Supporting Materials to

Palladium-Catalyzed Cross-coupling Reaction of Carboxylic Anhydrides with Organozinc Reagents

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Experimental Section

All reactions were carried out under argon atmosphere using standard Schlenk techniques. Solvents were purified by the standard methods.[1] Ph_2Zn was commercially available from Acros. The carboxylic anhydrides were prepared according to literature procedure.[2] $Pd(PPh_3)_4$ was prepared according to literature procedure.[3] ^{1}HNMR (300 MHz), ^{13}CNMR (75.4 MHz) and ^{19}FNMR (282 MHz) were registered with $CDCl_3$ as solvent and tetramethylsilane (TMS) as internal standard. Chemical shifts are reported in units (ppm) by assigning TMS resonance in the ^{1}H spectrum as 0.00 ppm and $CDCl_3$ resonance in the ^{13}C spectrum as 77.0 ppm. All coupling constants (*J* values) were reported in Hertz (Hz). Column chromatography was performed on silica gel 300-400 mesh. Gas chromatographic analysis (GC) was carried out on an Angilent-6890N equipped with capillary column (0.25 mm i.d.X30 m), using N_2 as carrier gas. Analytical thin-layer chromatography (TLC) was visualized with UV light (254 and 365 nm) or by iodine vapor staining. Electron impact (EI, 70 eV) was used as the ionization method for the mass spectrometry (percent values were given in parentheses). Mass data were reported in mass units (*m/z*).

General Procedure For the Palladium-Catalyzed Reaction of Carboxylic Anhydrides and Organozinc Reagents (Table 1). A typical procedure is as follows: To a THF solution (3 mL) containing benzoic anhydride (227 mg, 1.00 mmol) in a dry 25 mL Schlenk tube under argon, Ph_2Zn (286 mg, 1.2 mmol, 92% purity) and $Pd(PPh_3)_4$ (58 mg, 0.05 mmol) were added at room temperature. The reaction mixture was then heated in an oil bath (80^{o}C) for 18 hours. The yield of benzophenone was determined by GC using dibenzyl ether as an internal standard and characterized by comparison with an authentic sample.

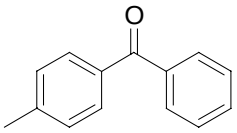
Cross-Coupling Reaction of Carboxylic Anhydrides With Organozinc Reagents in the Presence of $Pd(PPh_3)_4$ (Table 2). A typical procedure is as follows: To the THF solution (3 mL) containing *p*-toluic anhydride (240 mg, 1.00 mmol) in a dry 25 ml Schlenck tube under argon, Ph_2Zn (286 mg, 1.2 mmol, 92% purity) and $Pd(PPh_3)_4$ (58 mg, 0.05 mmol) were added at room temperature. The system was then heated under argon in an oil bath (80^{o}C) for 18 hours. After cooling the reaction mixture, diethyl ether (50 mL) and H_2O (50 mL) were added and the aqueous layer was extracted with diethyl ether(50

mLX3). The combined ether solution was dried Na_2SO_4, filtered and then evaporated in vacuum. Purification of the residue by column chromatography gave the corresponding product **3b** (138 mg; yield 70%).

Coupling of Ph_2Zn with Mixed Anhydride *in situ* (Table 3). A typical procedure is as follows (entry 1): To a mixture of benzoic acid (122 mg, 1 mmol) and Et_3N (0.14 mL, 1 mmol) under argon in ice- salt bath, ethyl chloroformate (0.095 mL, 1 mmol) was added. Then the system was stirred at room temperature for 15 minutes. Finally, Ph_2Zn (286 mg, 1.2 mmol, 92% purity) and $Pd(PPh_3)_4$ (58 mg, 0.05 mmol) were added and the reaction mixture was heated in an oil bath (80^oC) for 16 hours. The yield of benzophenone was determined by GC using dibenzyl ether as an internal standard and characterized by comparison with an authentic sample.

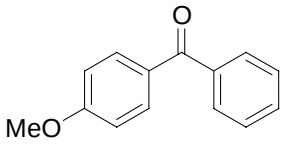
Synthesis of Ketones from Sodium Carboxylates and Organozinc Reagents. A typical procedure is as follows: To a mixture of sodium benzoate (288 mg, 2 mmol) and ethyl chloroformate (0.57 mL, 6 mmol) in dry THF (5 mL) that had been stirred for 15 min at room temperature under argon, Ph_2Zn (572 mg, 2.4 mmol, 92% purity) and $Pd(PPh_3)_4$ (116 mg, 0.10 mmol) were added. Then the system temperature was raised to 70^oC and kept at this temperature for 14 hours. After cooling the reaction mixture, diethyl ether (50 mL) and H_2O (50 mL) were added and the aqueous layer was extracted with diethyl ether(50 mL X 3). The combined ether solution was dried (Na_2SO_4), filtered and evaporated in vacuum. Purification of the residue by column chromatography gave the corresponding product **3a** (346 mg; yield 95%).

Analytical data for 3b-3q



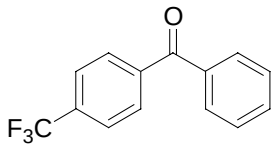
3b

4-Methylbenzophenone (**3b**)[4]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.78 (d, *J* = 7.0 Hz, 2 H), 7.72 (d, *J* = 7.0 Hz, 2 H), 7.57 (t, *J* = 7.0 Hz, 1H), 7.47 (t, *J* = 7.0 Hz, 2H), 7.28 (d, 2H, *J* = 7.0 Hz), 2.44 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 196.5, 143.2, 137.9, 134.8, 132.2, 130.3, 129.9, 128.9, 128.2, 21.7; MS (EI) (%): 196 (M^+, 43), 181(9), 165 (4), 152(4), 19(100), 105(32), 91(46), 77(43); IR: 1656, 1606, 1317, 1278, 836, 730, 700 cm^{-1}.



3c

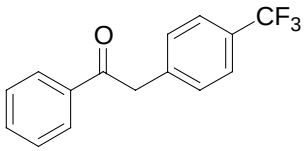
4-Methoxybenzophenone (**3c**)[5]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.82 (m，2H), 7.76-7.73(m, 2H), 7.55 (t, *J* = 7.0 Hz, 1H), 7.46 (t, *J* = 7.0 Hz, 2H), 6.95 (m, 2H), 3.87 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 197.2, 163.2, 138.3, 132.6, 131.9, 130.1, 129.7, 128.2, 113.5, 55.5; MS (EI): 212(M^+, 436), 181 (3), 135 (100), 105 (10), 92 (12), 77 (28), 51 (6); IR (KBr) 1653, 1602, 1510, 1171, 1030, 846, 742, 702 cm^{-1}.



3d

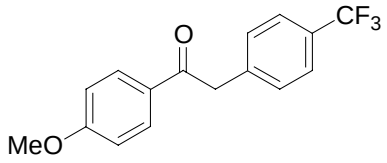
4-Trifluoromethylbenzophenone (**3d**)[6]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.51 (d, *J* = 7.2 Hz, 2H), 7.63 (t, *J* = 7.2 Hz, 1H), 7.76 (d, *J* = 8.1 Hz, 2H), 7.81 (d, *J* = 8.1 Hz, 2H), 7.90 (d, *J* = 7.2 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 195.5, 140.7 (q, *J* = 4.2 Hz), 136.7,

133.9, 133.5, 133.0, 130.0 (d, J = 10.4 Hz), 128.5, 125.3 (q, J = 14.1 Hz), 121.8; ^{19}F NMR (282 MHz, $CDCl_3$): δ -63.4.



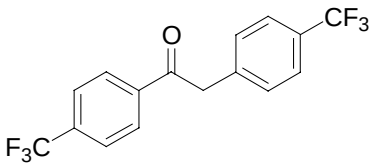
3e

4'-Trifluoromethyl-deoxybenzoin (**3e**): ^{1}H NMR (300 MHz, $CDCl_3$)[7]: δ 4.35 (s, 2H), 7.38 (d, J = 8.4 Hz, 2H), 7.43-7.53 (m, 2H), 7.55-7.62 (m, 2H), 7.70-7.81 (m, 1H), 7.99-8.02 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 196.7, 142.8, 138.5, 136.3, 135.3, 133.5, 139.1, 128.8, 128.5, 125.5 (q, J = 15.2 Hz), 44.99; ^{19}F NMR (282 MHz $CDCl_3$): δ -62.9;



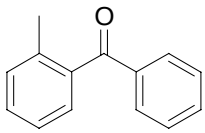
3f

1-(4-methoxy-phenyl)-2-(4-trifluoromethyl-phenyl)-ethanone (**3f**)[8]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.87 (s, 3H), 4.30 (s, 2H), 6.95 (d, J = 9 Hz, 2H), 7.38 (d, J = 8 Hz, 2H), 7.58 (d, J = 8 Hz, 2H), 7.99 (d, J = 9 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 195.2, 163.8, 138.9 (q, J = 3.4 Hz), 130.8, 129.9, 129.9, 129.3, 128.9, 125.5 (q, J = 13.8 Hz), 113.9, 55.5, 44.8; ^{19}F NMR (282 MHz, $CDCl_3$): δ -62.9;



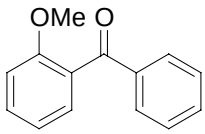
3g

1,2-bis-(4-trifluoromethyl-phenyl)-ethanone (**3g**)[9]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 4.38 (s, 2H), 7.38 (d, *J* = 8.0 Hz, 2H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.75 (d, *J* = 8.0 Hz, 2H), 8.11 (d, *J* = 8.0 Hz, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 196.6, 166.1, 158.5, 142.4, 138.9 (q, *J* = 4.0 Hz), 137.0 (q, *J* = 5.4 Hz), 129.9, 128.8, 125.9 (q, *J* = 14.1 Hz), 125.7 (q, *J* = 13.5 Hz), 122.3, 45.5; ^{19}F NMR (282 MHz, $CDCl_3$): δ –63.02, -63.6.



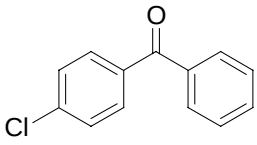
3h

2-Methylbenzophenone (**3h**)[10]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 2.33 (s, 3H), 7.20-7.32 (m, 3H), 7.35-7.46 (m, 3H), 7.53-7.58 (m, 1H), 7.78-7.81 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 198.5, 138.5, 137.6, 136.6, 133.0, 130.9, 130.1, 130.0, 128.4, 128.4, 125.1, 19.9; IR (KBr): 1666, 1598, 1449, 1315, 1268, 925, 732, 709 cm^{-1}; MS (EI): 196(M^+, 67), 195 (100), 178 (11), 119 (29), 105 (21), 91 (33), 77(33), 51 (13).



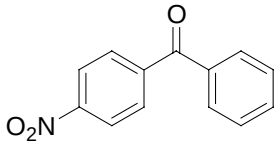
3i

2-Methoxybenzophenone (**3i**)[11]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 3.72 (s, 3H), 6.98-7.07 (m, 2H), 7.35-7.50 (m, 4H), 7.52-7.58 (m, 1H), 7.79-7.84 (m, 2H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 55.5, 111.4, 120.4, 128.2, 128.7, 129.5, 129.8, 131.8, 132.9, 137.7. 157.3, 196.5; MS (EI): 213 ($M+1^+$, 15.61), 212 (M^+, 35), 195 (20), 135 (80), 121 (22), 105 (39), 77 (100), 51 (46); IR (KBr): 1666, 1599, 1488, 1245, 1024, 926, 755, 703 cm^{-1}.



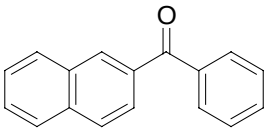
3j

4-Chlorobenzophenone (**3j**)[12]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.78-7.73 (m, 4H), 7.67-7.57 (m, 1H), 7.51-7.44 (m, 4H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 195.5 138.8, 137.2, 135.8, 132.6, 131.4, 129.9, 128.6, 128.4; MS (EI): 218 (M^+, ^{37}Cl, 8), 216 (M^+, ^{35}Cl, 24), 181 (10), 139 (52), 111 (52), 105 (83), 77 (100), 51 (72); IR (KBr) 1651, 1584, 1281, 1089, 844, 728, 695 cm^{-1}.



3k

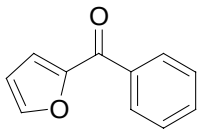
4-Nitrobenzophenone (**3k**)[13]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.53 (t, *J* = 7.8 Hz, 2H), 7.66 (t, *J* = 7.8 Hz, 1H), 7.80 (d, *J* = 7.8 Hz, 2H), 7.94 (d, *J* = 8.6 Hz, 2H), 8.32-37 (d, *J* = 8.6 Hz, 2H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 194.8, 142.8, 136.2, 133.4, 130.6, 130.1, 128.7,128.6 123.5; MS (EI): 227 (M^+, 53), 181, (4), 150 (13), 105 (100), 77 (578), 76 (19), 51 (20); IR (KBr): 3101, 1651, 1595, 1514, 1359, 1318, 1106, 930, 873, 734, 705 cm^{-1}.



3l

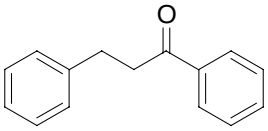
2-Benzoylnaphthane (**3l**)[14]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.49-7.65 (m, 5H), 7.84-7.95(m, 6H), 8.26 (s, 1H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 196.7, 137.8, 135.2, 134.7, 132.4, 132.2, 131.8, 130.1, 129.4, 128.30, 128.29, 128.26,127.8, 126.7, 125.7; MS (EI):

233 ($M+1^+$, 18), 232 (M^+, 92), 231 (20), 155 (100), 127 (65), 105 (34), 77 (46); IR (KBr): 3055, 1658, 1270, 1116, 819, 754, 697 cm^{-1}.



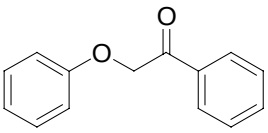
3m

2-Benzoylfuran (**3m**)[15]: ^1H NMR (300 MHz, $CDCl_3$): δ 7.99-7.96 (m, 2H), 7.72 (s, 1H), 7.60-7.57 (m, 1H), 7.53-7.48 (m, 2H), 7.26-7.23 (m, 1H), 6.61-6.59 (m, 1H). ^{13}C NMR: (75 MHz, $CDCl_3$): δ 182.5, 152.1, 147.1, 137.1, 132.5, 129.2, 128.3, 120.6, 112.1.



3n

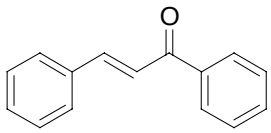
1,3-Diphenyl-1-propanone (**3n**)[16]: ^1H NMR (300 MHz, $CDCl_3$): δ 3.07 (t, *J* = 8.0 Hz, 2H), 3.30 (t, *J* = 8.0 Hz, 2H), 7.18-7.32 (m, 5H), 7.42-7.47 (m, 2H), 7.55 (t, *J* = 7.8 Hz, 1H), 7.95 (d, *J* = 7.8 Hz, 2H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 30.1, 40.4, 126.1, 128.0, 128.4, 128.5, 128.6, 133.1, 136.8, 141.2, 199.2; MS (EI): 211($M+1^+$, 8), 210(M^+, 46), 131 (1), 106 (9), 105 (100), 103 (5), 91 (11), 79 (3), 78 (6), 77 (396), 65 (41), 51 (9); IR (KBr): 3062, 3026, 1682, 1596, 1448, 1209, 973, 744, 689 cm^{-1}.



3o

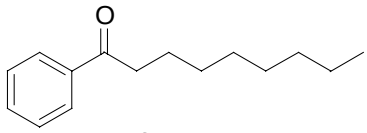
2-Phenoxyacetophenone (**3o**)[17]: ^1H NMR (300 MHz, $CDCl_3$): δ 5.26 (s, 2H), 6.92-7.00 (m, 3H), 7.28 (m, 2H), 7.46-7.51 (m, 2H), 7.60(m, 1H), 7.97-8.00 (m, 2H); ^{13}C NMR (75MHz, $CDCl_3$): δ 194.5, 157.9, 134.5, 133.8, 129.5, 128.8, 128.1, 121.6, 114.7, 70.7;

MS (EI): 213 ($M+1^+$, 6), 212(M, 36), 106 (8), 105 (100), 91 (10), 77 (90), 65 (15), 51 (41); IR (KBr): 3066, 1708, 1600, 1581, 1500, 1449, 1228, 1094 cm^{-1}.



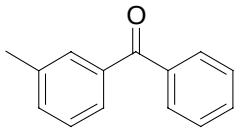
3p

trans-Chalcon (**3p**)[18]: ^1H NMR (300 MHz, $CDCl_3$): δ 8.02 （d，*J* = 7.0 Hz, 2H）, 7.81 (d, *J* = 15.9 Hz, 1H), 7.63 (m, 2H), 7.52 (m, 4H), 7.40 (m, 3H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 190.6, 144.8, 138.2, 134.8, 132.8, 130.6, 128.9, 128.6, 128.5, 128.4, 122.0; MS (EI): 209 ($M+1^+$, 12.27), 208 (M^+, 80), 207 (100), 131 (23), 105 (17), 103 (23), 77 (51), 51 (23); IR (KBr): 3060, 1762, 1662, 1605, 1575, 1496, 1448, 978, 746, 689 cm^{-1}.



3q

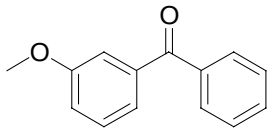
1-Phenyl-1-nonanone (**3q**)[19]: ^1H NMR (300 MHz, $CDCl_3$): δ 7.94-7.98 (d, *J* = 7.1 Hz, 2H), 7.52-7.58 (m, 1H), 7.42-7.48 (t, *J* = 7.1 Hz, 2H), 2.96 (t, *J* = 7.8 Hz, 2H), 1.74 (m, 2H), 1.13-1.40 (m, 10H), 0.88 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 200.6, 137.0, 132.8, 128.5, 128.0, 38.6, 31.8, 29.4, 29.3, 29.1, 24.3, 22.6, 14.1; MS (EI): 219 ($M+1^+$, 4.14), 218 (M^+, 11), 133 (11), 120 (100), 105 (81), 77 (27), 51 (4); IR (KBr): 3063, 2928, 2856, 1690, 1689, 1582, 1450, 1258, 1217 cm^{-1}.



3r

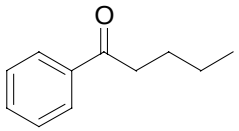
3-Methylbenzophenone (**3r**)[20]: ^1H NMR (300 MHz, $CDCl_3$): δ 7.82-7.78 (m, 2 H), 7.63-7.56 (m, 3H), 7.50-7.45 (m, 2H), 7.40-7.33 (m, 2H), 2.42 (s, 3H); ^{13}C NMR (75 MHz,

$CDCl_3$): δ 196.9, 138.1, 137.7, 137.6, 133.2, 132.3, 130.4, 130.0, 128.2, 128.0, 127.3, 21.3; MS (EI) (%): 197 ($M+1^+$, 27), 196 (M^+, 82), 119 (100), 105 (64), 91 (43), 77 (44), 65 (24), 51 (22), 41 (2); IR: 1661, 1598, 1318, 1212, 958, 778, 720, 705 cm^{-1}.



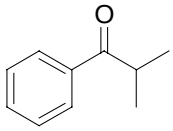
3s

3-Methoxybenzophenone (**3s**)[21]: ^1H NMR (300 MHz, $CDCl_3$): δ 7.82-7.79 (m，2H), 7.59-7.56(m, 1H), 7.50-7.45 (m, 2H), 7.38-7.34 (t, 3H), 7.15-7.11 (m, 1H), 3.85 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$): δ 196.5, 159.5, 138.8, 137.5, 132.4, 130.0, 129.2, 128.2, 122.8, 118.8, 114.3, 55.4; MS (EI): 213 ($M+1^+$, 18), 212 (M^+, 100), 135 (88), 107 (23), 105 (83), 92 (18), 77 (72), 64 (11), 51 (17); IR (KBr) 1660, 1597, 1580, 1450, 1430, 1283, 1047, 826, 724, 704 cm^{-1}.



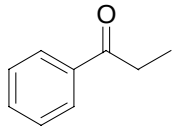
3t

Pentanophenone (**3t**)[22]: ^1H NMR (300 MHz, $CDCl_3$): δ 7.96 (d, *J* = 7.1 Hz, 2H), 7.57-7.52 (m, 1H), 7.45 (t, *J* = 7.1 Hz, 2H), 2.96 (t, *J* = 7.8 Hz, 2H), 1.72 (m, 2H), 1.41 (m, 2H), 0.95 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 200.5, 137.0, 132.8, 128.4, 127.9, 38.2, 26.4,22.4, 13.9; MS (EI): 163 ($M+1^+$, 2), 162 (M^+, 14), 147 (1), 133 (5), 120 (61), 105 (100), 85 (1), 77 (41), 57 (2), 51 (10), 43 (2), 41 (3); IR (KBr):3064, 2960, 2874, 1687, 1598, 1450, 1267, 1209, 691 cm^{-1}.



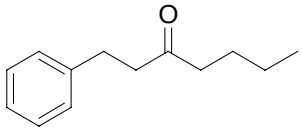
3u

Isobutyrophenone (**3u**)[23]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.63 (d, *J* = 7.1 Hz, 2H), 7.58-7.53 (m, 1H), 7.47 (t, *J* = 7.1 Hz, 2H), 3.57 (m, *J* = 6.6 Hz, 1H), 1.22 (d, *J* = 6.6 Hz, 6H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 204.5, 136.2, 132.8, 128.6, 128.3, 35.3, 19.1; MS (EI): 148 ($M+1^+$, 11.16), 147 (M^+, 39), 105 (82), 77 (97), 71 (8), 51 (57), 43 (85), 41 (100); IR (KBr): 3063, 2972, 2874, 1685, 1467, 1448, 1384, 1225, 980, 703 cm^{-1}.



3v

Propiophenone (**3v**)[24]: ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.97 (d, *J* = 7.1 Hz, 2H), 7.58-7.52 (m, 1H), 7.45 (t, *J* = 7.1 Hz, 2H), 3.01 (q, *J* = 6.9 Hz, 2H), 1.24 (t, *J* = 6.9 Hz, 3H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 200.8, 136.9, 132.8, 128.5, 127.9, 31.8, 8.2; MS (EI): 135 ($M+1^+$, 3), 134 (M^+, 21), 105 (100), 77 (54), 71 (10), 57 (16), 51 (19), 43 (11), 41 (7); IR (KBr): 2980, 2940, 1689, 1598, 1450, 1221, 952, 746, 691 cm^{-1}.



3w

1-phenyl-heptan-3-one (**3w**)[25] ^{1}H NMR (300 MHz, $CDCl_3$): δ 7.30-7.14(m, 5H), 2.86 (t, *J* = 7.8 Hz, 2H), 2.70 (t, *J* = 7.8 Hz, 2H), 2.36 (t, *J* = 7.5 Hz, 2H), 1.53 (m, *J* = 7.5 Hz, 2H), 1.27 (m, *J* = 7.5 Hz, 2H), 0.88 (t, *J* = 7.5 Hz, 3H); ^{13}C NMR: (75 MHz, $CDCl_3$): δ 210.2, 141.1, 128.4, 128.2, 126.2, 44.1, 42.6, 29.7, 25.8, 22.2, 13.7; MS (GC-EI): 190 (M^+, 40), 172 (14), 161 (3), 148 (39), 130 (51), 115 (8), 105 (100), 91 (90), 77 (28), 57 (43).

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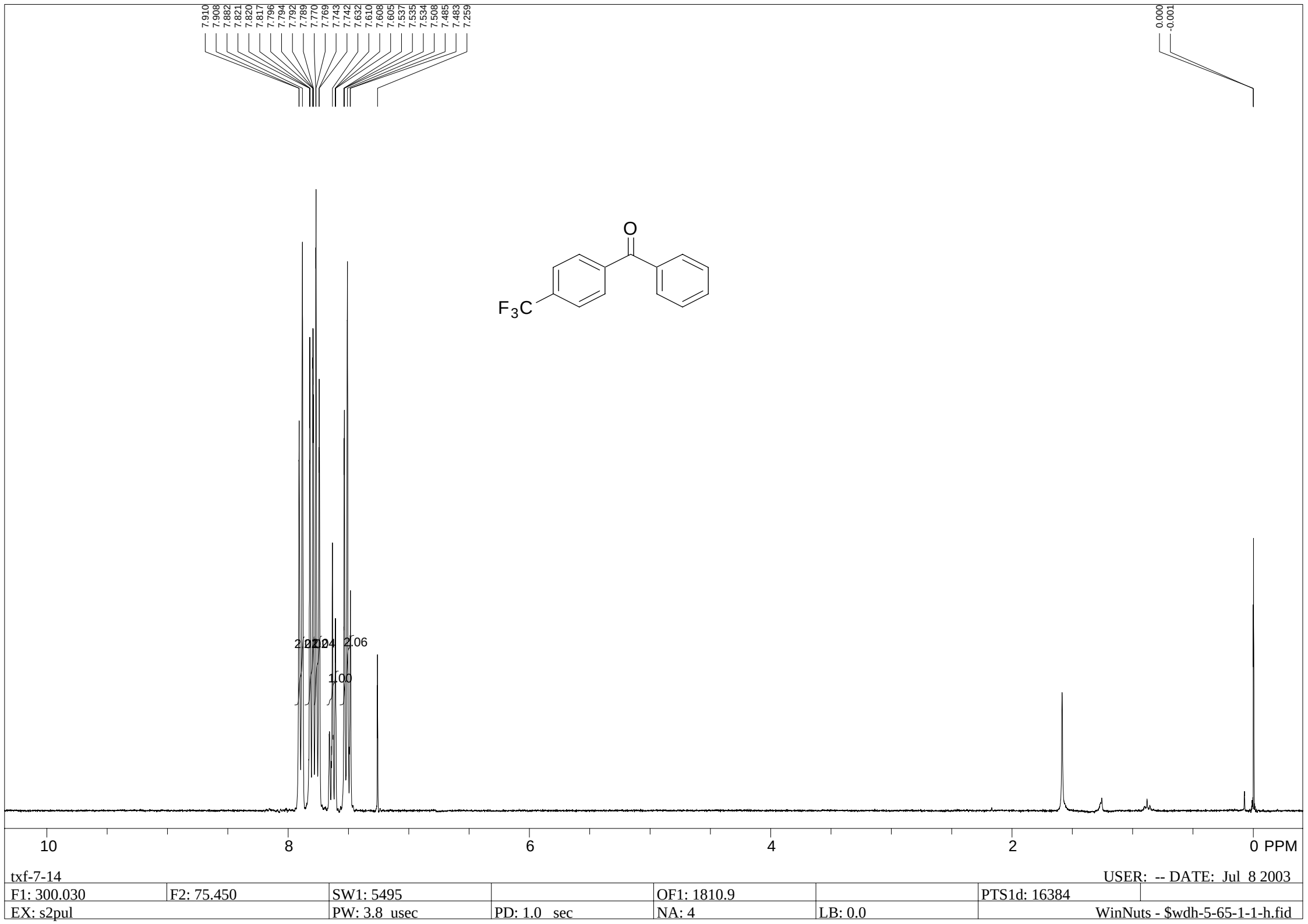
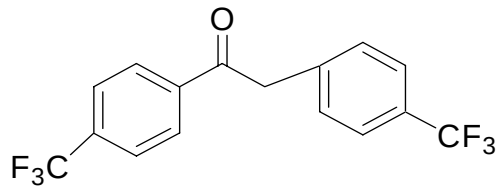
SIOC-OMCMercuryVX-300F19 Sensitivity TestSample: 0.05% Trifluorotoluene2002 USER: -- DATE: Jul 8 2003

F1: 282.286	F2: 300.029	SW1: 84746		OF1: -22384.9		PTS1d: 65536	
EX: s2pul		PW: 5.1 usec	PD: 1.5 sec	NA: 4	LB: 0.0		WinNuts - $wdh-5-65-1-1-f.fid



txf-7-14 USER: -- DATE: Jul 8 2003

F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1810.9		PTS1d: 16384
EX: s2pul		PW: 3.8 usec	PD: 1.0 sec	NA: 4	LB: 0.0	WinNuts - $wdh-5-65-1-1-h.fid



txf-7-14 USER: -- DATE: Jul 8 2003

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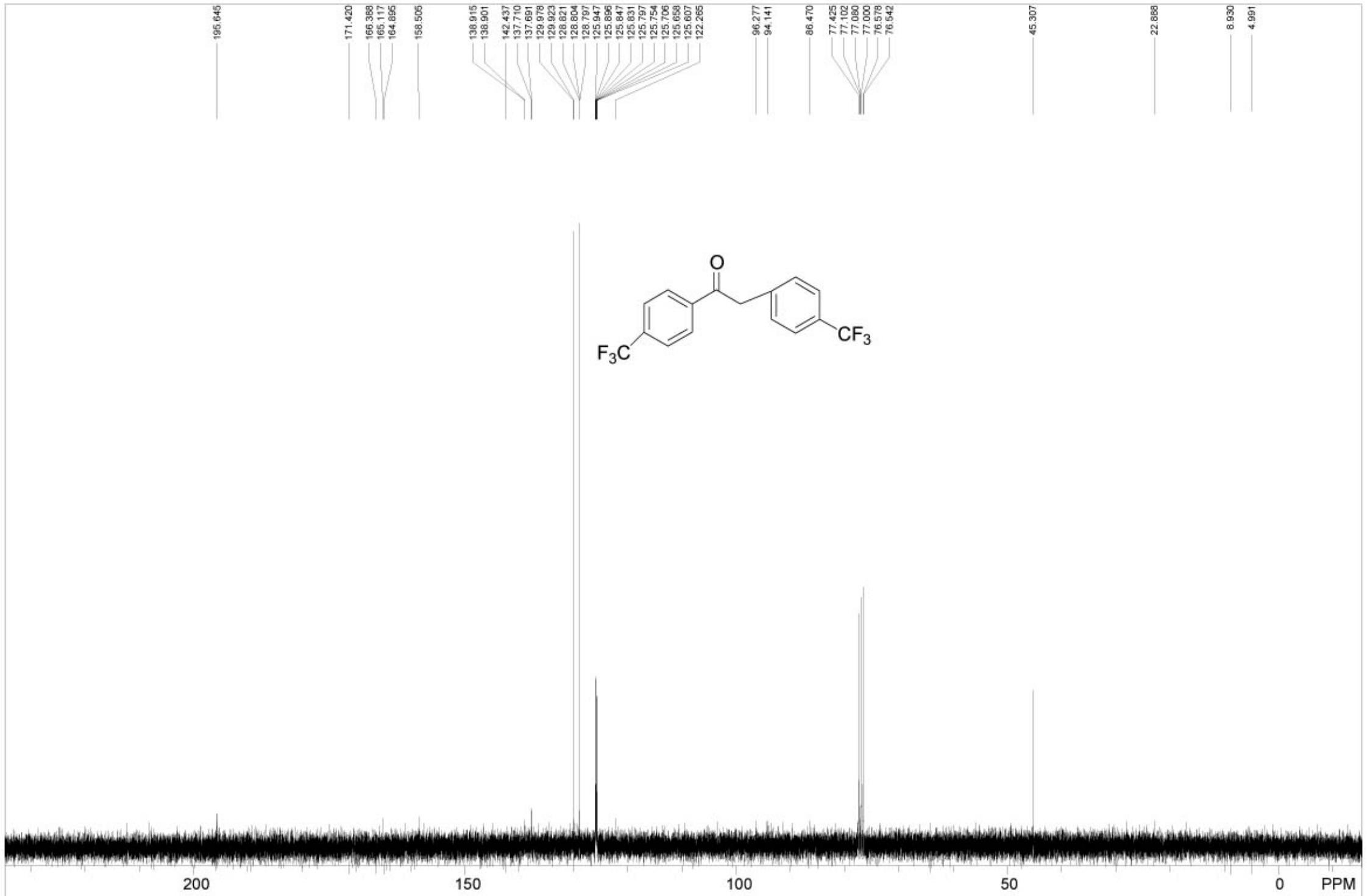

zgg-7-73c

USER: -- DATE: Jul 8 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8282.0		PTS1d: 65536
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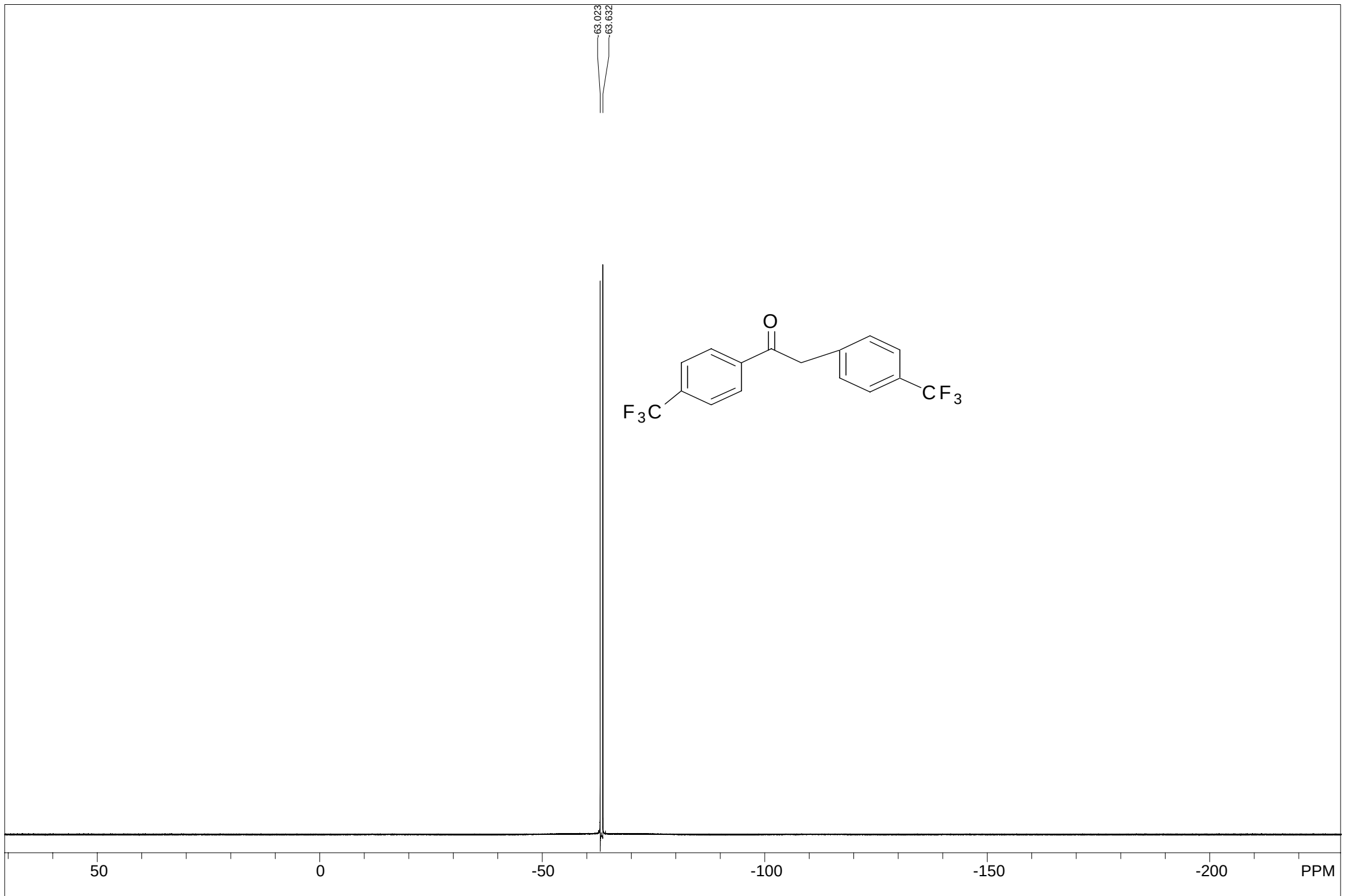
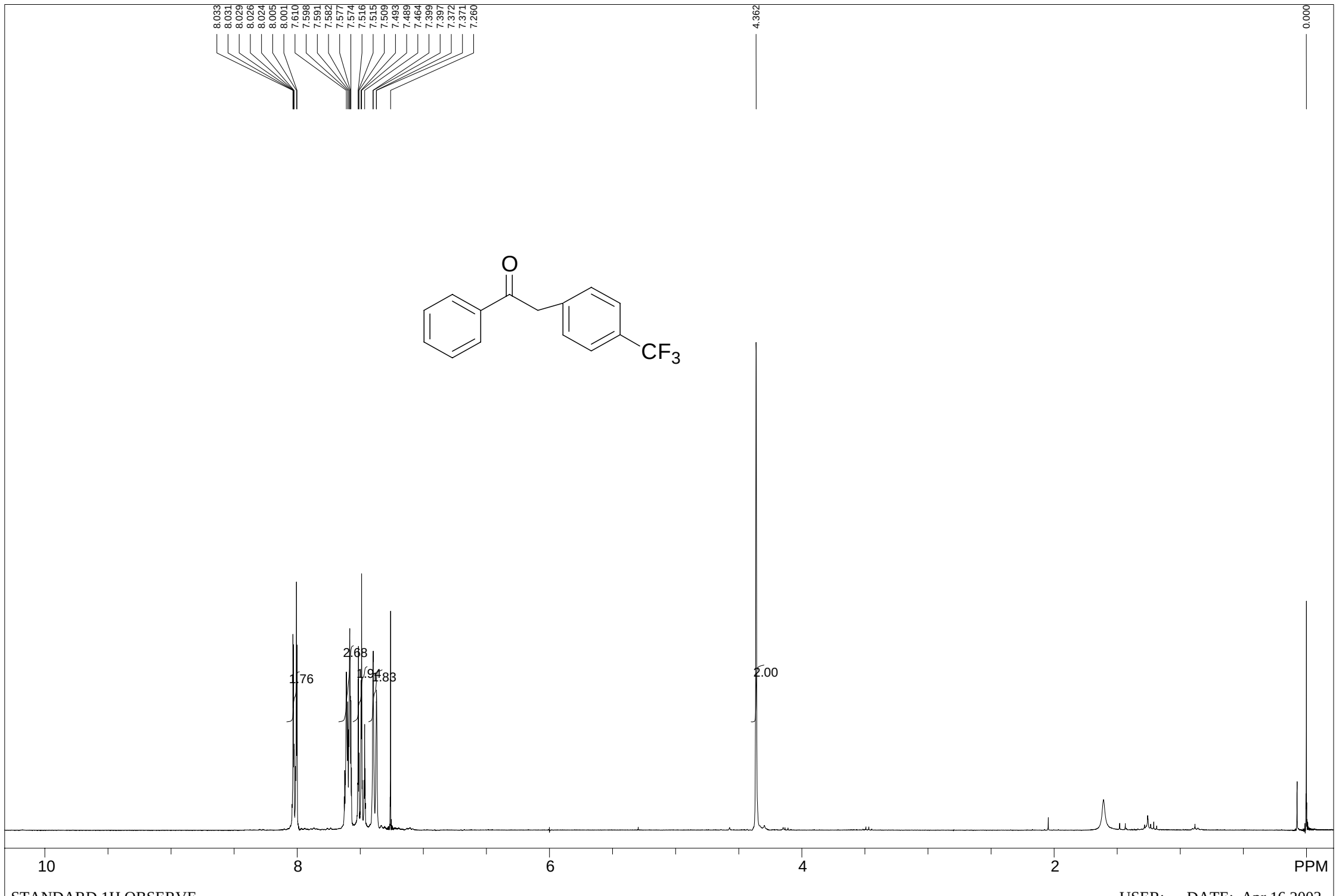


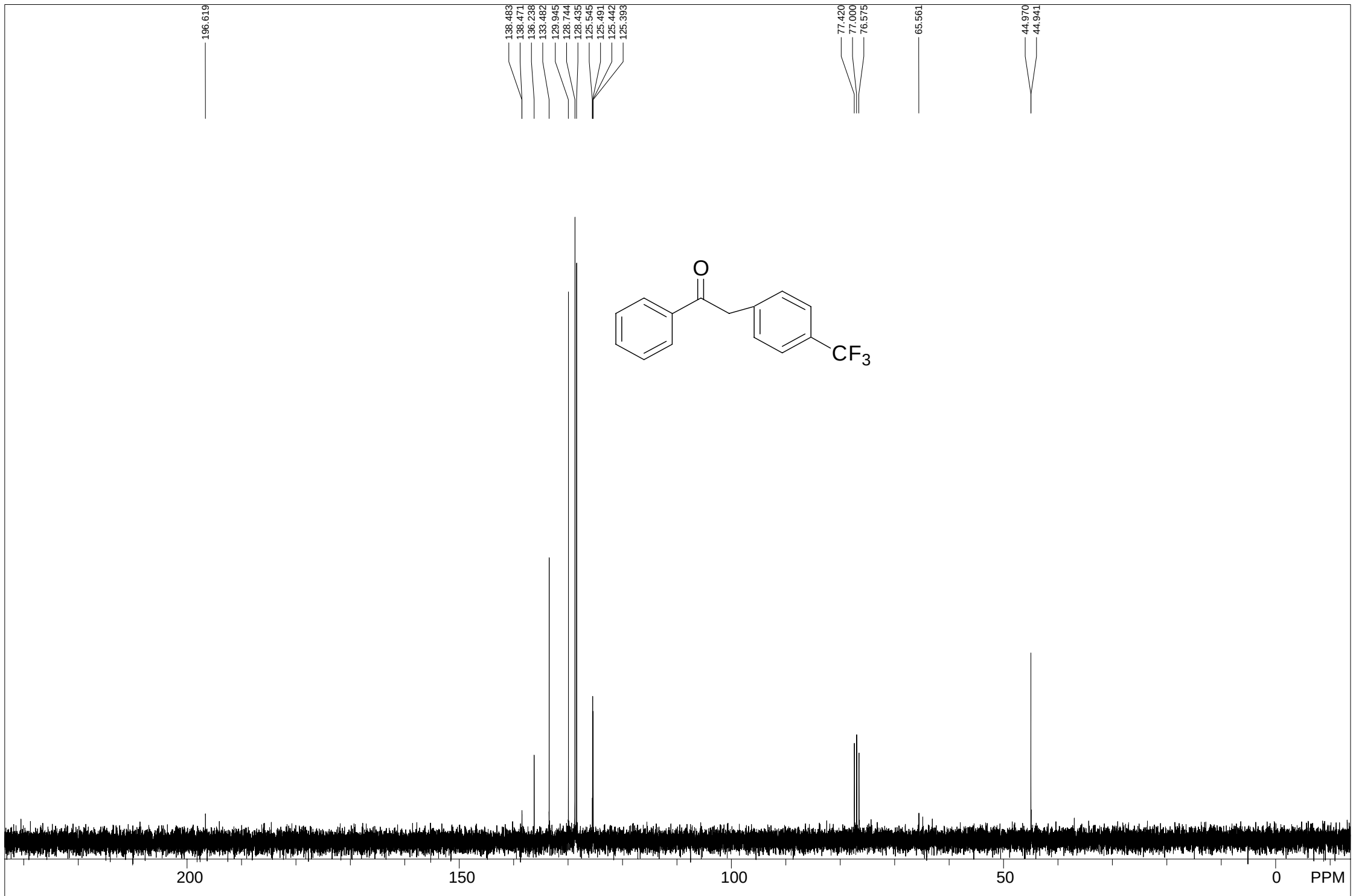
SIOC-OMCMercuryVX-300F19 Sensitivity TestSample: 0.05% Trifluorotoluene2002 USER: -- DATE: Jul 8 2003

F1: 282.286	F2: 300.029	SW1: 84746		OF1: -22384.9		PTS1d: 65536	
EX: s2pul		PW: 5.1 usec	PD: 1.5 sec	NA: 16	LB: 0.0	WinNuts - $wdh-5-72-1-1-f.fid	



STANDARD 1H OBSERVE USER: -- DATE: Apr 16 2003

F1: 300.030	F2: 75.450	SW1: 4803		OF1: 1800.7		PTS1d: 16384	
EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 18	LB: 0.0	WinNuts - $wdh-5-73-1-h.fid	



zgg-5-25-2a-c

USER: -- DATE: Apr 16 2003

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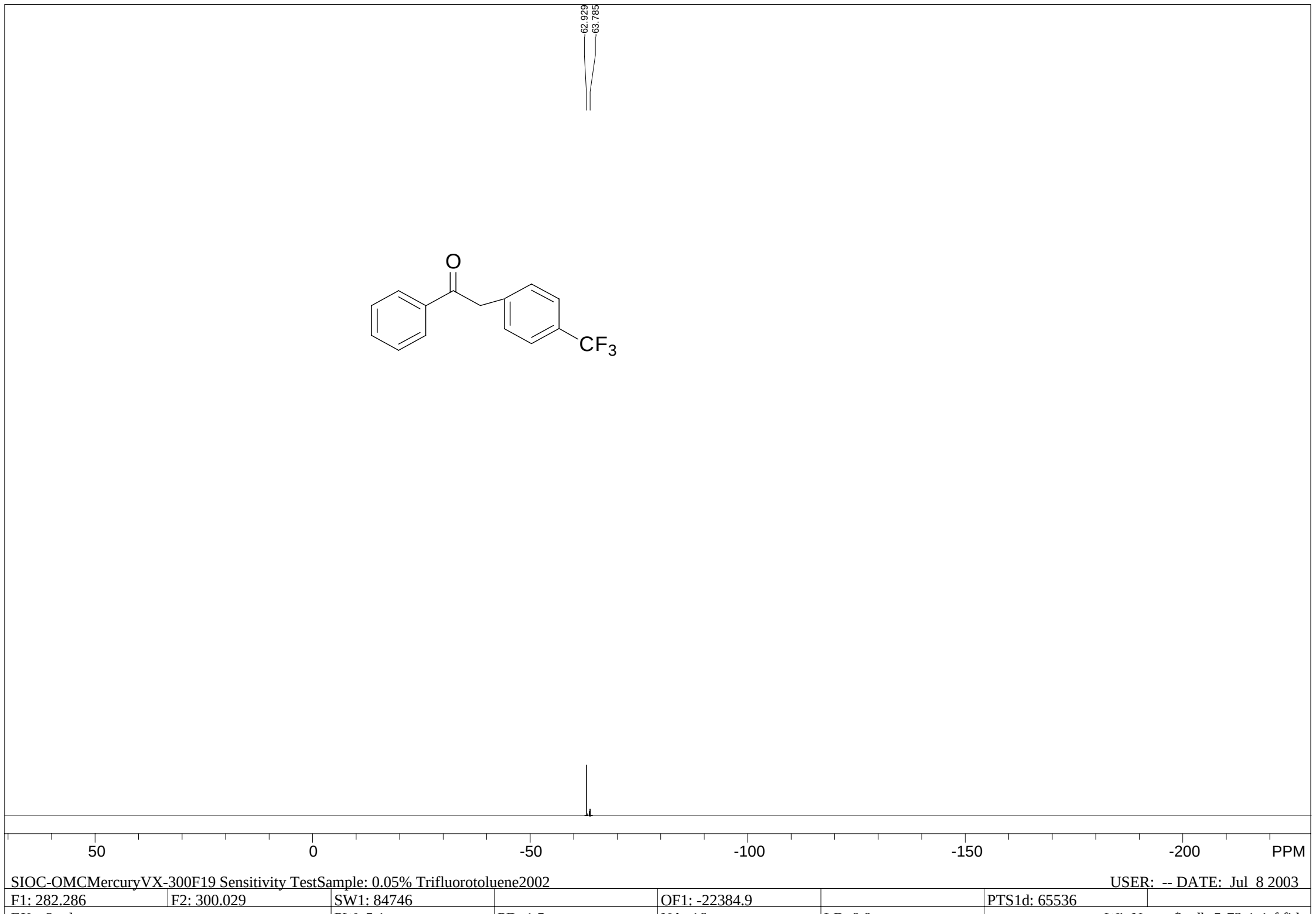
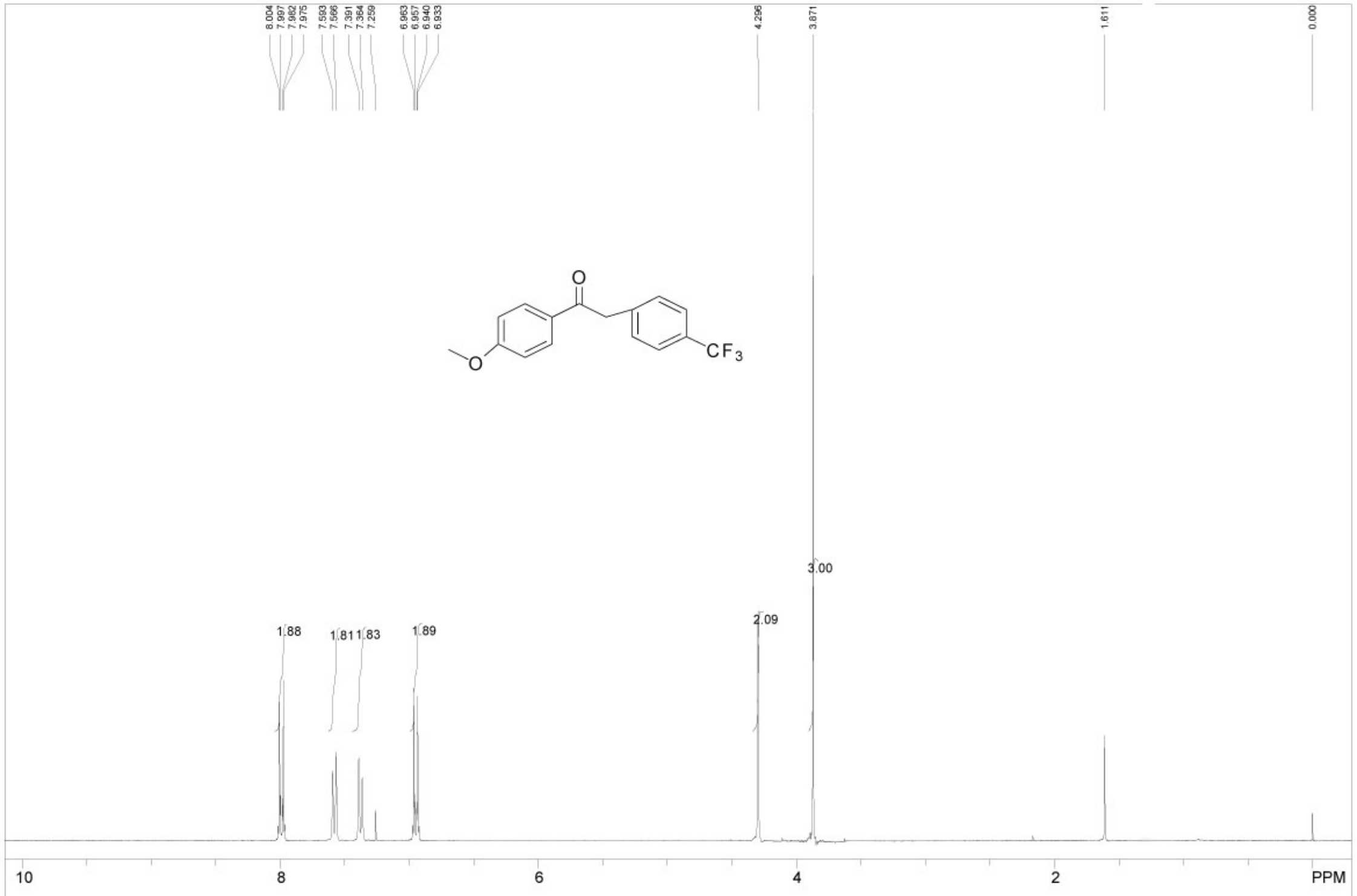


SIOC-OMCMercuryVX-300F19 Sensitivity TestSample: 0.05% Trifluorotoluene2002 USER: -- DATE: Jul 8 2003

F1: 282.286	F2: 300.029	SW1: 84746		OF1: -22384.9		PTS1d: 65536	
EX: s2pul		PW: 5.1 usec	PD: 1.5 sec	NA: 16	LB: 0.0		WinNuts - $wdh-5-73-1-1-f.fid



txf-7-14 USER: -- DATE: Jul 8 2003

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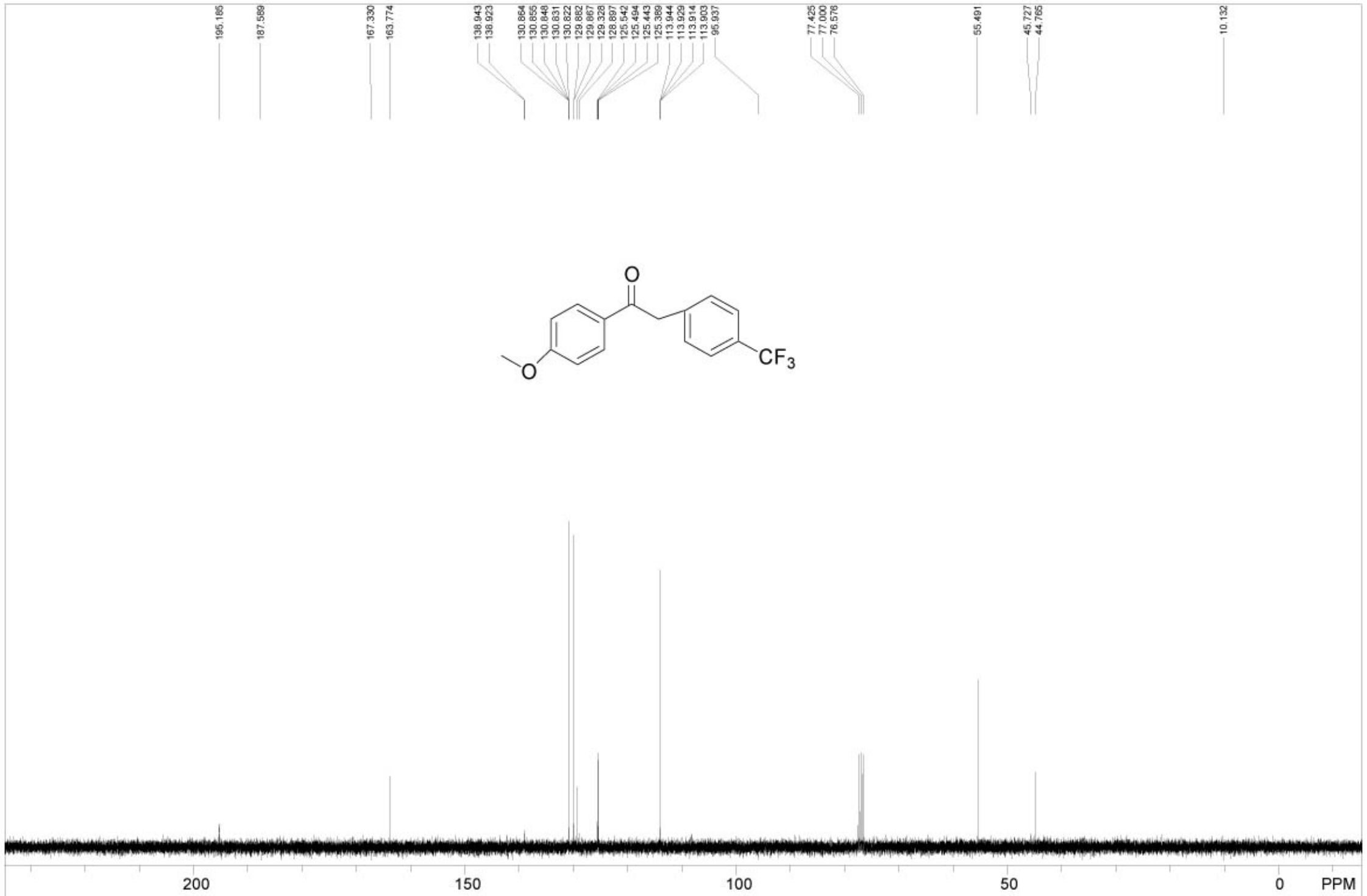

zgg-7-73c

USER: -- DATE: Jul 8 2003

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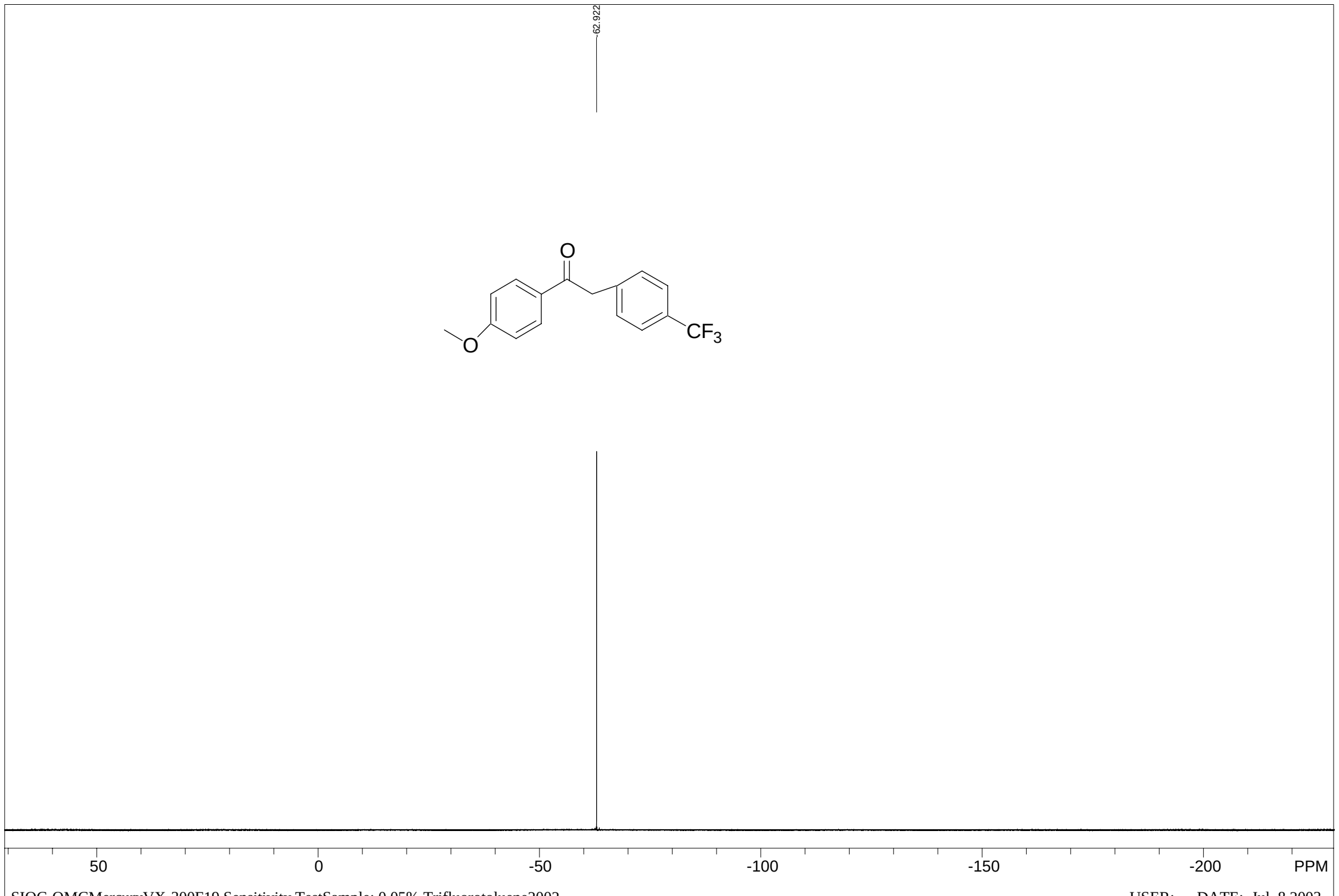
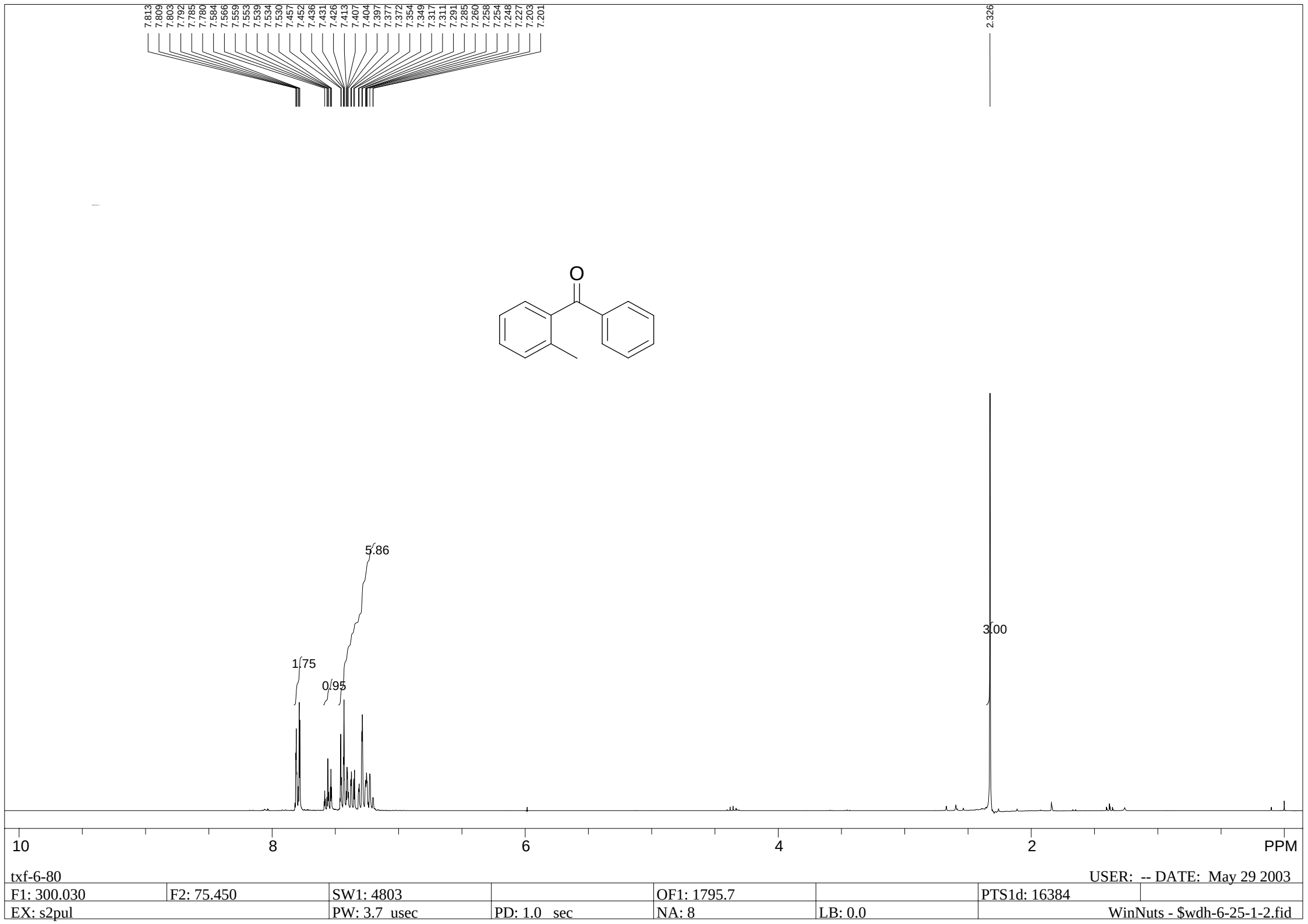


SIOC-OMCMercuryVX-300F19 Sensitivity TestSample: 0.05% Trifluorotoluene2002 USER: -- DATE: Jul 8 2003

F1: 282.286	F2: 300.029	SW1: 84746		OF1: -22384.9		PTS1d: 65536	
EX: s2pul		PW: 5.1 usec	PD: 1.5 sec	NA:	LB: 0.0		WinNuts - $wdh-5-74-1-1-f.fid



txf-6-80

USER: -- DATE: May 29 2003

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EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 8	LB: 0.0		WinNuts - $wdh-6-25-1-2.fid

zgg-7-19c

USER: -- DATE: May 29 2003

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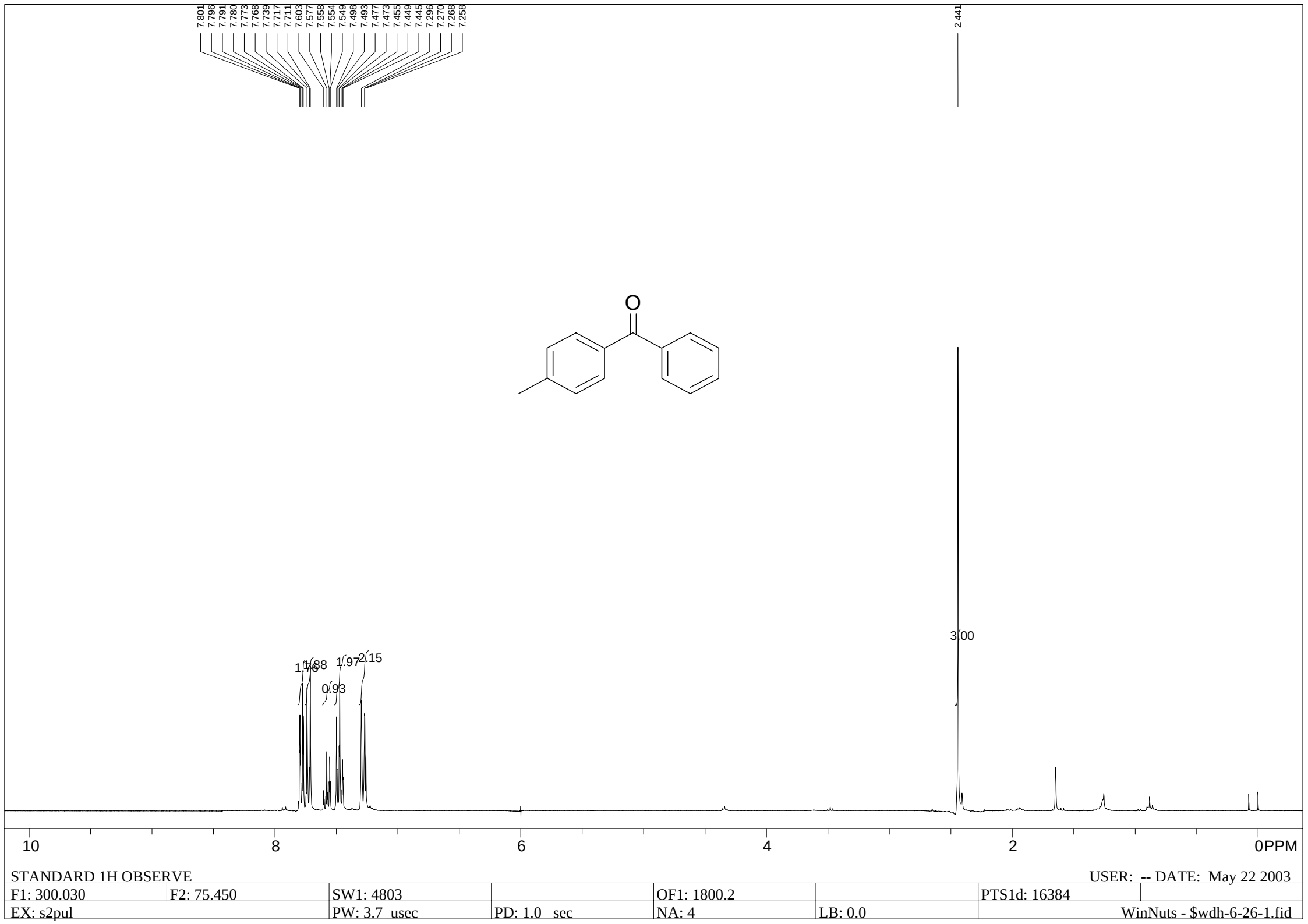

STANDARD 1H OBSERVE

USER: -- DATE: May 22 2003

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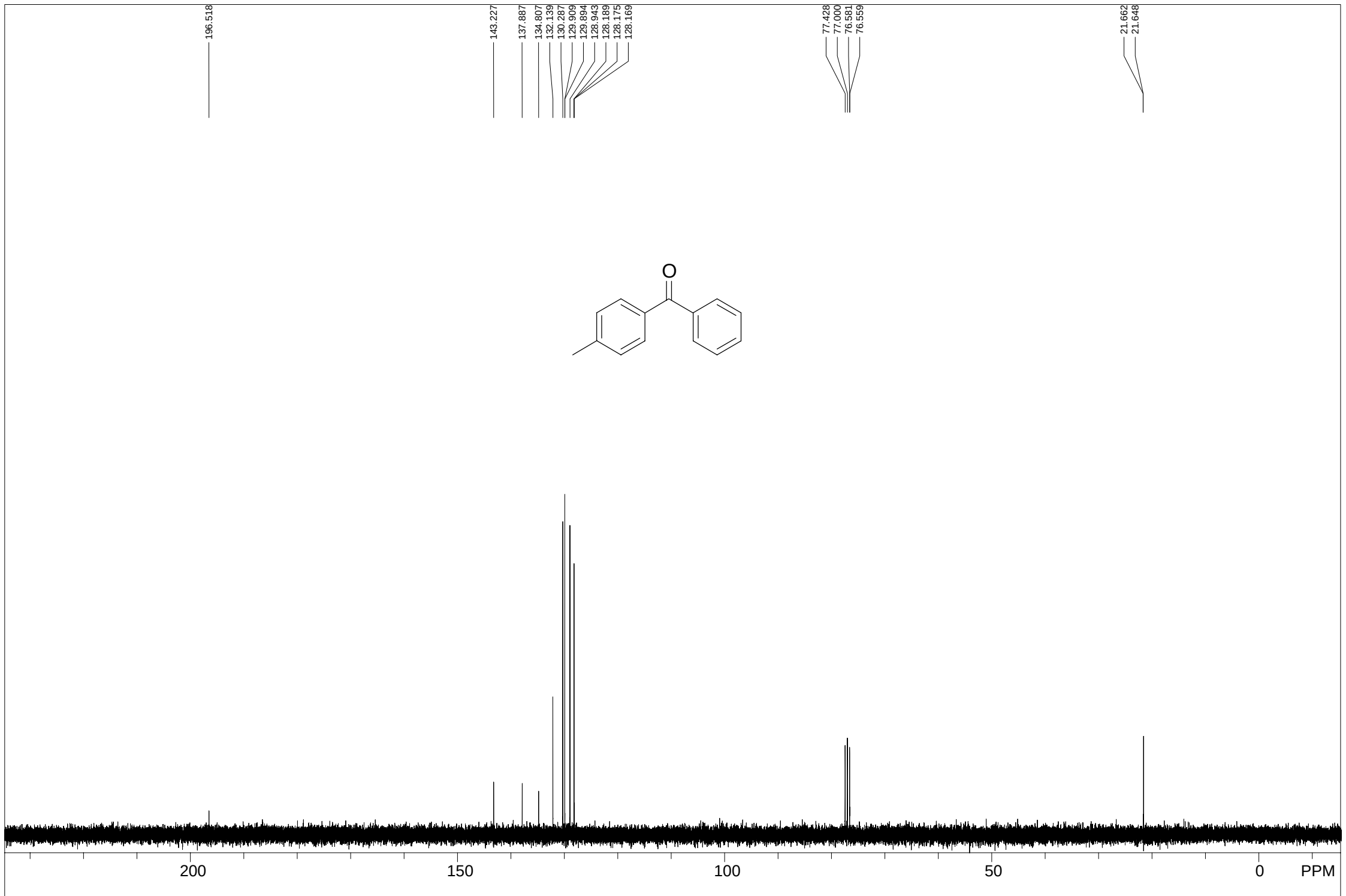

zgg-7-03c

USER: -- DATE: May 22 2003

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EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 64	LB: 0.0		WinNuts - $wdh-6-26-1c.fid

STANDARD 1H OBSERVE

USER: -- DATE: May 22 2003

F1: 300.030	F2: 75.450	SW1: 4803		OF1: 1803.0		PTS1d: 16384
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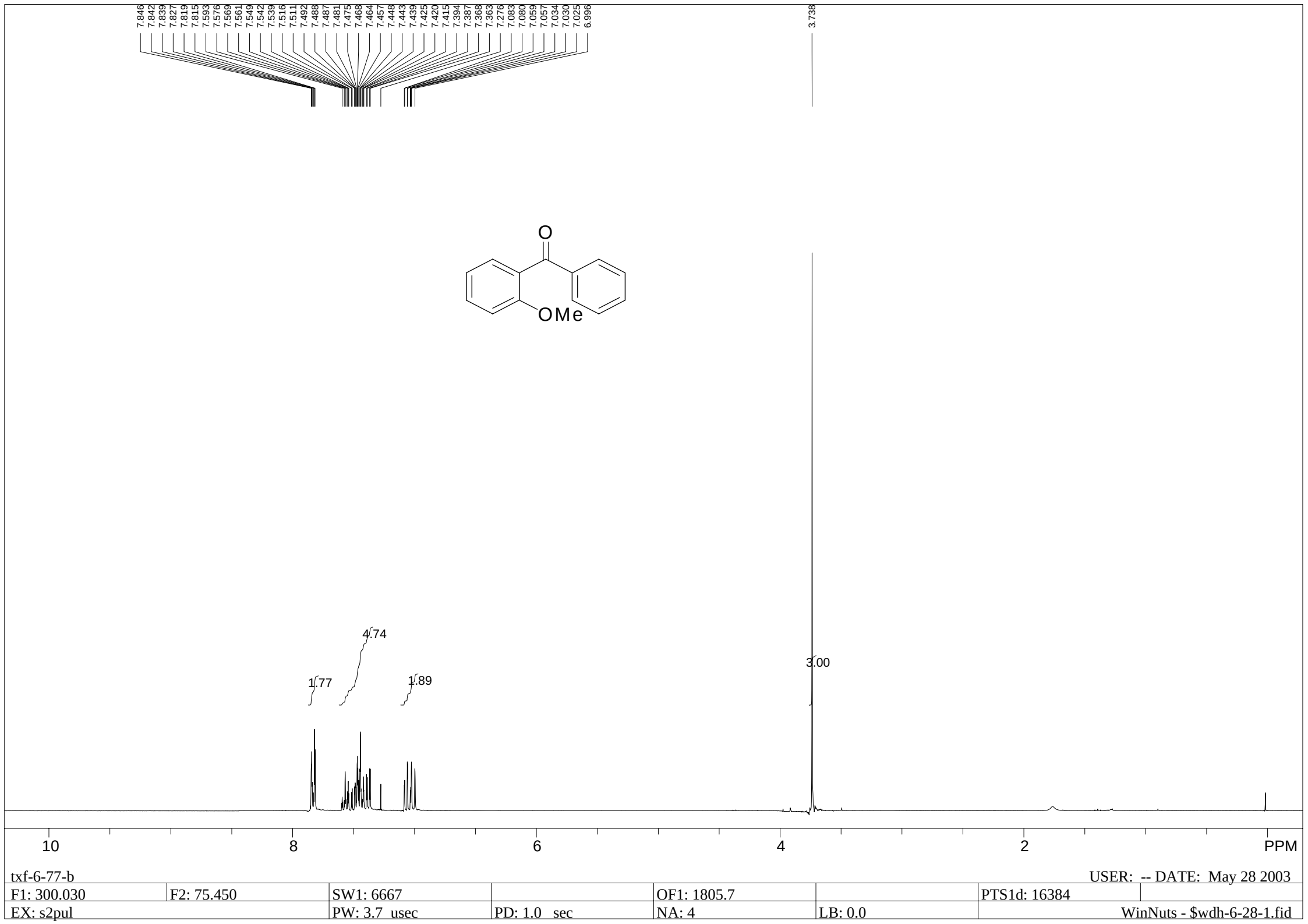
zgg-7-03c

USER: -- DATE: May 22 2003

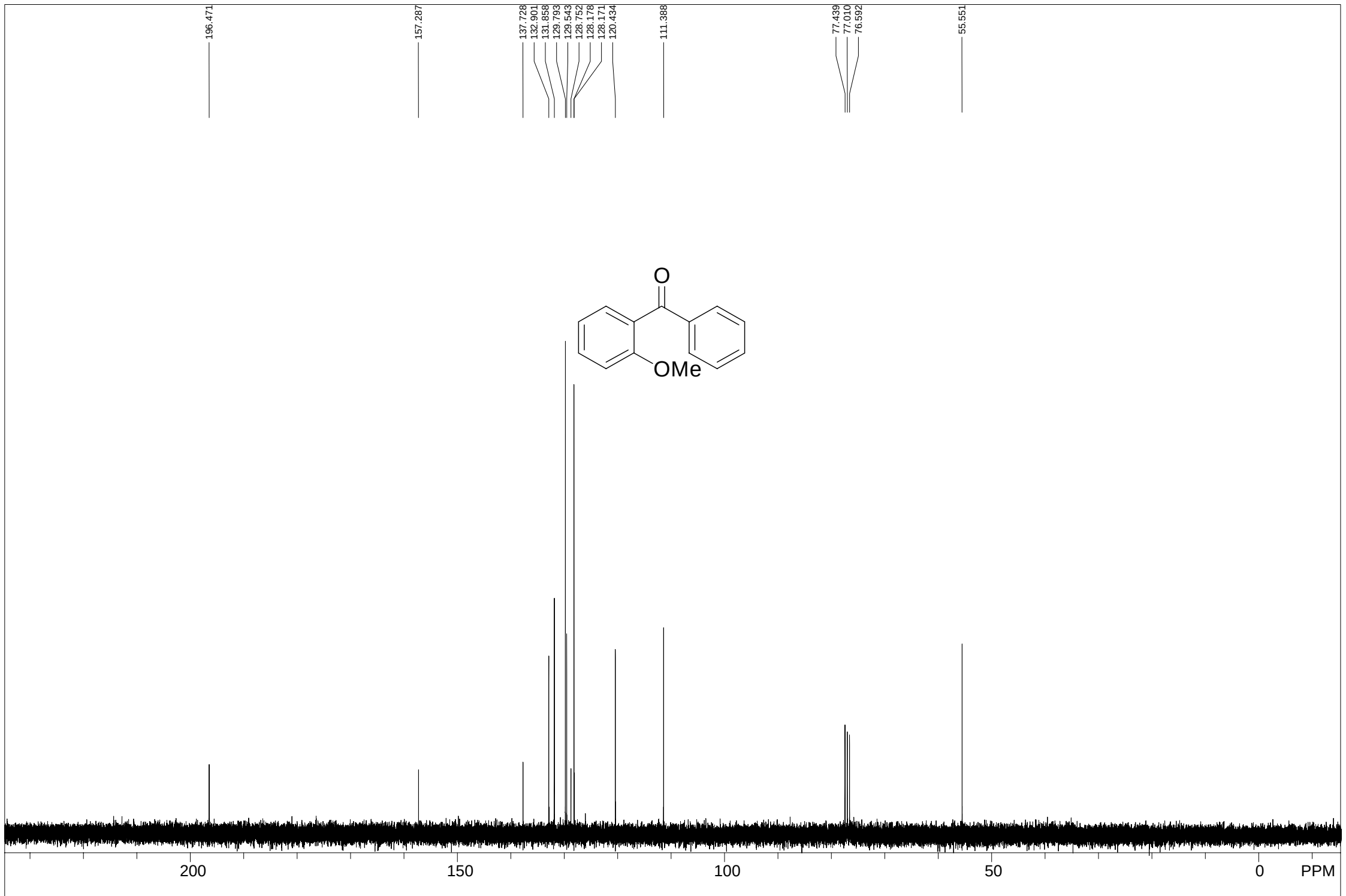
F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8272.2		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 32	LB: 0.0		WinNuts - $wdh-6-27-1c.fid



txf-6-77-b

USER: -- DATE: May 28 2003

F1: 300.030	F2: 75.450	SW1: 6667		OF1: 1805.7		PTS1d: 16384	
EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 4	LB: 0.0		WinNuts - $wdh-6-28-1.fid



zgg-7-18c

USER: -- DATE: May 28 2003

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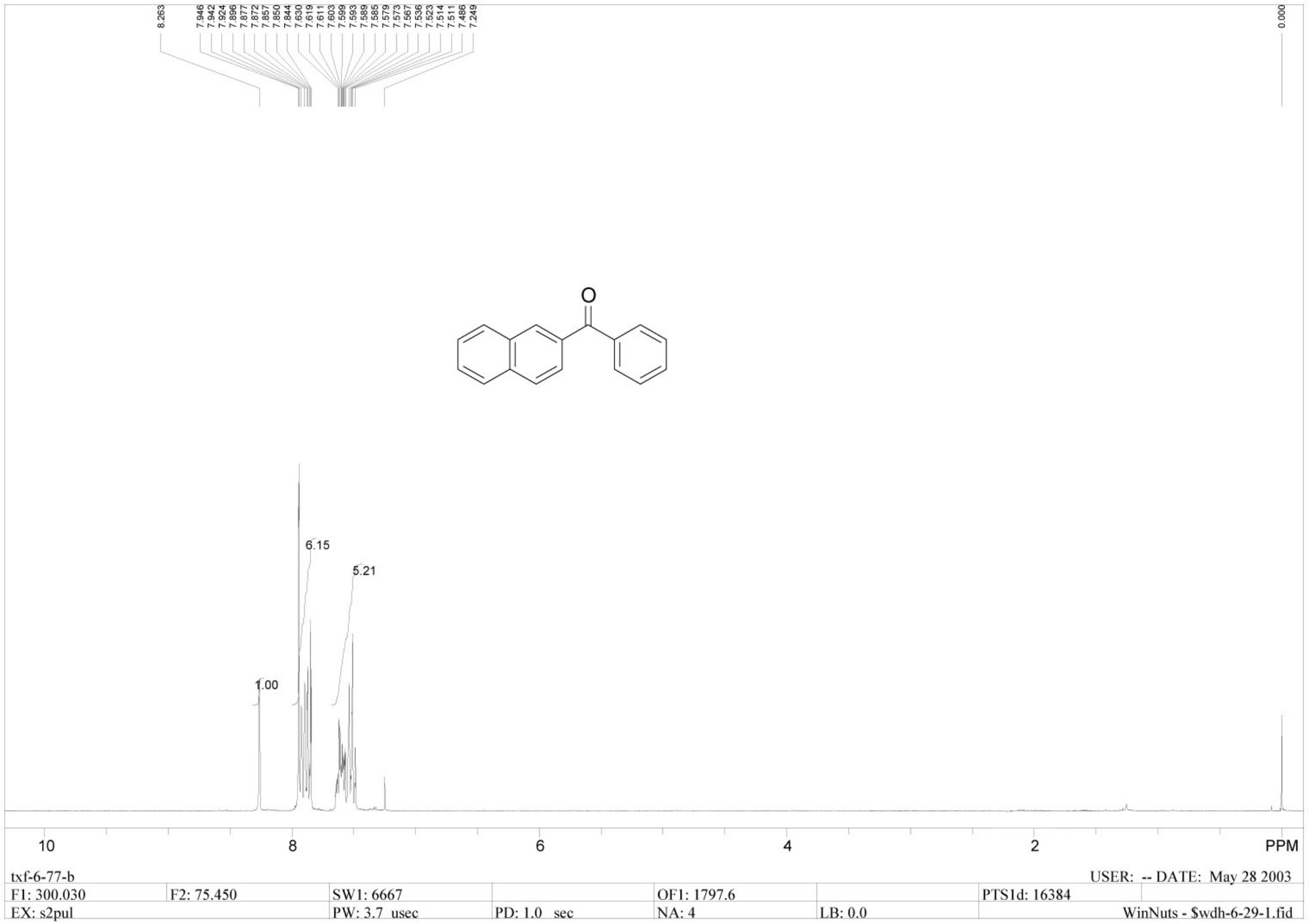

txf-6-77-b

USER: -- DATE: May 28 2003

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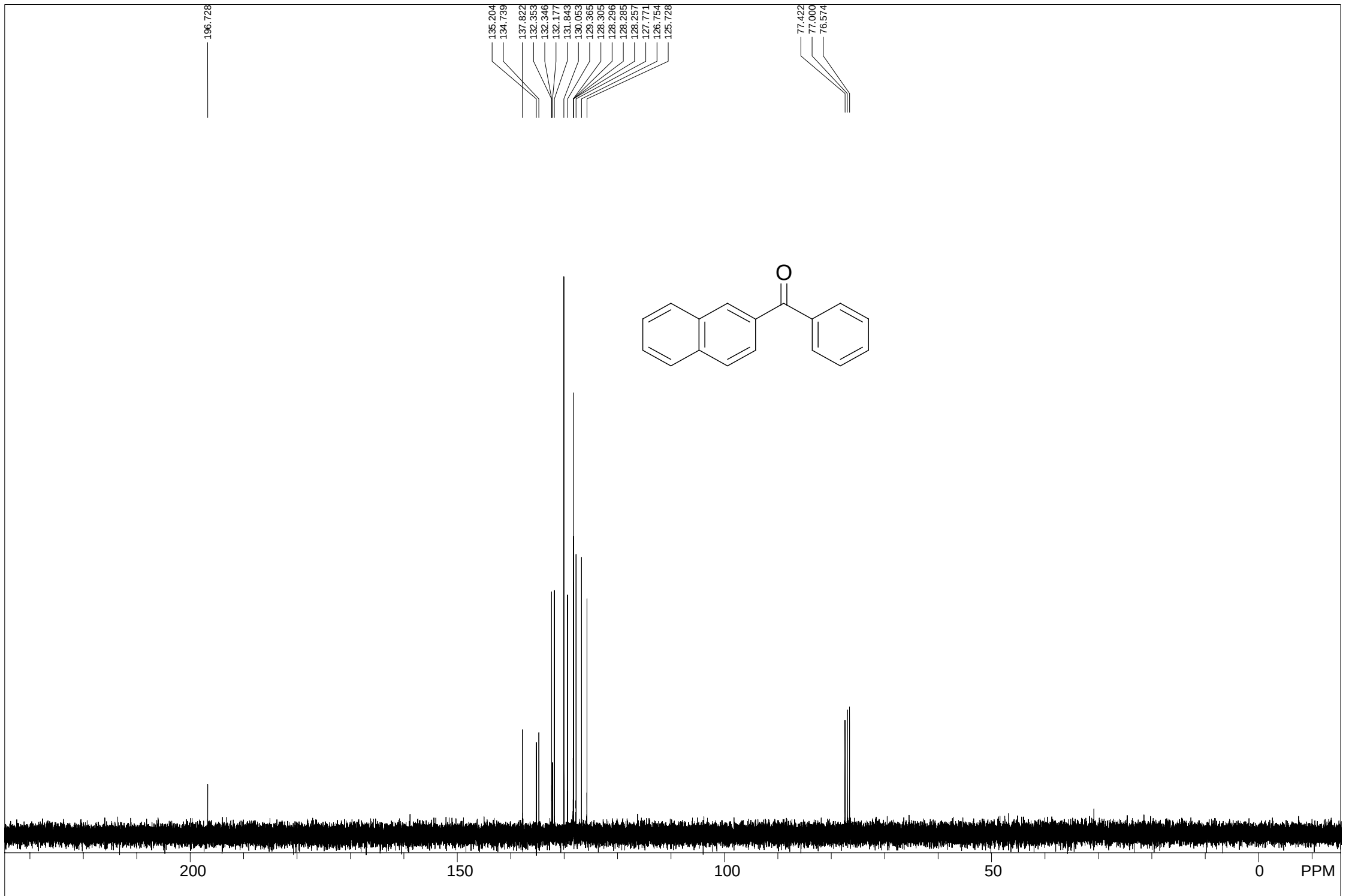

zgg-7-18c

USER: -- DATE: May 28 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8277.1		PTS1d: 65536	
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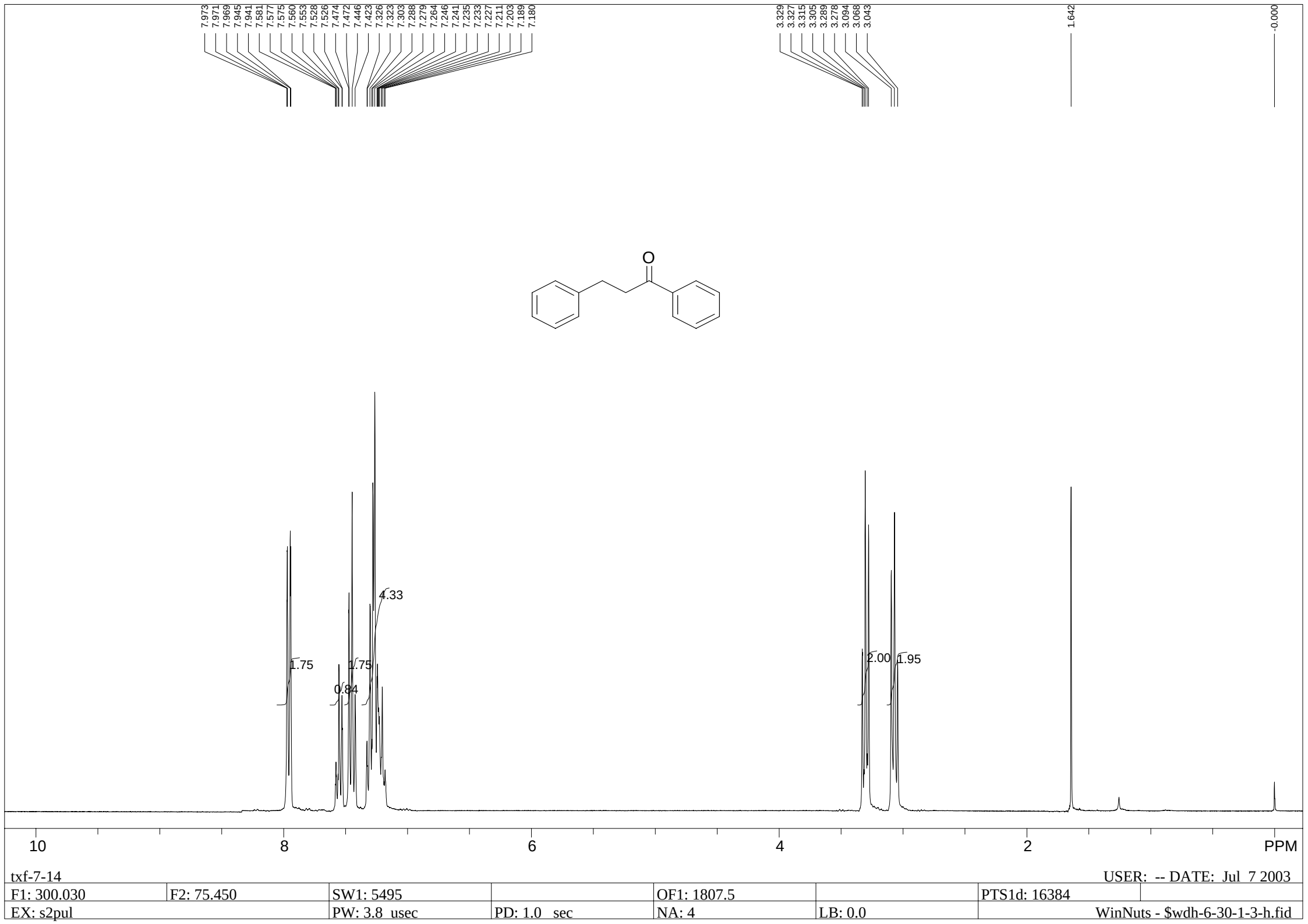

txf-7-14 USER: -- DATE: Jul 7 2003

F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1807.5		PTS1d: 16384
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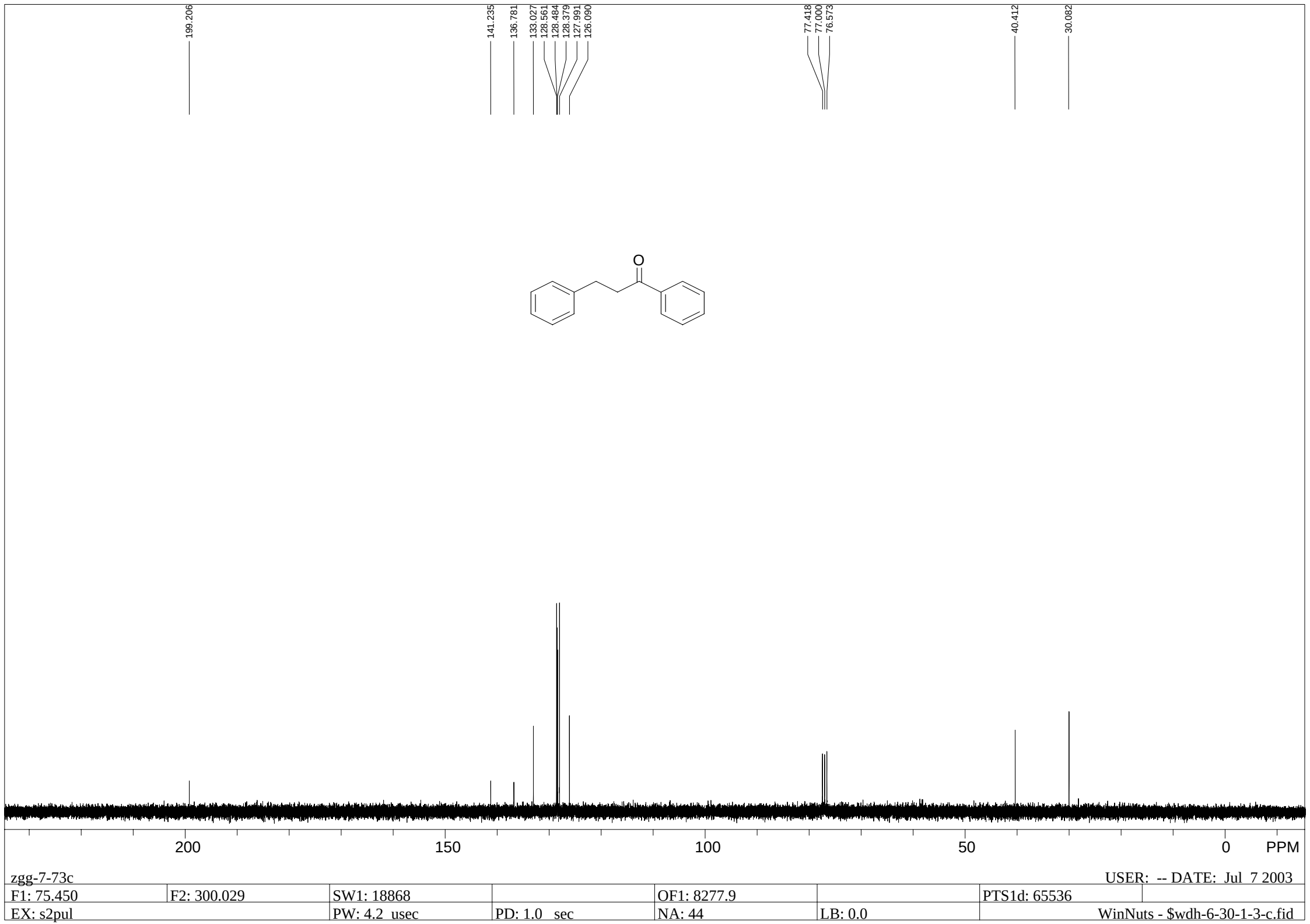


zgg-7-73c

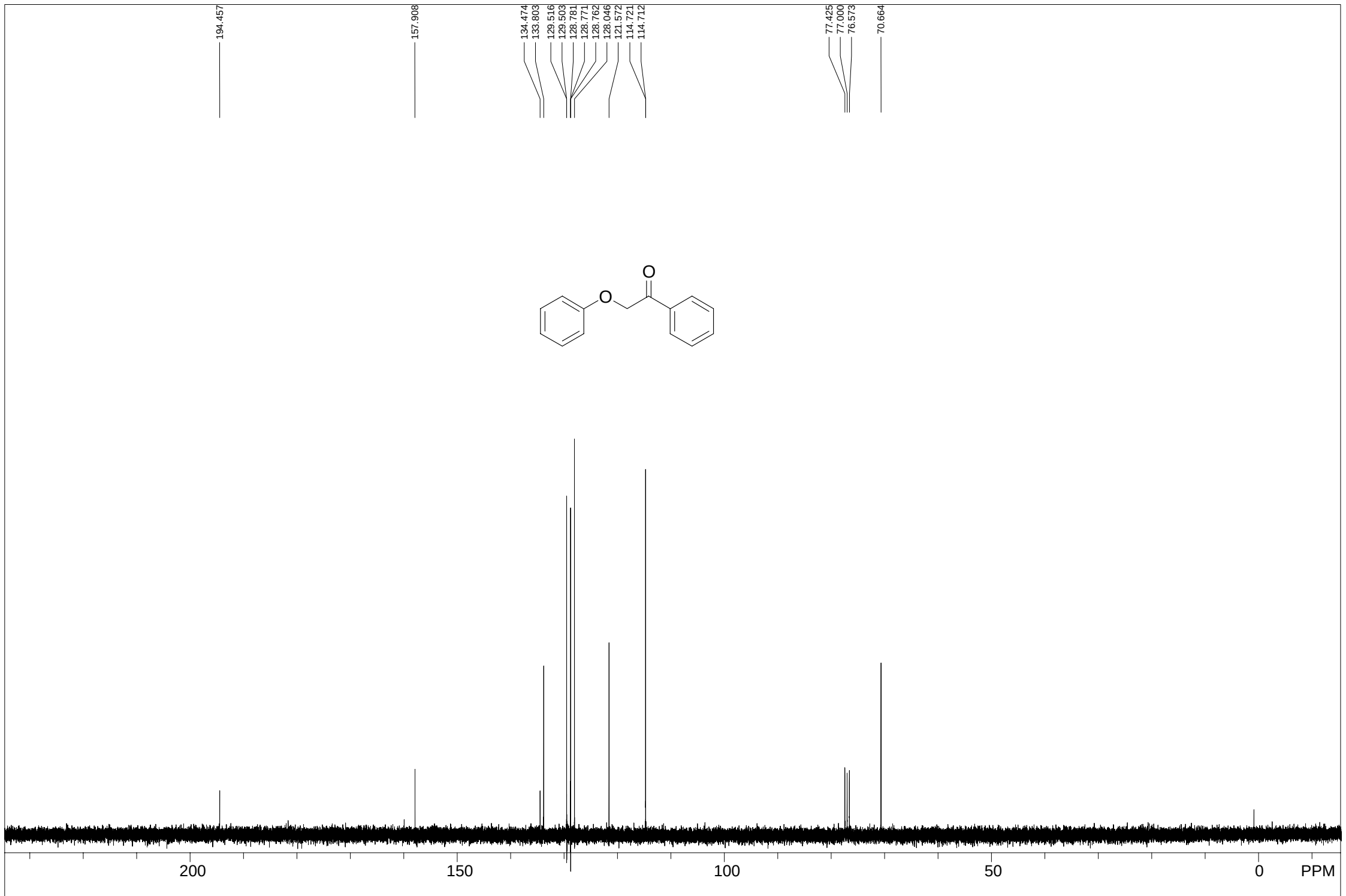
USER: -- DATE: Jul 7 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8277.9		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 44	LB: 0.0		WinNuts - $wdh-6-30-1-3-c.fid

txf-7-14

USER: -- DATE: Jul 7 2003

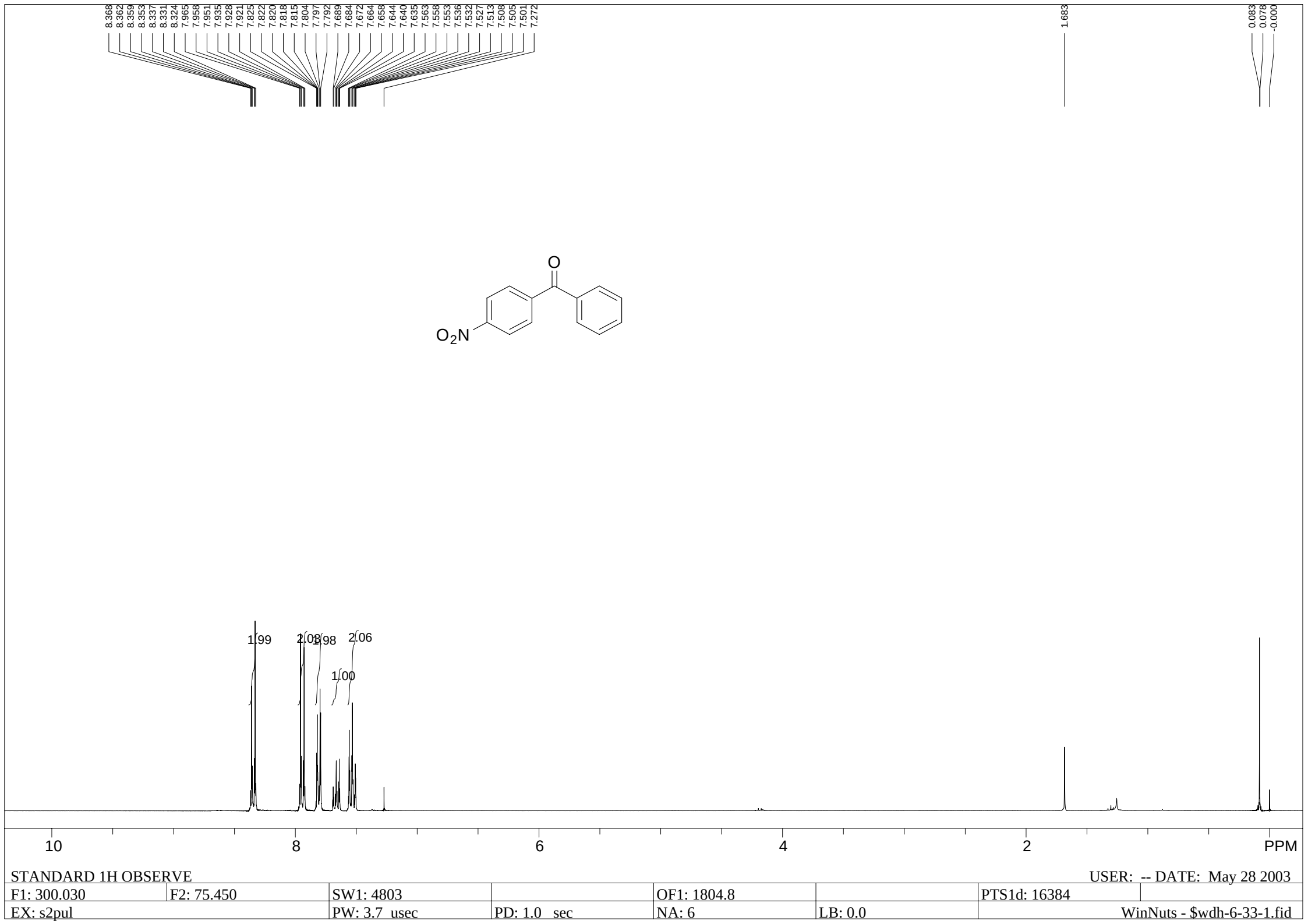
F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1781.6		PTS1d: 16384	
EX: s2pul		PW: 3.8 usec	PD: 1.0 sec	NA: 4	LB: 0.0	WinNuts - $wdh-6-31-1-3-h.fid	



zgg-7-73c

USER: -- DATE: Jul 7 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8275.1		PTS1d: 65536
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 16	LB: 0.0	WinNuts - $wdh-6-31-1-3-c.fid

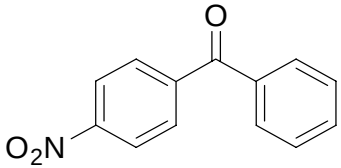


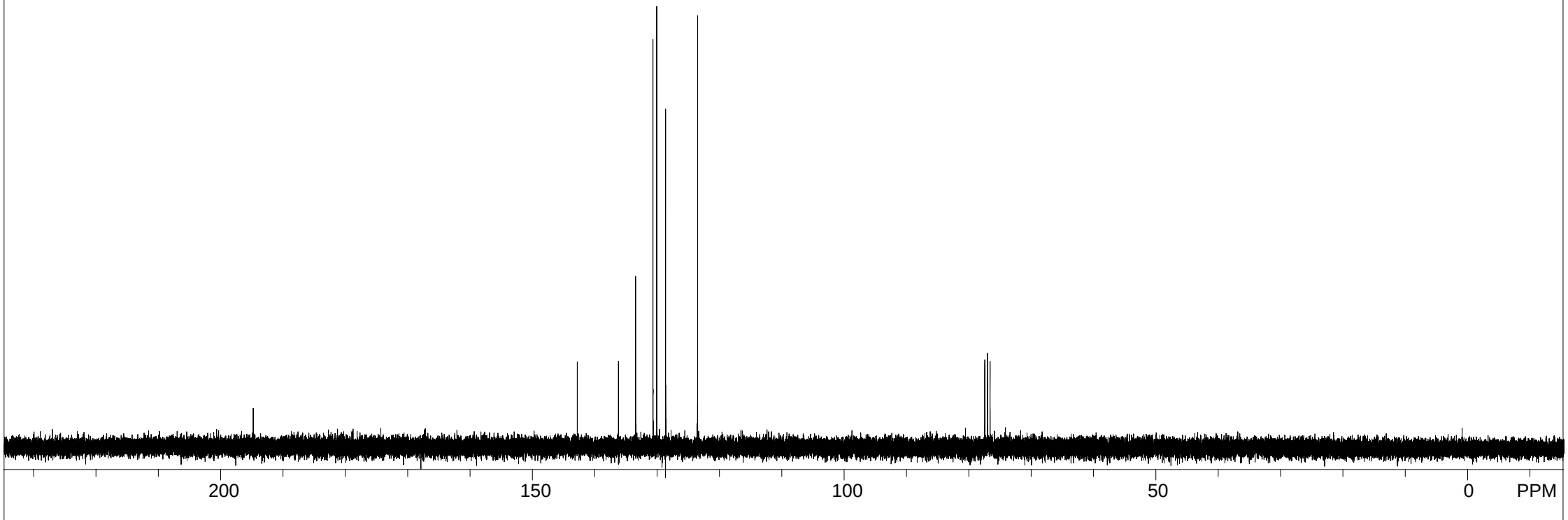
STANDARD 1H OBSERVE

USER: -- DATE: May 28 2003

F1: 300.030	F2: 75.450	SW1: 4803		OF1: 1804.8		PTS1d: 16384	
EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 6	LB: 0.0		WinNuts - $wdh-6-33-1.fid

194.771
142.806
136.193
133.440
130.656
130.054
128.647
128.632
128.627
128.619
123.494
77.426
77.002
76.579

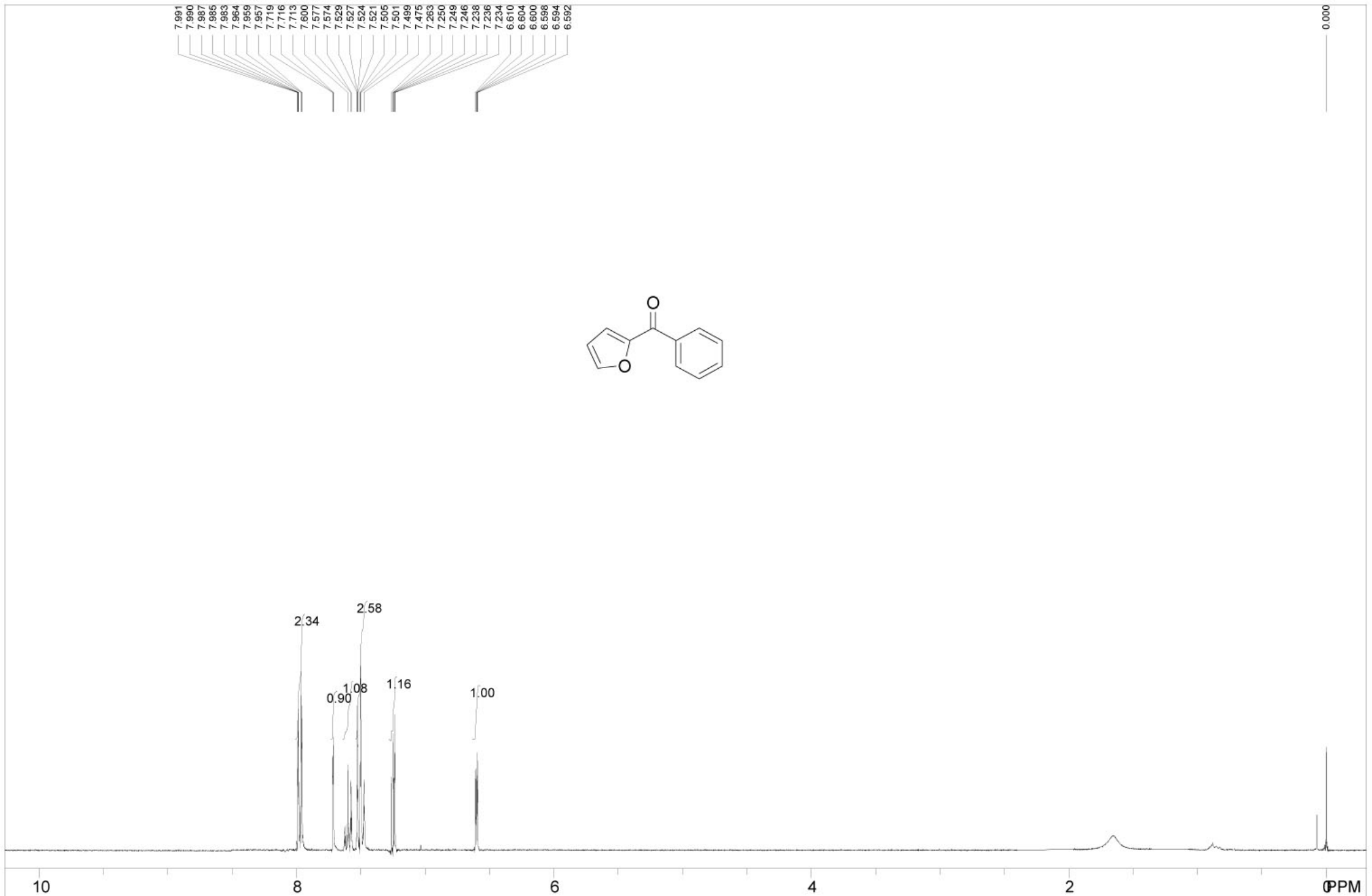




zgg-7-19c

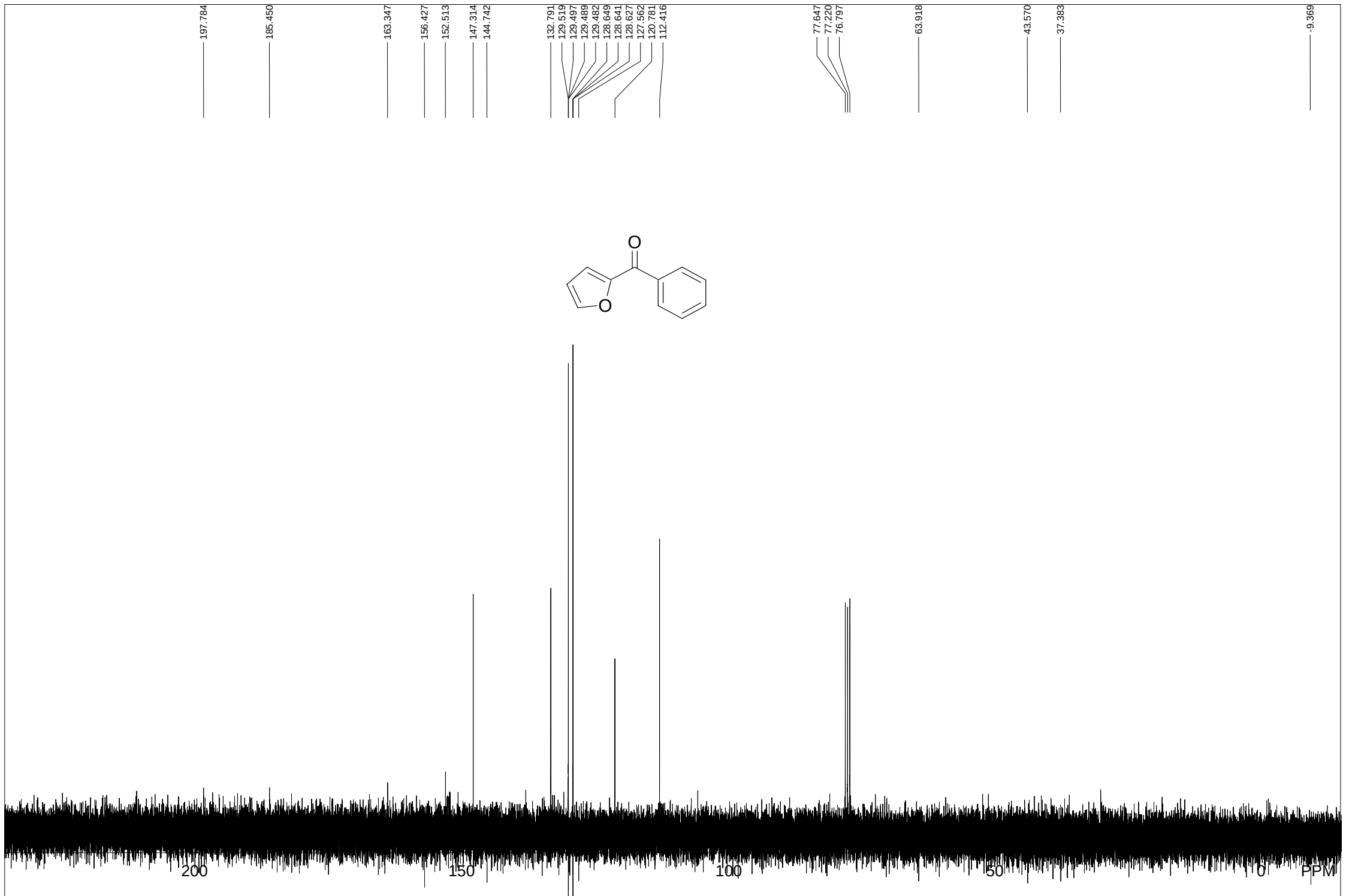
USER: -- DATE: May 28 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8278.0		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 28	LB: 0.0	WinNuts - $wdh-6-33-1c.fid	



txf-7-14 USER: -- DATE: Jul 8 2003

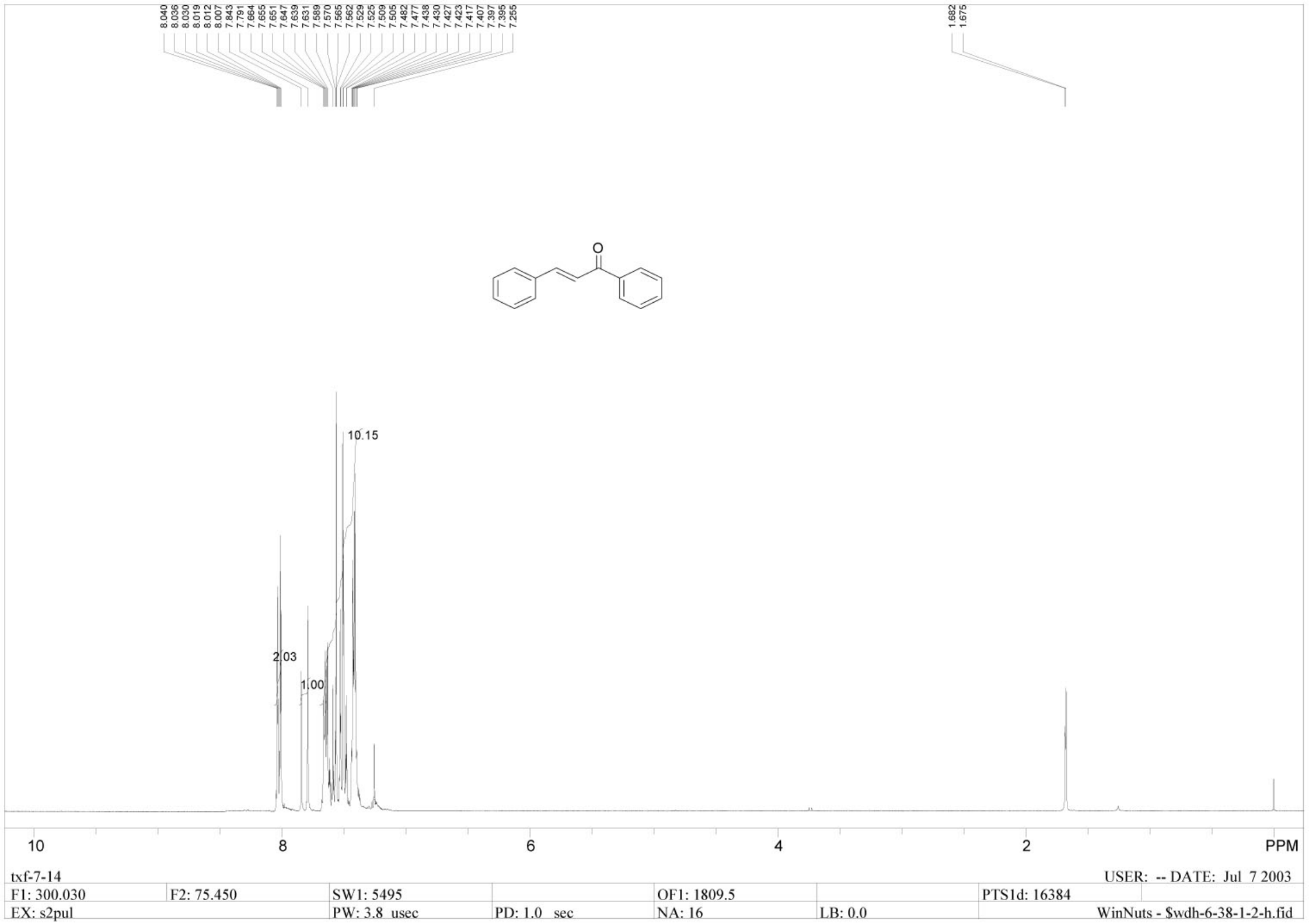
F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1812.5		PTS1d: 16384
EX: s2pul		PW: 3.8 usec	PD: 1.0 sec	NA: 4	LB: 0.0	WinNuts - $wdh-6-35-1-h-g.fid



zgg-7-73c

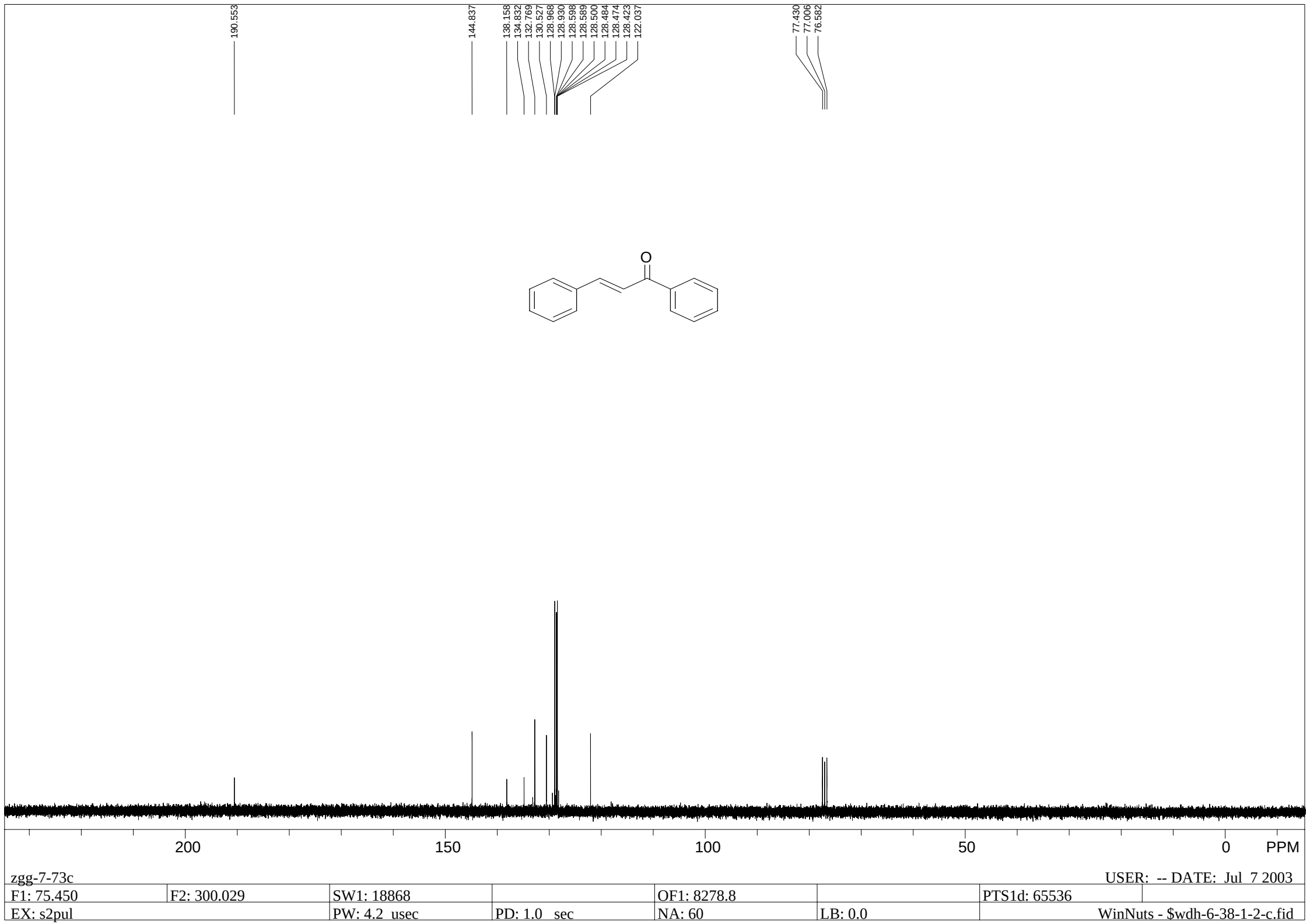
USER: -- DATE: Jul 8 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8298.6		PTS1d: 65536
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 132	LB: 0.0	WinNuts - $wdh-6-35-1-c-g.fid



txf-7-14 USER: -- DATE: Jul 7 2003

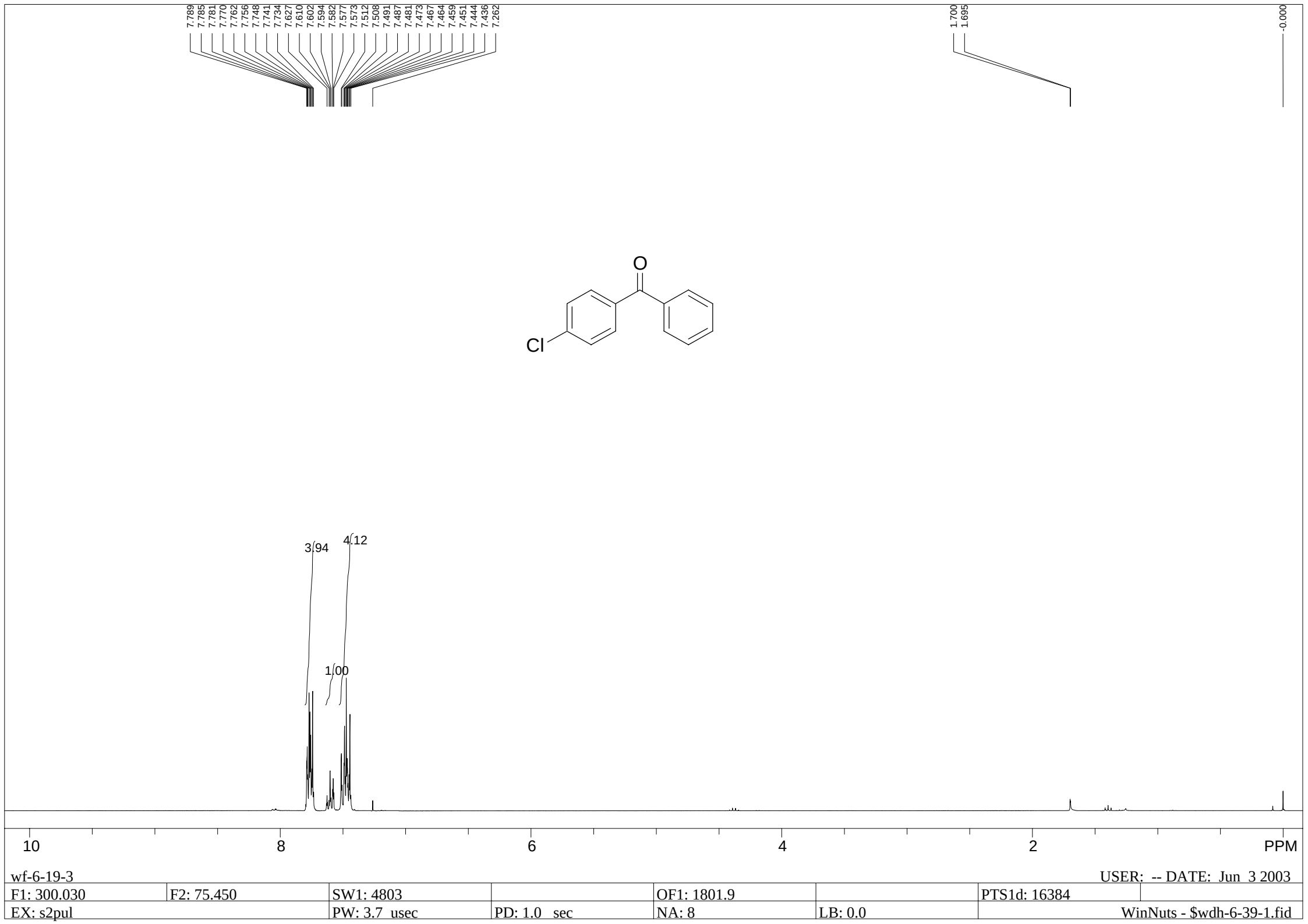
F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1809.5		PTS1d: 16384
EX: s2pul		PW: 3.8 usec	PD: 1.0 sec	NA: 16	LB: 0.0	WinNuts - $wdh-6-38-1-2-h.fid



zgg-7-73c

USER: -- DATE: Jul 7 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8278.8		PTS1d: 65536
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 60	LB: 0.0	WinNuts - $wdh-6-38-1-2-c.fid



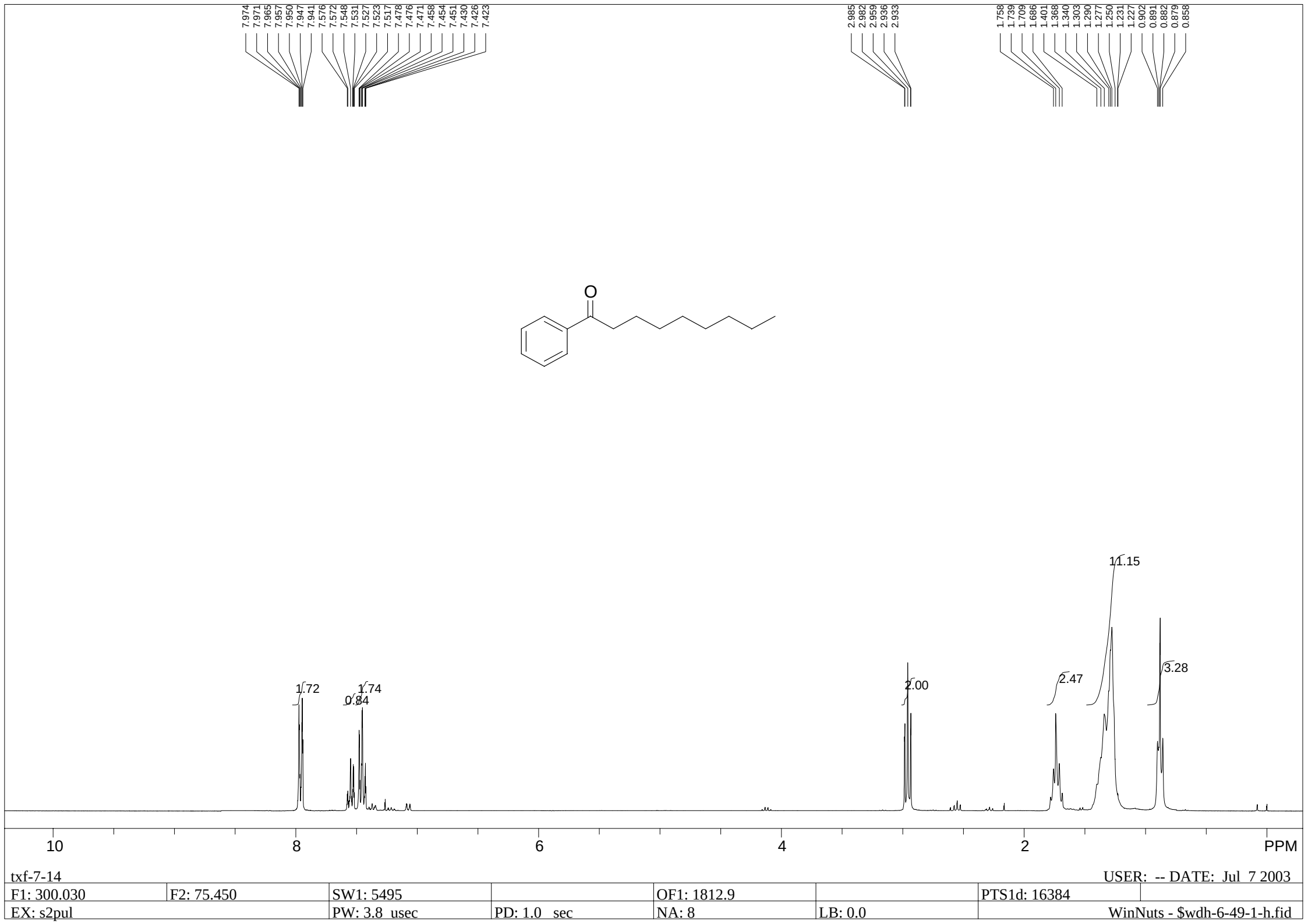
wf-6-19-3 USER: -- DATE: Jun 3 2003

F1: 300.030	F2: 75.450	SW1: 4803		OF1: 1801.9		PTS1d: 16384	
EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 8	LB: 0.0		WinNuts - $wdh-6-39-1.fid

zgg-7-26c

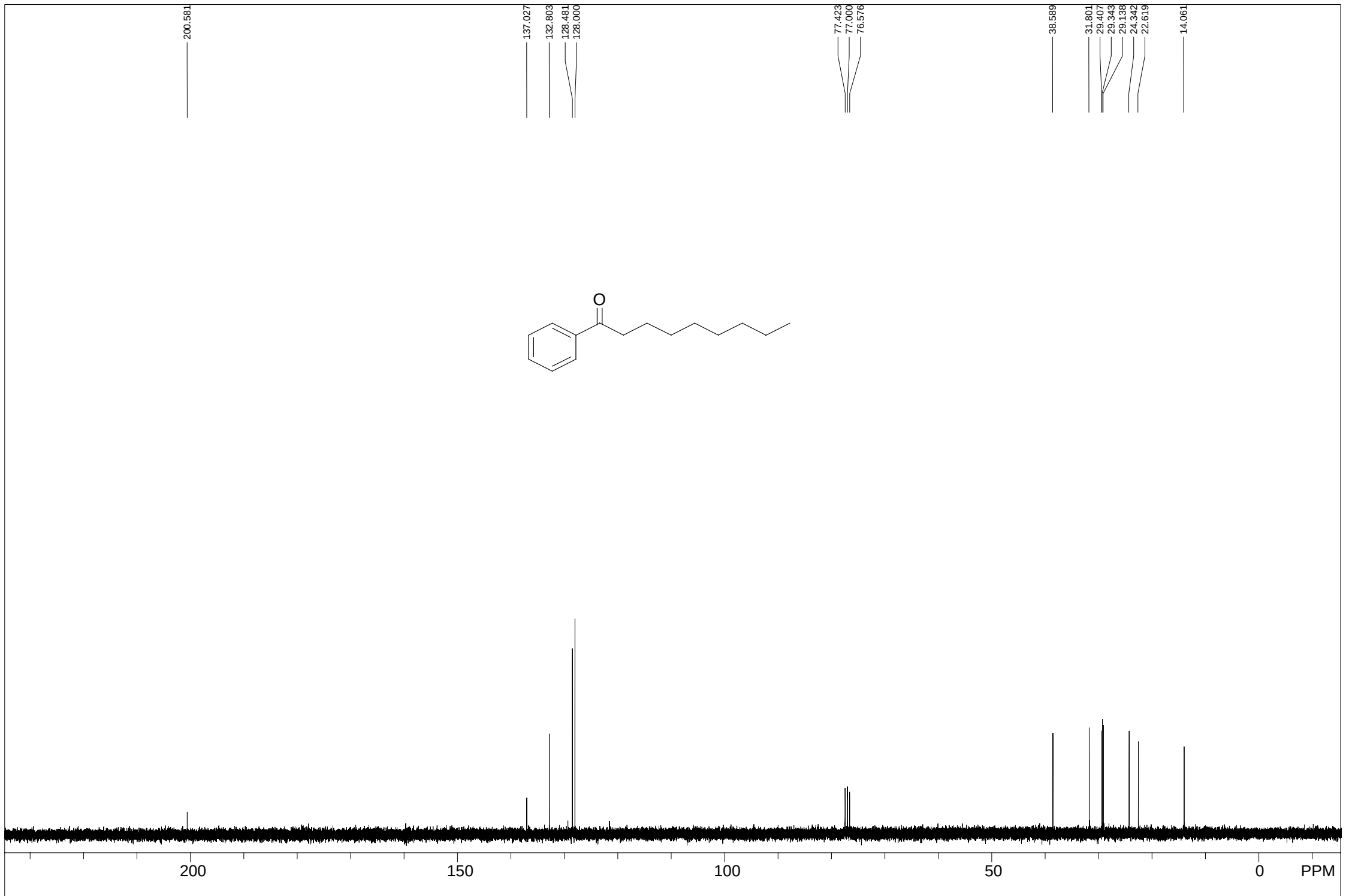
USER: -- DATE: Jun 3 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8277.1		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 60	LB: 0.0		WinNuts - $wdh-6-39-1c.fid



txf-7-14 USER: -- DATE: Jul 7 2003

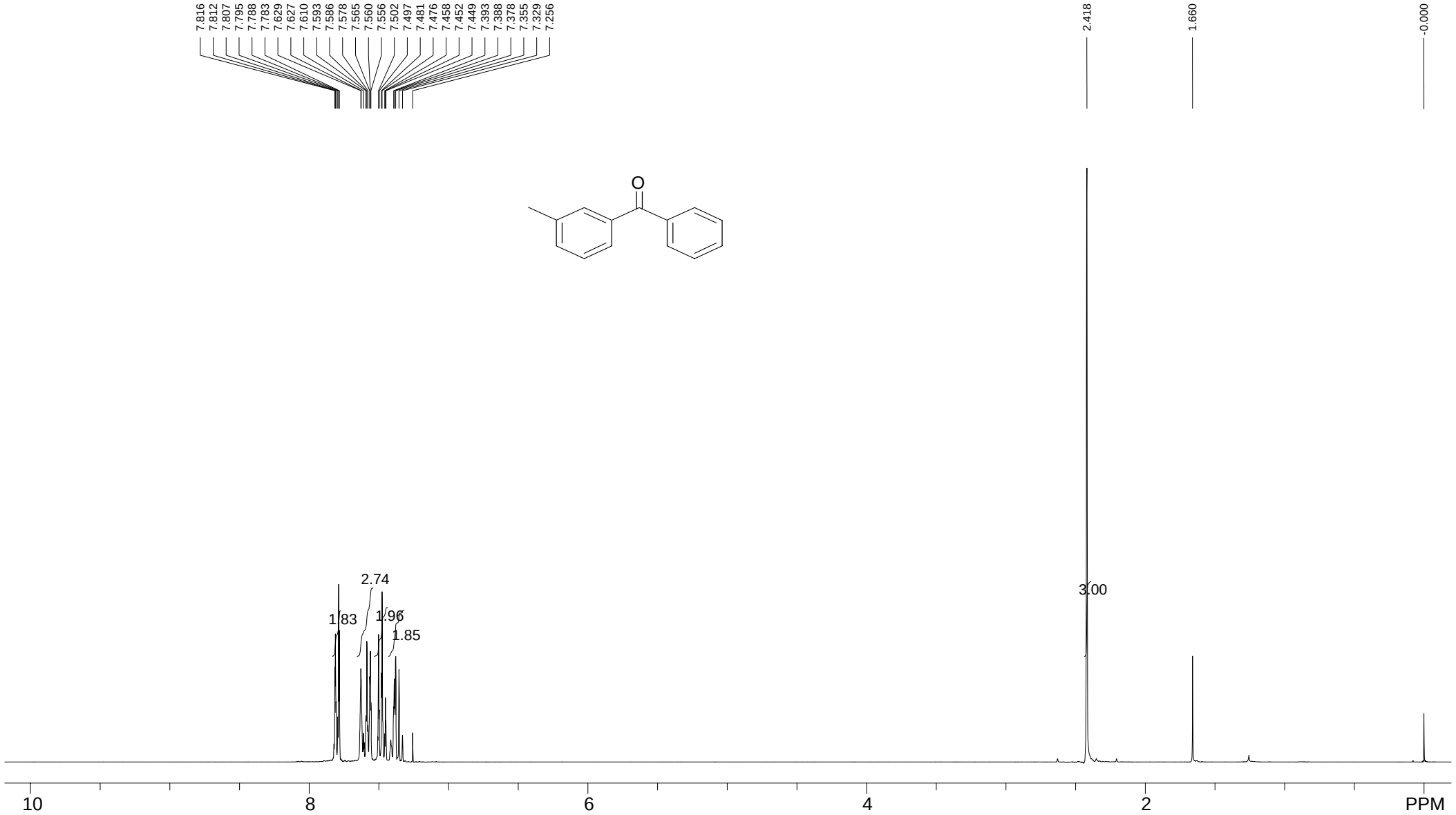
F1: 300.030	F2: 75.450	SW1: 5495		OF1: 1812.9		PTS1d: 16384	
EX: s2pul		PW: 3.8 usec	PD: 1.0 sec	NA: 8	LB: 0.0	WinNuts - $wdh-6-49-1-h.fid	

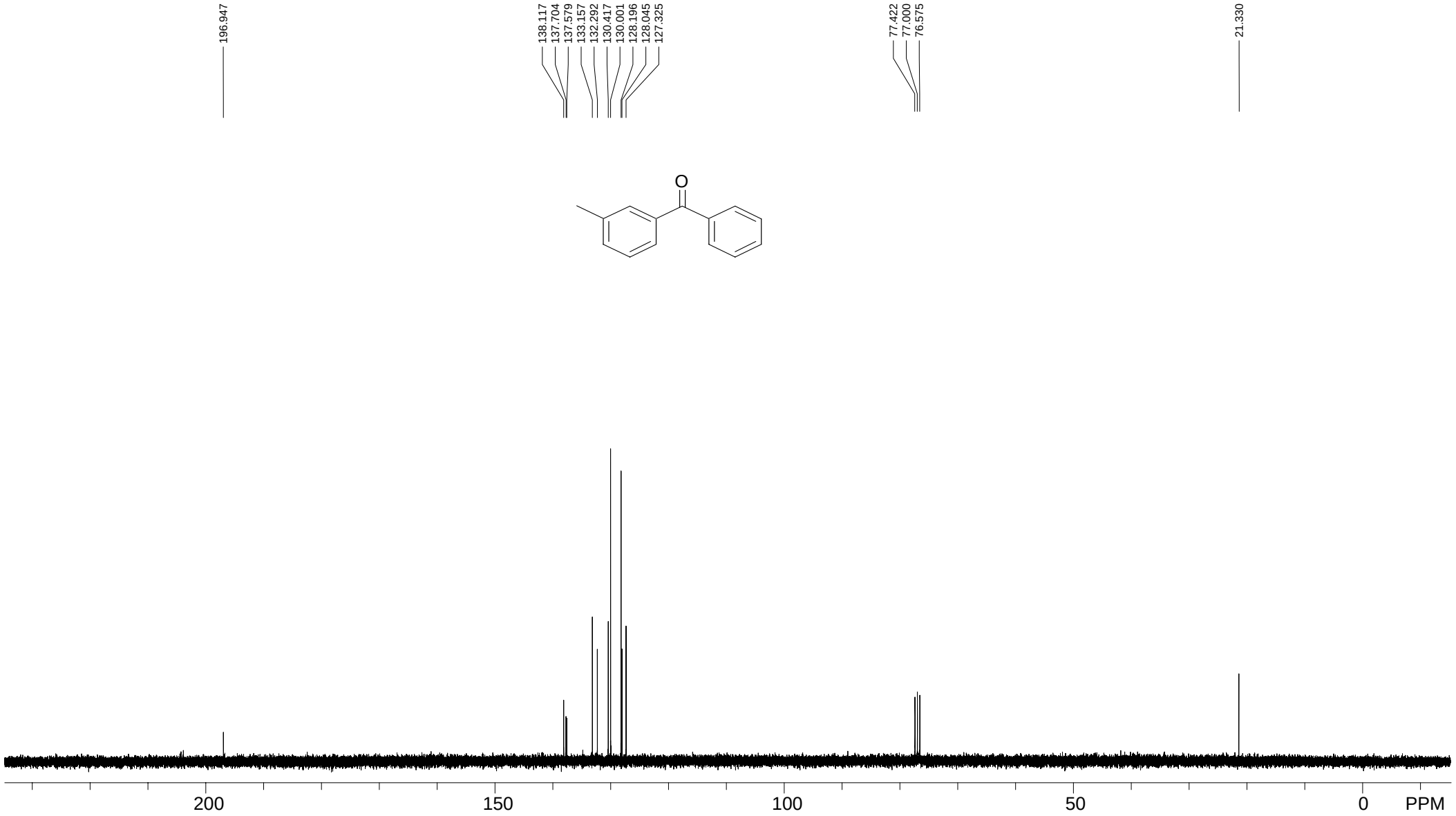


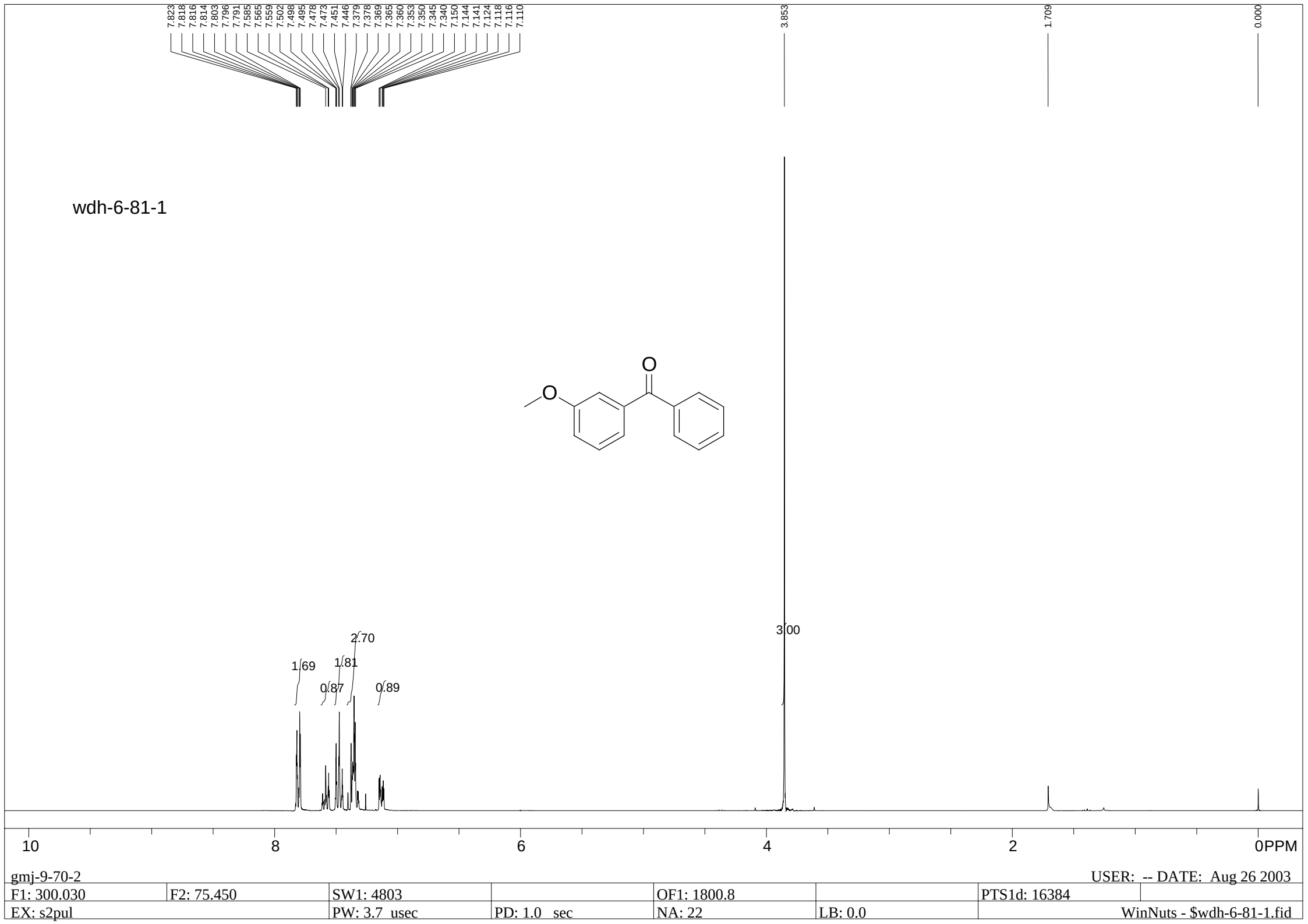
zgg-7-73c

USER: -- DATE: Jul 7 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8278.7		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 20	LB: 0.0		WinNuts - $wdh-6-49-1-c.fid

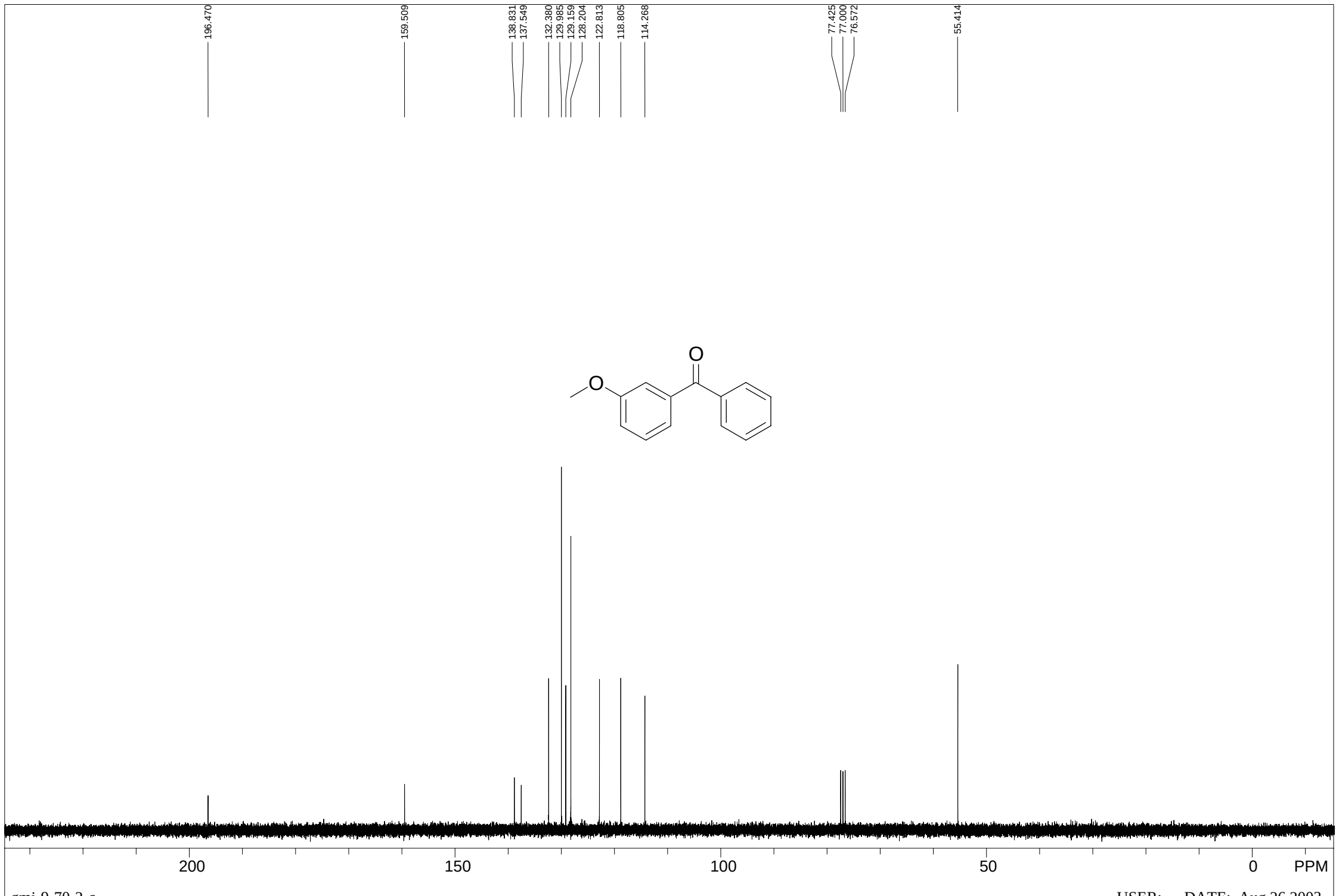

7.816
7.812
7.807
7.795
7.788
7.783
7.629
7.627
7.610
7.593
7.586
7.578
7.565
7.560
7.556
7.502
7.497
7.481
7.476
7.458
7.452
7.449
7.393
7.388
7.378
7.355
7.329
7.256
2.418
1.660
-0.000
O
2.74
1.83
1.96
1.85
3.00
10
8
6
4
2
PPM


196.947
138.117
137.704
137.579
133.157
132.292
130.417
130.001
128.196
128.045
127.325
77.422
77.000
76.575
21.330
O
200
150
100
50
0
PPM



gmj-9-70-2 USER: -- DATE: Aug 26 2003

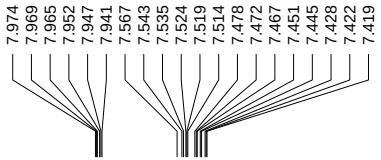
F1: 300.030	F2: 75.450	SW1: 4803		OF1: 1800.8		PTS1d: 16384	
EX: s2pul		PW: 3.7 usec	PD: 1.0 sec	NA: 22	LB: 0.0	WinNuts - $wdh-6-81-1.fid	

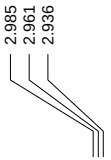


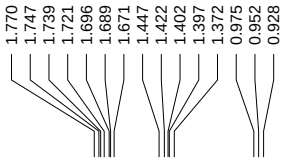
gmj-9-70-2-c

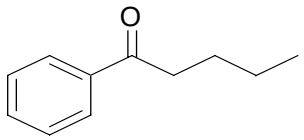
USER: -- DATE: Aug 26 2003

F1: 75.450	F2: 300.029	SW1: 18868		OF1: 8278.2		PTS1d: 65536	
EX: s2pul		PW: 4.2 usec	PD: 1.0 sec	NA: 44	LB: 0.0	WinNuts - $wdh-6-81-1-C.fid	

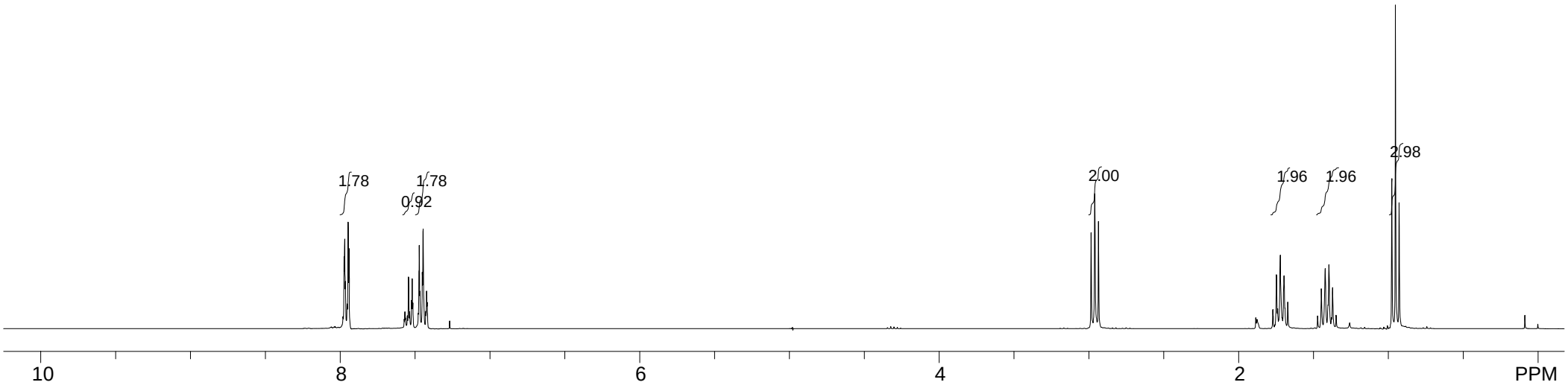

7.974
7.969
7.965
7.952
7.947
7.941
7.567
7.543
7.535
7.524
7.519
7.514
7.478
7.472
7.467
7.451
7.445
7.428
7.422
7.419


2.985
2.961
2.936


1.770
1.747
1.739
1.721
1.696
1.689
1.671
1.447
1.422
1.402
1.397
1.372
0.975
0.952
0.928


O

3t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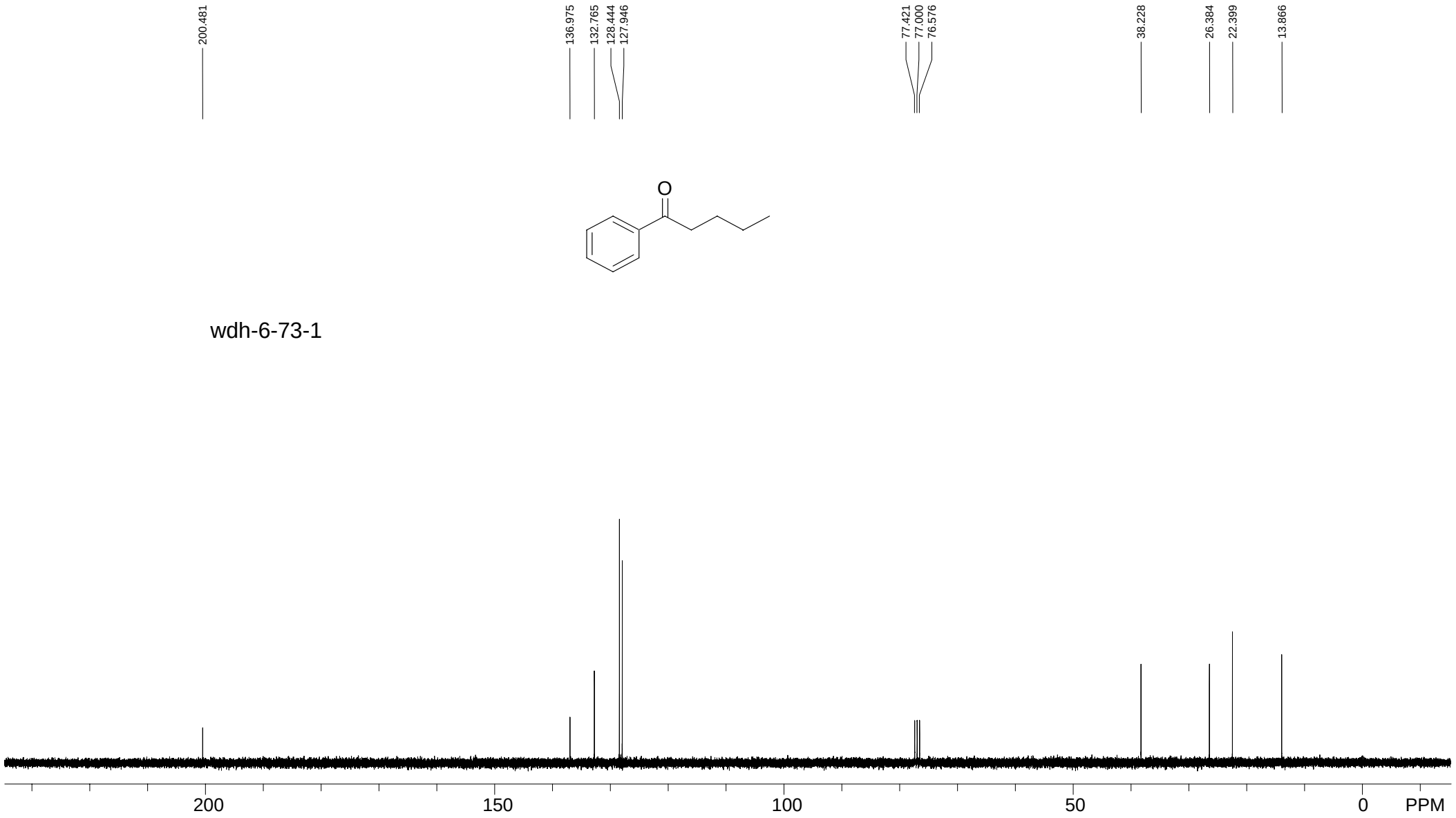
1.96
2.98
10
8
6
4
2
PPM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127.946
77.421
77.000
76.576
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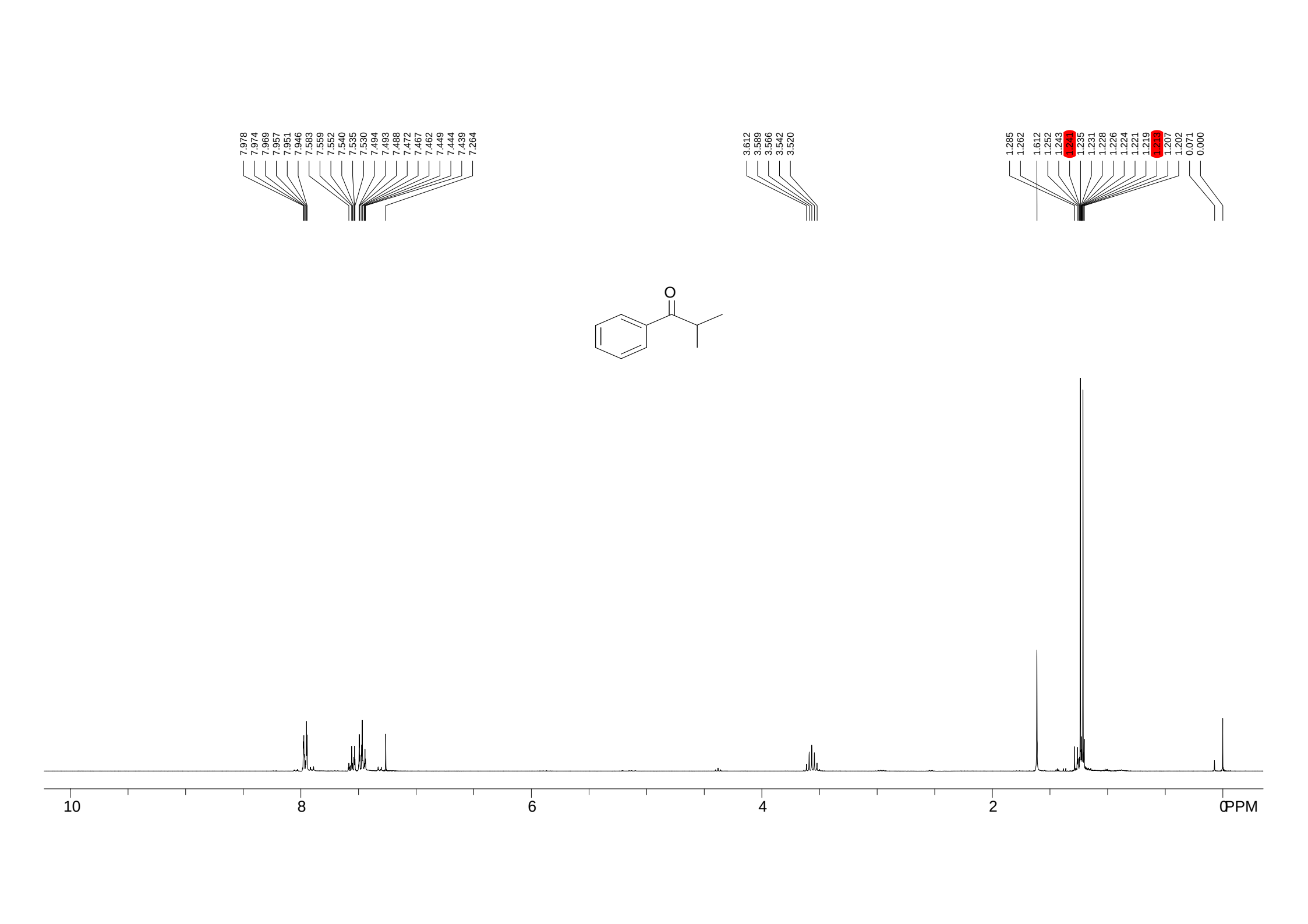
26.384
22.399
13.866
O
wdh-6-73-1
200
150
100
50
0
PPM


7.978
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7.969
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7.951
7.946
7.583
7.559
7.552
7.540
7.535
7.530
7.494
7.493
7.488
7.472
7.467
7.462
7.449
7.444
7.439
7.264
3.612
3.589
3.566
3.542
3.520
1.285
1.262
1.612
1.252
1.243
1.241
1.235
1.231
1.228
1.226
1.224
1.221
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1.202
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0.000
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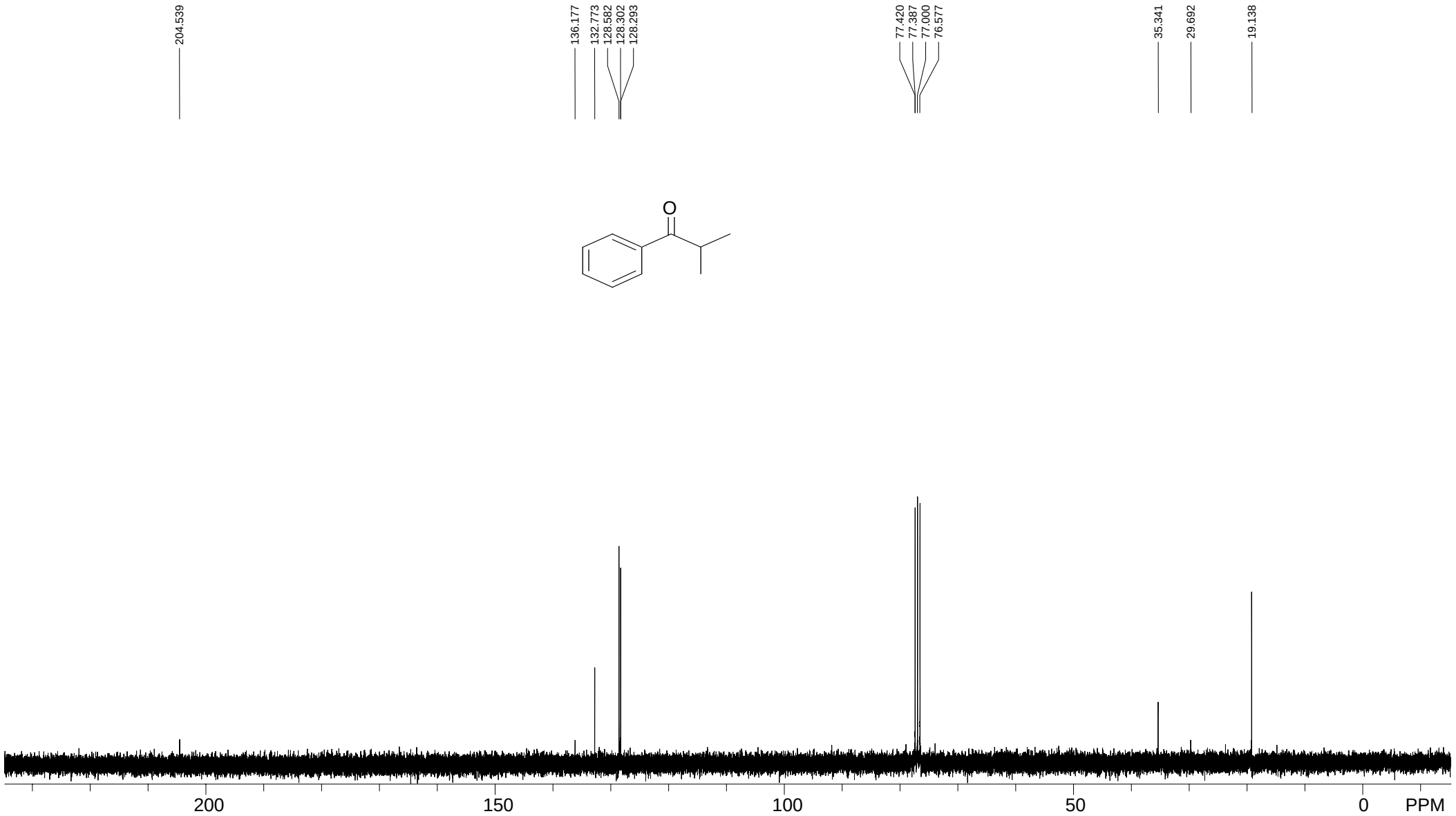
10
8
6
4
2
0
PPM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128.293
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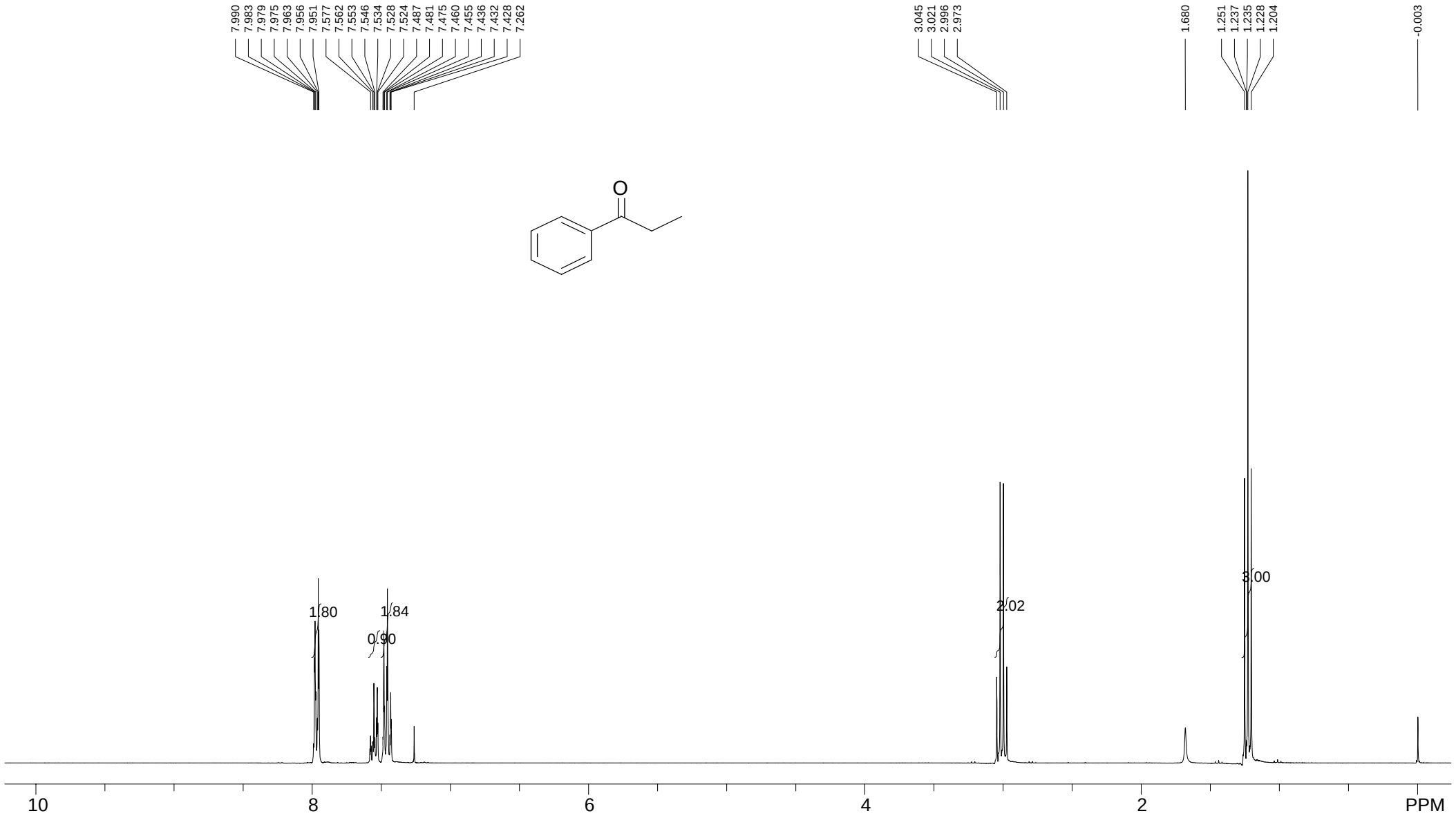
77.387
77.000
76.577
35.341
29.692
19.138
O
200
150
100
50
0
PPM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7.979
7.975
7.963
7.956
7.951
7.577
7.562
7.553
7.546
7.534
7.528
7.524
7.487
7.481
7.475
7.460
7.455
7.436
7.432
7.428
7.262
3.045
3.021
2.996
2.973
1.680
1.251
1.237
1.235
1.228
1.204
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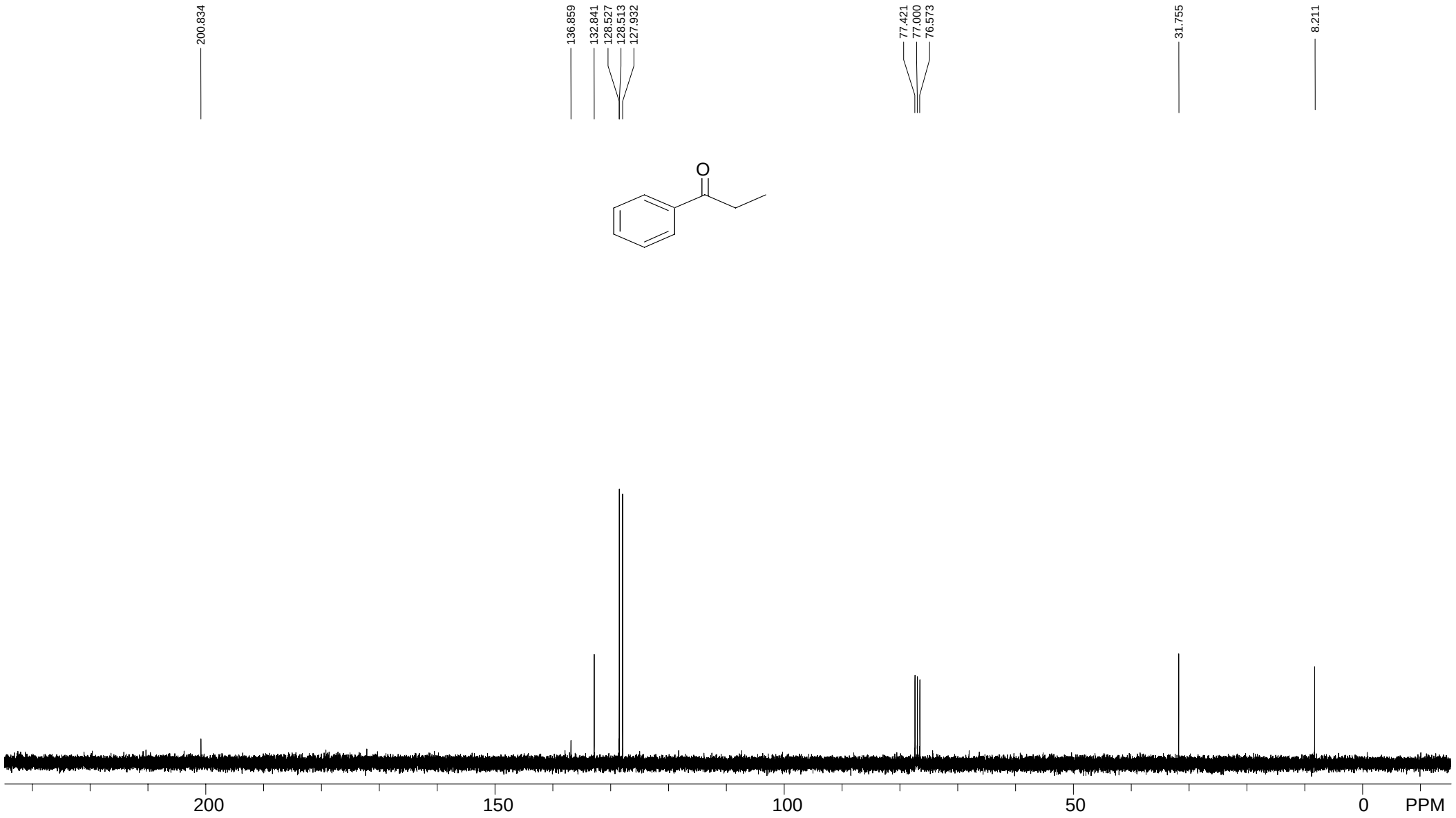
O
1.80
0.90
1.84
2.02
3.00
10
8
6
4
2
PPM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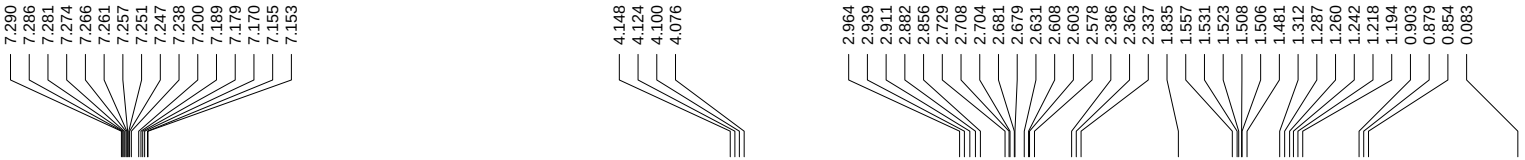
128.513
127.932
77.421
77.000
76.573
31.755
8.211
O
200
150
100
50
0
PPM


7.290
7.286
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7.266
7.261
7.257
7.251
7.247
7.238
7.200
7.189
7.179
7.170
7.155
7.153
4.148
4.124
4.100
4.076
2.964
2.939
2.911
2.882
2.856
2.729
2.708
2.704
2.681
2.679
2.631
2.608
2.603
2.578
2.386
2.362
2.337
1.835
1.557
1.531
1.523
1.508
1.506
1.481
1.312
1.287
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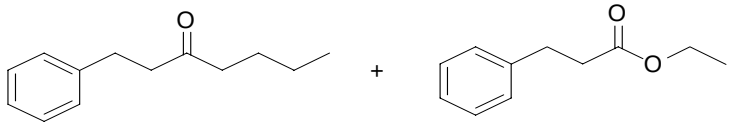
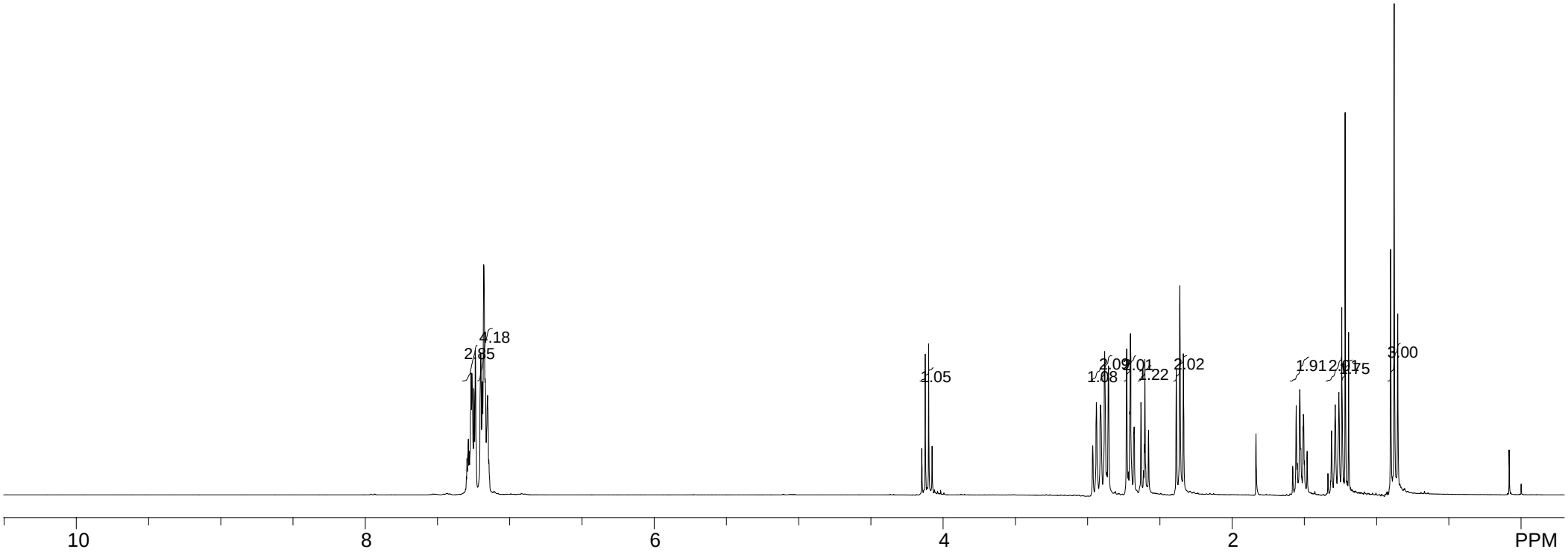
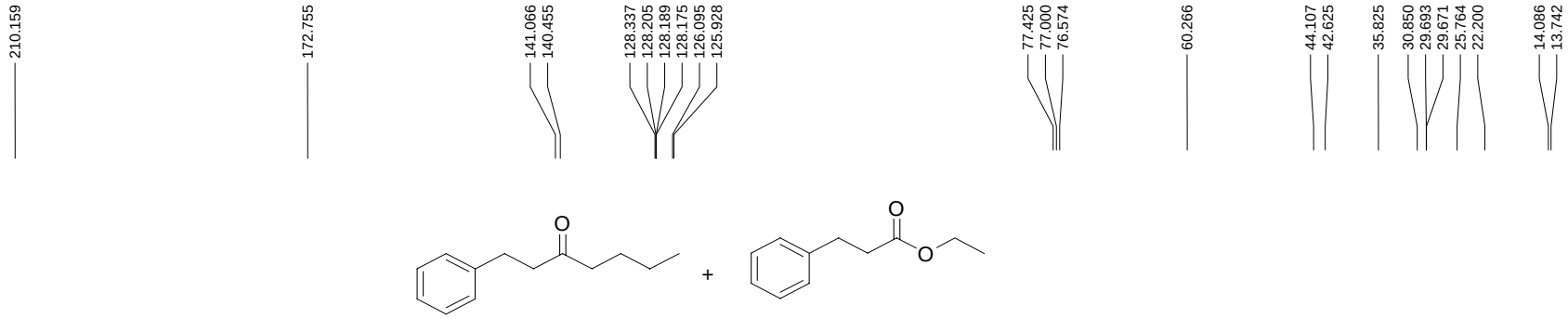
1.242
1.218
1.194
0.903
0.879
0.854
0.083

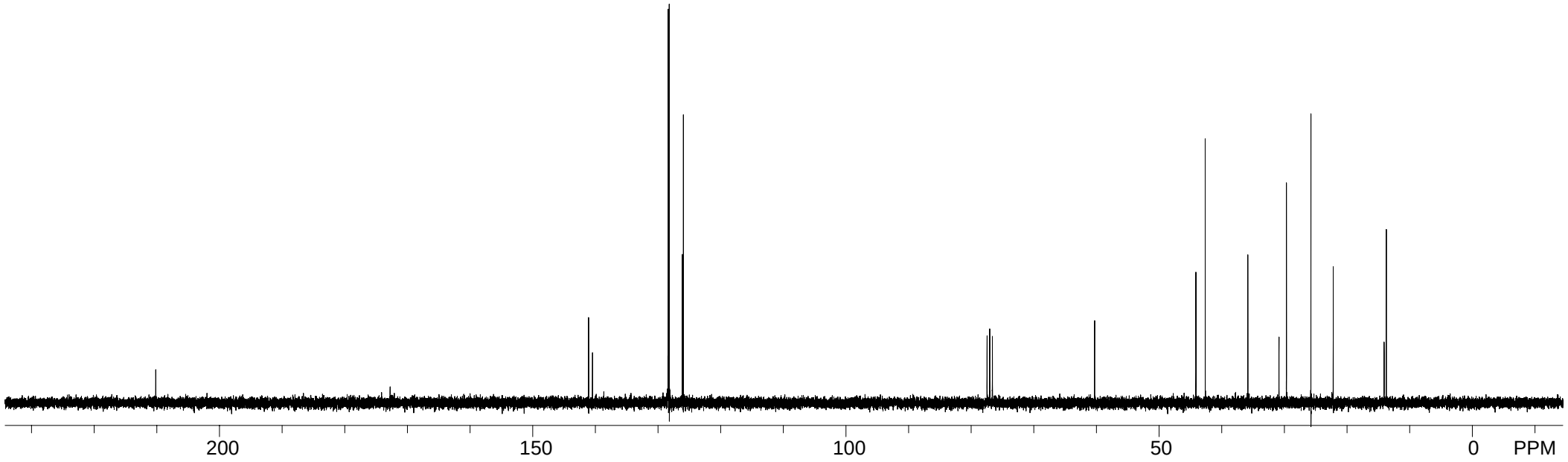

O
+
O
O

wdh-6-97-1


4.18
2.85
2.05
2.09
2.01
1.08
1.22
2.02
1.91
2.17
3.00
10
8
6
4
2
PPM


210.159
172.755
141.066
140.455
128.337
128.205
128.189
128.175
126.095
125.928
77.425
77.000
76.574
60.266
44.107
42.625
35.825
30.850
29.693
29.671
25.764
22.200
14.086
13.742
O
+
O
O

wdh-6-97-1-C


200
150
100
50
0
PPM