Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

List of Contents

(A) Materials and equipment

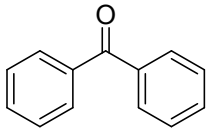
Reagents were obtained commercially and used as received. Solvents were purified and dried by standard methods. ^{1}H NMR spectra were recorded on a Bruker-400 NMR spectrometer using TMS as an internal standard. Chemical shift values (δ) are given in ppm. Coupling constants (J) were measured in Hz. GC-MS analyses were performed on a SHIMADZU QP2010. High Resolution mass spectrometer (HRMS) spectra were recorded on a Bruker micrOTOF-Q II analyzer. 200-300 mesh silica gel was used for column chromatography.

(B) Typical experimental procedure

Typical Experimental Procedure for the Synthesis of ketones

An oven-dried Schlenk tube was charged with a magnetic stir-bar, 1,2-diarylalkynes **1** (0.5 mmol), aniline (0.6 mmol), K_2CO_3 (0.5 mmol), $Cu(OAc)_2$ (0.075 mmol), DMSO (3 mL), The tube was sealed, and oxygen was purged through syringe. Reaction was stirred at 120 ˚C for 16-18 h. After the reaction was finished, the reaction mixture was diluted in 30 mL ethyl acetate, filtered on celite pad. The organic portion was washed with a saturated solution of brine (8 mL), saturated NH_4Cl (8 mL), a saturated solution of brine (8 mL), dried (Na_2SO_4) and concentrated in vacuum, and the resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to afford the desired products **2**.

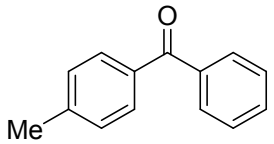
(C) Analytical data



2a

Benzophenone (2a): [1]

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.83 (dd, J = 8.0 Hz, J = 1.6 Hz, 4H), 7.61-7,56 (m, 2H), 7.51-7.45 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.7, 137.8, 132.5, 130.2, 128.4; IR (neat cm^{-1}): 1660 (C=O); LRMS (EI 70 ev) *m/z* (%): 182 (M^+, 100); HRMS m/z (ESI) calcd for $C_{13}H_{11}O$ $(M+H)^+$ 183.0804, found 183.0801.

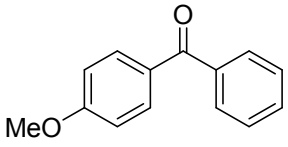


2b

Phenyl(p-tolyl)methanone (2b): [1]

^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.79 (d, J = 7.2 Hz, 2H), 7.73 (d, J = 8.0 Hz, 2H), 7.59 (t, J = 7.4

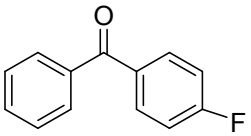
Hz, 1H), 7.48 (t, J = 7.6 Hz, 2H), 7.28 (d, J = 8.0 Hz, 2H), 2.43 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.4, 143.2, 137.9, 134.8, 132.1, 130.2, 129.8, 128.9, 128.1, 21.6; IR (neat cm^{-1}): 1658 (C=O); LRMS (EI 70 ev) *m/z* (%): 196 (M^+, 100); HRMS m/z (ESI) calcd for $C_{14}H_{13}O$ $(M+H)^+$ 197.0960, found 197.0963.



2c

(4-Methoxyphenyl)(phenyl)methanone (2c): [1]

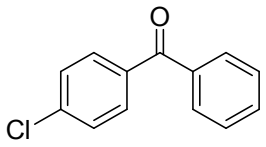
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80 (d, J = 8.4 Hz, 2H), 7.73 (d, J = 8.0 Hz, 2H), 7.51-7.45 (m, 3H), 6.96 (d, J = 8.4 Hz, 2H), 3.91 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 197.1, 163.2, 138.2, 132.4, 131.7, 130.0, 129.5, 128.2, 113.6, 55.8; IR (neat cm^{-1}): 1652 (C=O); LRMS (EI 70 ev) *m/z* (%): 212 (M^+, 100); HRMS m/z (ESI) calcd for $C_{14}H_{13}O_2$ $(M+H)^+$ 213.0909, found 213.0913.



2d

(4-Florophenyl)(phenyl)methanone (2d): [1]

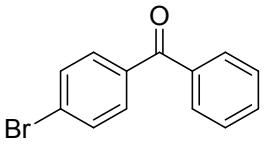
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.86-7.83 (m, 2H), 7.78 (d, J = 4.2 Hz, 2H), 7.62 (dd, J = 7.2 Hz, J = 1.2 Hz, 1H), 7.51 (t, J = 7.6 Hz, 2H), 7.18 (t, J = 8.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.5, 165.5, 162.9, 137.6, 132.7, 132.7, 132.6, 132.4, 132.0, 129.8, 128.3, 115.5, 115.3; IR (neat cm^{-1}): 1661 (C=O); LRMS (EI 70 ev) *m/z* (%): 200 (M^+, 100); HRMS m/z (ESI) calcd for $C_{13}H_{10}FO$ $(M+H)^+$ 201.0710, found 201.0719.



2e

(4-Chlorophenyl)(phenyl)methanone (2e): [1]

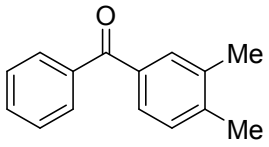
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.78 (t, J = 7.2 Hz, 4H), 7.62 (t, J = 7.4 Hz, 1H), 7.50 (dd, J = 7.6 Hz, J = 8.4 Hz, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.4, 138.8, 137.2, 135.8, 132.6, 131.4, 129.9, 128.6, 128.3; IR (neat cm^{-1}): 1664 (C=O); LRMS (EI 70 ev) *m/z* (%): 218 (41), 216 (M^+, 100); HRMS m/z (ESI) calcd for $C_{13}H_{10}ClO$ $(M+H)^+$ 217.0415, found 217.0410.



2f

(4-Bromophenyl)(phenyl)methanone (2f): [1]

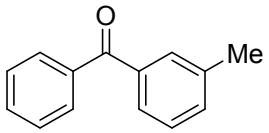
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.78 (t, J = 4.2 Hz, 2H), 7.69 (dd, J = 2.0 Hz, J = 2.0 Hz, 2H), 7.64-7.58 (m, 3H), 7.51 (t, J = 7.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.6, 137.1, 136.3, 132.6, 131.6, 131.5, 129.9, 128.4, 127.5; IR (neat cm^{-1}): 1659 (C=O); LRMS (EI 70 ev) *m/z* (%): 260 (M^+, 100), 258 (81); HRMS m/z (ESI) calcd for $C_{13}H_{10}BrO$ $(M+H)^+$ 260.9909, found 260.9913.



2g

(3,4-Dimethylphenyl)(phenyl)methanone (2g): [2]

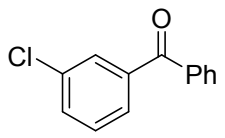
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.79 (t, J = 4.2 Hz, 2H), 7.61 (s, 1H), 7.59-7.52 (m, 2H), 7.49 (t, J = 7.6 Hz, 2H), 7.23 (d, J = 7.6 Hz, 1H), 2.35 (s, 3H), 2.32 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.3, 141.9, 138.0, 136.7, 135.3, 132.0, 131.1, 129.9, 129.4, 128.1, 128.0, 20.0, 19.7; IR (neat cm^{-1}): 1661 (C=O); LRMS (EI 70 ev) *m/z* (%): 210 (M^+, 100); HRMS m/z (ESI) calcd for $C_{15}H_{15}O$ $(M+H)^+$ 211.1116, found 211.1111.



2h

Phenyl(m-tolyl)methanone (2h): [3]

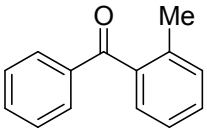
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.81 (dd, J = 1.2 Hz, J = 8.4 Hz, 2H), 7.62-7.57 (m, 3H), 7.46-7.40 (m, 2H), 7.38 (dd, J = 4.4 Hz, J = 4.4 Hz, 2H), 2.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.8, 138.1, 137.4, 137.1, 133.0, 132.1, 130.6, 130.1, 128.4, 128.0, 127.2, 21.3; IR (neat cm^{-1}): 1663 (C=O); LRMS (EI 70 ev) *m/z* (%): 196 (M^+, 100); HRMS m/z (ESI) calcd for $C_{14}H_{13}O$ $(M+H)^+$ 197.0960, found 197.0954.



2i

(3-Chlorophenyl)(phenyl)methanone (2i): [1]

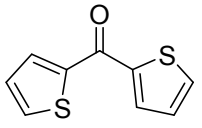
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80-7.71 (m, 3H), 7.68-7.65 (m, 1H), 7.63-7.59 (m, 1H), 7.56-7.54 (m, 1H), 7.51 (dd, J = 4.8 Hz, J = 4.0 Hz, 2H), 7.43 (dd, J = 6.0 Hz, J = 6.4 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 195.5, 139.4, 137.0, 135.2, 133.0, 132.6, 130.2, 130.0, 129.6, 128.4, 128.1; IR (neat cm^{-1}): 1657 (C=O); LRMS (EI 70 ev) *m/z* (%): 218 (36), 216 (M^+, 90); HRMS m/z (ESI) calcd for $C_{13}H_{10}ClO$ $(M+H)^+$ 217.0415, found 217.0421.



2j

Phenyl(o-tolyl)methanone (2j): [1]

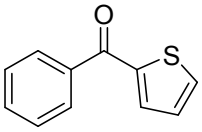
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.74 (d, J = 7.2 Hz, 2H), 7.54-7.50 (m, 1H), 7.43-7.36 (m, 2H), 7.33-7.26 (m, 1H), 7.25-7.20 (m, 3H); 2.33 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 198.5, 138.8, 138.1, 137.0, 133.5, 131.7, 130.6, 130.3, 129.0, 128.8, 125.4, 20.4; IR (neat cm^{-1}): 1647 (C=O); LRMS (EI 70 ev) *m/z* (%): 196 (M^+, 100); HRMS m/z (ESI) calcd for $C_{14}H_{13}O$ $(M+H)^+$ 197.0960, found 197.0961.



2k

Dithiophen-2-ylmethanone (2k): [4]

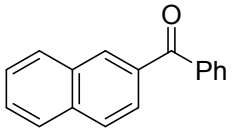
^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.08 (dd, J = 4.0 Hz, J = 1.2 Hz, 2H), 7.86 (dd, J = 4.8 Hz, J = 1.2 Hz, 2H), 7.22-7.17 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 182.8, 138.5, 137.3, 137.0, 128.6; 1631 (C=O); LRMS (EI 70 ev) *m/z* (%): 194 (M^+, 100); HRMS m/z (ESI) calcd for $C_9H_7OS_2$ $(M+H)^+$ 194.9932, found 194.9936.



2l

Phenyl(thiophen-2-yl)methanone (2l): [5]

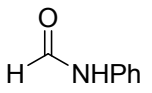
^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.87 (d, J = 7.6 Hz, 2H), 7.73 (d, J = 4.8 Hz, 1H), 7.65 (d, J = 3.6 Hz, 1H), 7.61 (t, J = 7.4 Hz, 1H), 7.51 (t, J = 7.8 Hz, 2H), 7.17 (t, J = 4.4 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 188.2, 143.6, 138.1, 134.8, 134.1, 132.2, 129.1, 128.3, 127.9; IR (neat cm^{-1}): 1638 (C=O); LRMS (EI 70 ev) *m/z* (%): 188 (M^+, 100); HRMS m/z (ESI) calcd for $C_{11}H_9OS$ $(M+H)^+$ 189.0368, found 189.0361.



2m

2-Naphthylphenone (2m): [6]

^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.26 (s, 1H), 7.95-7.91 (m, 4H), 7.87-7.84 (m, 2H), 7.65-7.60 (m, 2H), 7.57-7.50 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 196.5, 137.7, 135.2, 134.3, 132.3, 132.2, 131.7, 130.2, 129.2, 128.3, 128.1, 128.0, 127.5, 126.7, 125.4; IR (neat cm^{-1}): 1666 (C=O); LRMS (EI 70 ev) *m/z* (%): 232 (M^+, 100); HRMS m/z (ESI) calcd for $C_{17}H_{13}O$ $(M+H)^+$ 233.7973, found 233.7970.



E

N-phenylformamide (E) : [7]

^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.71 (d, J = 8.0 Hz, 1H), 8.40 (brs, 1H), 7.55-7.52 (m, 1H), 7.38-7.32 (m, 2H), 7.21 (t, J = 6.6 Hz, 1H), 7.12-7.08 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ: 162.5, 136.4, 129.7, 125.3, 118.6.

(D) References

1 M. Li, C. Wang and H. Ge, *Org. Lett.*, 2011, **13**, 2062.

2 K. P. Boroujeni, *Chin. Chem. Lett*. 2010, **21**, 1395.

3 M. Cai, G. Zheng, L. Zhang and J. Peng, *Eur. J. Org. Chem.*, 2009, **2009**, 1585.

4 A. Maji, S. Rana, Akanksha and D. Maiti, *Angew. Chem. Int. Ed.*, 2014, **53**, 2428.

5 B. Xin, Y. Zhang and K. Cheng, *J. Org. Chem.*, 2006, **71**, 5725.

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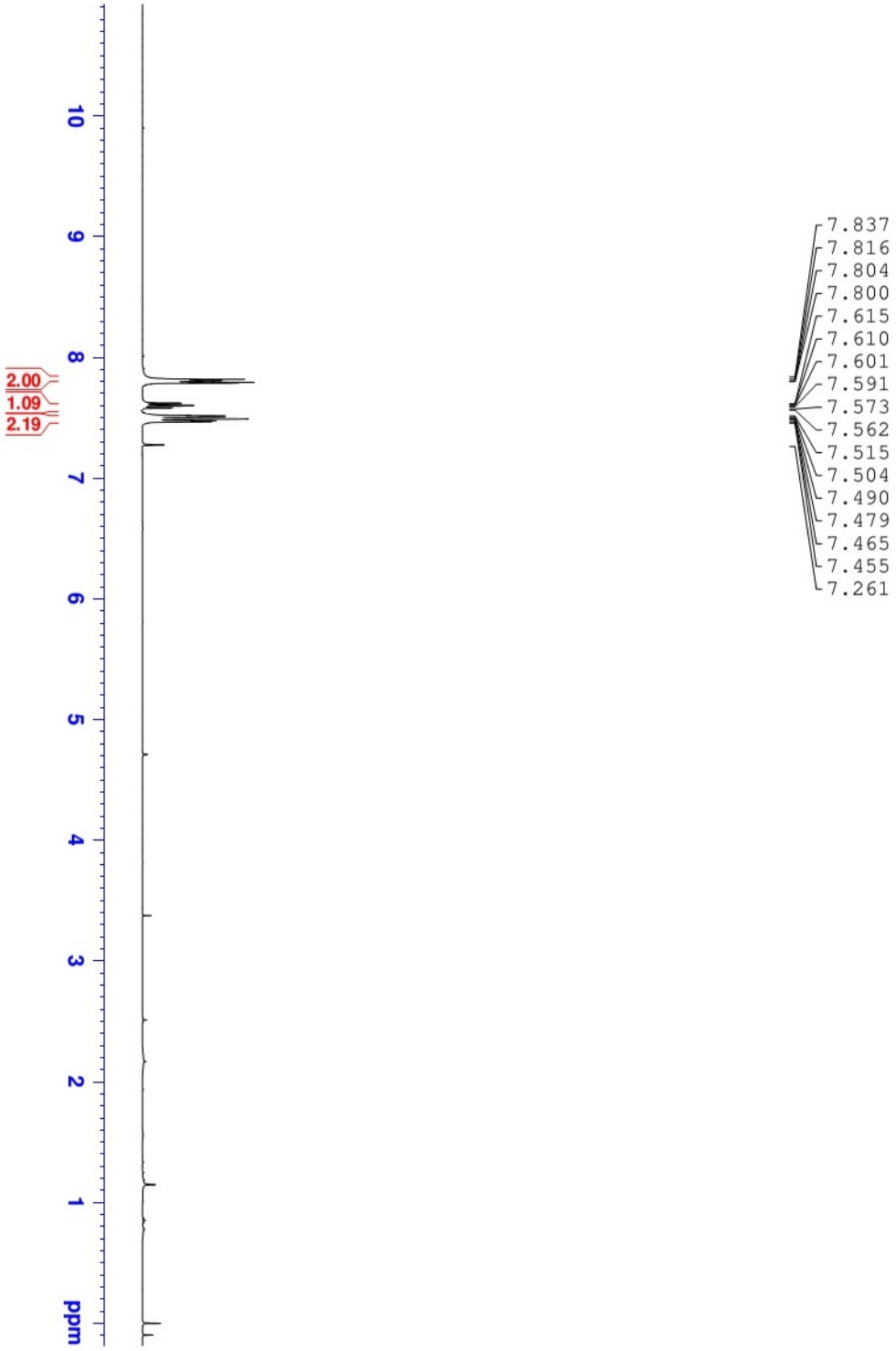
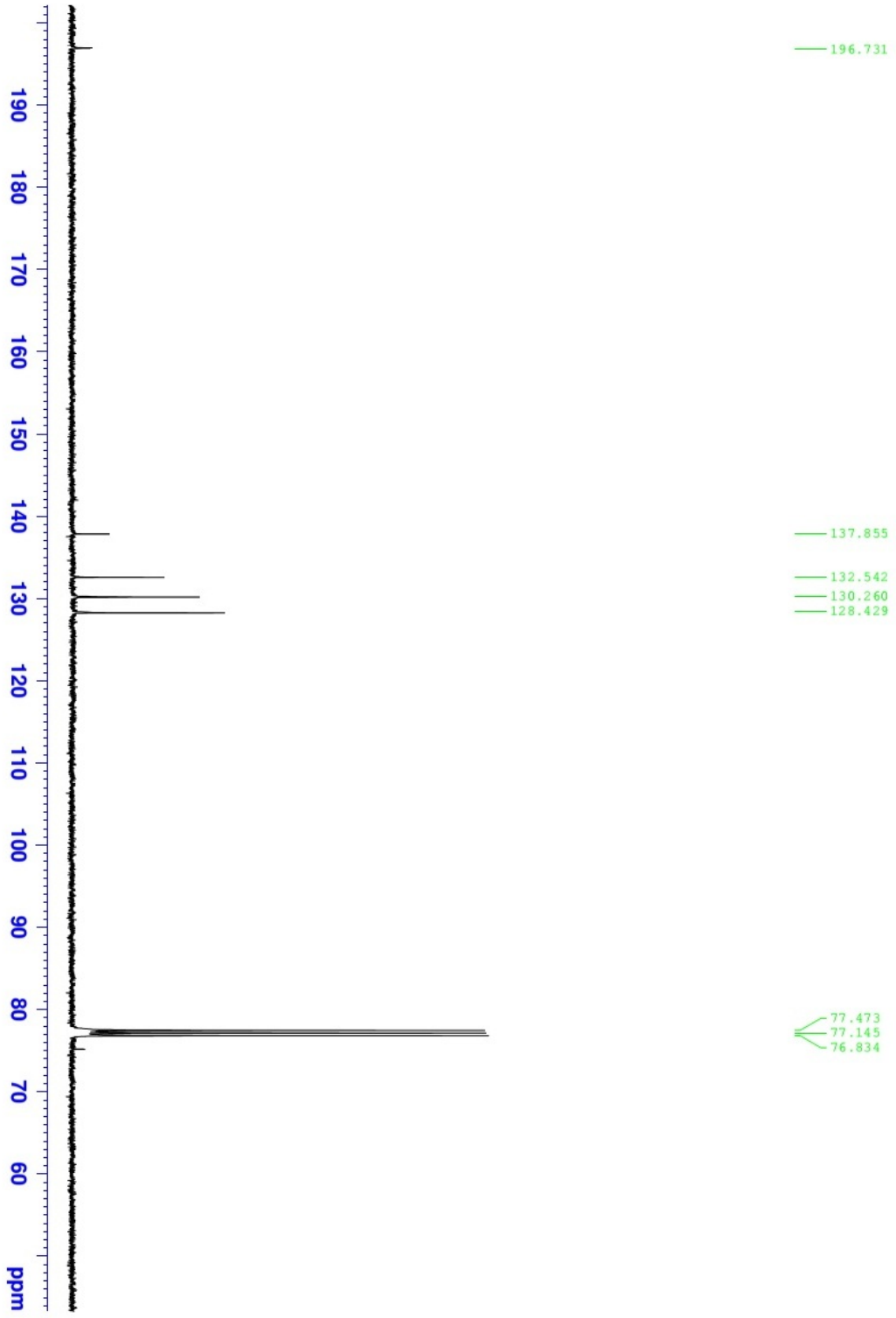
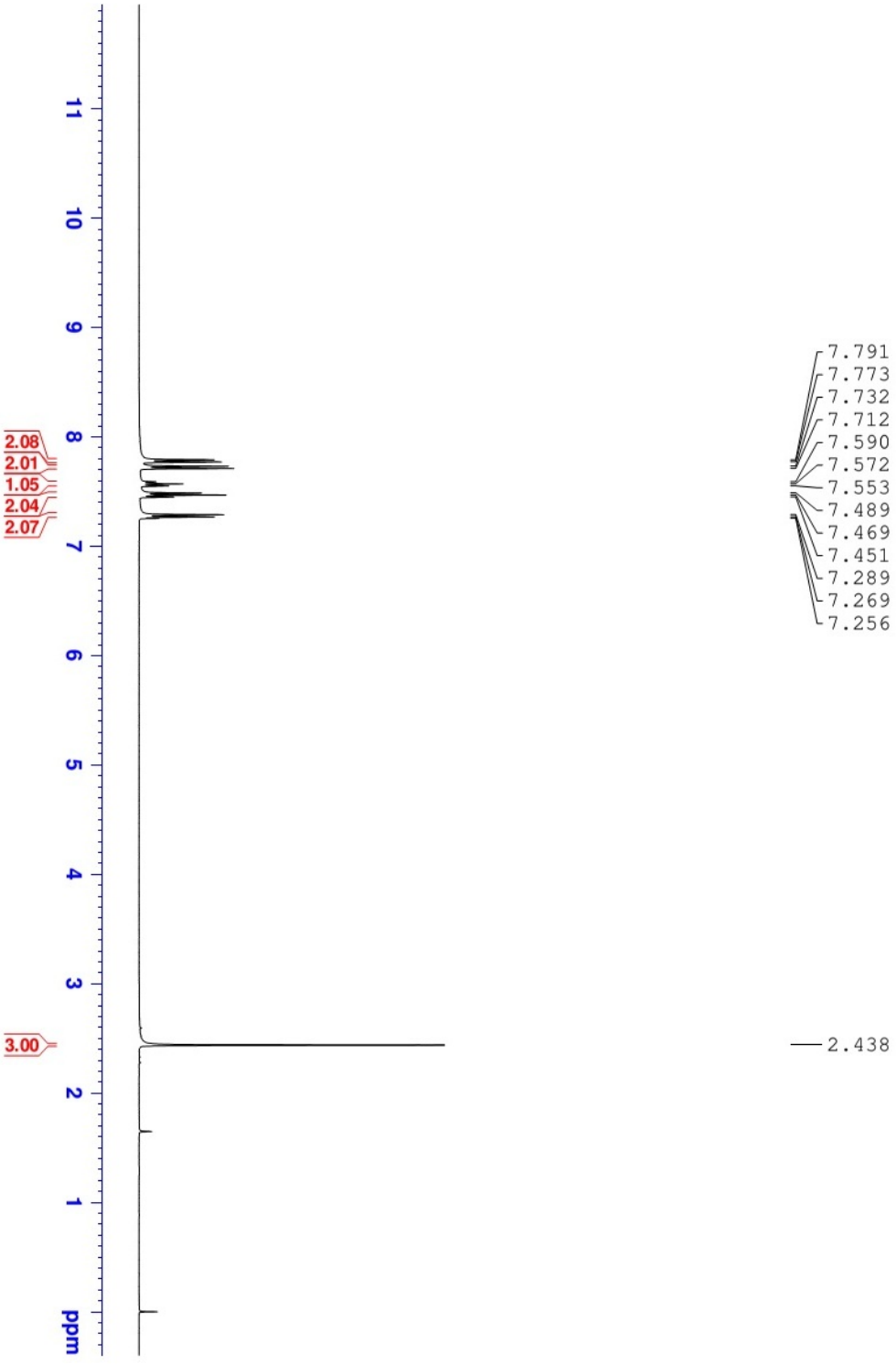
(E) Spectra



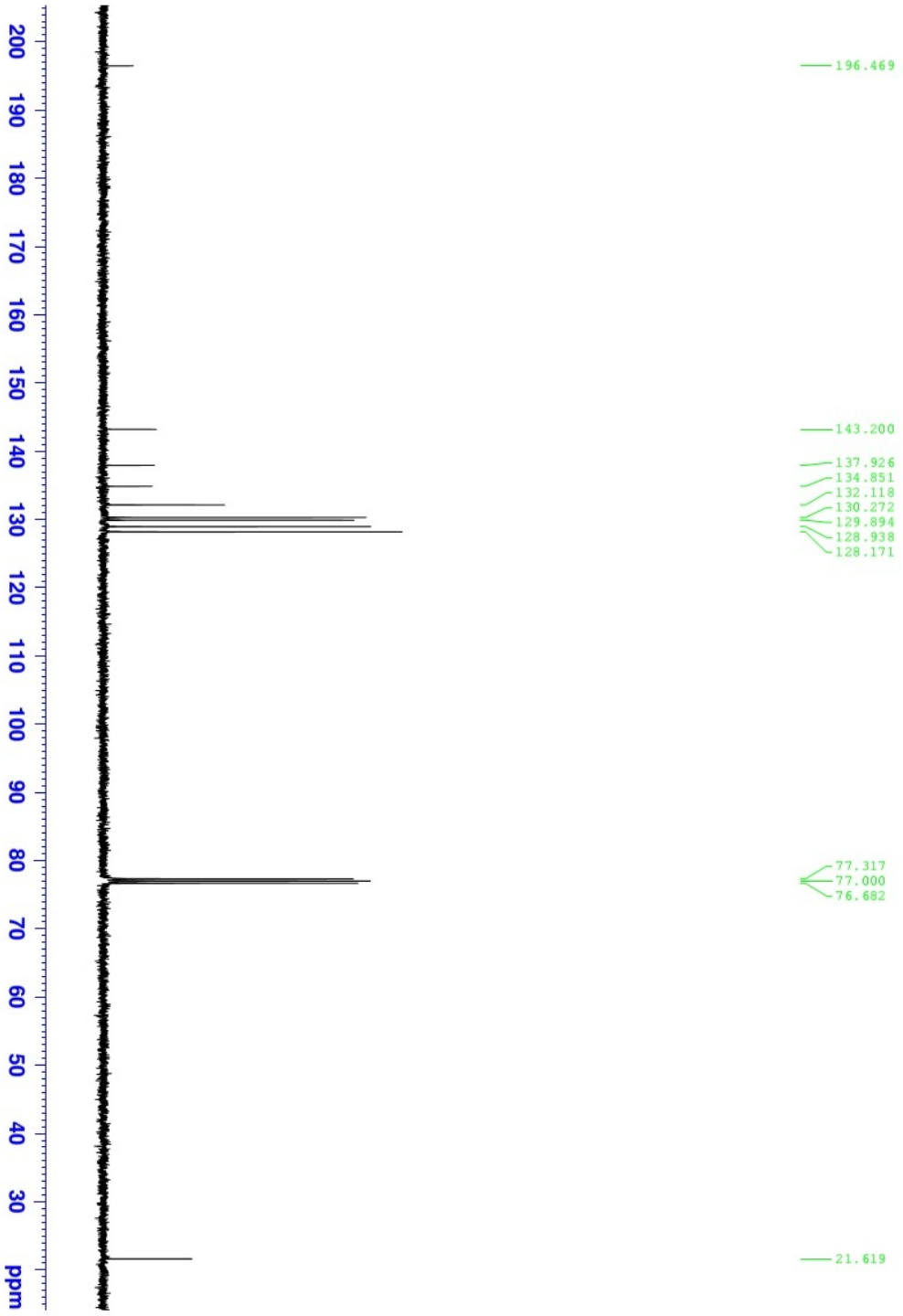
^{1}H NMR of Compound 2a



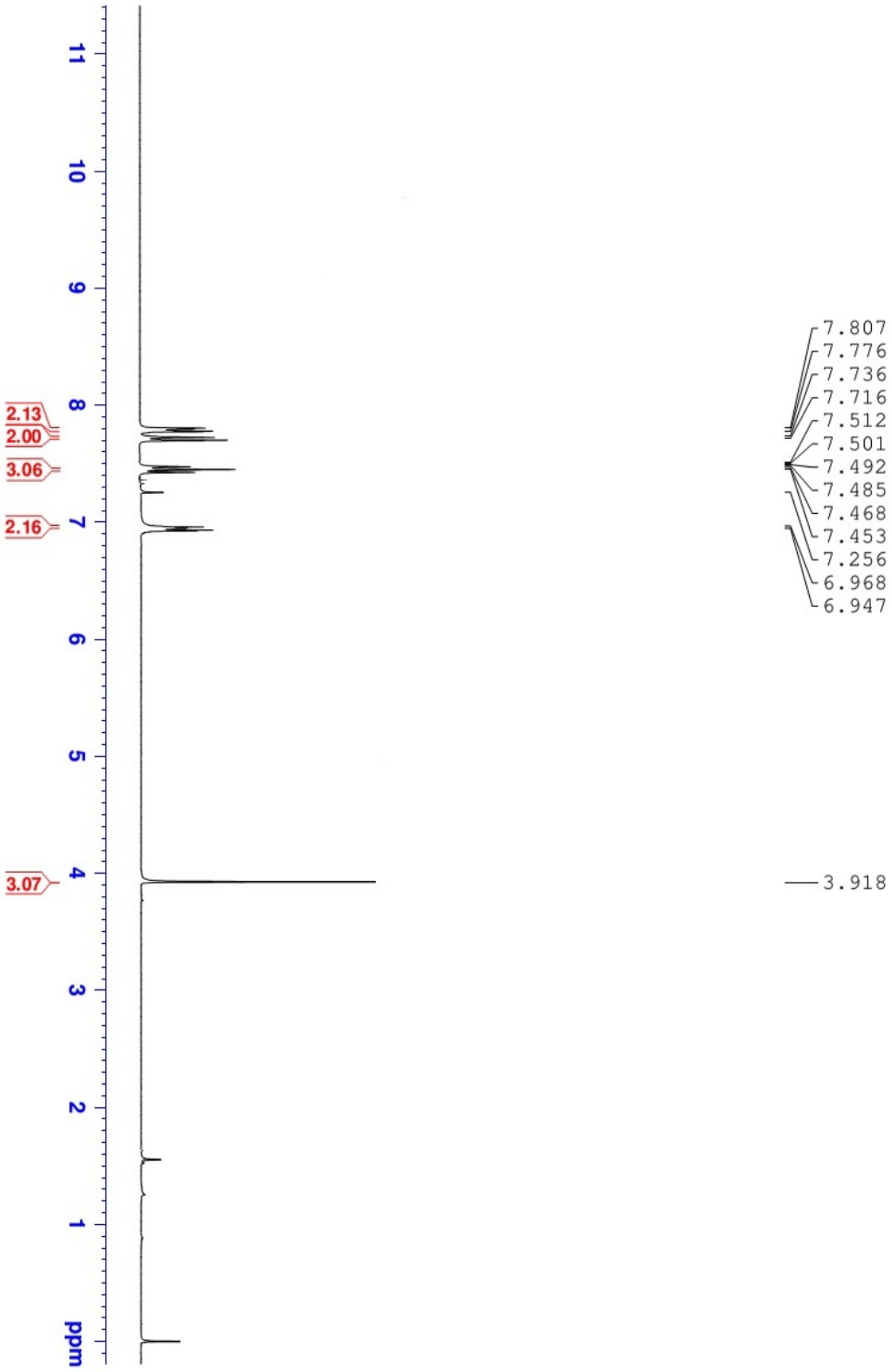
^{13}C NMR of Compound 2a



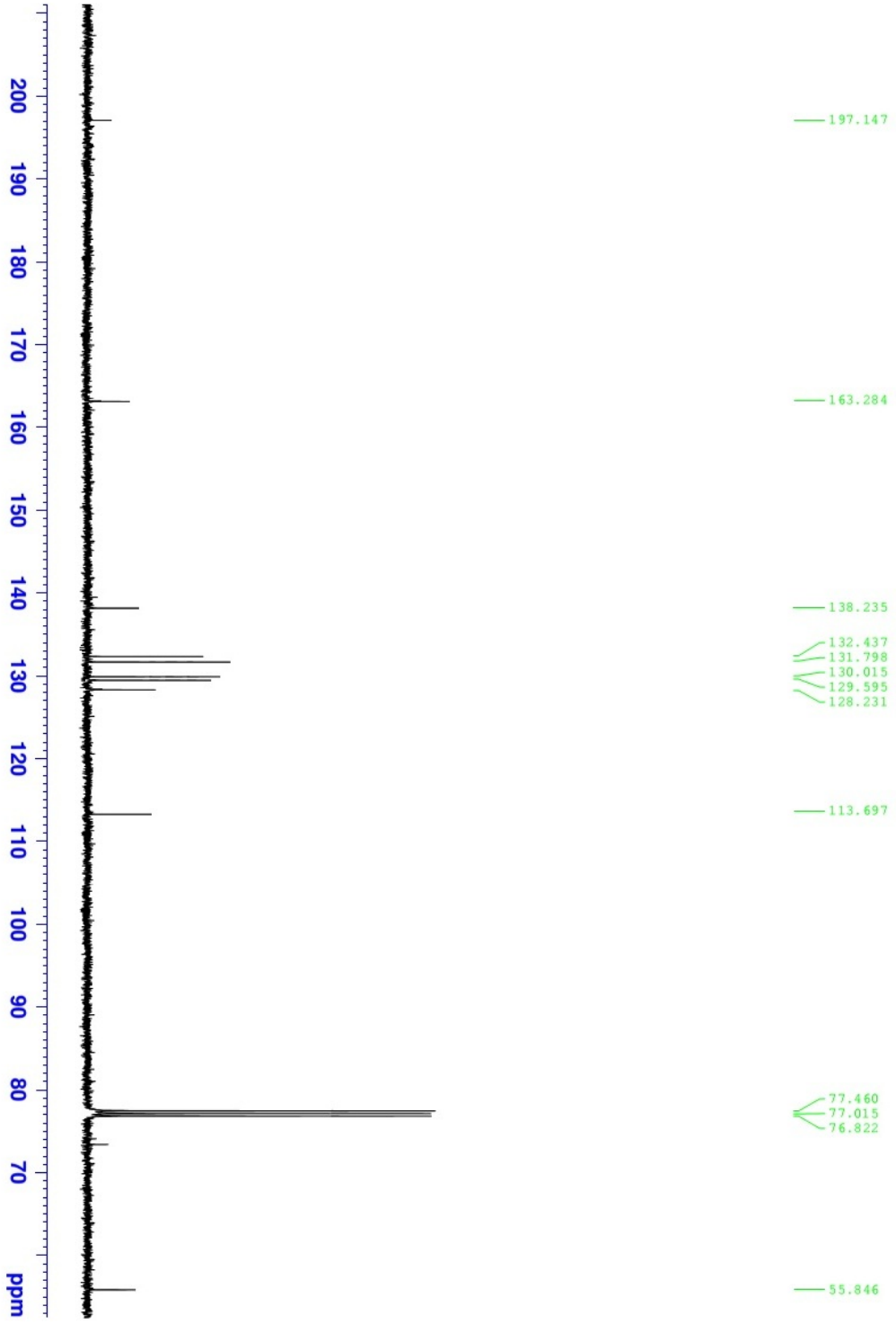
^{1}H NMR of Compound 2b



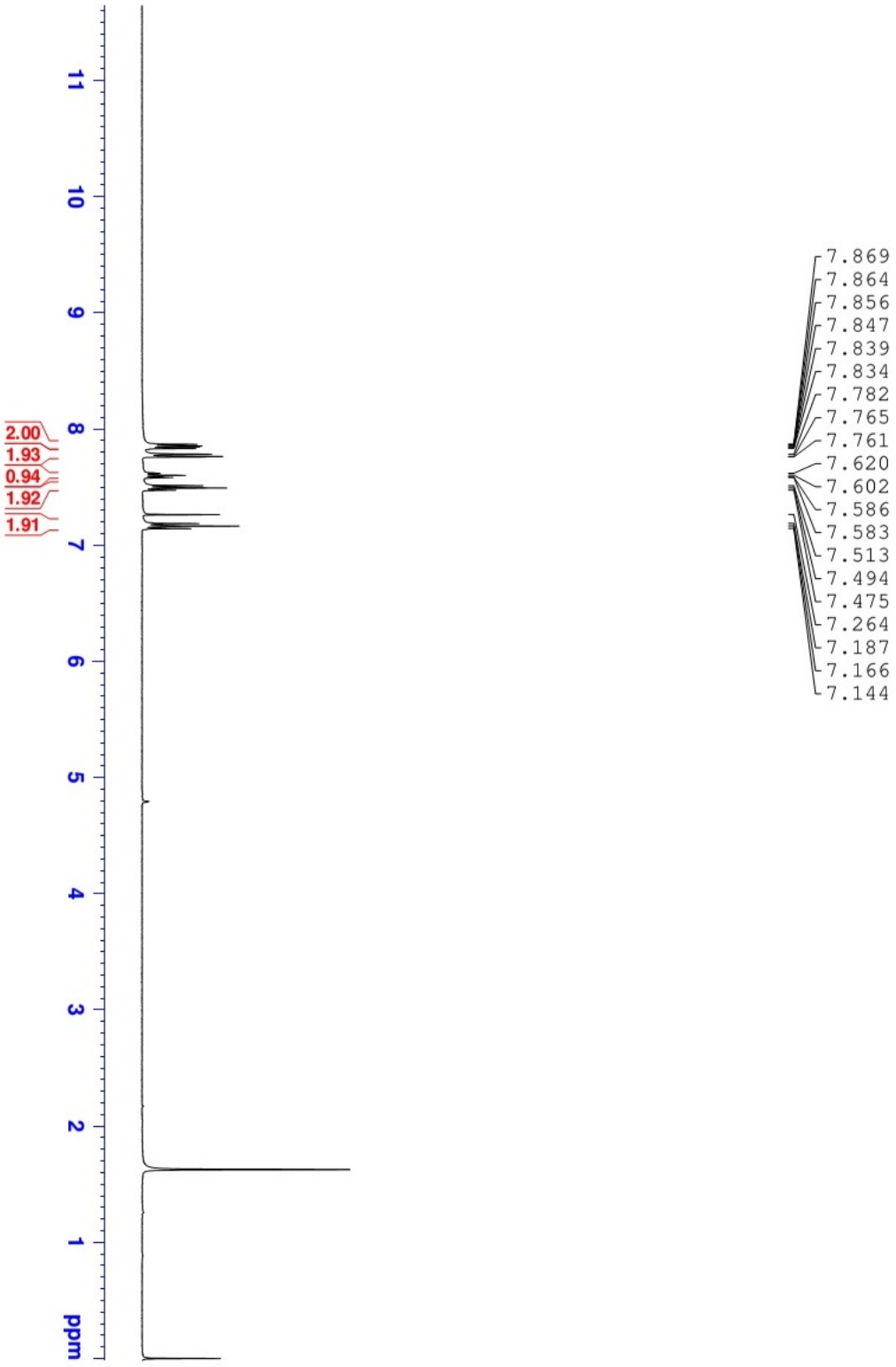
^{13}C NMR of Compound 2b



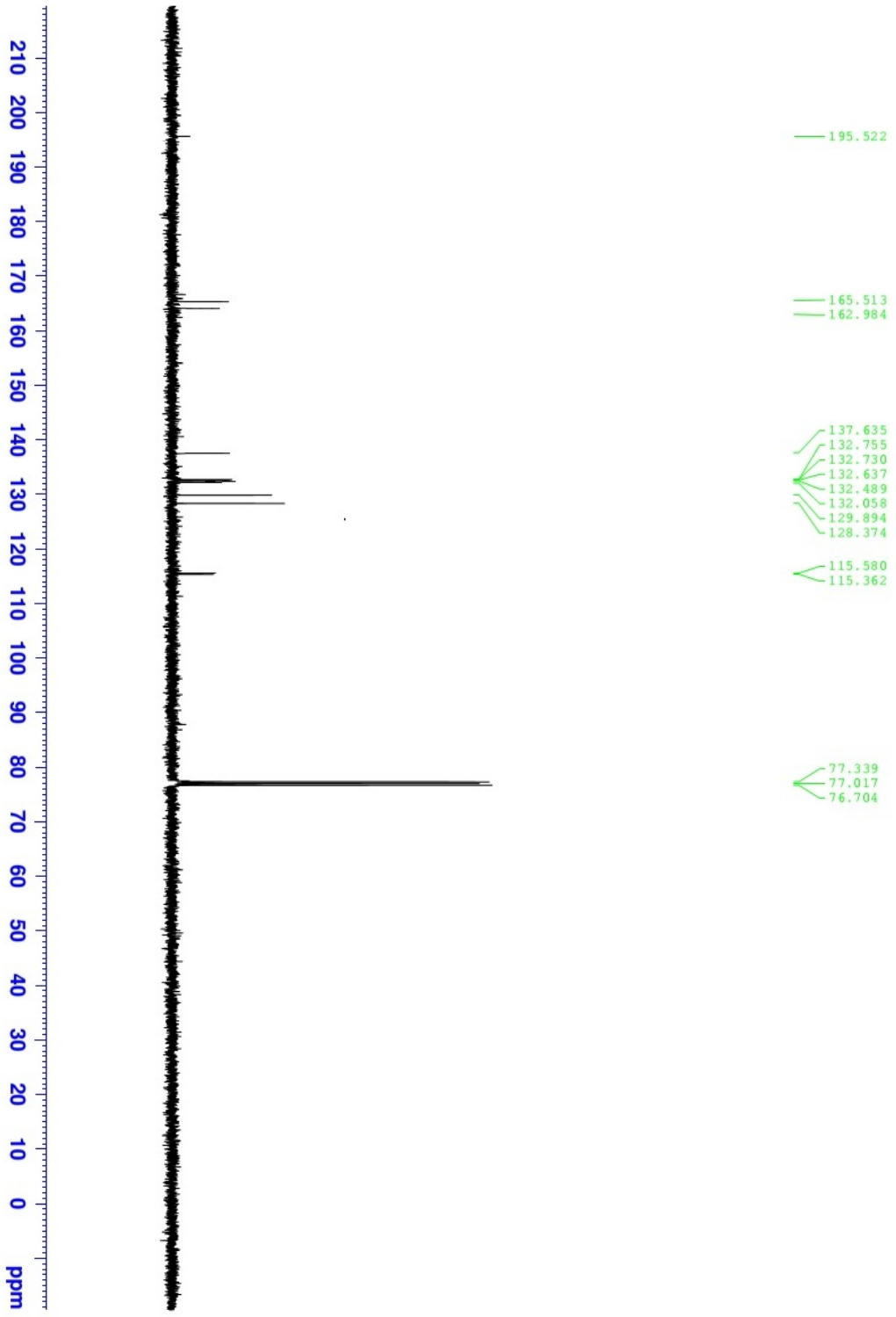
^{1}H NMR of Compound 2c



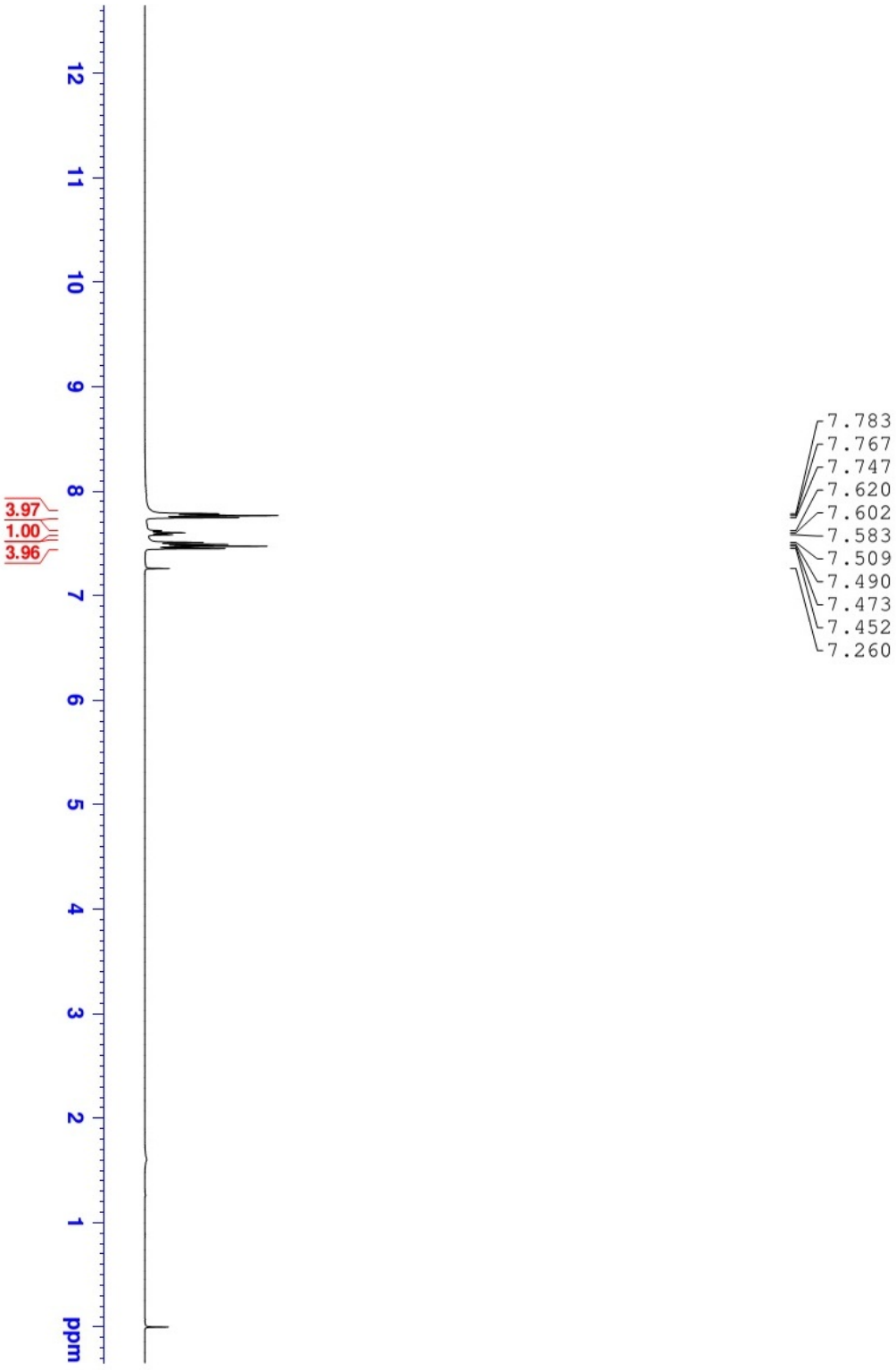
^{13}C NMR of Compound 2c



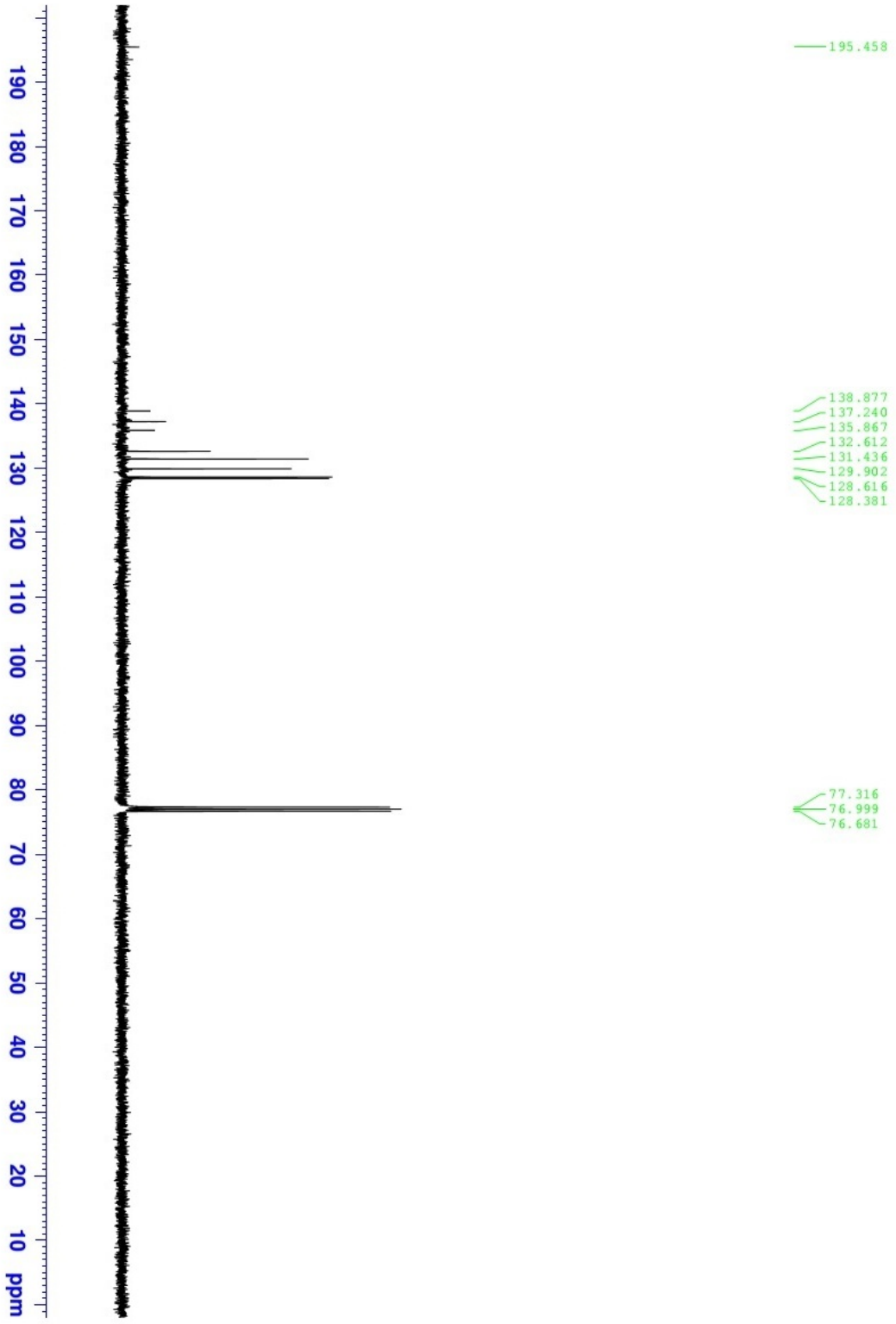
^{1}H NMR of Compound 2d



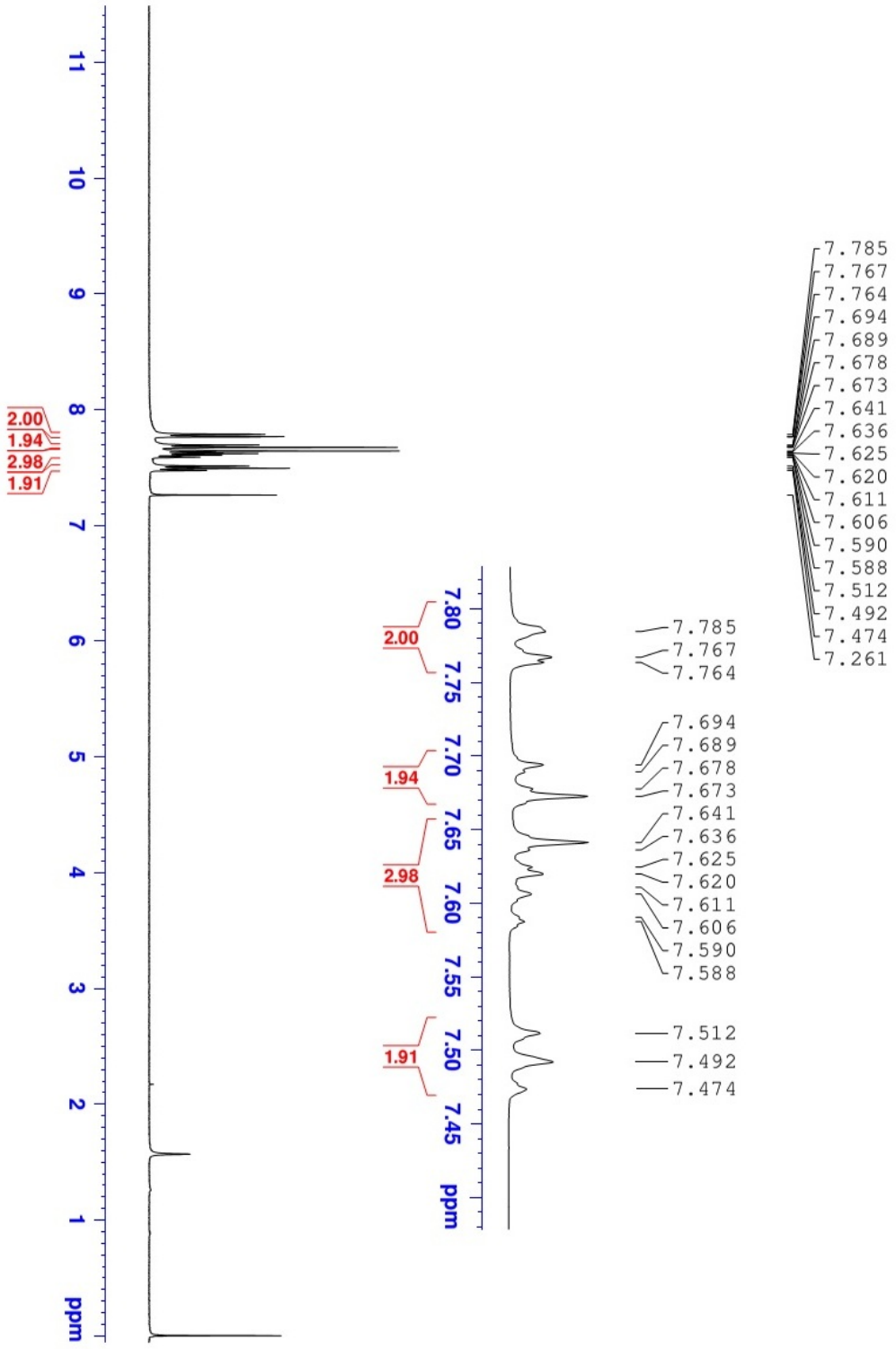
^{13}C NMR of Compound 2d



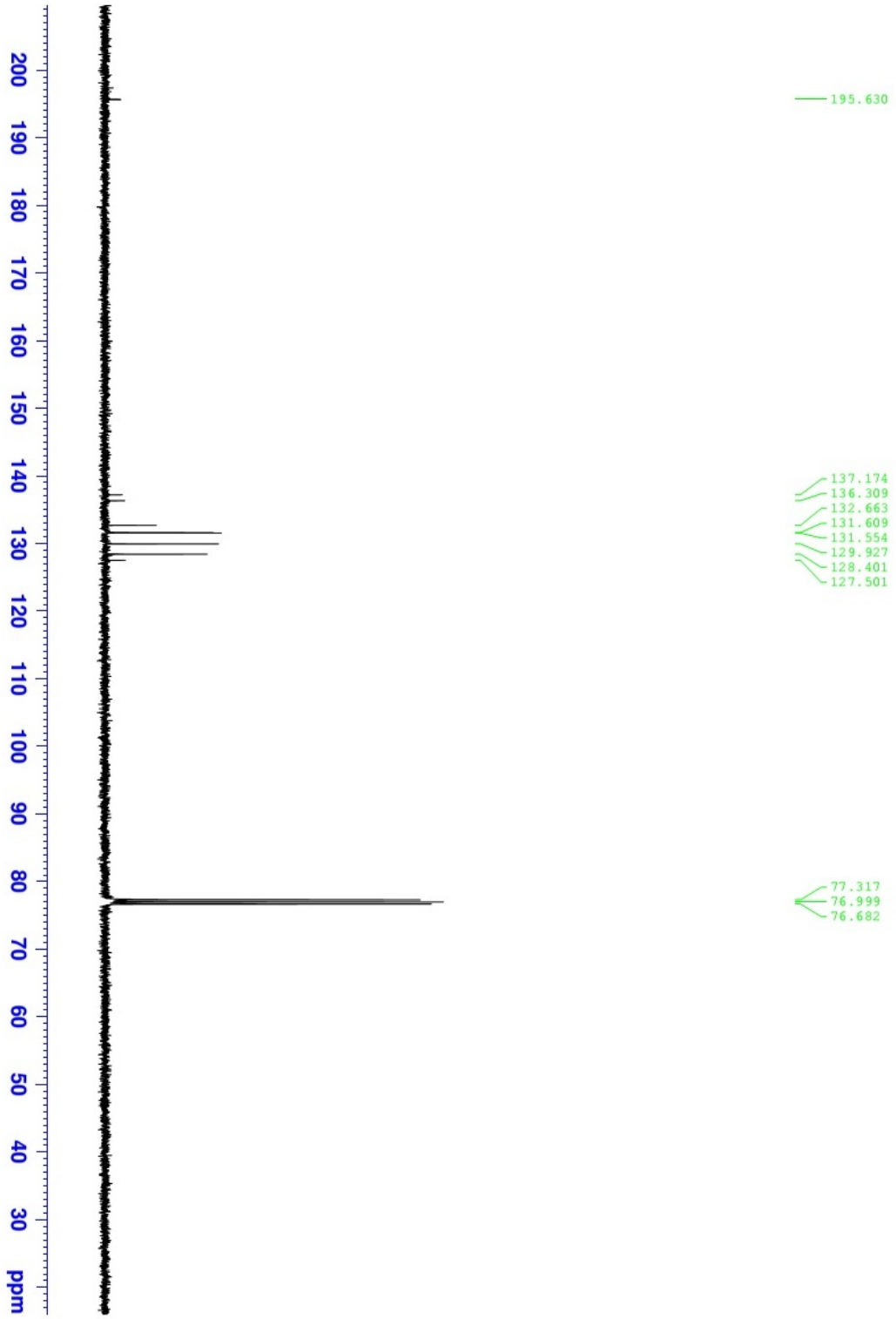
^{1}H NMR of Compound 2e



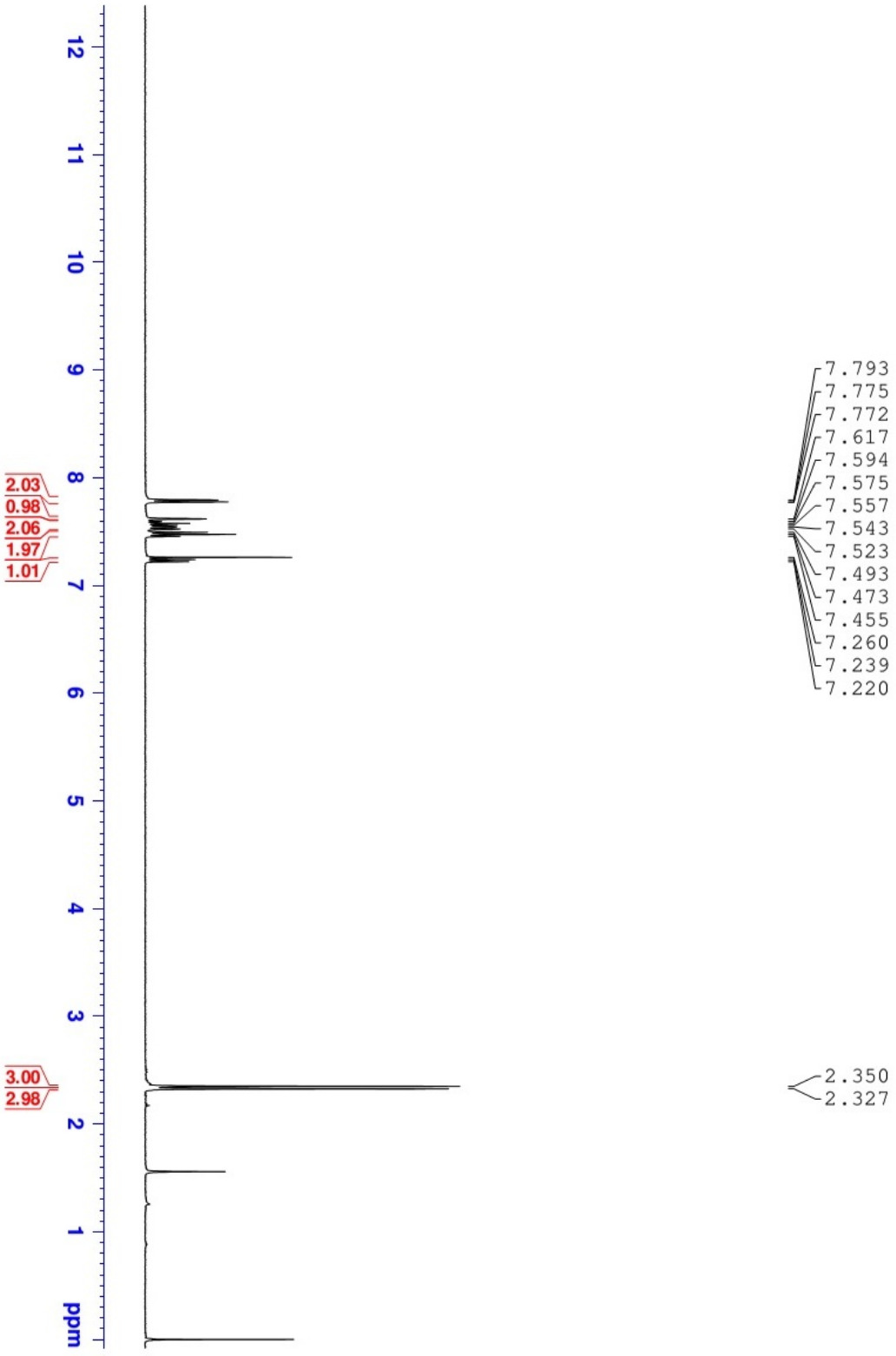
^{13}C NMR of Compound 2e



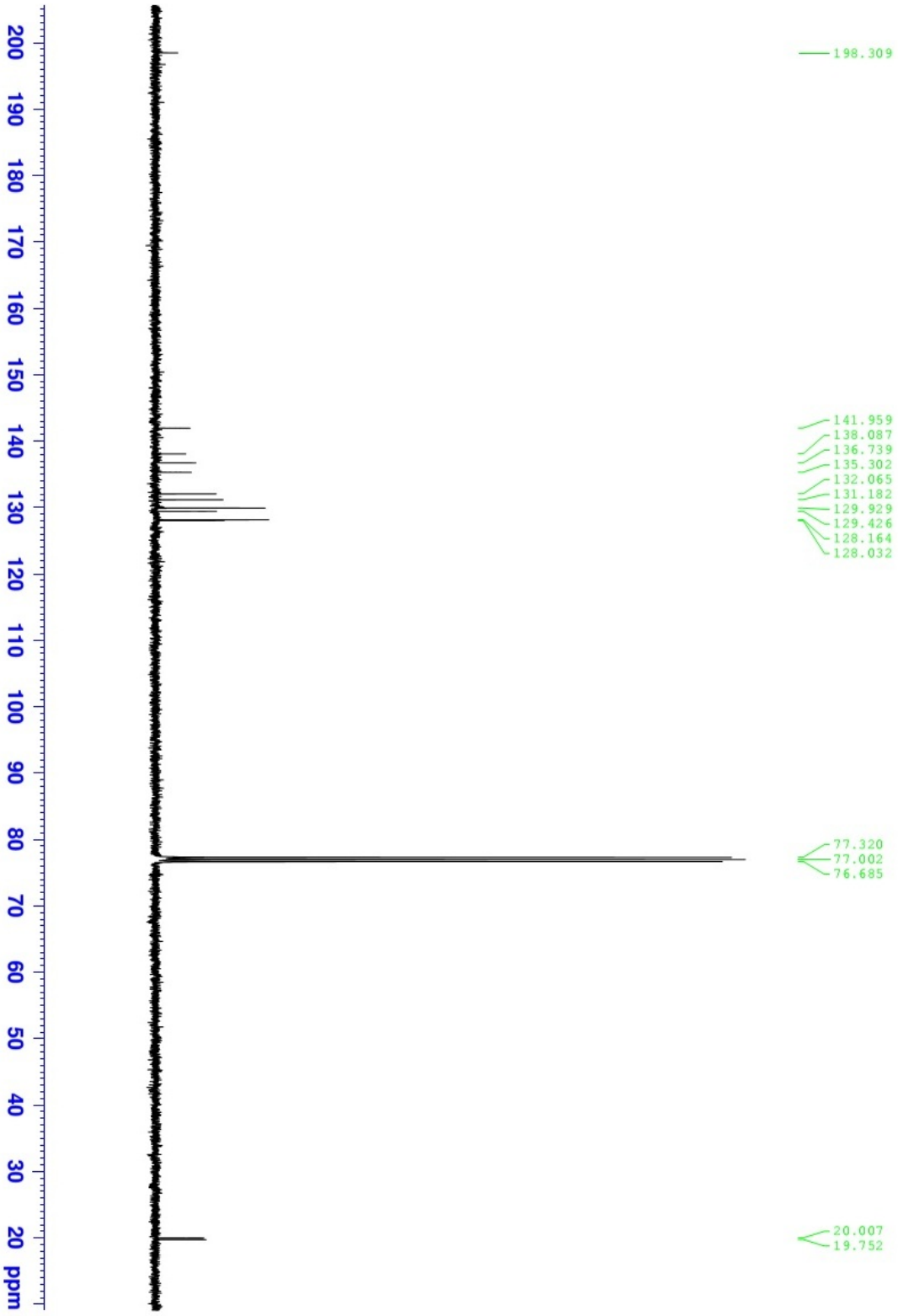
^{1}H NMR of Compound 2f



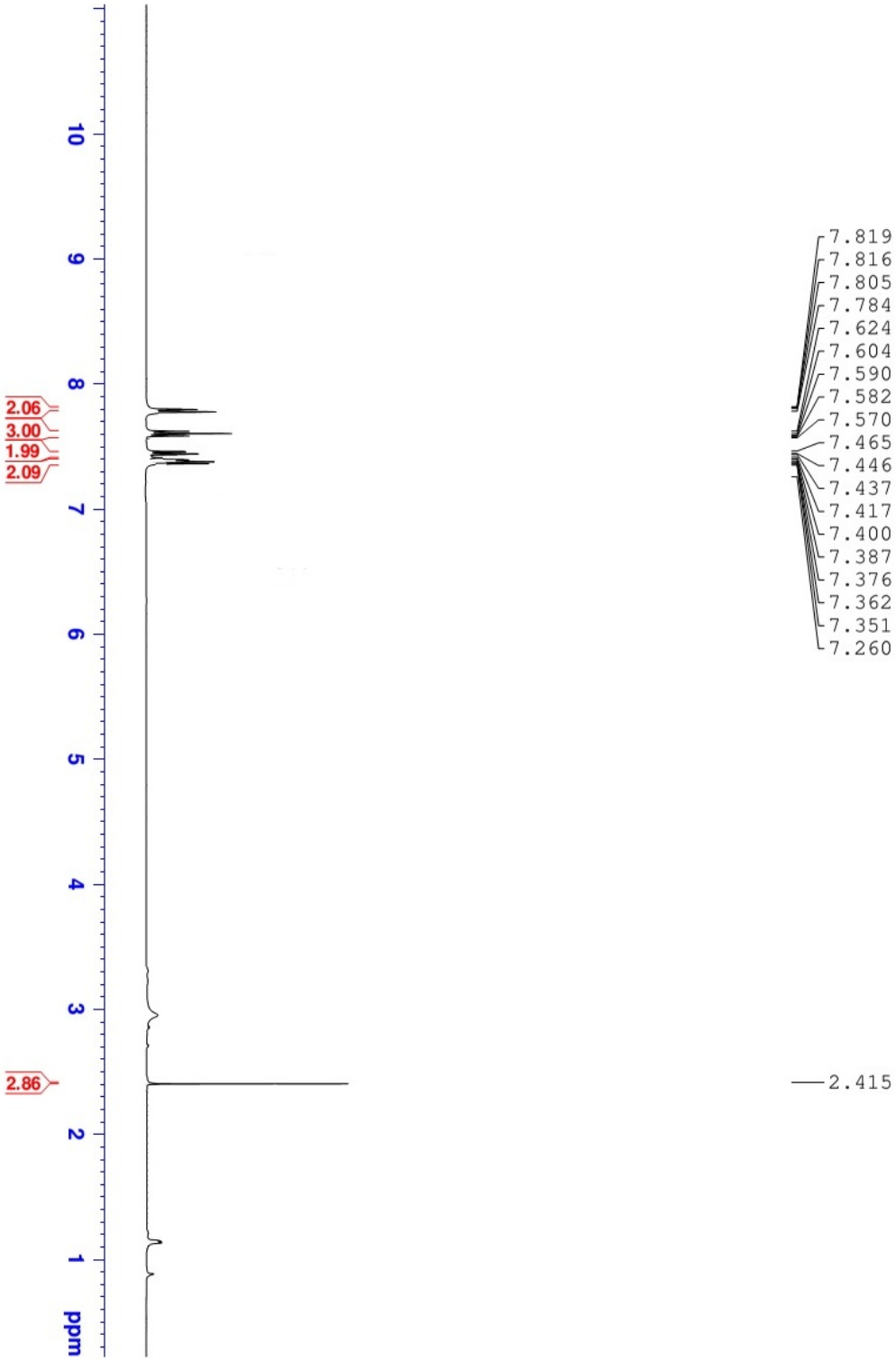
^{13}C NMR of Compound 2f



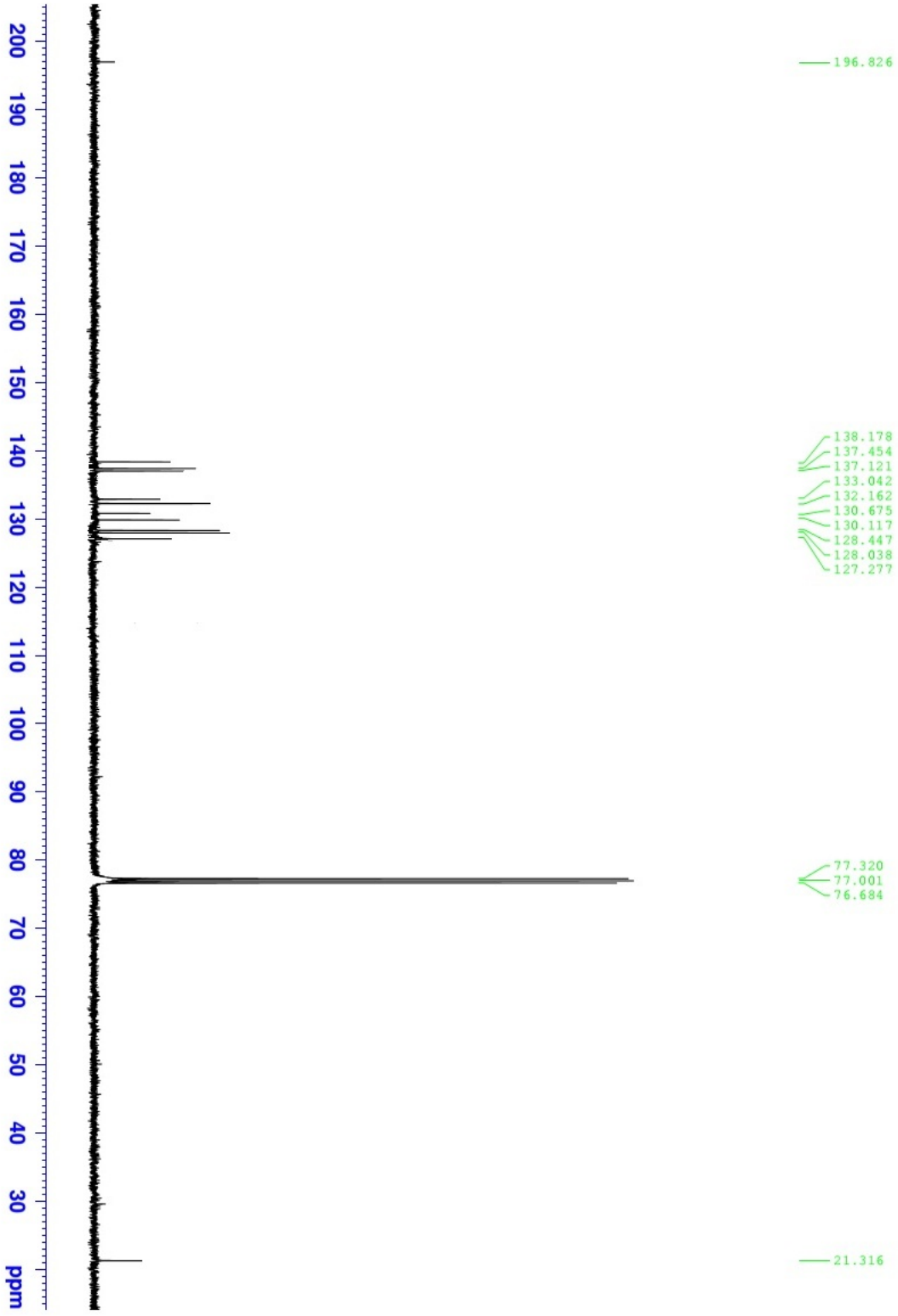
^{1}H NMR of Compound 2g



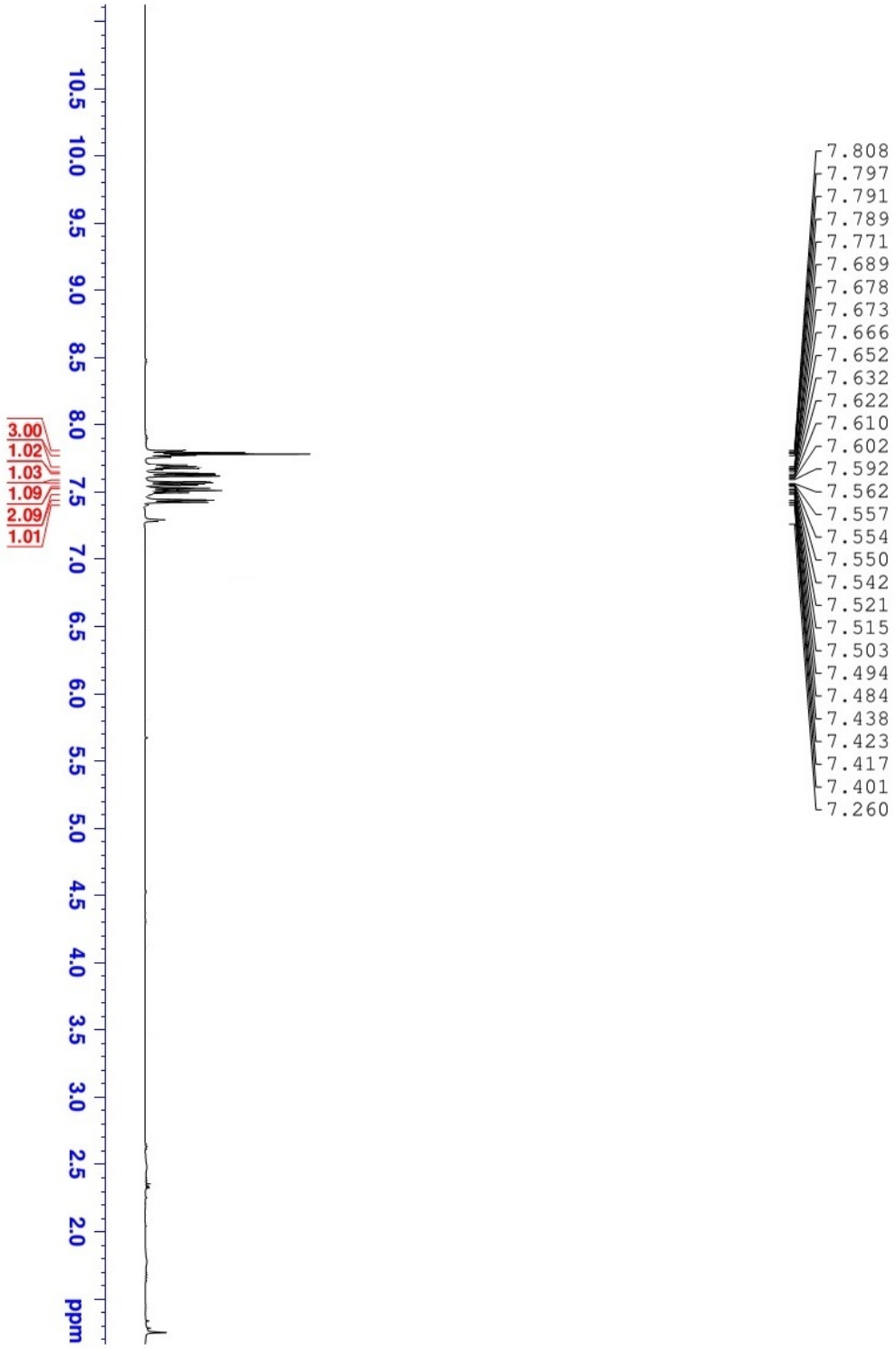
^{13}C NMR of Compound 2g



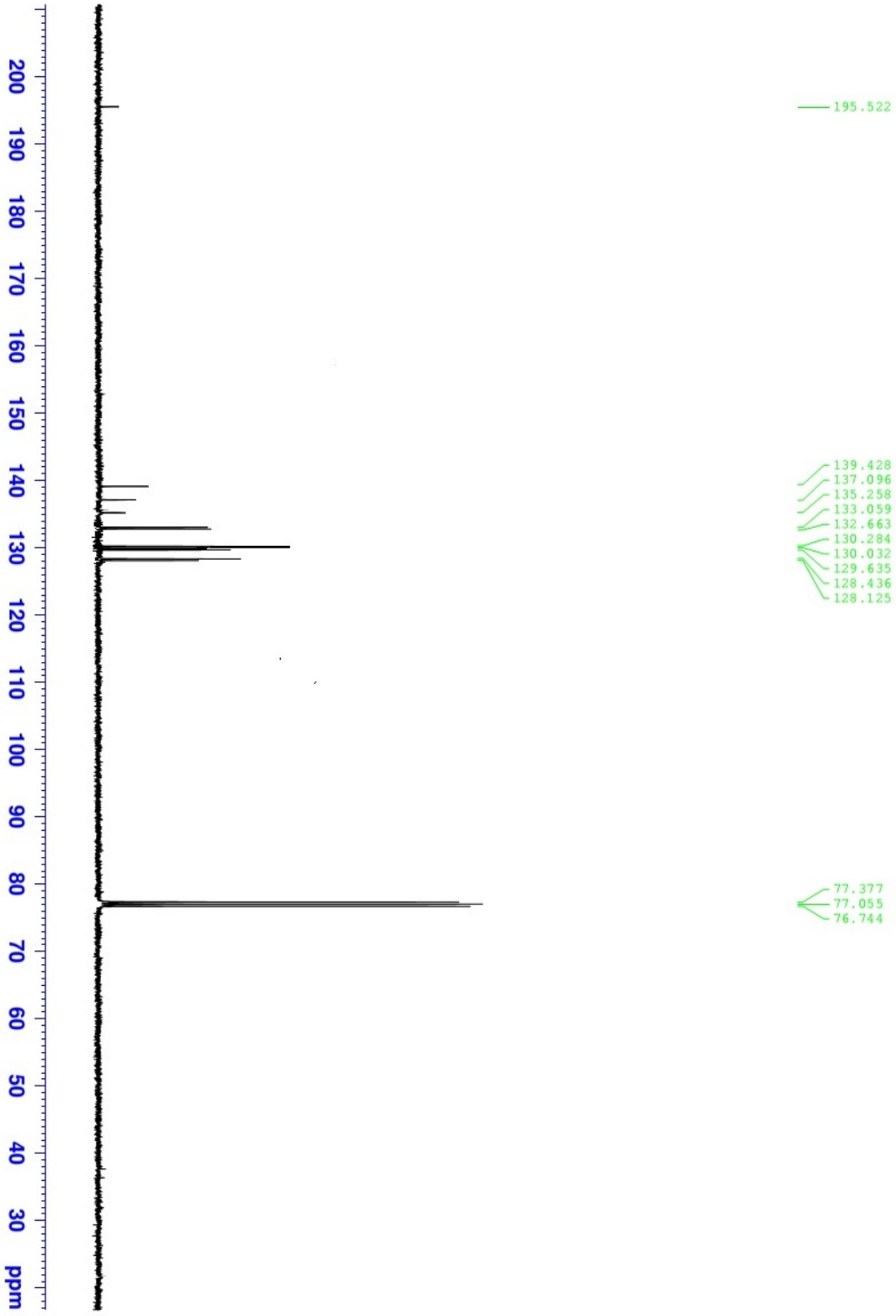
^{1}H NMR of Compound 2h



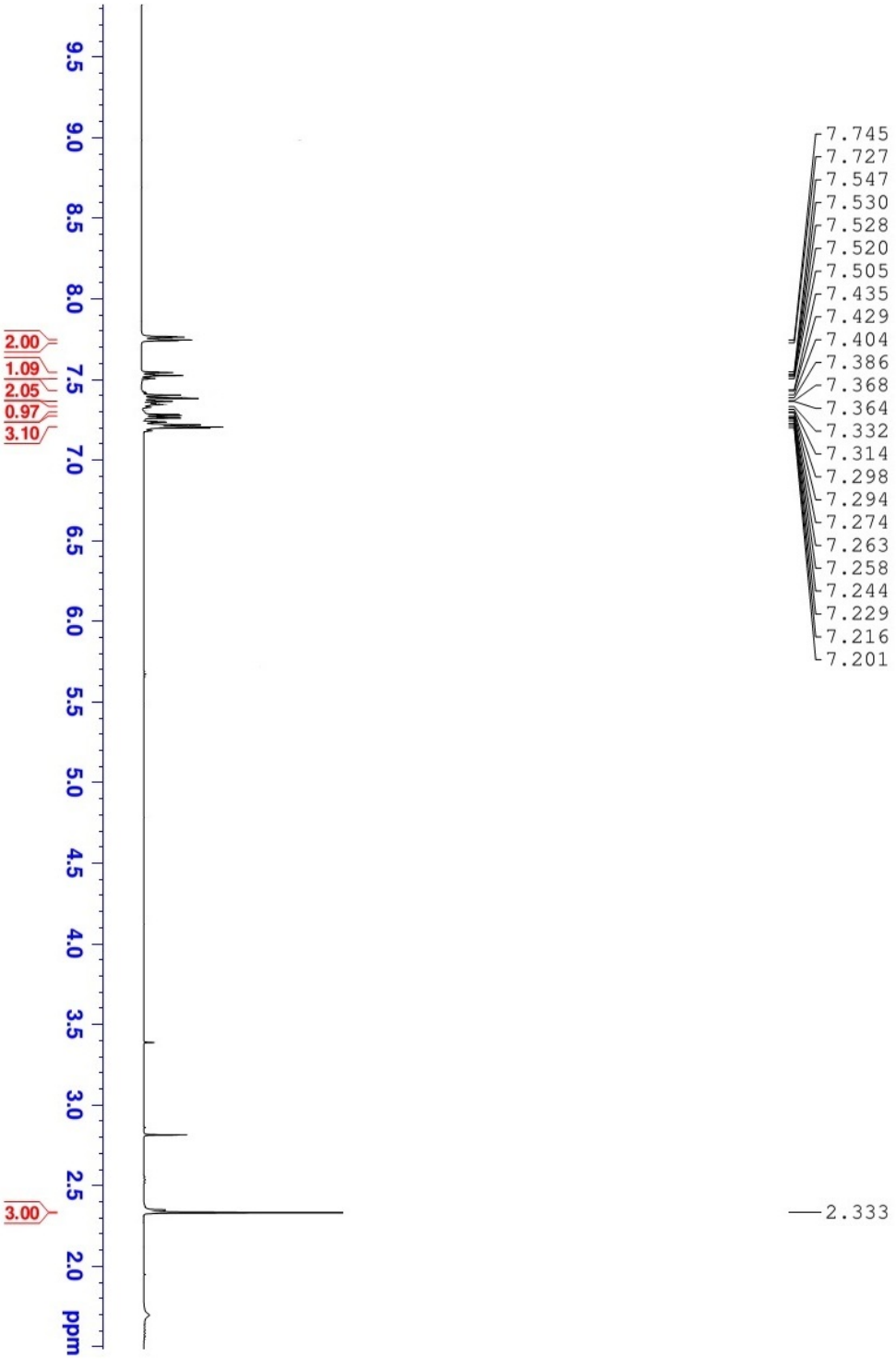
^{13}C NMR of Compound 2h



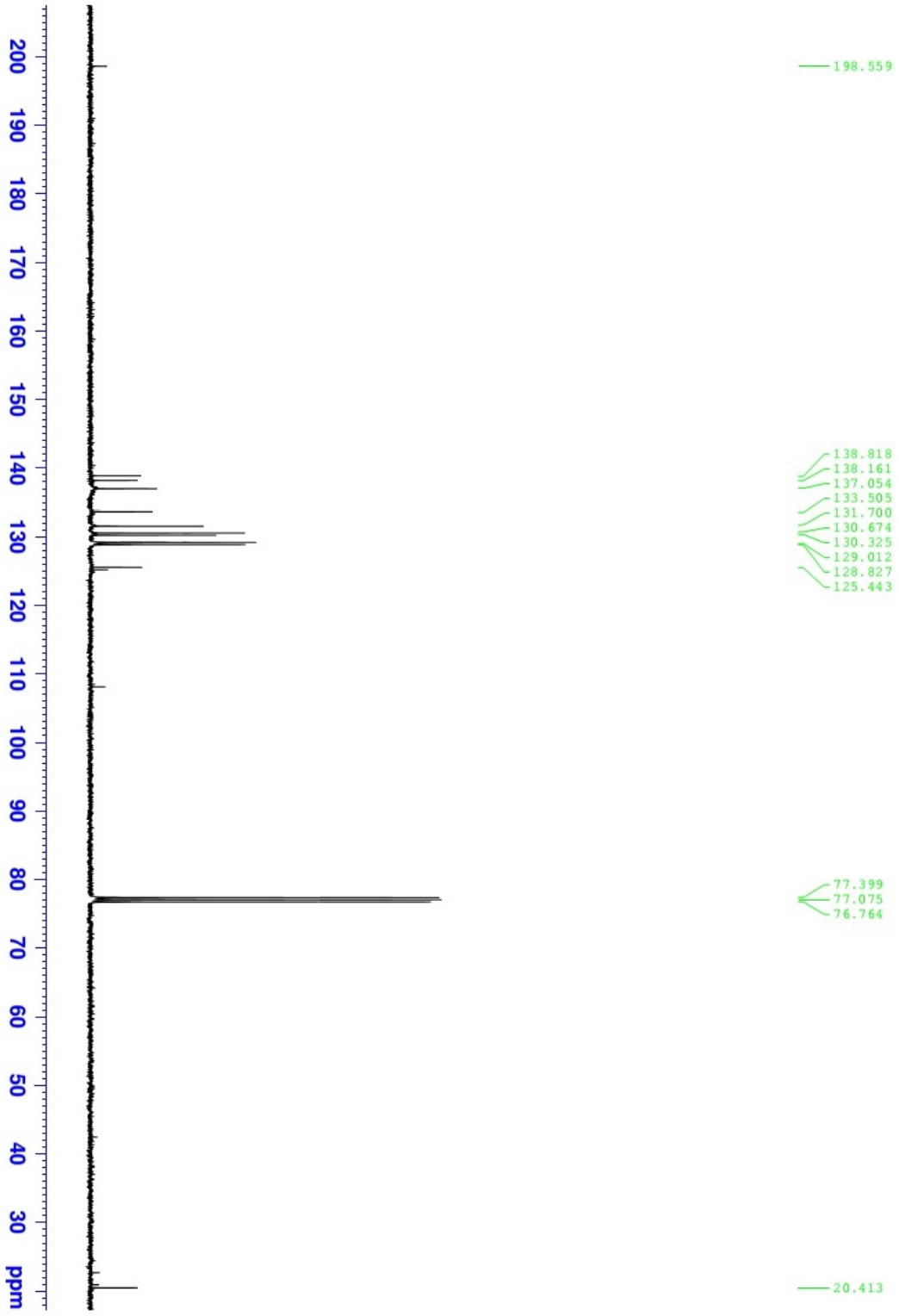
^{1}H NMR of Compound 2i



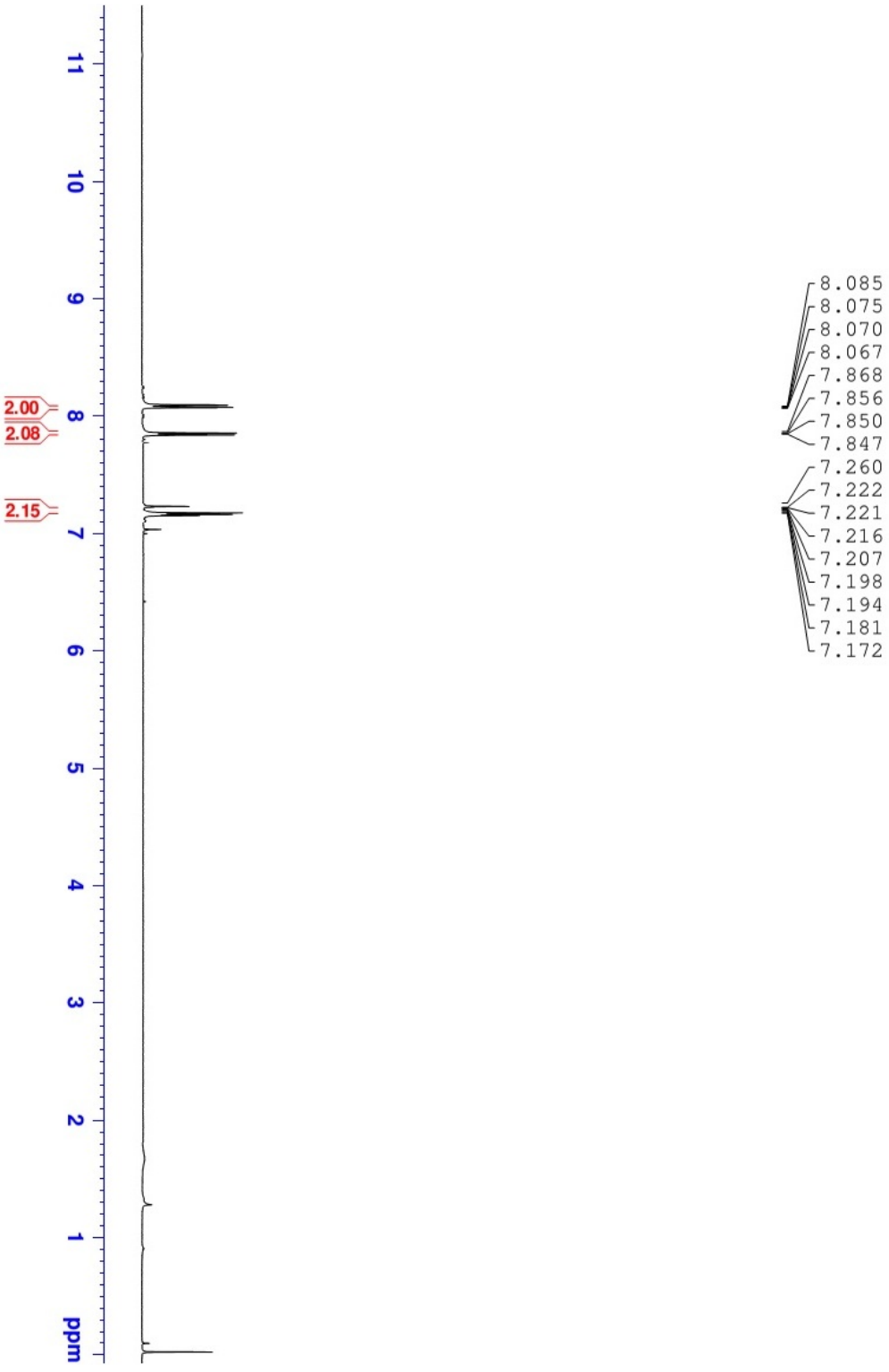
^{13}C NMR of Compound 2i



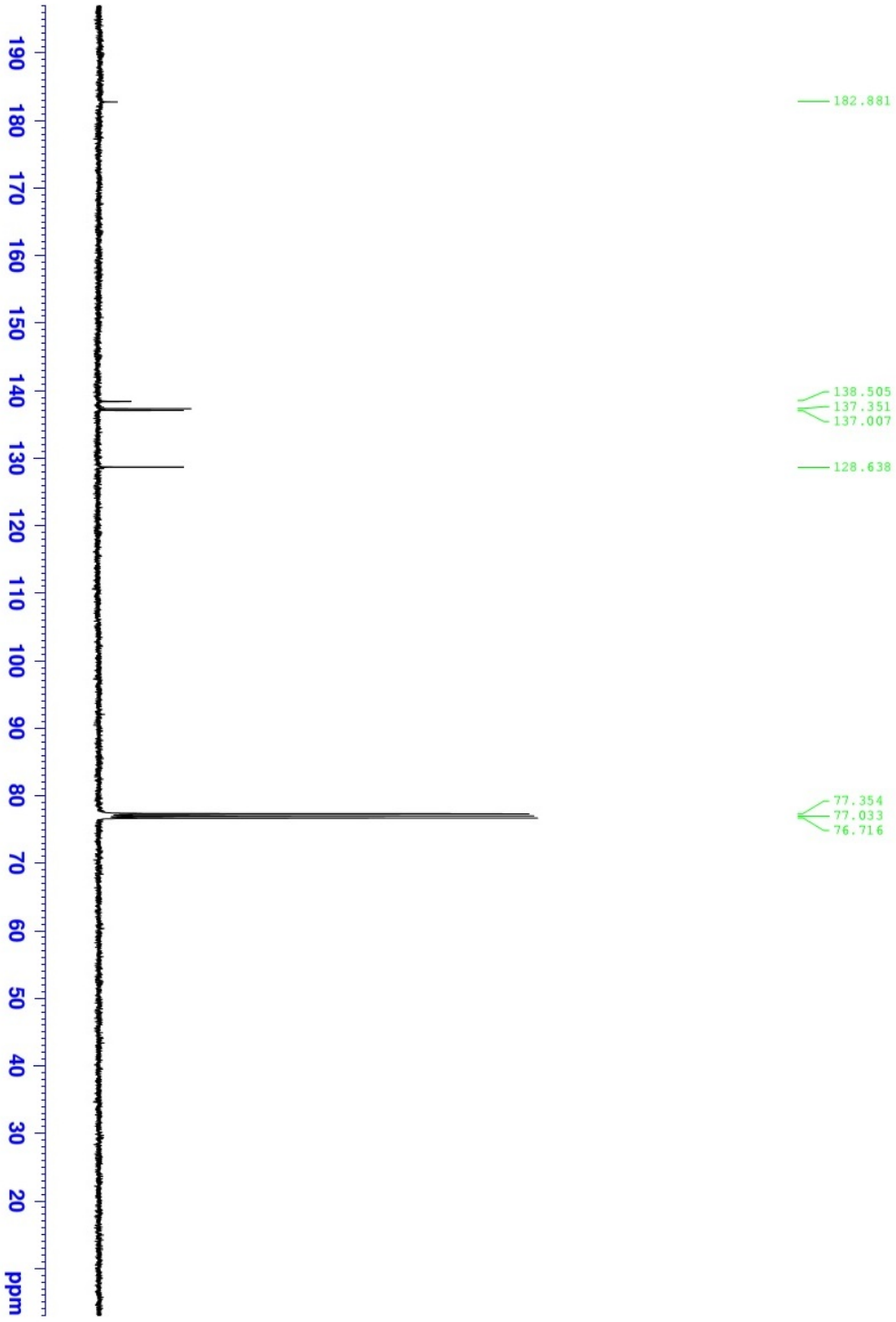
^{1}H NMR of Compound 2j



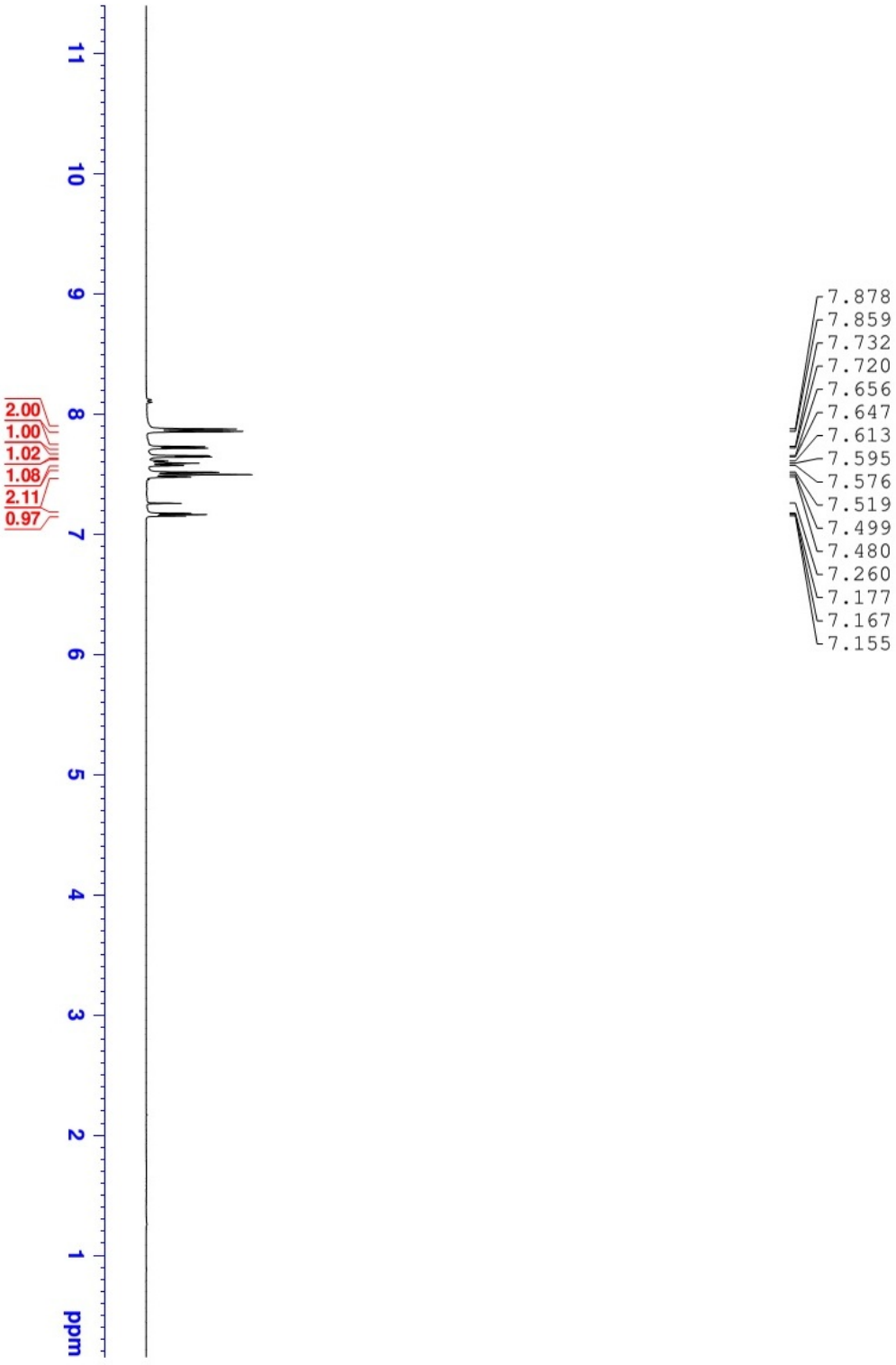
^{13}C NMR of Compound 2j



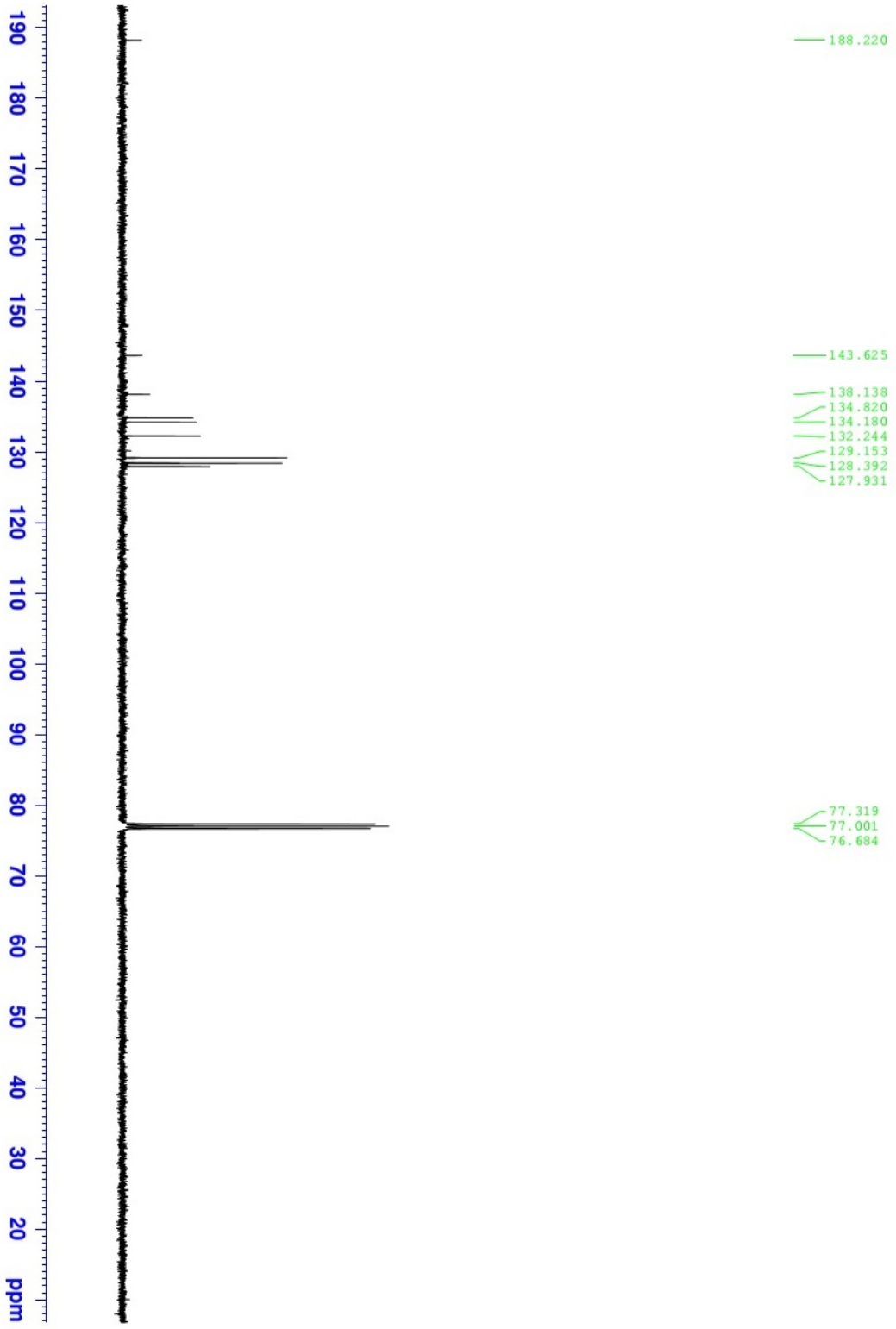
^{1}H NMR of Compound 2k



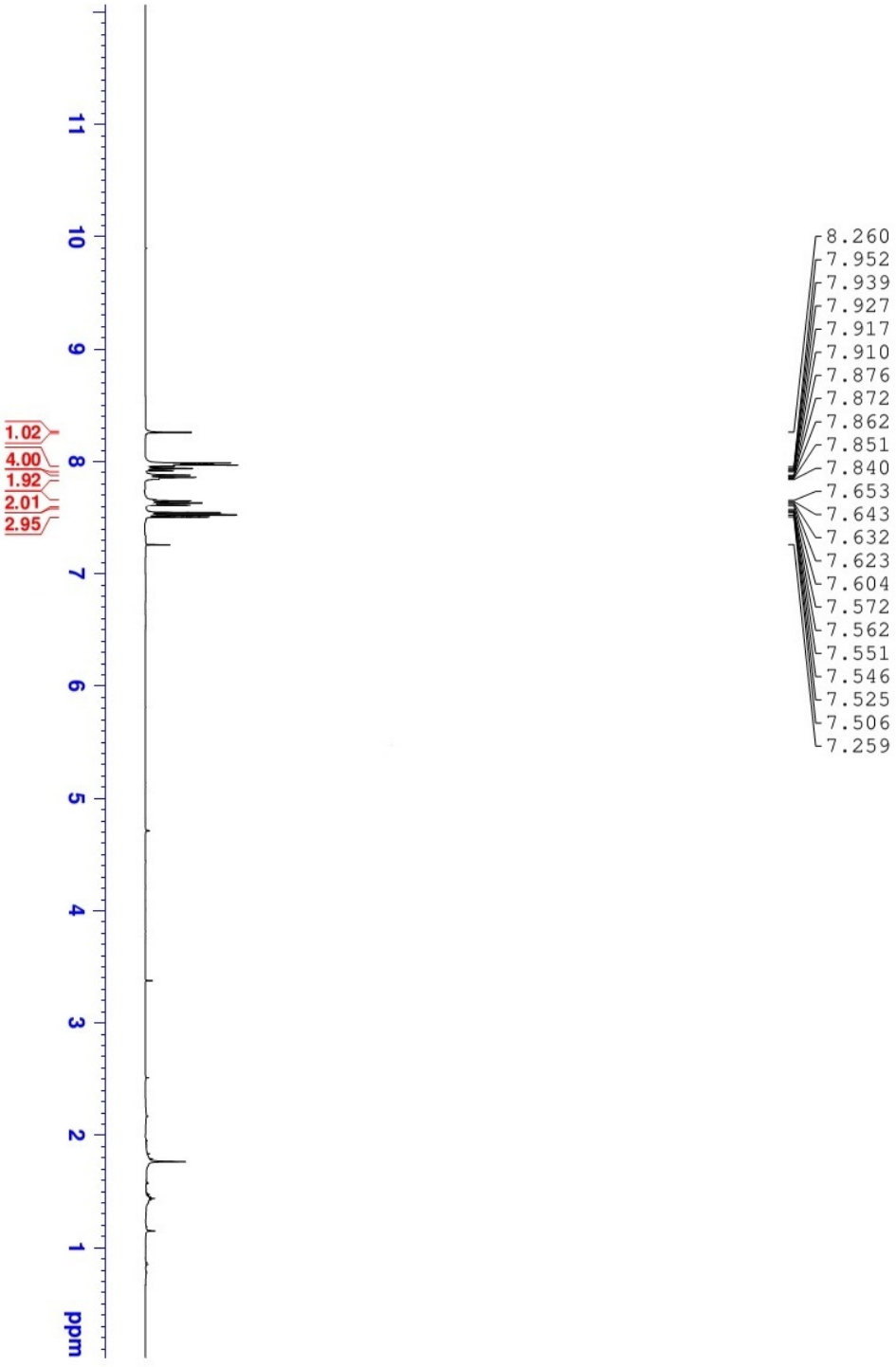
^{13}C NMR of Compound 2k



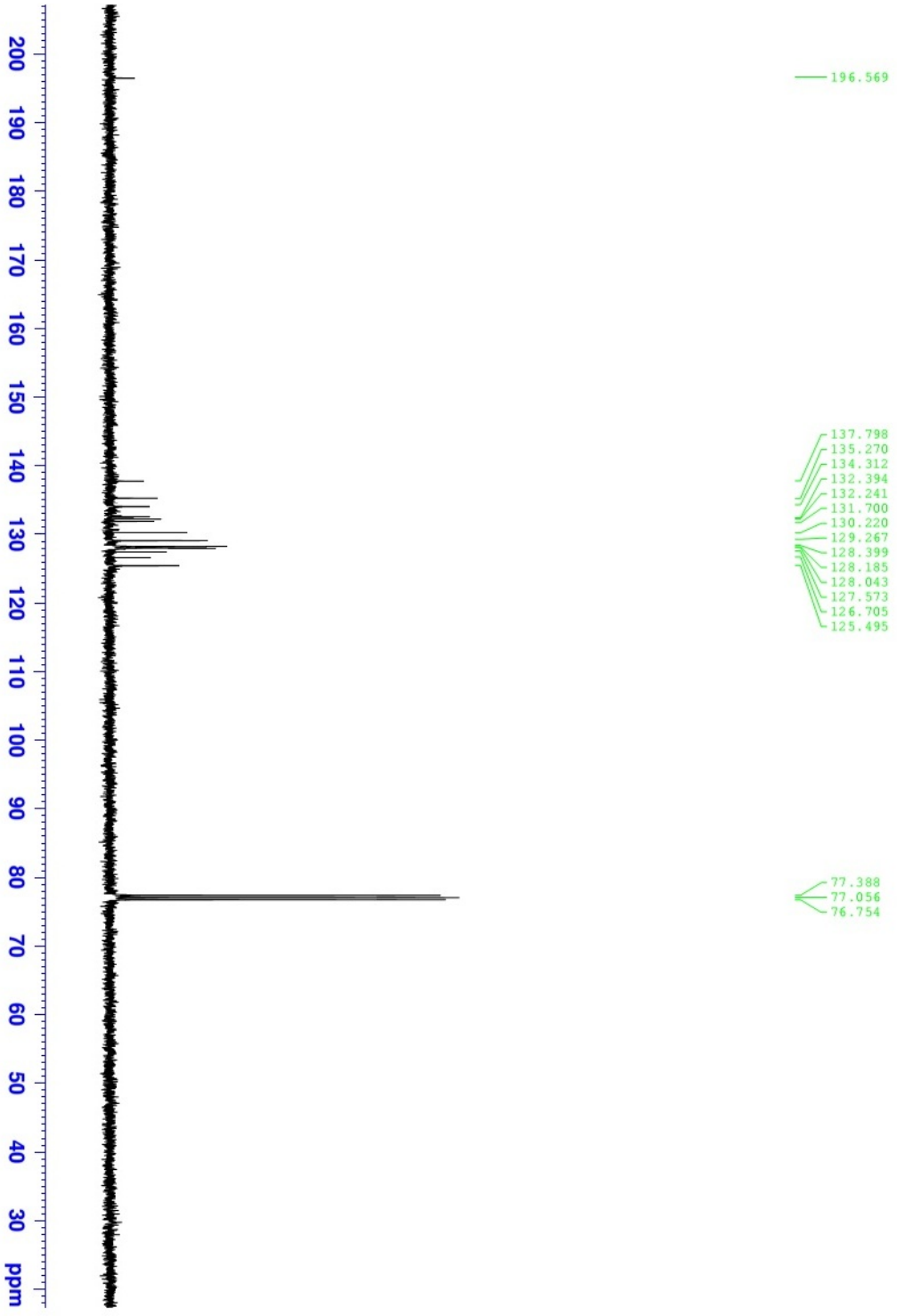
^{1}H NMR of Compound 2l



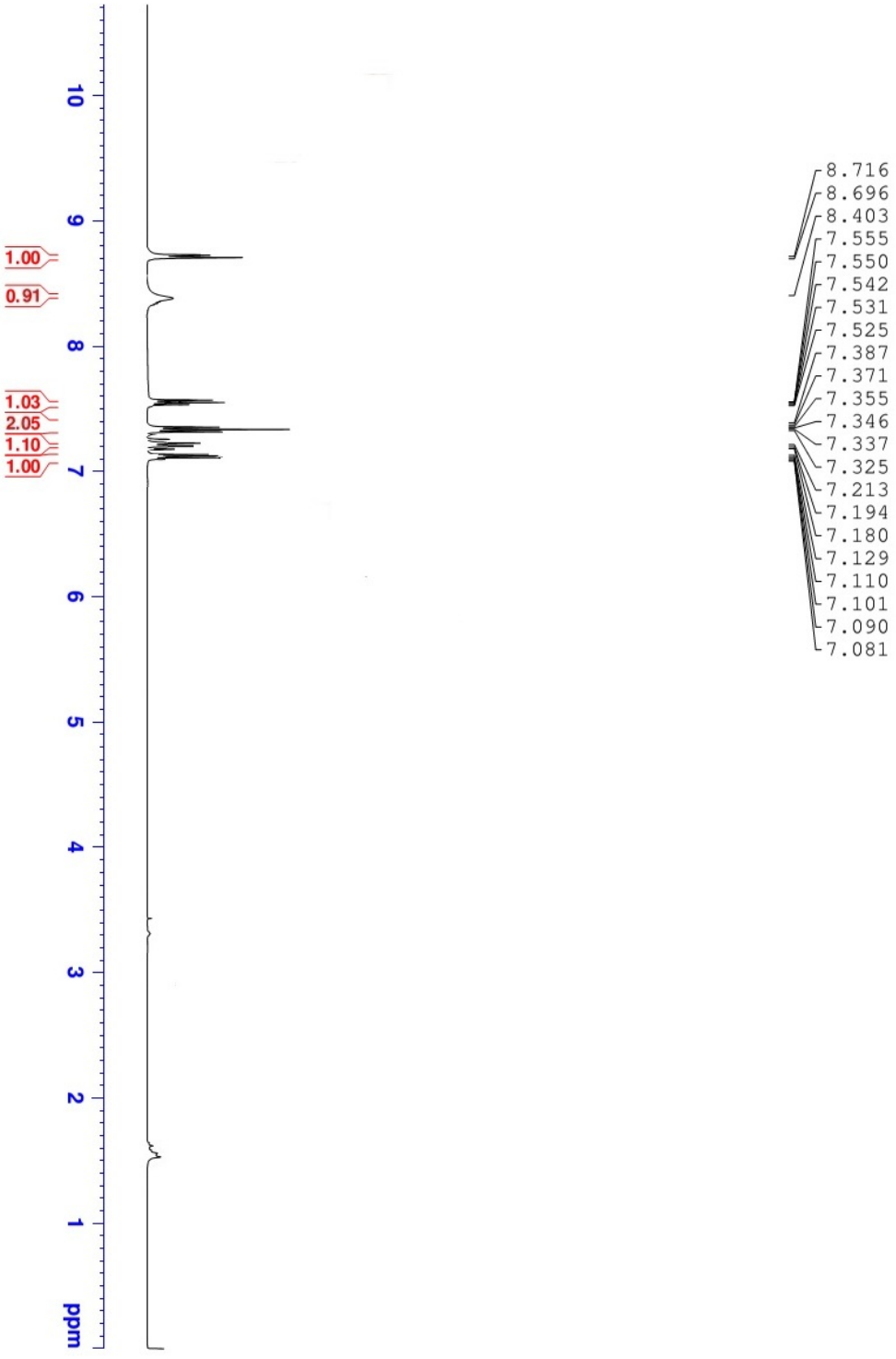
^{13}C NMR of Compound 2l



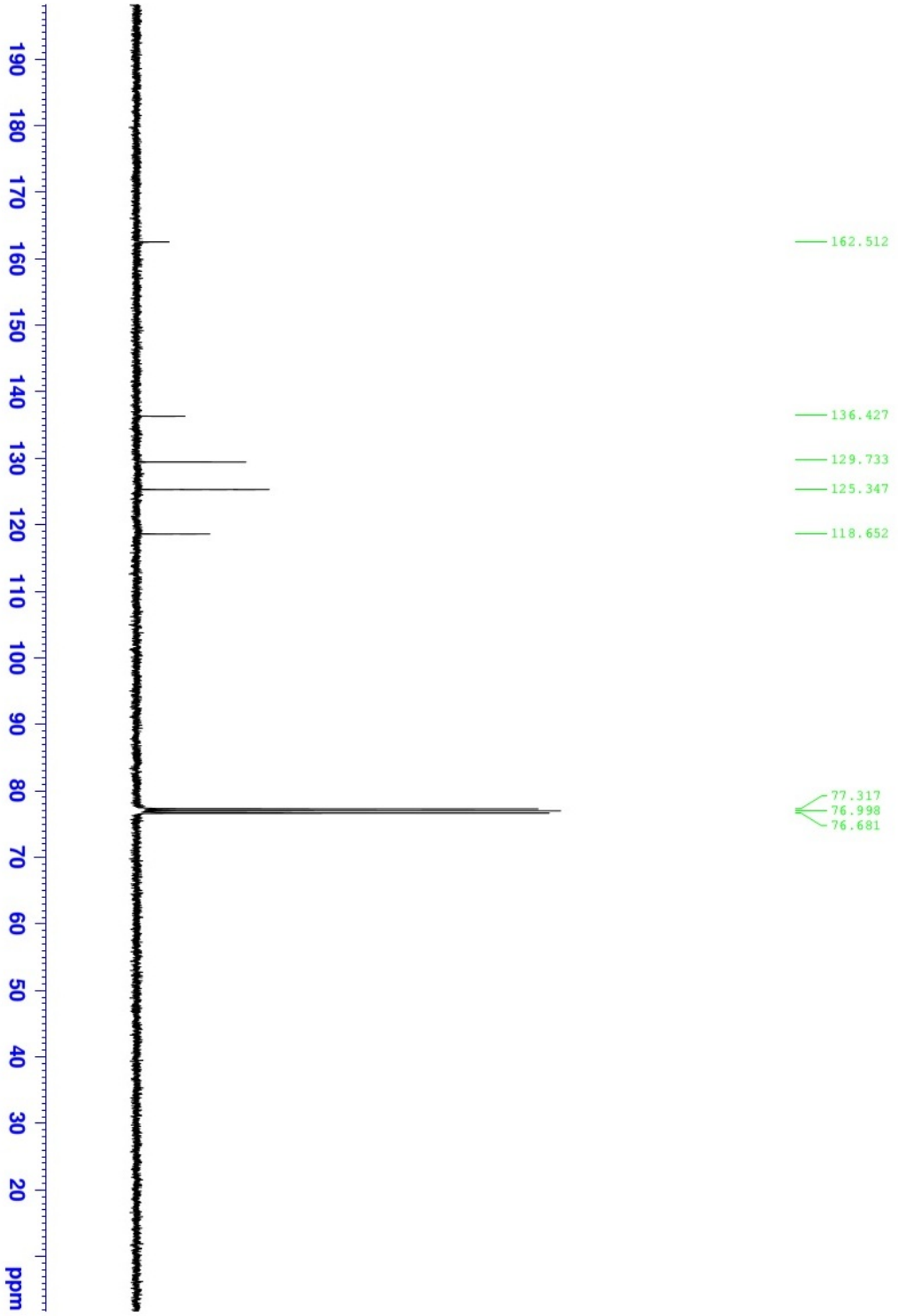
^{1}H NMR of Compound 2m



^{13}C NMR of Compound 2m



^{1}H NMR of Compound E



^{13}C NMR of Compound E