SUPPORTING INFORMATION

Thiopseudourea Ligated Palladium Complexes: Synthesis, Characterization and Application as Catalysts for Suzuki-Miyaura, Sonogashira, Heck and Hiyama Reactions

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(A) General Information

All commercial reagents were used as such without further purification. All solvents were dried and distilled by standard methods. Purification of products was carried out by column chromatography using silica gel(60-120 mesh) with mixture of ethyl acetate and hexane as eluting agents. All known compounds were characterized and compared with the literature. The ^{1}H NMR and ^{13}C NMR spectra were obtained using $CDCl_3$and TMS as the internal standard. IR spectra were obtained using KBr pellets. EI-MS spectra were determined on a Shimadzu GC-MS instrument (GCMS-QP2010 plus). ESI-MS spectra were determined on a LCQ ion trap mass spectrometer equipped with an ESI source. HRMS spectra were determined on QSTAR XL (ESI ionization source). The data acquired in positive ionization mode. X-ray data of complex **3c** was carried at room temperature using a Bruker Smart Apex CCD diffractometer with graphite monochromatedMoKα radiation (λ=0.71073Å) with ω-scan method.

(B) Analytical Data

Analytical data for the products of the Suzuki reaction

4-Methylbiphenyl (entry 1, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.51 (d, J = 7.55 Hz, 2H), 7.44-7.34 (m, 4H), 7.26 (t, J = 8.68 Hz, 1H), 7.19 (d, J = 7.93 Hz, 2H), 2.38 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 168.

4-Methoxybiphenyl (entry 2, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.47 (t, J = 8.49 Hz, 4H), 7.36 (t, J = 7.74 Hz, 2H), 7.24 (d, J = 8.30 Hz, 1H), 6.89 (d, J = 8.87 Hz, 2H), 3.83 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 184.

4-Fluorobiphenyl (entry 3, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.52-7.47 (m, 4H), 7.38 (t, J = 7.74 Hz, 2H), 7.29 (t, J = 7.36 Hz, 1H), 7.09 (t, J = 8.68 Hz, 2H). EI-MS (*m/z*) $(M)^+$ = 172.

Biphenyl-4-carboxaldehyde (entry 4, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 10.03 (s,1H), 7.92 (d, J = 8.12 Hz, 2H), 7.72 (d, J = 8.30 Hz, 2H), 7.59 (d, J = 7.93 Hz, 2H), 7.46-7.35 (m, 3H). EI-MS (*m/z*) $(M)^+$ = 182.

1,2-Diphenylbenzene (entry 5, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.37 (s, 4H), 7.18-7.13 (m, 6H), 7.11-7.07 (m, 4H). EI-MS (*m/z*) $(M)^+$ = 230.

Biphenyl-4-ethylbenzoate (entry 6, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 8.06 (d, J = 8.30 Hz, 2H), 7.63-7.56 (m, 4H), 7.44-7.32 (m, 3H), 4.37 (q, 2H), 1.45 (t, J = 7.17 Hz, 3H). EI-MS (*m/z*) $(M)^+$ = 226.

4-Acetylbiphenyl (entry 7, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 8.00 (d, J = 8.68 Hz, 2H), 7.64 (d, J = 8.68 Hz, 2H), 7.58 (d, J = 7.93 Hz, 2H), 7.46-7.33 (m, 3H), 2.61 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 196.

2-Phenylnapthalene (entry 8, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.98 (s, 1H), 7.88-7.79 (m, 3H), 7.68 (t, 3H), 7.48-7.29 (m, 5H). EI-MS (*m/z*) $(M)^+$ = 204.

Biphenyl-4-acetonitrile (entry 9, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.58-7.51 (m, 4H), 7.43-7.29 (m, 5H), 3.76 (s, 2H). EI-MS (*m/z*) $(M)^+$ = 193.

Biphenyl-3-nitrile (entry 10, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.81 (s, 1H), 7.76 (d, *J* = 7.55 Hz, 1H), 7.59 (d, *J* = 7.55 Hz, 1H), 7.53-7.33 (m, 6H).EI-MS (*m/z*) $(M)^+$ = 179.

3-Methylbiphenyl (entry 11, Table 4). ^{1}H NMR (500 MHz, $CDCl_3$, TMS): δ 7.55 (d, *J* = 7.84 Hz, 2H), 7.41-7.28 (m, 6H), 7.13 (d, *J* = 7.84 Hz, 1H), 2.44 (s, 3H).EI-MS (*m/z*) $(M)^+$ = 168.

3-Methoxybiphenyl (entry 12, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.53 (d, *J* = 7.17 Hz, 2H), 7.38 (t, *J* = 7.55 Hz, 2H), 7.29 (t, *J* = 7.55 Hz, 2H), 7.11 (d, *J* = 7.55 Hz, 1H), 7.05 (s, 1H), 6.83 (d, *J* = 8.12 Hz, 1H), 3.84 (s,3H). EI-MS (*m/z*) $(M)^+$ = 184.

Biphenyl-3-carboxaldehyde (entry 13, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 10.02 (s, 1H), 8.03 (s, 1H), 7.79 (d, *J* = 8.30Hz, 2H), 7.57-7.52 (m, 3H), 7.40 (t, *J* = 7.55Hz, 2H), 7.32 (t, *J* = 7.55 Hz, 1H). EI-MS (*m/z*) $(M)^+$ = 182.

3-Acetylbiphenyl (entry14, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 8.13 (s, 1H), 7.89 (d, *J* = 8.30 Hz, 1H), 7.74 (d, *J* = 8.30 Hz, 1H), 7.57 (d, *J* = 6.79 Hz, 2H), 7.49 (t, *J* = 7.55 Hz, 1H), 7.42 (t, *J* = 7.55 Hz, 2H), 7.33 (t, *J* = 8.30 Hz, 1H), 2.62 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 196.

4-N,NDimethylaminobiphenyl (entry 15, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.50-7.42 (m, 4H), 7.33 (t, *J* = 7.93 Hz, 2H), 7.19 (t, *J* = 7.36 Hz, 1H), 6.75 (d, *J* = 8.87 Hz, 2H), 2.99 (s, 6H). EI-MS (*m/z*) $(M)^+$ = 197.

4-Methoxy-4′-methylbiphenyl (entry 16, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.45 (d, *J* = 8.68 Hz, 2H), 7.39 (d, *J* = 7.93 Hz, 2H), 7.17 (d, *J* = 8.12 Hz, 2H), 6.90 (d, *J* = 8.68 Hz, 2H), 3.81 (s, 3H), 2.37 (s,3H). EI-MS (*m/z*) $(M)^+$ = 198.

4-Acetyl-4′-methoxybiphenyl (entry 17, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.97 (d, J = 8.30 Hz, 2H), 7.60 (d, J = 8.30 Hz, 2H), 7.52 (d, J = 8.68 Hz, 2H), 6.94 (d, J = 8.68 Hz, 2H), 3.84 (s, 3H), 2.60 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 226.

4,4′-Dimethoxybiphenyl (entry 18, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.40 (d, J = 8.68 Hz, 4H), 6.89 (d, J = 8.68 Hz, 4H), 3.81 (s, 6H). EI-MS (*m/z*) $(M)^+$ = 214.

3,4-Dimethylbiphenyl (entry 19, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.44 (d, J = 8.30 Hz, 2H), 7.34-7.24 (m, 3H), 7.20 (d, J = 7.55 Hz, 2H), 7.09 (d, J = 6.79 Hz, 1H), 2.40 (s, 3H), 2.38 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 182.

4,4′-Dimethylbiphenyl (entry 20, Table 4). ^{1}H NMR (400 MHz, $CDCl_3$, TMS): δ 7.41 (d, J = 7.89 Hz, 4H), 7.17 (d, J = 7.89 Hz, 4H), 2.37 (s, 6H). EI-MS (*m/z*) $(M)^+$ = 182.

4-Acetyl-3-methylbiphenyl (entry 21, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.99 (d, J = 8.30 Hz, 2H), 7.63 (d, J = 8.30 Hz, 2H), 7.38-7.28 (m, 3H), 7.17 (d, J = 6.79 Hz, 1H), 2.61 (s, 3H), 2.43 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 210.

Biphenyl-3,4-dicarboxaldehyde (entry 22, Table 4). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 10.09 (s, 1H), 10.06 (s, 1H), 8.11 (s, 1H), 7.97 (d, J = 8.30 Hz, 2H), 7.88 (t, J = 8.30 Hz, 2H), 7.78 (d, J = 8.30 Hz, 2H), 7.64 (t, J = 8.30 Hz, 1H). EI-MS (*m/z*) $(M)^+$ = 210.

4-Trifluoromethyl-biphenyl (entry 1, Table 5). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.67 (s, 4H), 7.55 (d, J = 8.30 Hz, 2H), 7.43 (t, J = 7.55 Hz, 2H), 7.36 (t, J = 7.55 Hz, 1H). EI-MS (*m/z*) $(M)^+$ = 222.

4-Methoxy- 4′-Trifluoromethyl-biphenyl (entry 2, Table 5). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.66-7.59 (m, 4H), 7.49 (d, J = 8.30 Hz, 2H), 6.94 (d, J = 9.06 Hz, 2H), 3.84 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 252.

4-Nitro-biphenyl (entry 3, Table 5). ^{1}H NMR (500 MHz, $CDCl_3$, TMS): δ 8.28 (d, J = 9.11 Hz, 2H), 7.70 (d, J = 9.11 Hz, 2H), 7.59 (d, J = 7.29 Hz, 2H), 7.46 (t, J = 8.20 Hz, 2H), 7.41 (t, J = 7.29 Hz, H). EI-MS (*m/z*) $(M)^+$ = 199.

4-Nitro- 4′-methoxy-biphenyl (entry 4, Table 5). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 8.25 (d, J = 8.87 Hz, 2H), 7.66 (d, J = 8.87 Hz, 2H), 7.53 (d, J = 8.87 Hz, 2H), 6.95 (d, J = 8.87 Hz, 2H), 3.86 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 229.

biphenylacetylene (entry 1, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.55-7.52 (m, 4H), 7.35-7.33 (m, 6H). EI-MS (*m/z*) $(M)^+$ = 178.

1-(4-(2-phenylethynyl)phenyl)ethanone (entry 2, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.95 (d, J = 8.30 Hz, 2H), 7.61 (d, J = 8.49 Hz, 2H), 7.57-7.53 (m, 2H), 7.38-7.36 (m, 3H), 2.61 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 220.

1-nitro-4-(2-phenylethynyl)benzene (entry 3, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 8.23 (d, J = 8.87 Hz, 2H), 7.63 (d, J = 8.87 Hz, 2H), 7.58-7.54 (m, 2H), 7.40-7.38 (m, 3H). EI-MS (*m/z*) $(M)^+$ = 223.

1-(2-o-tolylethynyl)benzene (entry 4, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.54-7.48 (m, 3H), 7.32-7.31 (m, 3H), 7.22-7.13 (m, 3H), 2.51 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 192.

1-methyl-3-(2-phenylethynyl)benzene (entry 5, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.54-7.51 (m, 2H), 7.36-7.32 (m, 5H), 7.25-7.20 (m, 1H), 7.14 (d, J = 7.55 Hz, 2H), 2.35 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 192.

1-chloro-4-(2-phenylethynyl)benzene (entry 6, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.53-7.50 (m, 2H), 7.46 (d, J = 8.49 Hz, 2H), 7.35-7.30 (m, 5H). EI-MS (*m/z*) $(M)^+$ = 212.

1-(2-(4-methoxyphenyl)ethynyl)benzene (entry 7, table 6). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.52-7.46 (m, 4H), 7.34-7.32 (m, 3H), 6.88 (d, J = 8.68 Hz, 2H), 3.82 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 208.

trans-stilbene (entry 1, table 7). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.46 (d, J = 6.79 Hz, 4H), 7.31(d, J = 8.30 Hz, 4H), 7.23-7.18 (m, 2H), 7.05 (s, 2H). EI-MS (*m/z*) $(M)^+$ = 180.

4-acetyl-trans-stilbene (entry 2, table 7). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.92 (d, J = 8.49 Hz, 2H), 7.55 (d, J = 8.30, 2H), 7.50 (d, J = 7.17 Hz, 2H), 7.34 (t, J = 7.55 Hz, 2H), 7.25-7.22 (m, 1H), 7.19 (d, J = 16.24 Hz, 1H),7.09 (d, J = 16.43 Hz, 1H), 2.59 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 222.

4-methyl-trans-stilbene (entry 3, table 7). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.44 (d, J = 7.55 Hz, 2H), 7.36-7.26 (m, 4H), 7.18 (m, 1H), 7.11 (d, J = 7.74 Hz, 2H), 7.00 (s, 2H), 2.34 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 194.

4-methoxy-trans-stilbene (entry 4, table 7). ^{1}H NMR (300 MHz, $CDCl_3$, TMS): δ 7.44-7.38 (m, 4H), 7.29 (t, J = 7.93 Hz, 2H), 7.17 (m, 1H), 7.01 (d, J = 16.24 Hz, 1H), 6.91 (d, J = 16.24 Hz, 1H), 6.83 (d, J = 8.87 Hz, 2H), 3.80 (s, 3H). EI-MS (*m/z*) $(M)^+$ = 210.

(C) Crystallographic data

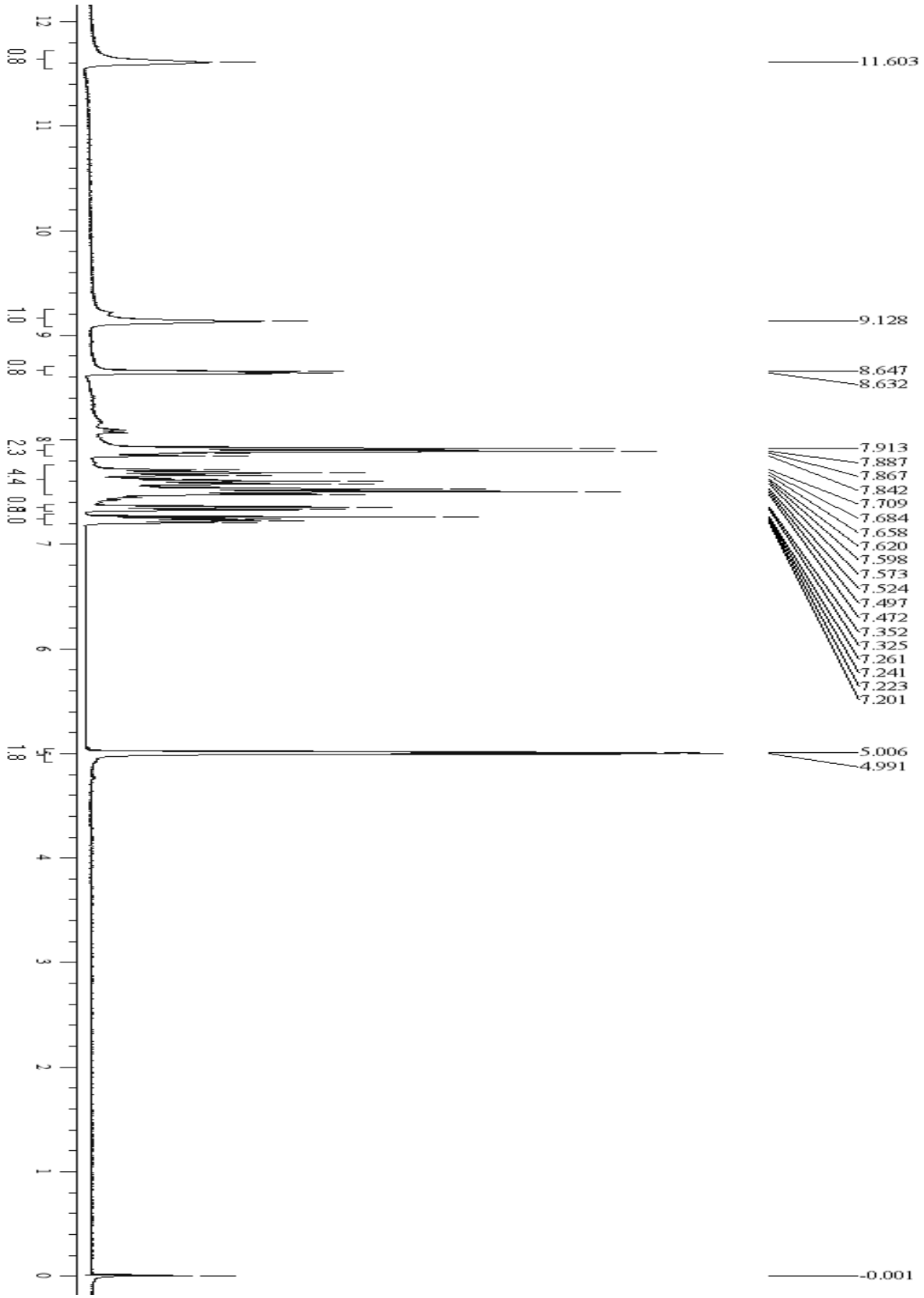
X-ray data of compound X was collected at room temperature using a Bruker Smart Apex CCD diffractometer with graphite monochromated Mo-Kα radiation (λ=0.71073Å) with ω-scan method.1 Preliminary lattice parameters and orientation matrices were obtained from four sets of frames. Unit cell dimensions were determined from the setting angles of 5032 reflections for **3c**.

Integration and scaling of intensity data were accomplished using SAINT program.[1] The structures were solved by Direct Methods using SHELXS972 and refinement was carried out by full-matrix least-squares technique using SHELXL97.[2] Anisotropic displacement parameters were included for all non-hydrogen atoms. All H atoms were positioned geometrically and treated as riding on their parent C atoms, with C-H distances of 0.93--0.96 Å, and with $U_{iso}(H) = 1.2U_{eq}$ (C) or $1.5U_{eq}$ for methyl atoms. The acetic acid solvent molecules could not be resolved due to extensive disorder and their assumed presence was removed from the overall scattering by the PLATON SQUEEZE procedure.

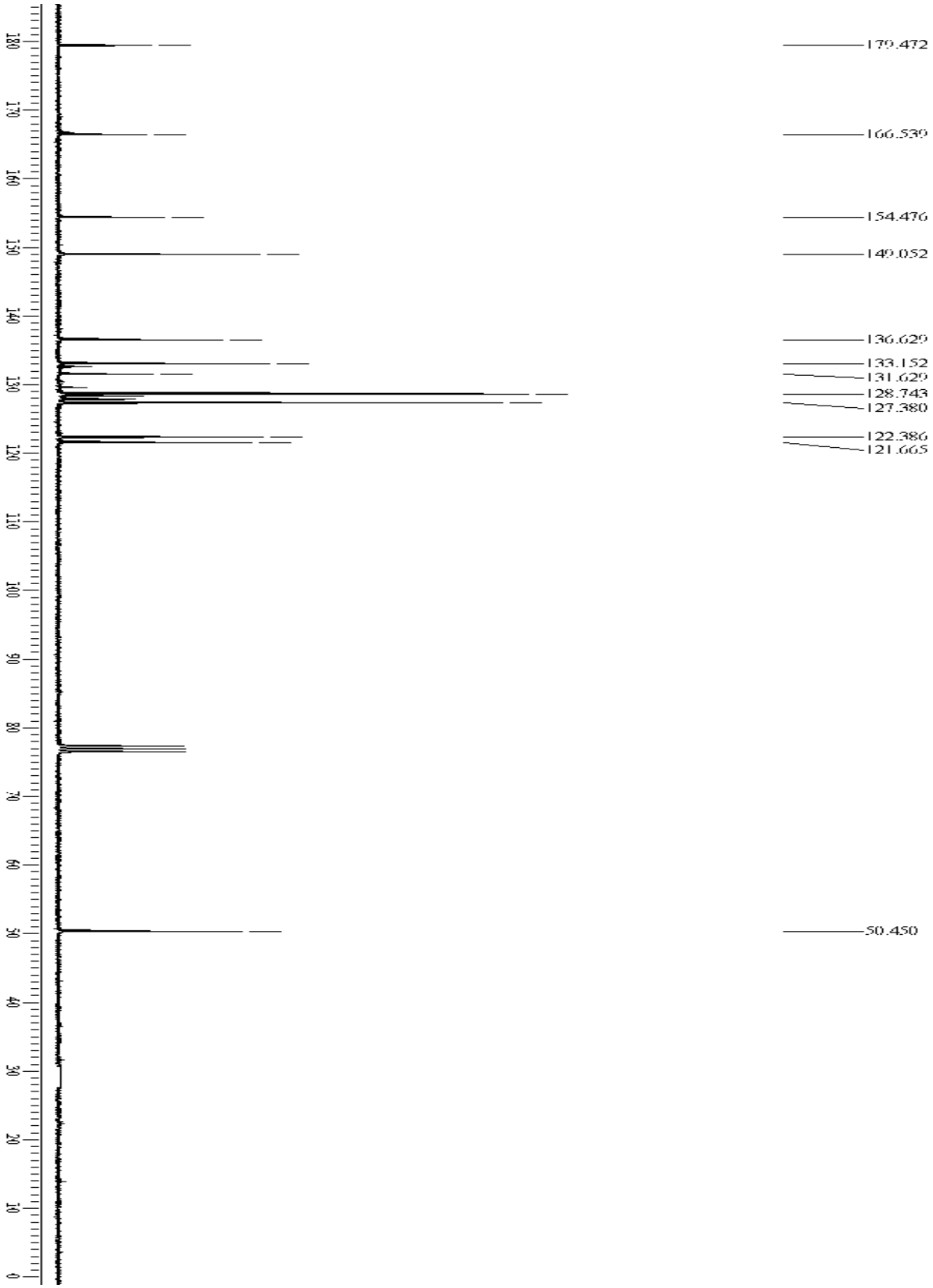
1. SMART & SAINT. Software Reference manuals. Versions 6.28a & 5.625, Bruker Analytical X-ray Systems Inc., Madison, Wisconsin, U.S.A., 2001.

2. Sheldrick, G. M. SHELXS97 and SHELXL97, Programs for crystal structure solution and refinement; University of Gottingen: Germany, 1997.

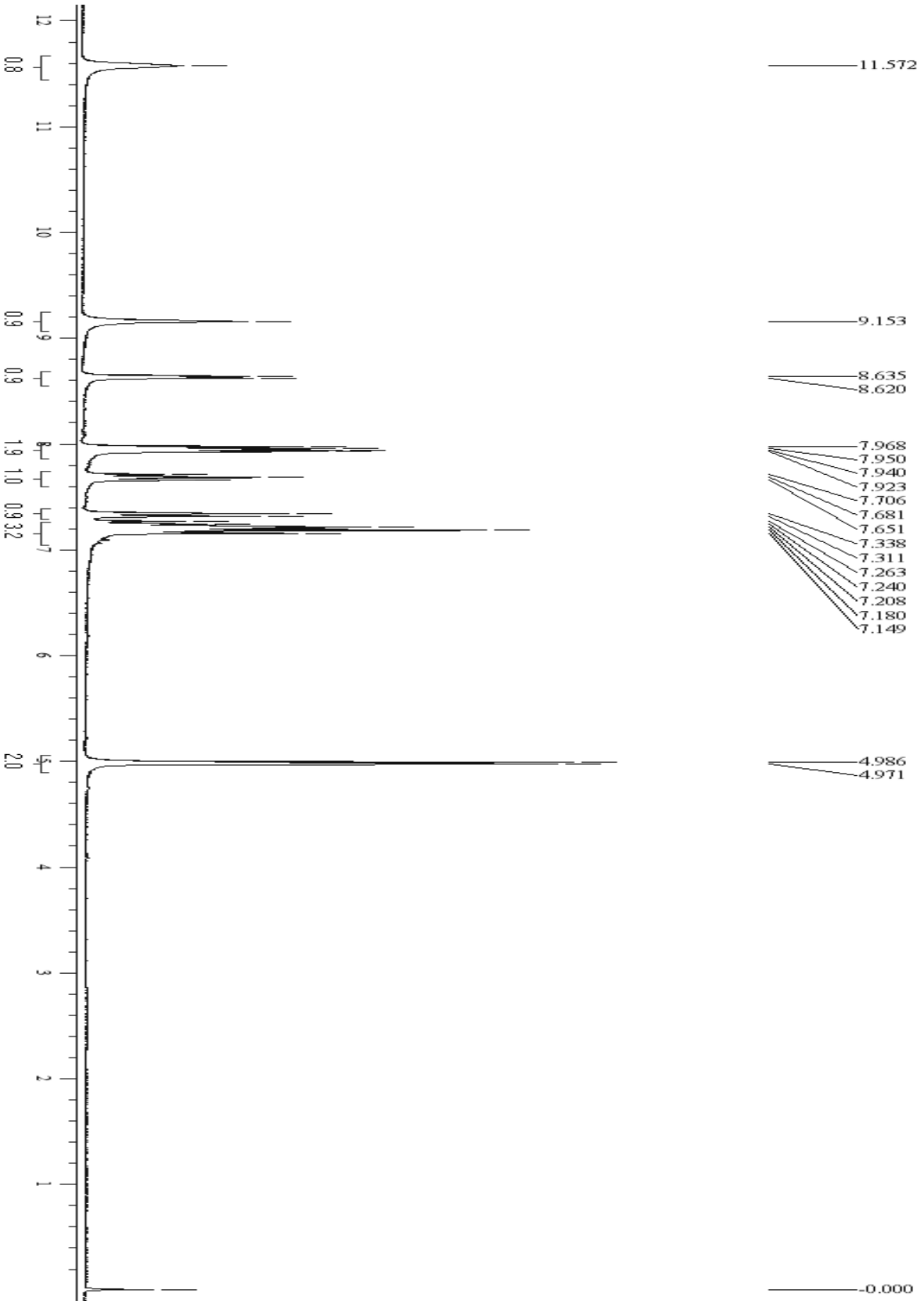
^{1}H NMR Spectrum of 1-(2-Picolyl)-3-benzoyl-thiourea (1a)



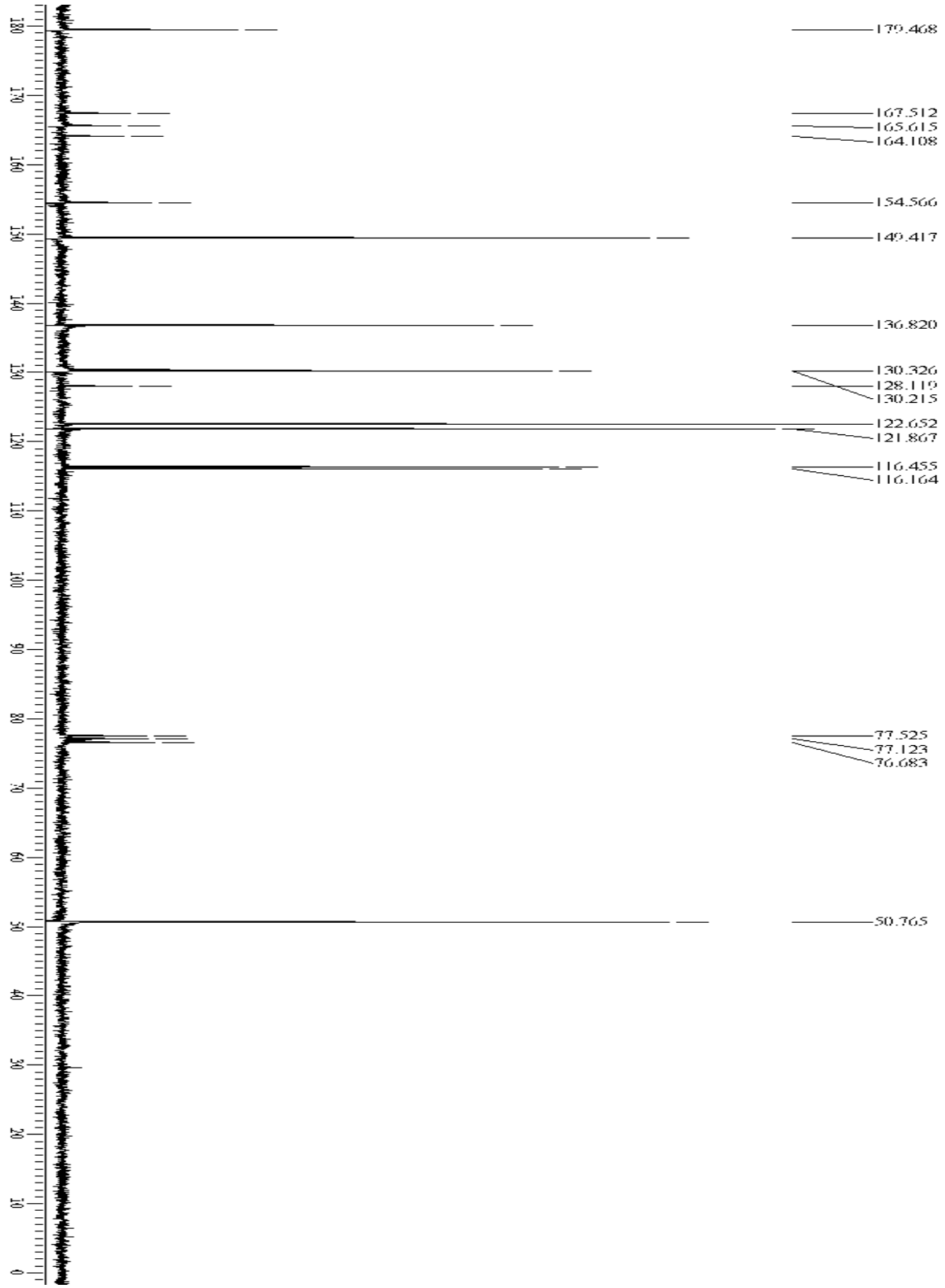
^{13}C NMR Spectrum of 1-(2-Picolyl)-3-benzoyl-thiourea (1a)



^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(4-fluorobenzoyl)-thiourea (1b)



^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(4-fluorobenzoyl)-thiourea (1b)



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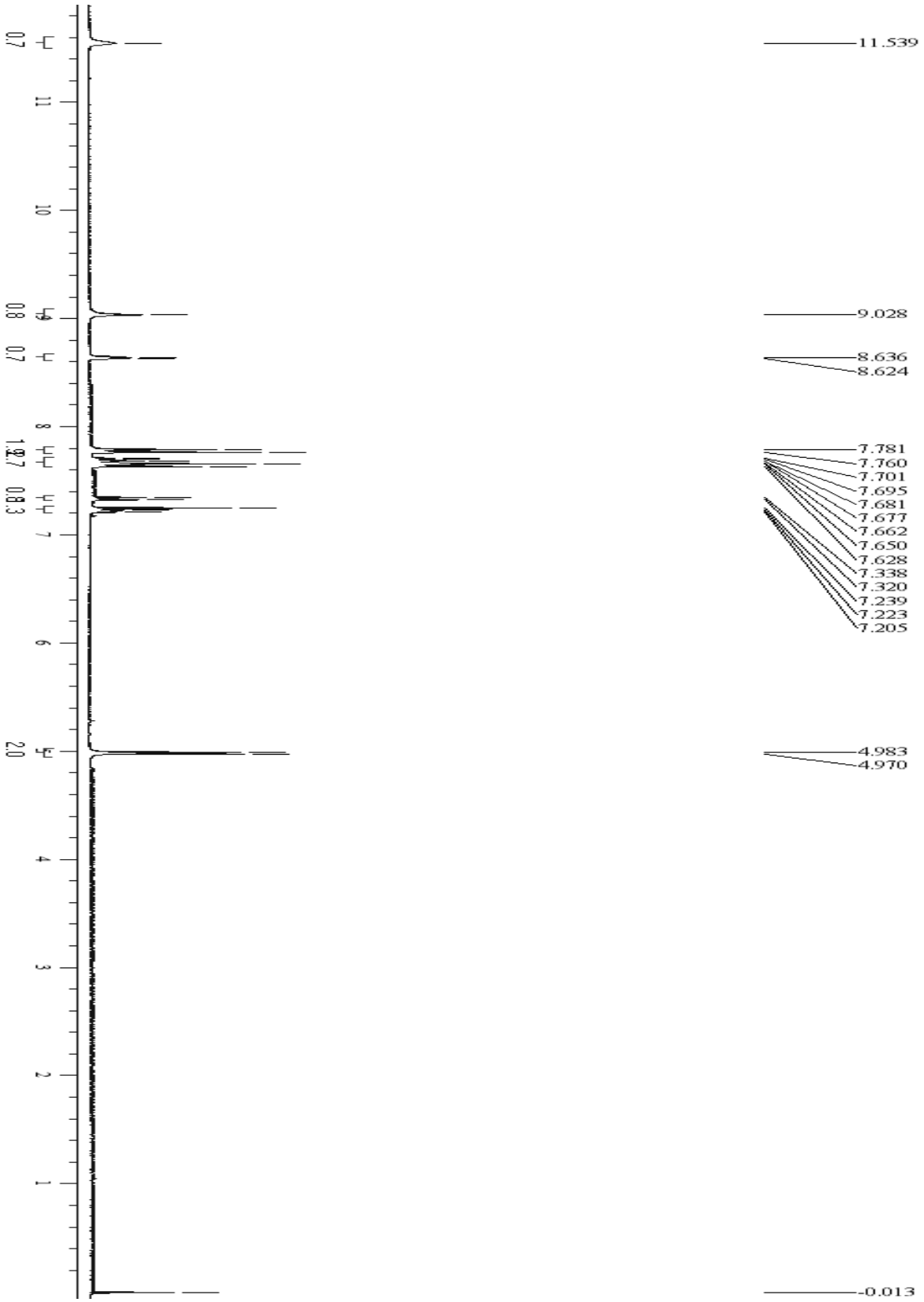

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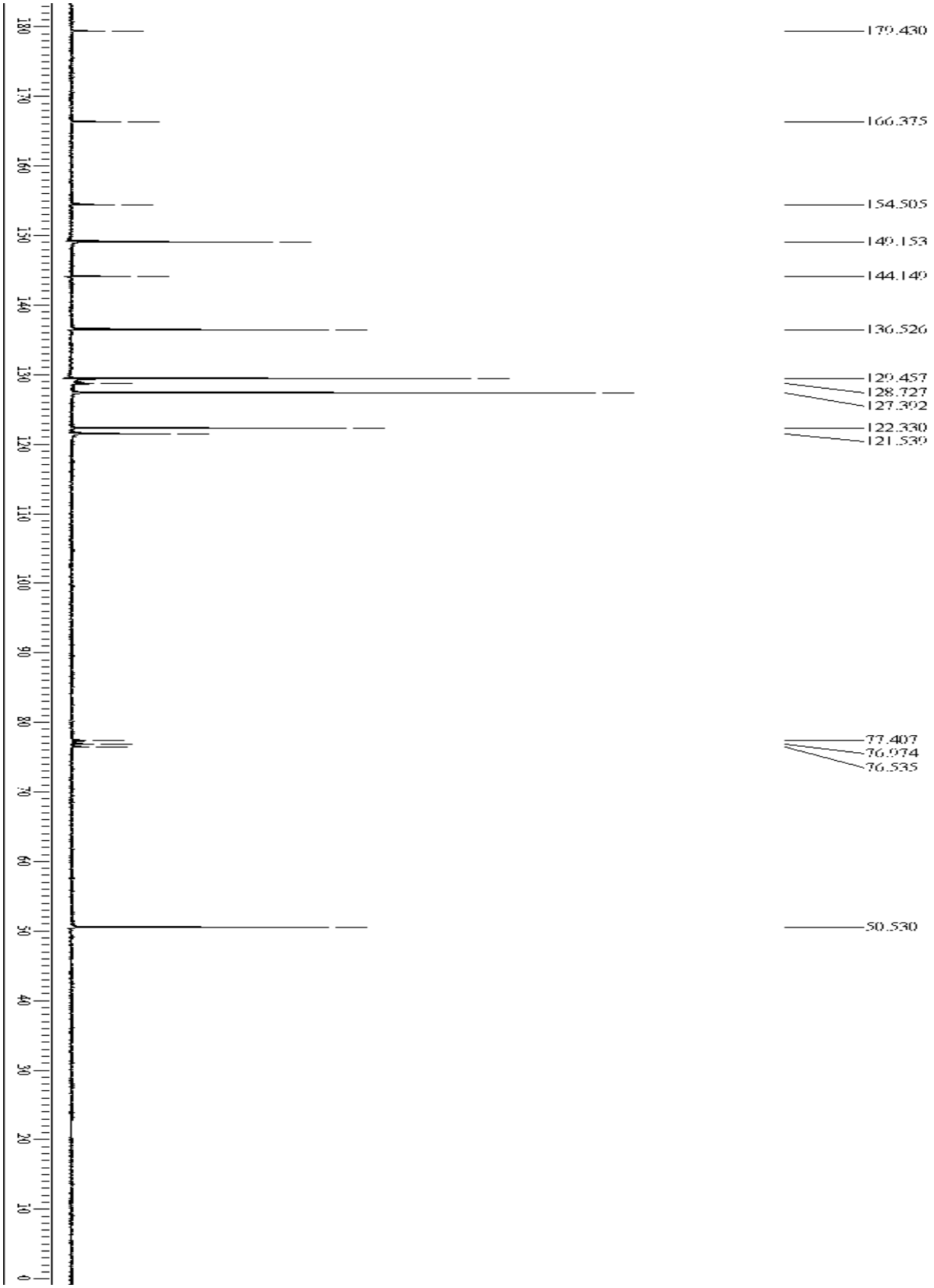
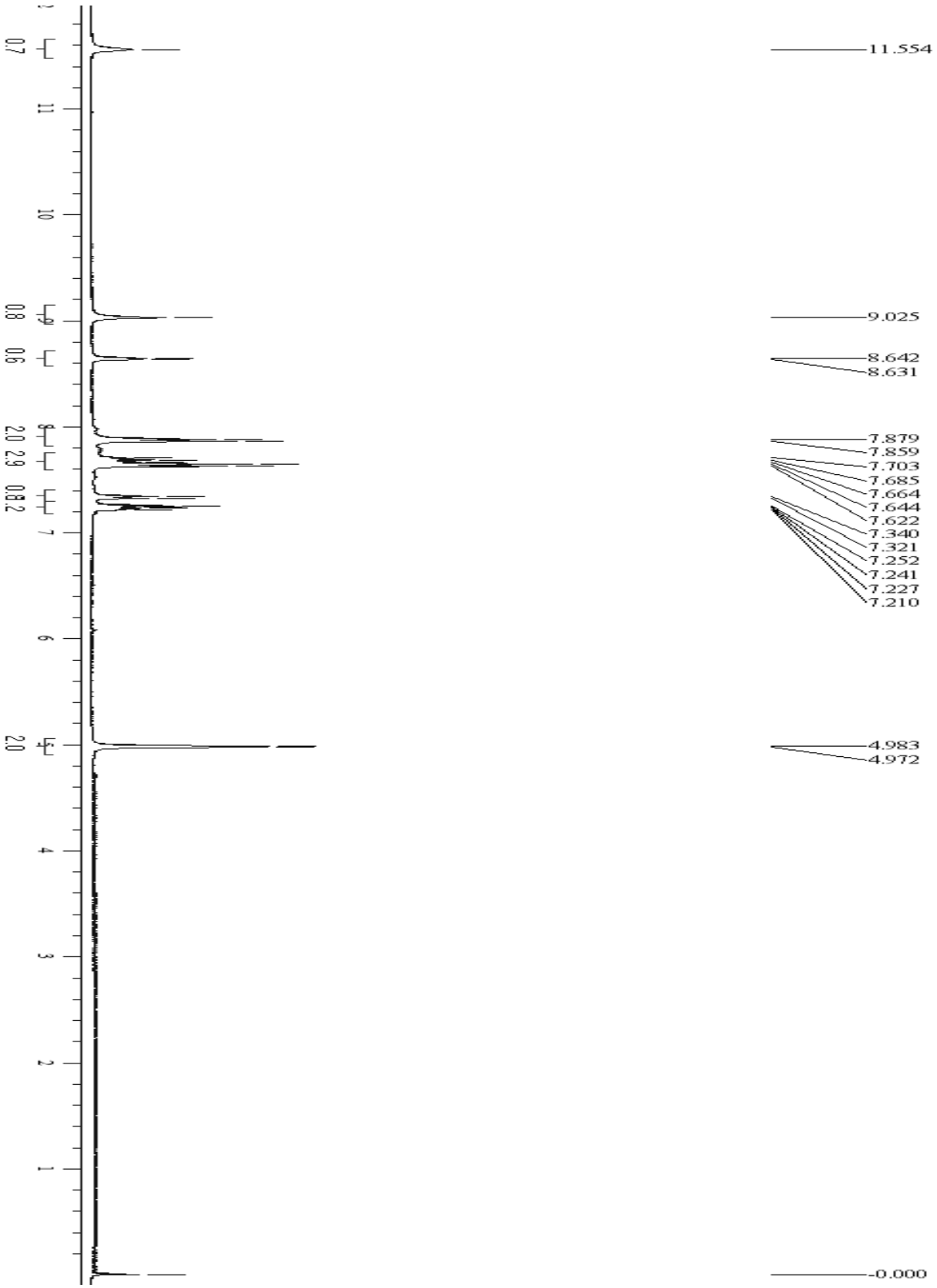


^{1}H NMR Spectrum of1-(2-Picolyl)-3-(4-iodobenzoyl)-thiourea (1d)



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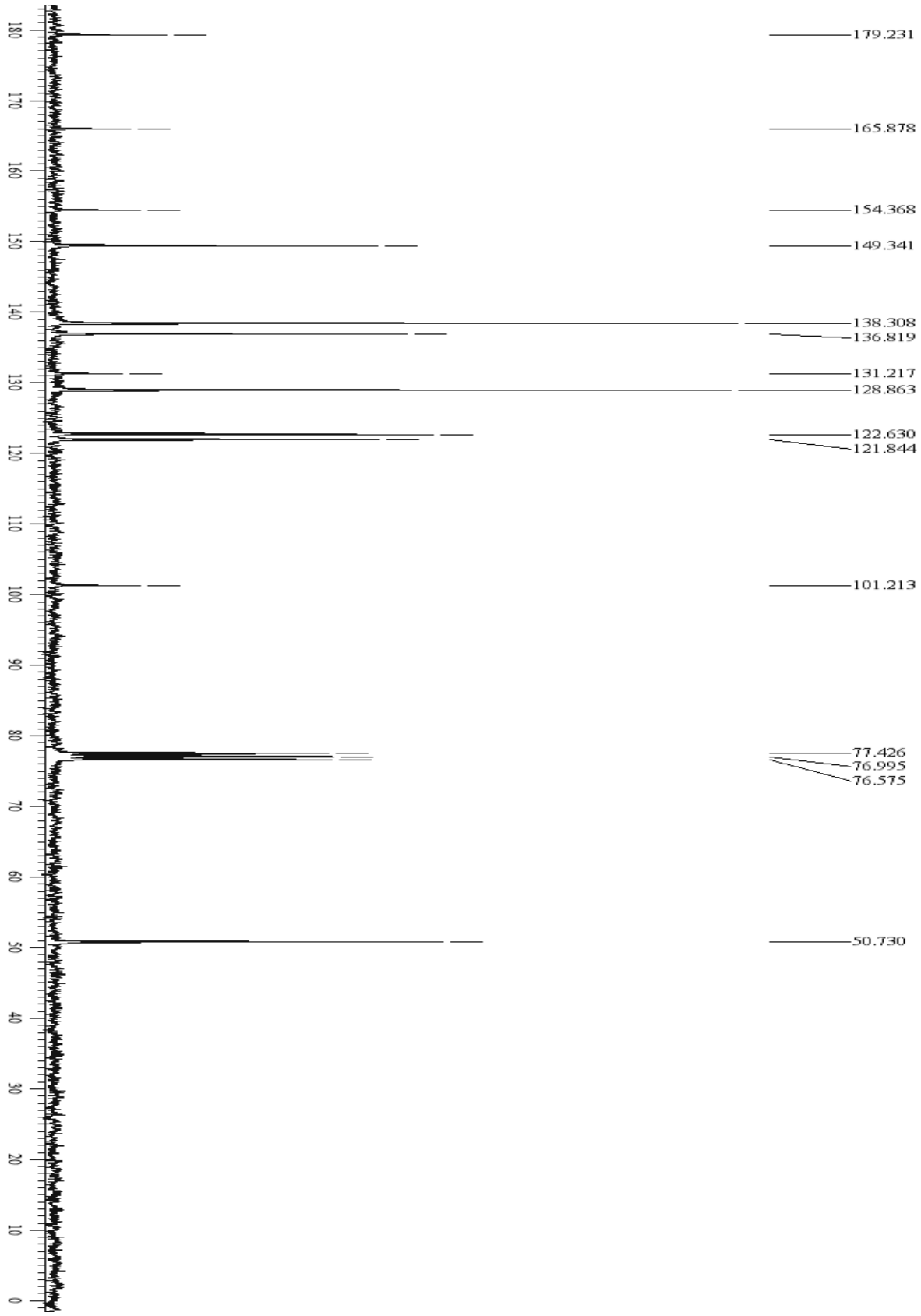
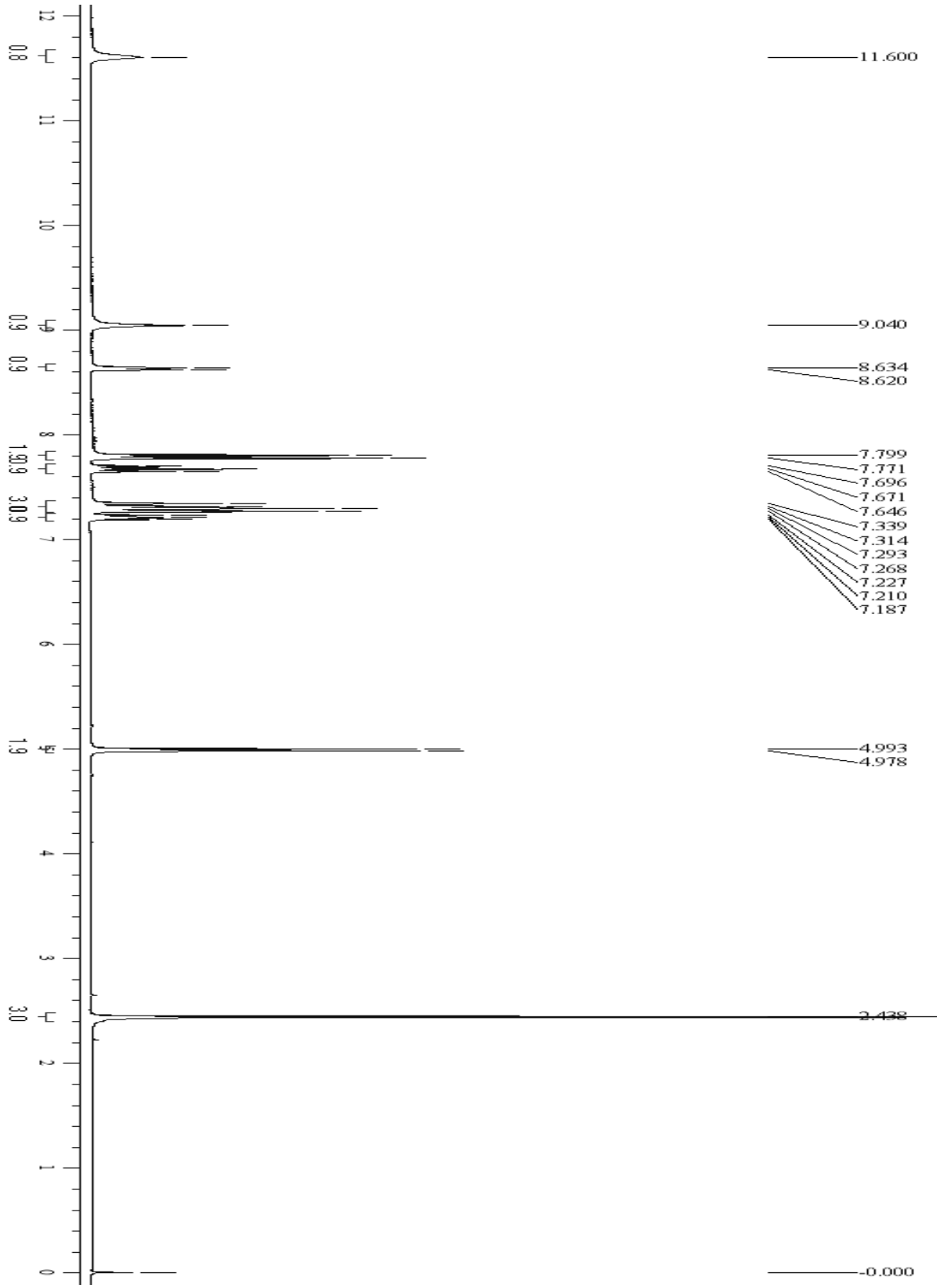
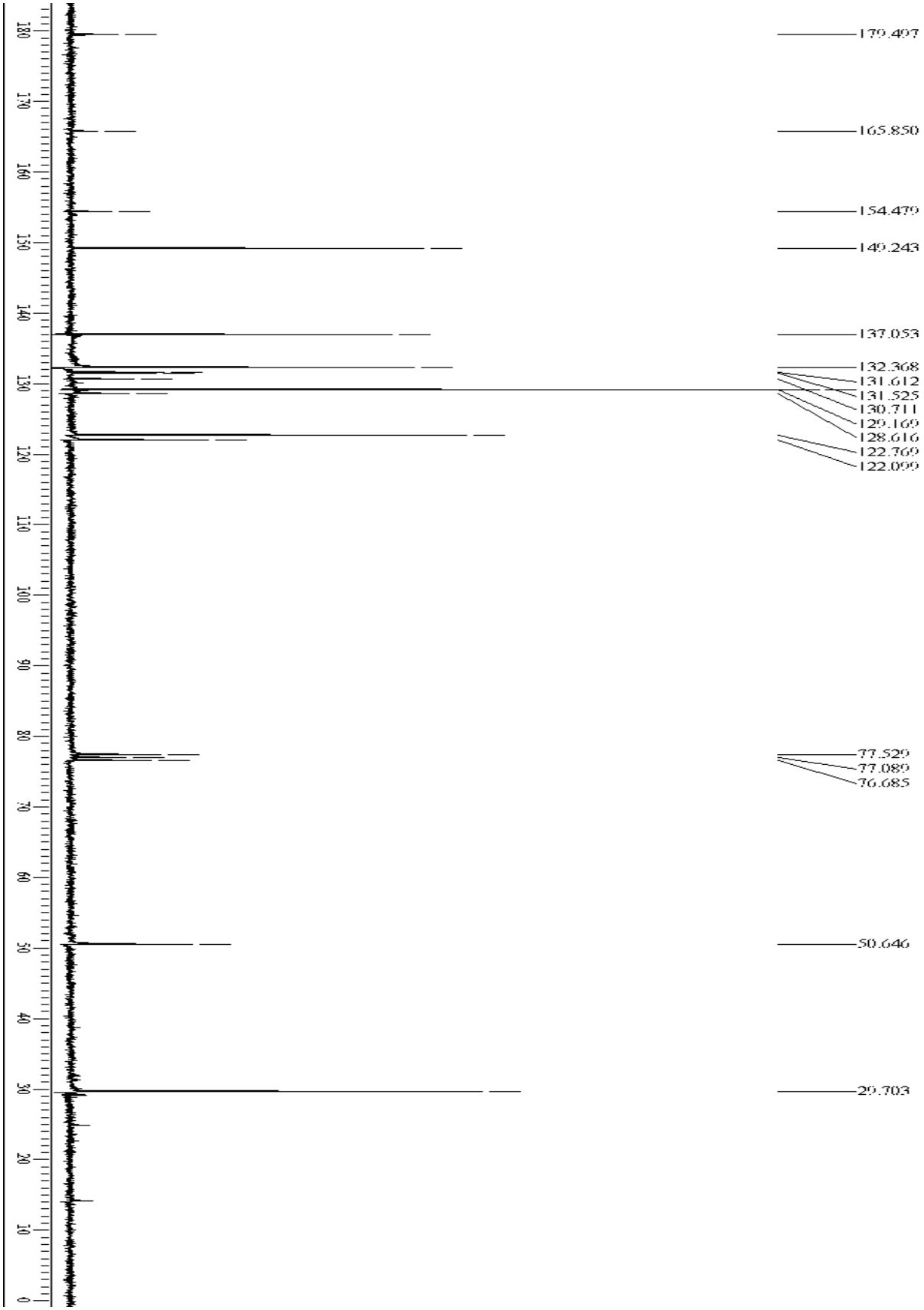


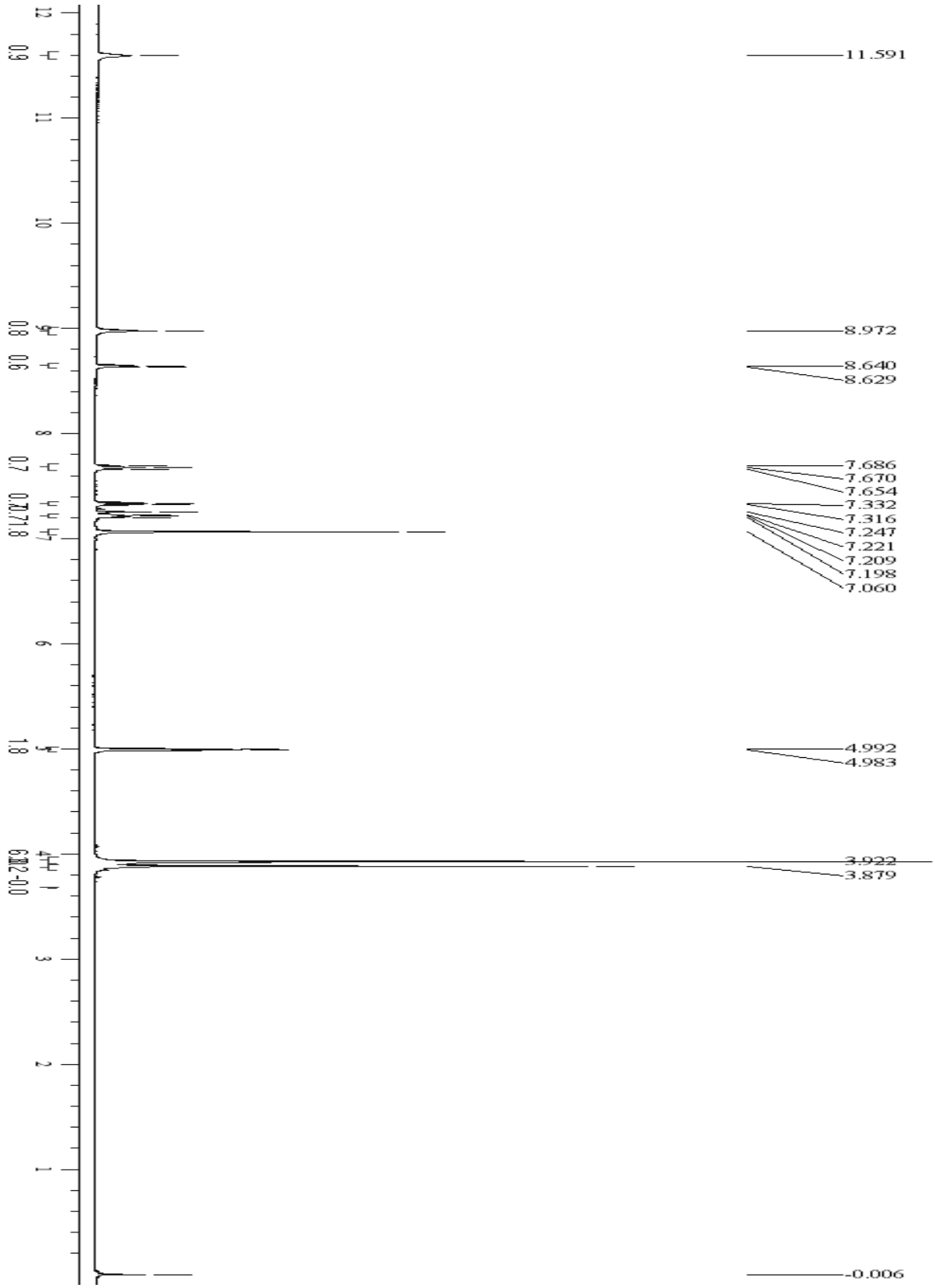
^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(4-methylbenzoyl)-thiourea (1e)



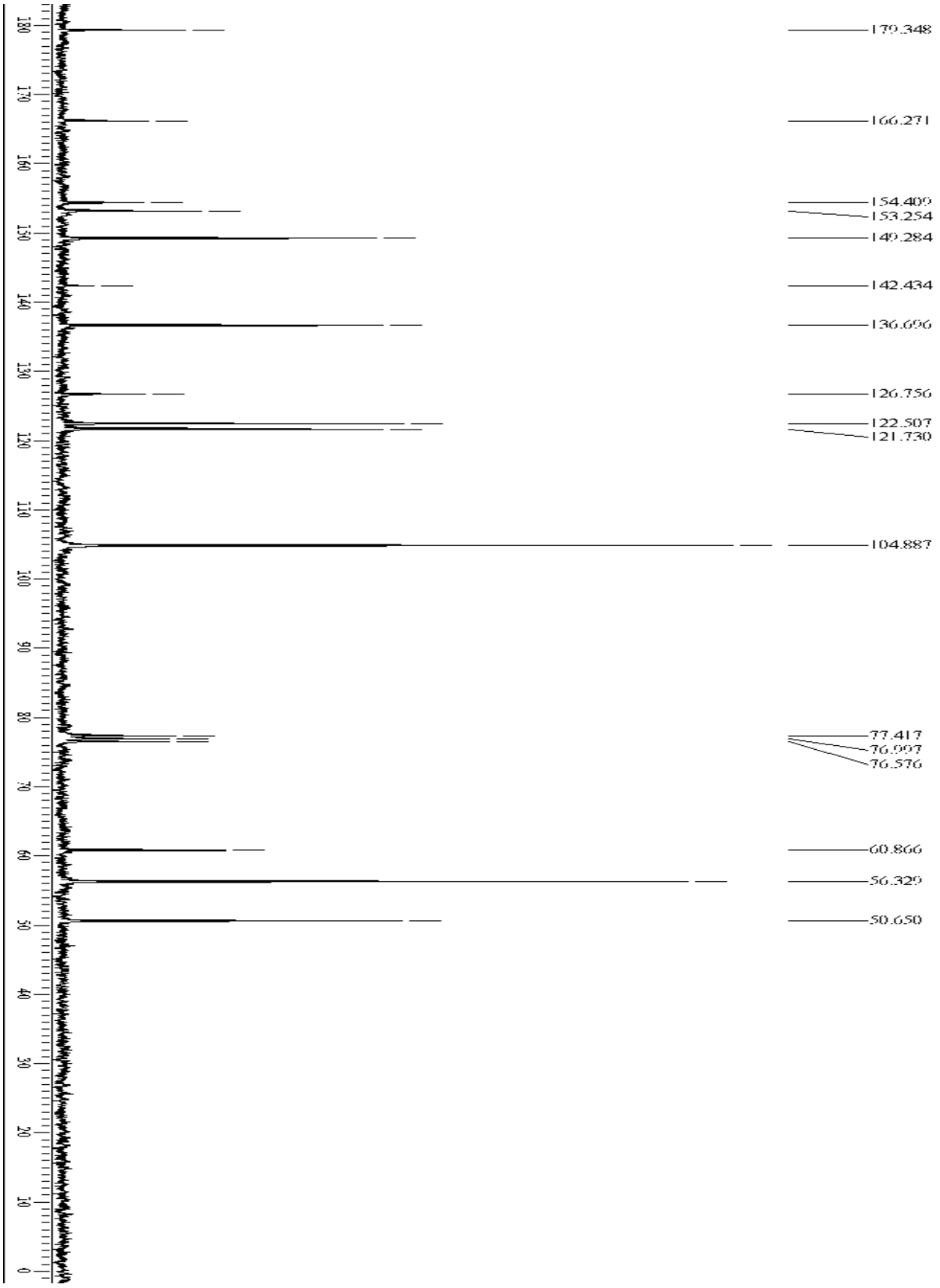
^{13}C NMR Spectrum of1-(2-Picolyl)-3-(4-methylbenzoyl)-thiourea (1e)



^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(3,4,5-trimethoxybenzoyl)-thiourea (1f)



^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(3,4,5-trimethoxybenzoyl)-thiourea (1f)



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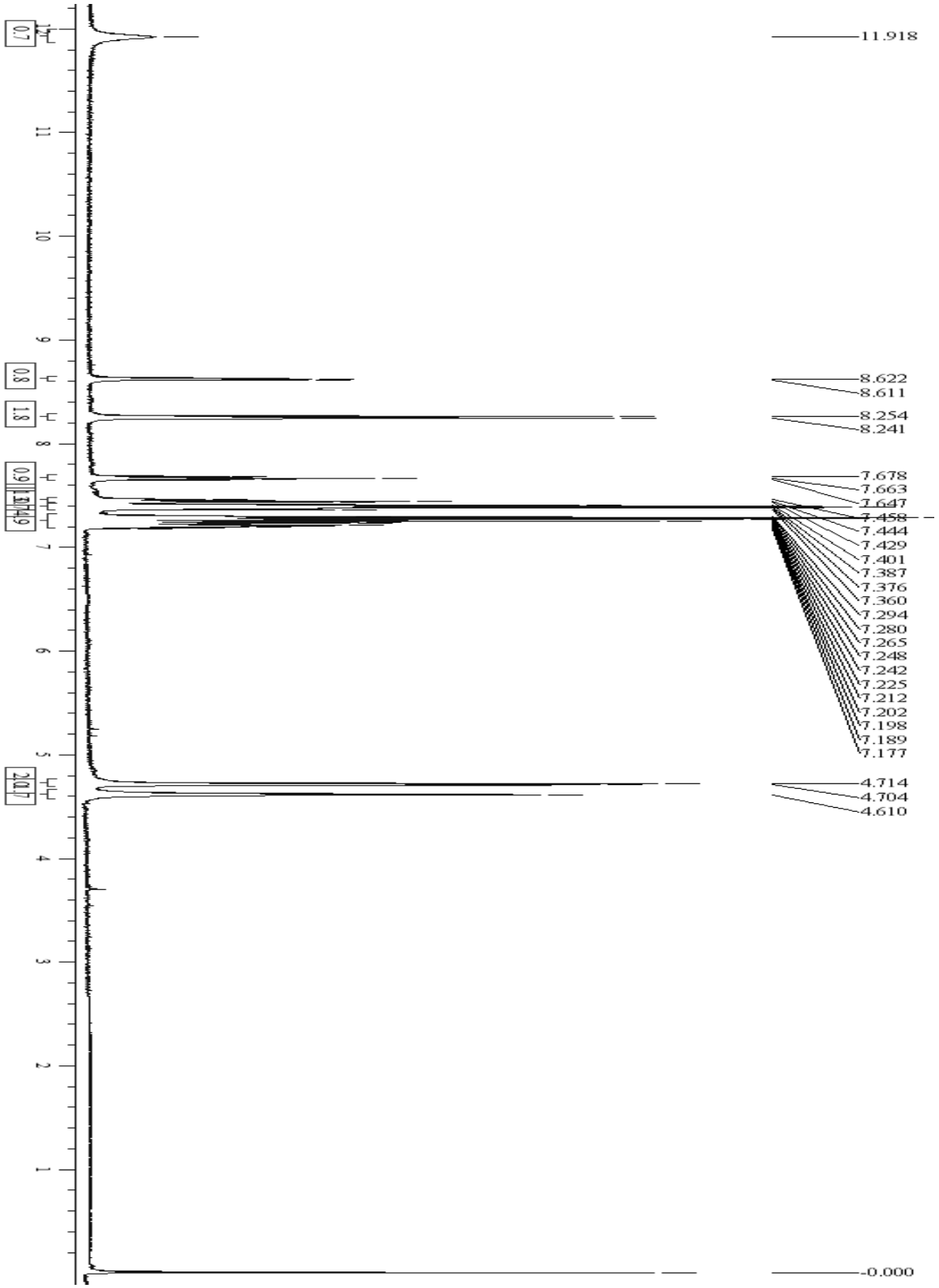

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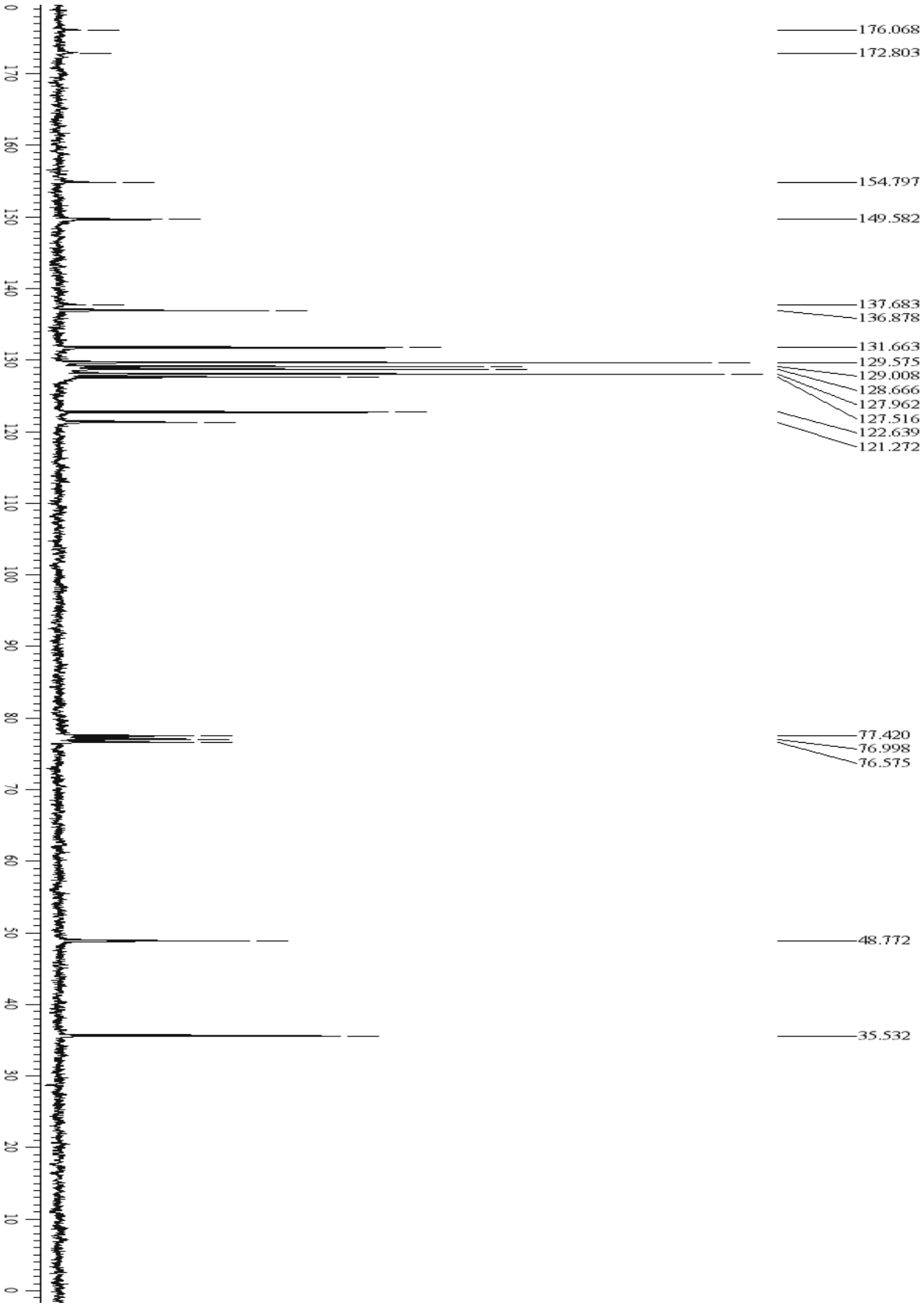

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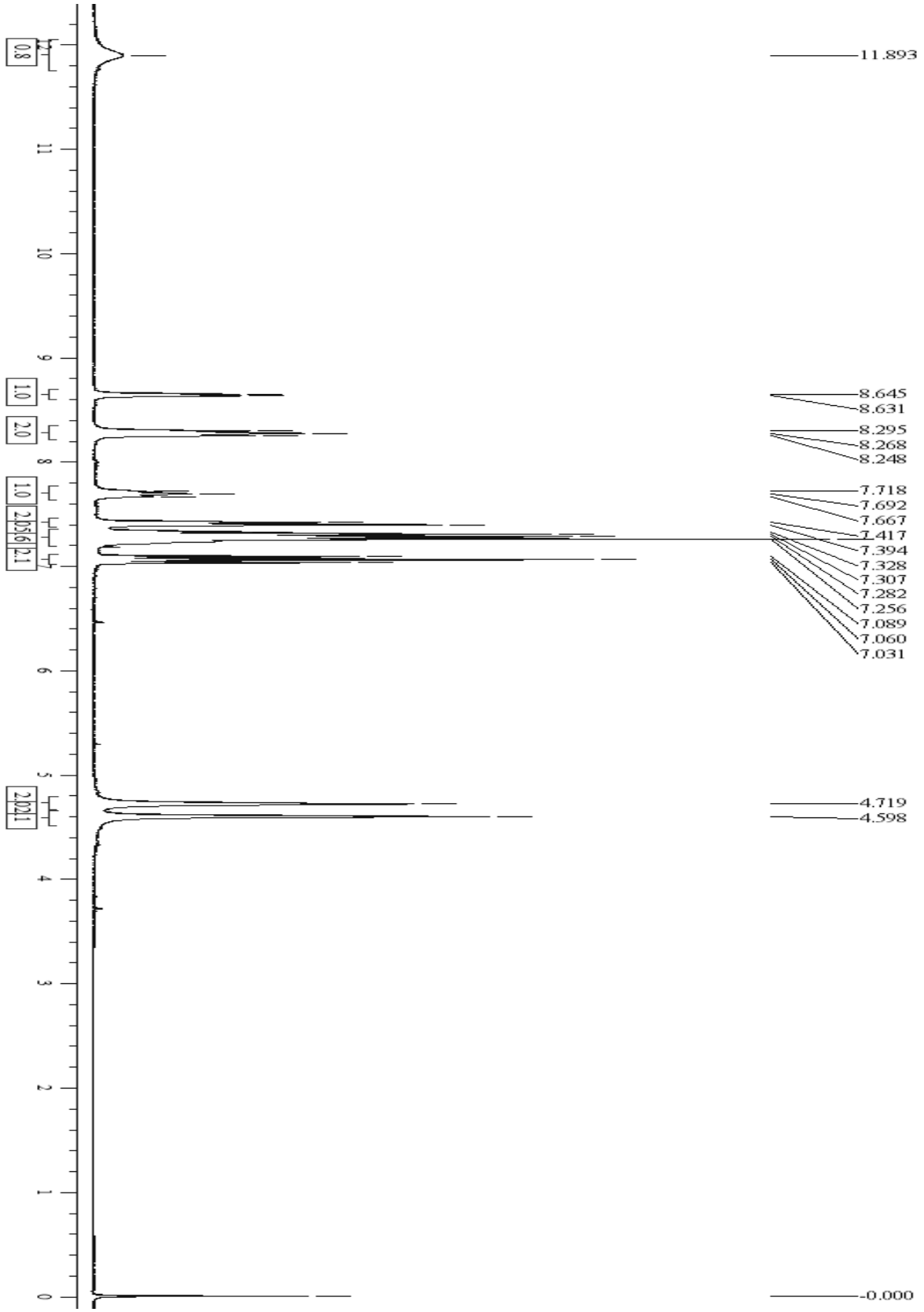
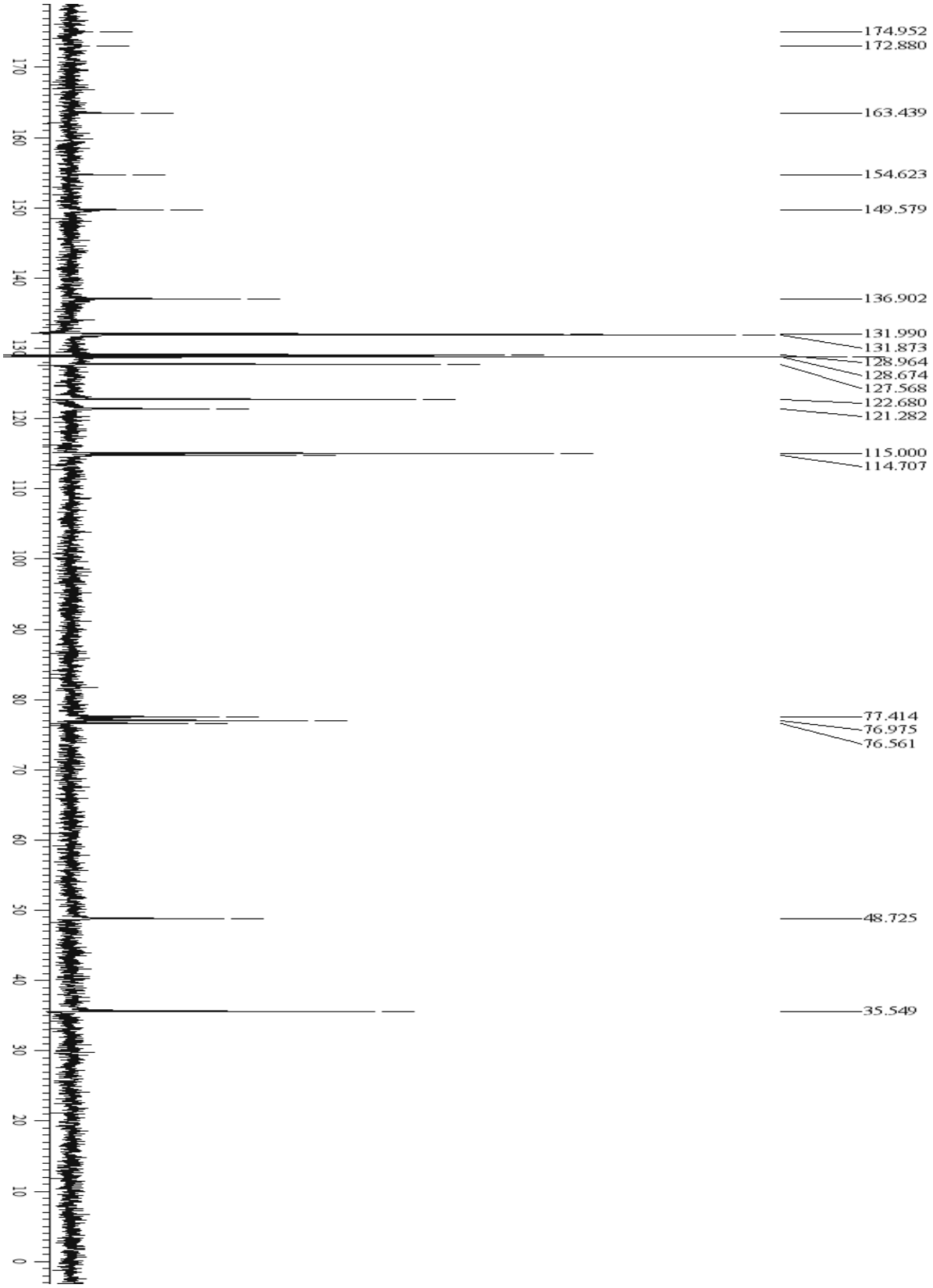


^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(4-fluorobenzoyl)-2-benzyl-2-thiopseudourea (2b)



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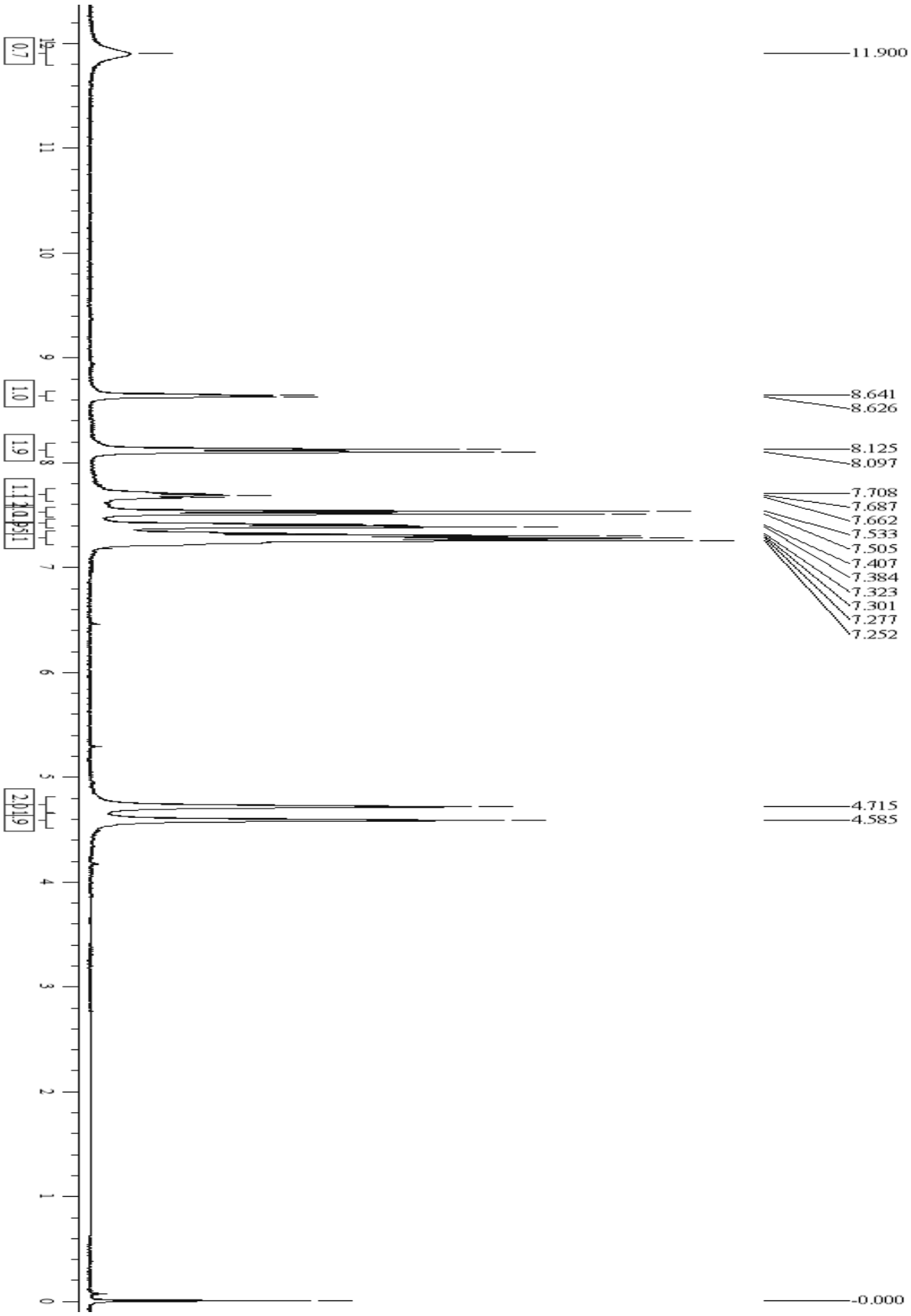
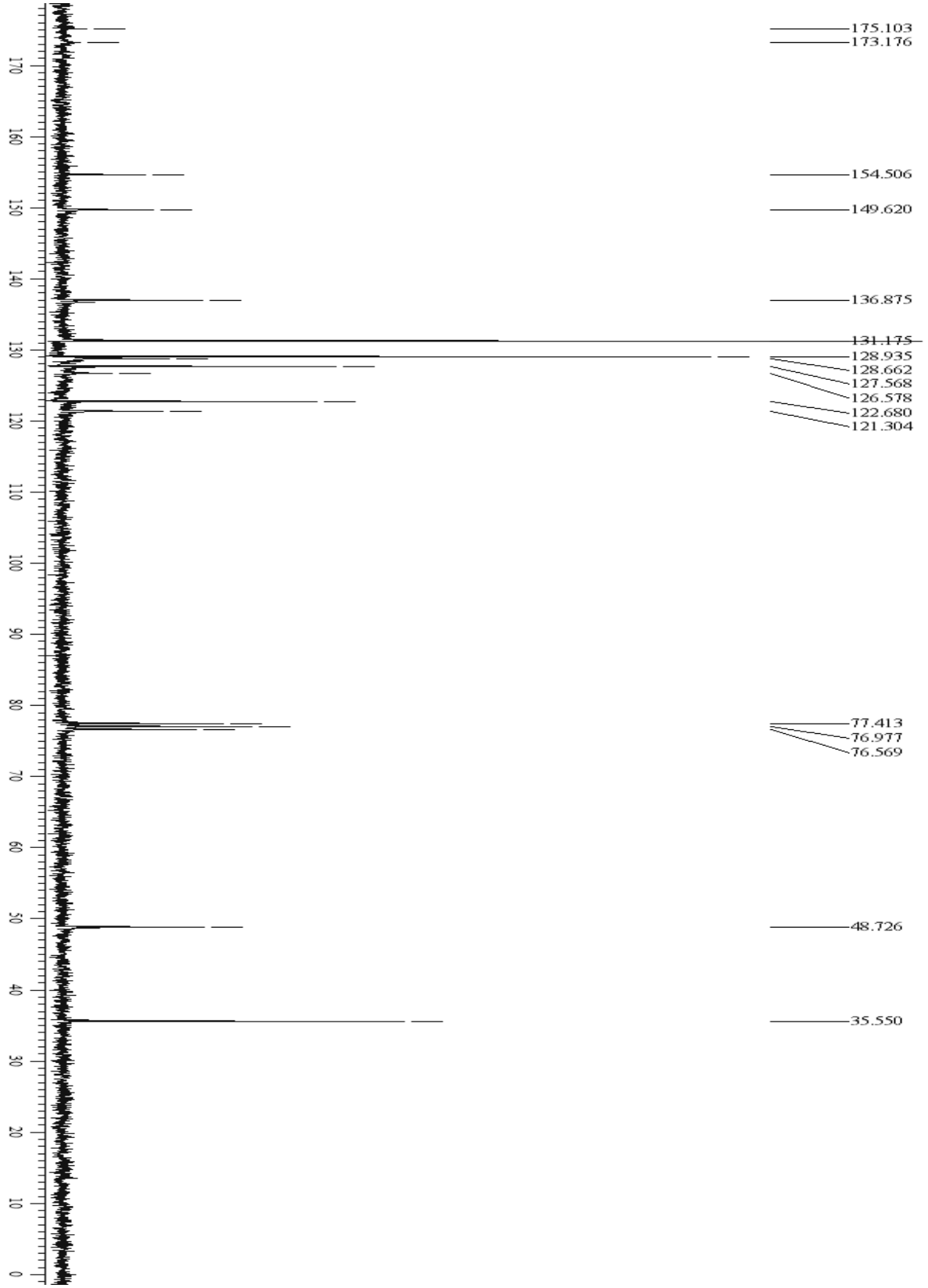
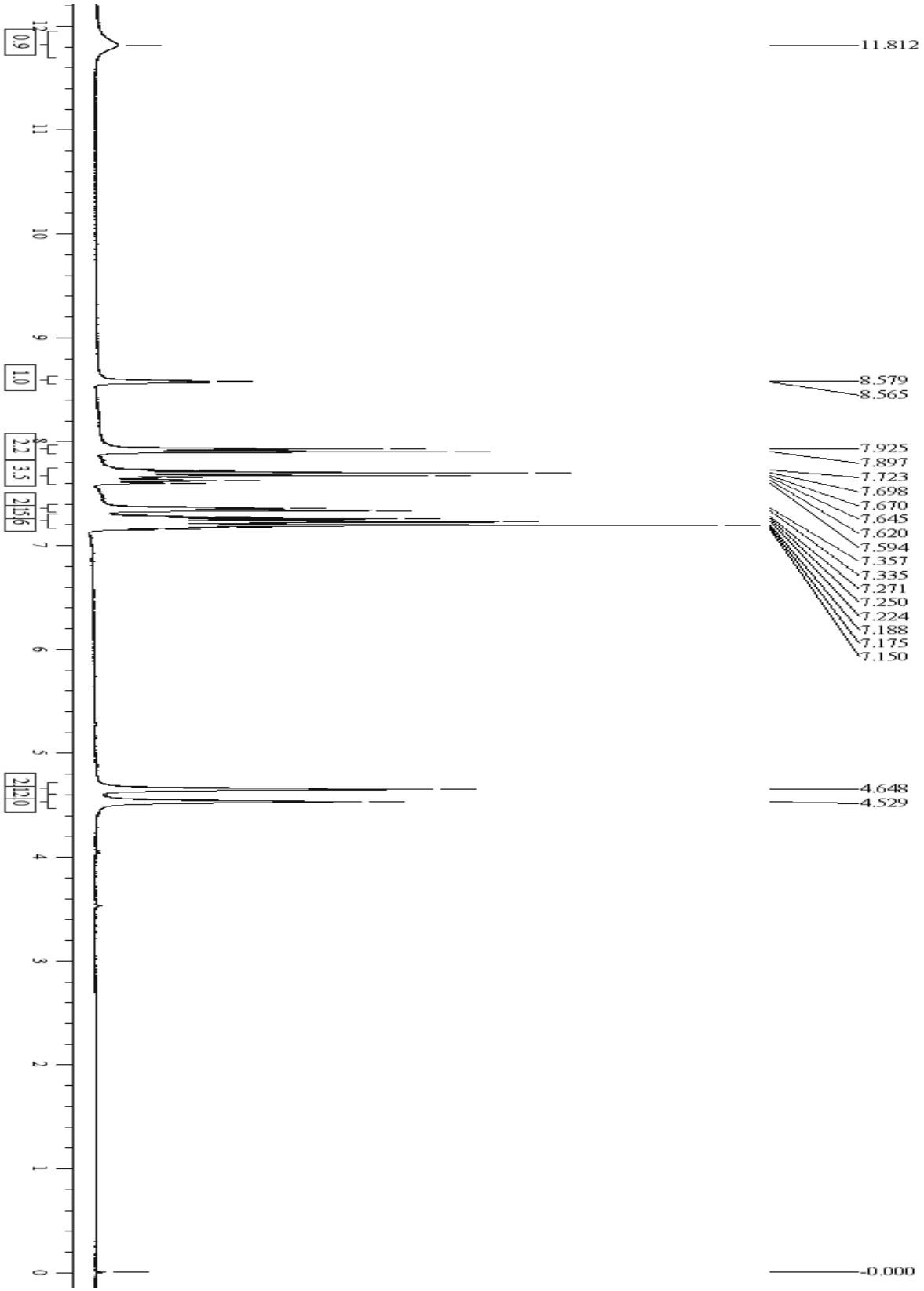


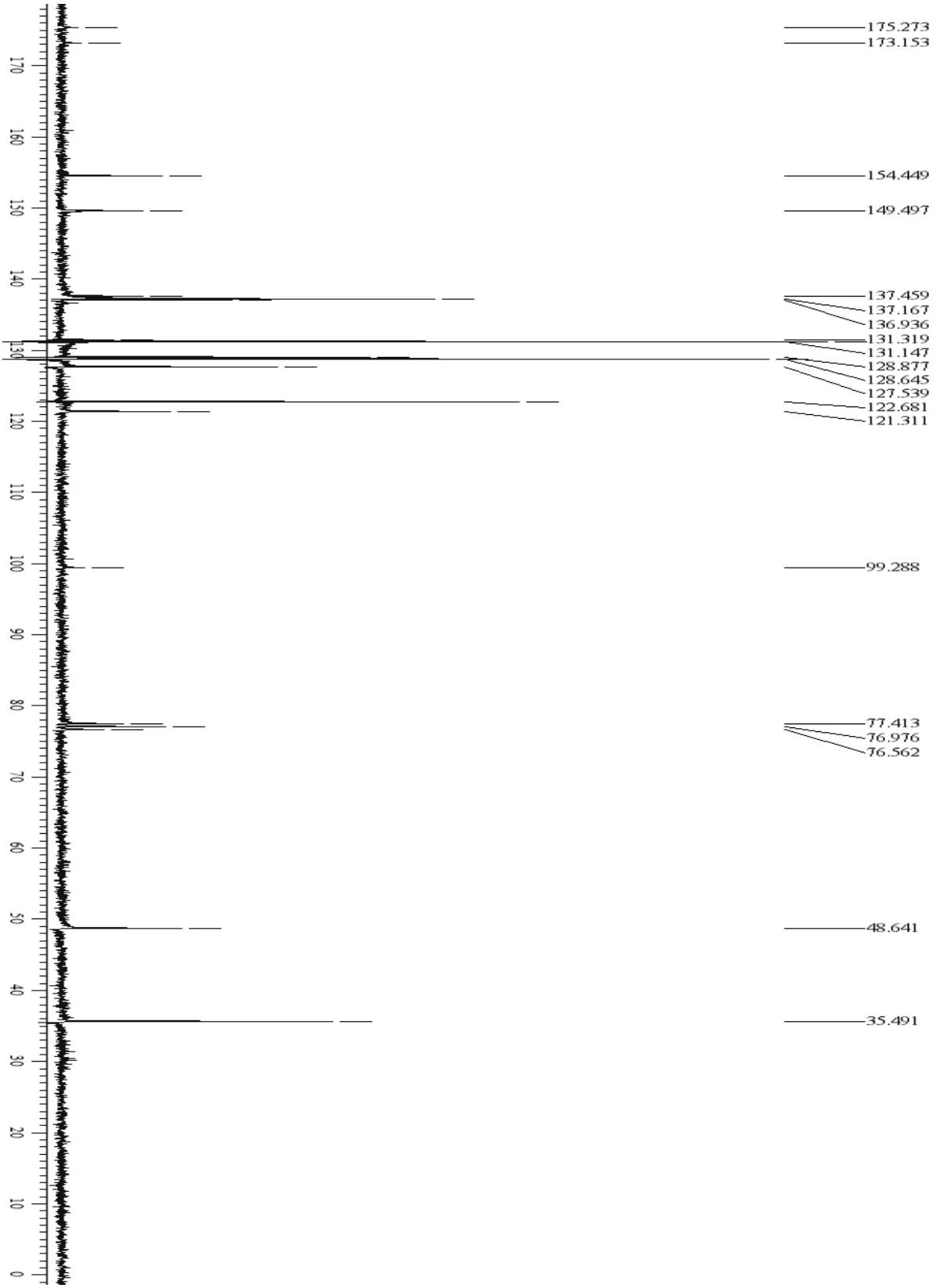
^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(4-bromobenzoyl)-2-benzyl-2-thiopseudourea (2c)



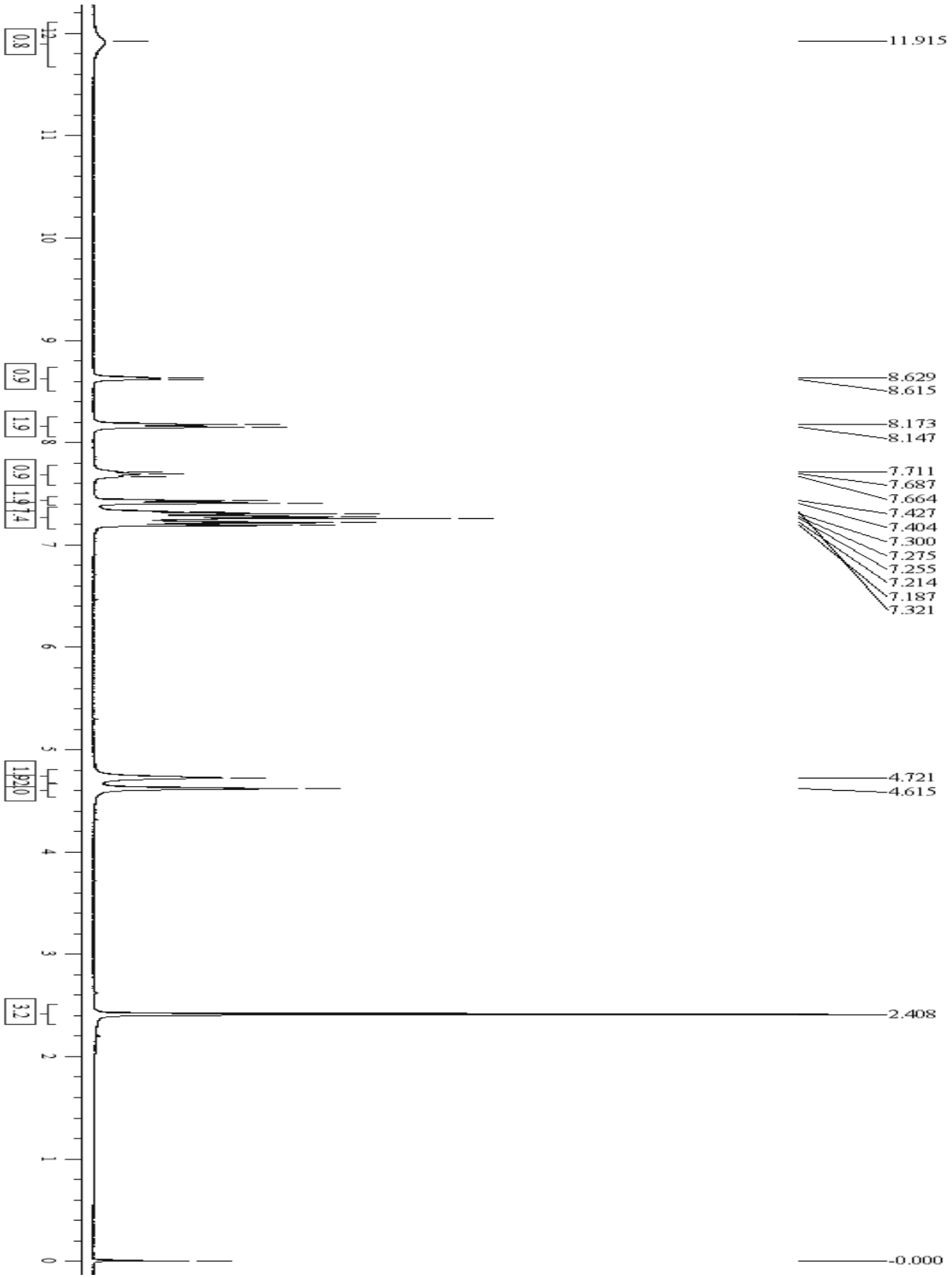
^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(4-iodobenzoyl)-2-benzyl-2-thiopseudourea (2d)



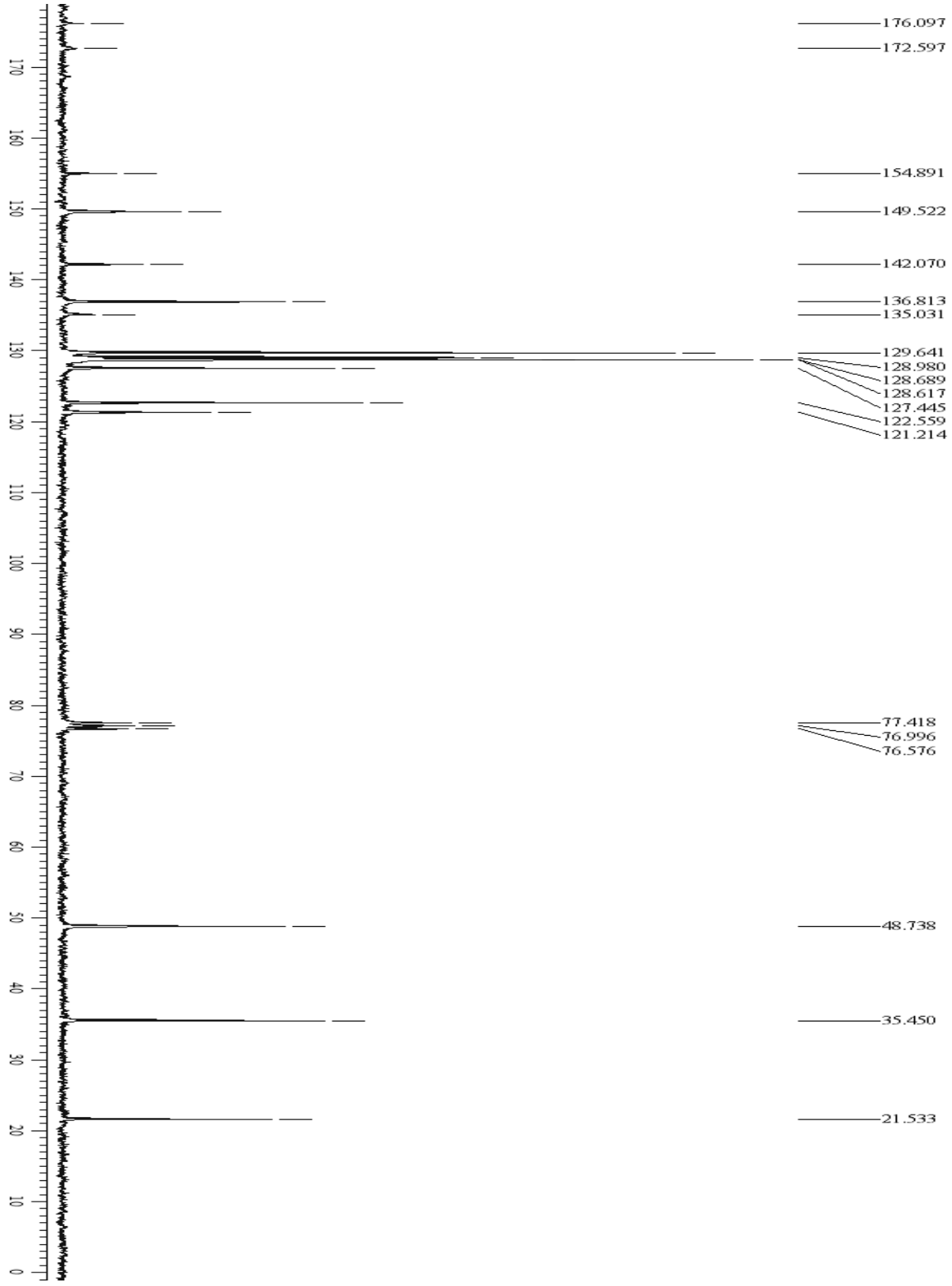
^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(4-iodobenzoyl)-2-benzyl-2-thiopseudourea (2d)



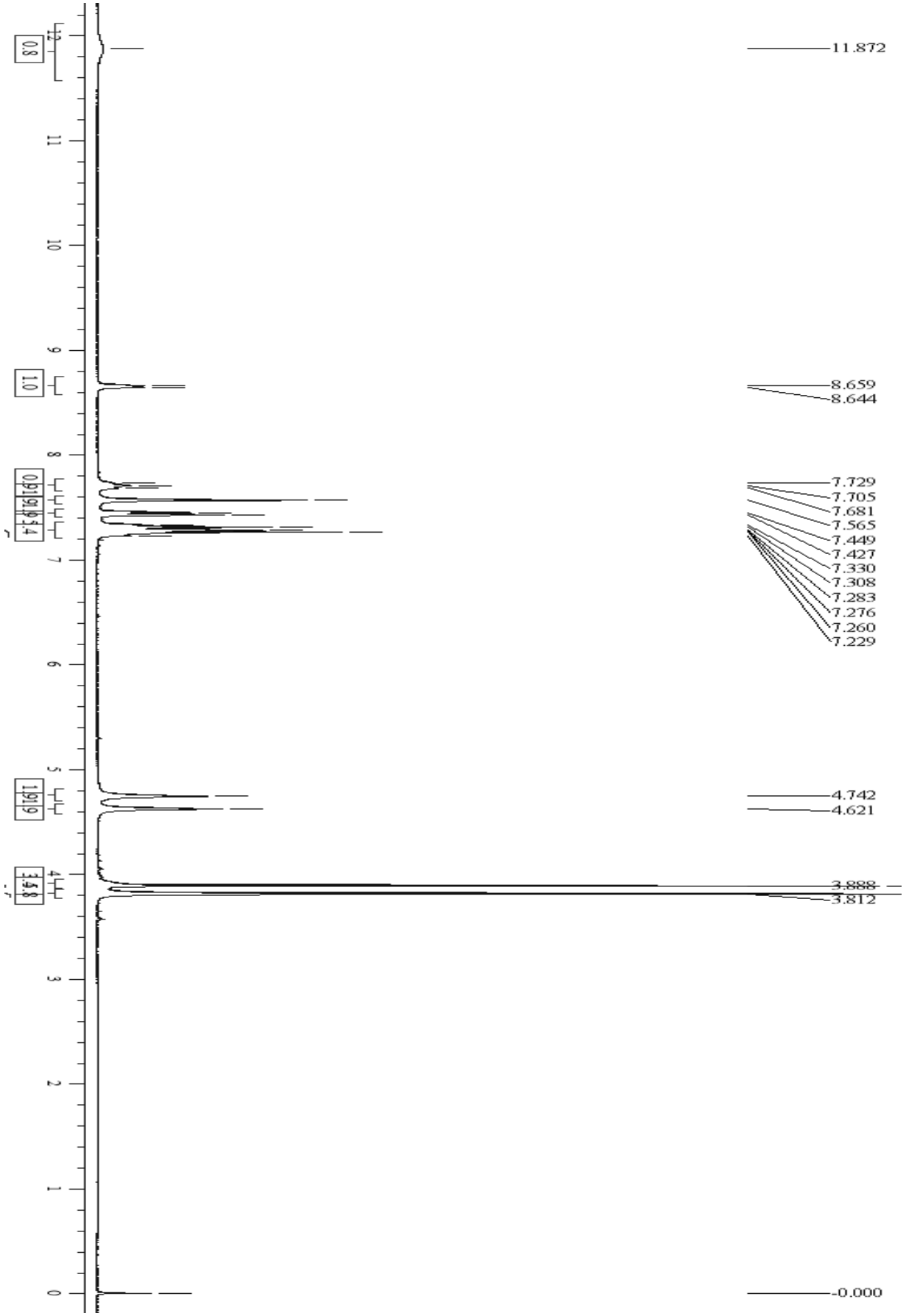
^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(4-methylbenzoyl)-2-benzyl-2-thiopseudourea (2e)



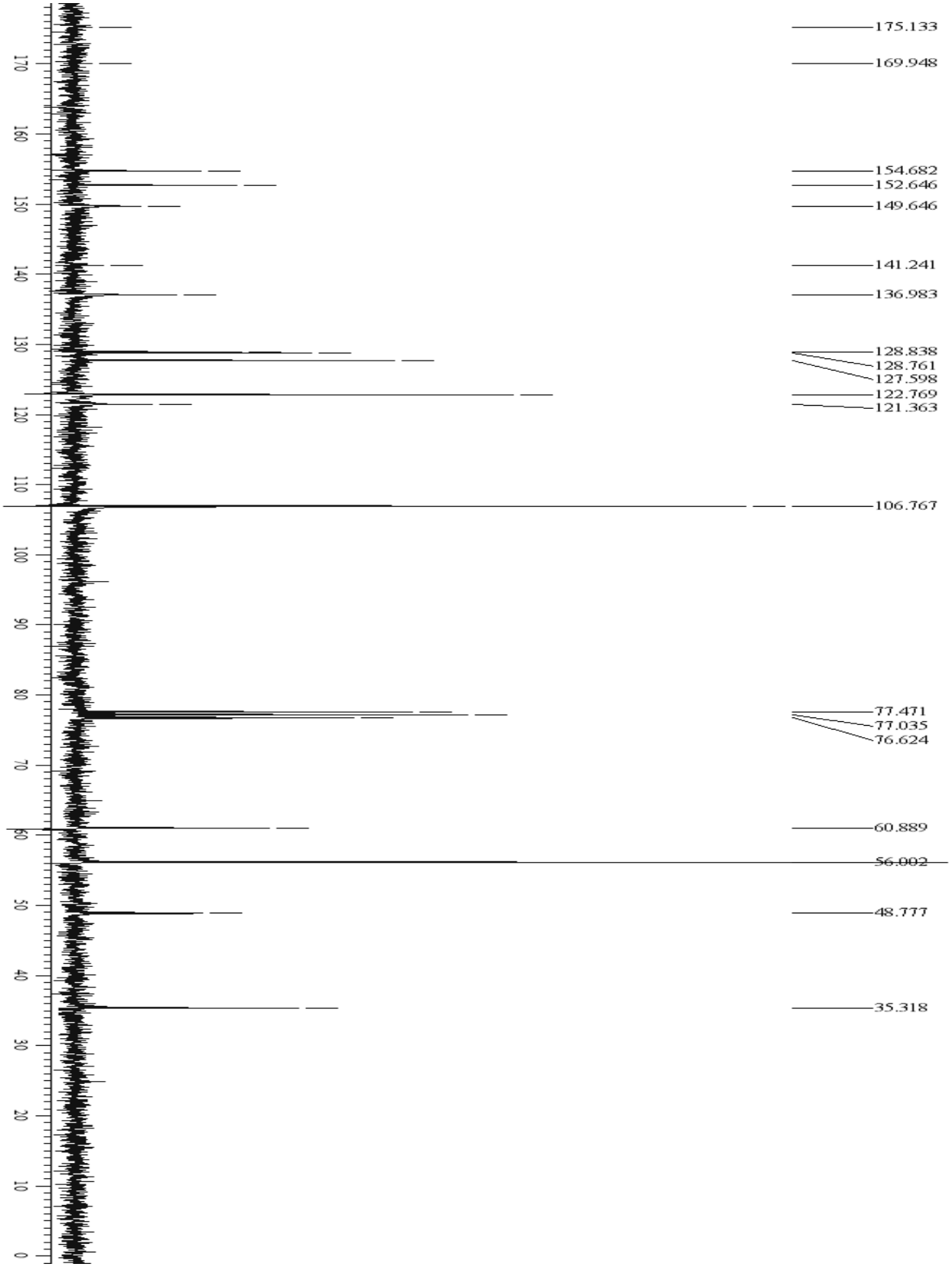
^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(4-methylbenzoyl)-2-benzyl-2-thiopseudourea (2e)



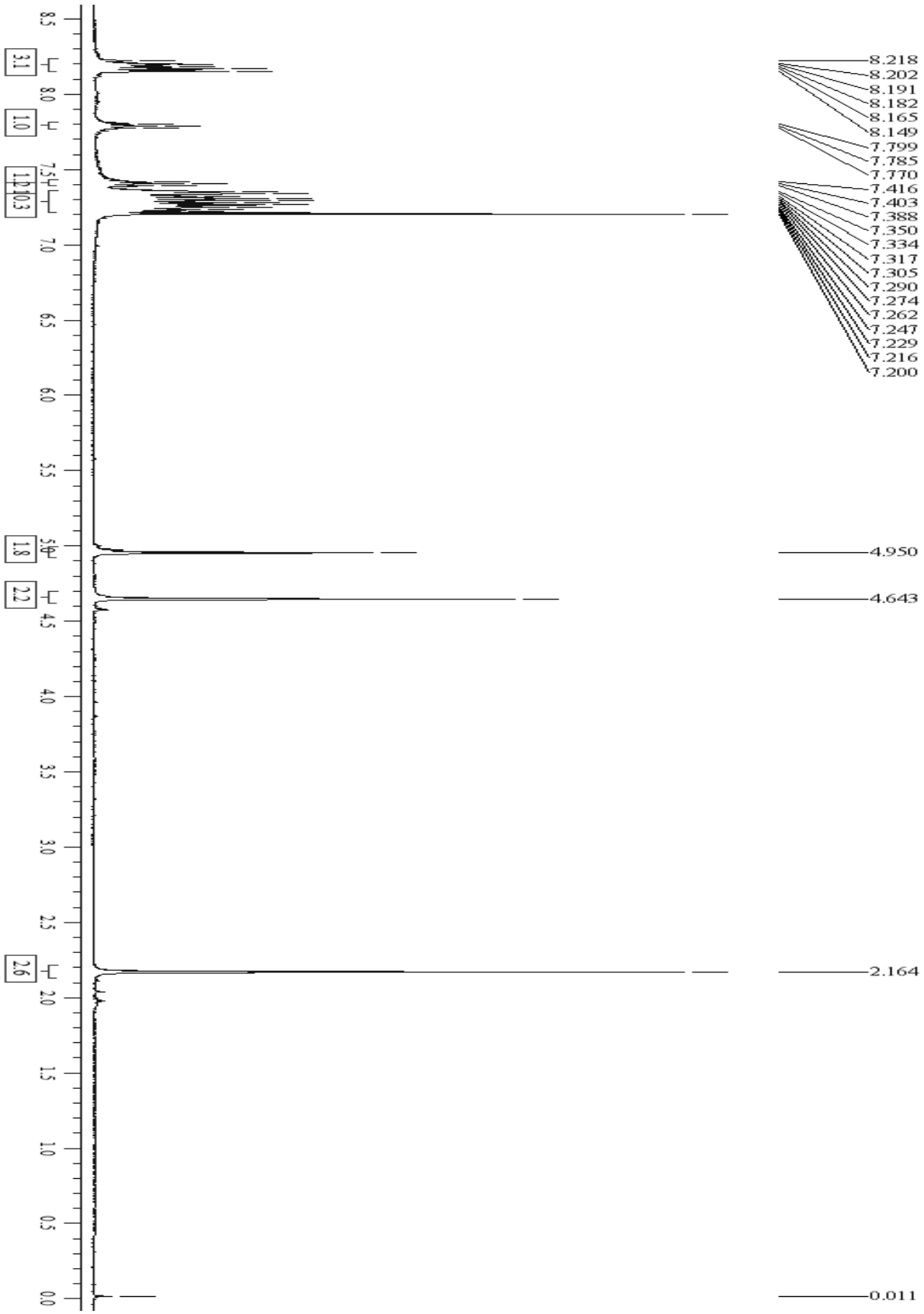
^{1}H NMR Spectrum of 1-(2-Picolyl)-3-(3,4,5-trimethoxybenzoyl)-2-benzyl-2-thiopseudourea (2f)



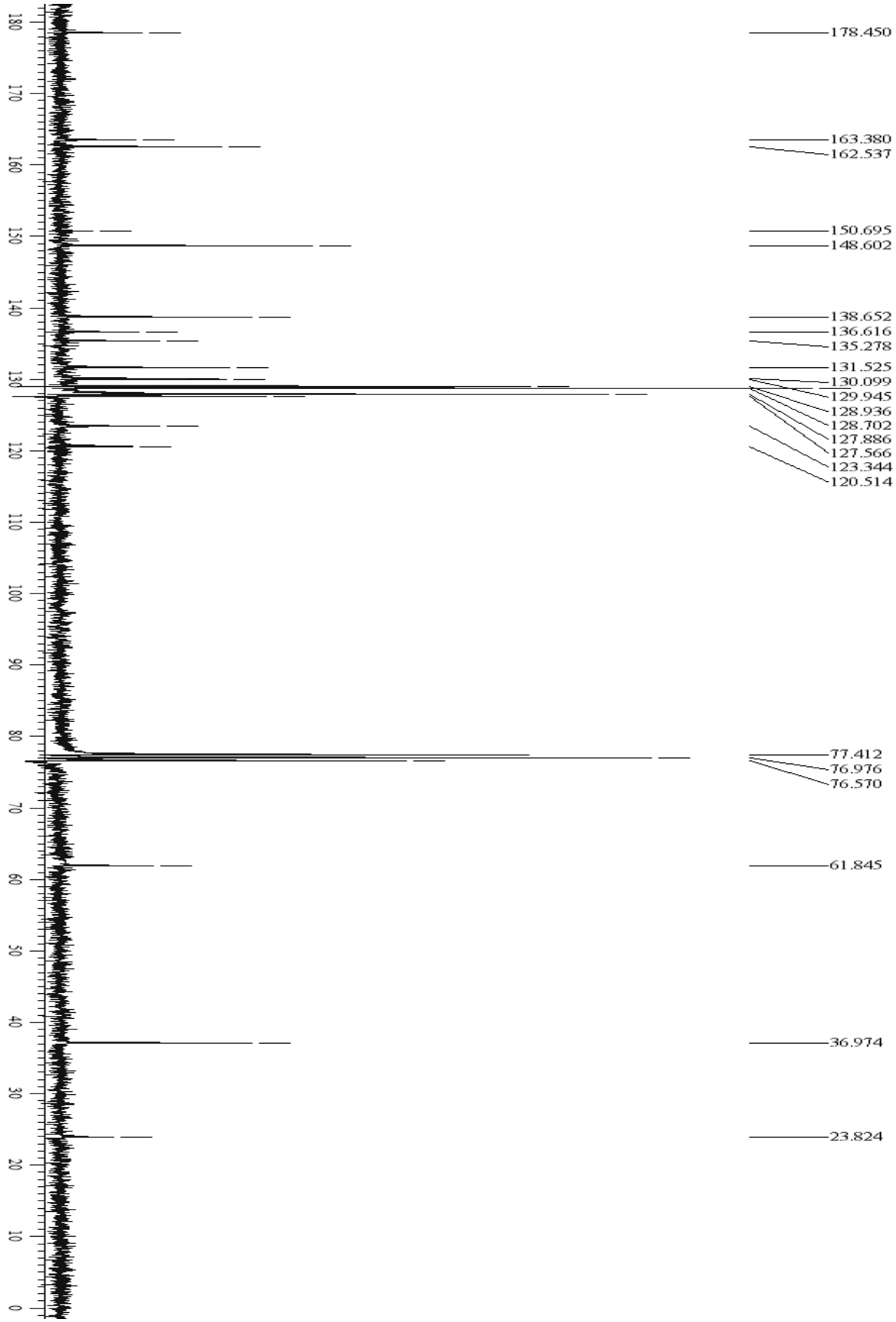
^{13}C NMR Spectrum of 1-(2-Picolyl)-3-(3,4,5-trimethoxybenzoyl)-2-benzyl-2-thiopseudourea (2f)



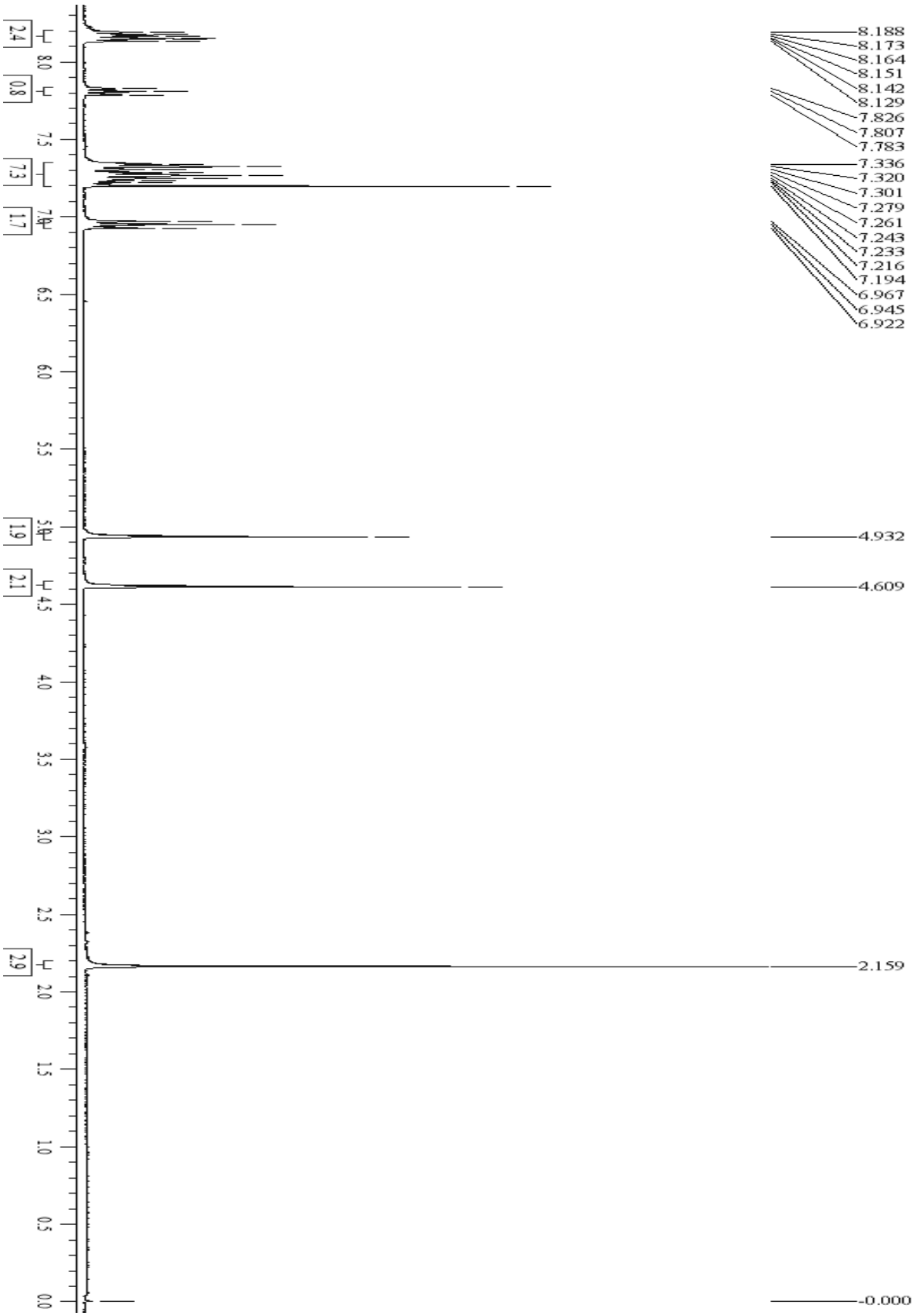
^{1}H NMR Spectrum of complex 3a



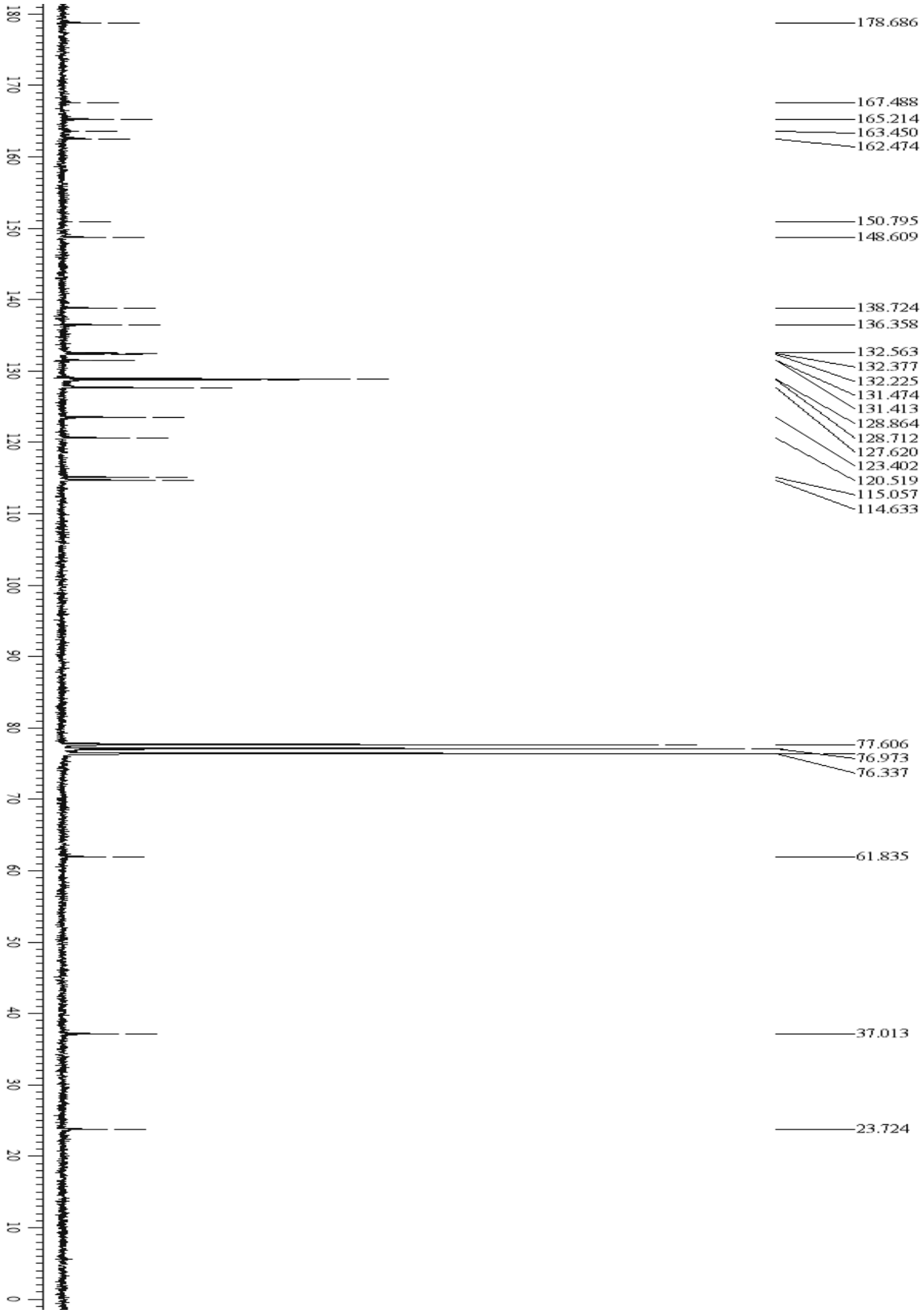
^{13}C NMR Spectrum of complex 3a



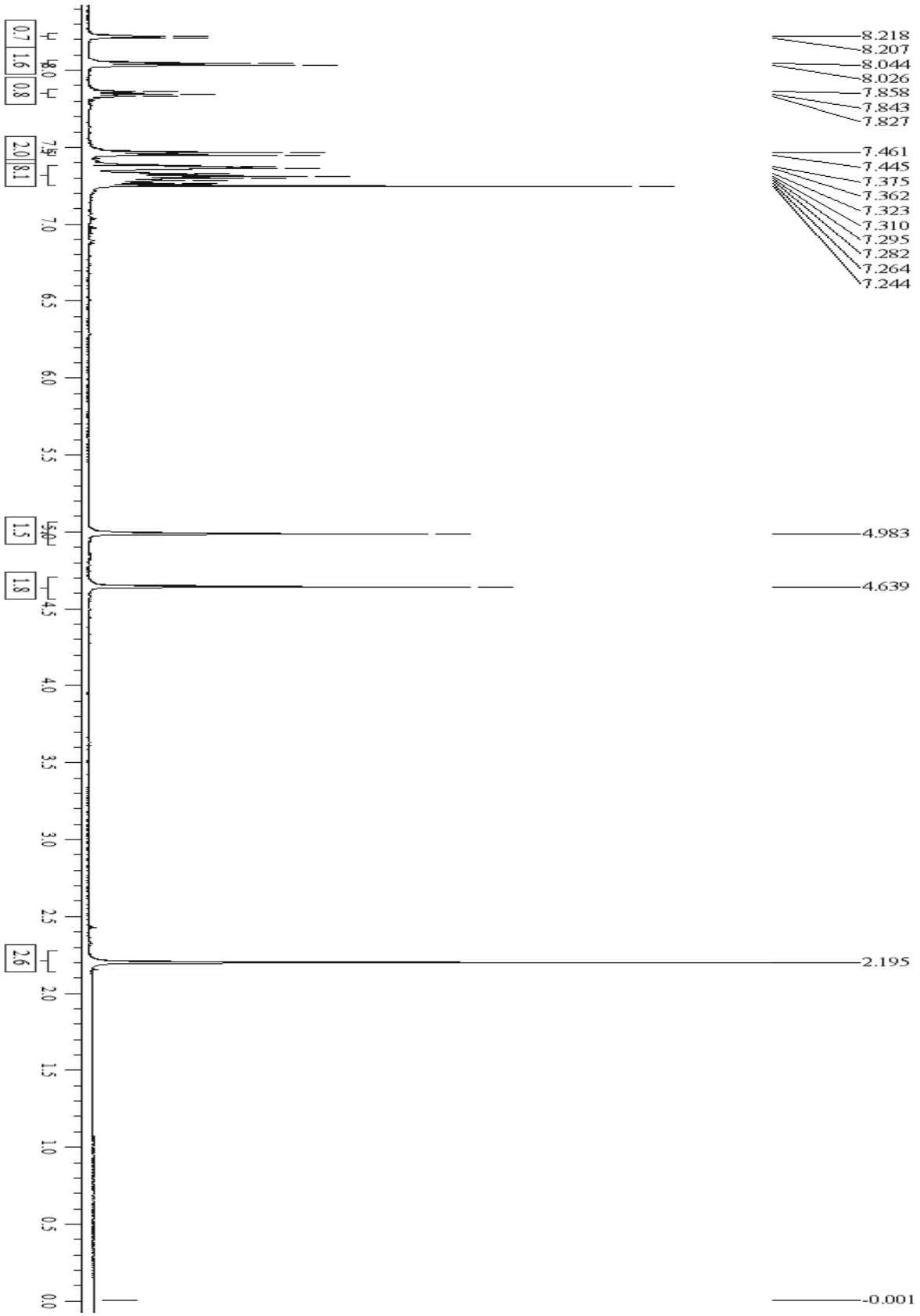
^{1}H NMR Spectrum of complex 3b



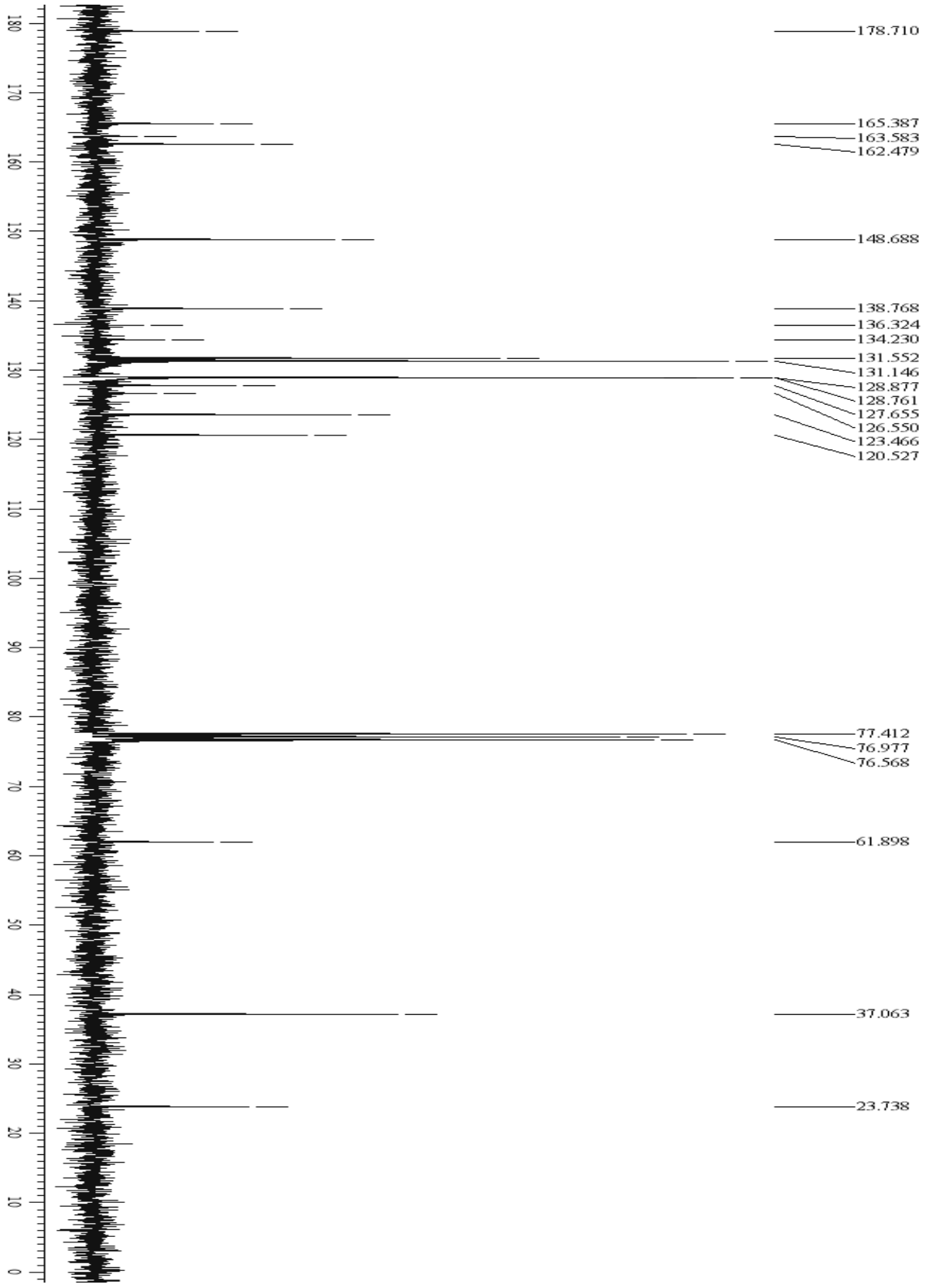
^{13}C NMR Spectrum of complex 3b



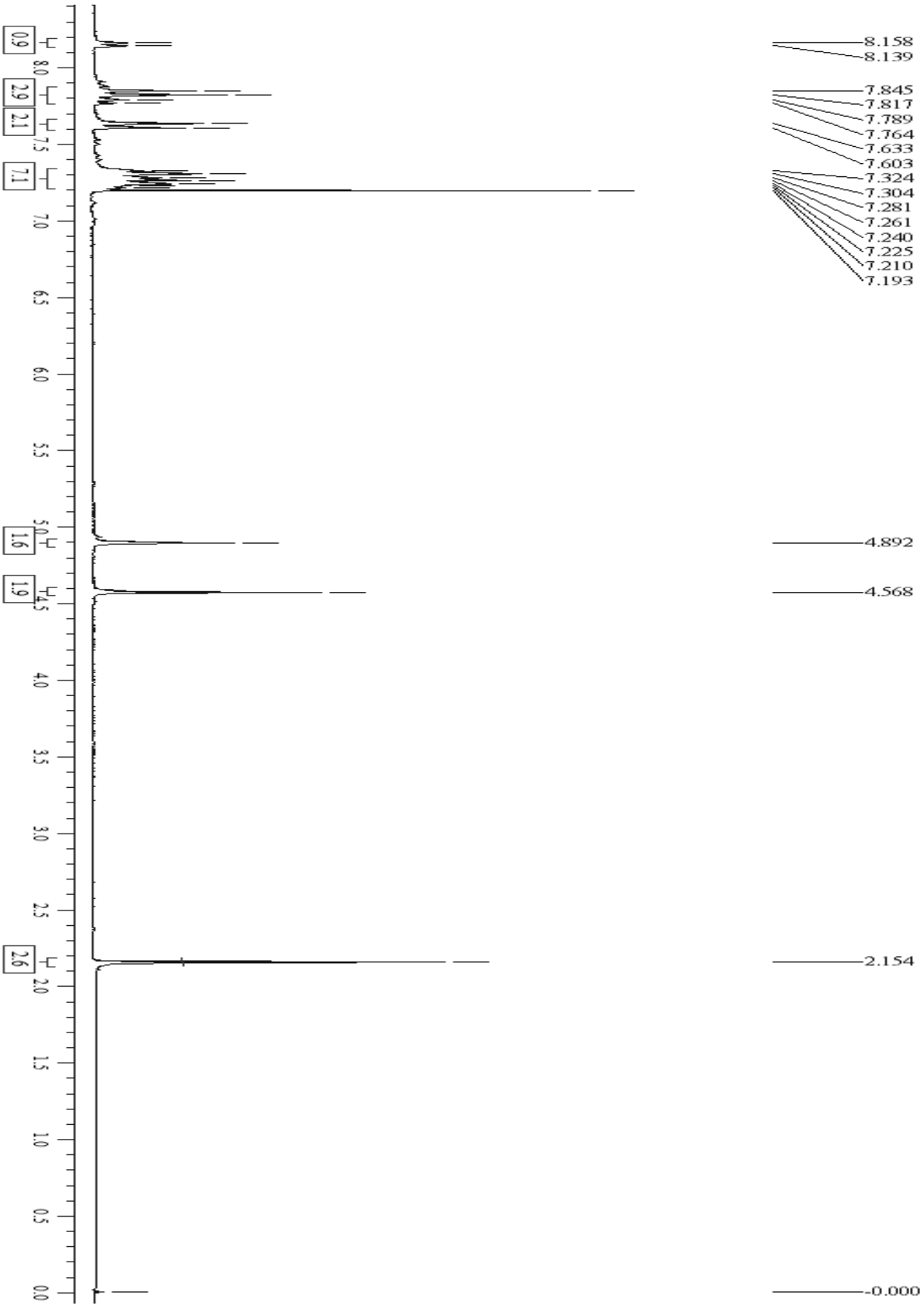
^{1}H NMR Spectrum of complex 3c



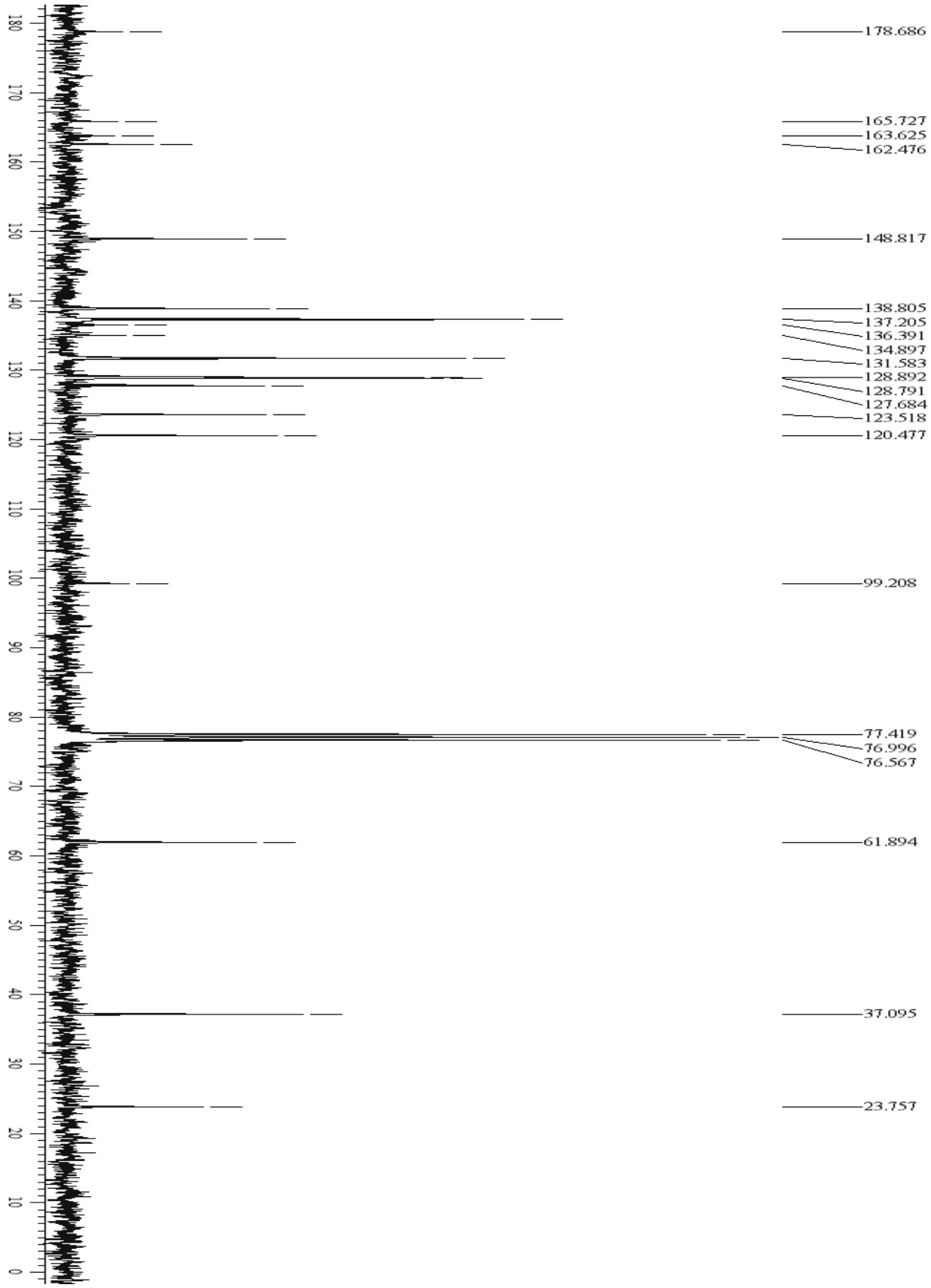
^{13}C NMR Spectrum of complex 3c



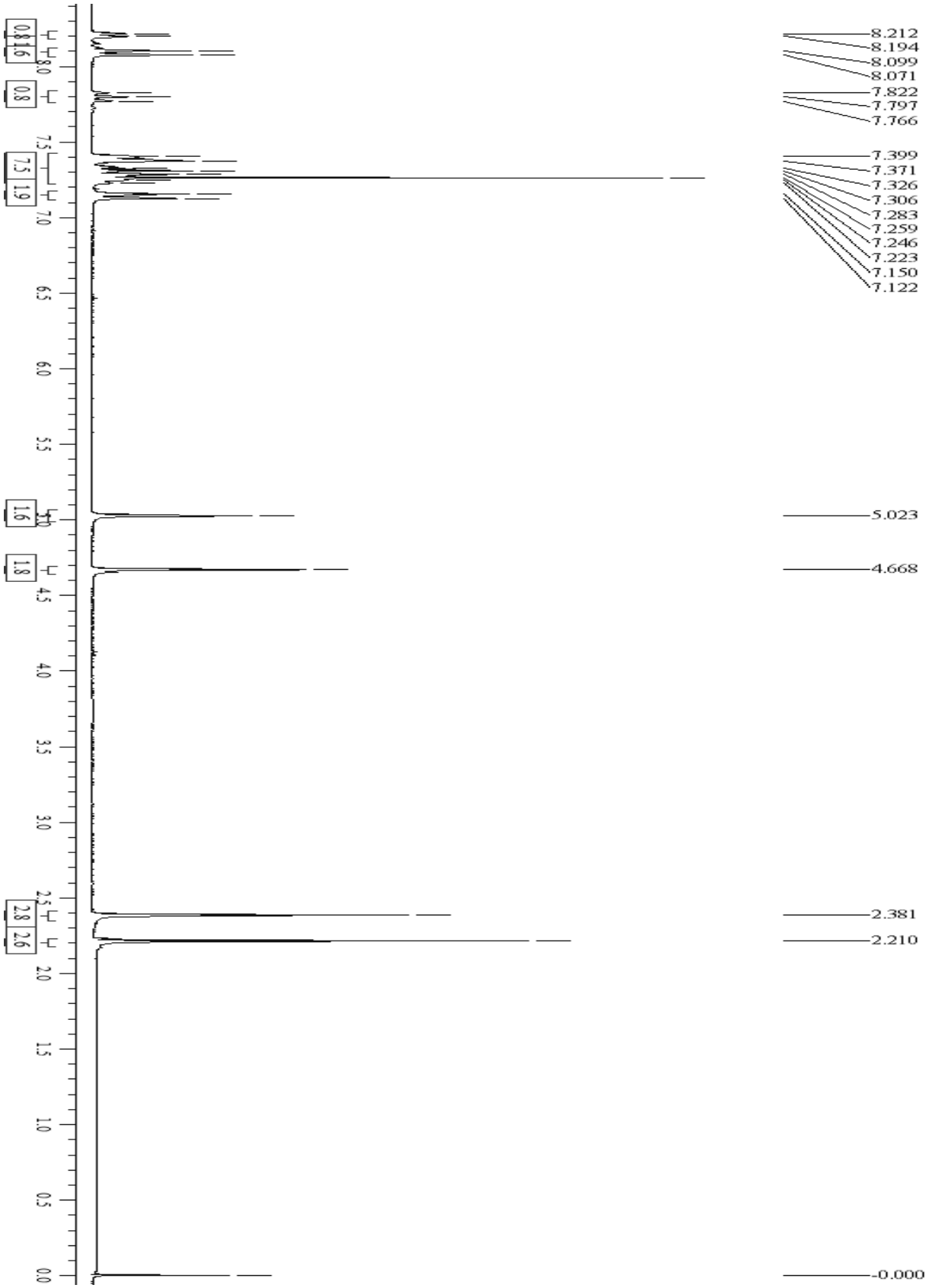
^{1}H NMR Spectrum of complex 3d



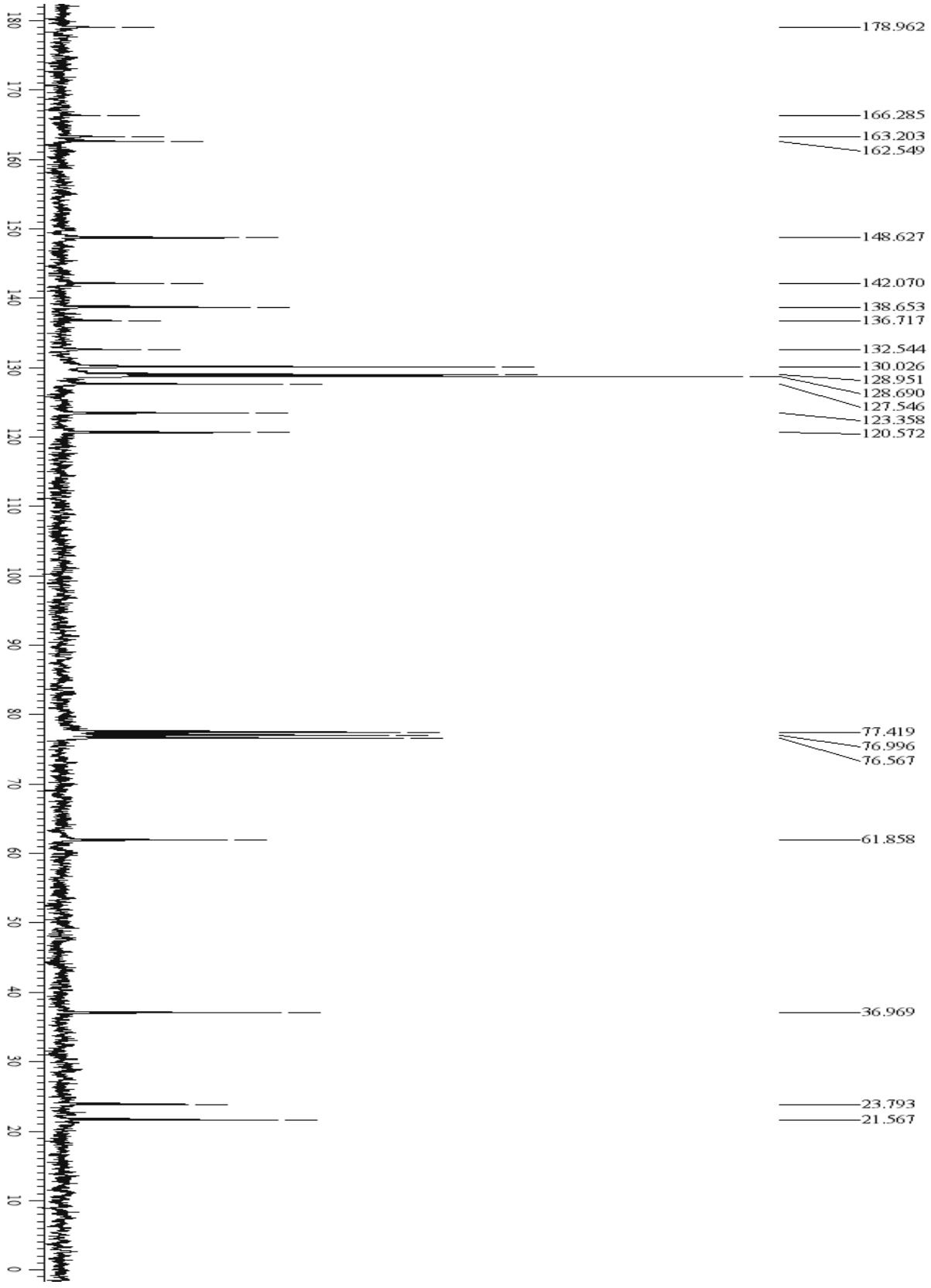
^{13}C NMR Spectrum of complex 3d



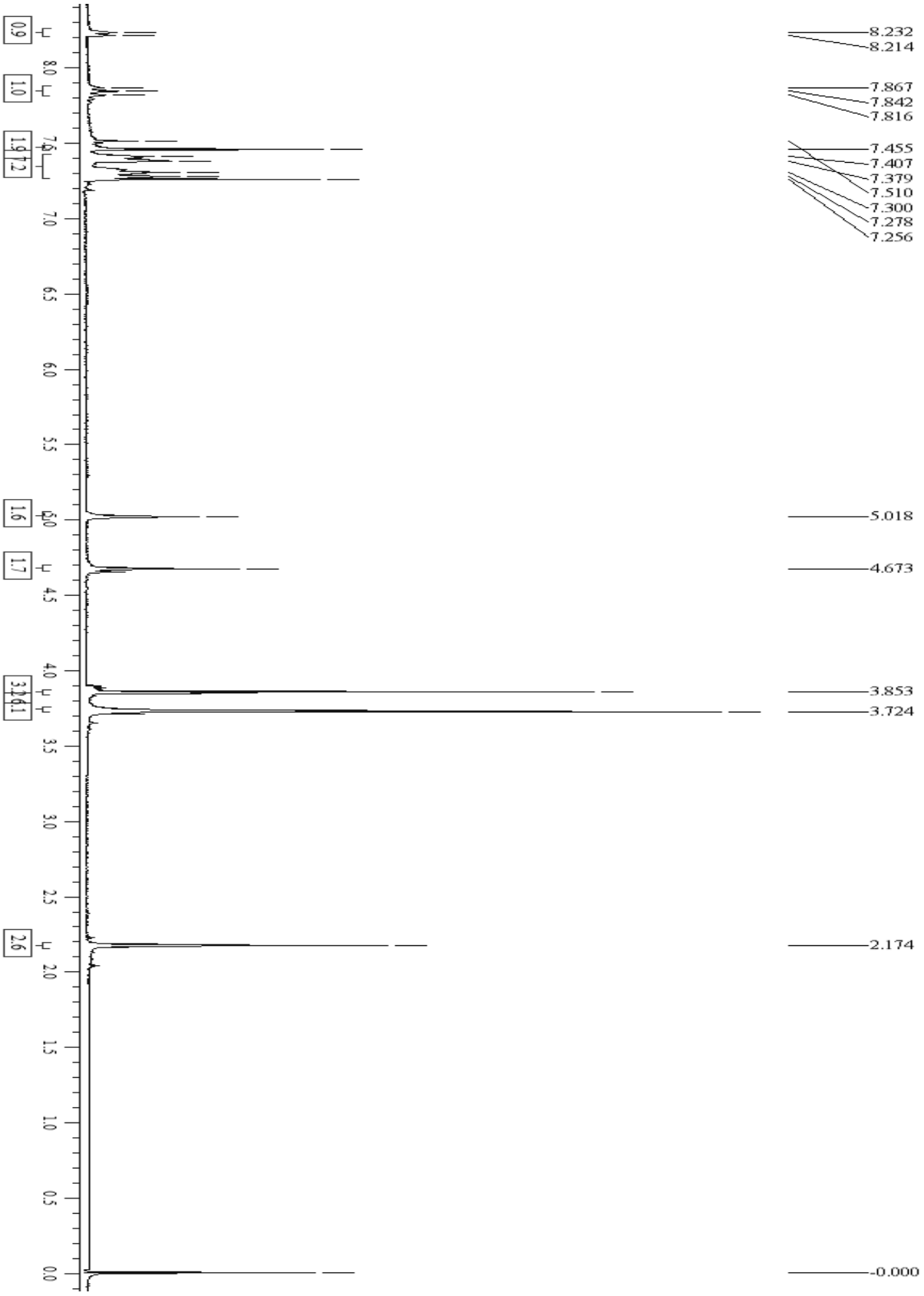
^{1}H NMR Spectrum of complex 3e



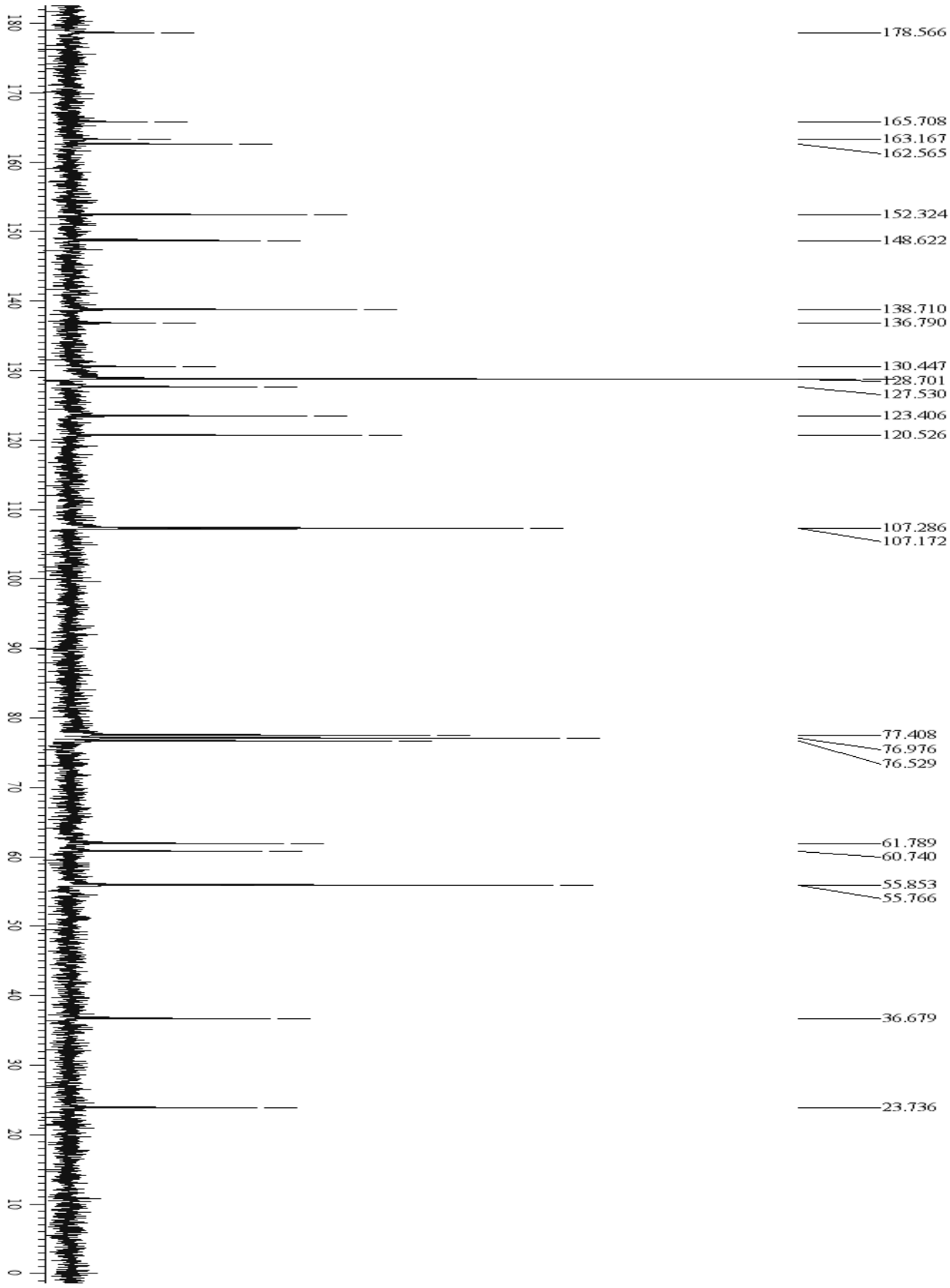
^{13}C NMR Spectrum of complex 3e



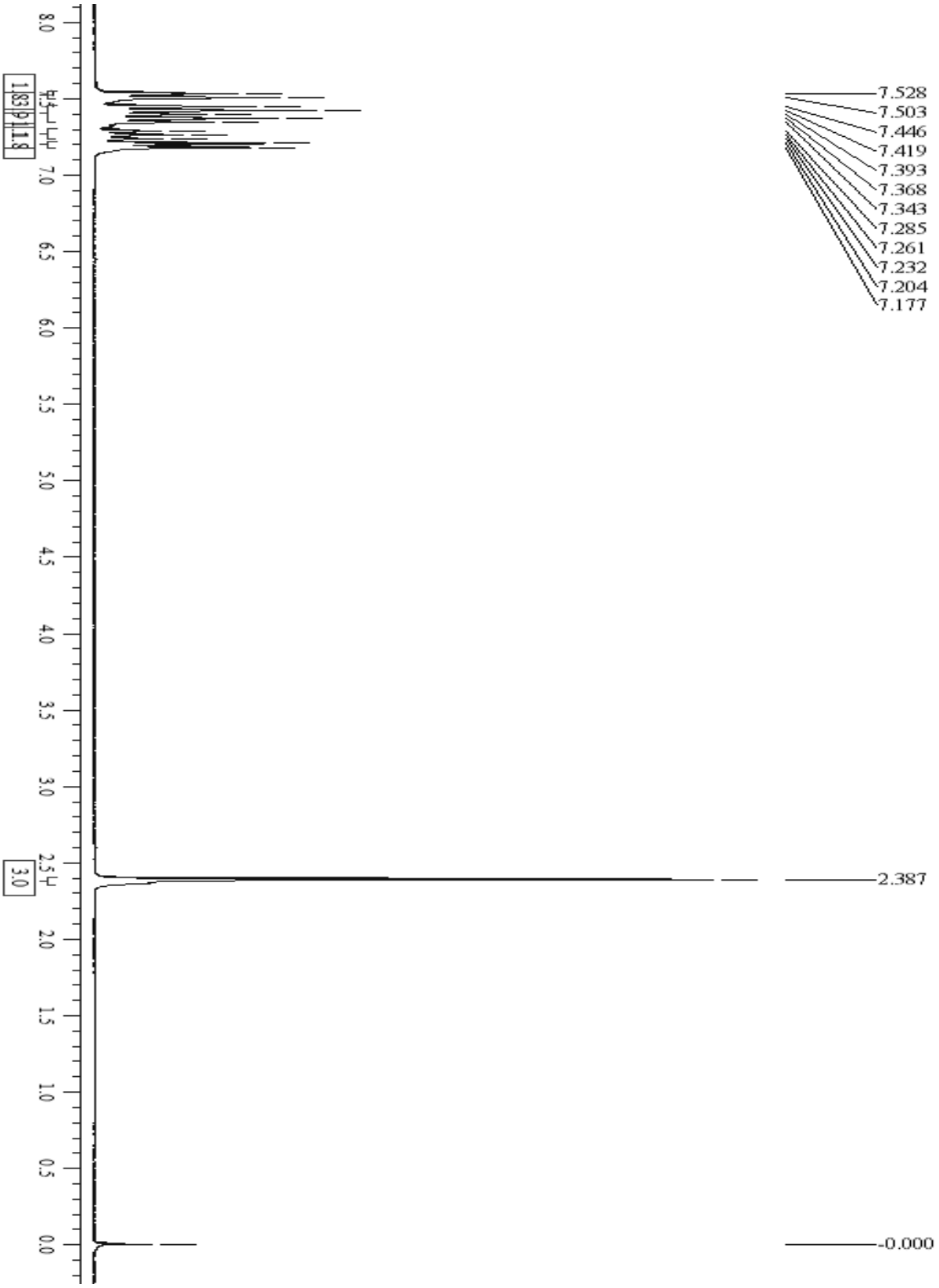
^{1}H NMR Spectrum of complex 3f



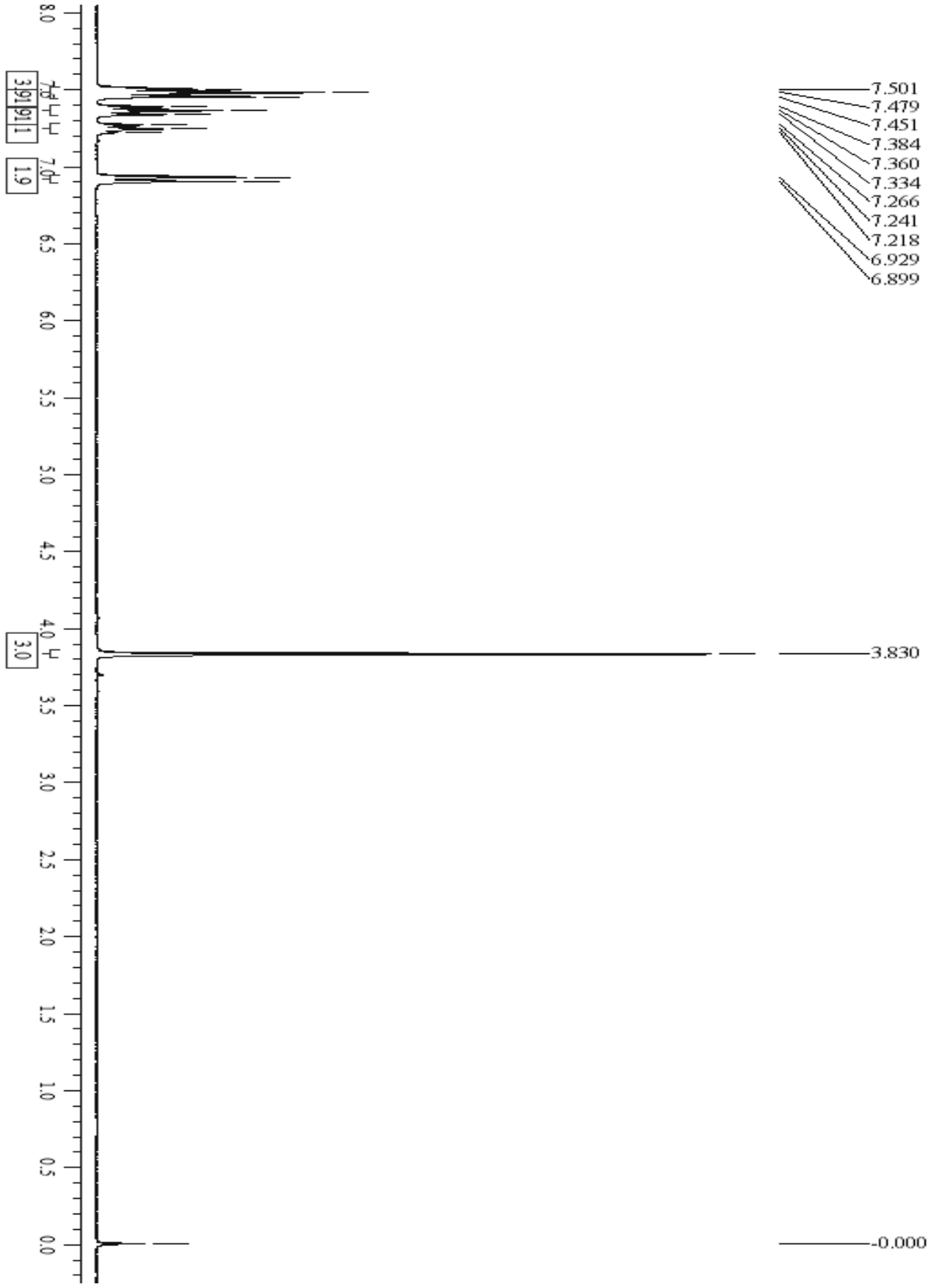
^{13}C NMR Spectrum of complex 3f



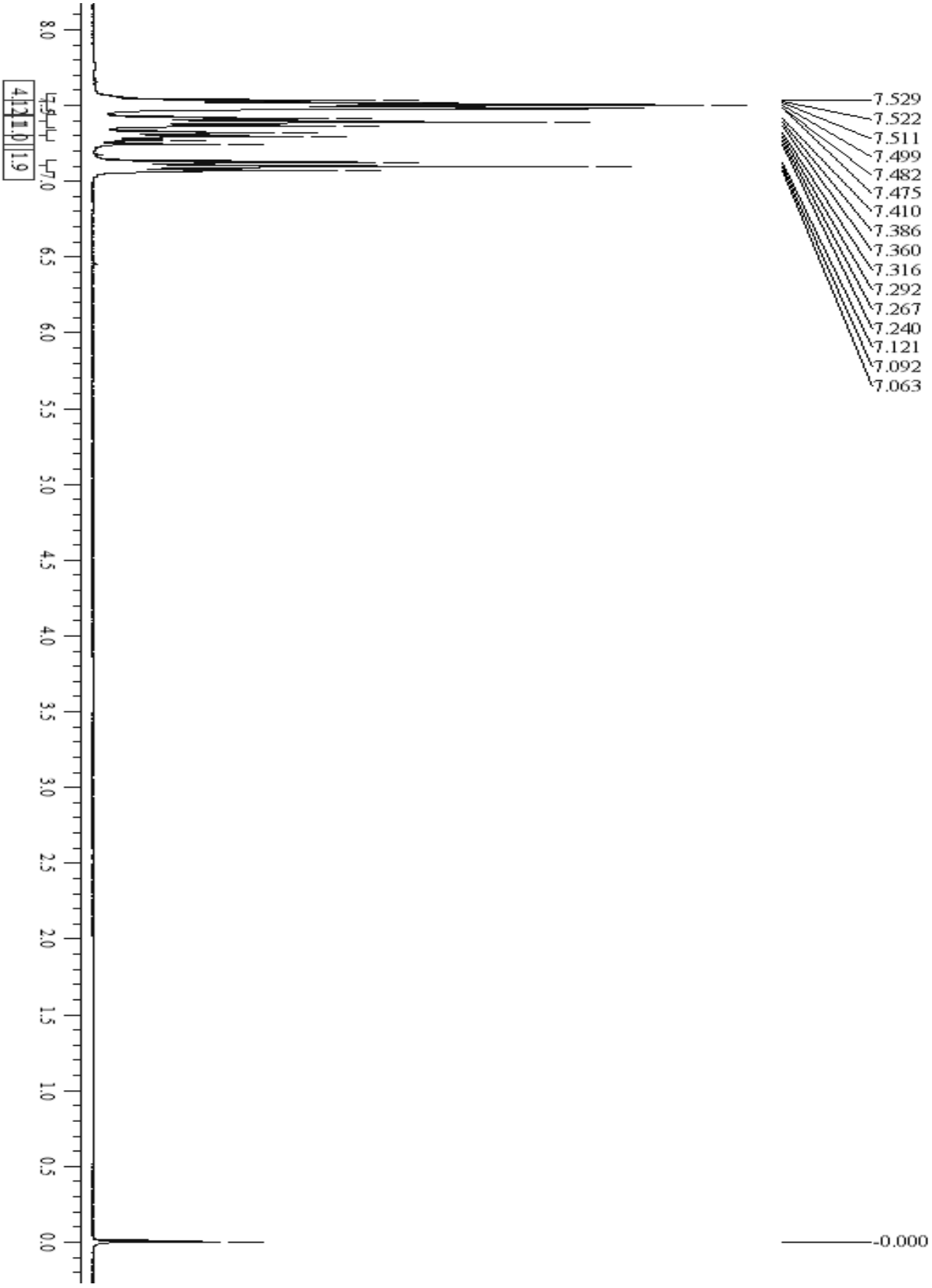
^{1}H NMR Spectrum of 4-Methylbiphenyl (entry 1, Table 4)



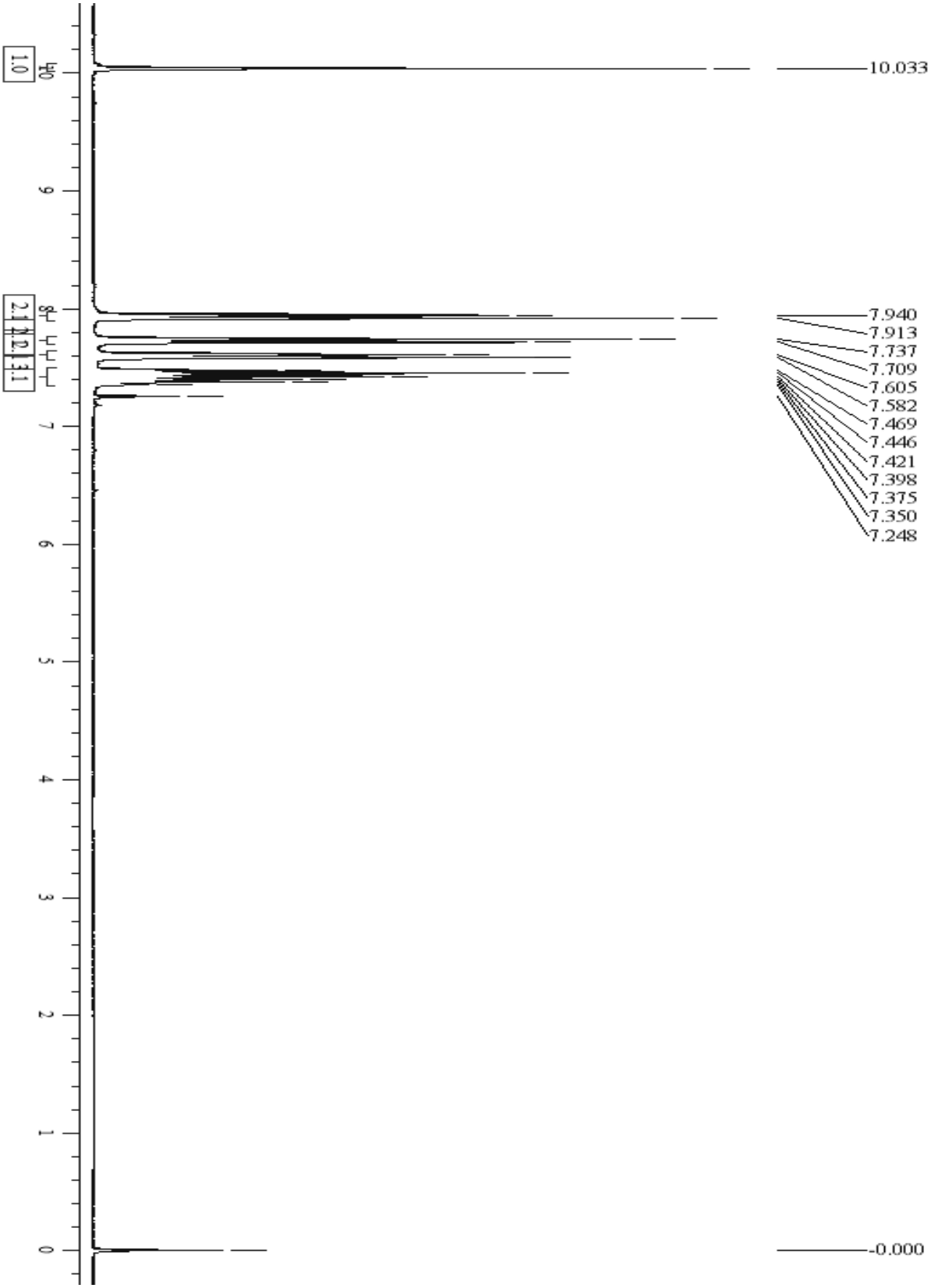
^{1}H NMR Spectrum of 4-Methoxybiphenyl (entry 2, Table 4)



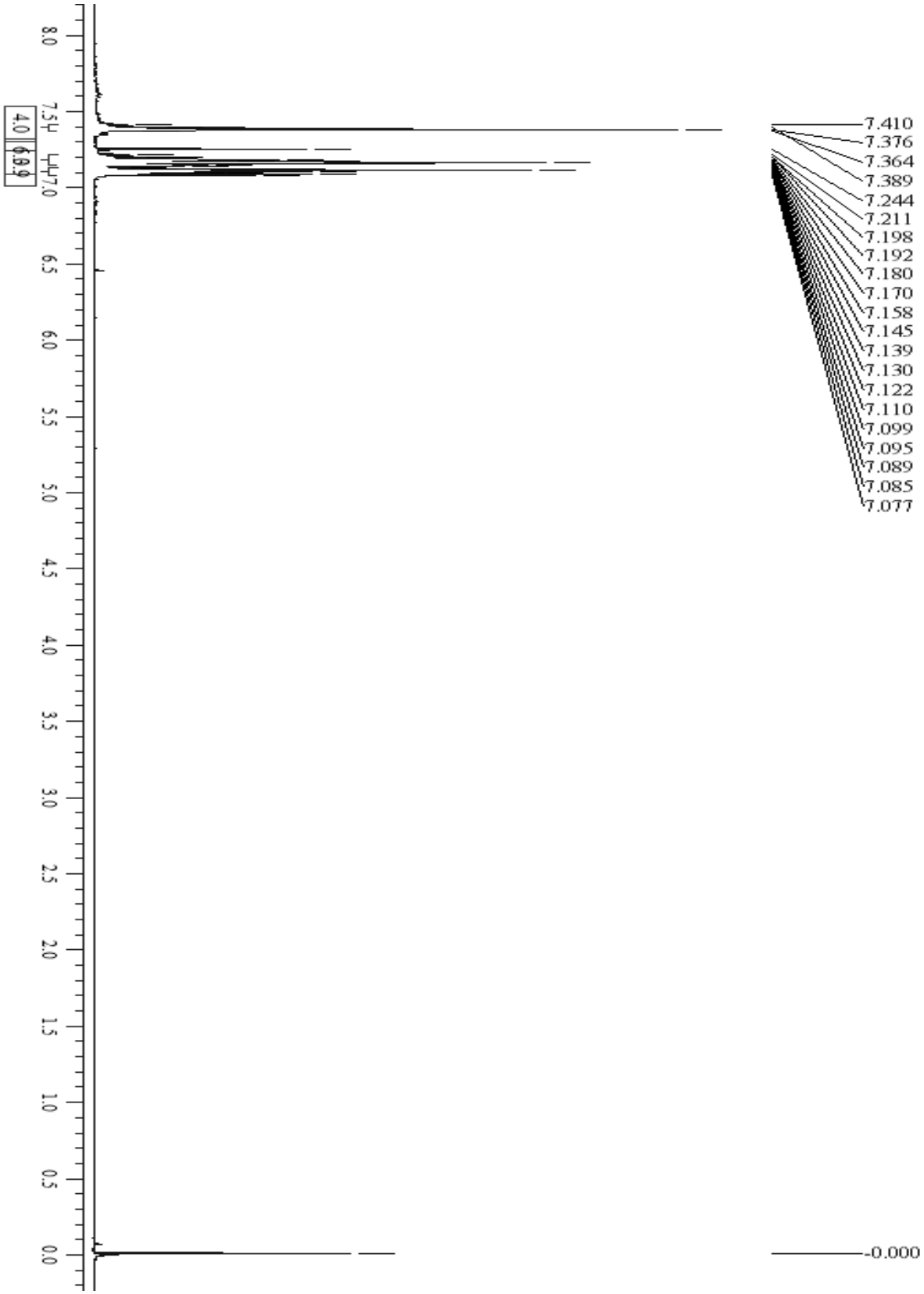
^{1}H NMR Spectrum of 4-Fluorobiphenyl (entry 3, Table 4)



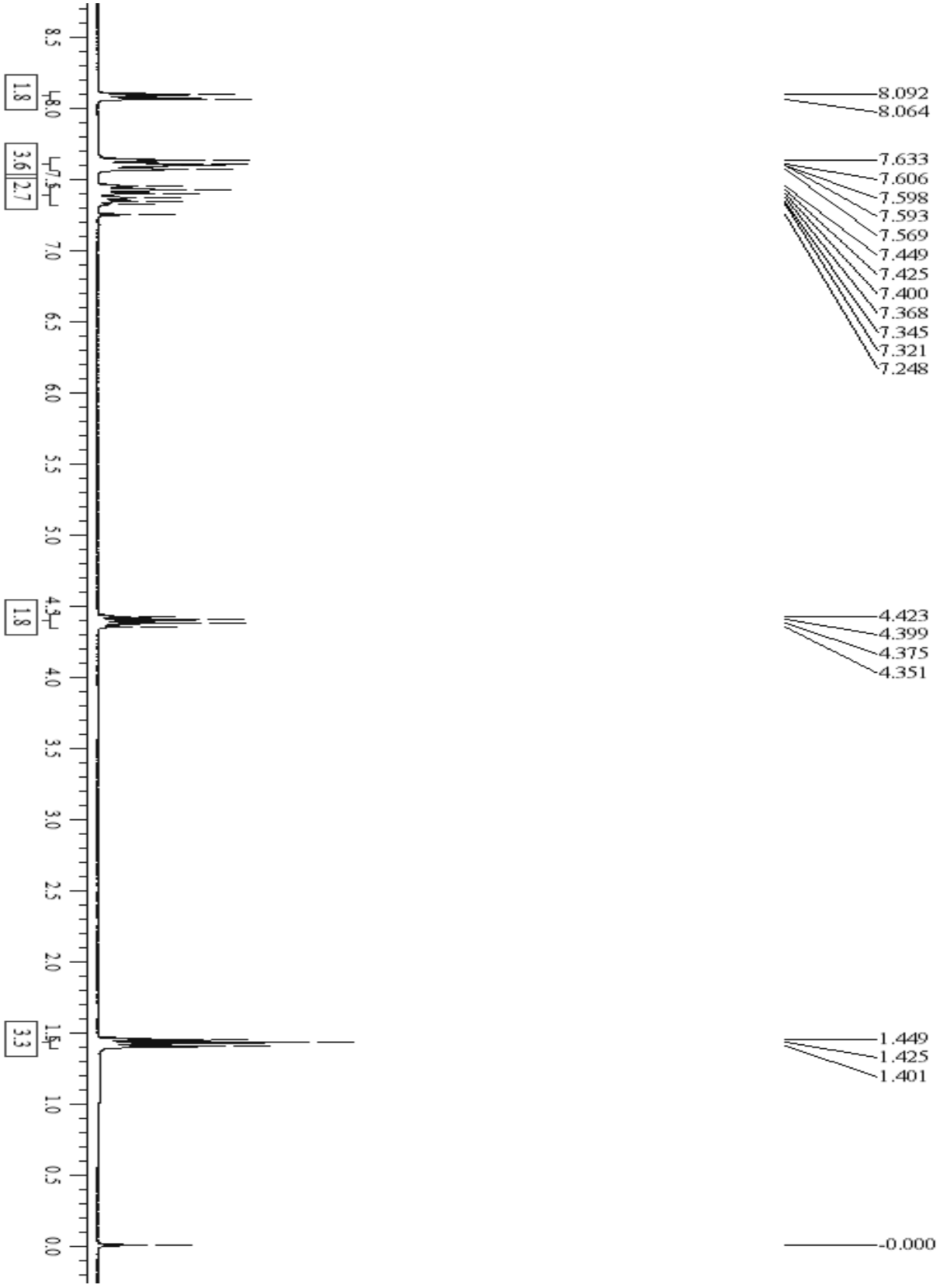
^{1}H NMR Spectrum of Biphenyl-4-carboxaldehyde (entry 4, Table 4)



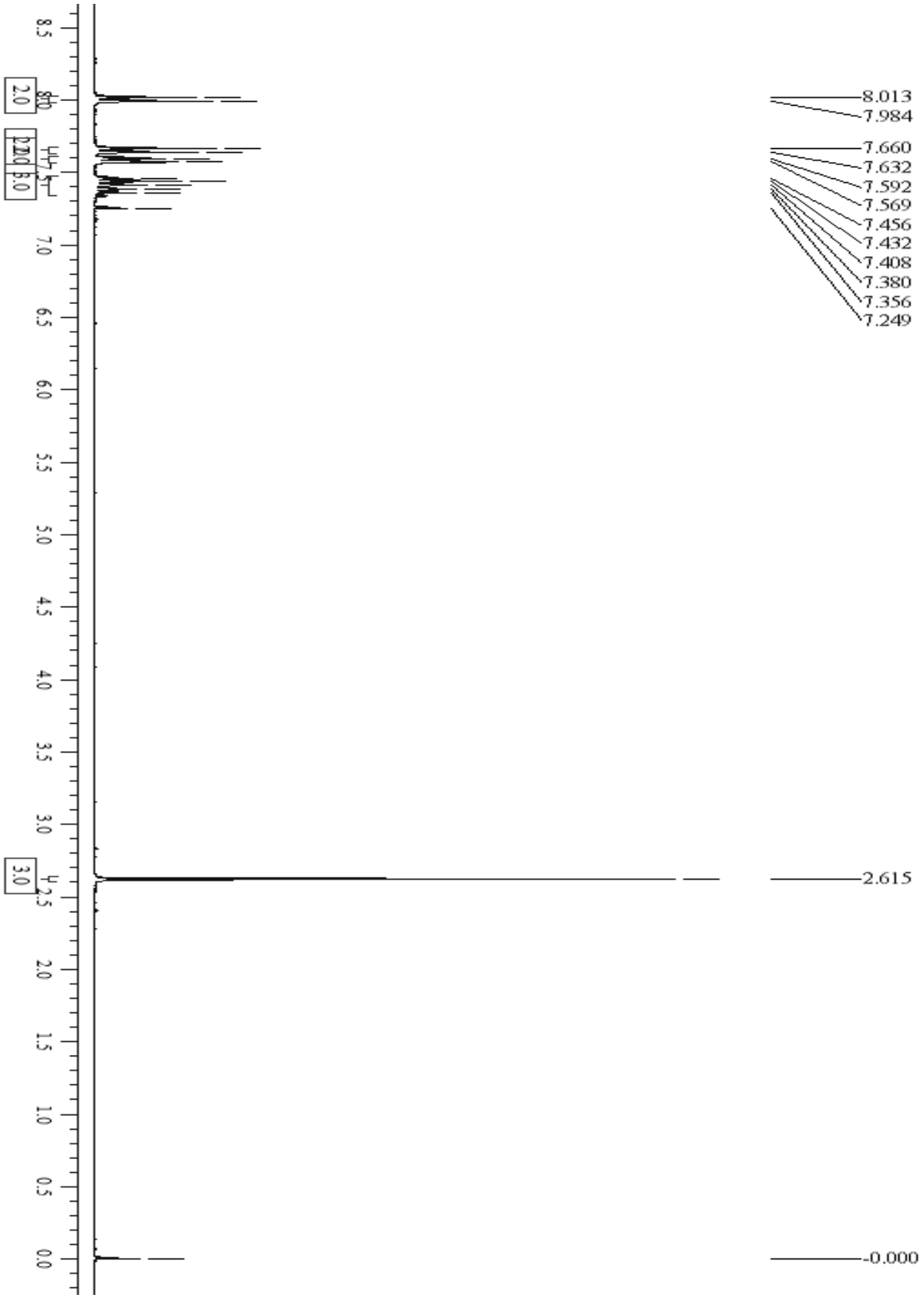
^{1}H NMR Spectrum of 1,2-Diphenylbenzene (entry 5, Table 4)



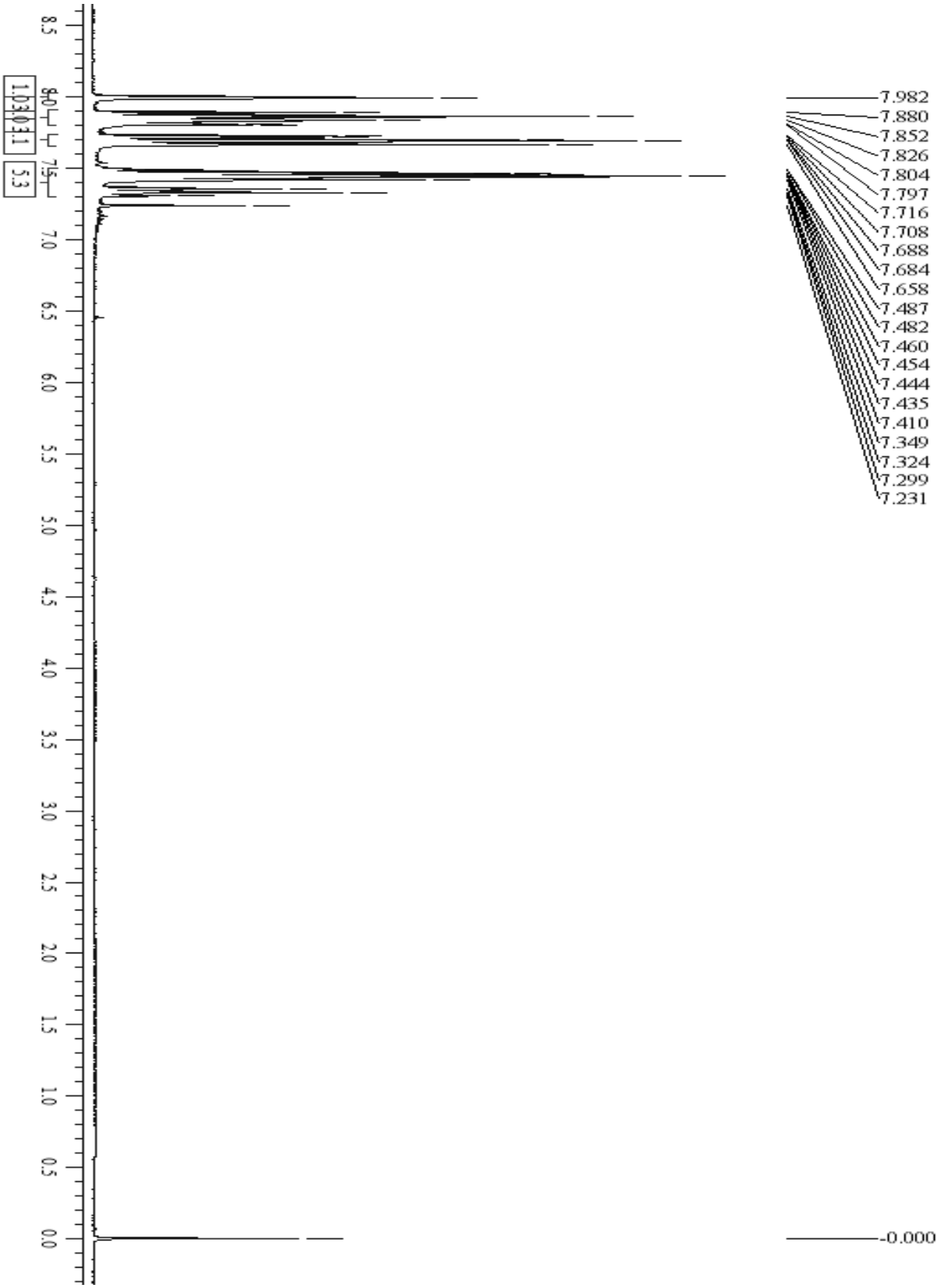
^{1}H NMR Spectrum of Biphenyl-4-ethylbenzoate (entry 6, Table 4)



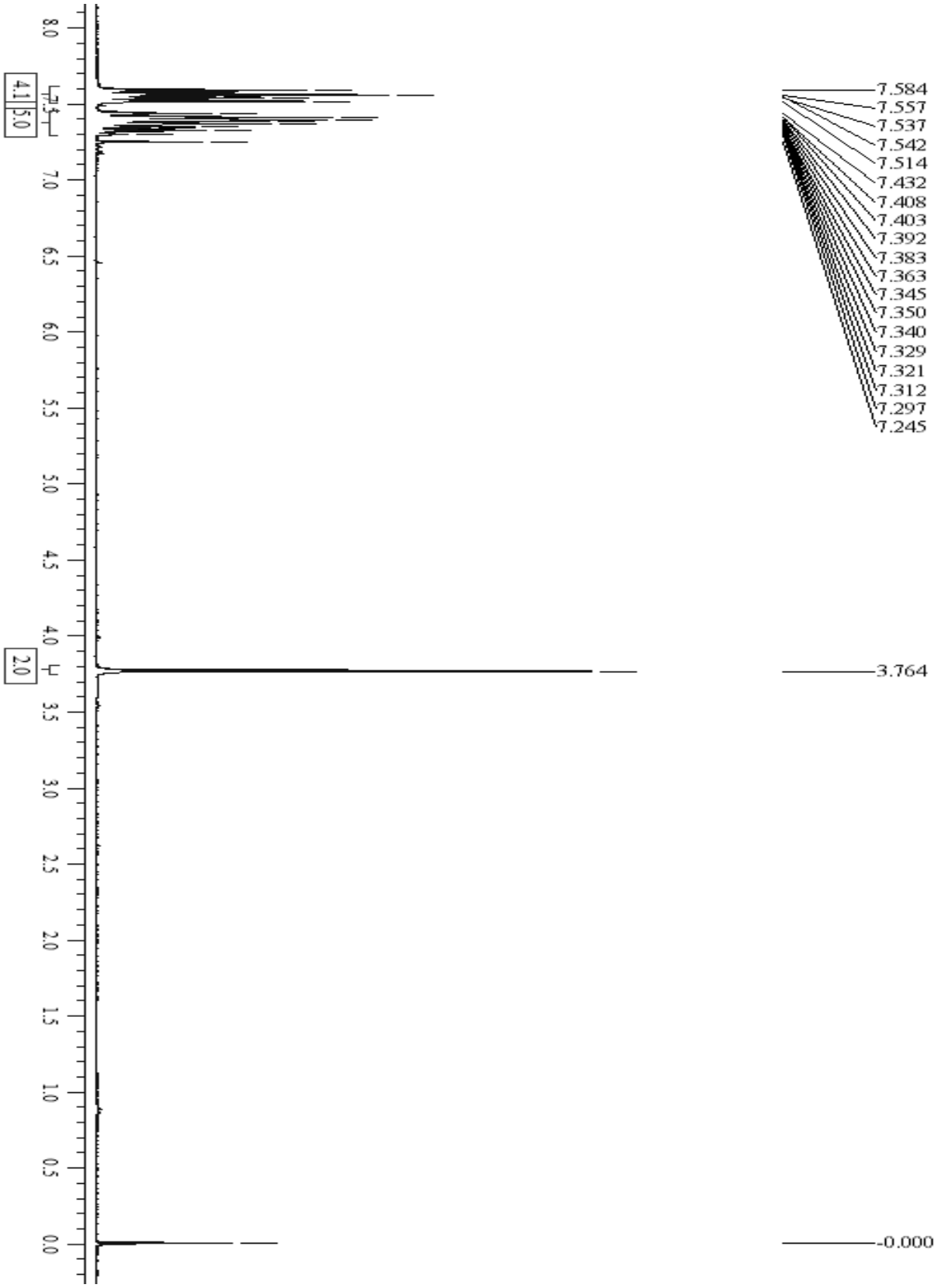
^{1}H NMR Spectrum of 4-Acetylbiphenyl (entry 7, Table 4)



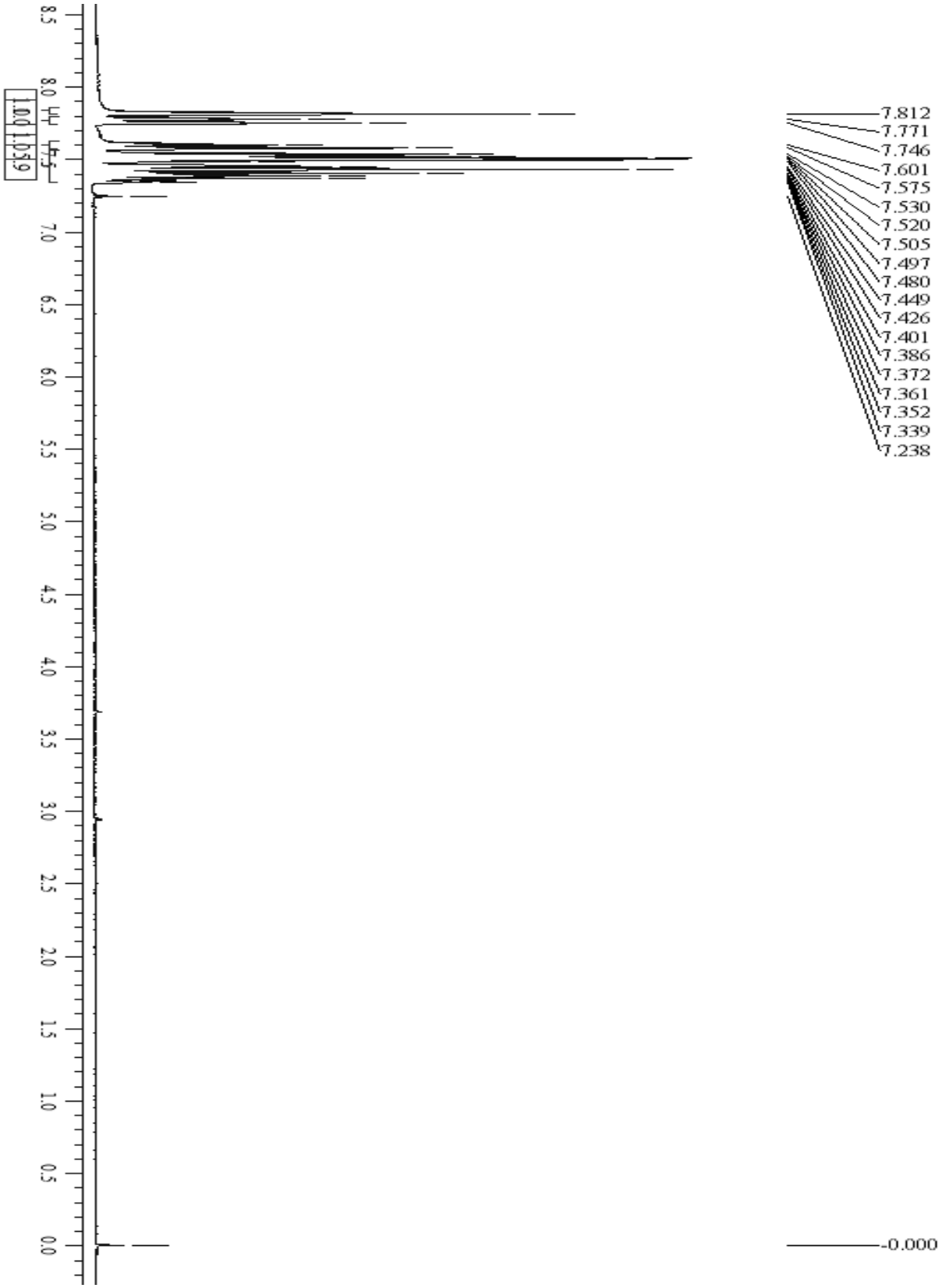
^{1}H NMR Spectrum of 2-Phenylnapthalene (entry 8, Table 4)



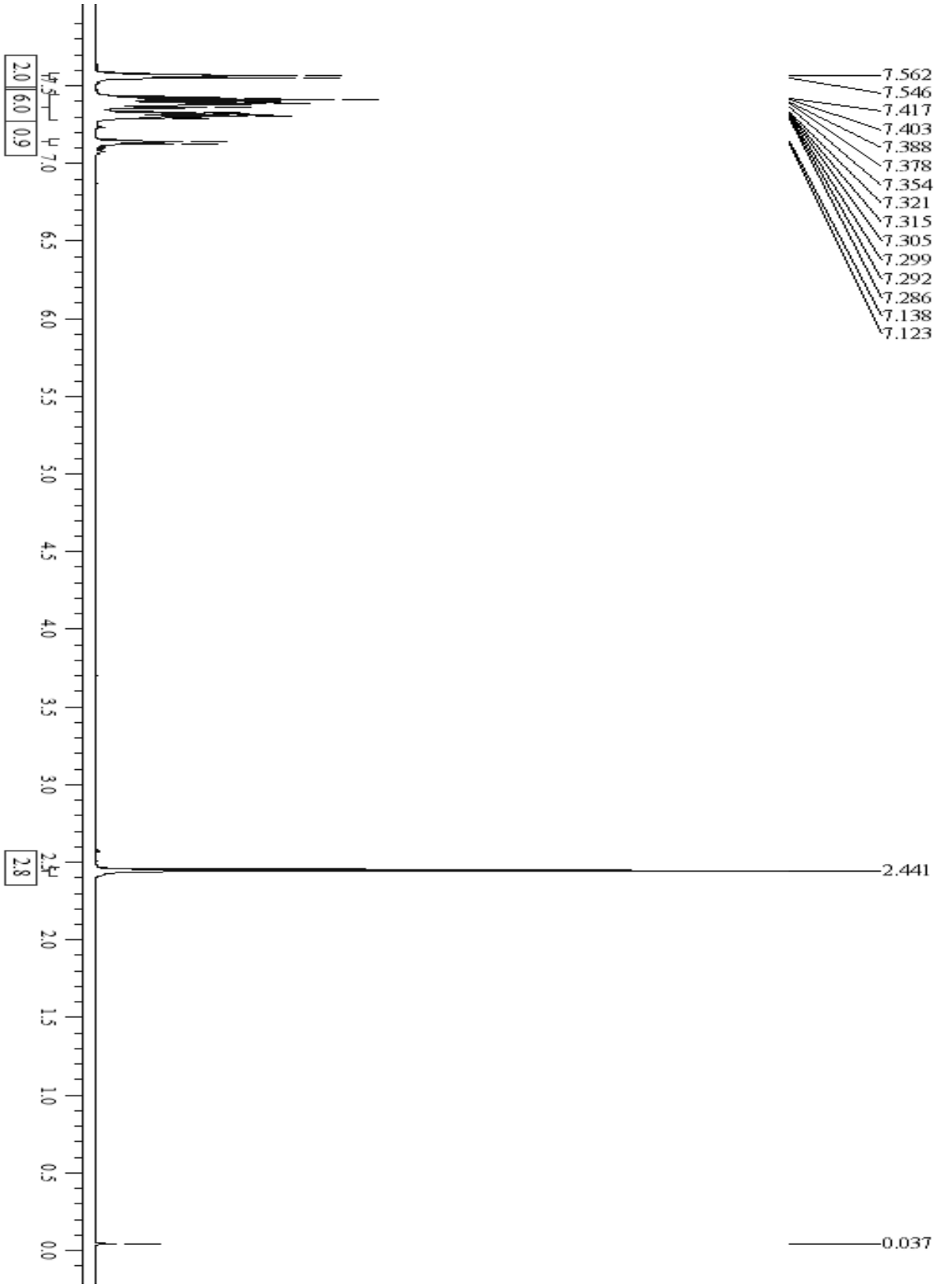
^{1}H NMR Spectrum of Biphenyl-4-acetonitrile (entry 9, Table 4)



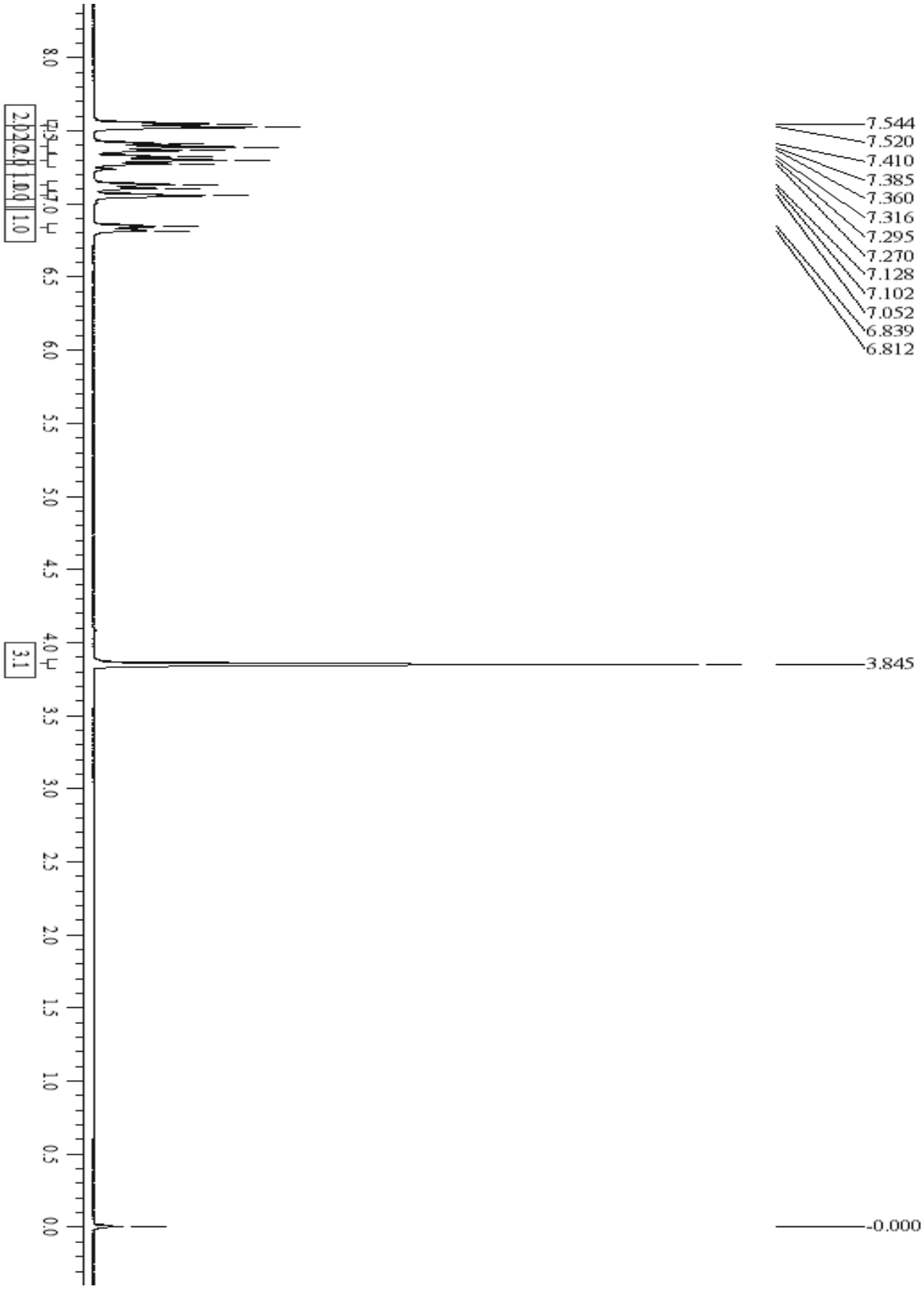
^{1}H NMR Spectrum of Biphenyl-3-nitrile (entry 10, Table 4)



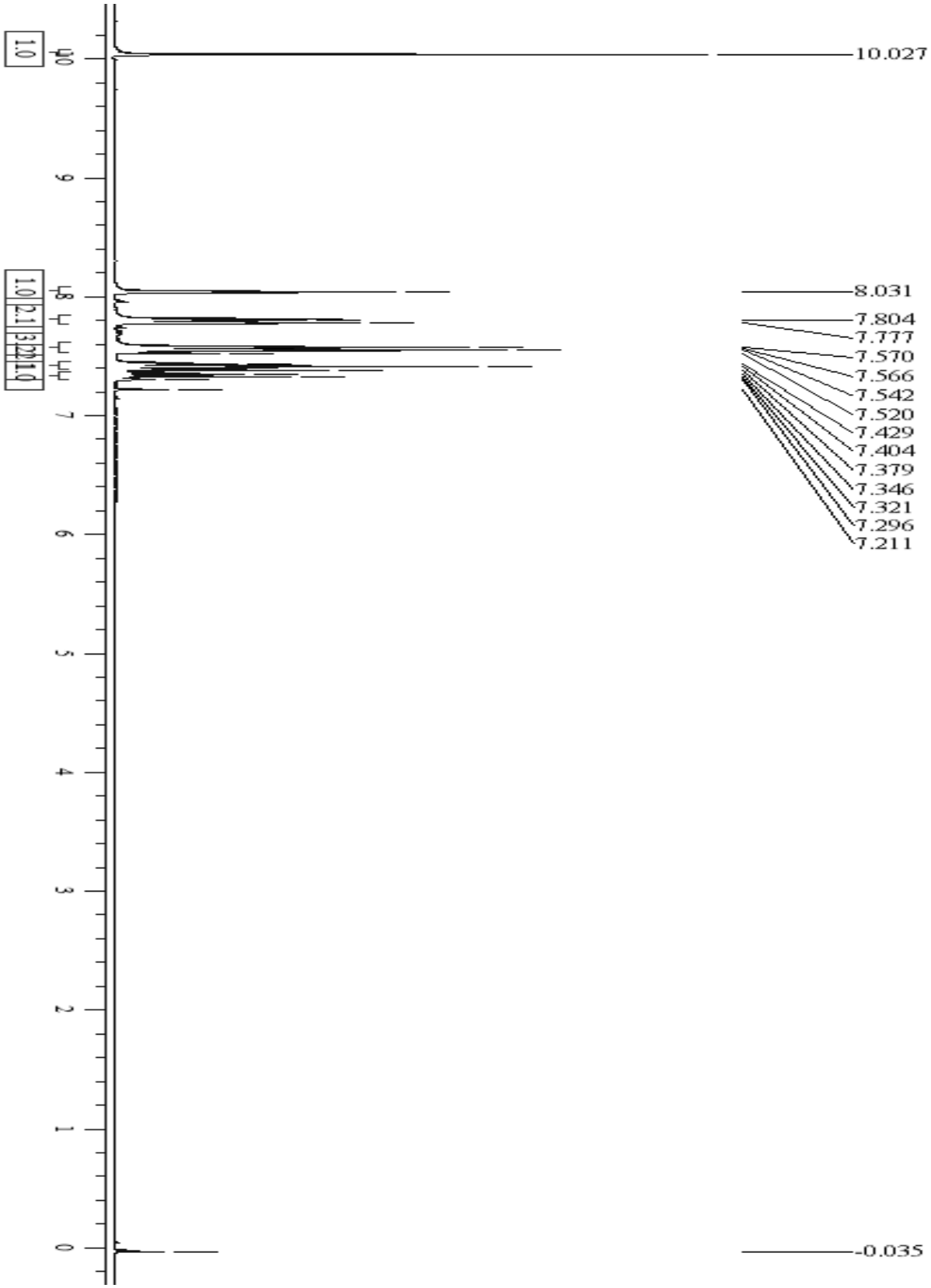
^{1}H NMR Spectrum of 3-Methylbiphenyl (entry 11, Table 4)



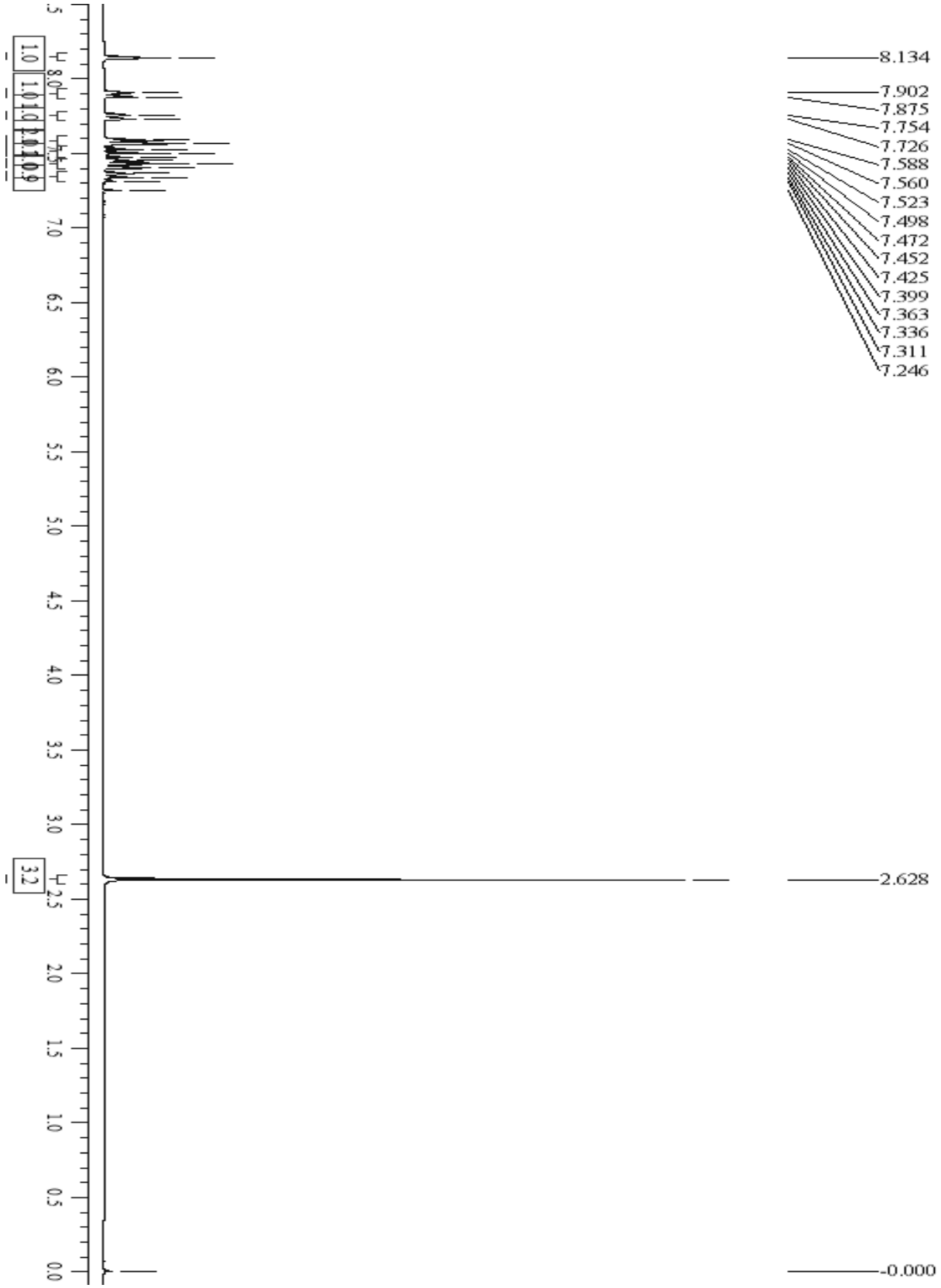
^{1}H NMR Spectrum of 3-Methoxybiphenyl (entry 12, Table 4)



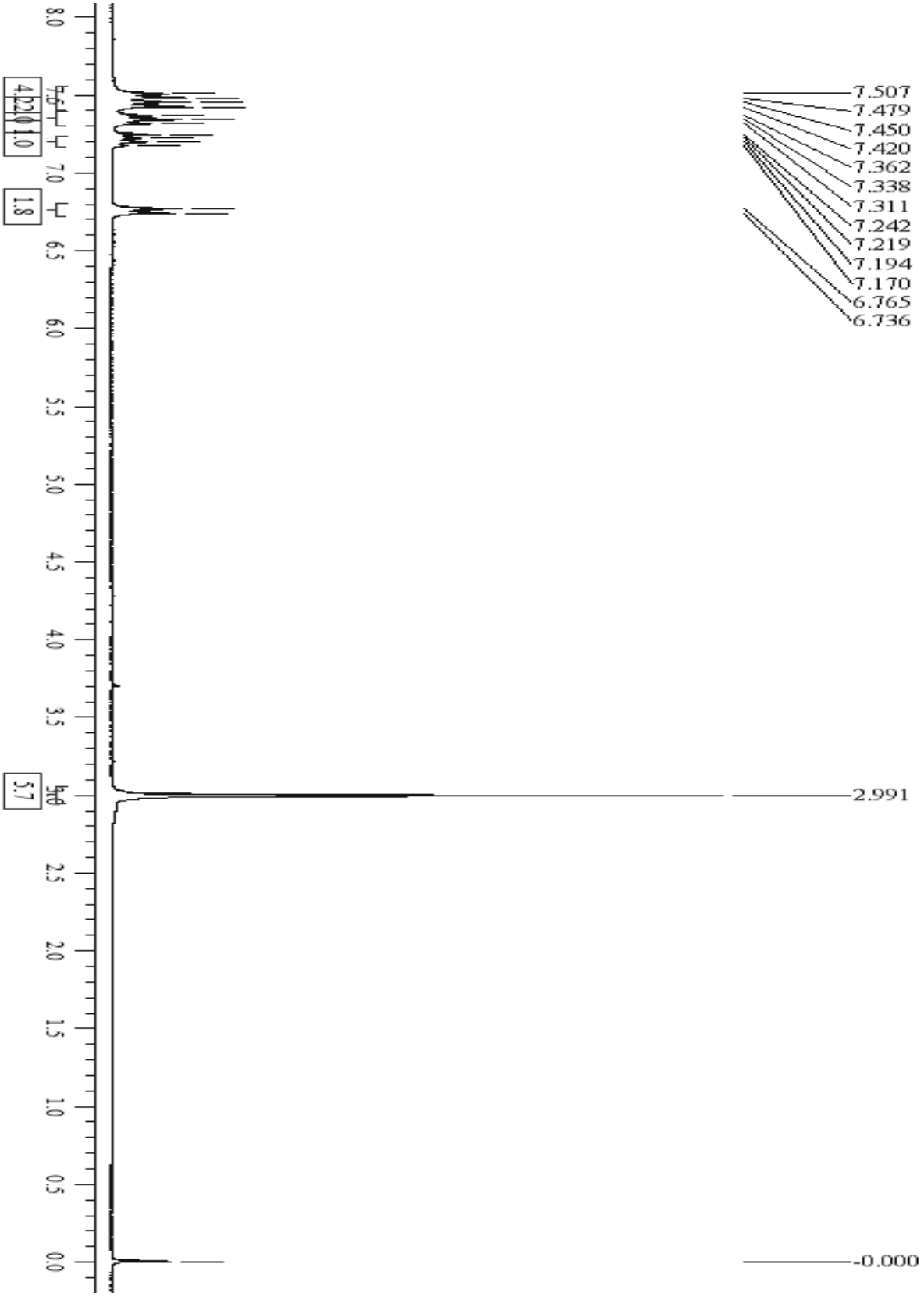
^{1}H NMR Spectrum of Biphenyl-3-carboxaldehyde (entry 13, Table 4)



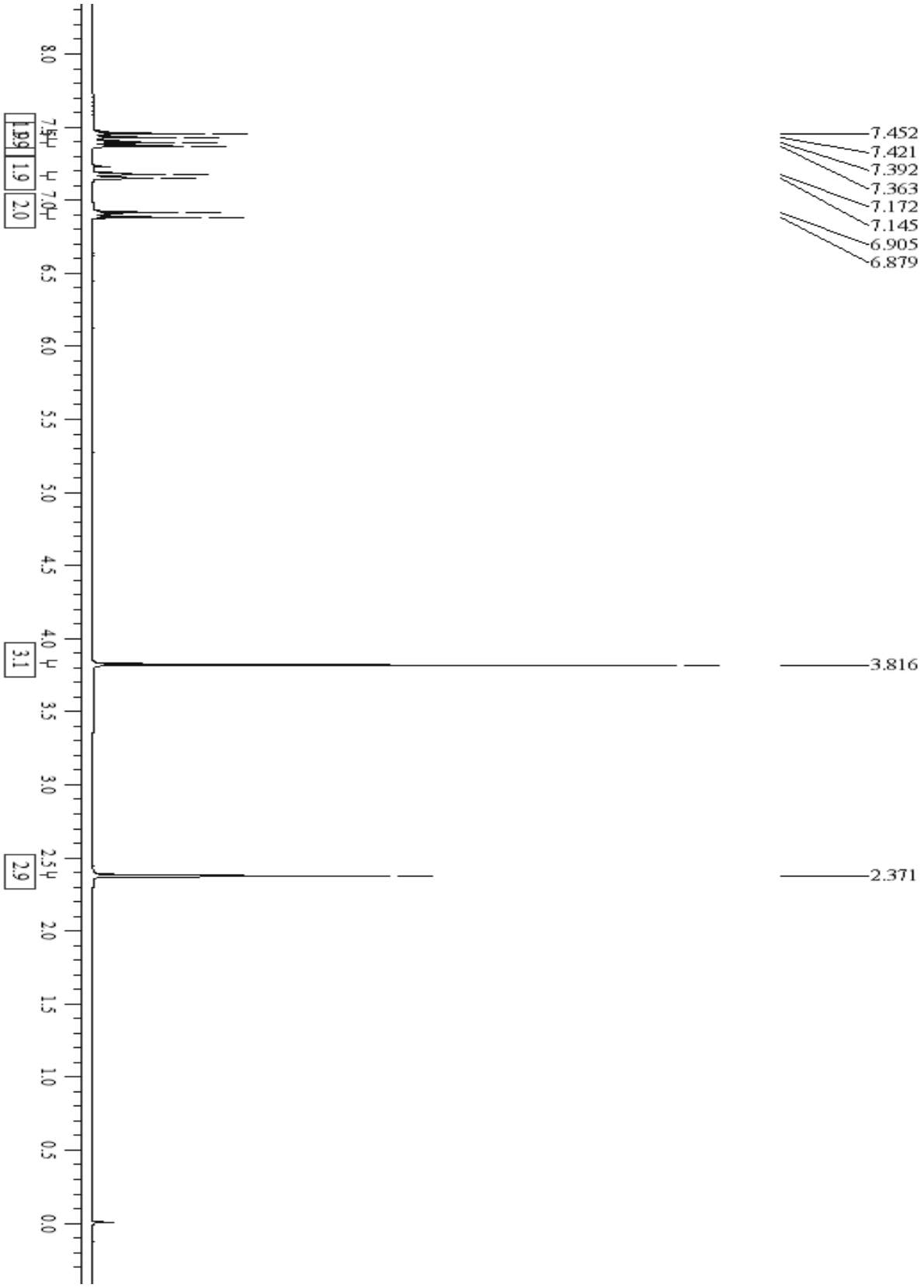
^{1}H NMR Spectrum of 3-Acetylbiphenyl (entry 14, table 4)



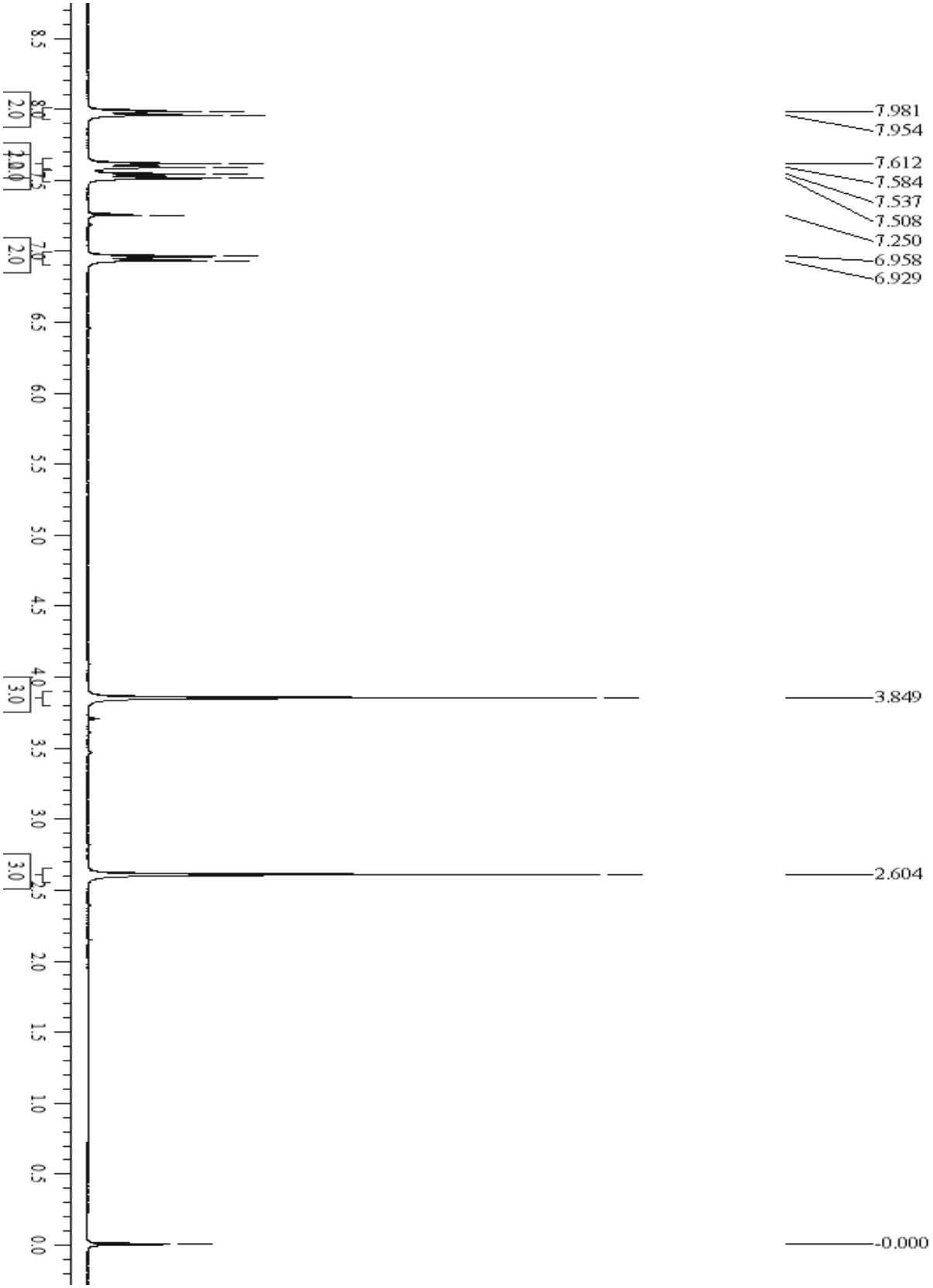
^{1}H NMR Spectrum of 4-N,N-Dimethylaminobiphenyl (entry 15, Table 4)



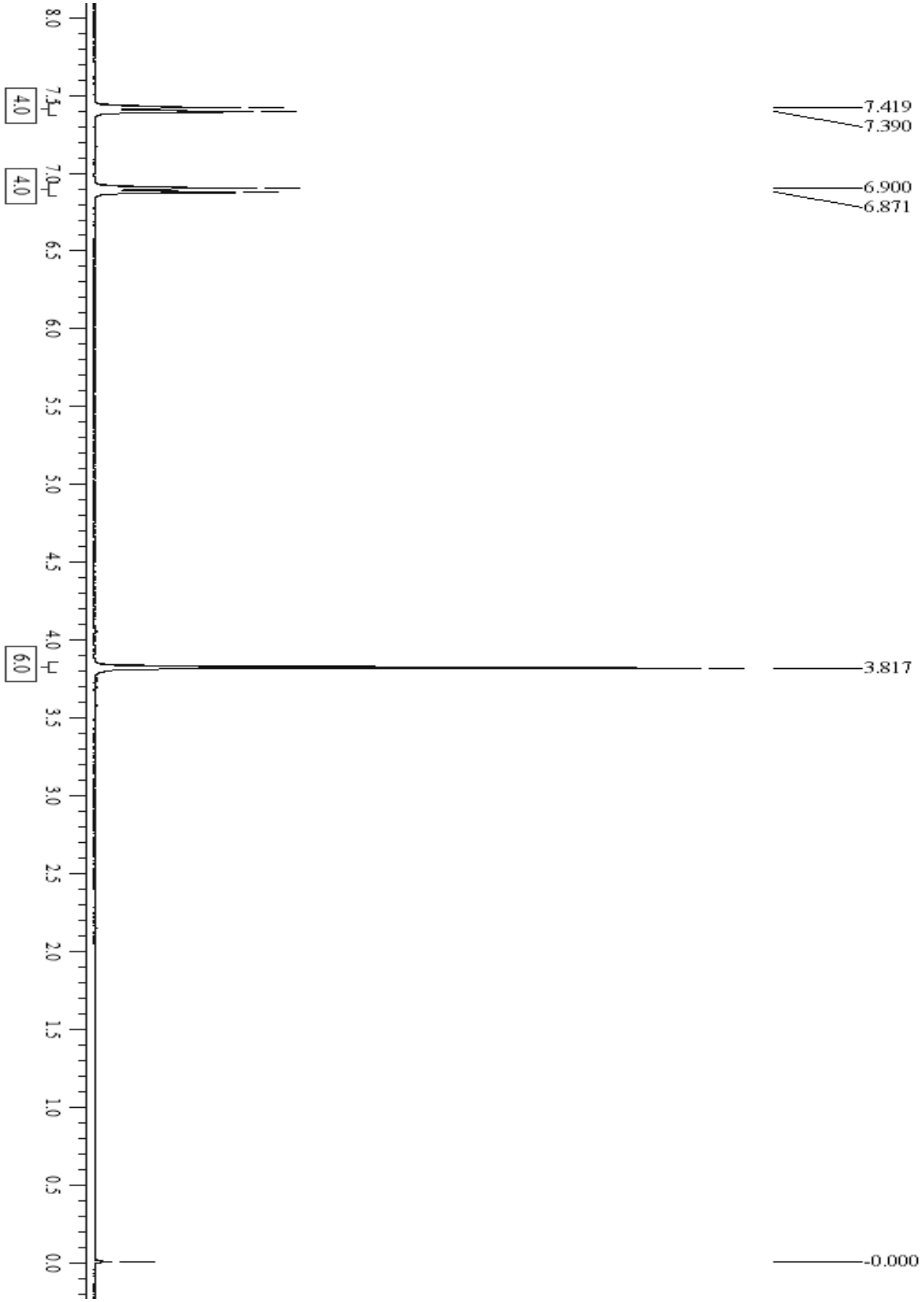
^{1}H NMR Spectrum of 4-Methoxy-4′-methylbiphenyl (entry 16, Table 4)



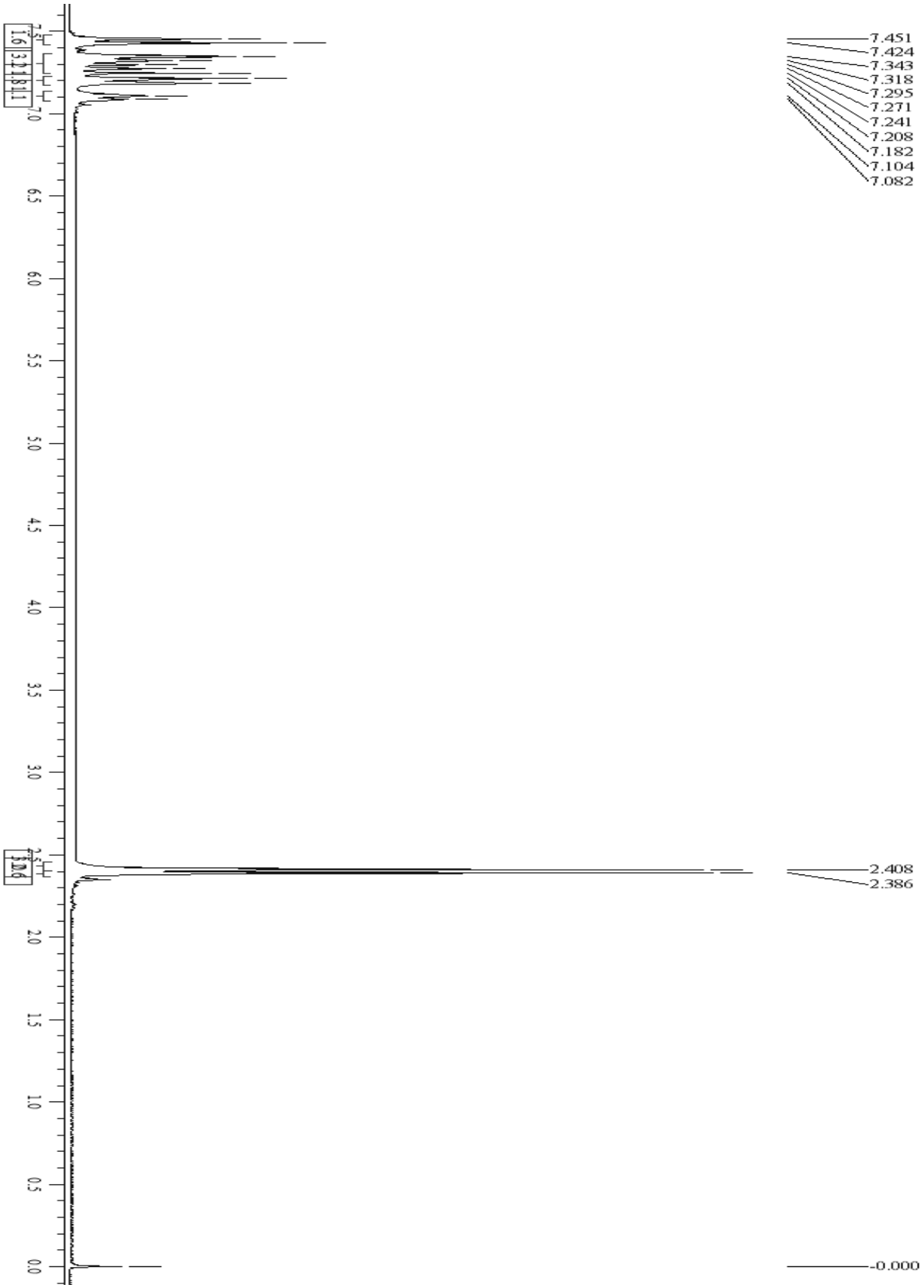
^{1}H NMR Spectrum of 4-Acetyl-4′-methoxybiphenyl (entry 17, Table 4)



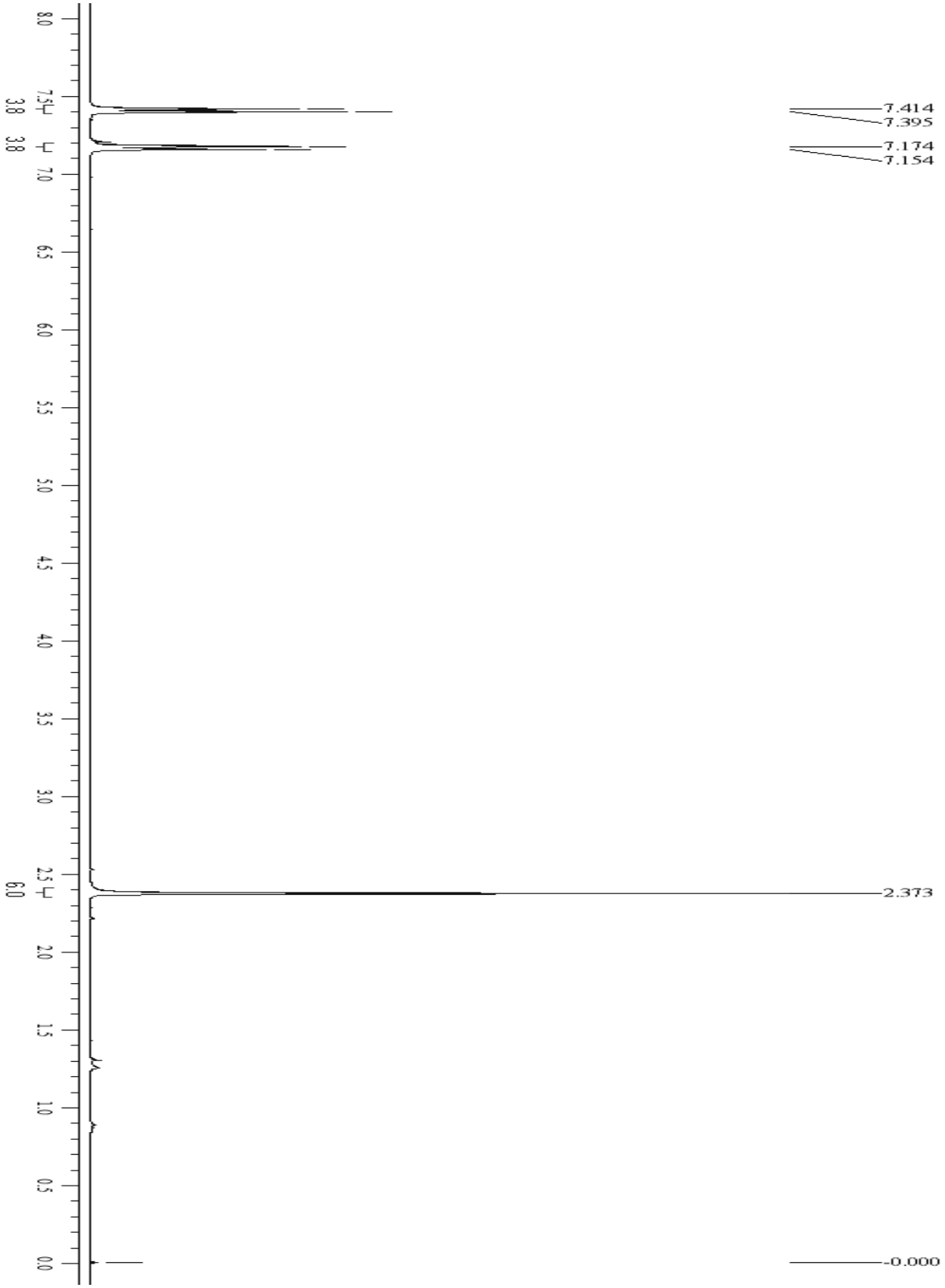
^{1}H NMR Spectrum of 4,4′-Dimethoxybiphenyl (entry 18, Table 4)



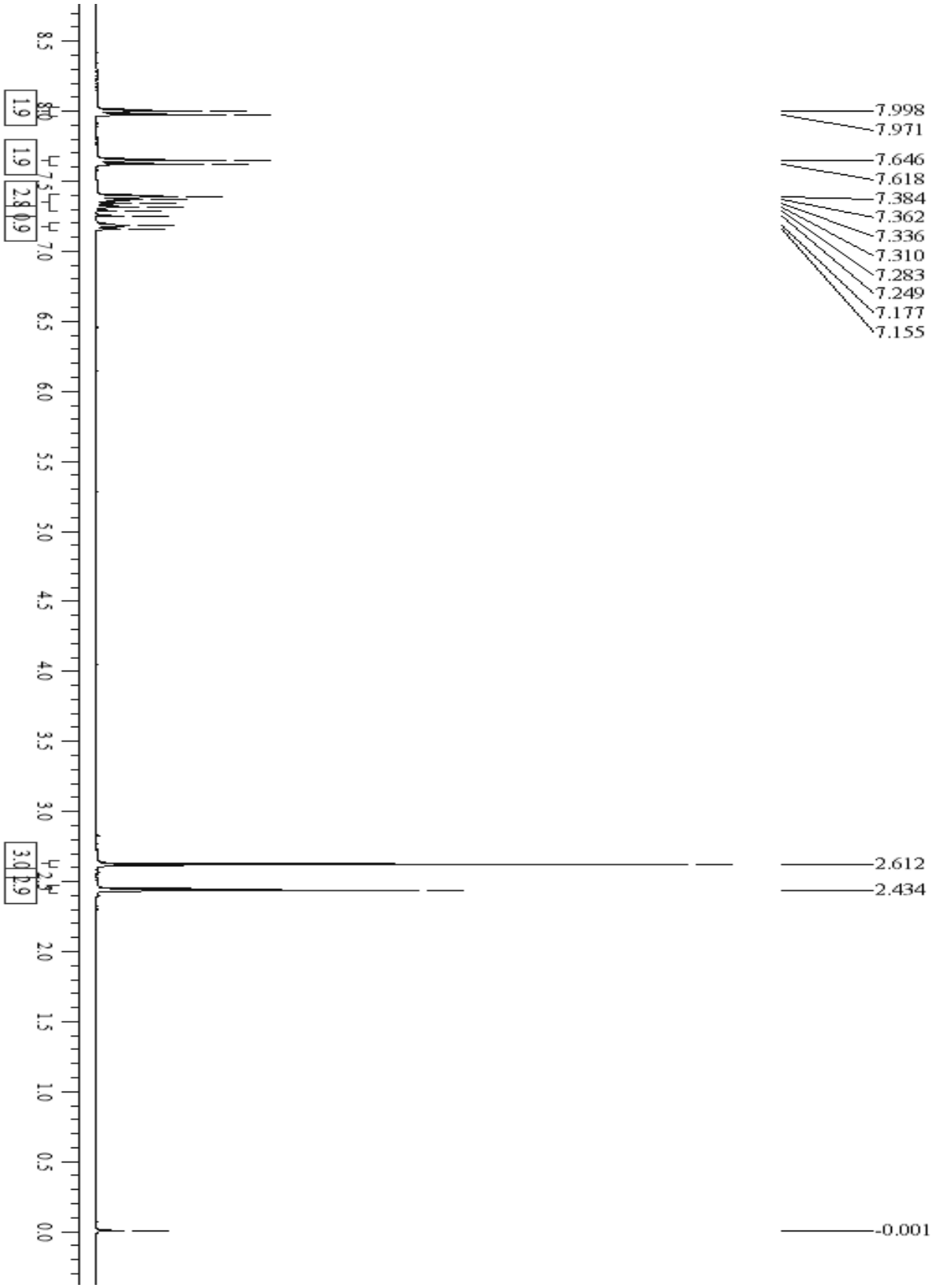
^{1}H NMR Spectrum of 4,3-Dimethylbiphenyl (entry 19, Table 4)



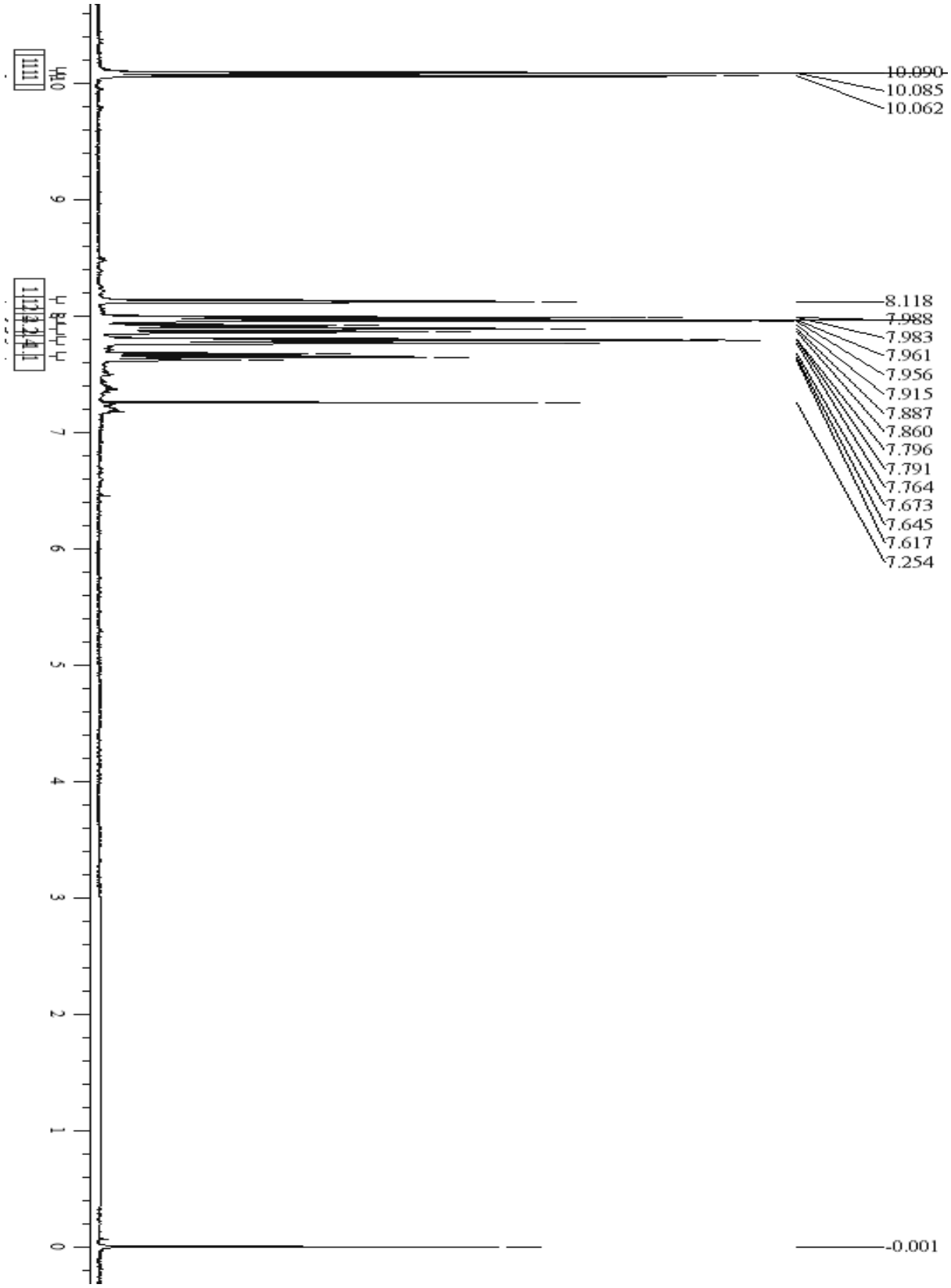
^{1}H NMR Spectrum of 4,4′-Dimethylbiphenyl (entry 20, Table 4)



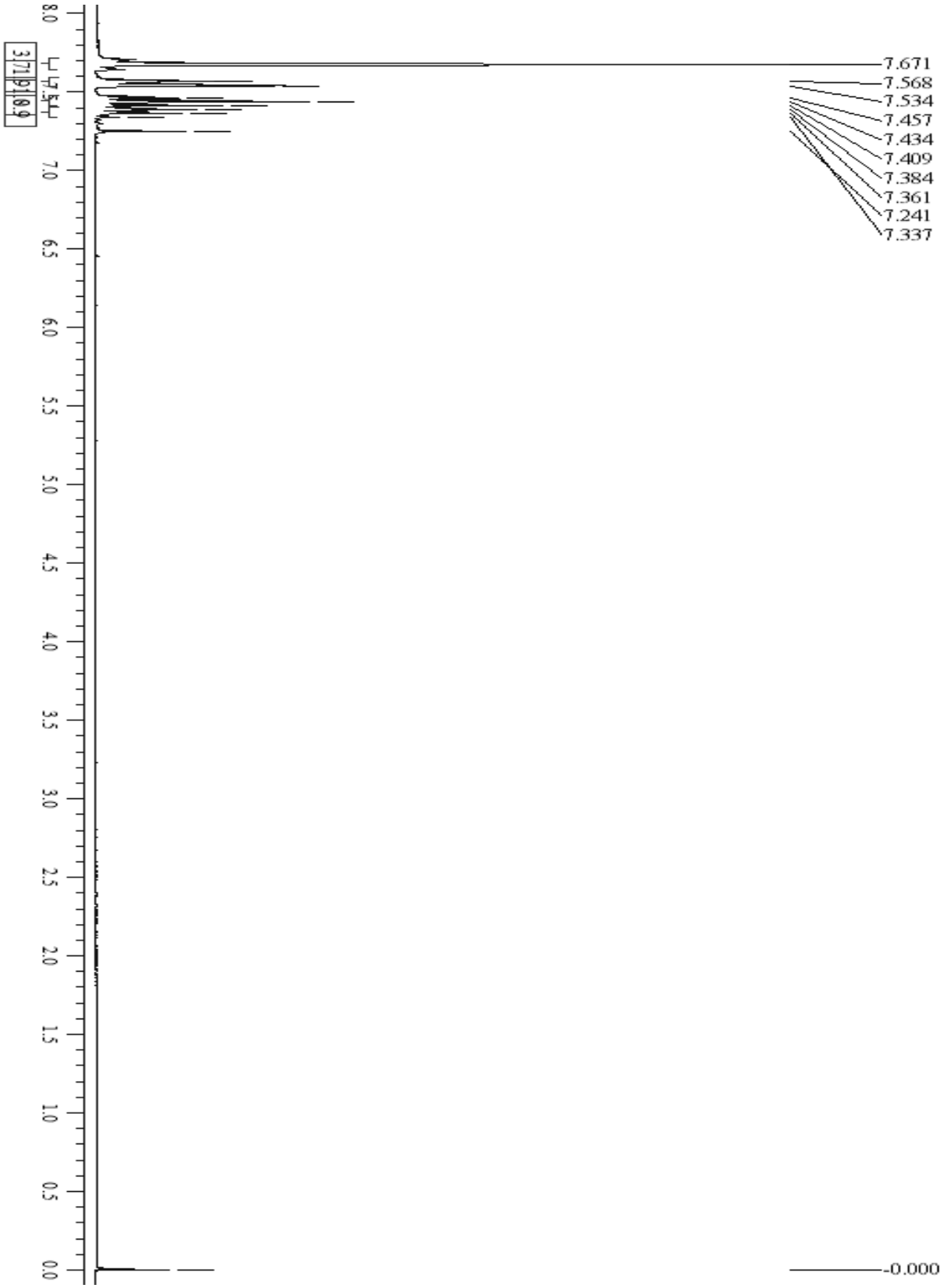
^{1}H NMR Spectrum of 4-Acetyl-3-methylbiphenyl (entry 21, table 4)



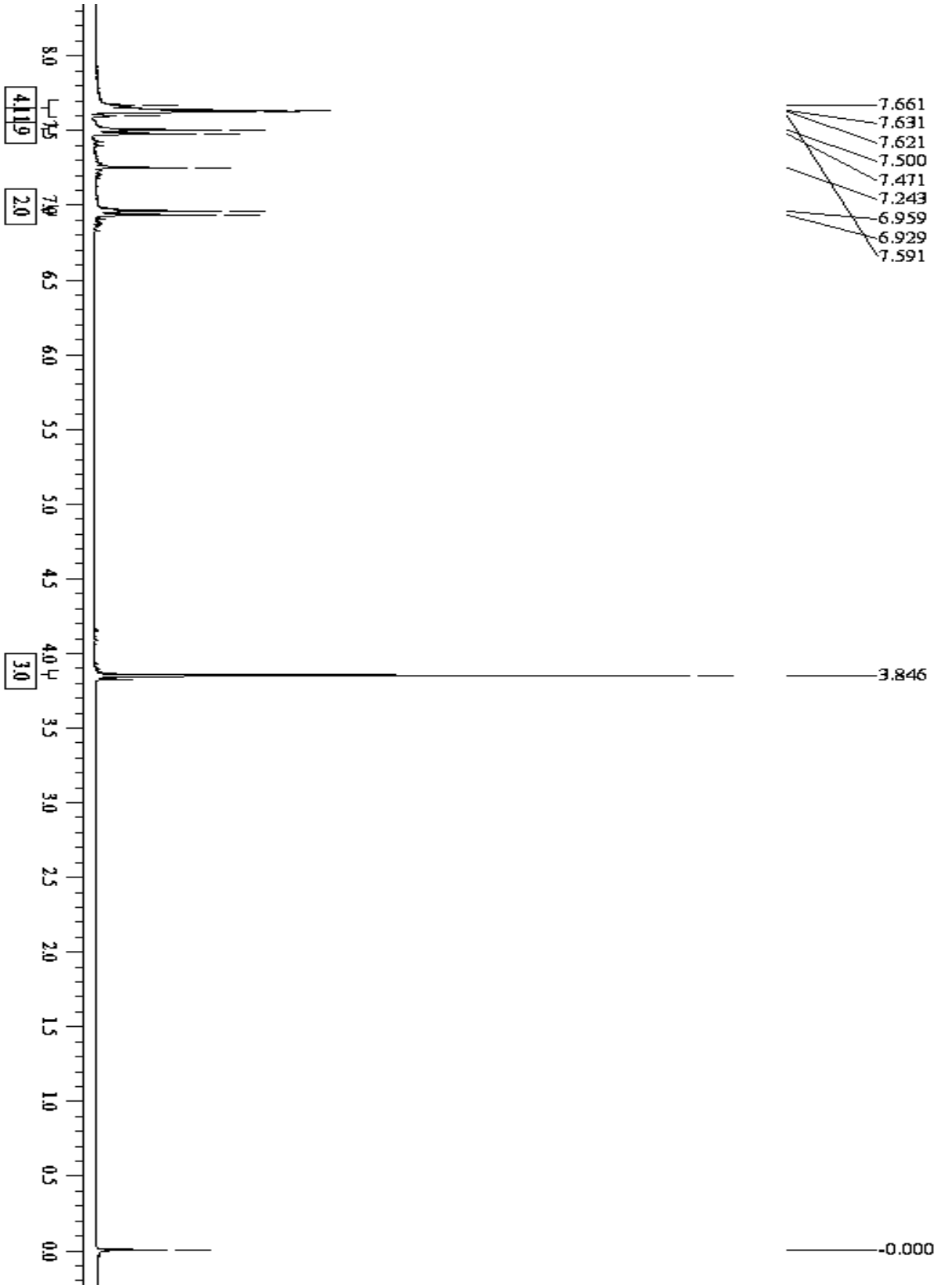
^{1}H NMR Spectrum of Biphenyl-3,4-dicarboxaldehyde (entry 22, table 4)



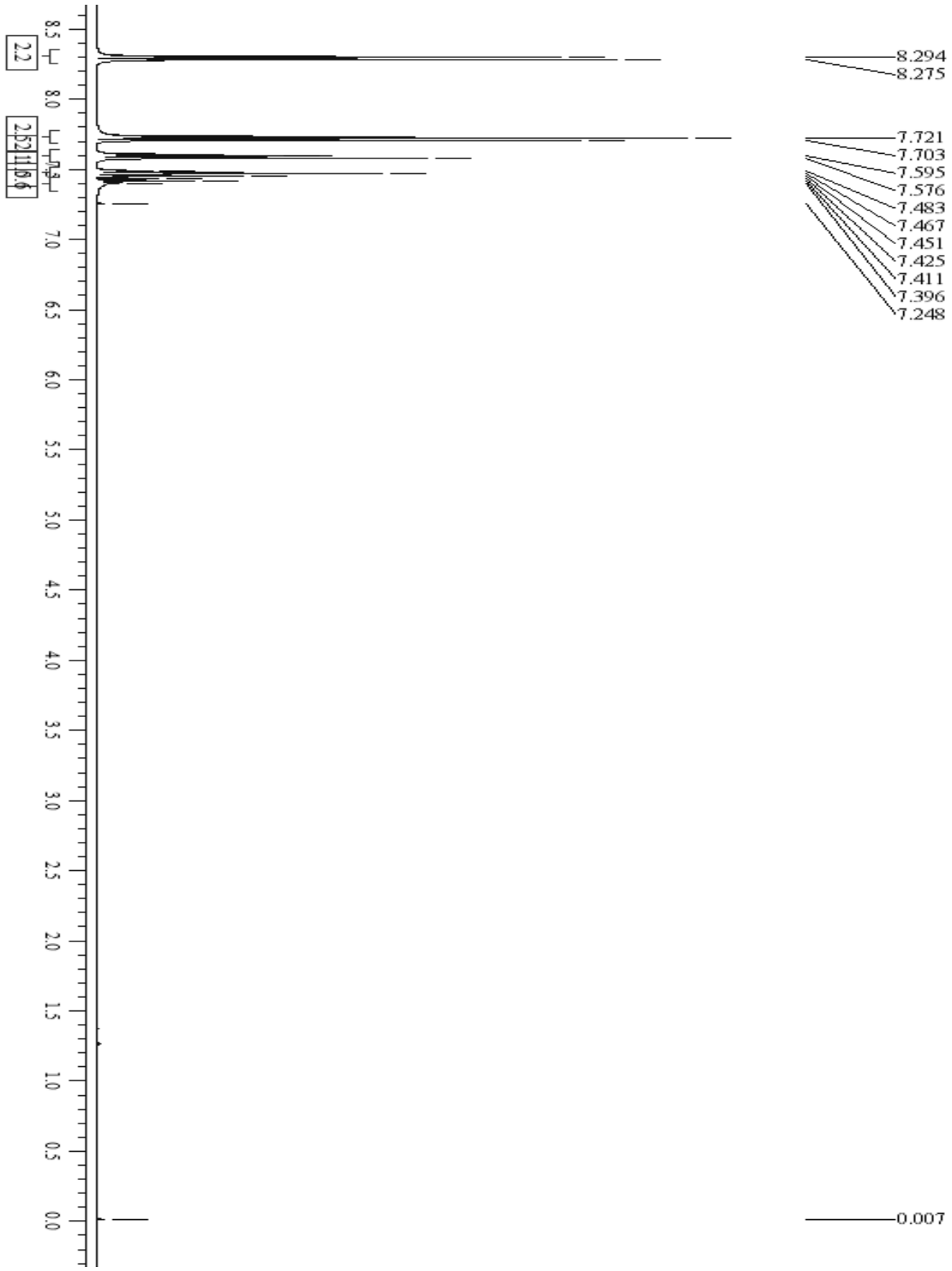
^{1}H NMR Spectrum of 4-Trifluoromethyl-biphenyl (entry 1, table 5)



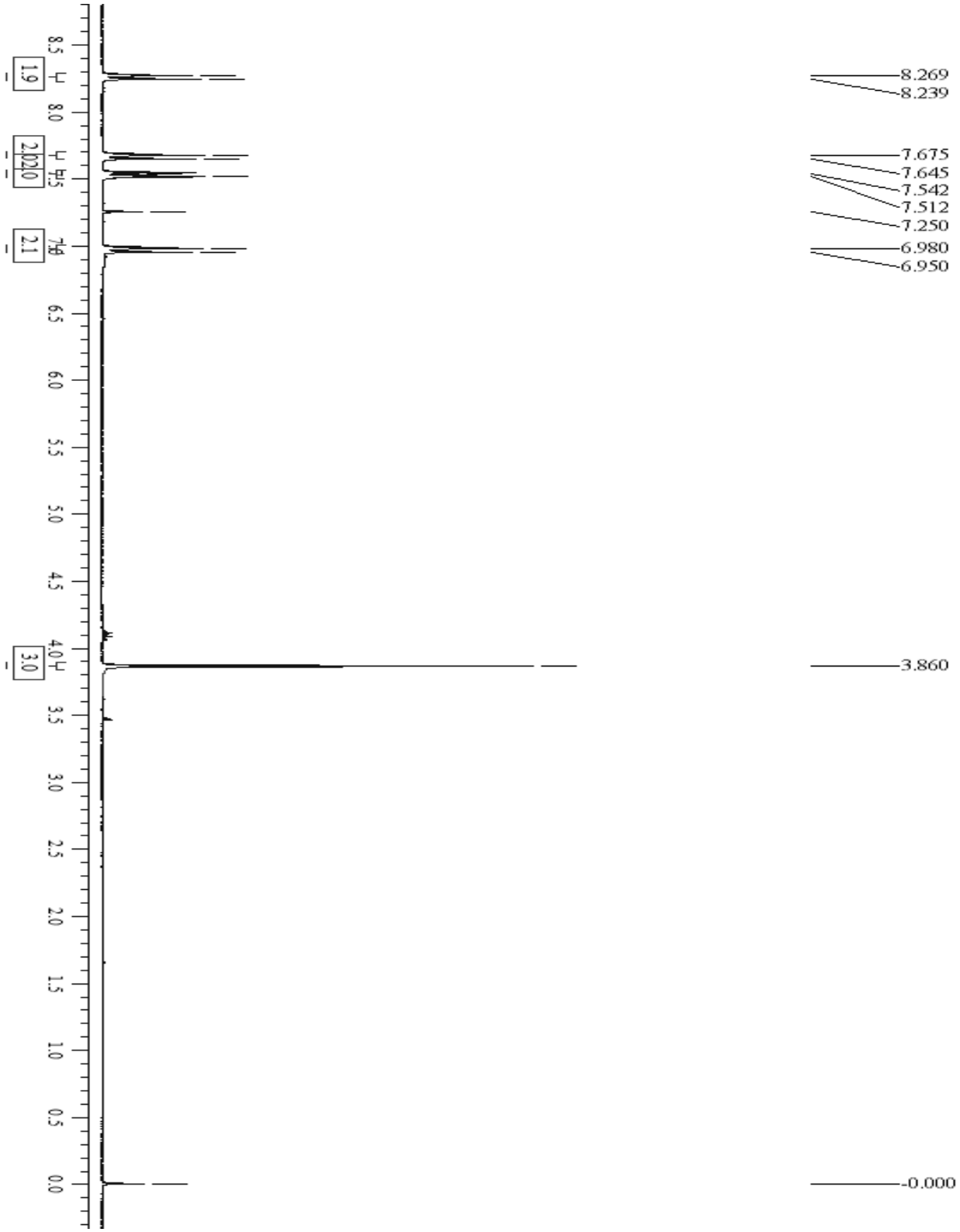
^{1}H NMR Spectrum of 4-Methoxy- 4′-Trifluoromethyl-biphenyl (entry 2, table 5)



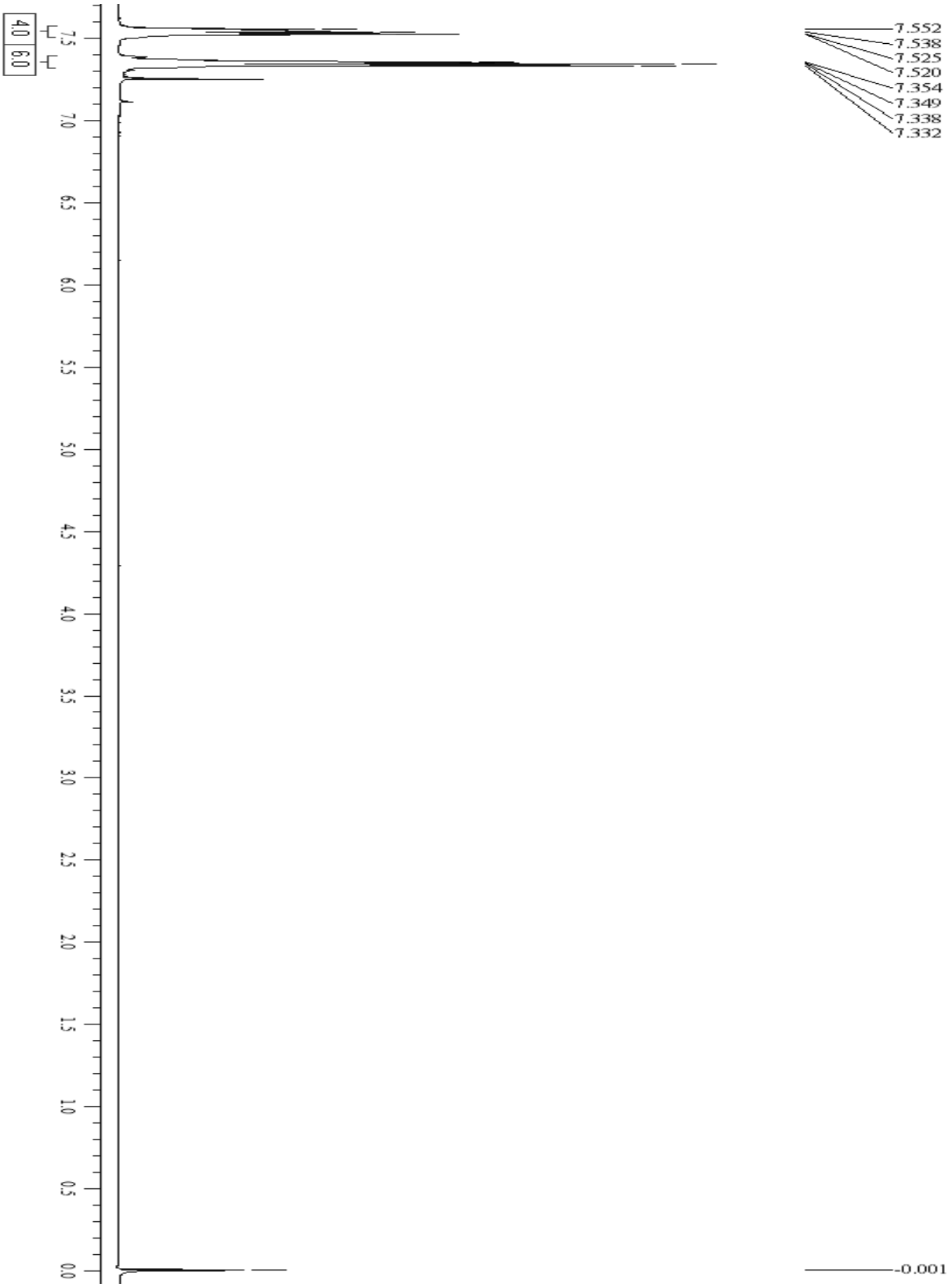
^{1}H NMR Spectrum of 4-Nitro-biphenyl (entry 3, table 5)



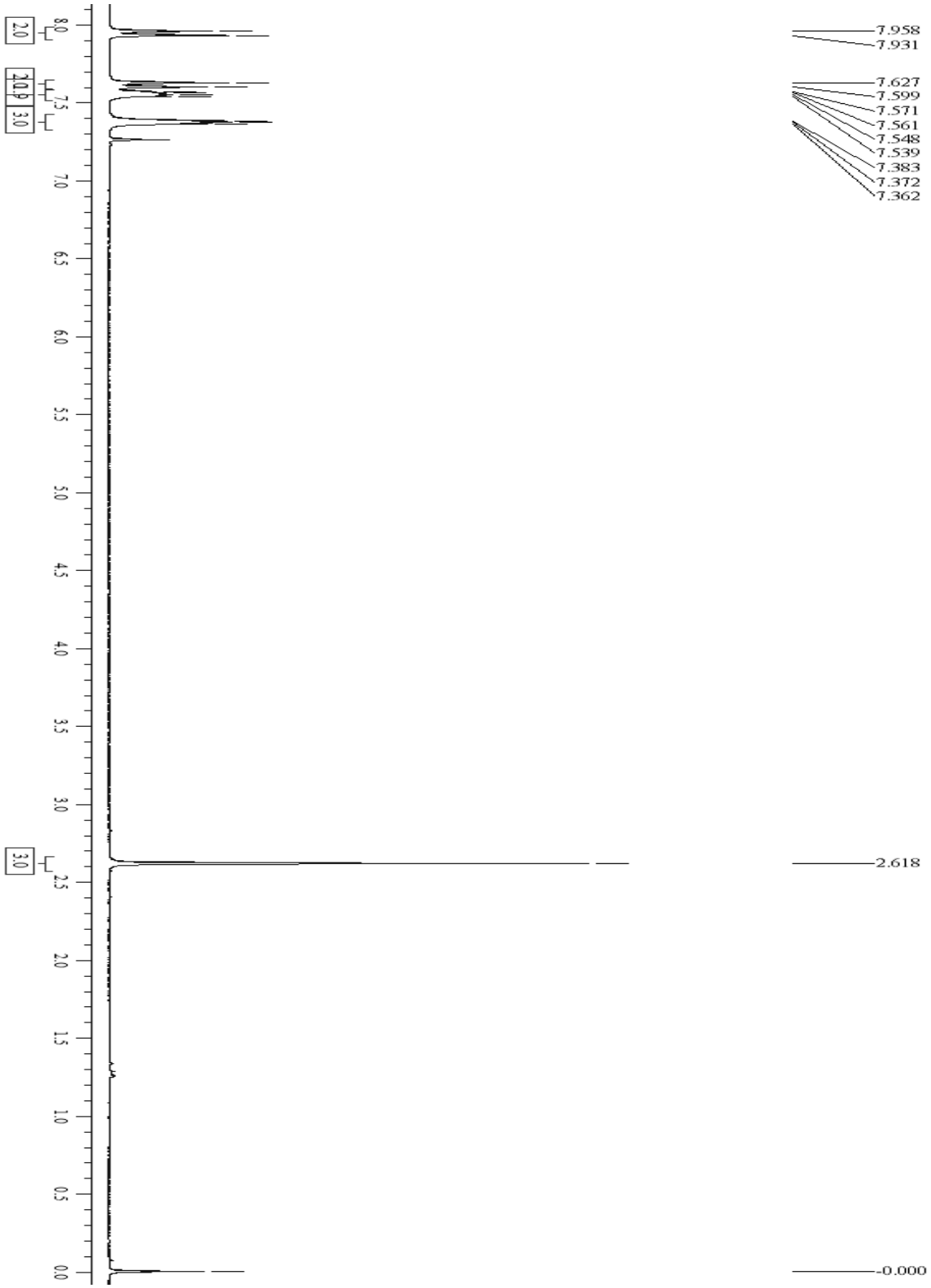
^{1}H NMR Spectrum of 4-Nitro- 4′-methoxy-biphenyl (entry 4, table 5)



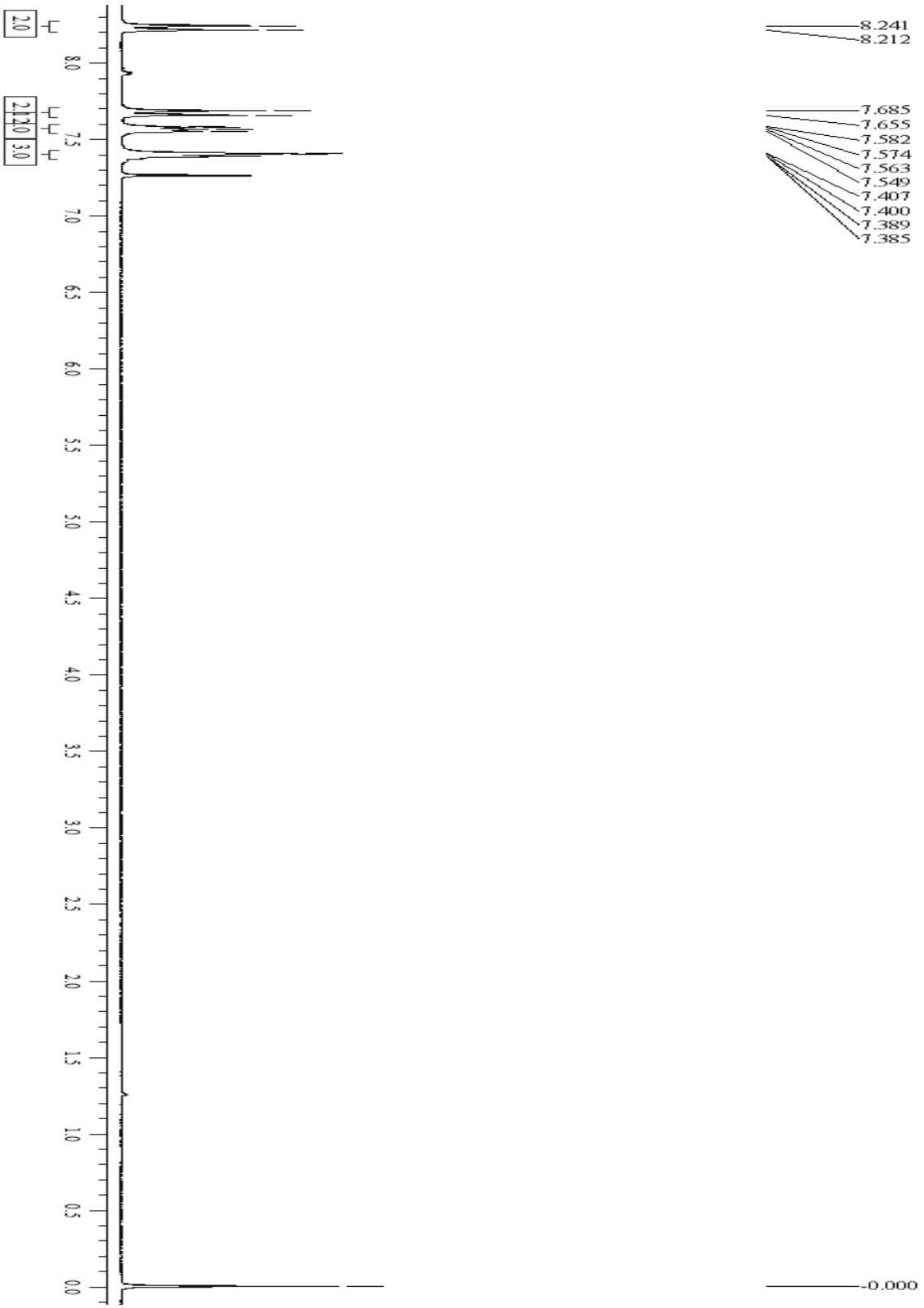
^{1}H NMR Spectrum of biphenylacetylene (entry 1, table 6)



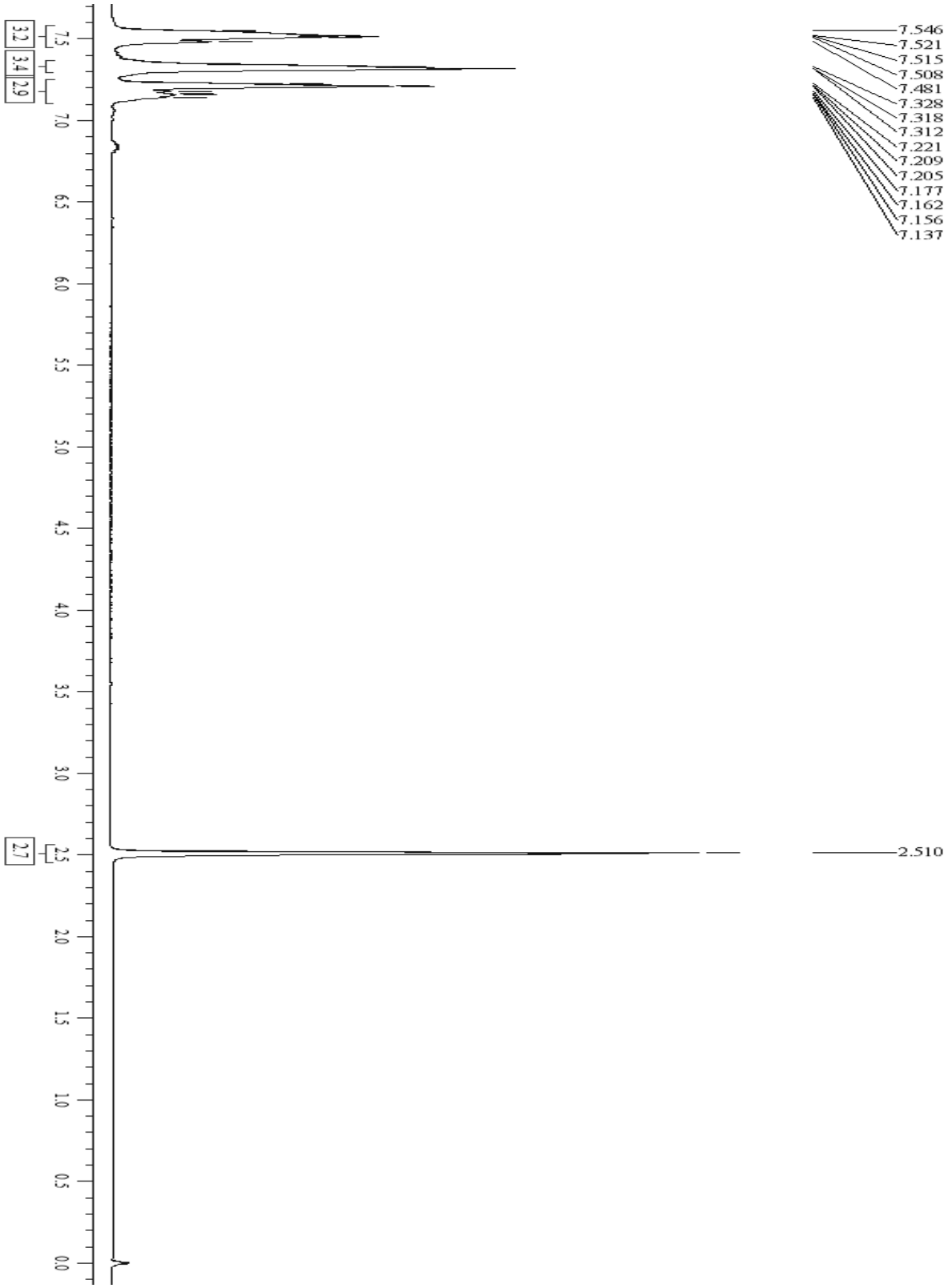
^{1}H NMR Spectrum of 1-(4-(2-phenylethynyl)phenyl)ethanone (entry 2, table 6)



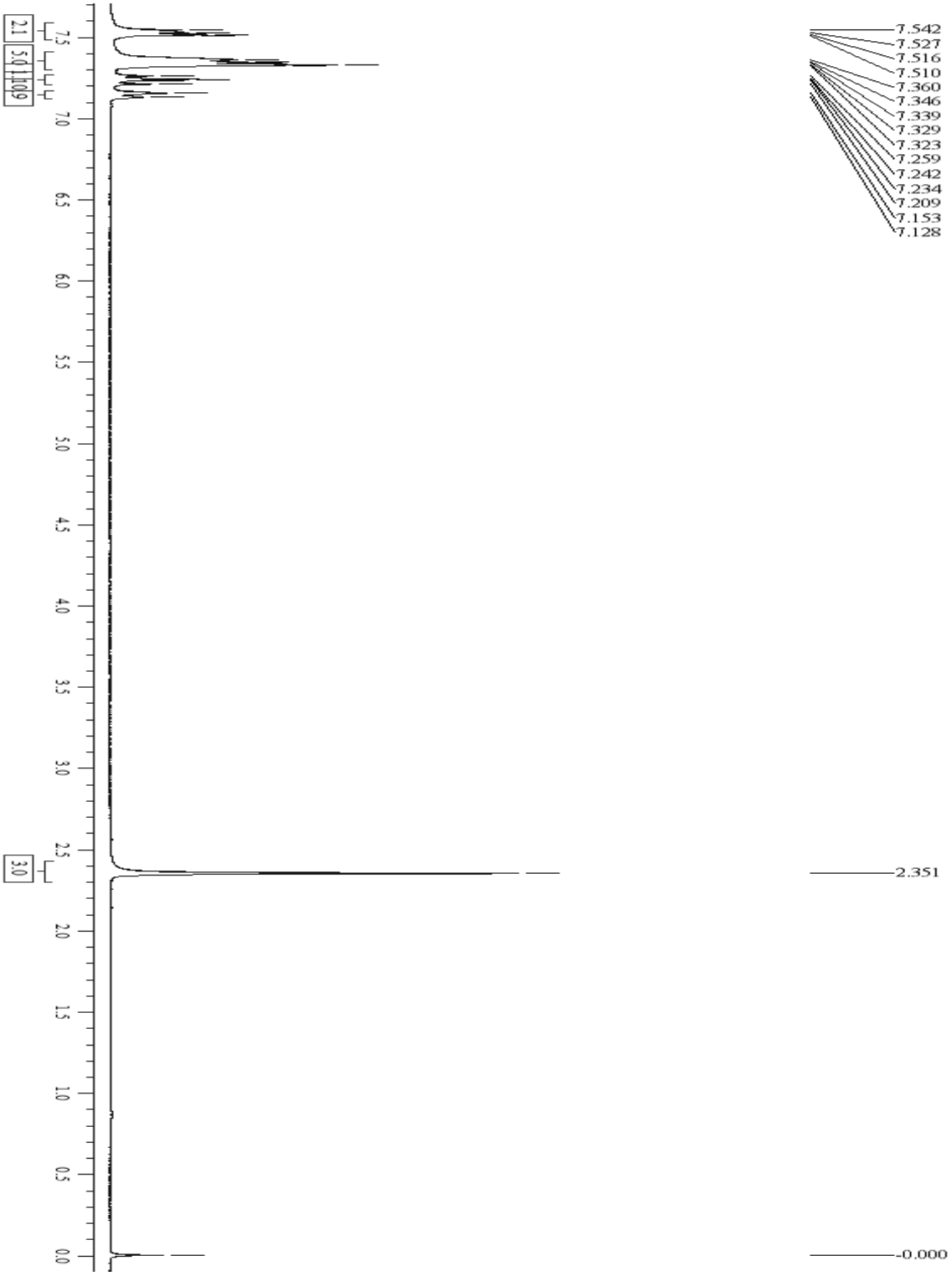
^{1}H NMR Spectrum of 1-nitro-4-(2-phenylethynyl)benzene (entry 3, table 6)



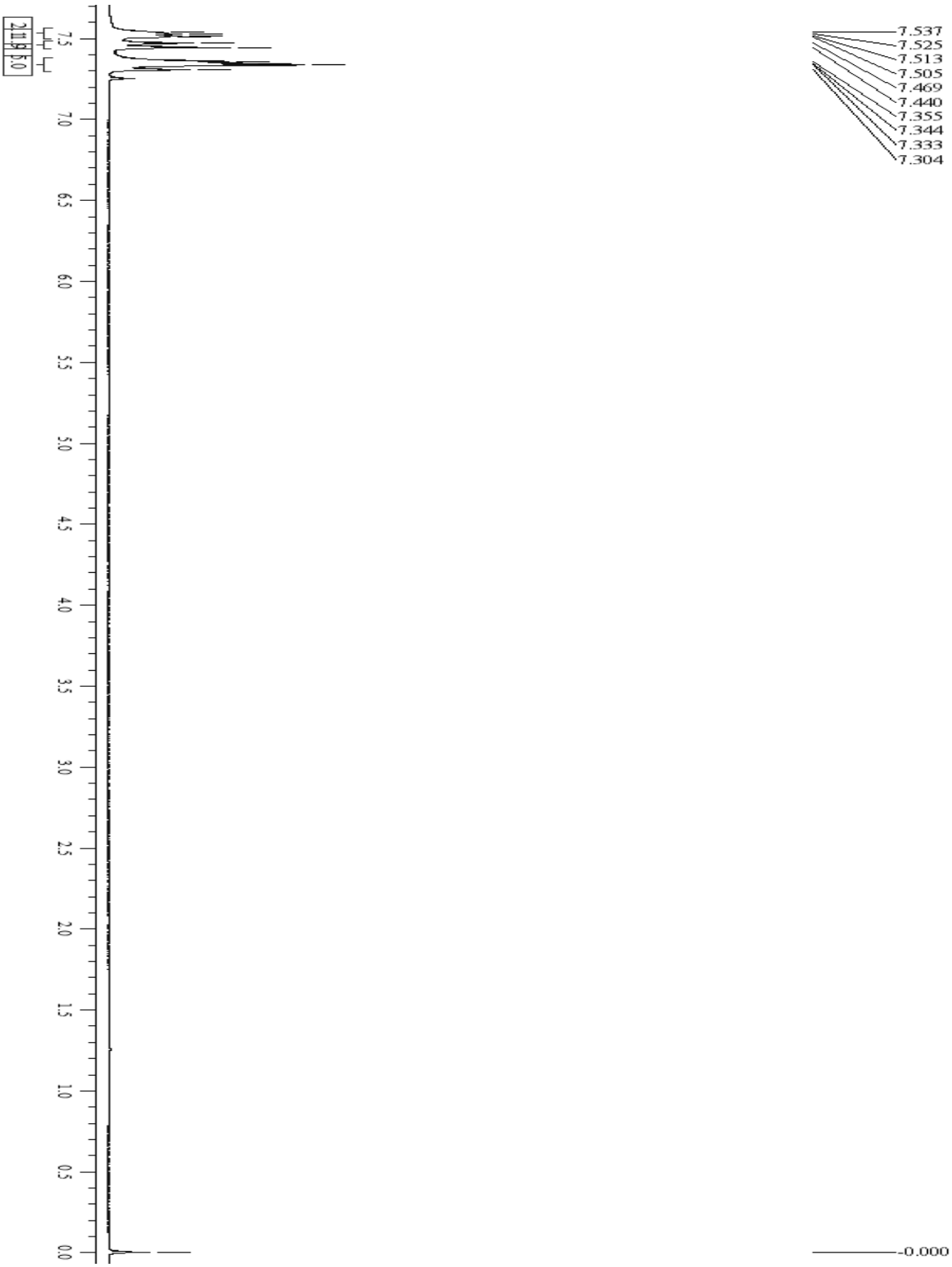
^{1}H NMR Spectrum of 1-(2-o-tolylethynyl)benzene (entry 4, table 6)



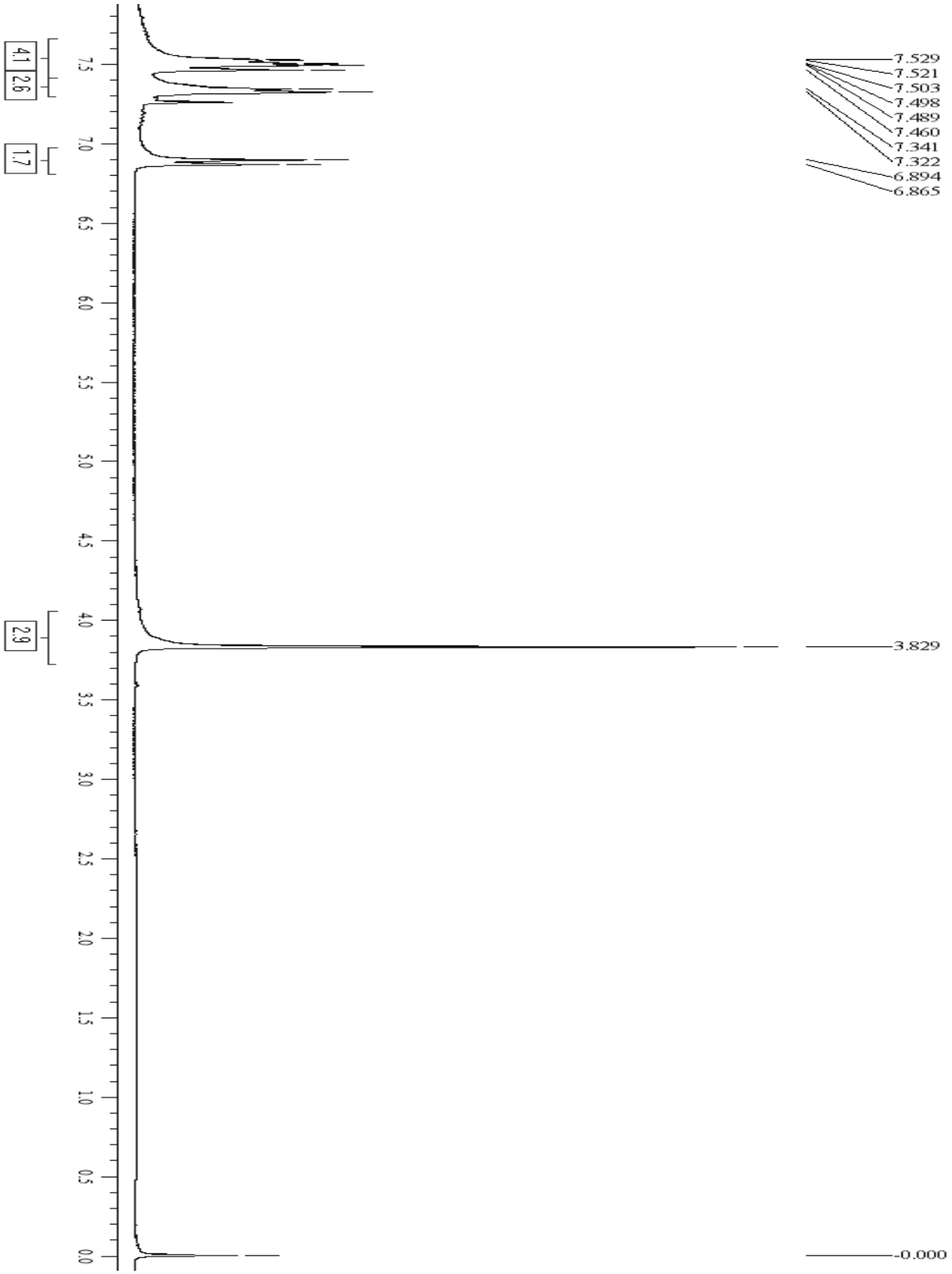
^{1}H NMR Spectrum of 1-methyl-3-(2-phenylethynyl)benzene (entry 5, table 6)



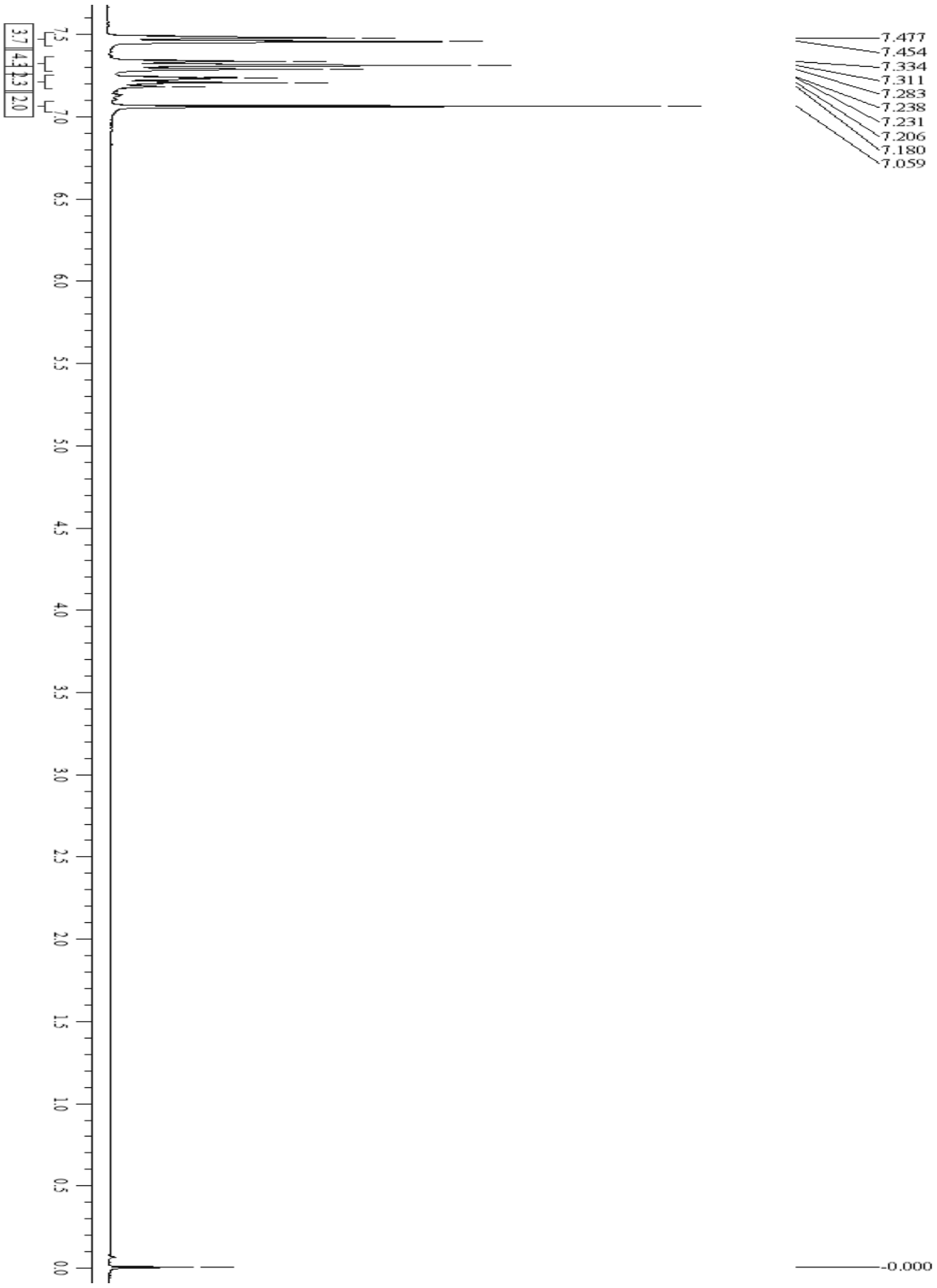
^{1}H NMR Spectrum of 1-chloro-4-(2-phenylethynyl)benzene (entry 6, table 6)



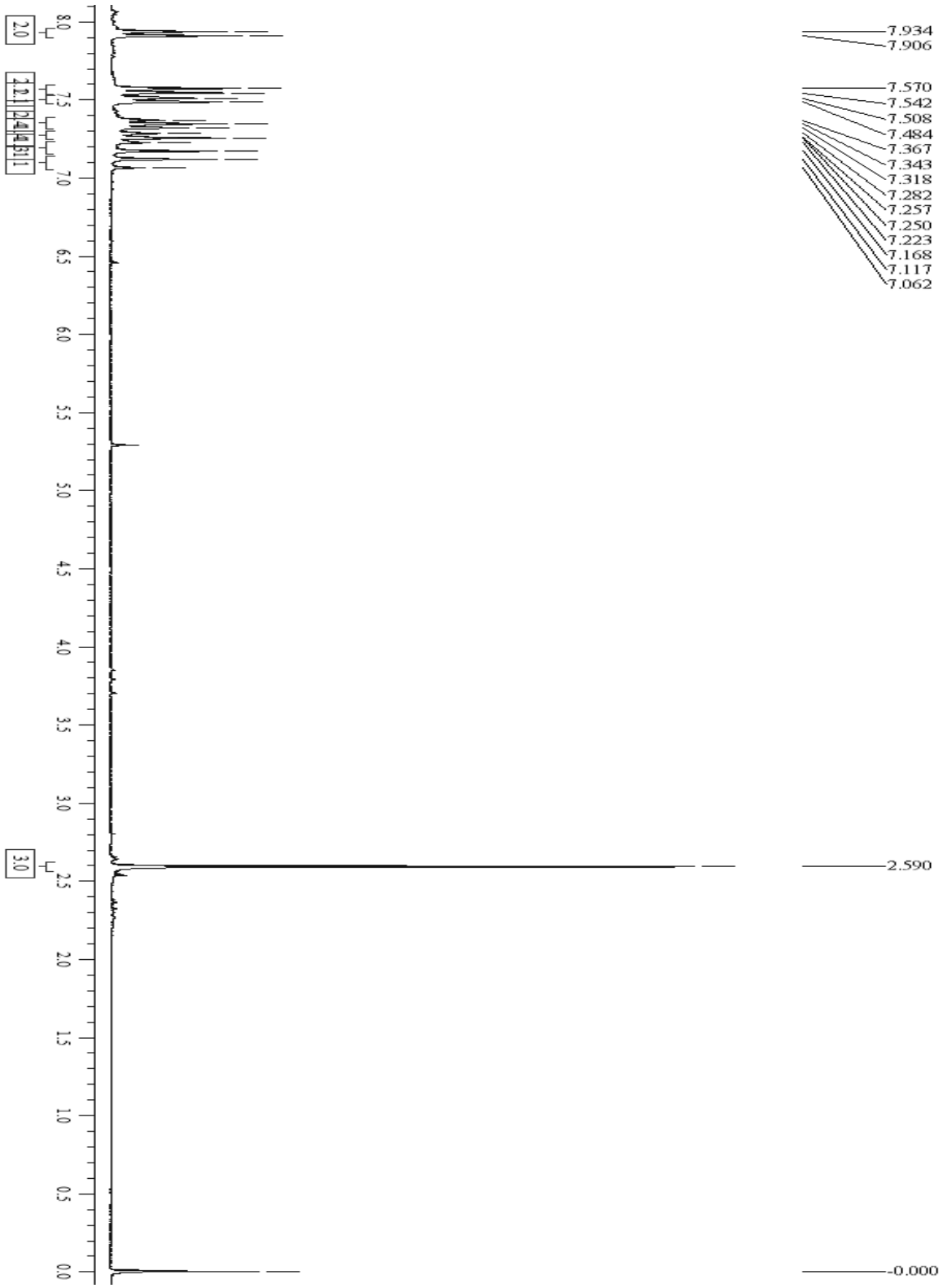
^{1}H NMR Spectrum of 1-(2-(4-methoxyphenyl)ethynyl)benzene (entry 7, table 6)



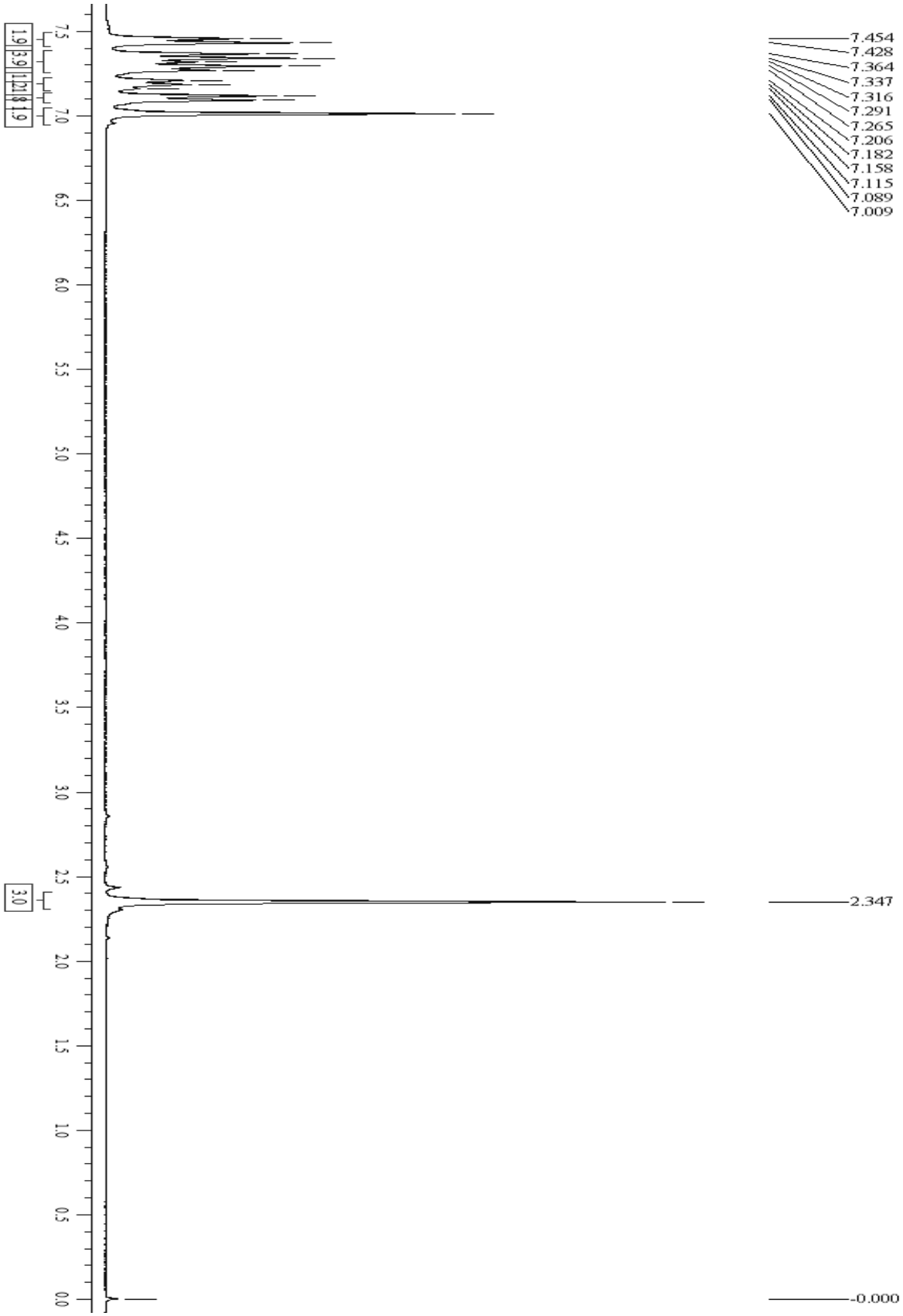
^{1}H NMR Spectrum of trans-stilbene (entry 1, table 7)



^{1}H NMR Spectrum of 4-acetyl-trans-stilbene (entry 2, table 7)



^{1}H NMR Spectrum of 4-methyl-trans-stilbene (entry 3, table 7)



^{1}H NMR Spectrum of 4-methoxy-trans-stilbene (entry 4, table 7)