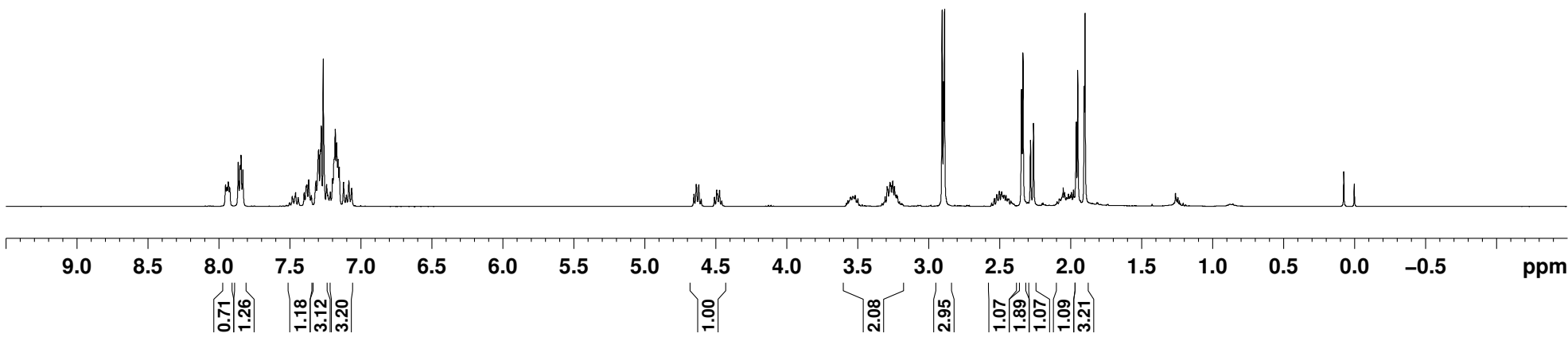
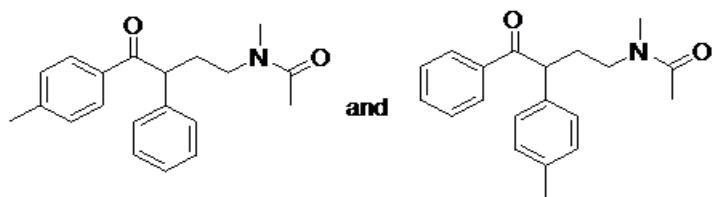
N-(3-Benzoyl-3-phenylhexyl)-N-methylacetamide (3la)





N-Methyl-N-(4-oxo-3-phenyl-4-p-tolylbutyl)acetamide (3ma) and N-Methyl-N-(4-oxo-4-phenyl-3-p-tolylbutyl)acetamide (3ma')

7.952
7.943
7.934
7.931
7.925
7.864
7.851
7.844
7.831
7.483
7.465
7.460
7.441
7.399
7.386
7.380
7.367
7.349
7.316
7.298
7.285
7.279
7.265
7.241
7.232
7.215
7.200
7.190
7.180
7.170
7.161
7.152
7.122
7.102
7.085
7.065
4.653
4.638
4.619
4.508
4.493
4.487
4.472
3.548
3.535
3.531
3.518
3.498
3.306
3.292
3.286
3.272
3.265
3.252
3.240
3.225
3.219
2.904
2.894
2.887
2.535
2.519
2.501
2.485
2.476
2.467
2.454
2.441
2.434
2.345
2.335
2.282
2.261
2.051
2.045
2.040
2.014
2.006
1.999
1.993
1.979
1.972
1.960
1.949
1.903
1.897
0.000

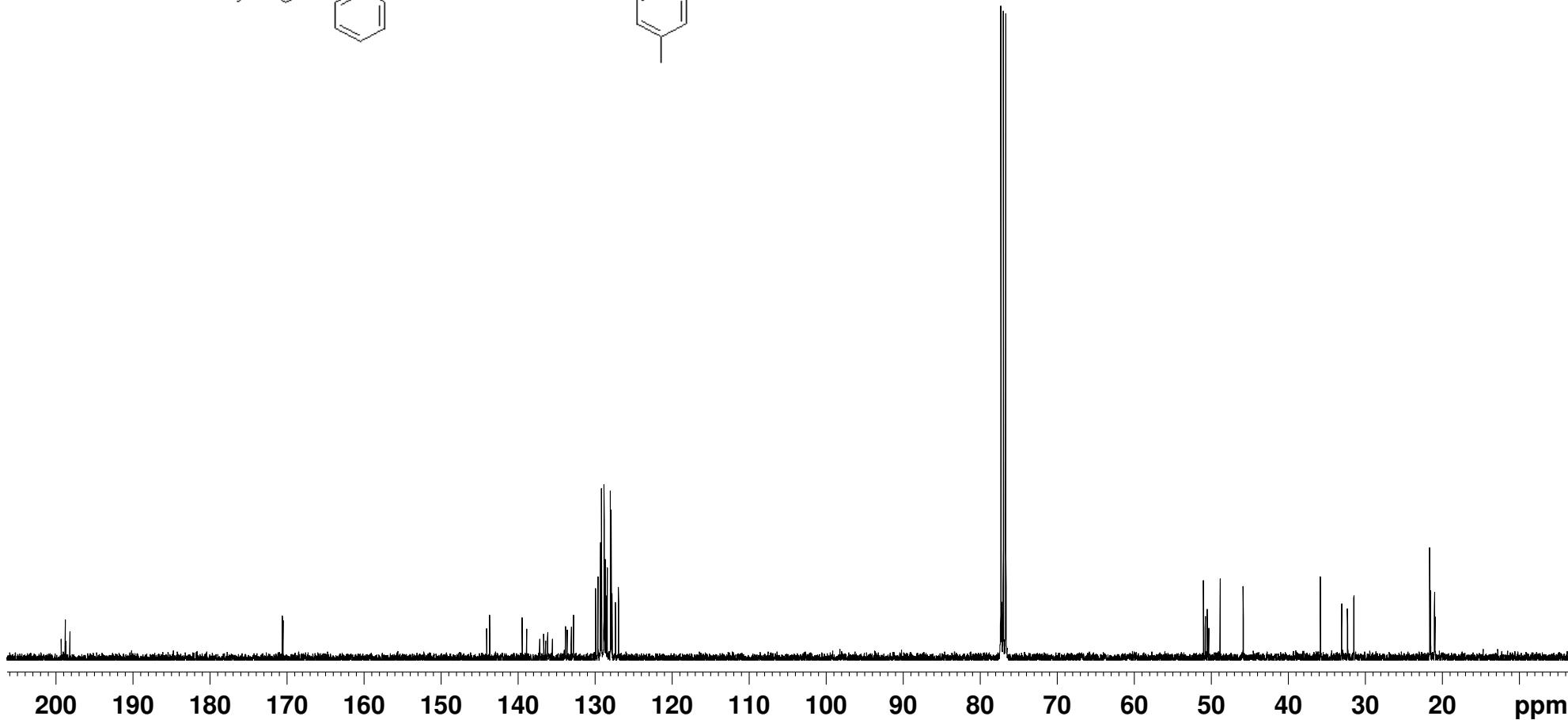
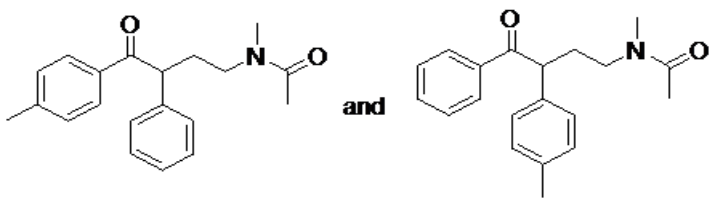


199.30
198.77
198.71
198.17

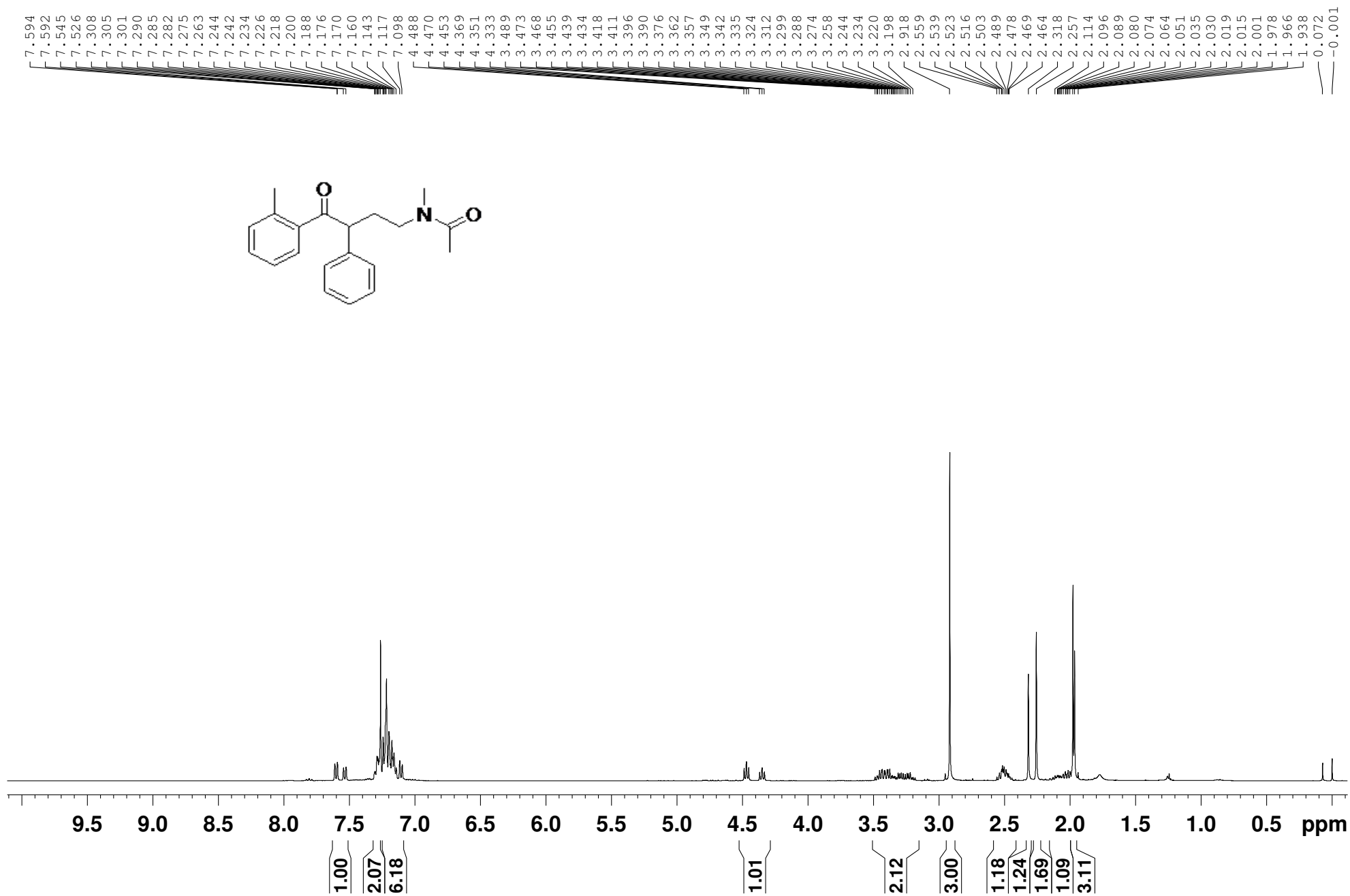
170.64
170.54
144.11
143.71
139.49
138.90
137.21
136.70
136.44
136.18
135.56
133.87
133.66
133.11
132.82
129.95
129.64
129.31
129.21
129.18
128.88
128.84
128.82
128.70
128.67
128.58
128.44
128.03
127.92
127.81
127.39
126.98

77.32
77.00
76.69

51.02
50.78
50.53
50.33
48.84
45.87
35.83
33.06
32.31
32.27
31.48
31.46
21.64
21.55
21.52
21.00
20.94



N-Methyl-N-(4-oxo-3-phenyl-4-o-tolylbutyl)acetamide (3na)

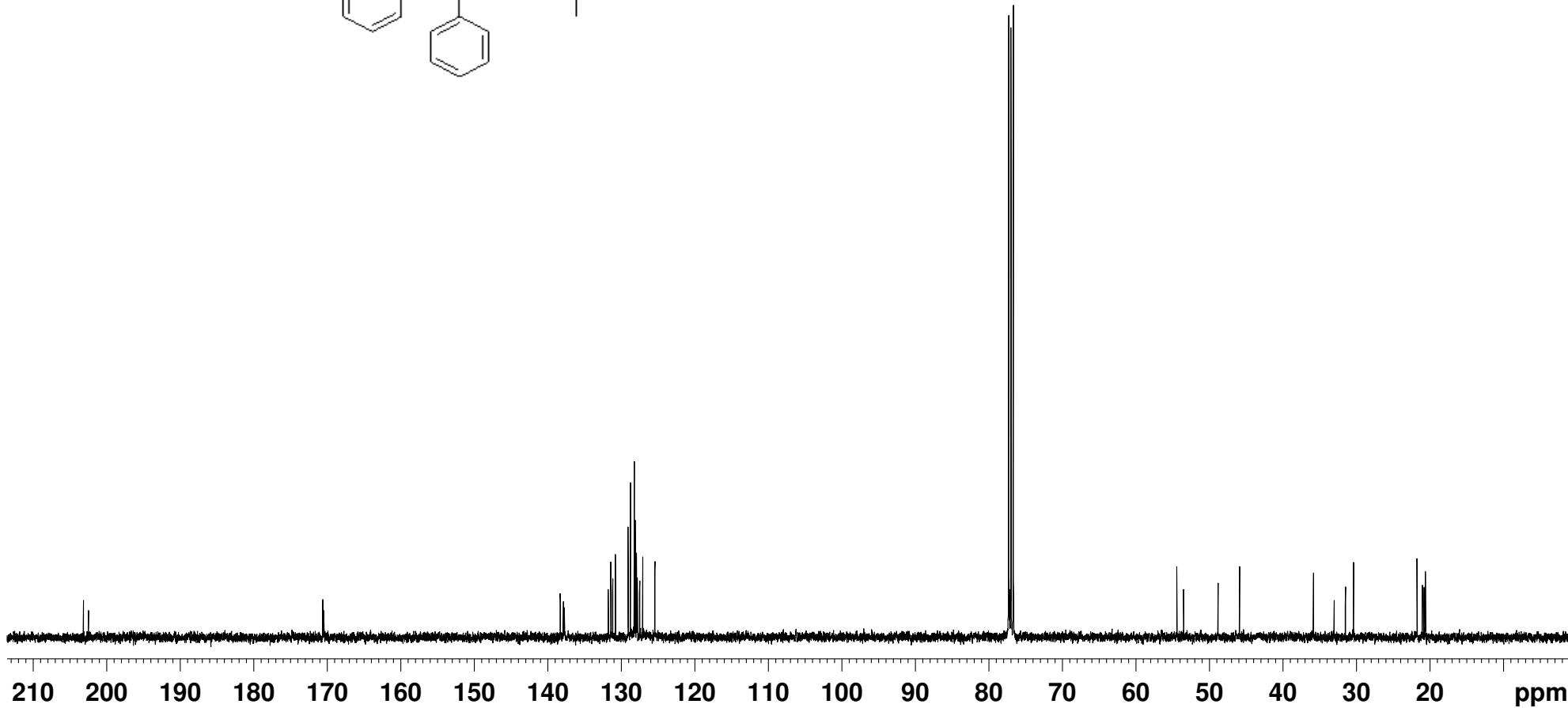
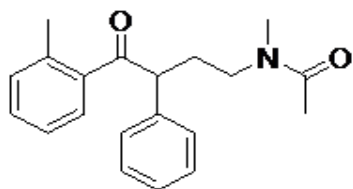


203.14
202.46

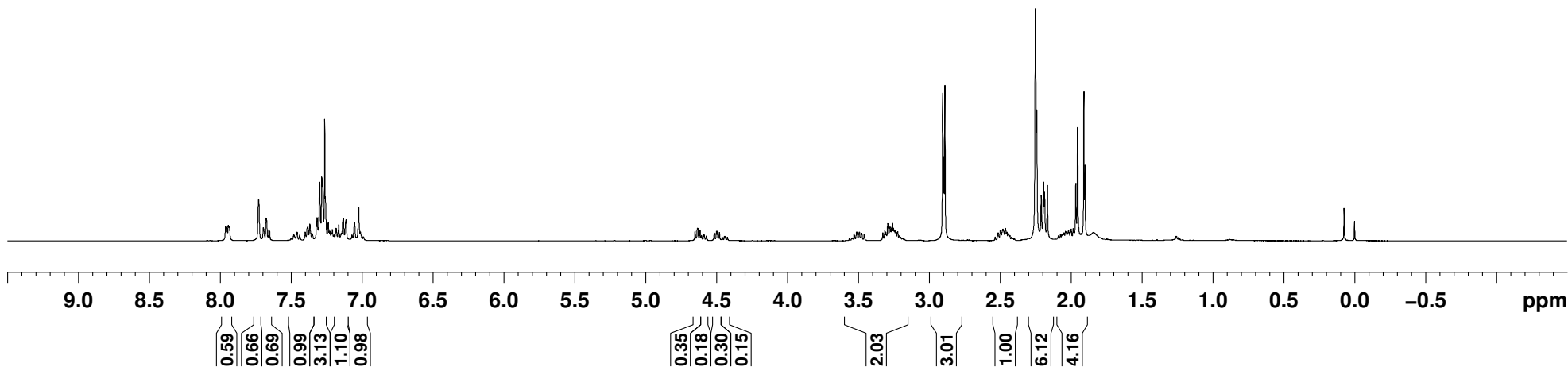
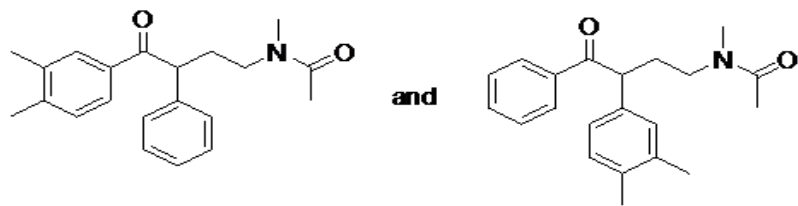
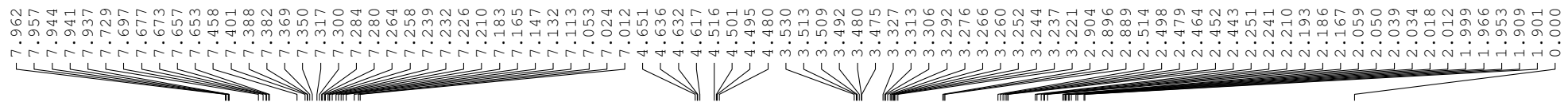
170.64
170.50
138.37
138.33
138.29
137.91
137.84
137.76
131.81
131.47
131.20
130.83
129.11
128.78
128.26
128.13
127.96
127.85
127.53
127.11
125.50
125.46

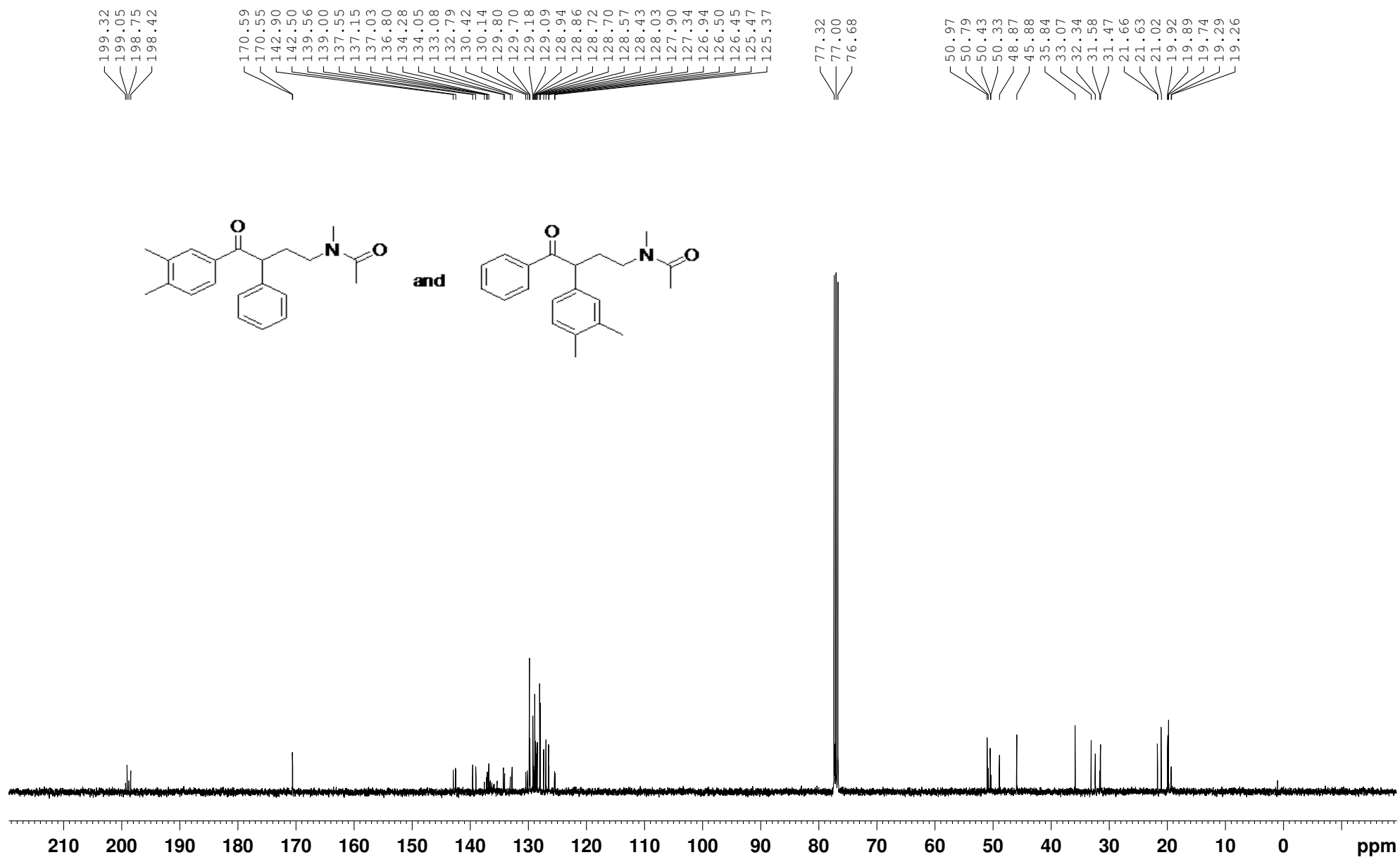
77.32
77.00
76.68

54.43
53.52
48.82
45.89
35.85
33.03
31.50
30.38
21.75
21.04
20.79
20.61

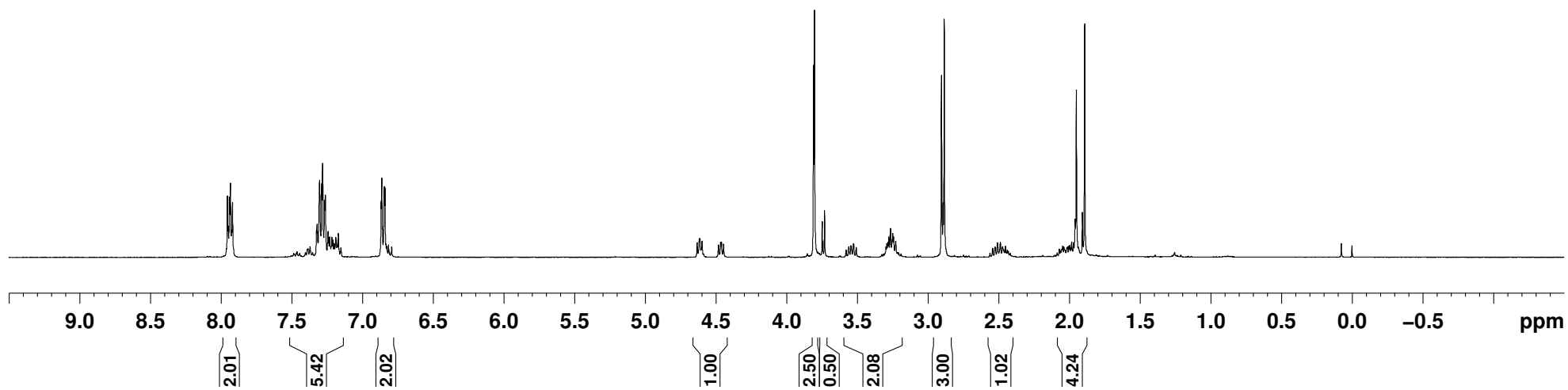
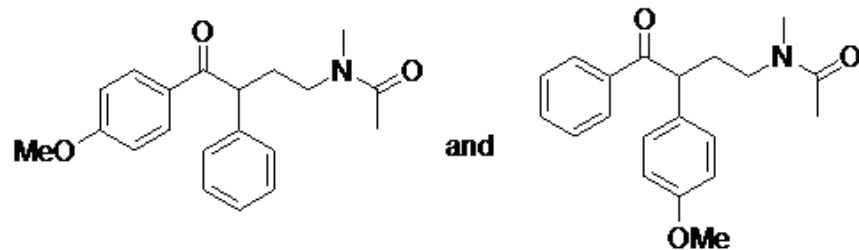
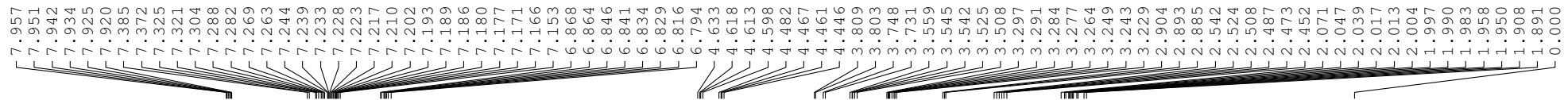


N-(4-(3,4-Dimethylphenyl)-4-oxo-3-phenylbutyl)-N-methylacetamide (3oa) and N-(3-(3,4-Dimethylphenyl)-4-oxo-4-phenylbutyl)-N-methylacetamide (3oa')





N-(4-(4-Methoxyphenyl)-4-oxo-3-phenylbutyl)-N-methylacetamide (3pa) and N-(3-(4-Methoxyphenyl)-4-oxo-4-phenylbutyl)-N-methylacetamide (3pa')



197.63
197.01

170.62
170.54
163.51
163.31

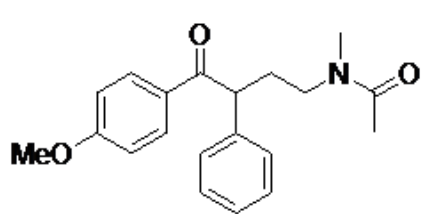
139.70
139.14
131.00
129.35
129.18
129.11
129.00
128.86
128.66
128.58
128.44
127.96
127.84
127.34
126.93
114.65
114.34
113.79
113.65

77.32
77.00
76.69

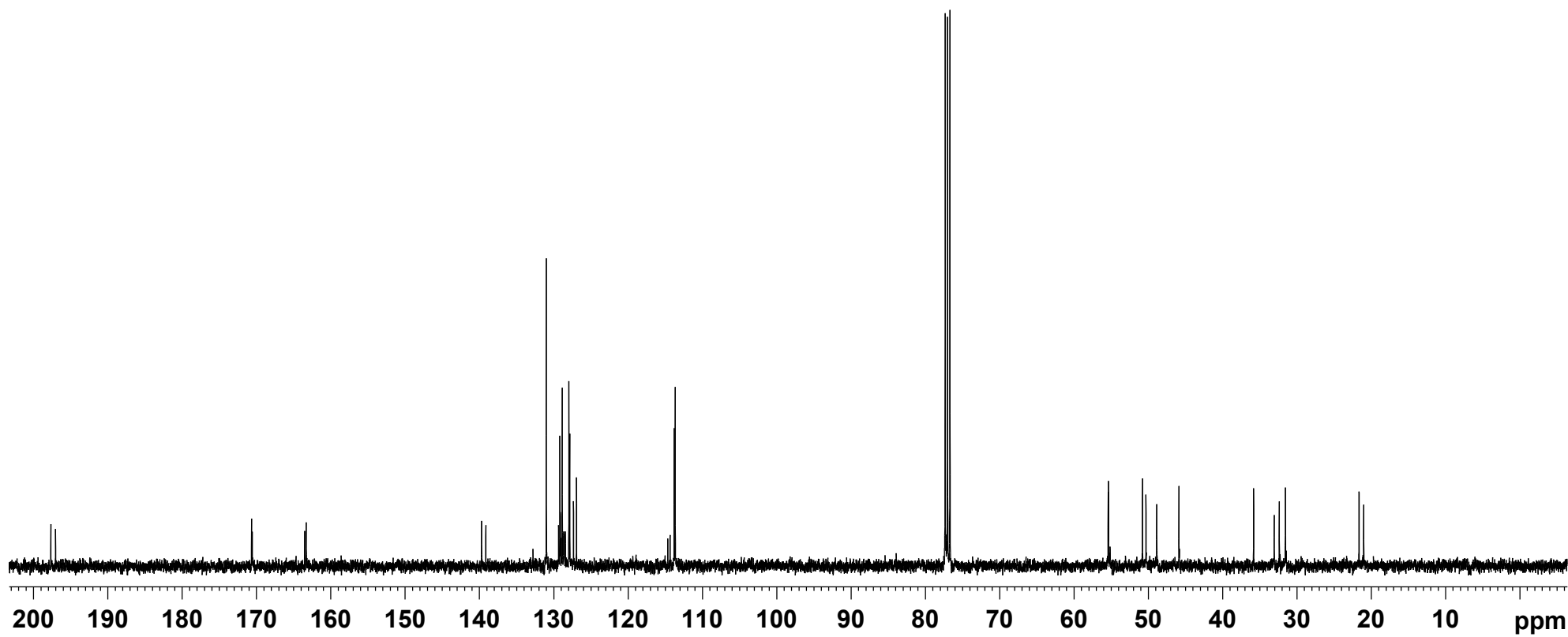
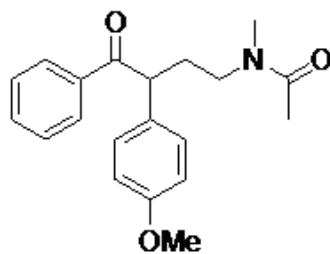
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55.34
55.13
50.77
50.30
48.86
45.86

35.81
33.04
32.36
31.54

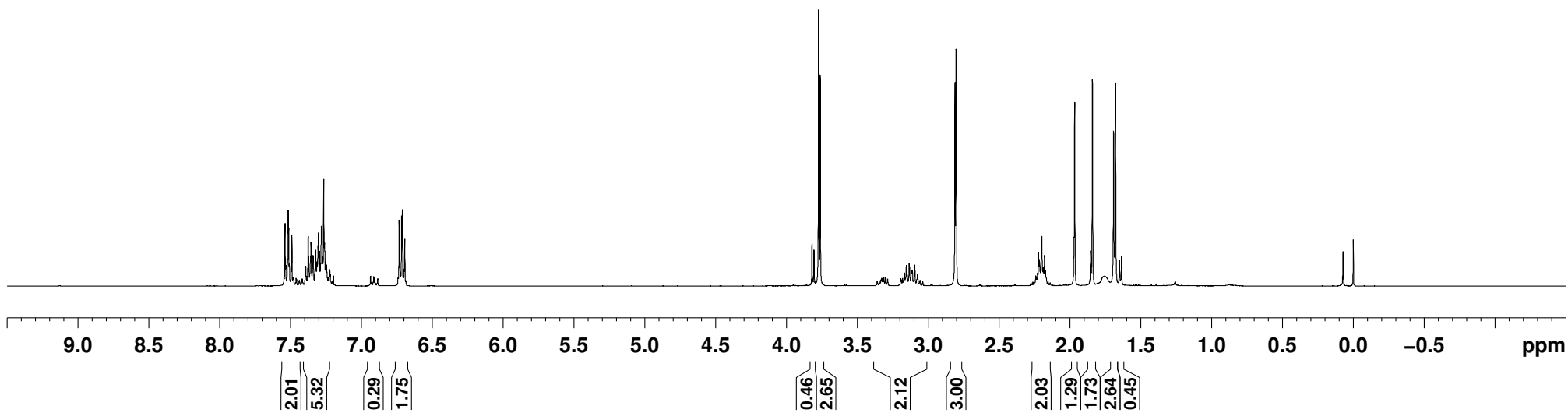
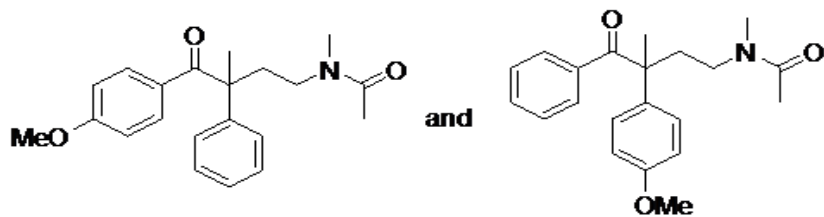
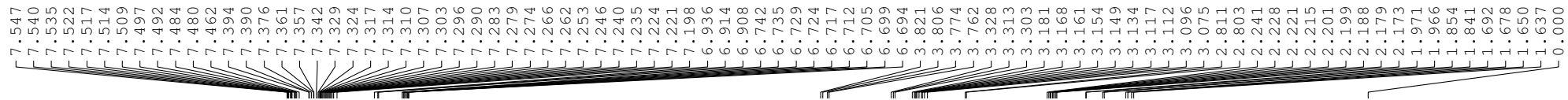
21.63
21.00



and



N-(4-(4-Methoxyphenyl)-3-methyl-4-oxo-3-phenylbutyl)-N-methylacetamide (3qa) and N-(3-(4-Methoxyphenyl)-3-methyl-4-oxo-4-phenylbutyl)-N-methylacetamide (3qa')

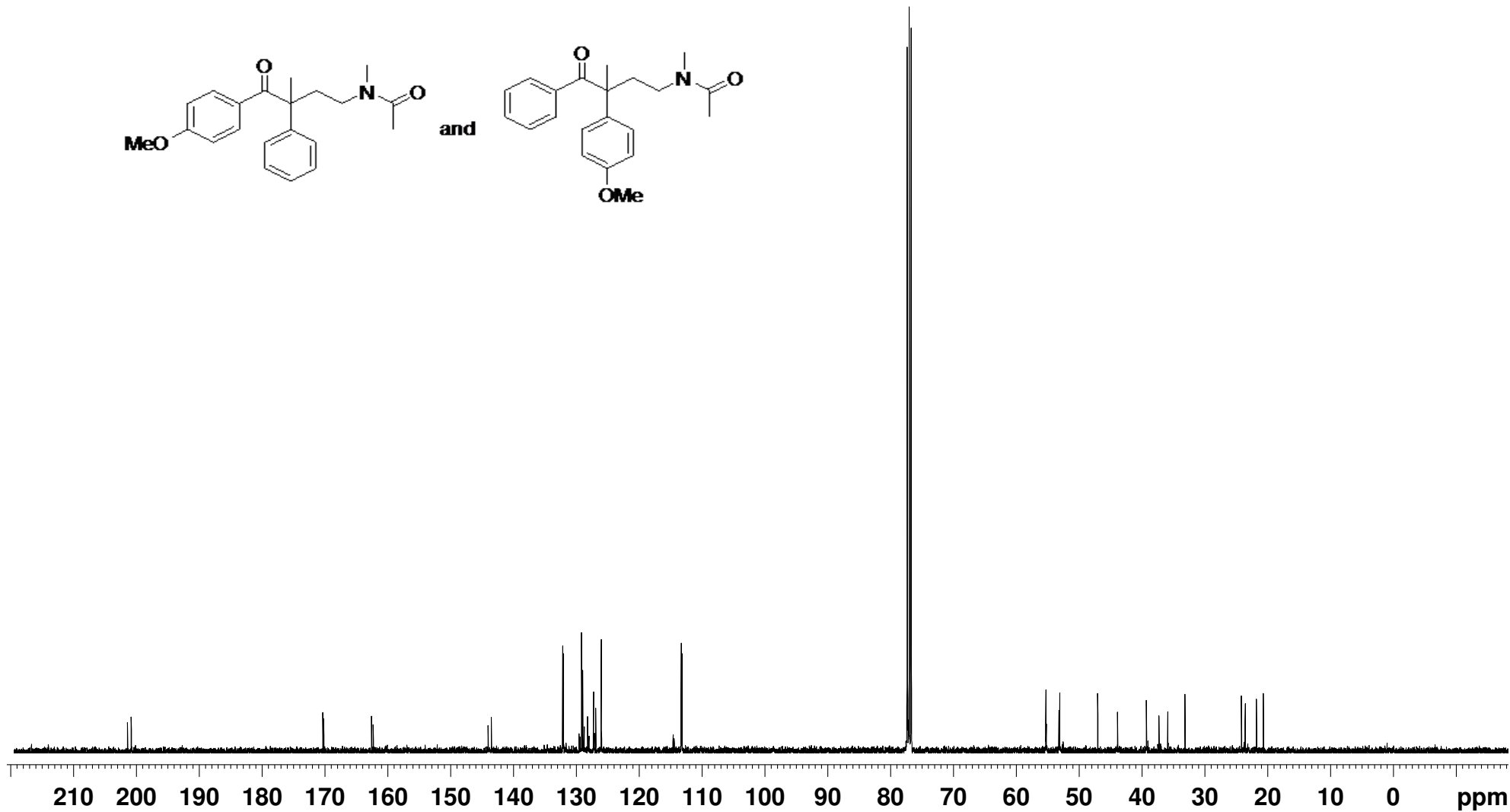
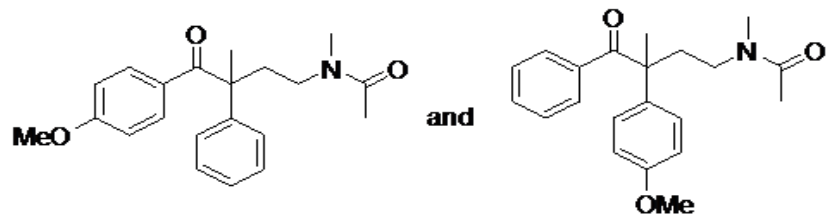


201.42
200.82

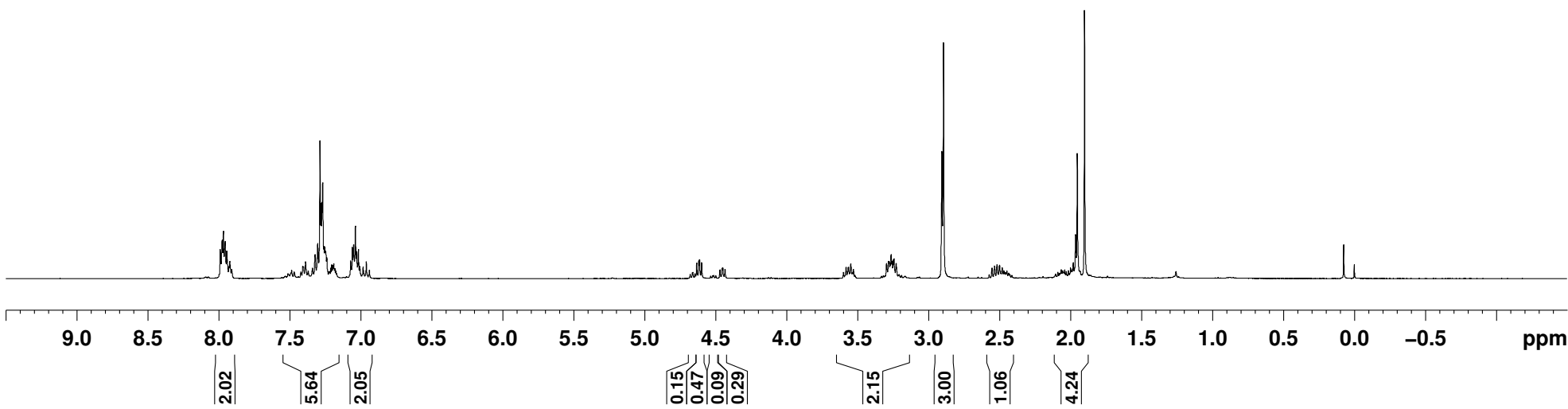
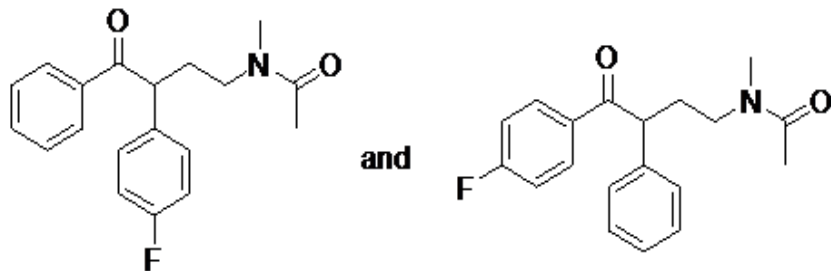
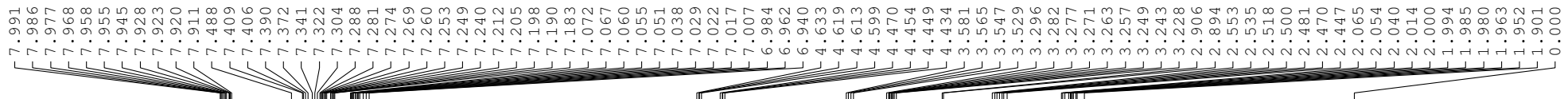
170.33
170.18
162.58
162.30
144.01
143.51
132.16
132.02
129.54
129.14
128.96
128.73
128.20
128.12
127.97
127.25
127.19
127.11
126.89
126.02
125.99
114.59
114.40
113.29
113.16

77.32
77.00
76.68

55.32
55.26
53.24
53.09
47.05
43.92
39.31
37.32
35.90
33.17
24.18
23.58
21.78
20.69



N-(3-(4-Fluorophenyl)-4-oxo-4-phenylbutyl)-N-methylacetamide (3ra) and N-(4-(4-Fluorophenyl)-4-oxo-3-phenylbutyl)-N-methylacetamide (3ra)

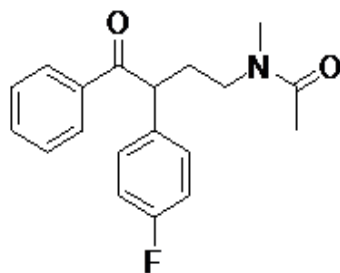


197.59
196.95

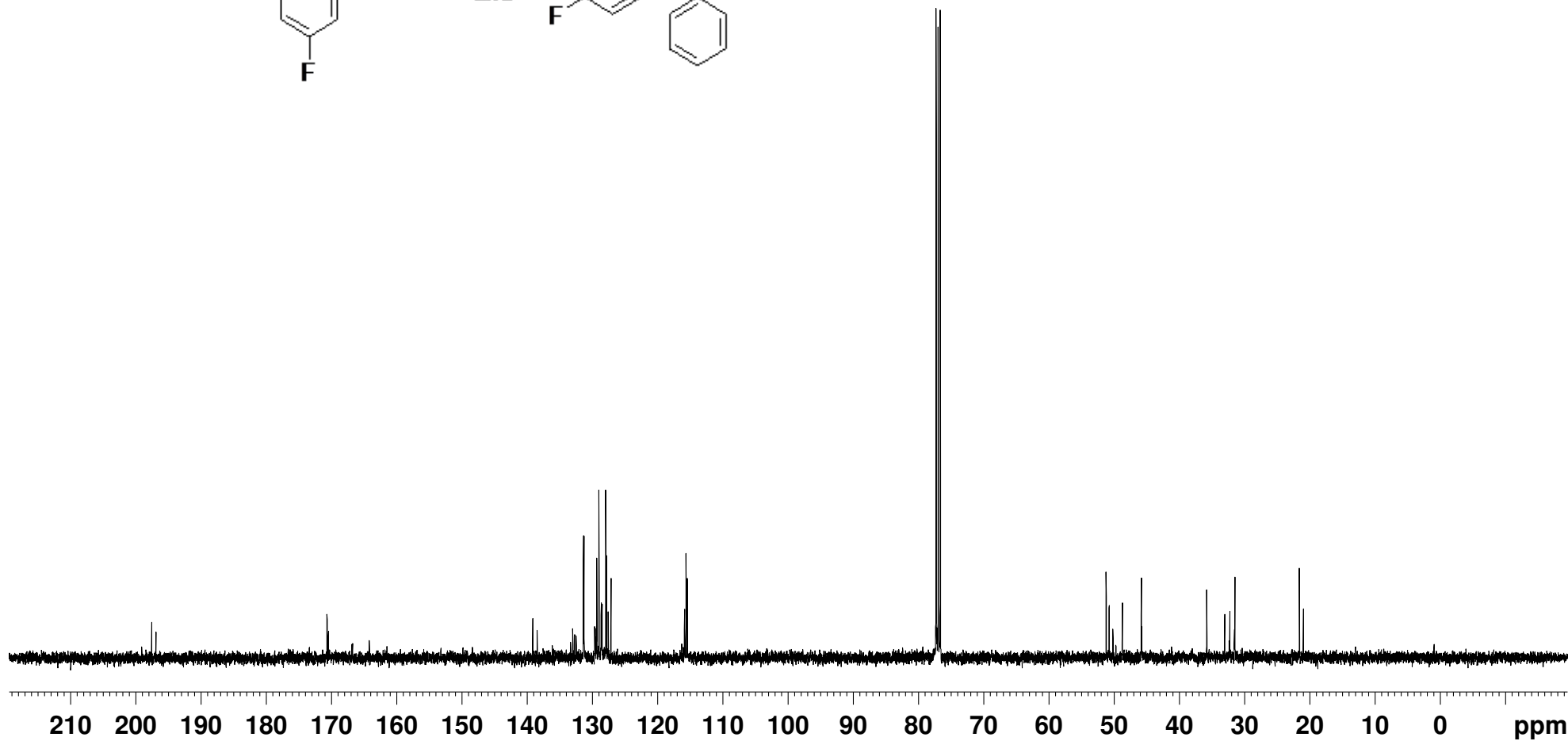
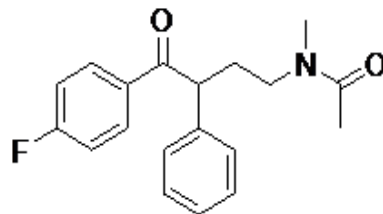
170.71
170.51
166.90
166.78
164.25
139.16
138.51
133.36
133.04
132.75
132.53
131.40
131.31
129.67
129.59
129.47
129.37
129.02
128.66
128.55
127.98
127.85
127.61
127.18
115.87
115.68
115.46

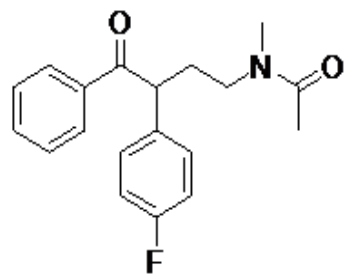
77.32
77.00
76.69

51.25
50.79
50.21
48.76
45.85
45.76
35.82
33.07
32.39
32.28
31.58
31.50
21.62
20.99

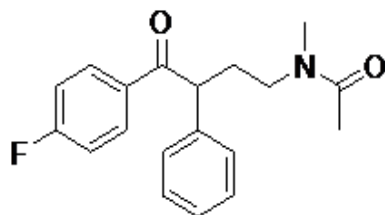


and

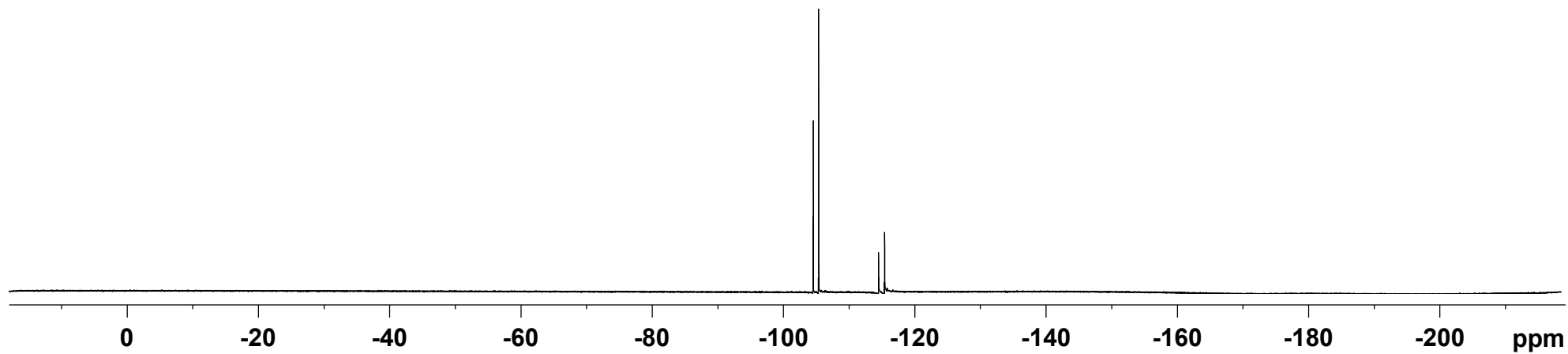




and



104.550
105.357
105.364
105.379
105.393
105.400
114.509
114.522
114.532
114.545
115.400
115.413
115.427
115.436
115.450

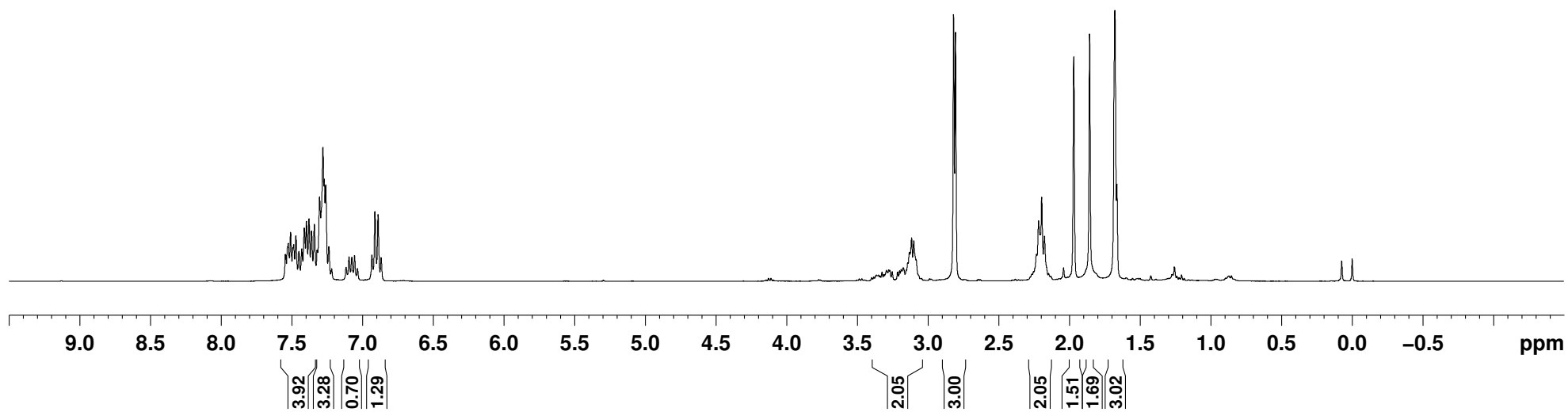
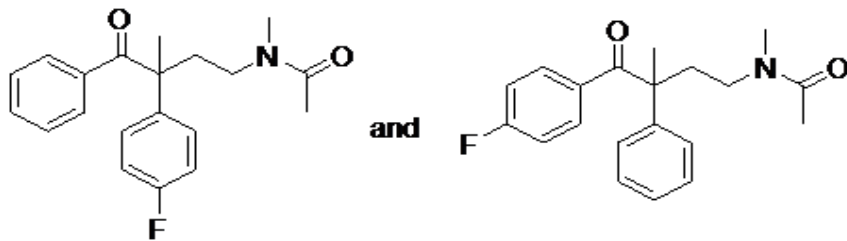


N-(3-(4-Fluorophenyl)-3-methyl-4-oxo-4-phenylbutyl)-N-methylacetamide (3sa) and N-(4-(4-Fluorophenyl)-3-methyl-4-oxo-3-phenylbutyl)-N-methylacetamide (3sa')

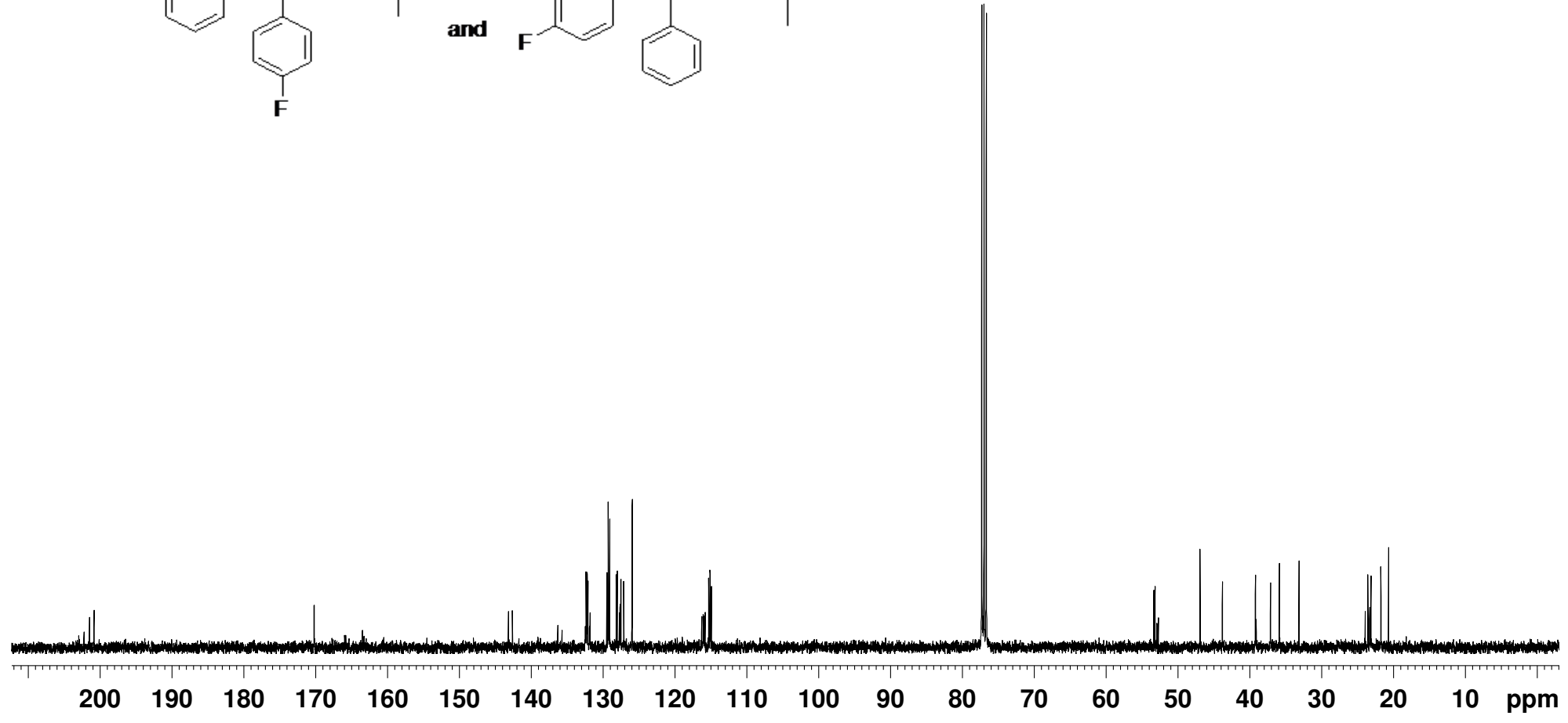
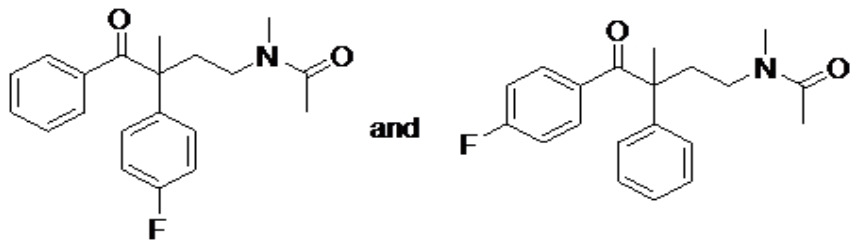
7.546
7.530
7.525
7.510
7.492
7.487
7.471
7.450
7.430
7.412
7.396
7.379
7.361
7.341
7.322
7.304
7.280
7.271
7.260
7.238
7.219
7.117
7.096
7.076
7.057
7.036
6.935
6.912
6.891
6.869

3.366
3.350
3.339
3.325
3.312
3.294
3.278
3.270
3.253
3.215
3.200
3.190
3.176
3.143
3.131
3.116
3.100
2.819
2.805
2.232
2.218
2.195
2.176
1.968
1.857
1.678

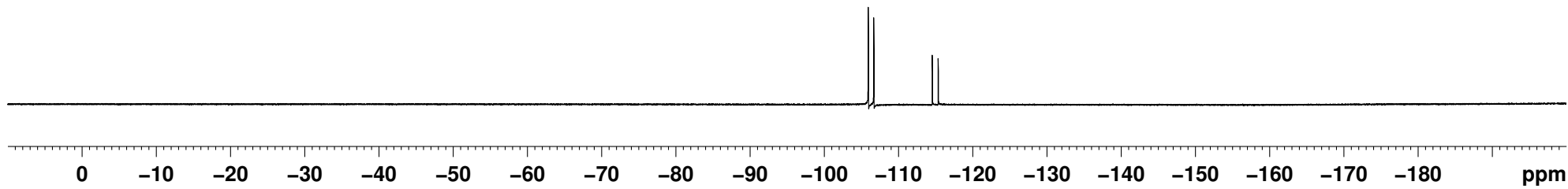
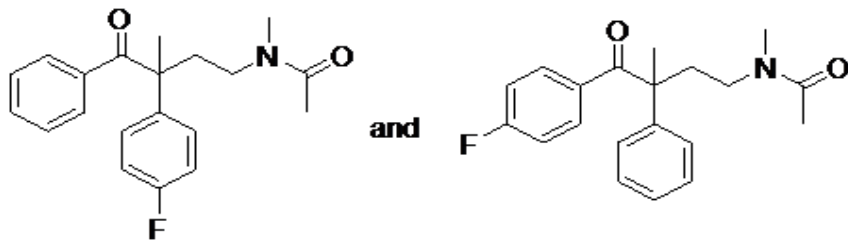
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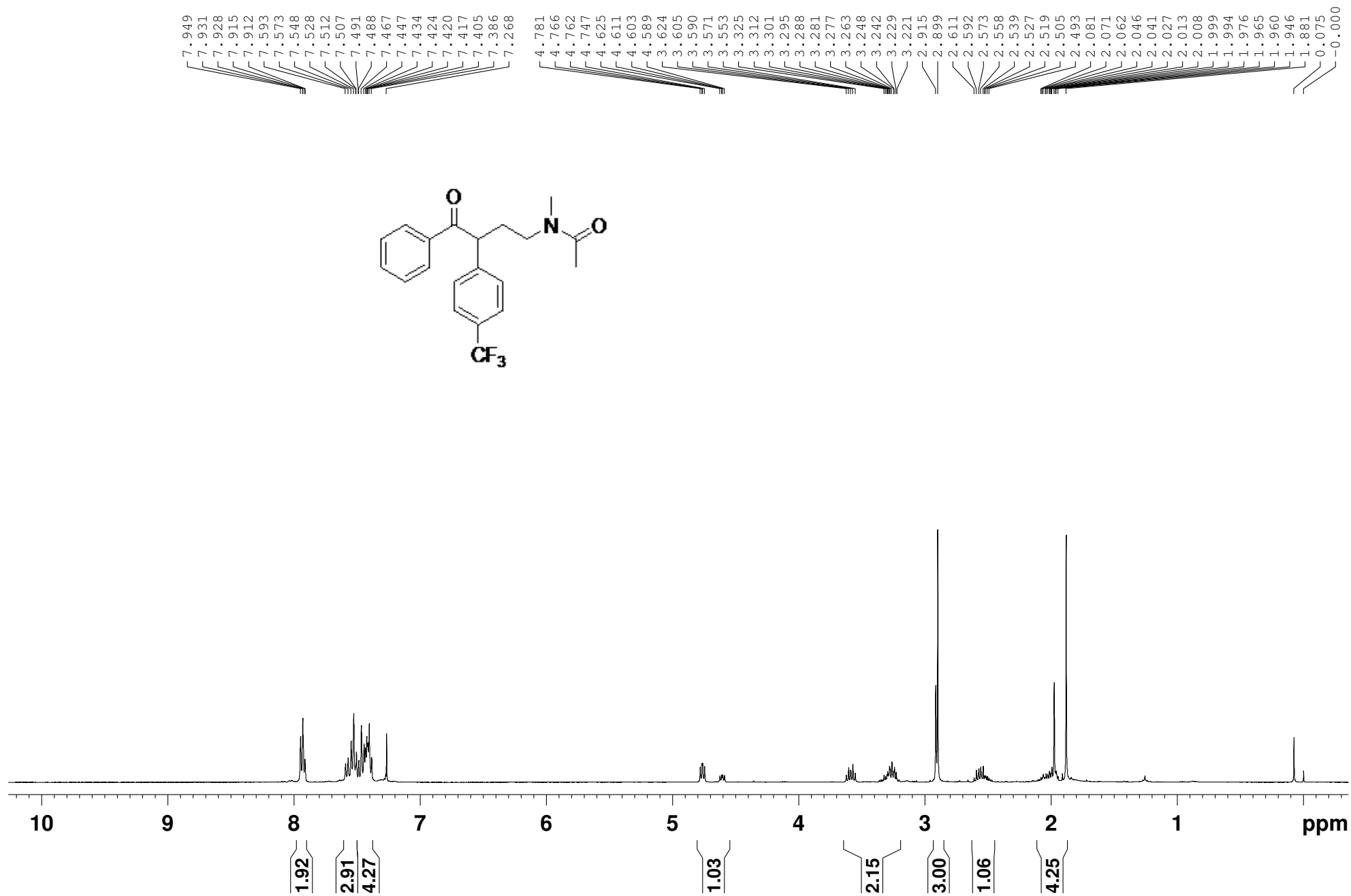
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 201.46
 200.83
 170.21
 163.51
 143.19
 142.65
 136.34
 135.75
 132.50
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 132.30
 132.25
 132.21
 132.12
 131.90
 131.84
 129.51
 129.36
 129.31
 129.11
 128.21
 128.04
 127.75
 127.65
 127.55
 127.16
 126.00
 125.96
 116.30
 116.09
 116.03
 115.81
 115.32
 115.15
 115.10
 114.93
 77.32
 77.00
 76.68
 53.37
 53.21
 52.92
 52.73
 46.93
 43.81
 39.22
 39.12
 37.11
 35.88
 33.15
 23.93
 23.57
 23.32
 23.14
 21.76
 20.68



-105.93
-105.94
-105.95
-105.96
-105.98
-106.00
-106.67
-106.69
-106.69
-106.71
-106.72
-106.75
-114.57
-114.58
-114.59
-114.60
-114.61
-114.63
-115.37
-115.39
-115.40
-115.42



N-Methyl-N-(4-oxo-4-phenyl-3-(4-(trifluoromethyl)phenyl)butyl)acetamide (3ta)

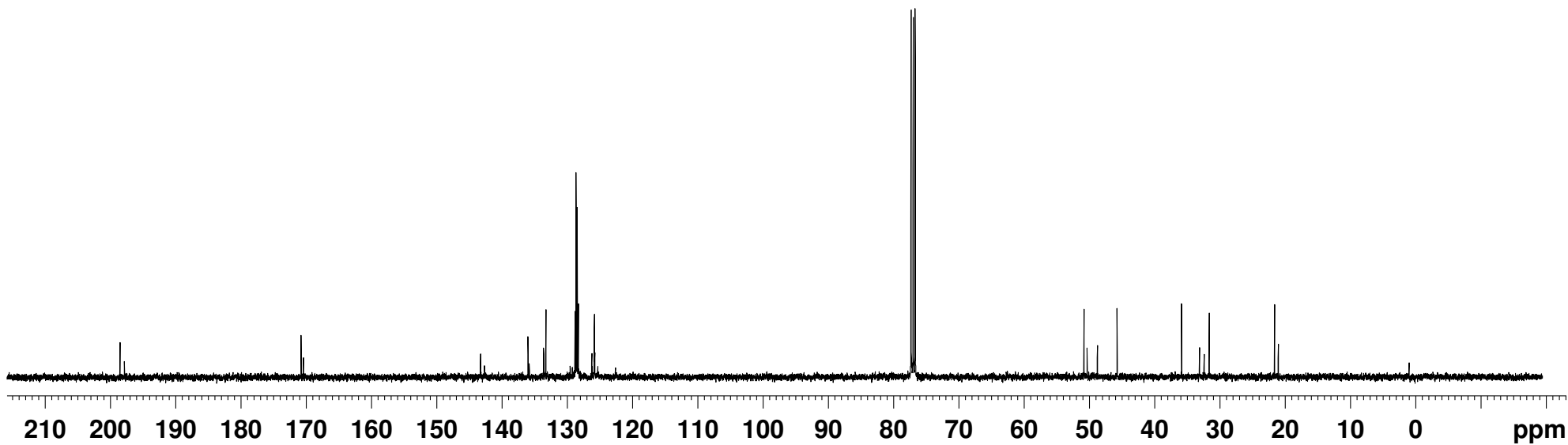
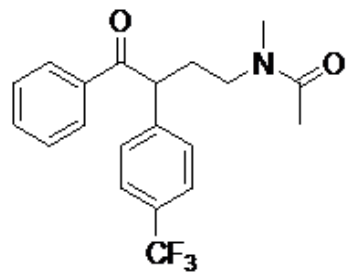


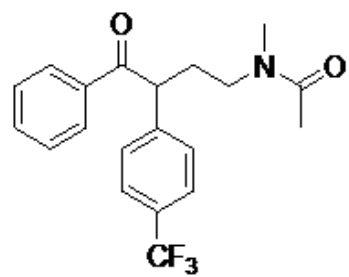
198.57
197.90

170.82
170.47
143.30
142.70
136.03
135.84
133.64
133.29
128.83
128.68
128.66
128.48
128.32
126.26
126.22
125.87
125.84
125.80

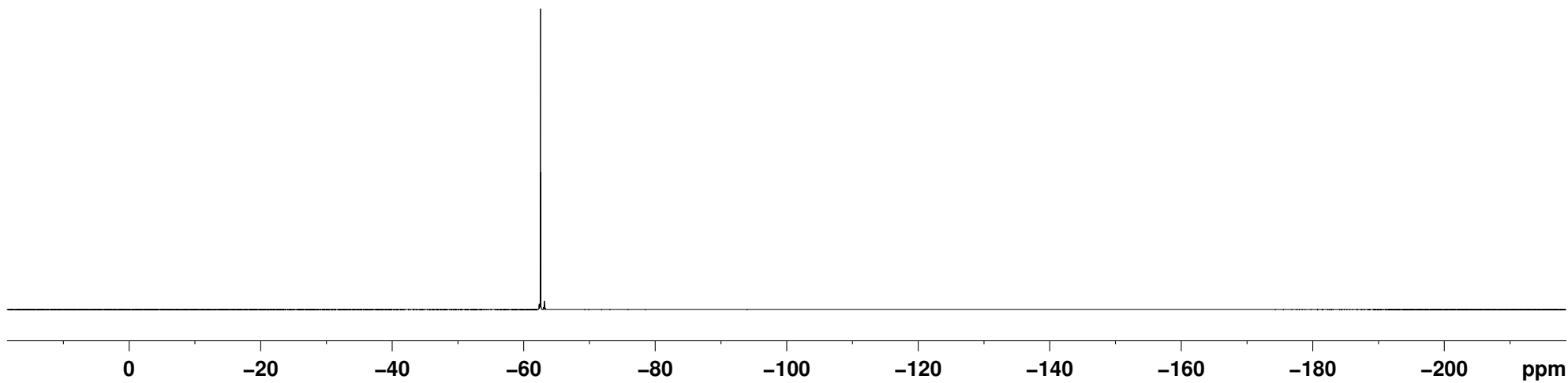
77.32
77.00
76.69

50.80
50.33
48.76
45.74
35.86
33.11
32.39
31.61
21.58
21.03

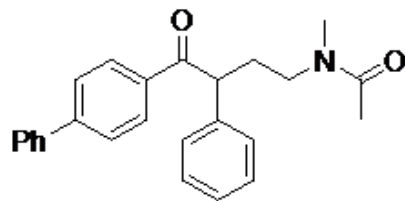
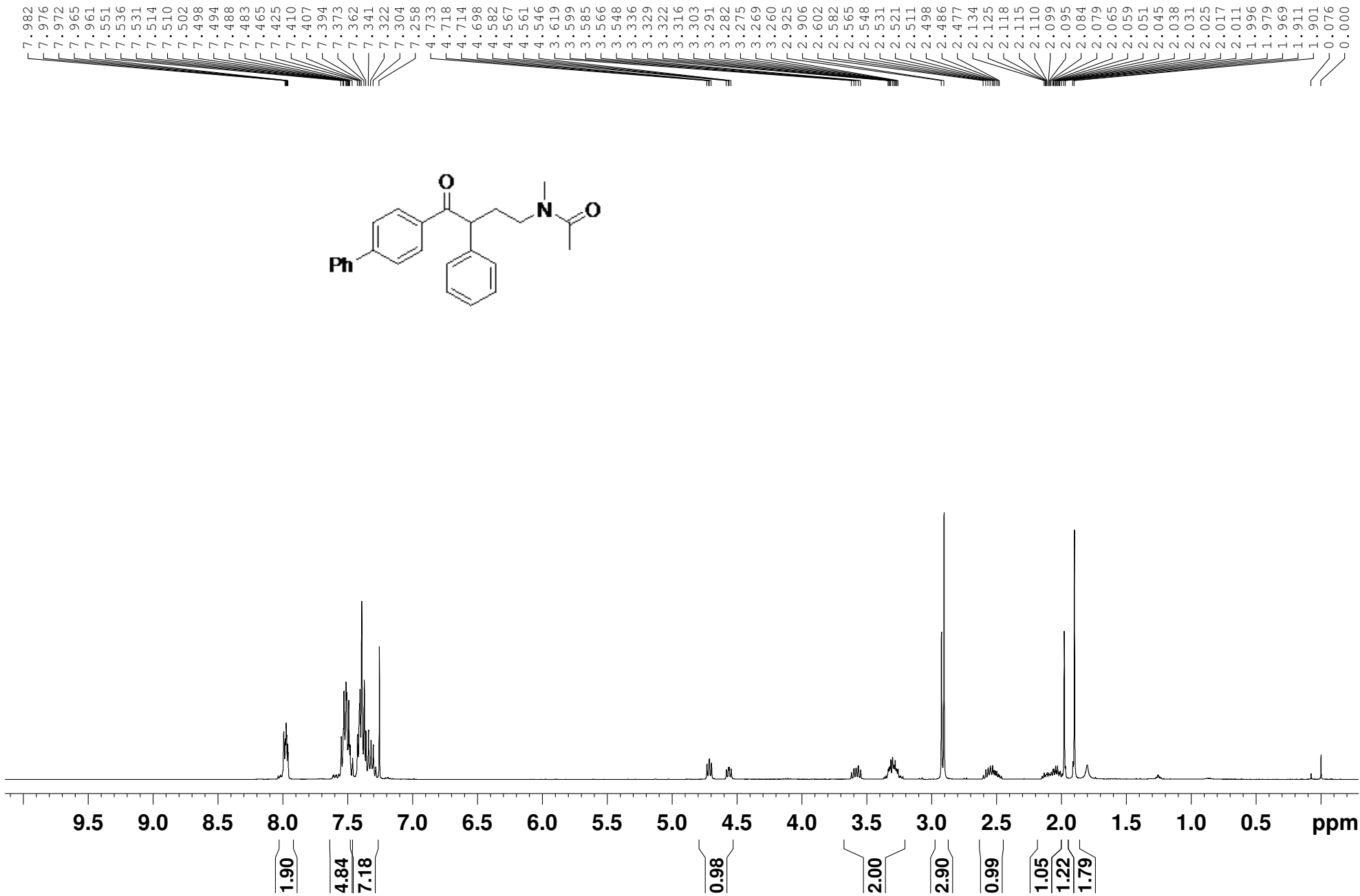




62.59
62.66



N-(4-(Biphenyl-4-yl)-4-oxo-3-phenylbutyl)-N-methylacetamide (3ua)



199.13
198.53

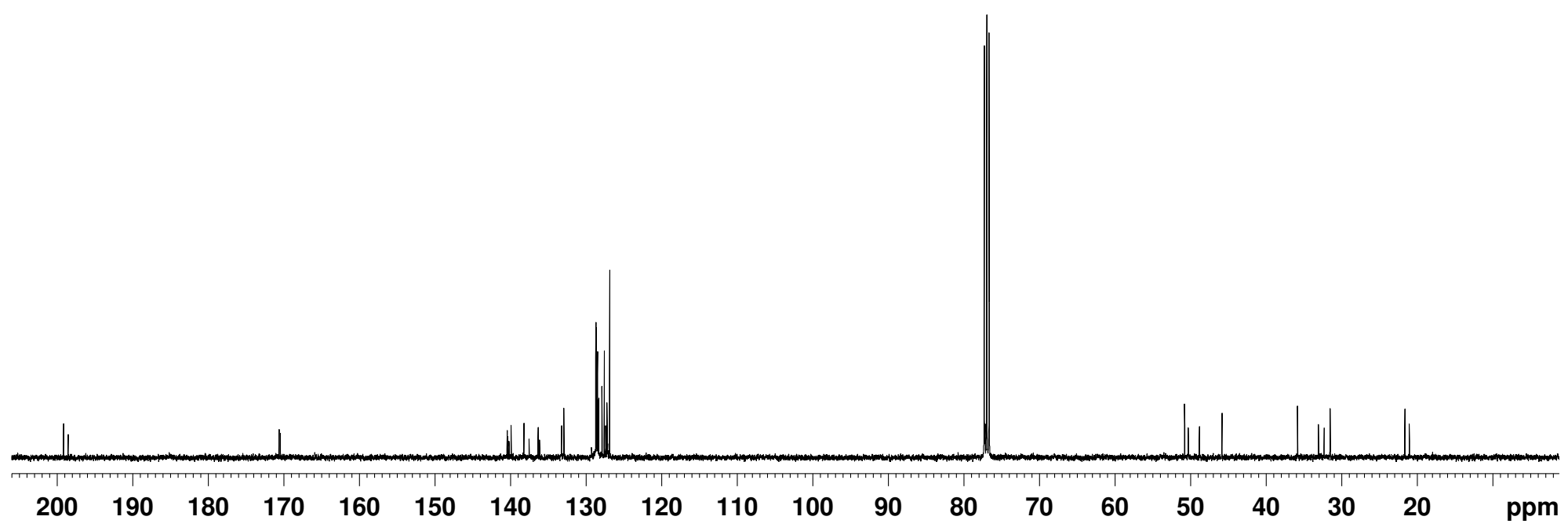
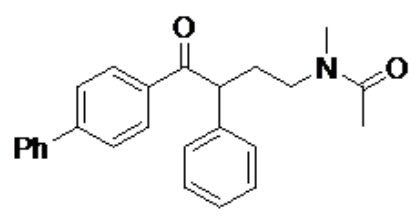
170.67
170.51
140.47
140.40
140.21
139.94
138.24
137.58
136.38
136.18
133.27
132.97
128.76
128.74
128.71
128.69
128.67
128.52
128.48
128.35
127.92
127.61
127.44
127.25
126.91

77.31
77.00
76.68

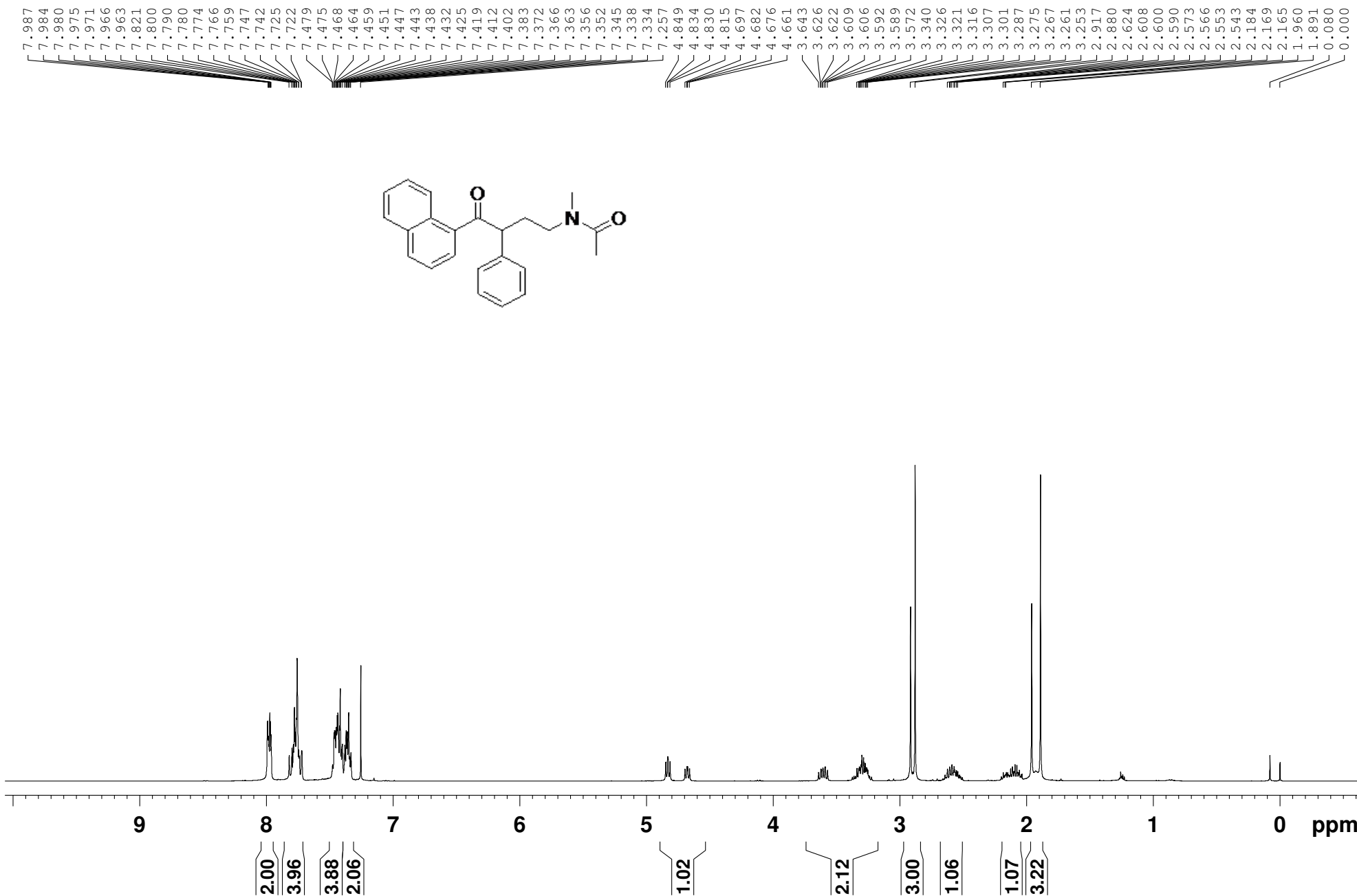
50.79
50.32
48.85
45.85

35.85
33.09
32.33
31.53

21.64
21.05



N-Methyl-N-(4-(naphthalen-1-yl)-4-oxo-3-phenylbutyl)acetamide (3va)

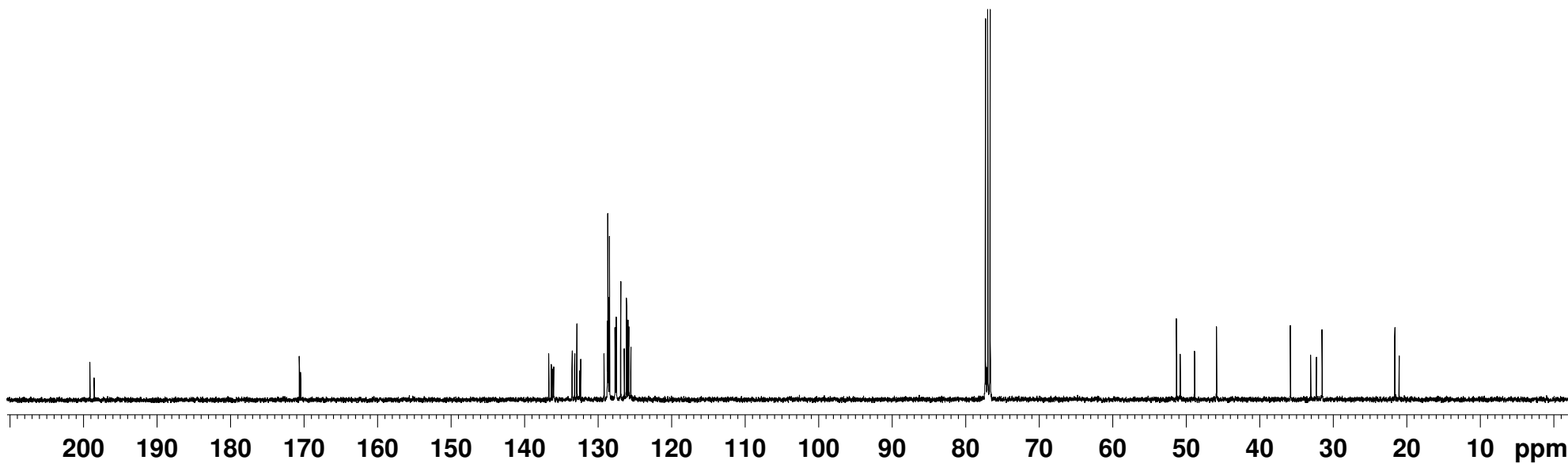
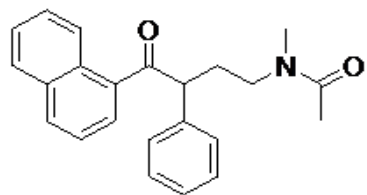


199.11
198.52

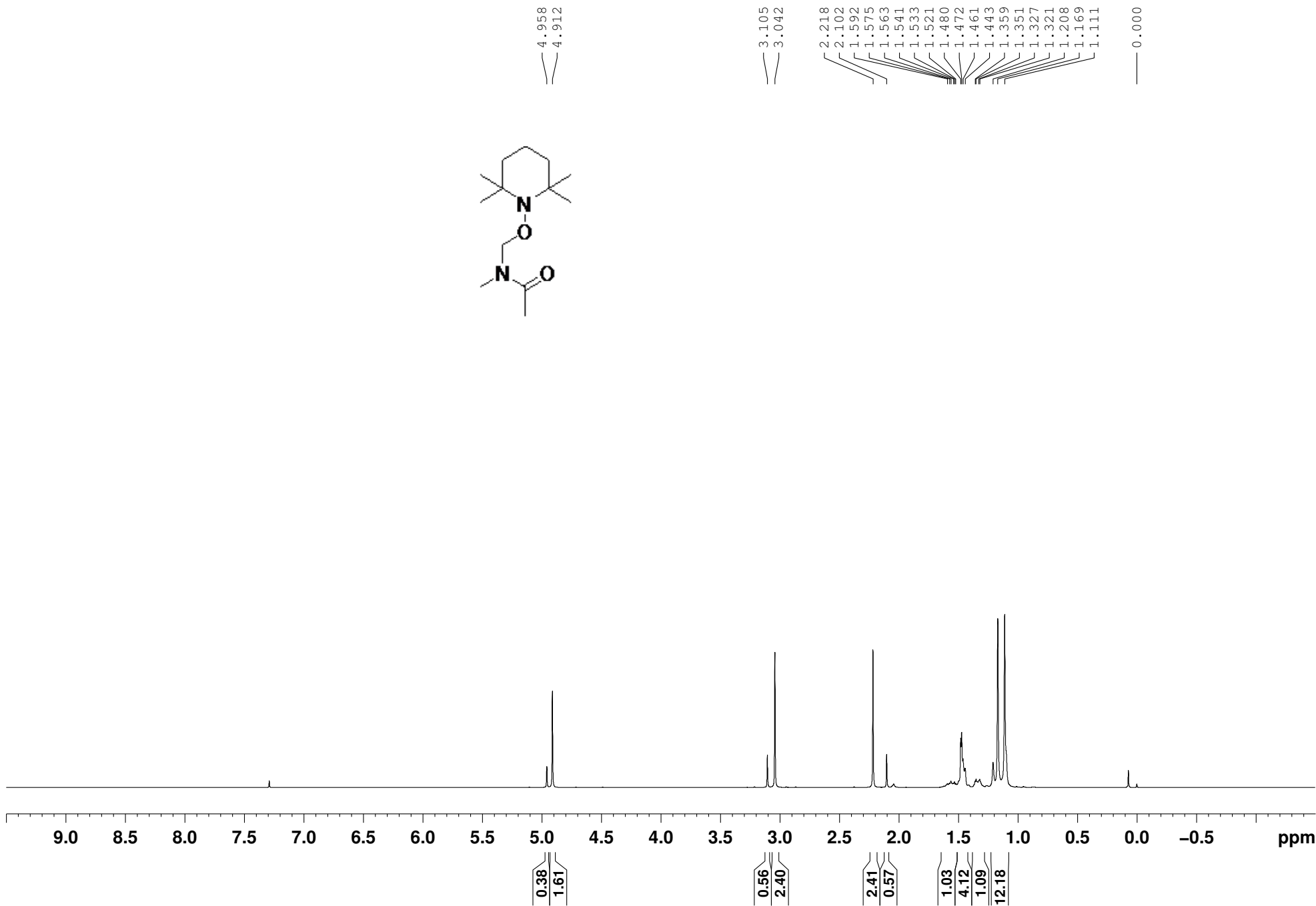
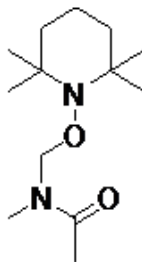
170.66
170.50
136.72
136.38
136.15
136.05
133.55
133.21
132.90
132.51
132.41
129.21
128.77
128.71
128.62
128.47
127.71
127.66
127.63
127.54
126.95
126.46
126.16
125.96
125.84
125.57

77.32
77.00
76.68

51.32
50.82
48.86
45.88
35.84
33.07
32.29
31.51
21.63
21.03



N-Methyl-N-((2,2,6,6-tetramethylpiperidin-1-yloxy)methyl)acetamide (4)



171.634
171.138

85.438
81.432
77.321
77.003
76.685

59.910
59.716

39.784
39.693
35.923
34.025
33.103
32.904
21.988
21.483
20.010
17.030
16.945

