Supporting Information

Reductive Bromine Atom Transfer Reaction

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General Information.

Thin layer chromatography (TLC) was performed on Merck precoated plates (silica gel 60 F254, Art 5715, 0.25 mm) and were visualized by fluorescence quenching under UV light or by staining with p-anisaldeyde/AcOH/H_2SO_4/EtOH, or $12MoO_3.H_3PO_4$/EtOH. The products were purified by flash chromatography on silica gel (Kanto Chem. Co. Silica Gel 60N (spherical, neutral, 40-50 μm)) and, if necessary, were further purified by recycling preparative HPLC (Japan Analytical Industry Co. Ltd., LC-918) equipped with GPC columns (JAIGEL-1H + JAIGEL-2H columns) using $CHCl_3$ as eluent. ^1H NMR spectra were recorded with a JEOL JNM-ECS400 (400 MHz) spectrometer and referenced to the solvent peak at 7.26 ppm. ^{13}C NMR spectra were recorded with a JEOL JNM-ECS400 (100 MHz) spectrometer and referenced to the solvent peak at 77.00 ppm. Splitting patterns are indicated as follows: br, broad; s, singlet; d, doublet; t, triplet; q, quartet; m, multiplet. Infrared spectra were recorded on a JASCO FT/IR-4100 spectrometer and are reported as wavenumber (cm^{-1}). Conventional and high-resolution mass spectra were recorded with a JEOL MS700 spectrometer. Benzene, hexane and MeCN were distilled over calcium hydride.

Typical procedure for the synthesis of ethyl caprylate (4a)

A magnetic stirring bar, **1a** (54.1 mg, 0.25 mmol), **2a** (92.9 mg, 2.5 mmol), hexane (10 mL), and H_2O (100 mL) were placed in a quartz tube and then the tube was irradiated by 6 W low-pressure mercury lamp with stirring for 6 h. The reaction mixture was concentrated in vacuo. The resulting residue was subjected to silica gel column chromatography using hexane/EtOAc (150/1) as eluent affording **4a** (45.8 mg, 77%).

Procedure for the synthesis of ethyl 2-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)acetate (5)

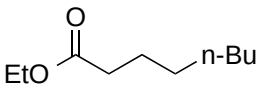
A magnetic stirring bar, **1a** (85.1 mg, 0.51 mmol), **2a** (420.1 mg, 5.0 mmol), C_6H_6 (10 mL), and TEMPO (90.8 mg, 0.58 mmol) were placed in quartz tube and then the tube was irradiated by 6 W low-pressure mercury lamp with stirring for 6 h. The reaction mixture was concentrated in vacuo. The resulting residue was subjected to silica gel column chromatography using hexane/EtOAc (150/1) as eluent affording **5** (90.1 mg, 69%).

Procedure for the deuterium-labeling experiments

A magnetic stirring bar, **1a** (46.4 mg, 0.28 mmol), **2a** (212.0 mg, 2.5 mmol), hexane (10 mL) and D_2O (100 mL) were placed in quartz tube and then the tube was irradiated by 6 W low-pressure

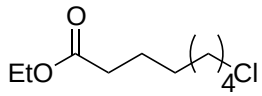
mercury lamp with stirring for 6 h. The reaction mixture was concentrated in vacuo. The resulting residue was subjected to silica gel column chromatography using hexane/EtOAc (150/1) as eluent affording **4a-D** (32.1 mg, 67%). D/H ratio (90:10) was determined by MS spectrum.

Ethyl caprylate (**4a**)



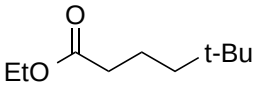
This compound is commercially available [CAS No. = 106-32-1]. ^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.11 (q, *J* = 7.1 Hz, 2H), 2.28 (t, *J* = 7.6 Hz, 2H), 1.63-1.59 (m, 2H), 1.32-1.21 (m, 11H), 0.78 (t, *J* = 6.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.05, 14.23, 22.57, 24.97, 28.91, 29.08, 31.63, 34.37, 60.13, 173.93.

Ethyl 8-chlorooctanoate (**4b**)[1]



^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.12 (q, *J* = 7.2 Hz, 2H), 3.53 (t, *J* = 6.8 Hz, 2H), 2.29 (t, *J* = 7.4 Hz, 2H), 1.79-1.71 (m, 2H), 1.66-1.56 (m, 2H), 1.47-1.40 (m, 2H), 1.36-1.31 (m, 4H), 1.25 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.21, 24.80, 26.64, 28.49, 28.89, 32.49, 34.25, 60.17, 173.76.

Ethyl 5,5-dimethylhexanoate (**4c**)



^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.12 (q, *J* = 7.2 Hz, 2H), 2.26 (t, *J* = 7.6 Hz, 2H), 1,60-1.55 (m, 2H), 1.26 (t, *J* = 6.8 Hz, 2H), 1.20-1.16 (m, 2H), 0.88 (s, 9H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.26, 20.28, 29.28, 35.13, 43.58, 60.16, 173.92; IR (neat) 2958 cm^{-1}, 1737 cm^{-1}, 1366 cm^{-1}; MS (relative intensity) m/z 157 ($[M\text{-}Me]^+$, 13), 127 (21), 115 (30), 111 (36), 88 (100), 57 (97); HRMS (CI) m/z calcd for $C_{10}H_{21}O_2$ 173.1463, found 173.1537.

Ethyl 8-hydroxyoctanoate (**4d**)[2]

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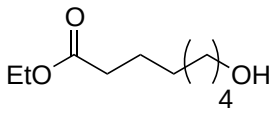
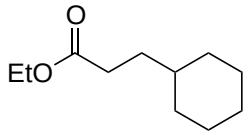
[1] Novartis AG; Novartis Pharma GmbH; Beranhard, R.; Ulrich M. Patent: WO200663821 A1, **2006.**

[2] Kudo, F.; Asou, Y.; Watanabe, M.; Kitayama, T.; Eguchi, T. *Synlett*, **2012**, *23*, 1843.



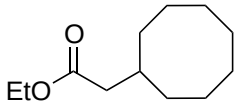
^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.11 (q, *J* = 7.0 Hz, 2H), 3.64 (t, *J* = 6.4 Hz, 2H), 2.29 (t, *J* = 7.6 Hz, 2H), 1.64-1.51 (m, 6H), 1.37-1.28 (m, 5H), 1.25 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.24, 24.85, 25.51, 29.01, 29.05, 32.66, 34.31, 60.18, 62.96, 173.87.

Ethyl 3-cyclohexylpropanoate (**4e**)[3]



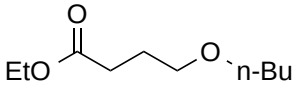
^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.11 (q, *J* = 7.2 Hz, 2H), 2.31-2.28 (m, 2H), 1.72-1.61 (m, 5H), 1.55-1.49 (m, 2H), 1.27-1.16 (m, 7H), 0.95-0.82 (m, 2H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.23, 26.21, 26.52, 31.96, 32.35, 32.94, 37.22, 60.16, 174.25.

Ethyl 2-cyclooctylacetate (**4f**)[4]



^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.12 (q, *J* = 7.2 Hz, 2H), 2.10 (d, *J* = 7.2 Hz, 2H), 2.12-2.00 (m, 1H), 1.69-1.41 (m, 12H), 1.33-1.25 (m, 2H), 1.25 (t, *J* = 7.2 Hz, 2H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.28, 25.21, 26.14, 27.03, 32.14, 34.54, 42.91, 60.05, 173.42.

Ethyl 4-butoxybutanoate (**4g**)



^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.12 (q, *J* = 7.2 Hz, 2H), 3.42 (t, *J* = 6.4 Hz, 2H), 3.39 (t, *J* = 6.4 Hz, 2H), 2.38 (t, *J* = 7.4 Hz, 2H), 1.88 (tt, *J* = 6.7 Hz, 2H), 1.56-1.49 (m, 2H), 1.37-1.33 (m, 2H), 1.25 (t, *J* = 7.2 Hz, 3H), 0.90 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 13.90, 14.21, 19.31, 25.07, 31.77, 60.24, 69.57, 70.64, 173.58; IR (neat) 2959 cm^{-1}, 1738 cm^{-1}, 1372 cm^{-1}, 1116 cm^{-1}; MS (relative intensity) m/z 131 ($[M-Bu]^+$, 26), 115 (11), 101 (15), 87 (100), 57 (68); HRMS (CI) m/z

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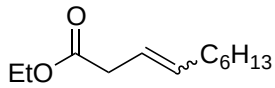
[3] Ryu, I.; Uehara, S.; Hirao, H.; Fukuyama, T. *Org. Lett.* **2008**, *10*, 1005.

[4] Yokohama, S.; Miwa, T.; Aibara, S.; Fujiwara, H.; Matsumoto, H.; Nakayama, K.; Iwamoto, T.; Mori, M.; Moroi, R.; Tsukada, W.; Isoda, S. *Chem. Pharm. Bull.* **1992**, *40*, 2391.

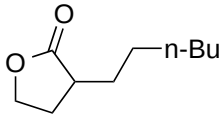
calcd for $C_{10}H_{21}O_3$ 189.1485, found 189.1492.

Ethyl dec-3-enoate (**4h**)[5]



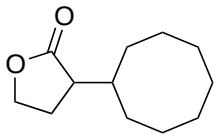
Obtained as a *E*/*Z* isomer mixture in a 71/29 ratio, as determined by ^{1}H NMR analysis: ^{1}H NMR ($CDCl_3$, 400 MHz) δ 5.56-5.51 (m, 2H), 4.17-4.12 (m, 2H), 3.08 (d, *J* = 3.6 Hz, 0.48H), 3.01 (d, *J* = 6.0 Hz, 1.19H), 2.03-1.99 (m, 2H), 1.35-1.22 (m, 11H), 0.88-0.84 (m, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.09 (*E* and *Z*, 2 lines superimposed), 14.19 (*E* and *Z*, 2 lines superimposed), 22.61 (*E* and *Z*, 2 lines superimposed), 28.80 (*E*), 28.90 (*Z*), 29.11 (*E*), 29.27 (*Z*), 31.69 (*E* and *Z*, 2 lines superimposed), 32.74 (*E*), 33.01 (*Z*), 38.18 (*E* and *Z*, 2 lines superimposed), 60.49(*E*), 60.57 (*Z*), 120.76 (*Z*), 121.50 (*E*), 133.50 (*Z*), 134.85 (*E*), 172.27 (*E* and *Z*, 2 lines superimposed).

3-Hexyl-dihydro-furan-2-one (**4i**)



This product is commercially available [CAS No. = 18436-37-8]. ^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.36-4.30 (m, 1H), 4.22-4.15 (m, 1H), 2.55-2.46 (m, 1H), 2.41-2.35 (m, 1H), 2.00-1.85 (m, 2H), 1.51-1.21 (m, 9H), 0.88 (m, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.02, 22.54, 27.26, 28.60, 28.97, 30.29, 31.58, 66.48, 179.63.

2,2-Heptamethylen-butyrolacton (**4j**)



^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.31 (dt, *J* = 2.8, 9.2 Hz, 1H), 4.15 (dt, *J* = 7.2, 9.2 Hz, 1H), 2.55 (ddd, *J* = 4.4, 9.2, 10.4 Hz, 1H), 2.29-2.01 (m, 3H), 1.81-1.21 (m, 14H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 24.44, 25.26, 25.96, 26.50, 26.58, 29.37, 32.50, 36.69, 46.59, 66.46, 178.98; IR (neat) 2926 cm^{-1}, 1773 cm^{-1}, 1764 cm^{-1}, 1449 cm^{-1}, 1301 cm^{-1}; MS (relative intensity) m/z 196 (M^+, 10), 125 (12), 86 (100); HRMS (EI) m/z calcd for $C_{12}H_{20}O_2$ 196.1463, found 196.1459.

Diethyl 2-hexylmalonate (**4k**)[6]

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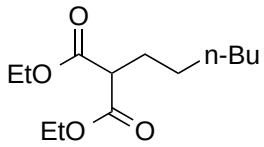
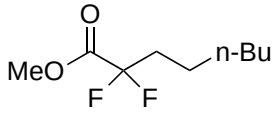
[5] Deng, M.-Z.; Li, N.-S.; Huang, Y.-Z. *J. Org. Chem.* **1992**, *57*, 4017.



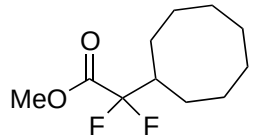
^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.18 (q, *J* = 7.2 Hz, 4H), 3.31 (t, *J* = 7.4 Hz, 1H), 1.91-1.87 (m, 2H), 1.31-1.24 (m, 14H), 0.87 (t, *J* = 6.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.01, 14.07, 22.50, 27.25, 28.72, 28.85, 31.48, 52.05, 61.23, 169.62.

Methyl 2,2-difluorooctanoate (**4l**)[7]



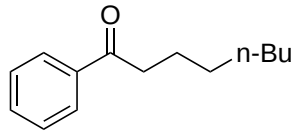
^{1}H NMR ($CDCl_3$, 400 MHz) δ 3.87 (s, 3H), 2.10-1.95 (m, 2H), 1.49-1.21 (m, 8H), 0.88 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 13.97, 21.35 (t, J_{CF} = 7.6 Hz), 22.39, 28.69, 31.38, 34.51 (t, J_{CF} = 22.9 Hz), 116.45, 164.94.

Methyl 2-cyclooctyl-2,2-difluoroacetate (**4m**)



^{1}H NMR ($CDCl_3$, 400 MHz) δ 3.86 (s, 3H), 2.39-2.21 (m, 1H), 1.73-1.42 (m, 14H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 25.33, 25.36 (t, J_{CF} = 3.8 Hz), 41.59 (t, J_{CF} = 20.5 Hz), 53.11, 118.36 (t, J_{CF} = 500.3 Hz), 165.18 (t, J_{CF} = 33.4 Hz); IR (neat) 2921 cm^{-1}, 1768 cm^{-1}, 1158 cm^{-1}, 1029 cm^{-1}; MS (relative intensity) m/z 220 ([M]$^+$, 1), 189 (1), 143 (10), 111 (25), 74 (22), 69 (100); HRMS (CI) m/z calcd for $C_{11}H_{19}F_2O_2$ 221.1348, found 221.1346.

1-Phenyloctan-1-one (**4n**)



This compound is commercially available [CAS No. = 1674-37-9]. ^{1}H NMR ($CDCl_3$, 400 MHz) δ 7.97-7.95 (m, 2H), 7.55-7.52 (m, 1H), 7.48-7.44 (m, 2H), 2.98-2.94 (m, 2H), 1.78-1.69 (m, 2H),

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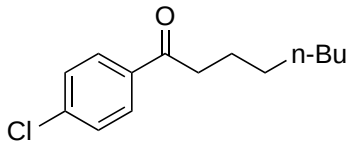
6 Marmillon, C.; Bompart, J.; Calas, M.; Escale, R; Bonnet, P.-A. *Heterocycles* **2000**, *53*, 1317.

7 Okano, T.; Takakura, N.; Nakano, Y.; Okajima, A.; Eguchi, S. *Tetrahedron* **1995**, *51*, 1903.

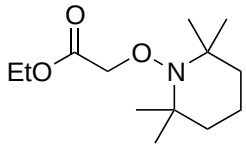
1.37-1.26 (m, 8H), 0.88 (t, J = 7.0 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.09, 22.62, 24.37, 29.14, 29.33, 31.70, 38.63, 128.04, 128.53, 132.85, 137.06, 200.64.

1-(4-Chlorophenyl)-5,5-dimethylhexan-1-one (**4o**)[8]



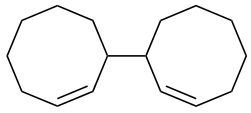
^{1}H NMR ($CDCl_3$, 400 MHz) δ 7.91-7.87 (m, 2H), 7.44-7.42 (m, 2H), 2.93 (t, J = 7.4 Hz, 2H), 1.76-1.68 (m, 2H), 1.55-1.28 (m, 8H), 0.88 (t, J = 7.0 Hz, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.07, 22.60, 24.25, 29.10, 29.26, 31.67, 38.58, 128.83, 129.45, 135.32, 139.25, 199.32.

Ethyl 2-((2,2,6,6-tetramethylpiperidin-1-yl)oxy)acetate (**5**)



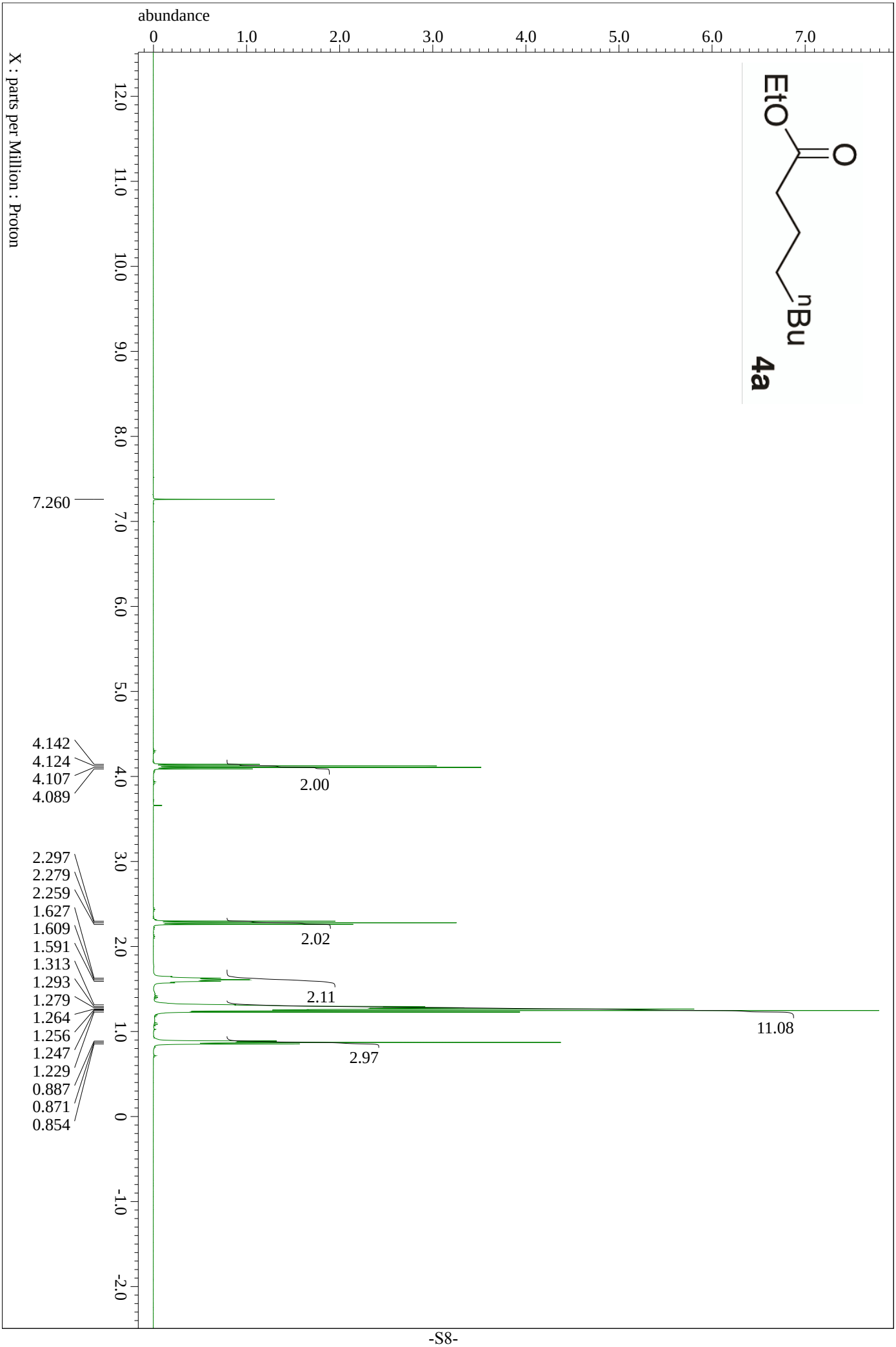
^{1}H NMR ($CDCl_3$, 400 MHz) δ 4.43 (s, 2H), 4.20 (q, J = 7.2 Hz, 2H), 1.46-1.40 (m, 4H), 1.35-1.25 (m, 3H), 1.28 (t, J = 7.2 Hz, 2H), 1.15 (s, 12H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 14.18, 17.01, 20.05, 32.69, 29.66, 60.02, 60.46, 75.56, 169.83; IR (neat) 2933 cm^{-1}, 1760 cm^{-1}, 1375 cm^{-1}, 1195 cm^{-1}, 1095 cm^{-1}; MS (relative intensity) m/z 244 (M+1$^+$, 2), 228 (100), 198 (5), 156 (28), 140 (8); HRMS (EI) m/z calcd for $C_{12}H_{23}NO_3$ 228.1600, found 228.1591.

3-(Cycloocten-3-yl)cyclooctene (**6**)



This compound is commercially available [CAS No. = 7123-80-0]. ^{1}H NMR ($CDCl_3$, 400 MHz) δ 5.70-5.63 (m, 2H), 5.36-5.27 (m, 2H), 2.51-2.17 (m, 4H), 2.05-1.99 (m, 2H), 1.73-1.09 (m, 16H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 25.78, 25.88, 26.76, 27.09, 27.15, 29.53, 29.72, 34.26, 40.63, 40.98, 129.20, 129.40, 133.30, 134.43.

[8] Dohi, S.; Moriyama, K.; Togo, H. *Tetrahedron* **2012**, *68*, 6557.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1.0
2.0
3.0
4.0
5.0
6.0
7.0
X : parts per Million : Proton
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
nBu
4a
7.260
4.142
4.124
4.107
4.089
2.297
2.279
2.259
1.627
1.609
1.591
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1.293
1.279
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2.11
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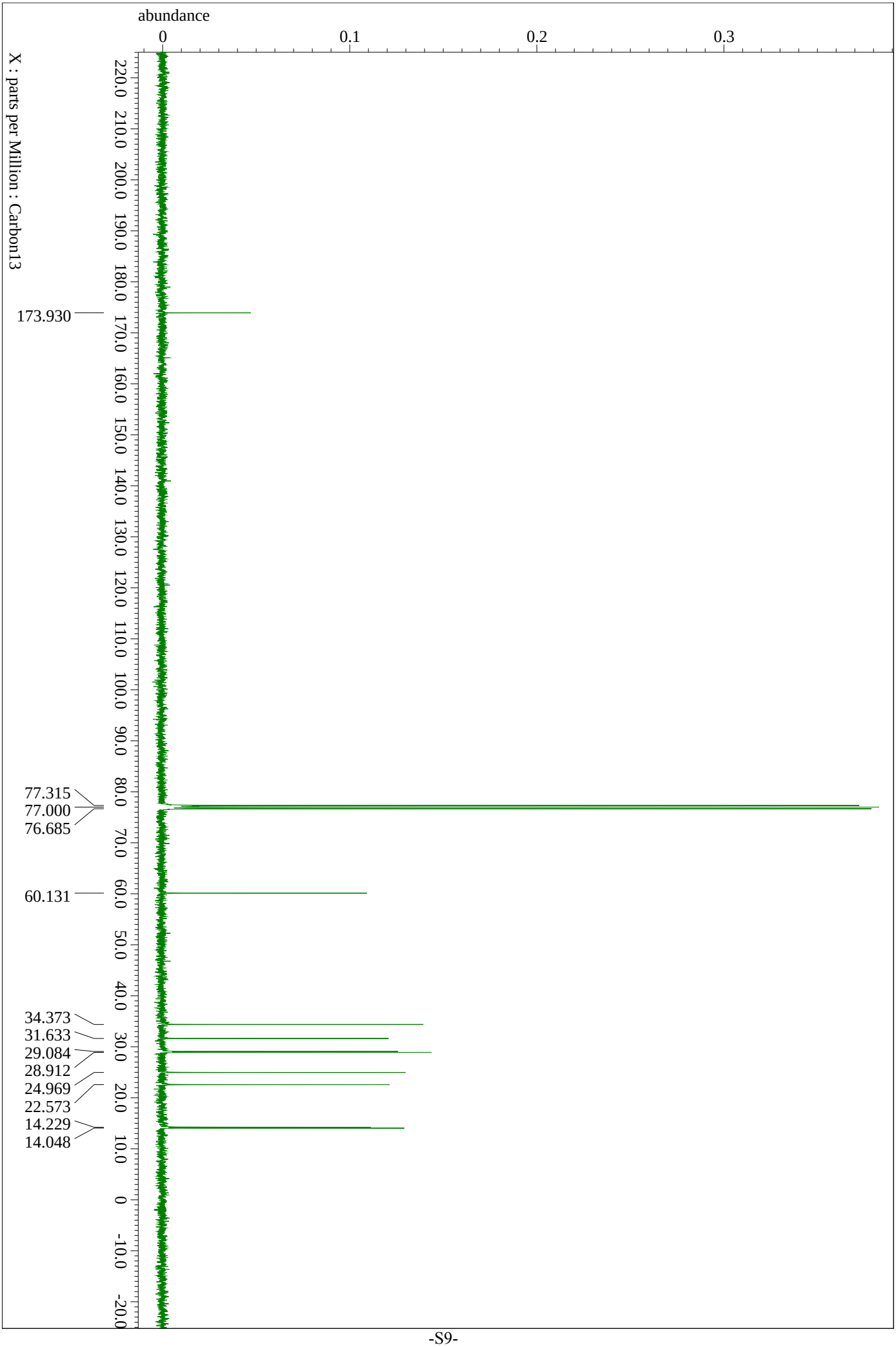
abundance
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0.1
0.2
0.3
X : parts per Million : Carbon13
220.0
210.0
200.0
190.0
180.0
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120.0
110.0
100.0
90.0
80.0
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30.0
20.0
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29.084
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24.969
22.573
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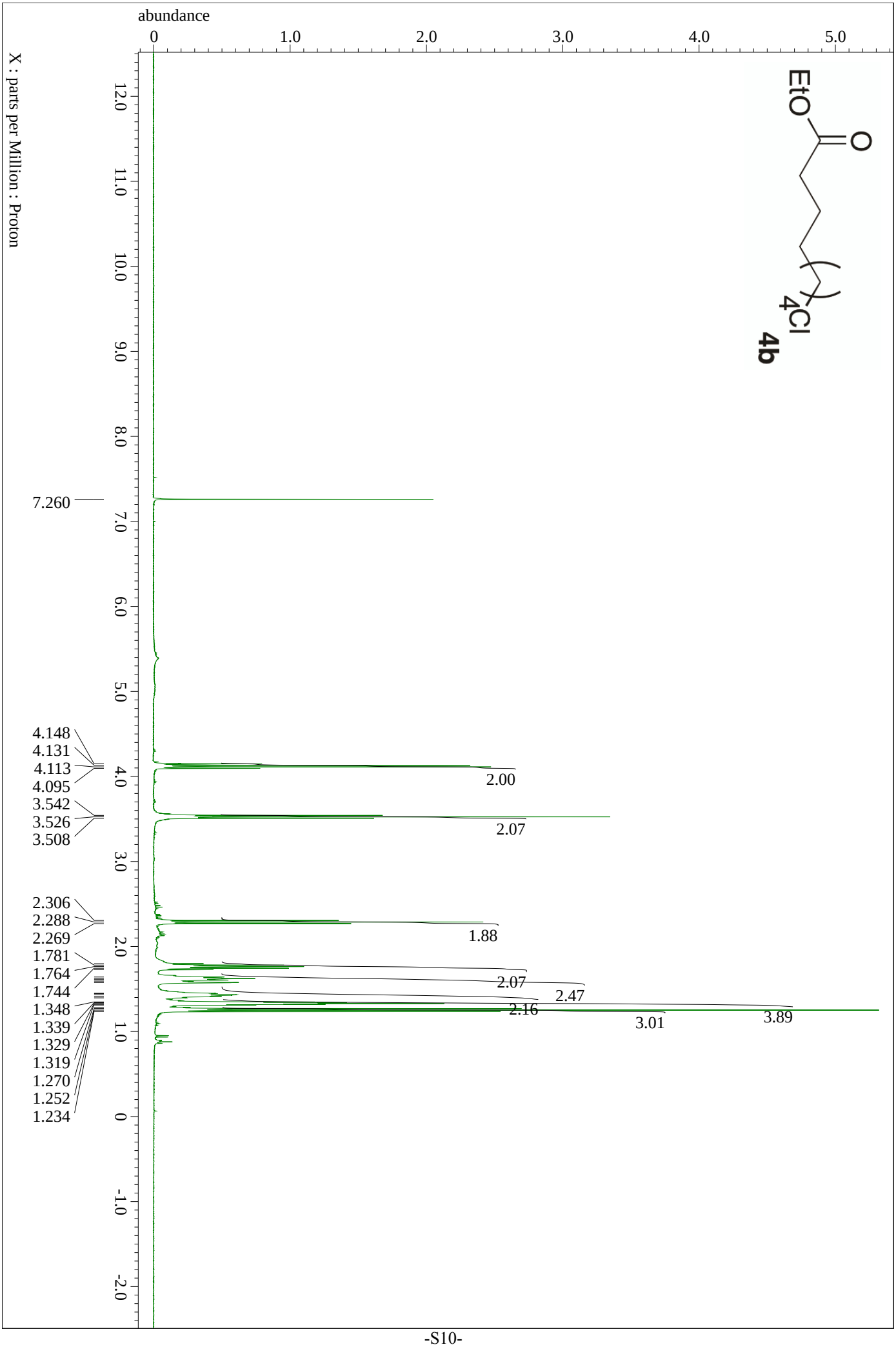
14.048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5.0
X : parts per Million : Proton
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9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
4Cl
4b
7.260
4.148
4.131
4.113
4.095
3.542
3.526
3.508
2.306
2.288
2.269
1.781
1.764
1.744
1.348
1.339
1.329
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1.252
1.234
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2.47
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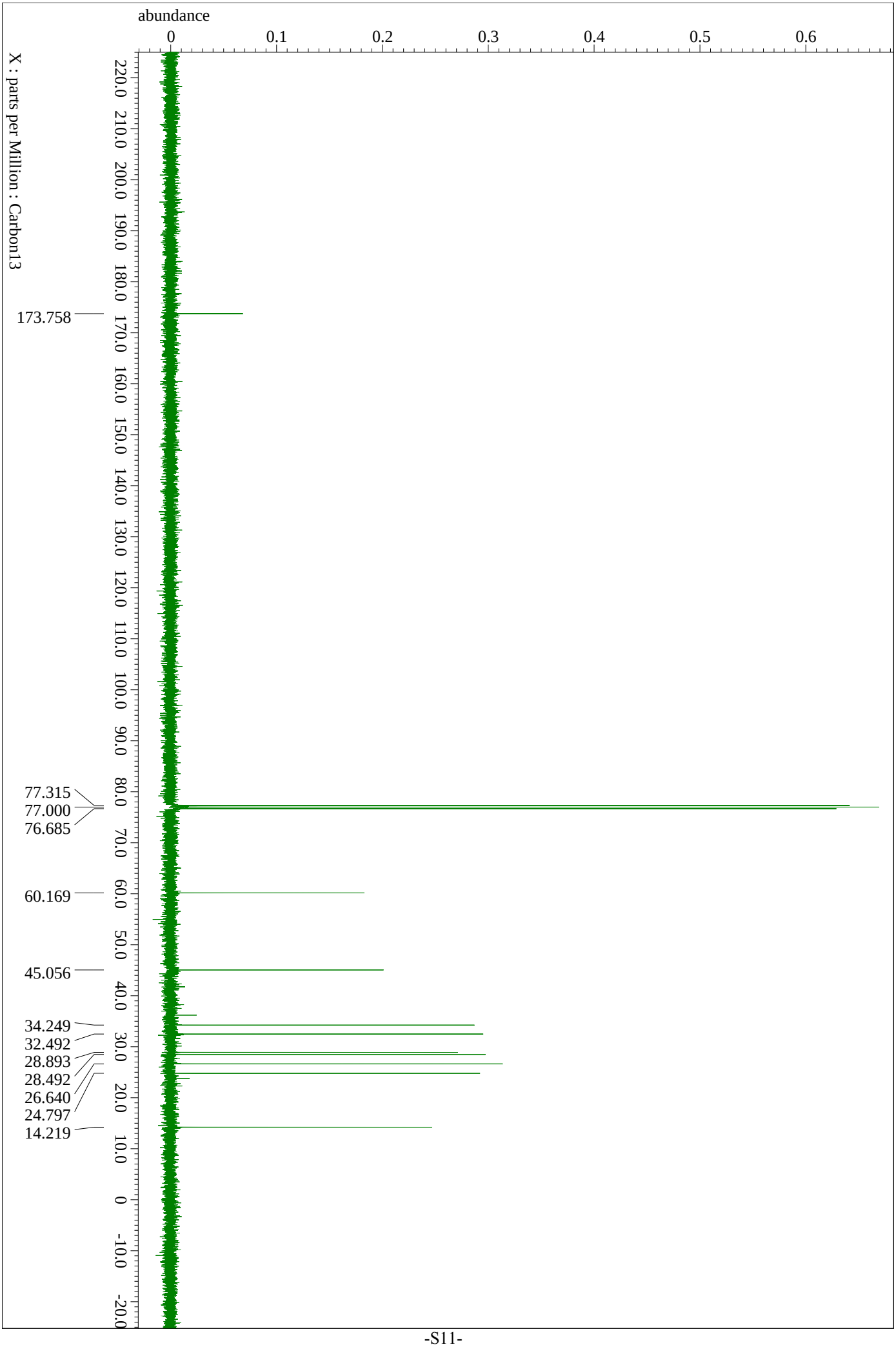
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180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
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45.056
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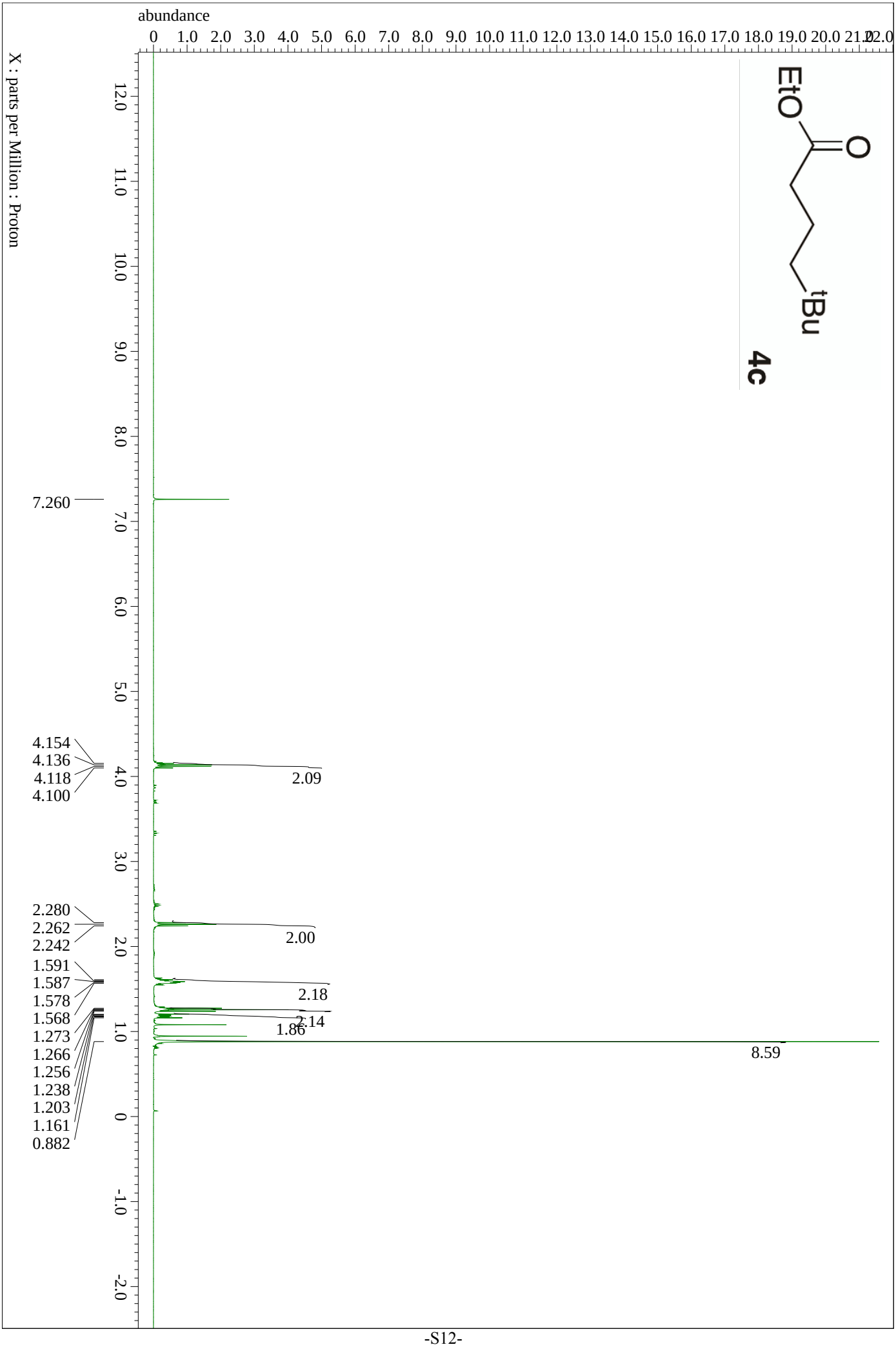
abundance
X : parts per Million : Proton
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O
tBu
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2.262
2.242
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1.587
1.578
1.568
1.273
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2.00
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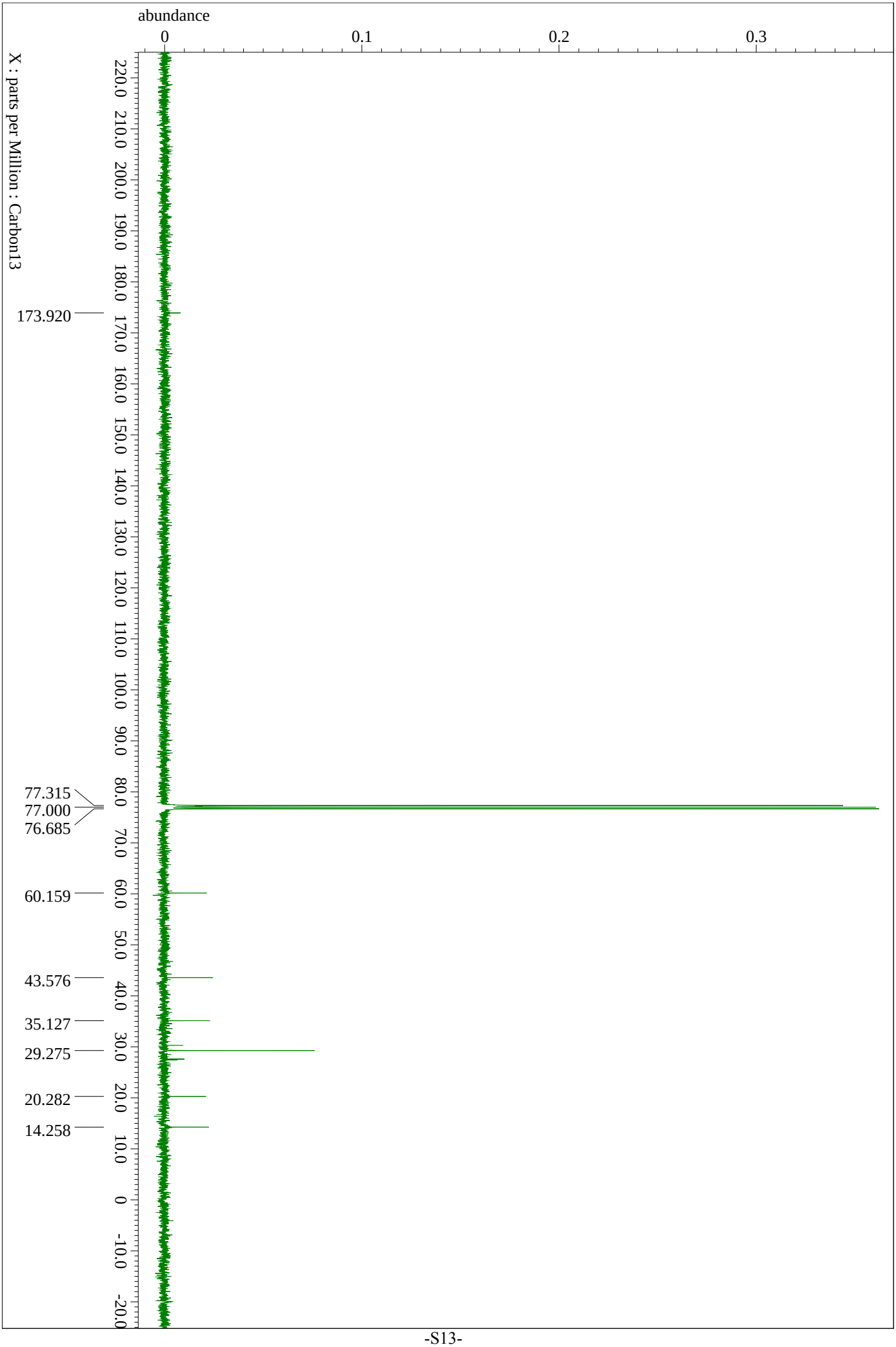
8.59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150.0
140.0
130.0
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110.0
100.0
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80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
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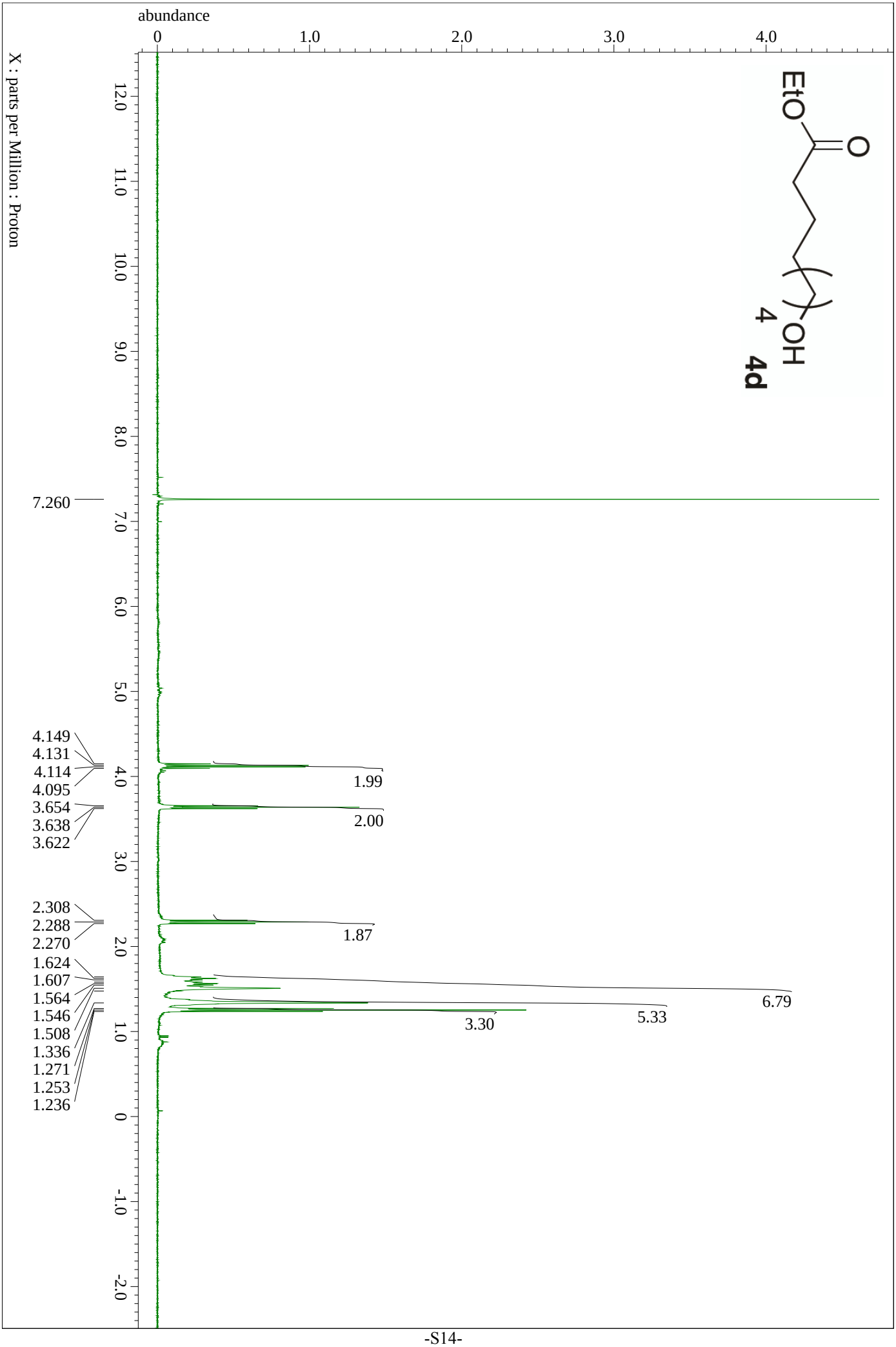
abundance
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3.0
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X : parts per Million : Proton
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7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
OH
4
4d
7.260
4.149
4.131
4.114
4.095
3.654
3.638
3.622
2.308
2.288
2.270
1.624
1.607
1.564
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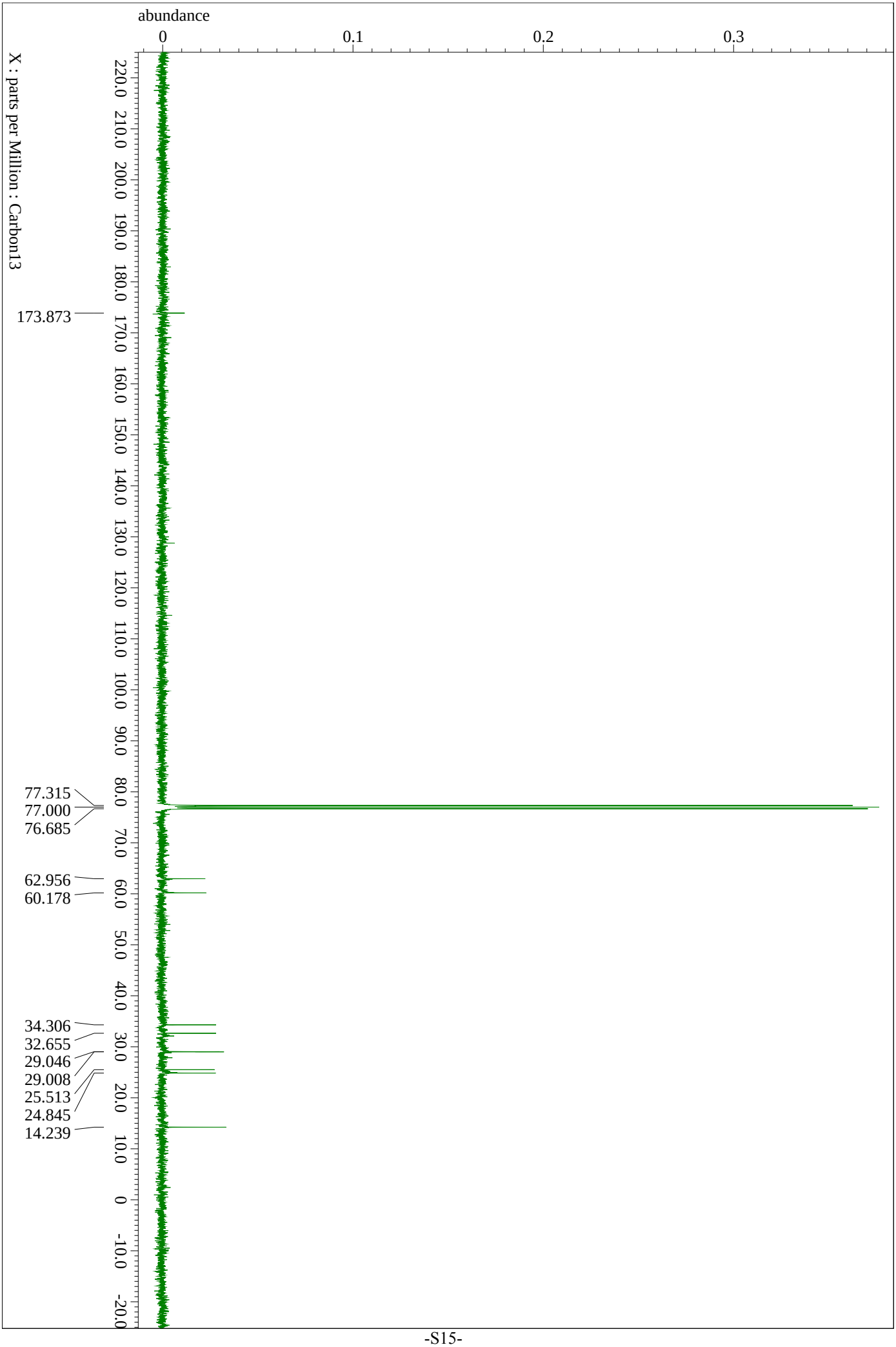
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110.0
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70.0
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30.0
20.0
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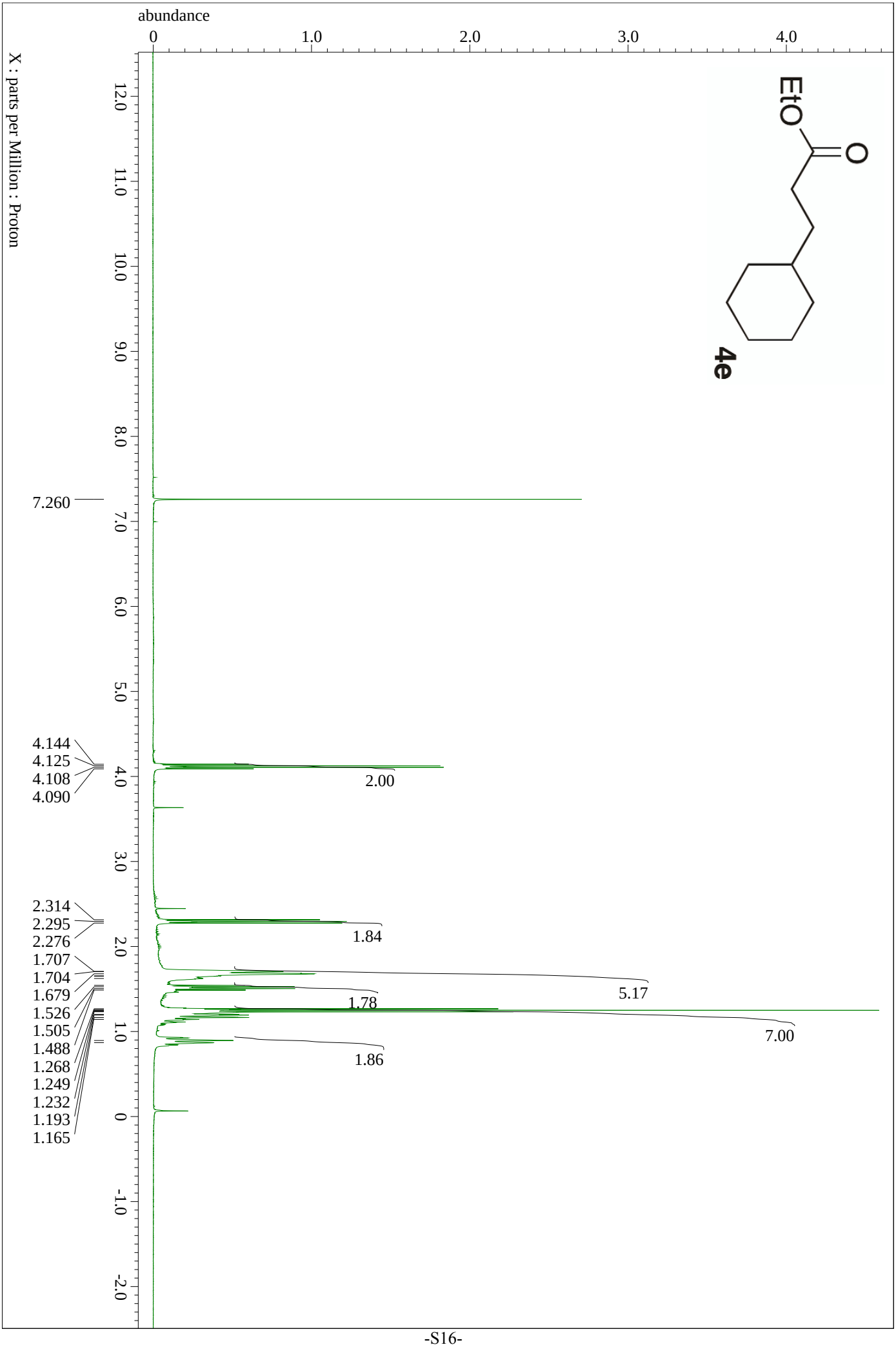
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3.0
4.0
X : parts per Million : Proton
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10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
4e
7.260
4.144
4.125
4.108
4.090
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2.295
2.276
1.707
1.704
1.679
1.526
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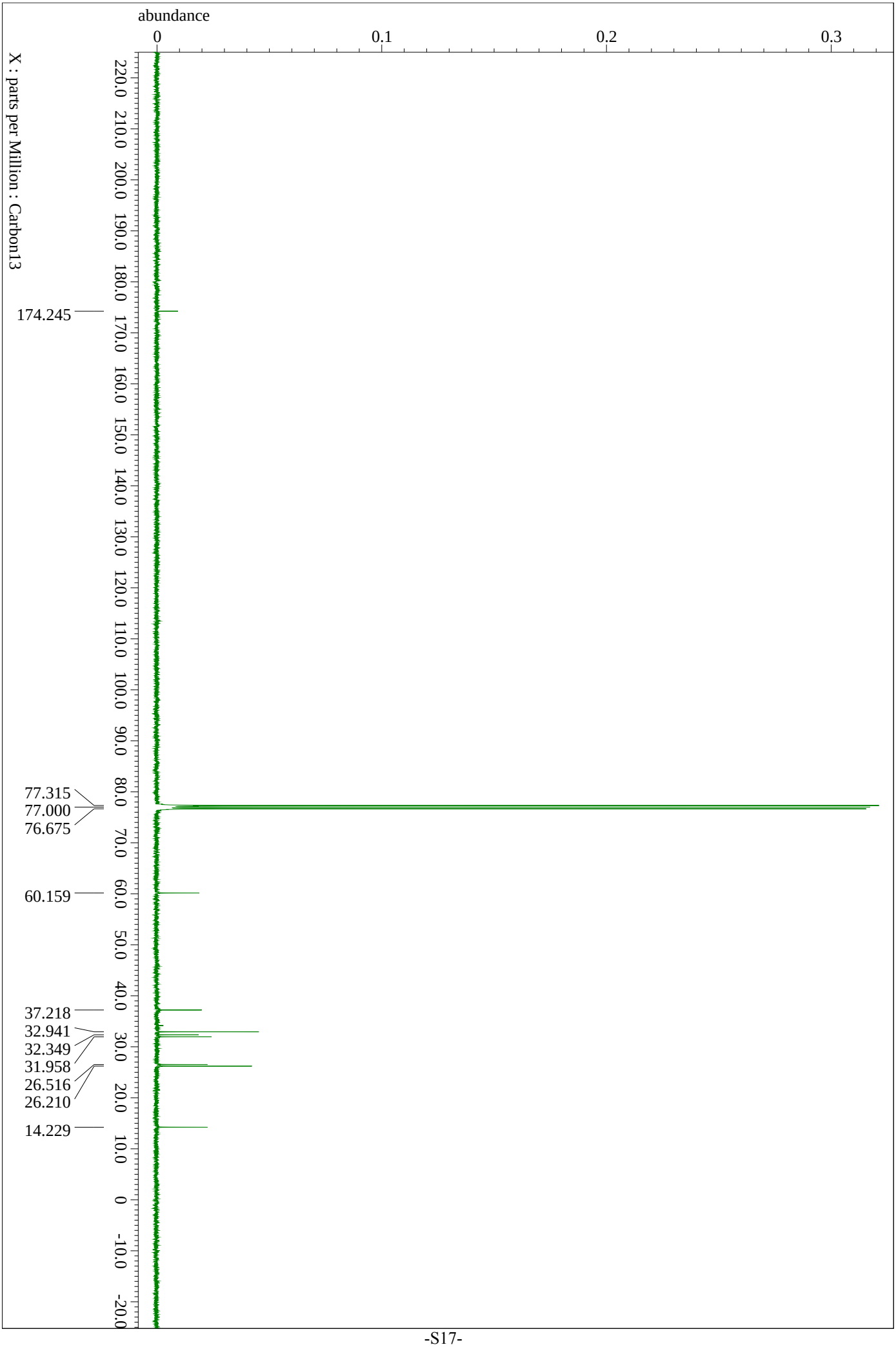
abundance
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0.2
0.3
X : parts per Million : Carbon13
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200.0
190.0
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170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
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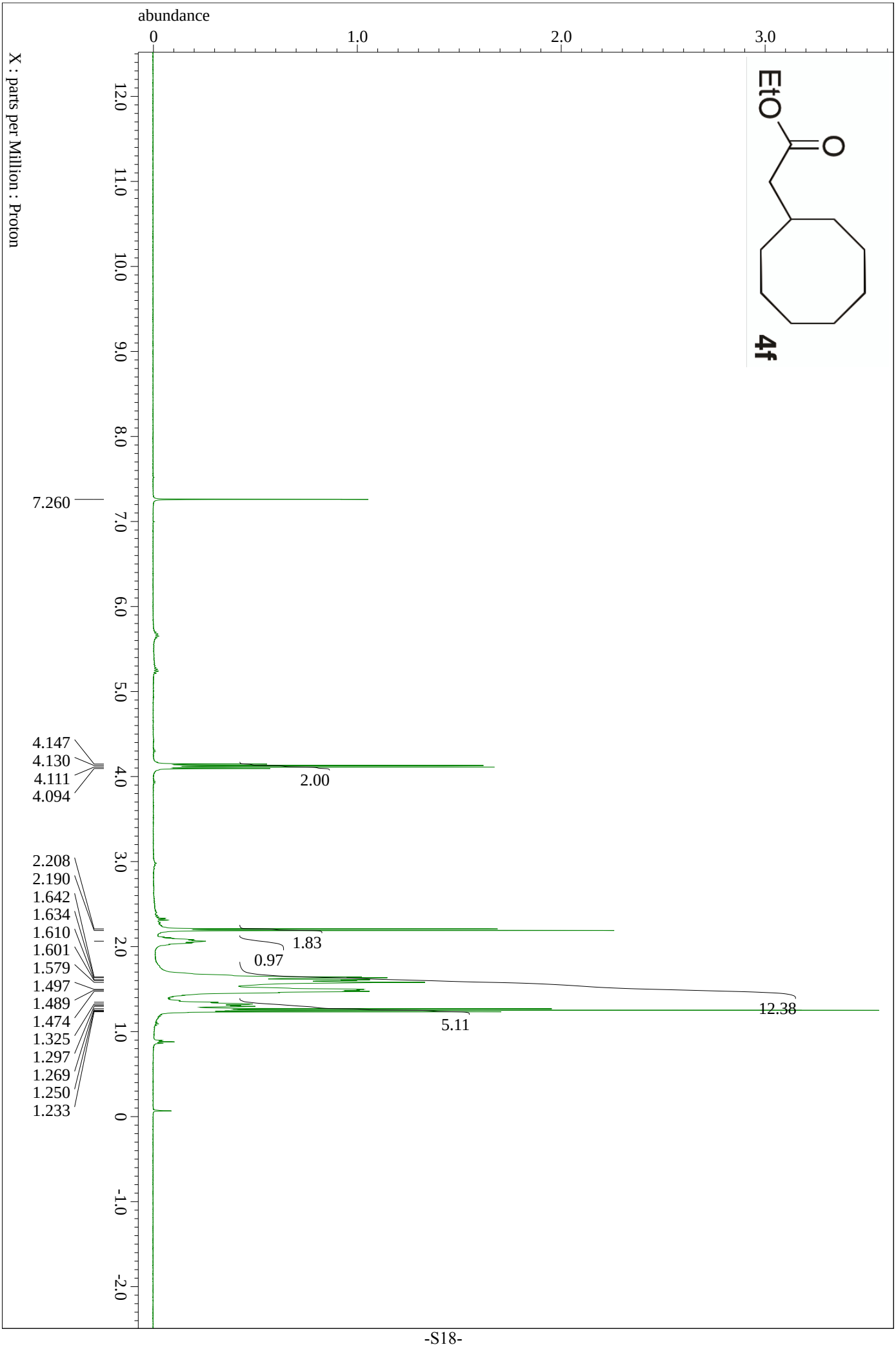
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2.0
3.0
X : parts per Million : Proton
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10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
4f
7.260
4.147
4.130
4.111
4.094
2.208
2.190
1.642
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1.610
1.601
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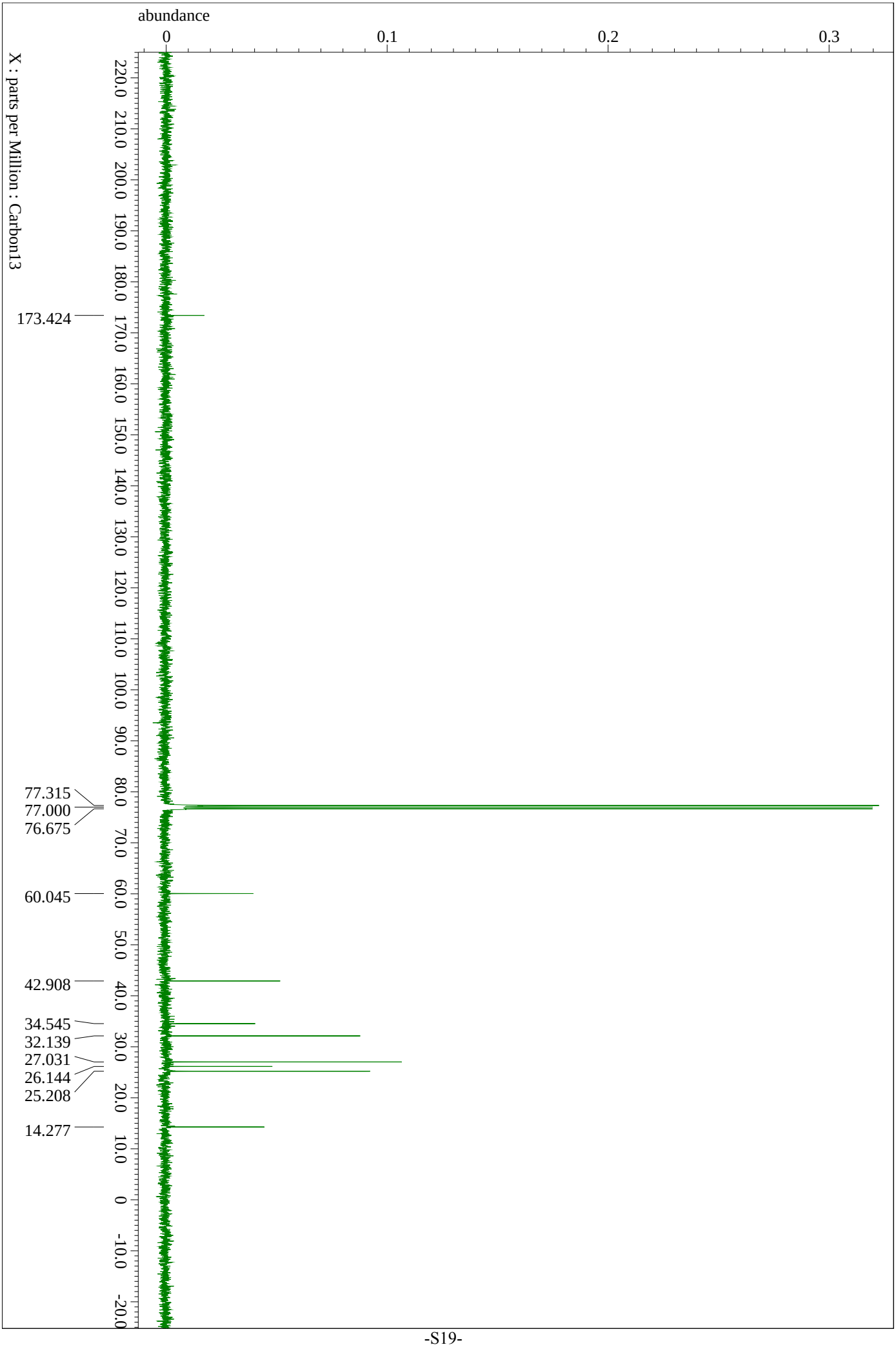
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0.3
X : parts per Million : Carbon13
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200.0
190.0
180.0
170.0
160.0
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130.0
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110.0
100.0
90.0
80.0
70.0
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40.0
30.0
20.0
10.0
0
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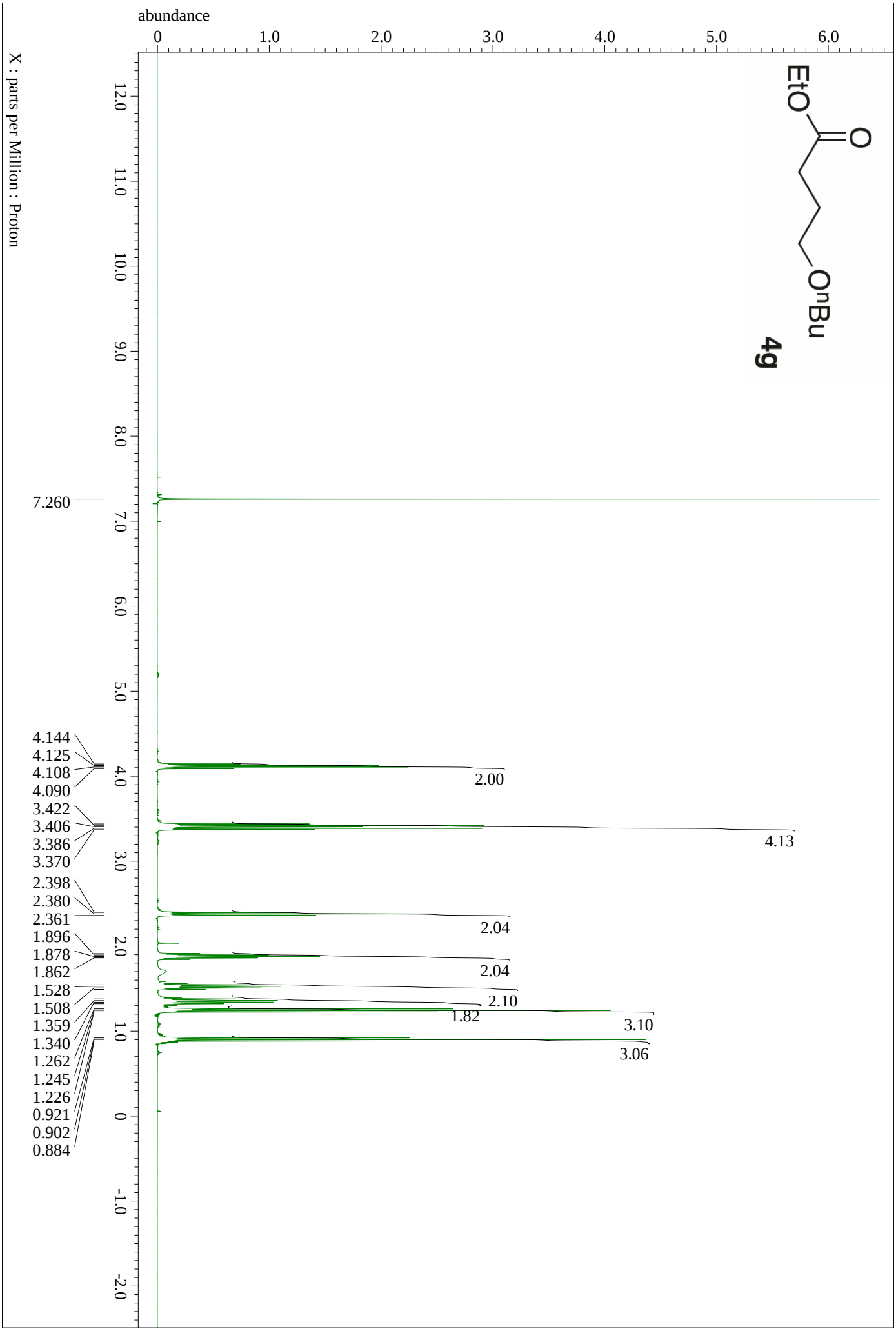
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2.0
3.0
4.0
5.0
6.0
X : parts per Million : Proton
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10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
OnBu
4g
7.260
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4.125
4.108
4.090
3.422
3.406
3.386
3.370
2.398
2.380
2.361
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1.528
1.508
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1.262
1.245
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2.04
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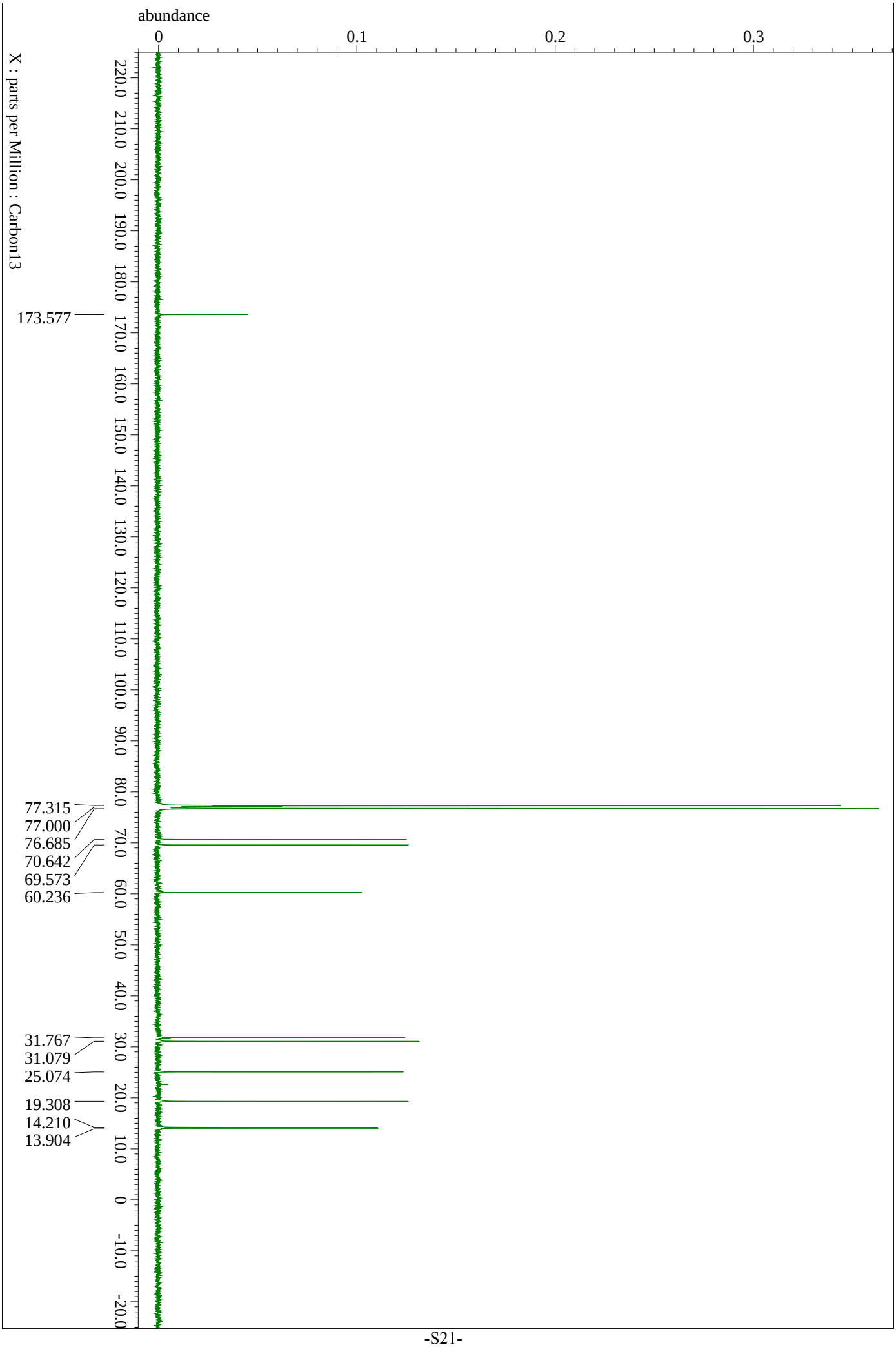
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0.3
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180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
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-20.0
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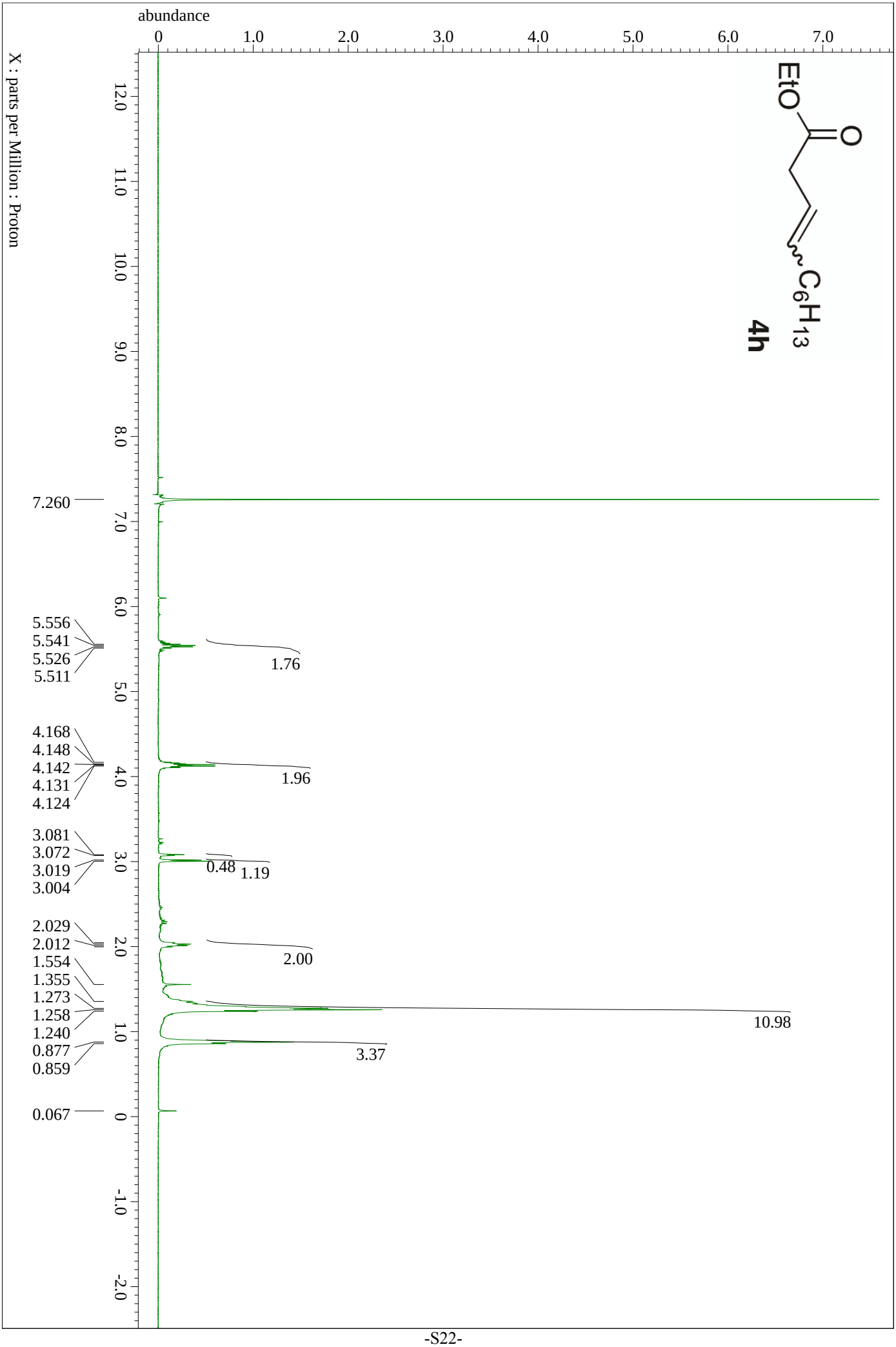
abundance
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X : parts per Million : Proton
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9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
O
C6H13
4h
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5.511
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4.148
4.142
4.131
4.124
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3.072
3.019
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2.012
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1.355
1.273
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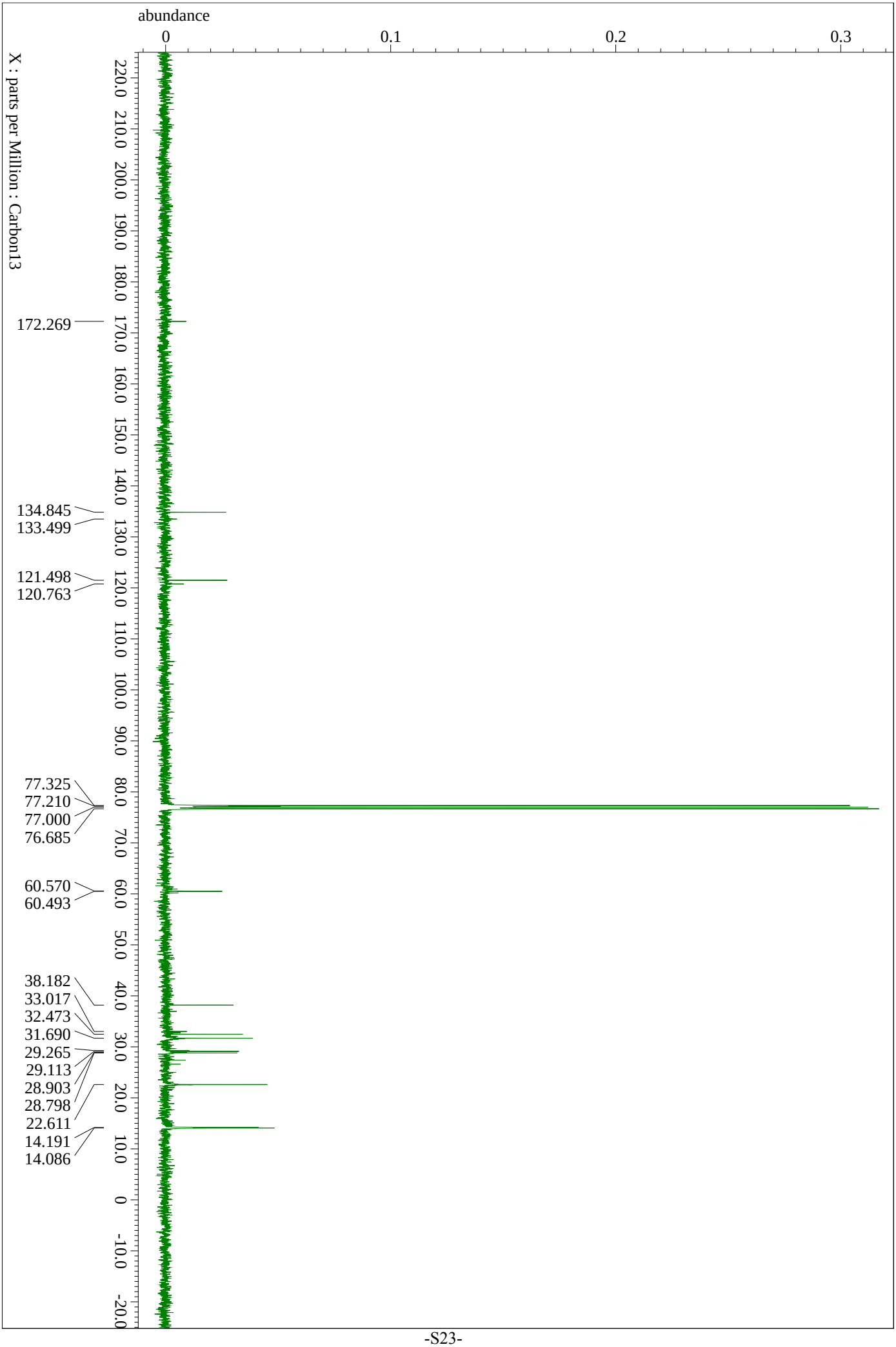
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X : parts per Million : Carbon13
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200.0
190.0
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170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
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133.499
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77.210
77.000
76.685
60.570
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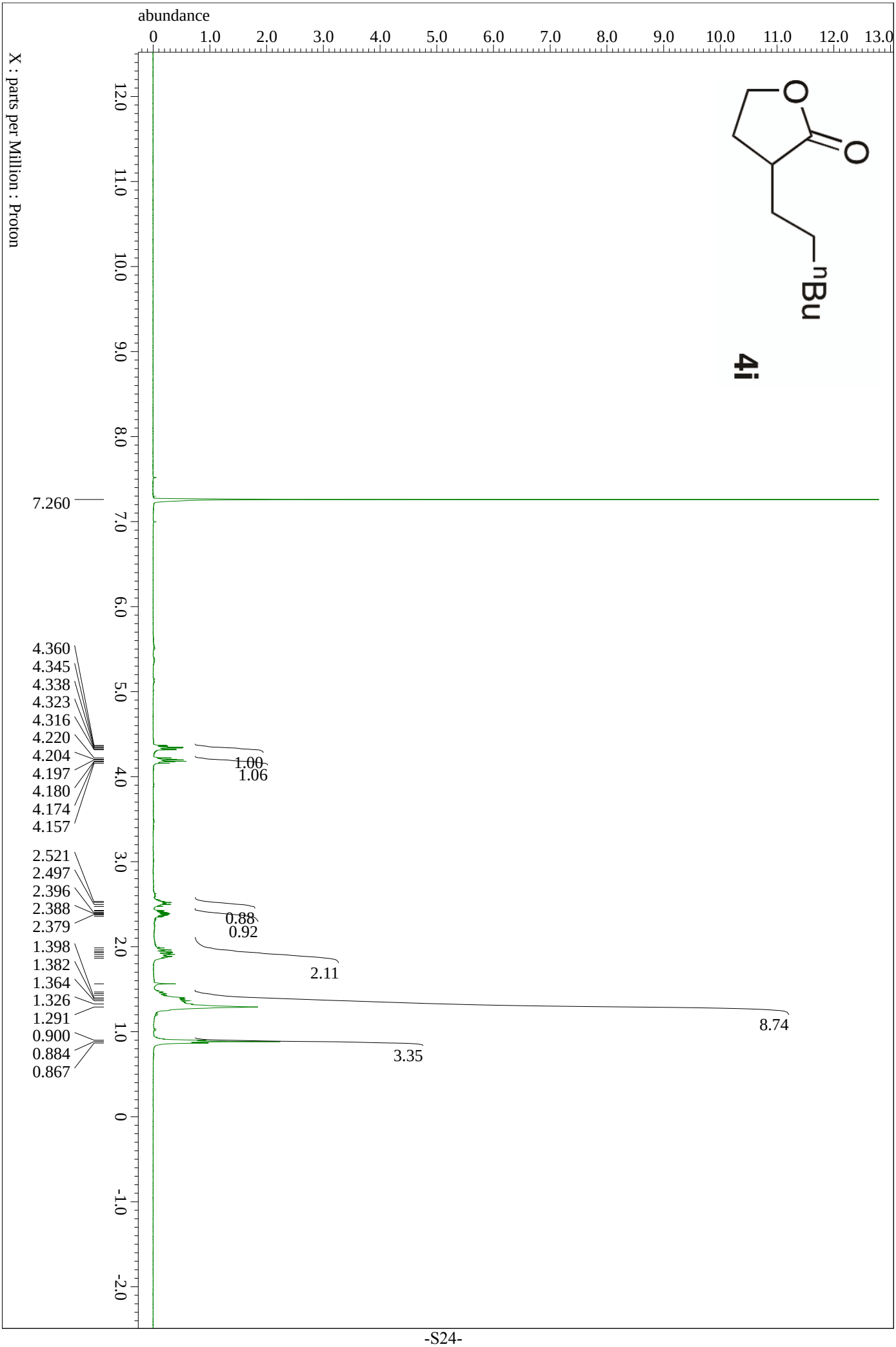
abundance
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X : parts per Million : Proton
12.0 11.0 10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0 -1.0 -2.0
O
O
nBu
4i
7.260
4.360
4.345
4.338
4.323
4.316
4.220
4.204
4.197
4.180
4.174
4.157
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2.379
1.398
1.382
1.364
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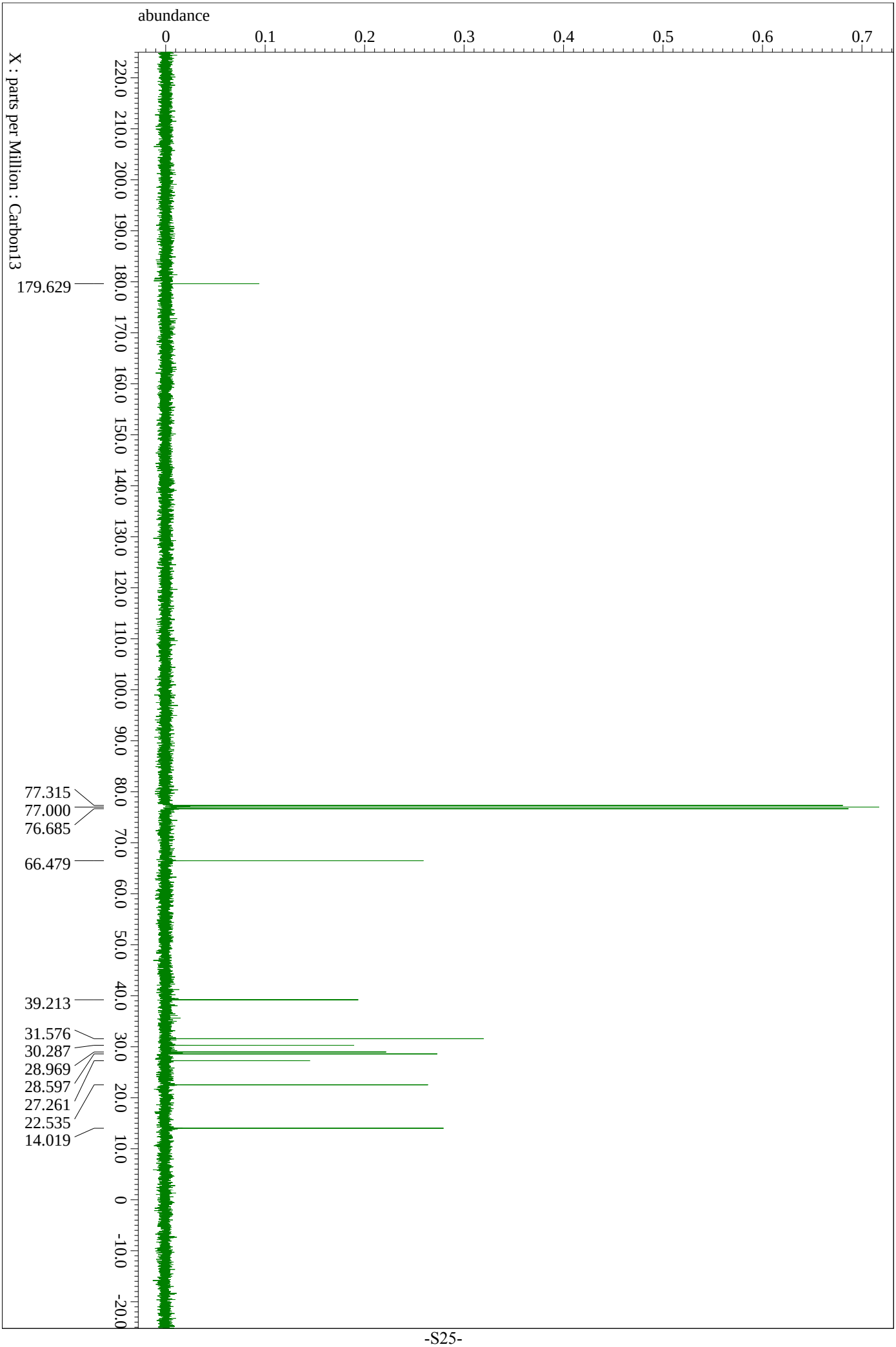
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0.6
0.7
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200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
179.629
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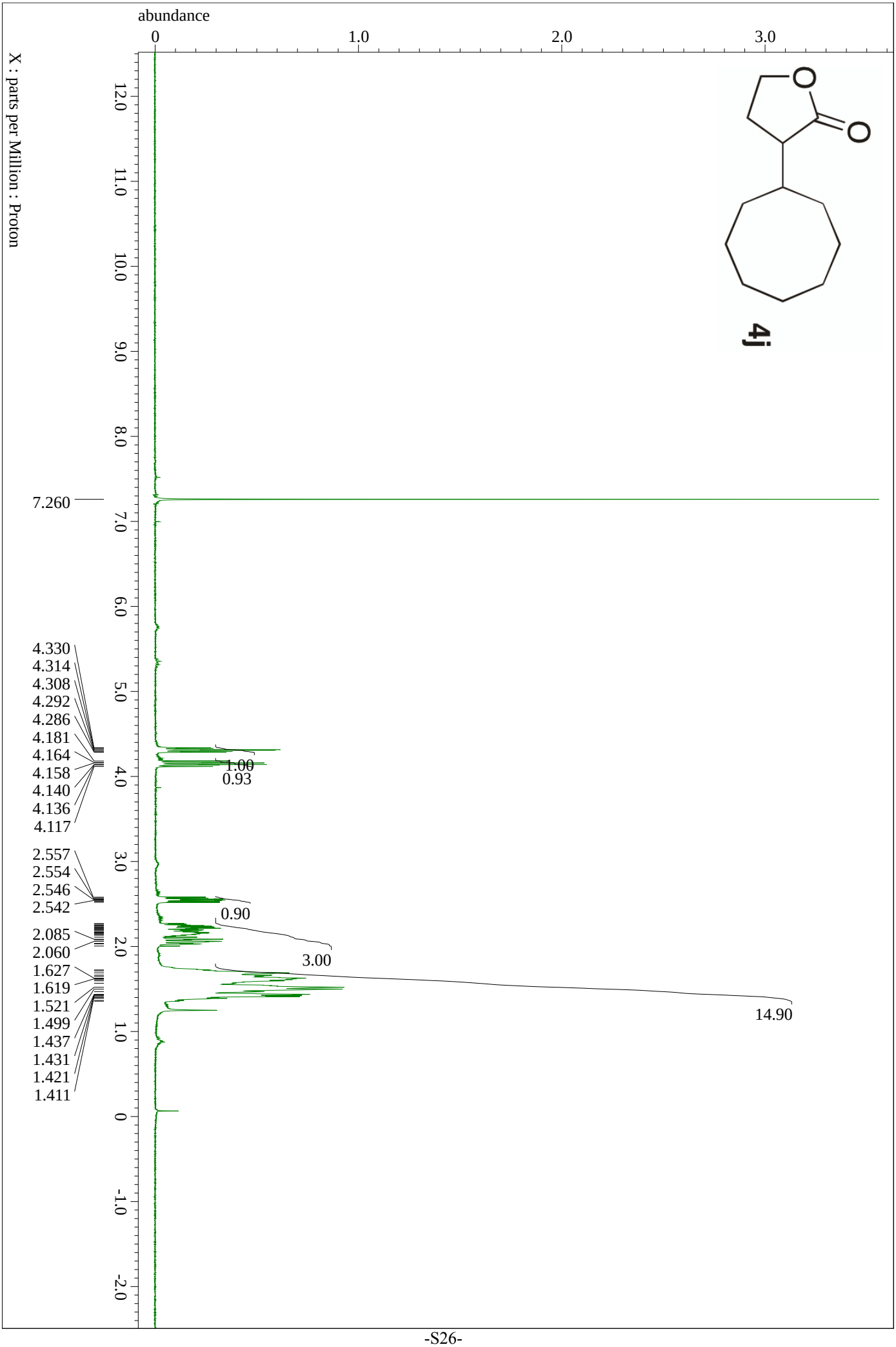
22.535
14.019


abundance
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3.0
X : parts per Million : Proton
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9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
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-2.0
7.260
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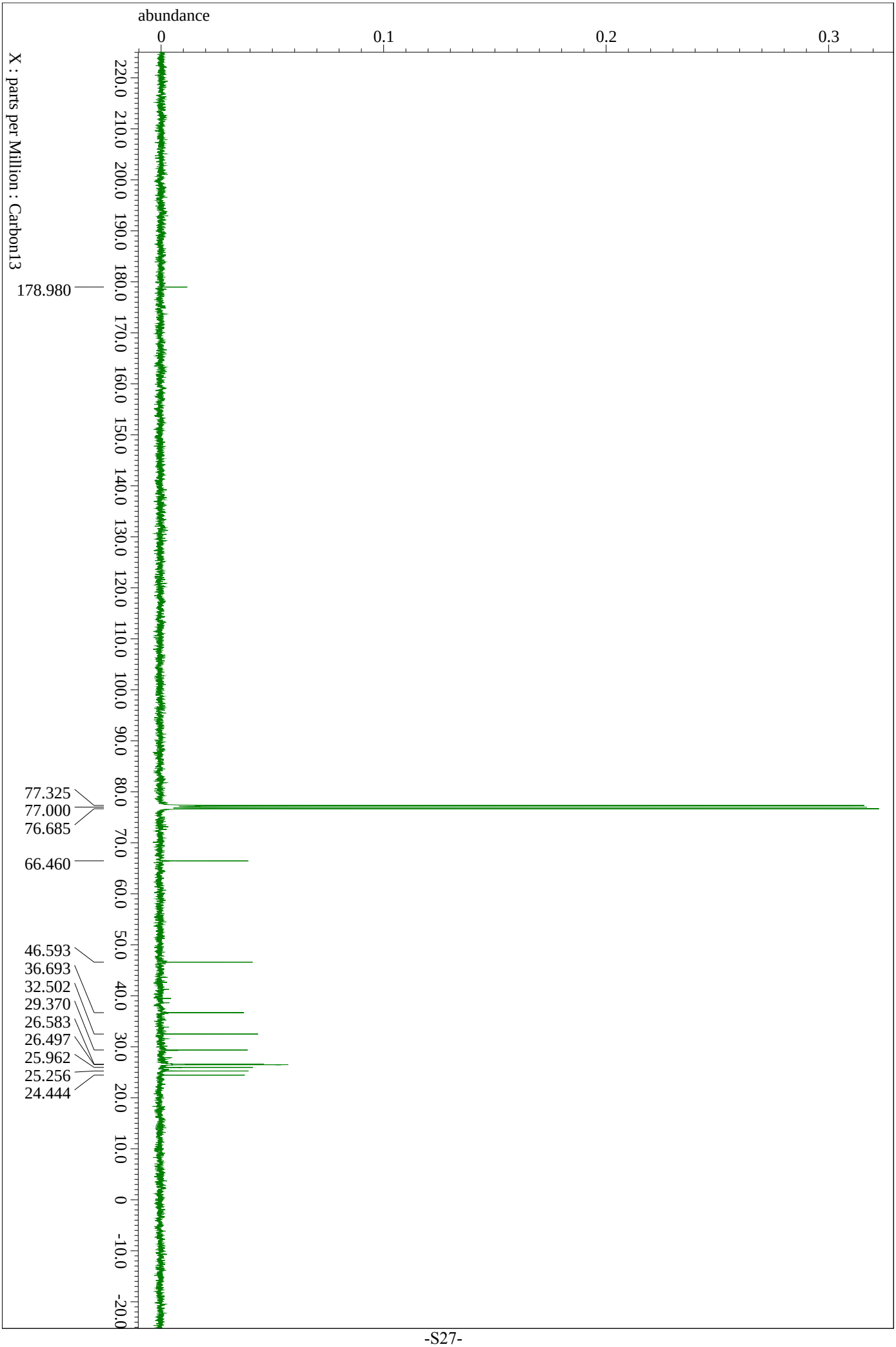
O
O
4j


abundance
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160.0
150.0
140.0
130.0
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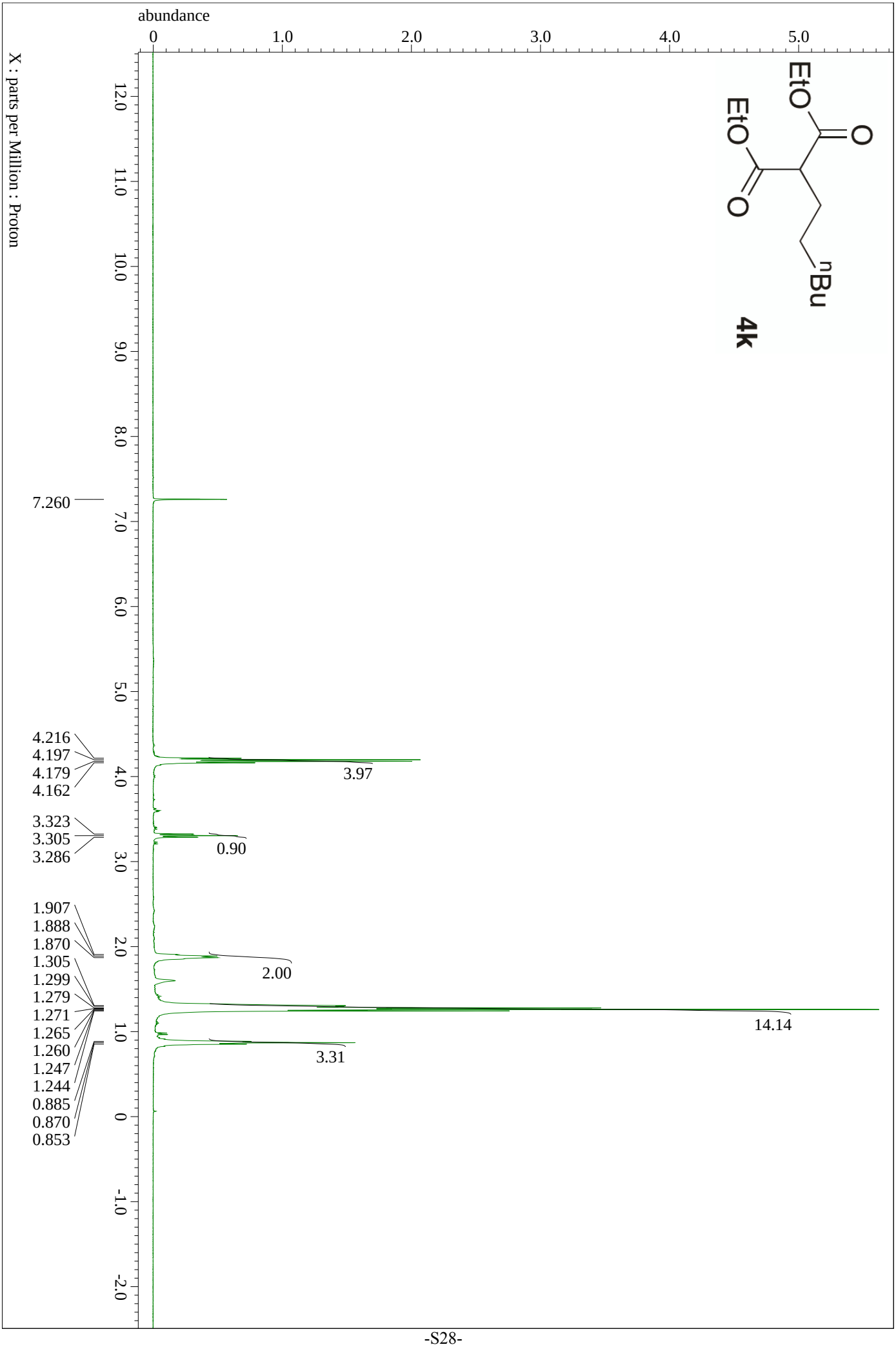
24.444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2.0
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5.0
X : parts per Million : Proton
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9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
EtO
EtO
O
O
nBu
4k
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4.197
4.179
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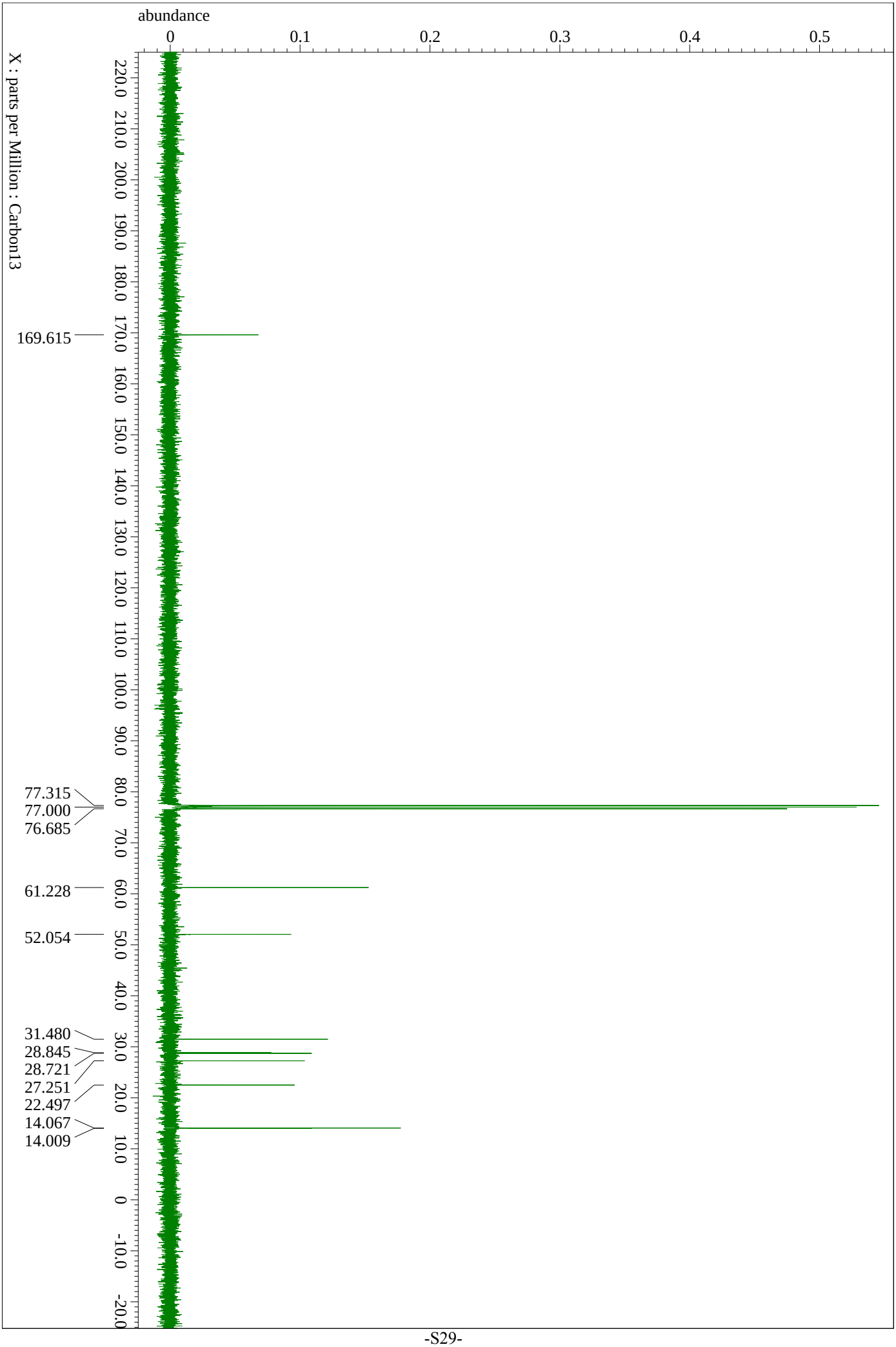
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180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
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10.0
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-20.0
169.615
77.315
77.000
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61.228
52.054
31.480
28.845
28.721
27.251
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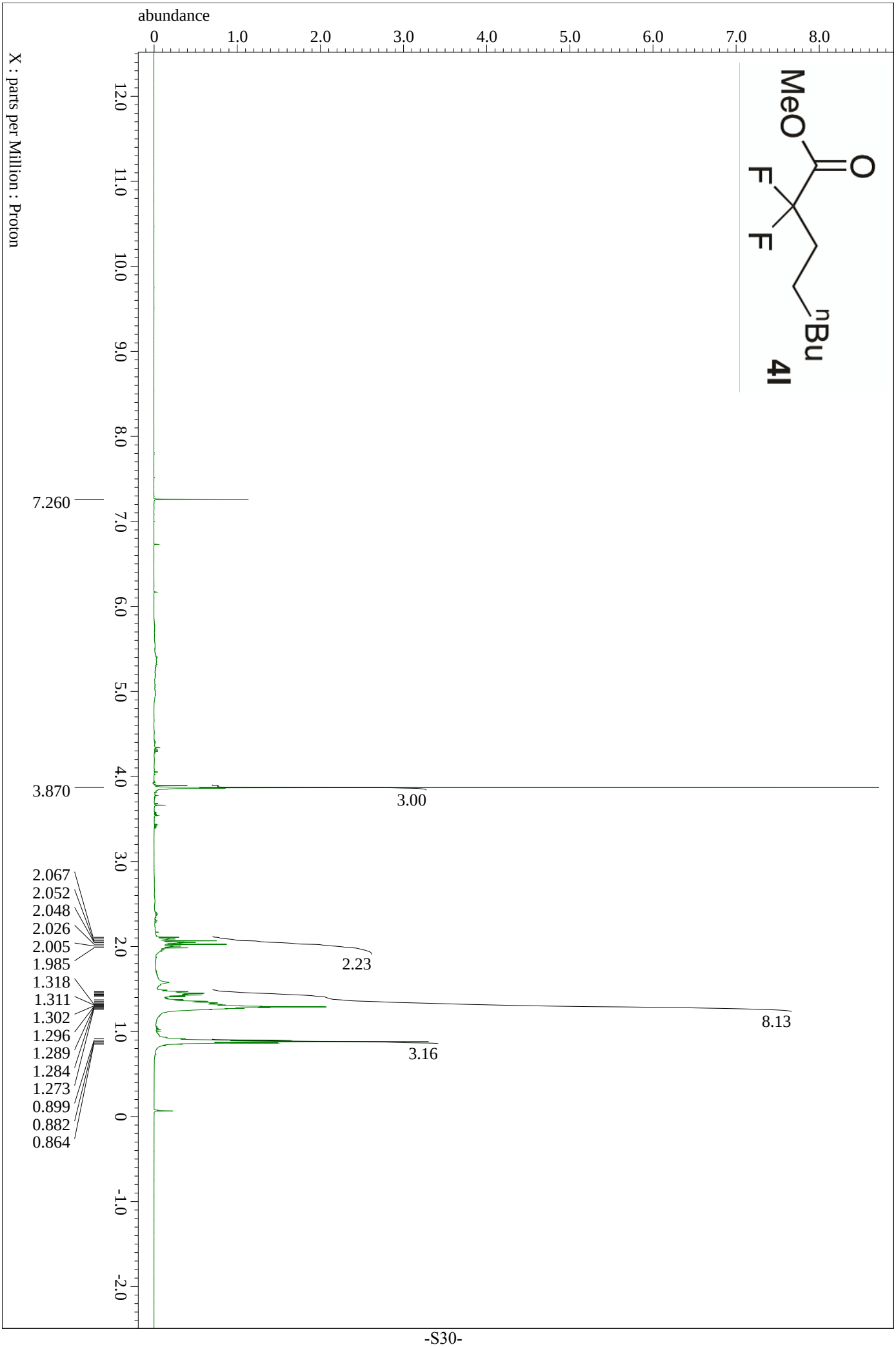
14.009


abundance
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6.0
7.0
8.0
X : parts per Million : Proton
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
MeO
O
F
F
nBu
4l
7.260
3.870
2.067
2.052
2.048
2.026
2.005
1.985
1.318
1.311
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1.273
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0.882
0.864
3.00
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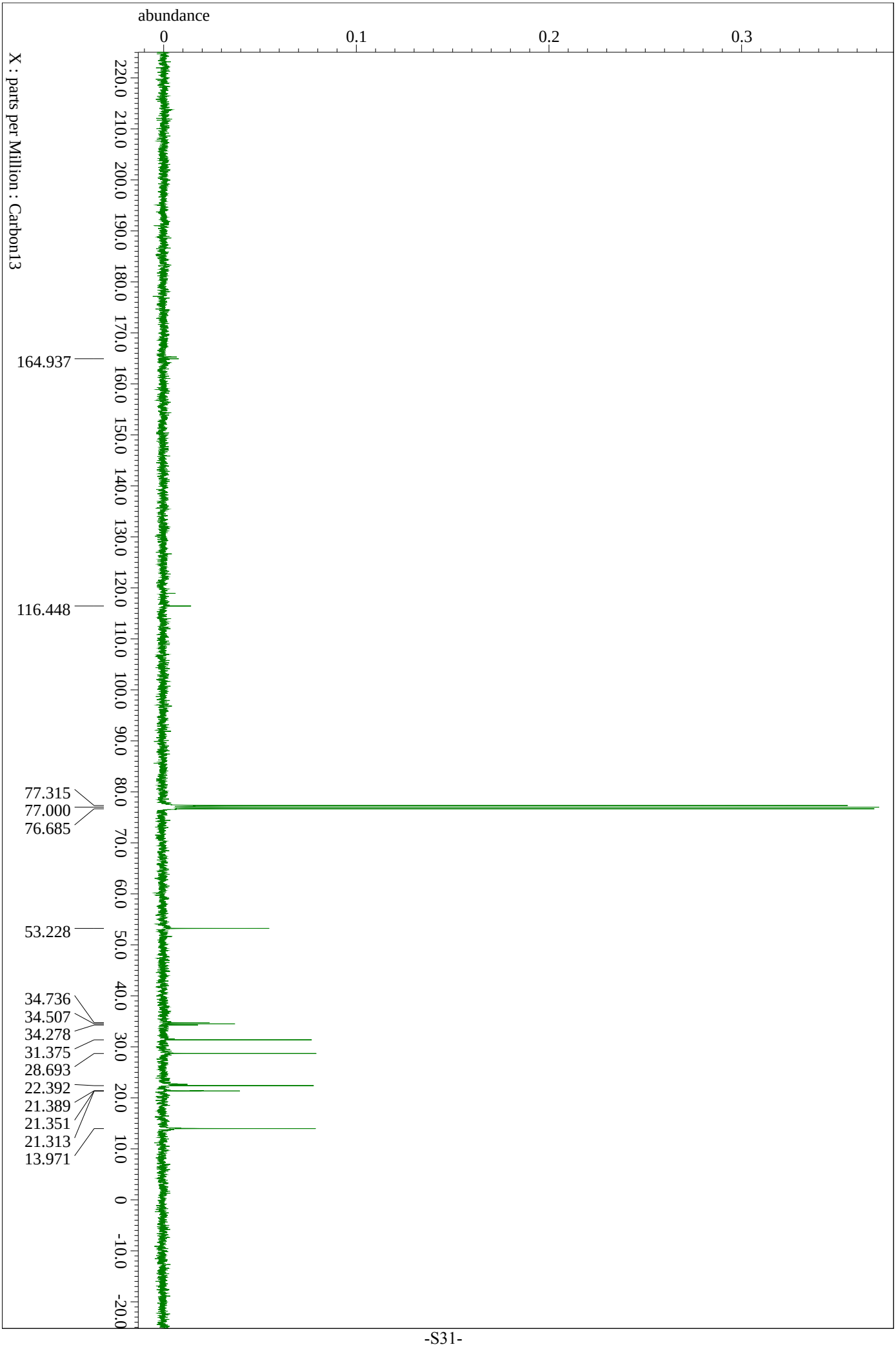
abundance
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0.2
0.3
X : parts per Million : Carbon13
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190.0
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170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
164.937
116.448
77.315
77.000
76.685
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34.278
31.375
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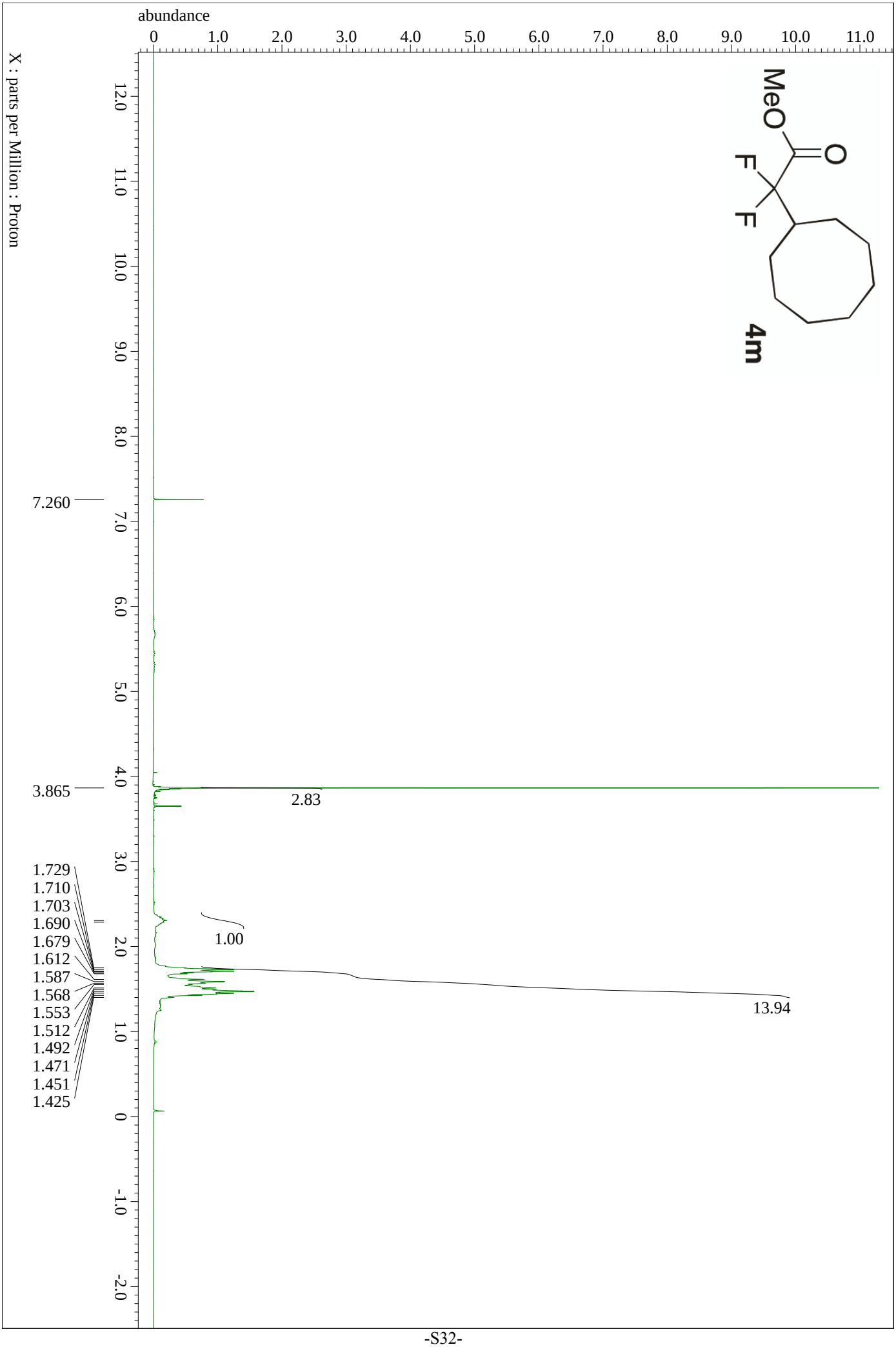
21.351
21.313
13.971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4.0
5.0
6.0
7.0
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9.0
10.0
11.0
X : parts per Million : Proton
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
MeO
O
F
F
4m
7.260
3.865
2.83
1.729
1.710
1.703
1.690
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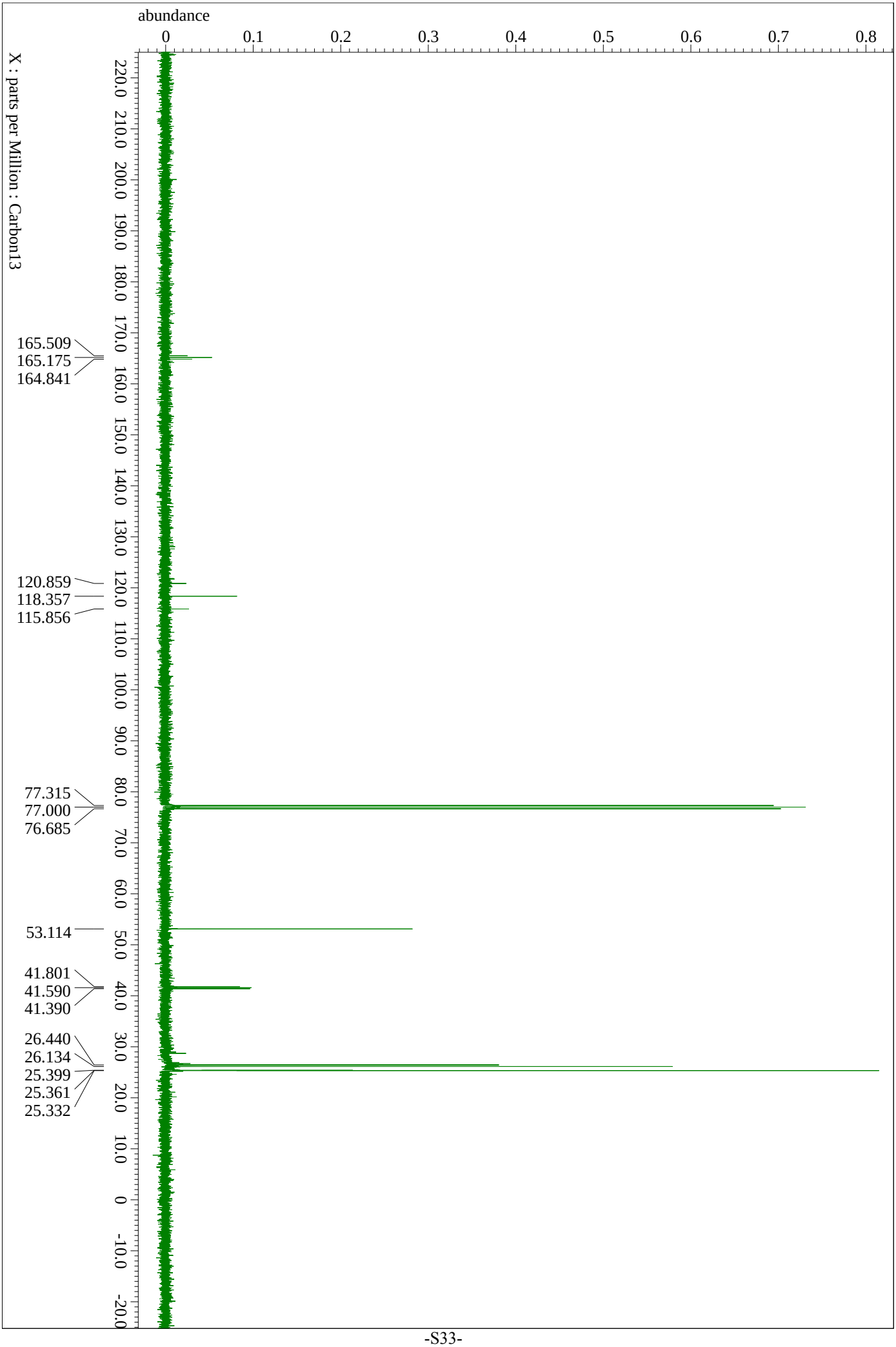
abundance
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0.2
0.3
0.4
0.5
0.6
0.7
0.8
X : parts per Million : Carbon13
220.0
210.0
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
165.509
165.175
164.841
120.859
118.357
115.856
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76.685
53.114
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26.440
26.134
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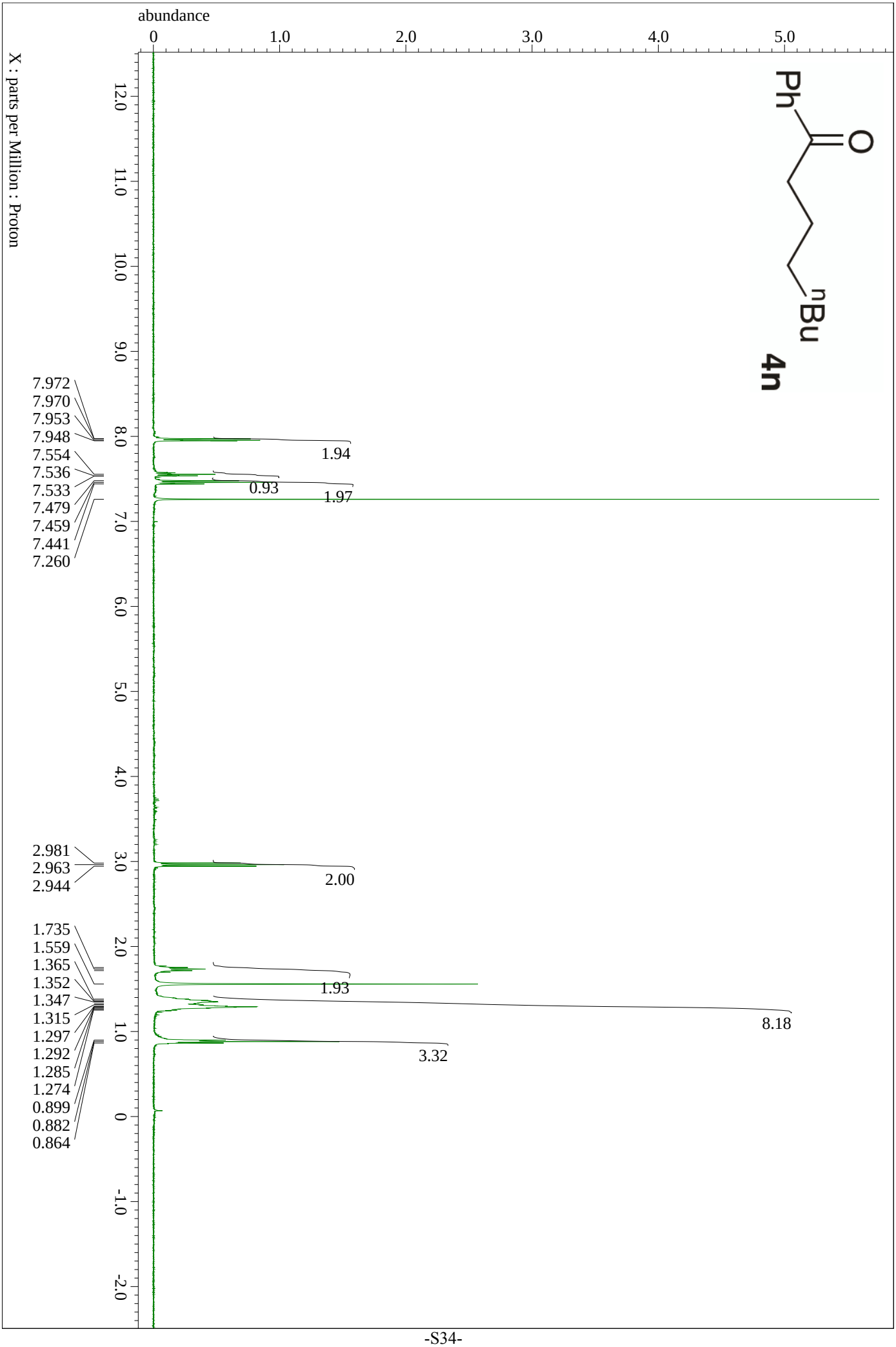
25.332


abundance
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2.0
3.0
4.0
5.0
X : parts per Million : Proton
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11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
Ph
O
nBu
4n
7.972
7.970
7.953
7.948
7.554
7.536
7.533
7.479
7.459
7.441
7.260
1.94
0.93
1.97
2.981
2.963
2.944
2.00
1.735
1.559
1.365
1.352
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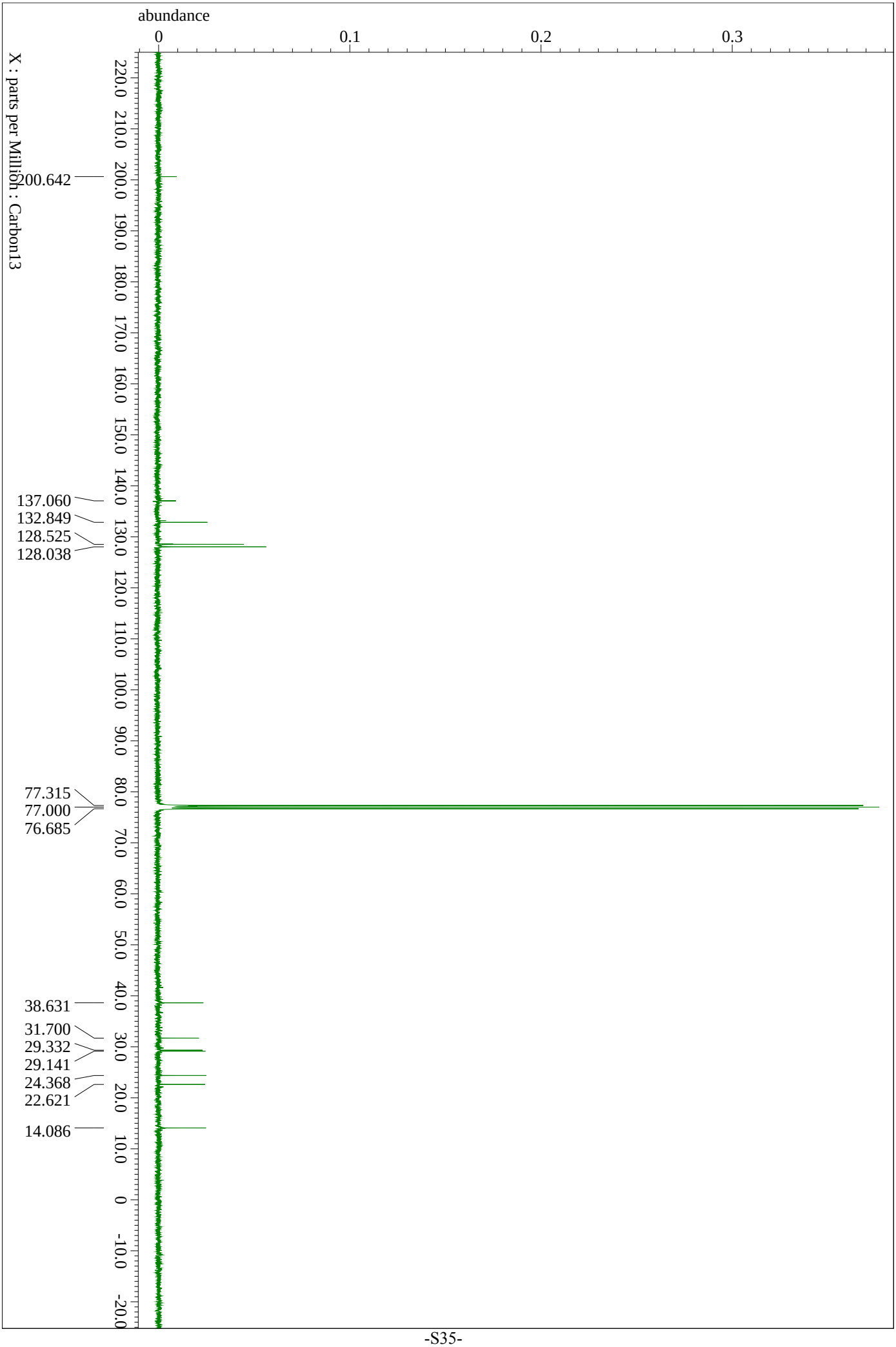
0.882
0.864
1.93
8.18
3.32


abundance
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0.2
0.3
X : parts per Million : Carbon13
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200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
200.642
137.060
132.849
128.525
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77.000
76.685
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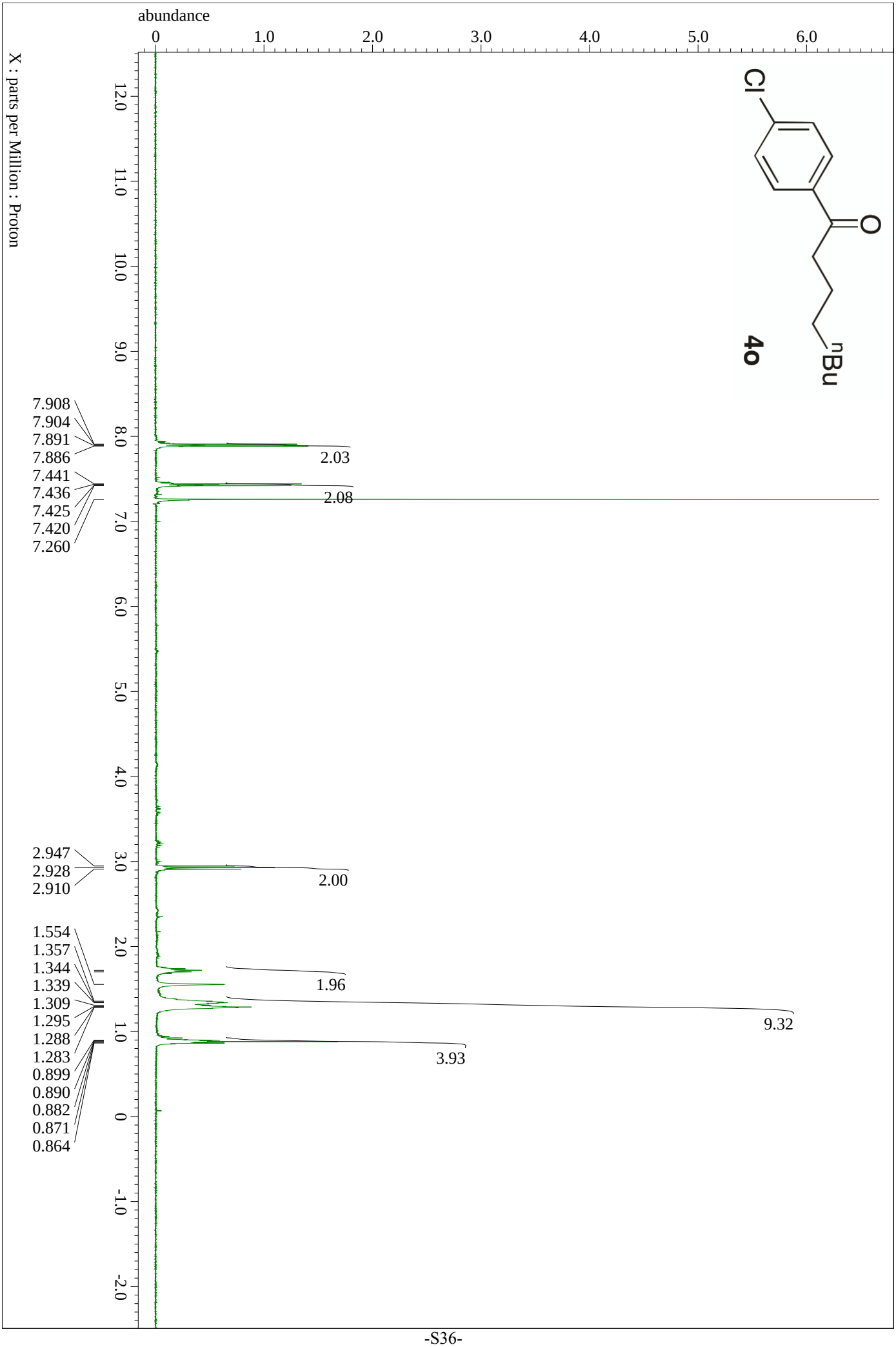
14.086


abundance
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3.0
4.0
5.0
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X : parts per Million : Proton
12.0
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10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
Cl
O
nBu
4o
7.908
7.904
7.891
7.886
7.441
7.436
7.425
7.420
7.260
2.03
2.08
2.947
2.928
2.910
2.00
1.554
1.357
1.344
1.339
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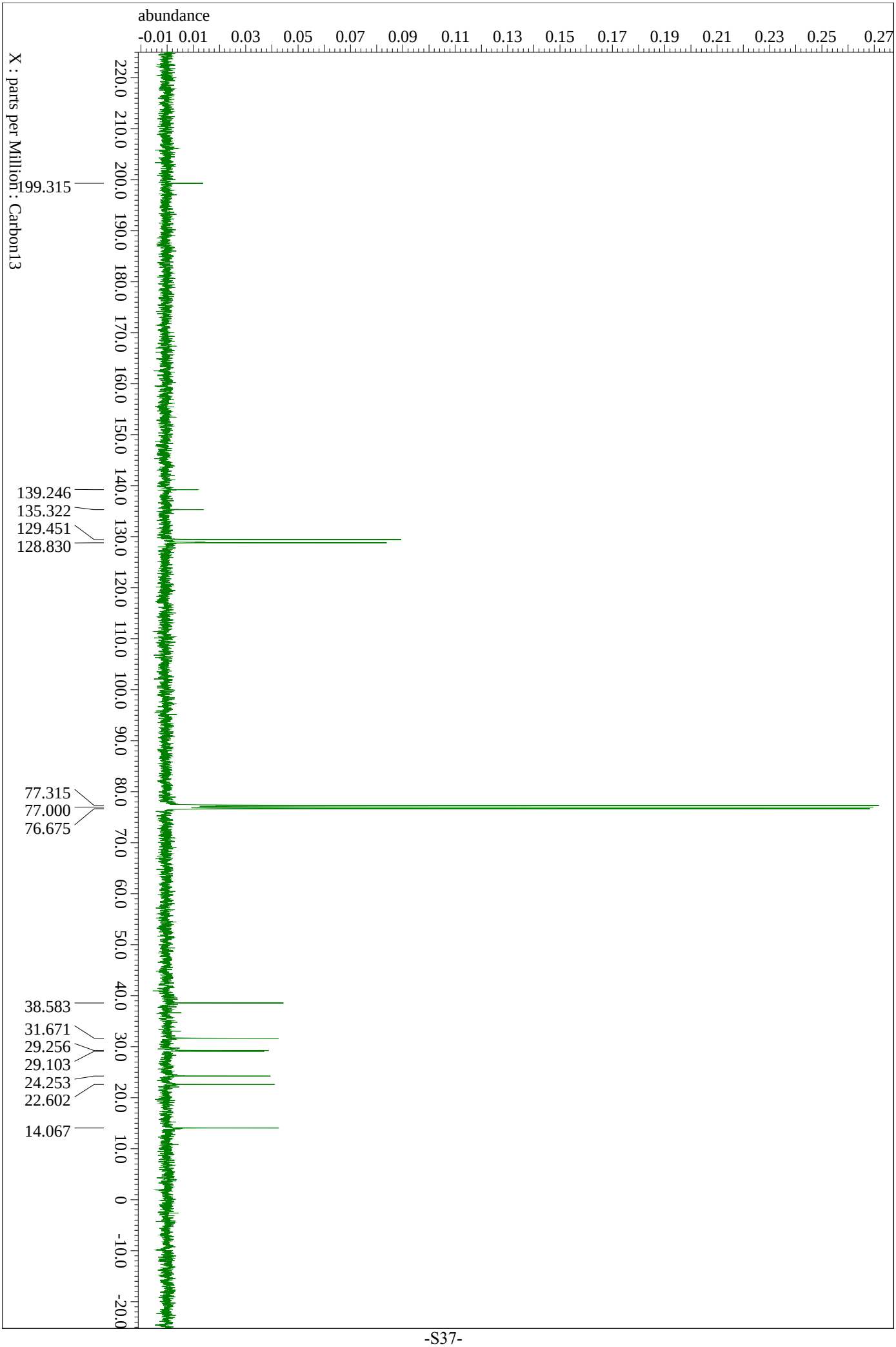
3.93


abundance
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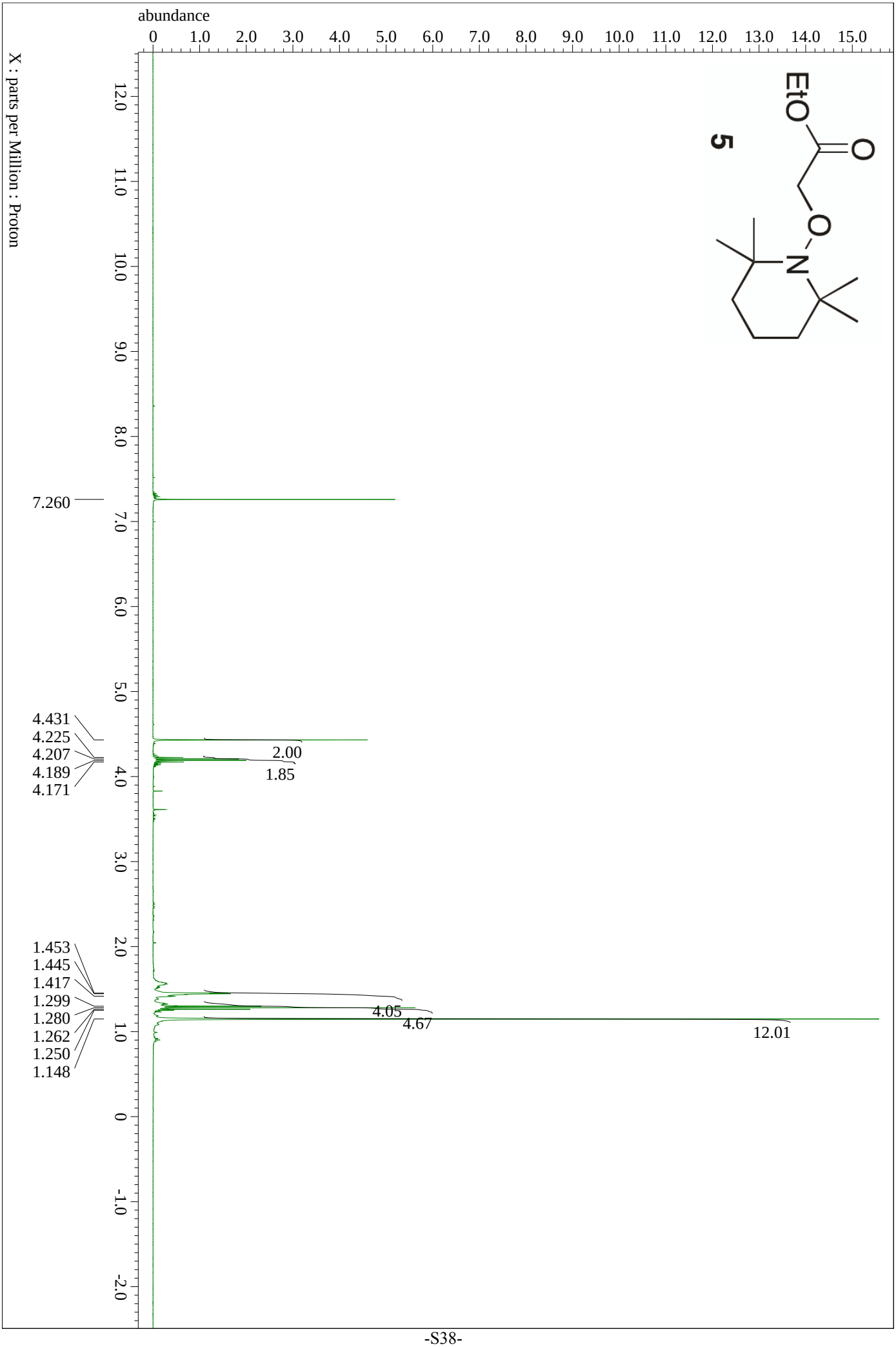
X : parts per Million : Carbon13
220.0 210.0 200.0 190.0 180.0 170.0 160.0 150.0 140.0 130.0 120.0 110.0 100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0 -10.0 -20.0
199.315
139.246
135.322
129.451
128.830
77.315
77.000
76.675
38.583
31.671
29.256
29.103
24.253
22.602
14.067


abundance
0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0
X : parts per Million : Proton
12.0 11.0 10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0 -1.0 -2.0
EtO
O
O
N
5
7.260
4.431
4.225
4.207
4.189
4.171
2.00
1.85
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1.417
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1.280
1.262
1.250
1.148
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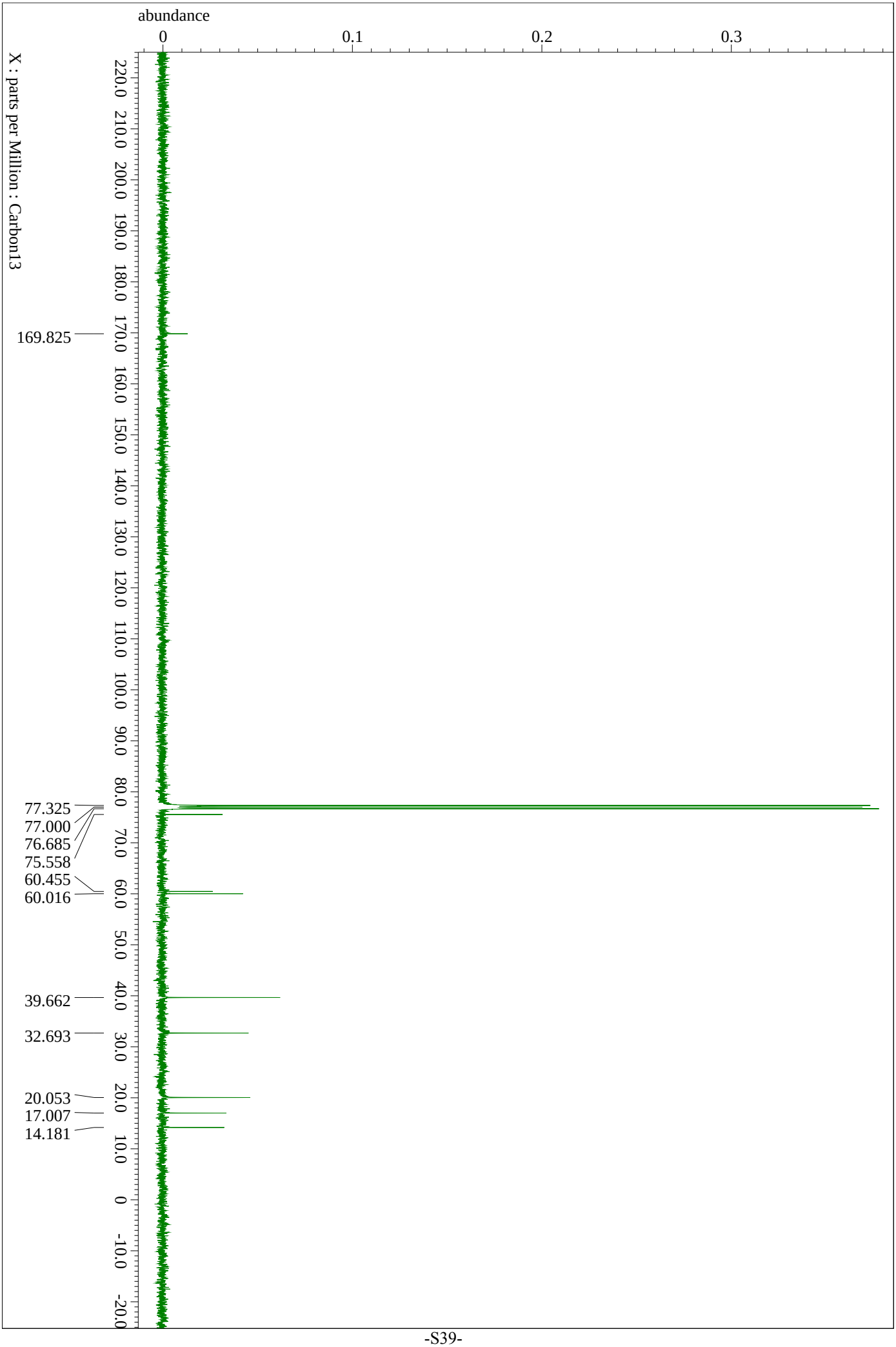
4.67
12.01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0.2
0.3
X : parts per Million : Carbon13
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200.0
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180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
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76.685
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39.662
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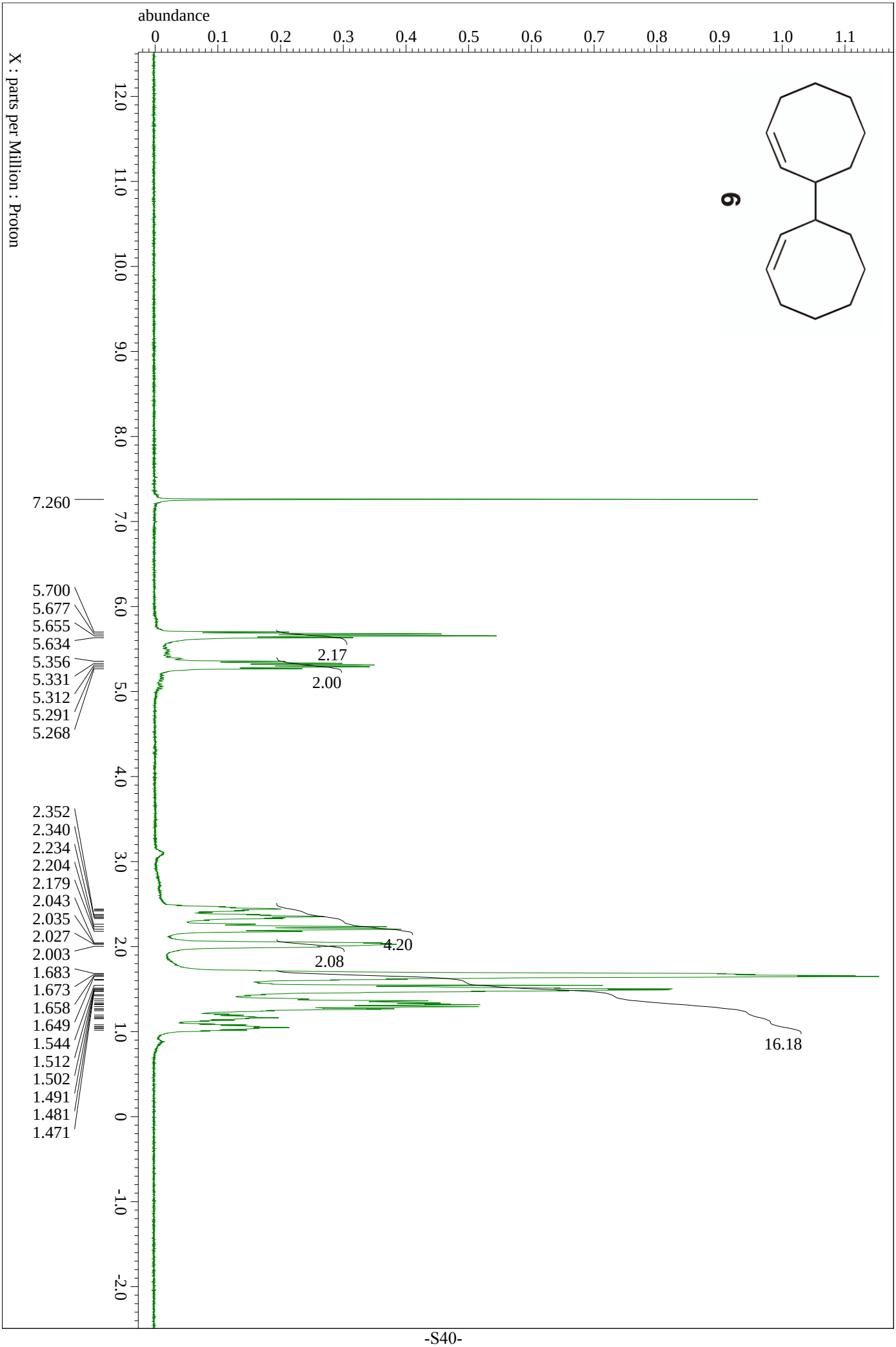
abundance
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
X : parts per Million : Proton
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
-1.0
-2.0
6
7.260
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5.331
5.312
5.291
5.268
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2.340
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2.027
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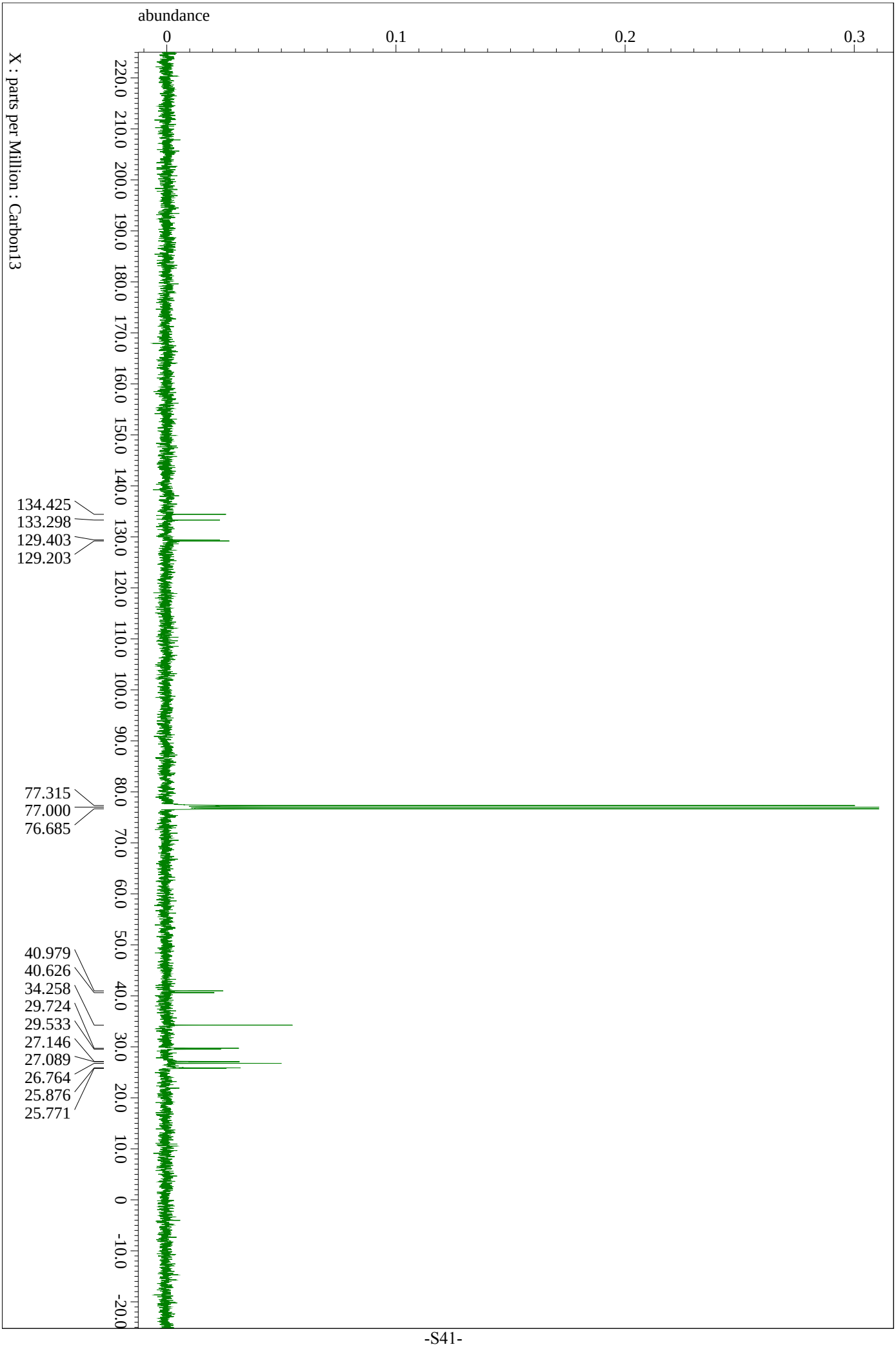
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140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
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133.298
129.403
129.203
77.315
77.000
76.685
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40.626
34.258
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