Electronic Supplementary Material (ESI) for ChemComm.

Supplementary Information

Copper(I) 2-Hydroxyethoxide-Promoted Cross-coupling of Aryl- and Alkenyldimethylsilanes with Organic Halides

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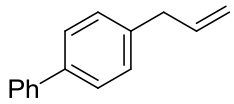
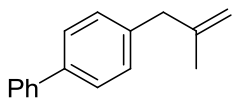
1. General THF was distilled from sodium and benzophenone. DMF was distilled from calcium hydride under reduced pressure. Preparative thin-layer chromatography (PTLC) was carried out using Wakogel B-5F. ^{1}H (300 MHz) and ^{13}C (75 MHz) NMR spectra were recorded in $CDCl_3$ on a JEOL JNM-AL300 spectrometer unless otherwise noted. The chemical shifts (δ) were quoted in parts per million from tetramethylsilane for ^{1}H and $CDCl_3$ for ^{13}C spectroscopy. IR spectra were obtained on a JASCO FT-IR 460 Plus and reported in cm^{-1}. Mass spectra were recorded on a JEOL MStation MS700.

2. Typical procedure for Copper(I) 2-Hydroxyethoxide-Promoted Cross-coupling (Table 3): CuI (57 mg, 0.3 mmol) and pre-prepared powdered lithium 2-hydroxyethoxide (**10**) (41 mg, 0.6 mmol) were placed in a flask under Ar. A mixture of 4-biphenyldimethylsilane (**8a**) (64 mg, 0.3 mmol) and methallyl chloride (**2b**) (54 mg, 0.6 mmol) in DMF (1.5 mL) was added to the flask at 25 °C under Ar. The mixture was stirred for 16 h at 50 °C. The reaction was quenched by addition of 3.5% aqueous NH_3 and the product was extracted with Et_2O. The extract was washed with H_2O and dried over Na_2SO_4. The solvent was evaporated under reduced pressure and the residue was purified by PTLC (hexane) to give **6b** (52 mg, 83%).

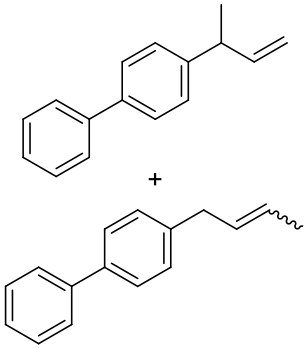
3. Characterization data for compounds 6



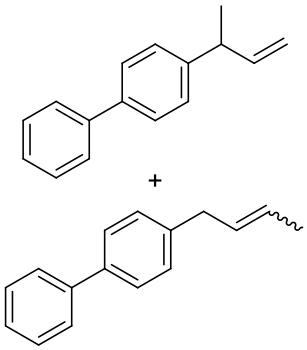
4-Allylbiphenyl (6a)[1]: IR (neat) 3058, 3028, 2978, 2902, 1638, 1487, 1432, 1413, 1075, 1008, 914, 761, 738, 696; ^{1}H NMR 3.44 (d, *J* = 6.8 Hz, 2H), 5.07–5.17 (m, 2H), 6.01 (ddt, *J* = 16.9, 10.1, 6.8 Hz, 1H), 7.25–7.36 (m, 3H), 7.40–7.47 (m, 2H), 7.51–7.61 (m, 4H); ^{13}C NMR 39.8, 115.9, 127.00, 127.03, 127.2, 128.7, 129.0, 137.3, 139.0, 139.1, 141.0.



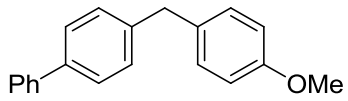
4-(2-Methylprop-2-en-1-yl)biphenyl (6b)[2]: IR (neat) 3071, 3027, 2969, 2916, 2848, 1650, 1487, 1449, 1407, 889, 759, 741, 693; ^{1}H NMR 1.72 (s, 3H), 3.36 (s, 2H), 4.78 (br s, 1H), 4.84 (br s, 1H), 7.24–7.29 (m, 2H), 7.30–7.36 (m, 1H), 7.40–7.47 (m, 2H), 7.50–7.56 (m, 2H), 7.56–7.61 (m, 2H); ^{13}C NMR 22.1, 44.2, 112.0, 126.97, 126.99, 127.01, 128.7, 129.3, 138.8, 139.0, 141.0, 145.0.



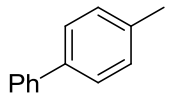
A mixture of 4-(1-methylprop-2-en-1-yl)biphenyl (6c) and 4-(but-2-en-1-yl)biphenyl (6d) [6c: 6d = 8:92 (*E*:*Z* = 86:14)] (entry 3): IR (neat) 3027, 2966, 2930, 1486, 1449, 1409, 1009, 967, 913, 838, 763, 737, 696; ^{1}H NMR (500 MHz) 1.40 (d, *J* = 7.4 Hz, 0.24H), 1.70 (dd, *J* = 6.0, 1.4 Hz, 2.37H), 1.75 (d, *J* = 4.5 Hz, 0.39H), 3.35 (d, *J* = 6.3 Hz, 1.58H), 3.44 (d, *J* = 5.7 Hz, 0.26H), 3.48–3.54 (m, 0.08H), 5.04–5.11 (m, 0.16H), 5.51–5.66 (m, 1.84H), 6.03 (ddd, *J* = 17.2, 10.3, 6.3 Hz, 0.08H), 7.21–7.34 (m, 3H), 7.39–7.44 (m, 2H), 7.49–7.60 (m, 4H); ^{13}C NMR 12.9, 17.9, 20.7, 32.7, 38.7, 42.8, 113.2, 125.0, 126.5, 126.99, 127.01, 127.1, 127.2, 127.6, 128.70, 128.72, 128.8, 128.9, 129.9, 138.80, 138.84, 139.1, 140.2, 141.1, 143.1. HRMS (FAB) calcd for $C_{16}H_{16}$ $[M]^{+}$ 208.1252, found 208.1249.



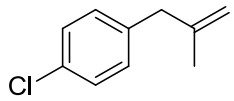
A mixture of 4-(1-methylprop-2-en-1-yl)biphenyl (6c) and 4-(but-2-en-1-yl)biphenyl (6d) [6c: 6d = 51:49 (*E*:*Z* = 70:30)] (entry 4): IR (neat) 3027, 2966, 2930, 1487, 1449, 1410, 1009, 967, 910, 838, 762, 736, 697; ^{1}H NMR (500 MHz) 1.40 (d, *J* = 7.4 Hz, 1.53H), 1.70 (dd, *J* = 6.0, 1.4 Hz, 1.02H), 1.75 (d, *J* = 4.6 Hz, 0.45H), 3.35 (d, *J* = 6.3 Hz, 0.68H), 3.44 (d, *J* = 5.2 Hz, 0.30H), 3.51 (dq, *J* = 6.3, 7.4 Hz, 0.51H), 5.04–5.11 (m, 1.02H), 5.51–5.66 (m, 0.98H), 6.03 (ddd, *J* = 17.2, 10.3, 6.3 Hz, 0.51H), 7.21–7.34 (m, 3H), 7.39–7.44 (m, 2H), 7.50–7.60 (m, 4H); ^{13}C NMR 12.9, 17.9, 20.7, 32.7, 38.7, 42.8, 113.2, 125.0, 126.5, 126.99, 127.01, 127.1, 127.2, 127.6, 128.68, 128.72, 128.8, 128.9, 129.9, 138.79, 138.84, 139.1, 140.2, 140.3, 141.0, 141.1, 143.1, 144.6.



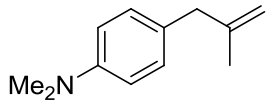
4-(4-Methoxybenzyl)biphenyl (6e)[3]: IR (neat) 3030, 2924, 2837, 1610, 1509, 1461, 1297, 1240, 1172, 1108, 1030, 849, 801, 766, 697; ^{1}H NMR 3.79 (s, 3H), 3.97 (s, 2H), 6.82–6.88 (m, 2H), 7.12–7.17 (m, 2H), 7.22–7.27 (m, 2H), 7.28–7.35 (m, 1H), 7.38–7.45 (m, 2H), 7.49–7.59 (m, 4H); ^{13}C NMR 40.7, 55.3, 113.9, 126.99, 127.04, 127.2, 128.7, 129.2, 129.9, 133.1, 138.9, 140.7, 141.0, 158.0.



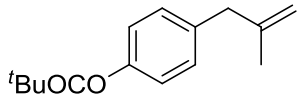
4-Methylbiphenyl (6f)[4] (Contaminated with biphenyl): IR (neat) 3029, 2921, 1484, 822, 758, 737; ^{1}H NMR 2.39 (s, 3H), 7.19–7.62 (m, 9H); ^{13}C NMR 21.1, 126.9, 127.0, 128.7, 129.5, 137.0, 138.3, 141.1.



1-Chloro-4-(2-methylprop-2-en-1-yl)benzene (6g)[3]: IR (neat) 3077, 2972, 2914, 1651, 1491, 1442, 1406, 1375, 1093, 1016, 894, 842, 793; ^{1}H NMR 1.66 (s, 3H), 3.28 (s, 2H), 4.71 (br s, 1H), 4.82 (br s, 1H), 7.09–7.14 (m, 2H), 7.23–7.28 (m, 2H); ^{13}C NMR 22.0, 43.9, 112.3, 128.4, 130.2, 131.8, 138.2, 144.6.

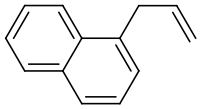


1-(Dimethylamino)-4-(2-methylprop-2-en-1-yl)benzene (6h): IR (neat) 3072, 2969, 2912, 2897, 2799, 1614, 1521, 1443, 1345, 947, 887, 795; ^{1}H NMR 1.67 (s, 3H), 2.92 (s, 6H), 3.22 (s, 2H), 4.71 (br s, 1H), 4.76 (br s, 1H), 6.67–6.72 (m, 2H), 7.03–7.09 (m, 2H); ^{13}C NMR 22.0, 40.9, 43.7, 111.1, 112.9, 127.9, 129.5, 146.0, 149.2. HRMS (FAB) calcd for $C_{12}H_{17}N$ $[M]^{+}$ 175.1361, found 175.1360.

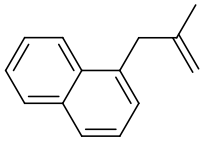


1-(*tert*-Butoxycarbonyl)-4-(2-methylprop-2-en-1-yl)benzene (6i):
IR (neat) 3076, 3005, 2977, 2933, 1713, 1651, 1610, 1476, 1456, 1415, 1392, 1368, 1292, 1255, 1166, 1118, 1020, 893, 851, 752; ^{1}H NMR 1.59 (s, 9H), 1.66 (s, 3H), 3.35 (s, 2H), 4.73 (s, 1H), 4.83

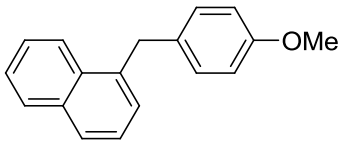
(s, 1H), 7.21–7.26 (m, 2H), 7.89–7.94 (m, 2H); ^{13}C NMR 22.0, 28.2, 44.5, 80.7, 112.5, 128.8, 129.5, 130.0, 144.3, 144.6, 165.8. HRMS (FAB) calcd for $C_{15}H_{20}O_2$ $[M]^+$ 232.1463, found 232.1460.



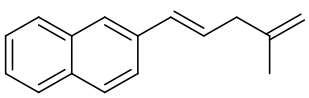
1-Allylnaphthalene (6j)[5]: IR (neat) 3046, 3005, 2977, 2911, 2119, 1926, 1827, 1638, 1597, 1509, 1396, 1257, 994, 914, 776; ^{1}H NMR 3.85 (d, *J* = 6.4 Hz, 2H), 5.06–5.14 (m, 2H), 6.12 (ddt, *J* = 16.7, 10.5, 6.3 Hz, 1H), 7.32–7.54 (m, 4H), 7.74 (d, *J* = 8.1 Hz, 1H), 7.84–7.89 (m, 1H), 8.00–8.07 (m, 1H); ^{13}C NMR 37.3, 116.2, 124.0, 125.5, 125.6, 125.8, 126.3, 126.9, 128.7, 131.9, 133.8, 136.1, 137.0.



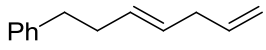
1-(2-Methyl-2-propen-1-yl)naphthalene (6k)[6]: IR (neat) 3067, 1650, 1597, 1509, 1444, 1396, 1260, 1078, 891, 790, 774; ^{1}H NMR 1.78 (s, 3H), 3.78 (s, 2H), 4.62 (s, 1H), 4.86 (s, 1H), 7.30–7.52 (m, 4H), 7.71–7.77 (m, 1H), 7.81–7.88 (m, 1H), 7.98–8.05 (m, 1H); ^{13}C NMR 22.8, 41.5, 112.2, 124.3, 125.4, 125.5, 125.7, 127.0, 127.2, 128.6, 132.4, 133.8, 135.7, 144.6.



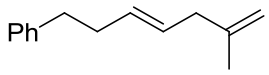
1-(4-Methoxybenzyl)naphthalene (6l): IR (neat) 1176, 1106, 1035, 908, 792, 779, 731; ^{1}H NMR 3.75 (s, 3H), 4.38 (s, 2H), 6.75–6.85 (m, 2H), 7.05–7.16 (m, 2H), 7.22–7.29 (m, 1H), 7.37–7.48 (m, 3H), 7.71–7.78 (m, 1H), 7.81–7.88 (m, 1H), 7.96–8.03 (m, 1H); ^{13}C NMR 38.1, 55.2, 113.9, 124.2, 125.50, 125.53, 125.9, 127.0, 127.1, 128.6, 129.6, 132.1, 132.7, 133.9, 137.0, 157.9. HRMS (FAB) calcd for $C_{18}H_{16}O$ $[M]^+$ 248.1201, found 248.1215.



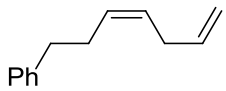
2-[(*E*)-4-Methyl-1,4-pentadien-1-yl]naphthalene (6m)[7]: IR (neat) 3057, 2969, 2933, 1650, 1627, 1598, 1508, 1438, 1372, 1271, 963, 890, 857, 818, 790, 742; ^{1}H NMR 1.80 (s, 3H), 2.96 (d, *J* = 7.0 Hz, 2H), 4.82 (br s, 2H), 6.36 (dt, *J* = 15.8, 7.1 Hz, 1H), 6.59 (d, *J* = 15.8 Hz, 1H), 7.38–7.48 (m, 2H), 7.60 (dd, *J* = 8.6, 1.6 Hz, 1H), 7.70 (s, 1H), 7.74–7.82 (m, 3H); ^{13}C NMR 22.5, 41.6, 111.1, 123.6, 125.5, 125.6, 126.1, 127.6, 127.8, 128.1, 128.6, 131.5, 132.7, 133.7, 135.0, 144.5.



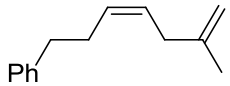
(*E*)-7-Phenyl-1,4-heptadiene (6n): IR (neat) 3062, 3027, 2925, 2855, 1637, 1604, 1496, 1454, 1433, 1031, 993, 970, 912, 744, 698; ^{1}H NMR 2.28–2.37 (m, 2H), 2.63–2.79 (m, 4H), 4.94–5.04 (m, 2H), 5.45 (dt, *J* = 15.2, 5.5 Hz, 1H), 5.51 (dt, *J* = 15.2, 5.5 Hz, 1H), 5.82 (ddt, *J* = 16.7, 10.4, 6.4 Hz, 1H), 7.15–7.32 (m, 5H); ^{13}C NMR 34.4, 36.0, 36.7, 114.9, 125.7, 128.2, 128.3, 128.4, 130.7, 137.2, 142.0. Anal. Calcd for $C_{13}H_{16}$: C, 90.64; H, 9.36. Found: C, 90.83; H, 9.45.



(*E*)-2-Methyl-7-phenyl-1,4-heptadiene (6o)[7]: IR (neat) 3067, 3027, 2969, 2932, 2854, 1649, 1496, 1454, 970, 888, 743, 698; ^{1}H NMR 1.68 (s, 3H), 2.29–2.39 (m, 2H), 2.63–2.73 (m, 4H), 4.65 (br s, 1H), 4.70 (br s, 1H), 5.43 (dt, *J* = 15.3, 5.7 Hz, 1H), 5.51 (dt, *J* = 15.3, 5.7 Hz, 1H), 7.15–7.32 (m, 5H); ^{13}C NMR 22.4, 34.4, 36.0, 41.1, 110.2, 125.7, 128.2, 128.3, 128.5, 131.2, 142.0, 145.2.



(*Z*)-7-Phenyl-1,4-heptadiene (6p)[3]: IR (neat) 3063, 3011, 2925, 1637, 1604, 1496, 1454, 1077, 994, 911, 697; ^{1}H NMR 2.37 (dt, *J* = 7.0, 7.8 Hz, 2H), 2.67 (t, *J* = 7.8 Hz, 2H), 2.74 (t, *J* = 6.4 Hz, 2H), 4.92–5.05 (m, 2H), 5.41 (dt, *J* = 10.8, 7.0 Hz, 1H), 5.51 (dt, *J* = 10.8, 7.0 Hz, 1H), 5.74 (ddt, *J* = 17.1, 10.1, 6.2 Hz, 1H), 7.15–7.33 (m, 5H); ^{13}C NMR 29.1, 31.5, 35.8, 114.6, 125.8, 127.4, 128.3, 128.4, 129.9, 136.9, 141.9.



(*Z*)-2-Methyl-7-phenyl-1,4-heptadiene(6q)[3]: IR (neat) 3064, 3026, 2933, 1649, 1604, 1496, 1453, 1373, 888, 698; ^{1}H NMR 1.69 (s, 3H), 2.33–2.42 (m, 2H), 2.63–2.73 (m, 4H), 4.68 (br s, 1H), 4.70 (br s, 1H), 5.44 (dtt, *J* = 10.8, 7.2, 1.1 Hz, 1H), 5.53 (dtt, *J* = 10.8, 7.2, 1.1 Hz, 1H), 7.15–7.32 (m, 5H); ^{13}C NMR 22.5, 29.1, 35.6, 35.9, 110.2, 125.8, 127.6, 128.3, 128.4, 130.2, 142.0, 144.7.

5. References

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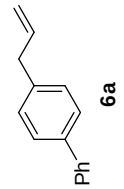
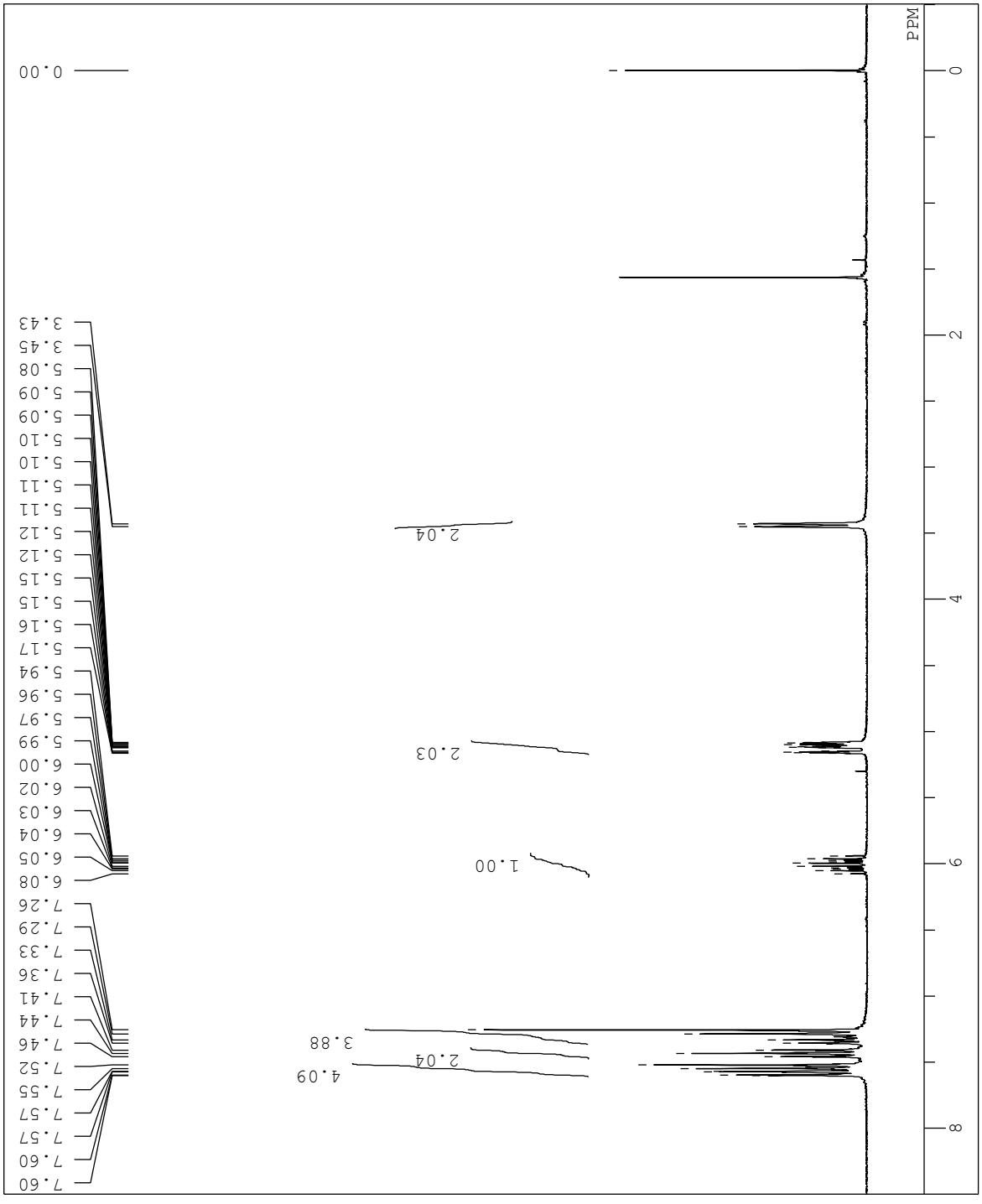
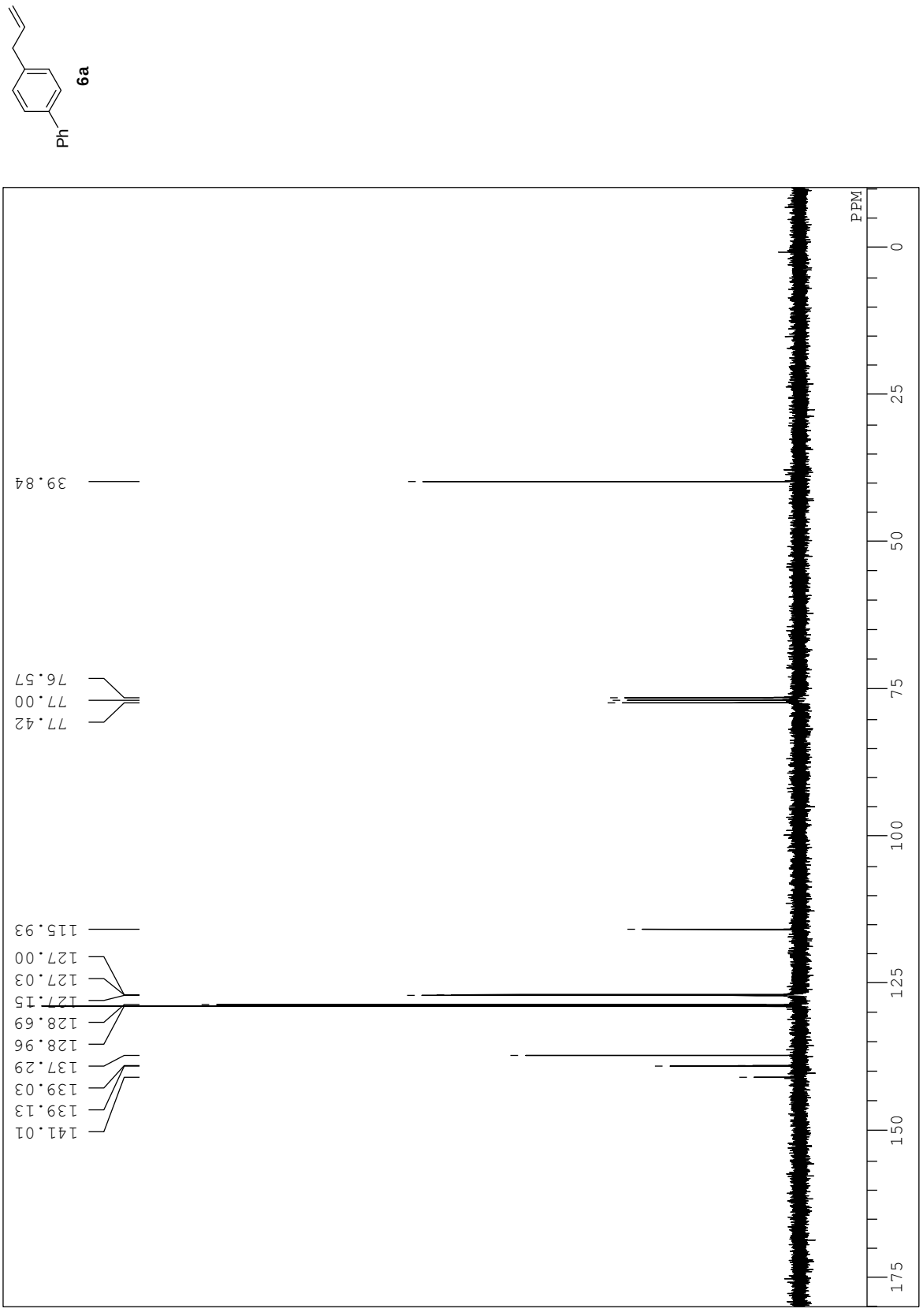
5. ^{1}H and ^{13}C NMR spectra for compounds 6



6a




6a
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75
100
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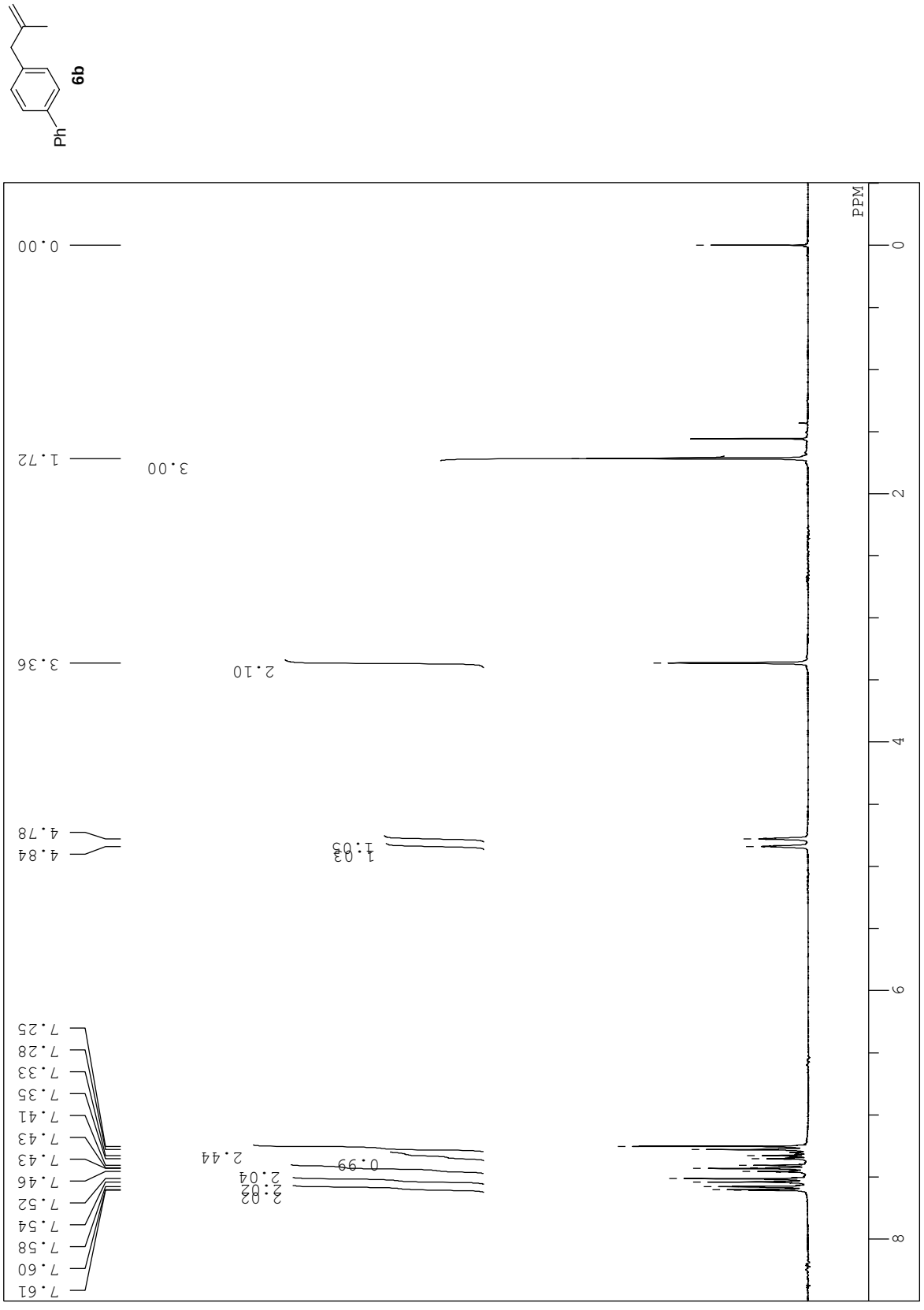
141.01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PPM
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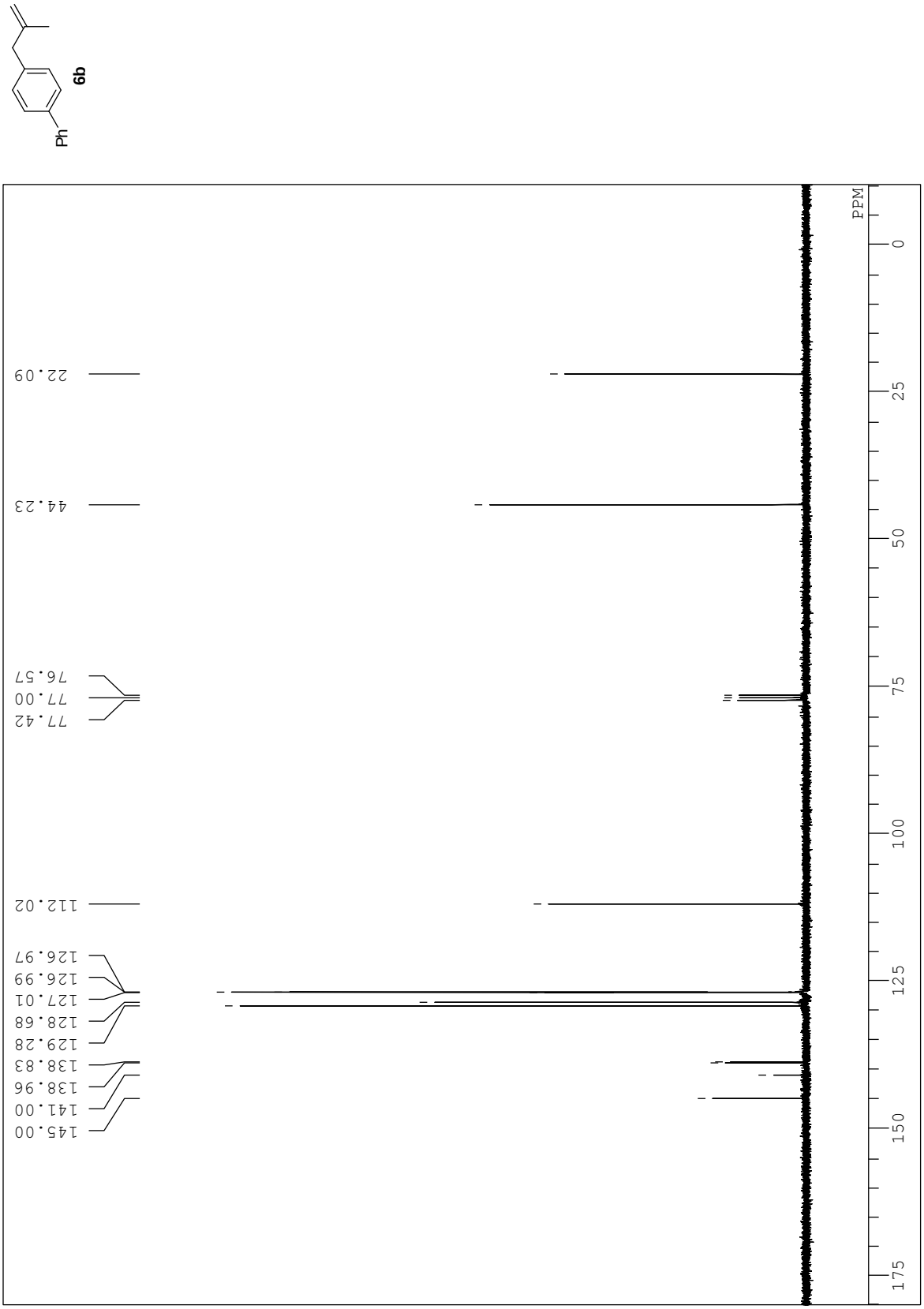
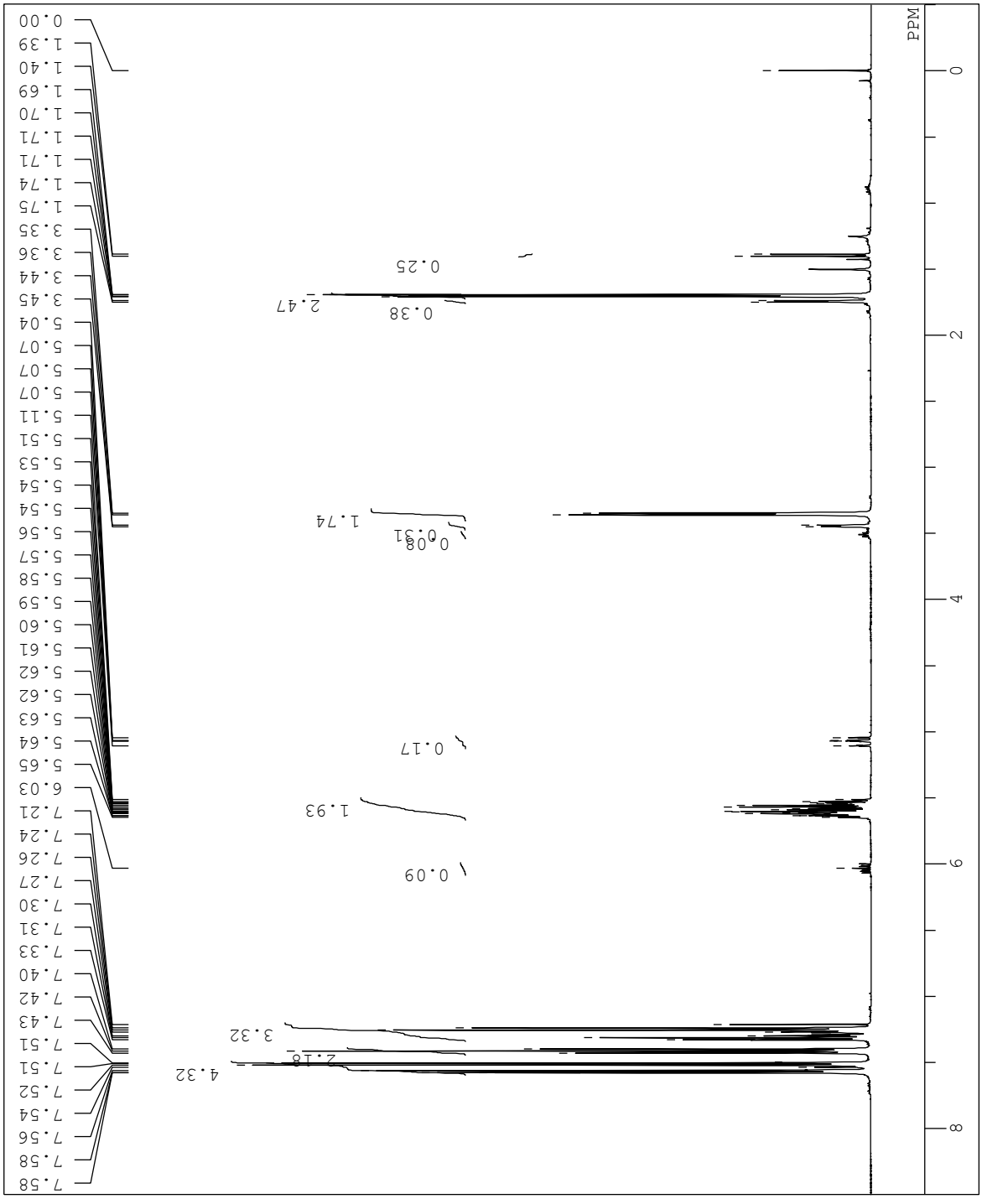
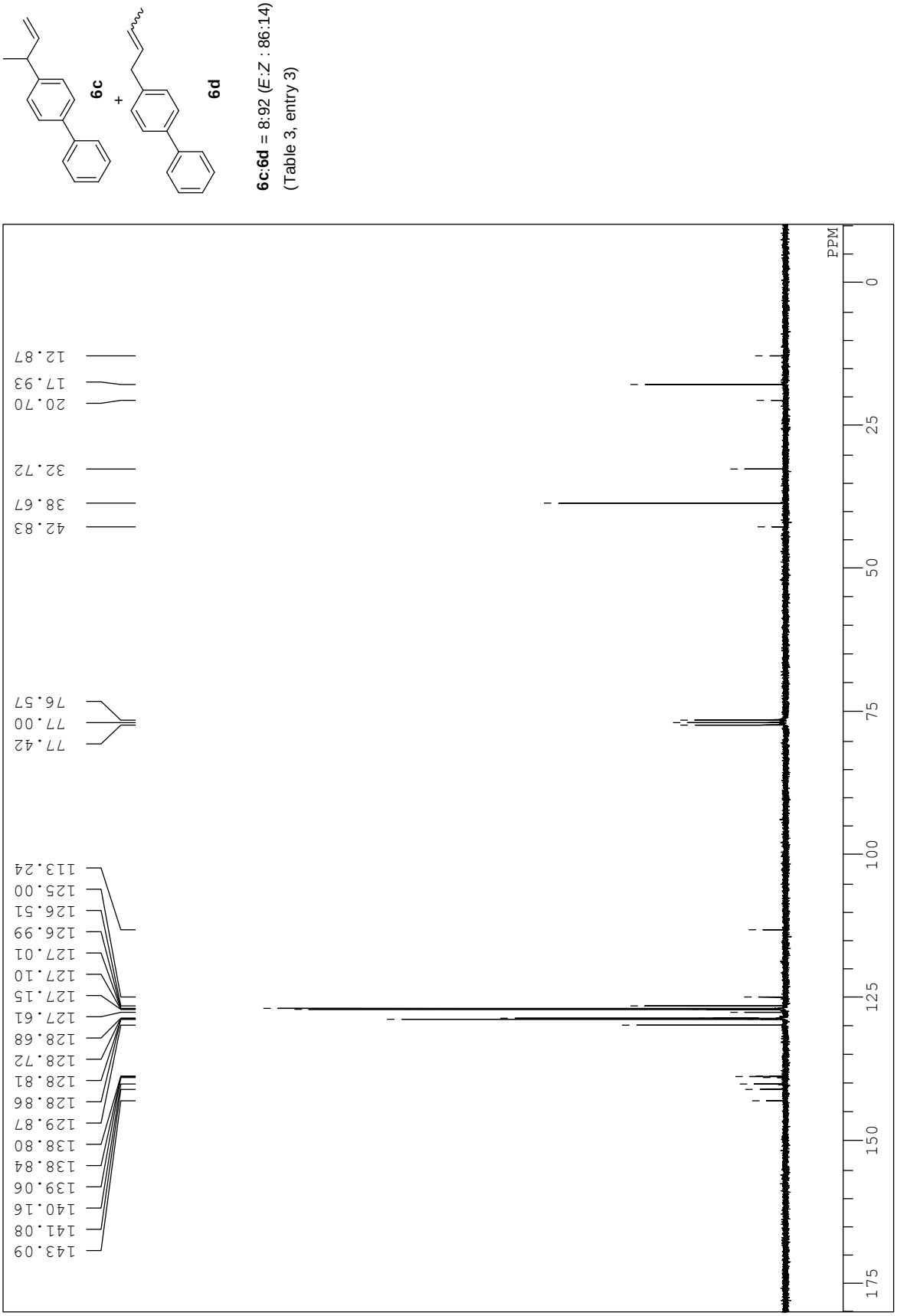
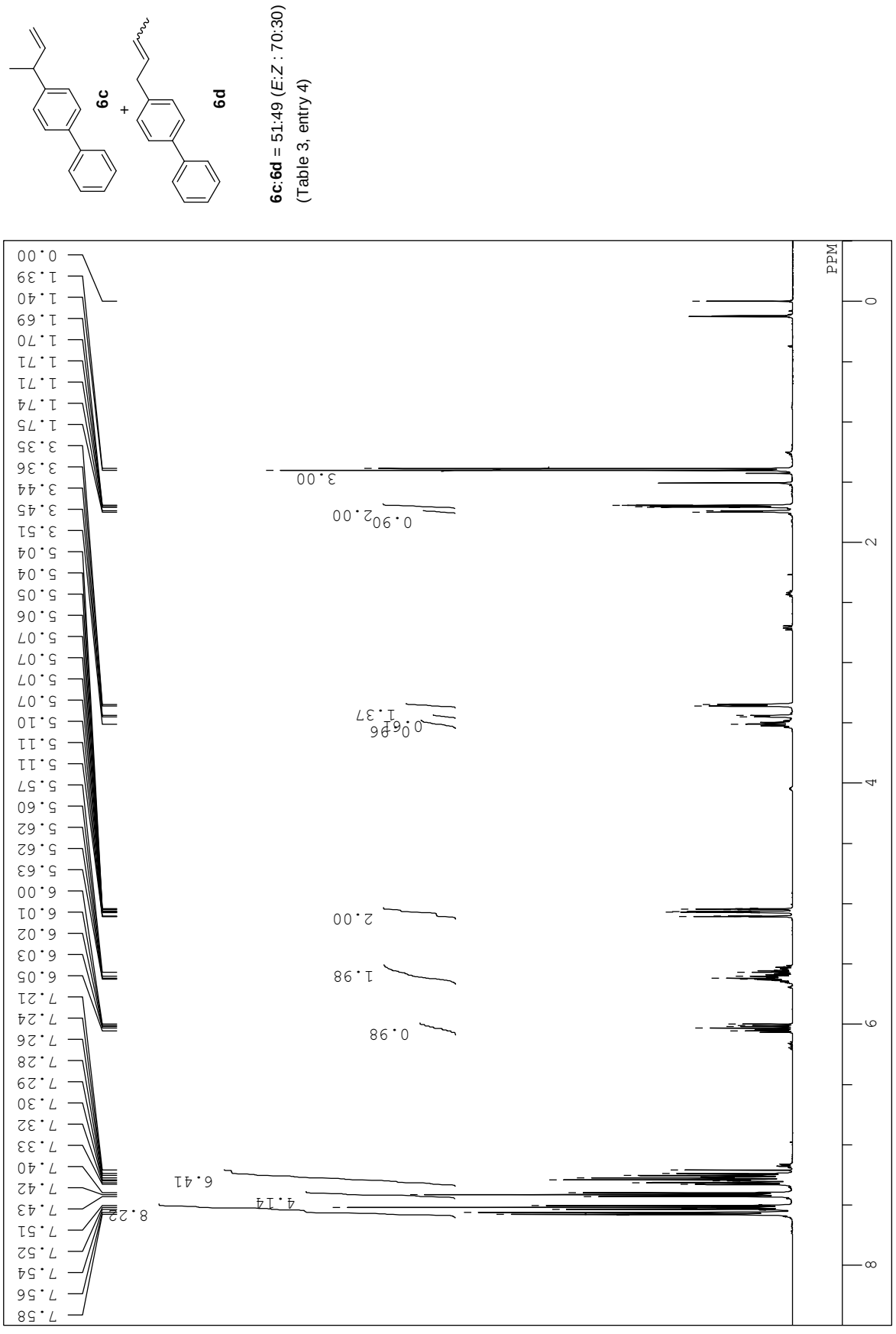
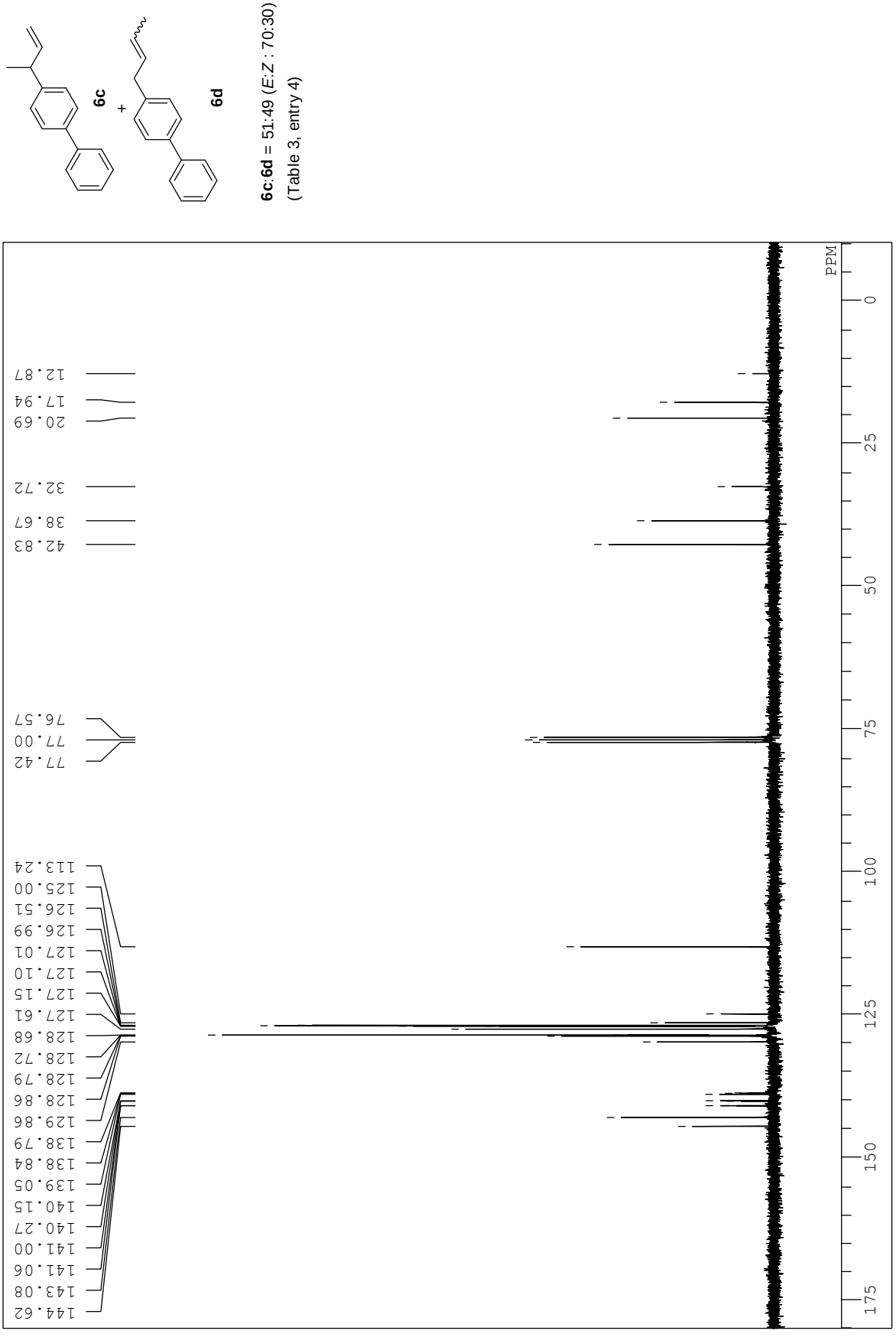
6
8
0.00
1.72
3.36
4.78
4.84
7.25
7.28
7.33
7.35
7.41
7.43
7.43
7.46
7.52
7.54
7.58
7.60
7.61
3.00
2.10
1.03
1.05
2.44
0.99
2.04
2.02

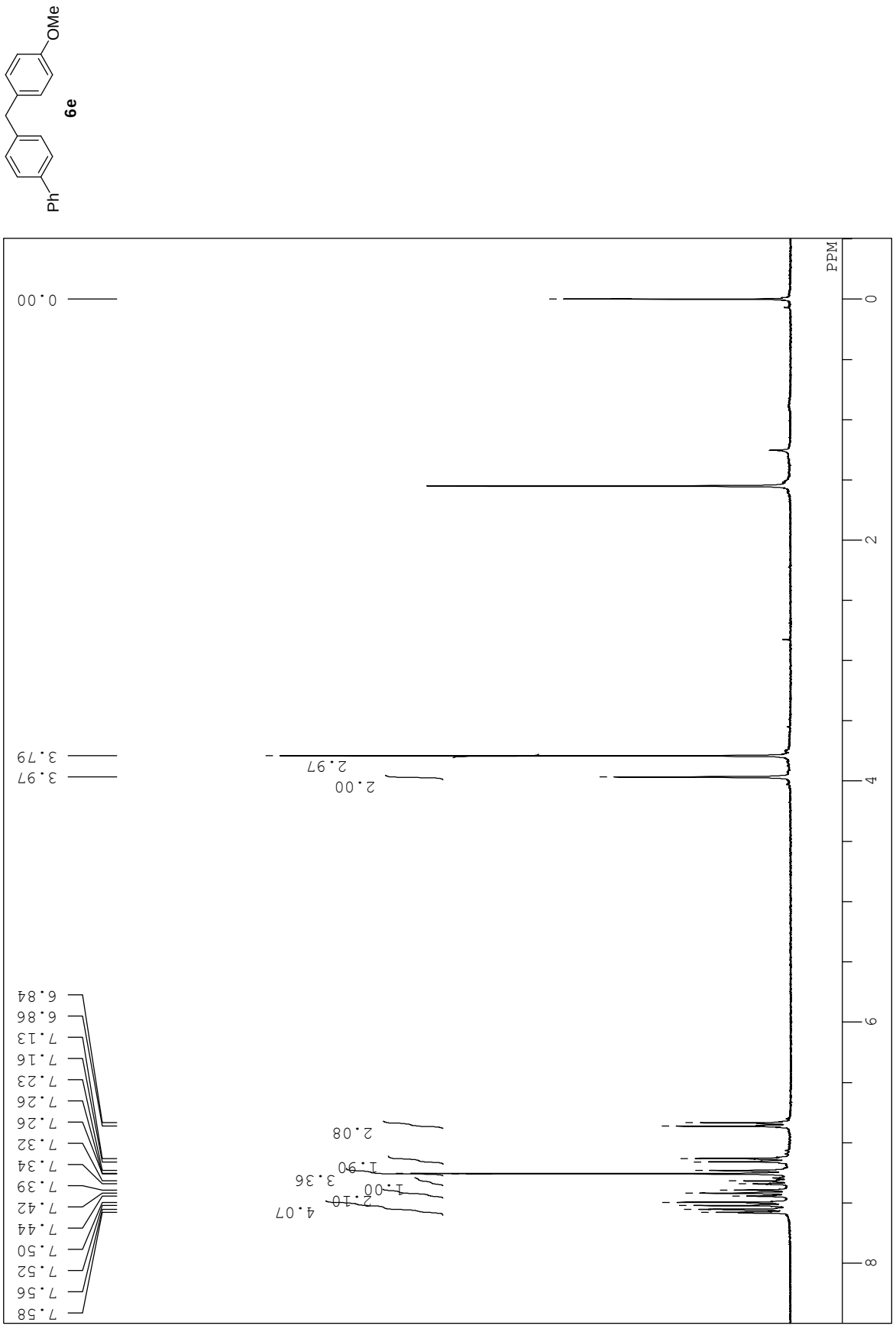

6b
Ph
22.09
44.23
76.57
77.00
77.42
112.02
126.97
126.99
127.01
128.68
129.28
138.83
138.96
141.00
145.00
PPM
0
25
50
75
100
125
150
175

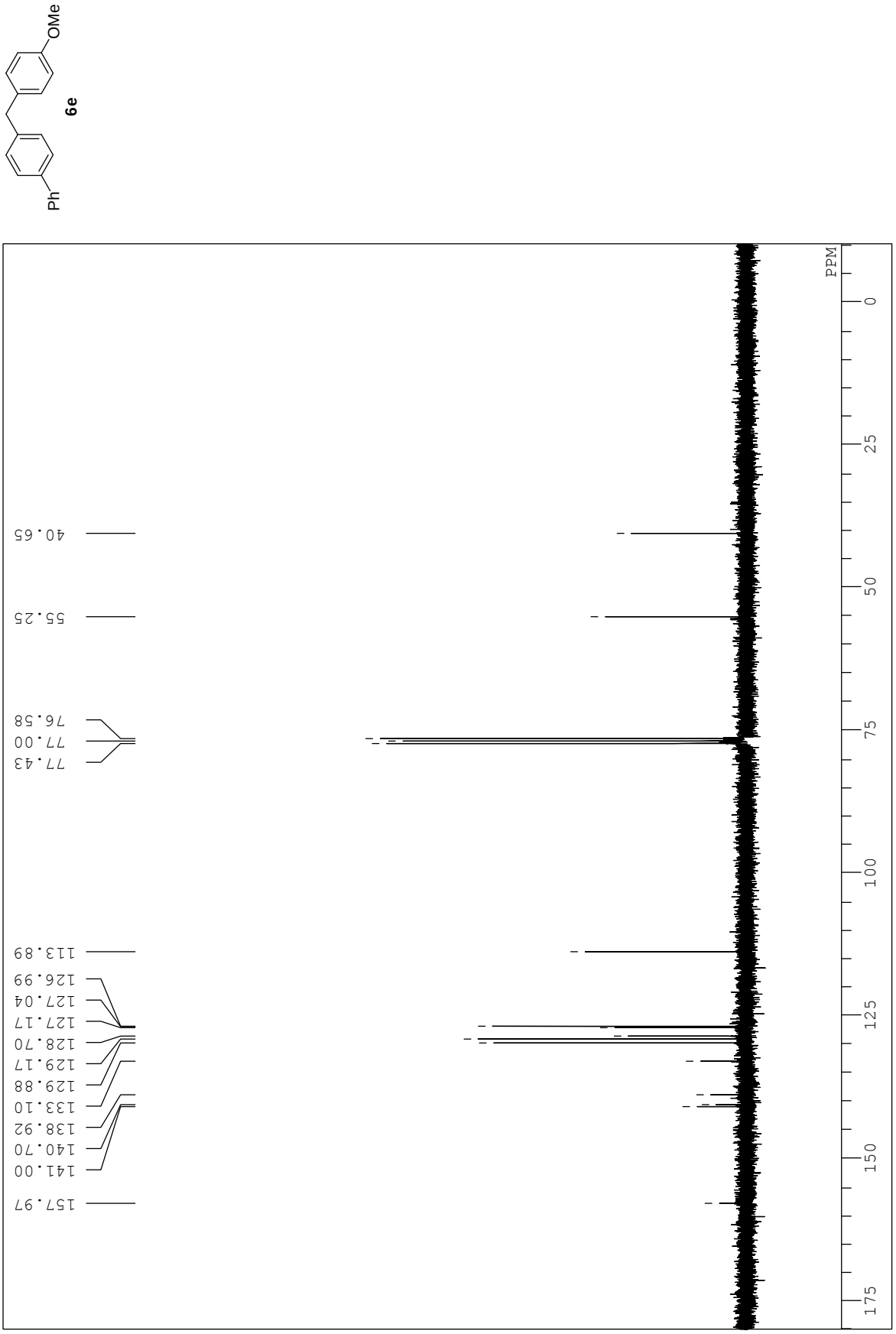

6c
+
6d
6c:6d = 8:92 (E:Z : 86:14)
(Table 3, entry 3)
PPM
0
2
4
6
8
4.32
2.18
3.32
0.09
1.93
0.17
0.08
0.31
1.74
0.38
2.47
0.25

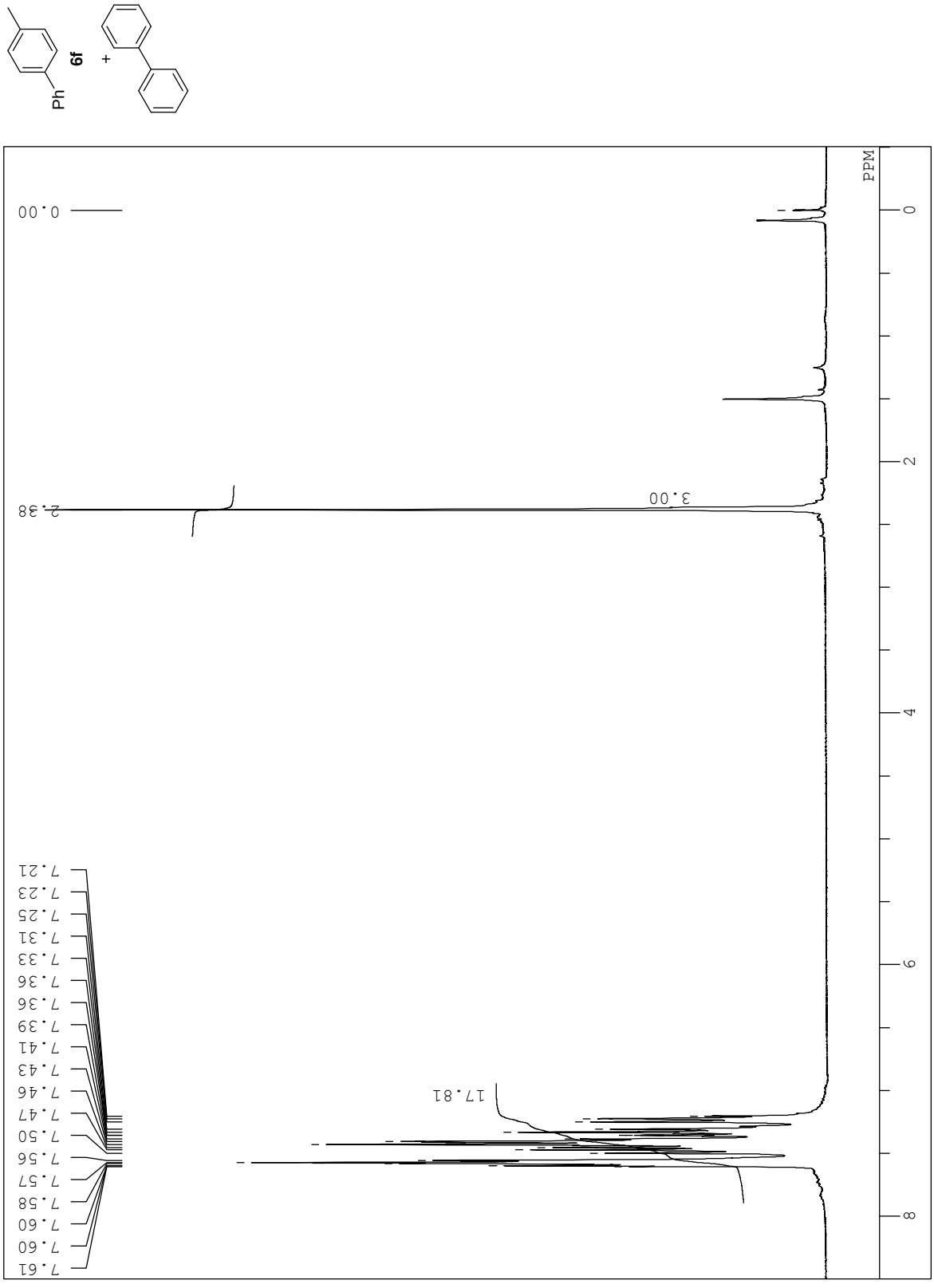

6c
+
6d
6c:6d = 8:92 (E:Z : 86:14)
(Table 3, entry 3)
PPM
0
25
50
75
100
125
150
175
12.87
17.93
20.70
32.72
38.67
42.83
76.57
77.00
77.42
113.24
125.00
126.51
126.99
127.01
127.10
127.15
127.61
128.68
128.72
128.81
128.86
129.87
138.80
138.84
139.06
140.16
141.08
143.09

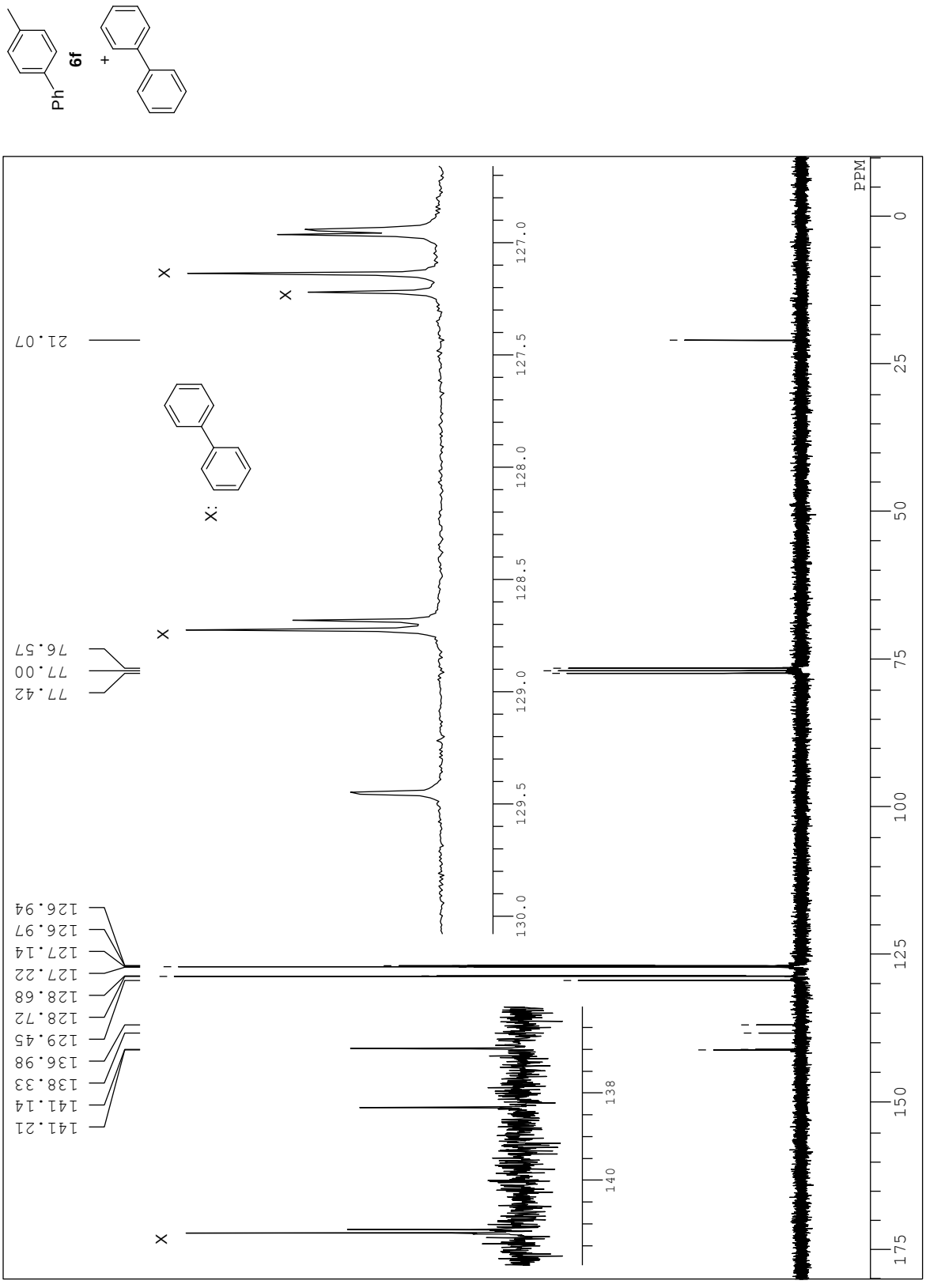

6c
+
6d
6c:6d = 51:49 (E:Z : 70:30)
(Table 3, entry 4)
PPM
8.22
4.14
6.41
0.98
1.98
2.00
0.96
1.37
0.90
2.00
3.00

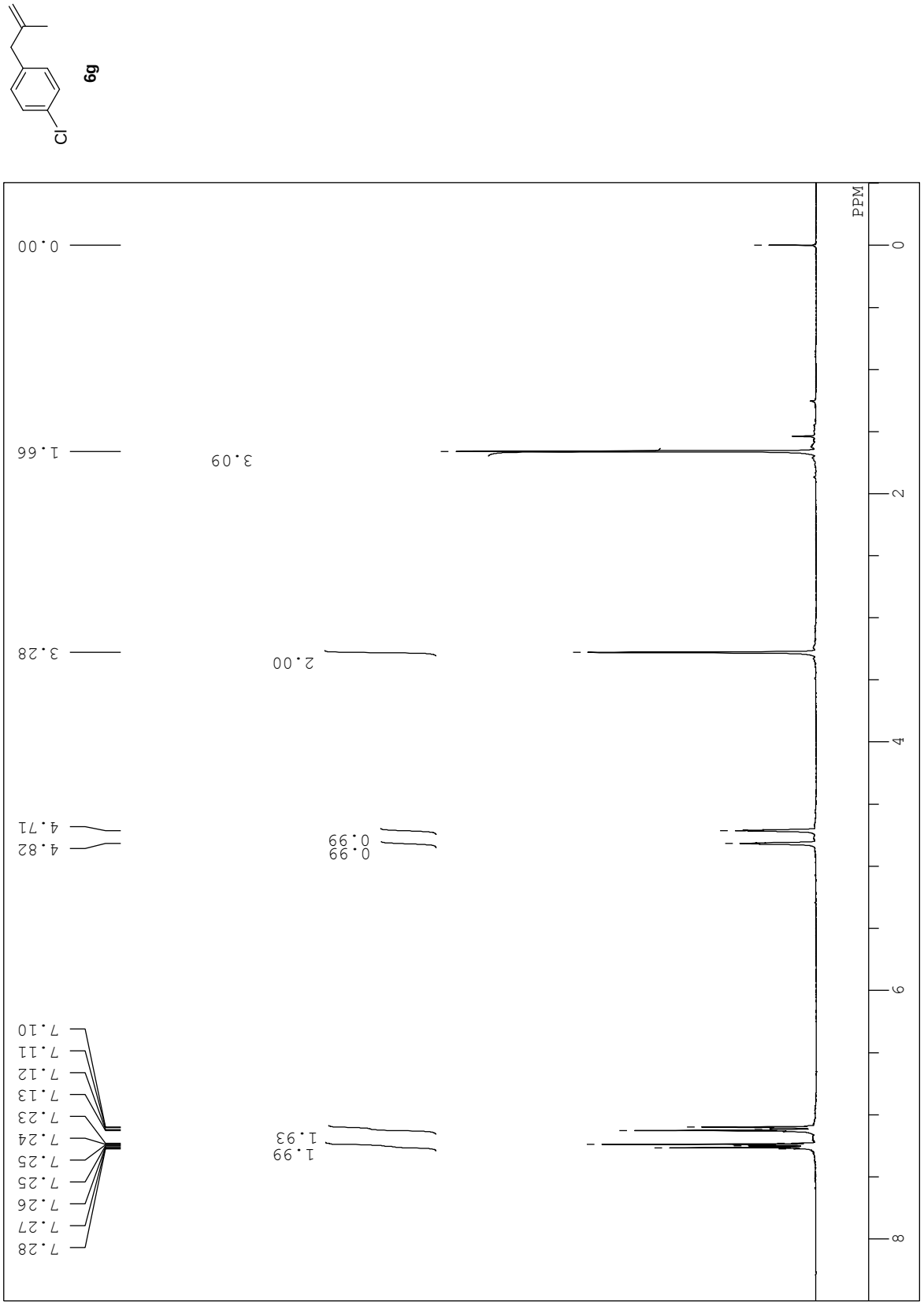

6c
+
6d
6c:6d = 51:49 (E:Z : 70:30)
(Table 3, entry 4)
PPM
0
25
50
75
100
125
150
175
144.62
143.08
141.06
141.00
140.27
140.15
139.05
138.84
138.79
129.86
128.86
128.79
128.72
128.68
127.61
127.15
127.10
127.01
126.99
126.51
125.00
113.24
77.42
77.00
76.57
42.83
38.67
32.72
20.69
17.94
12.87

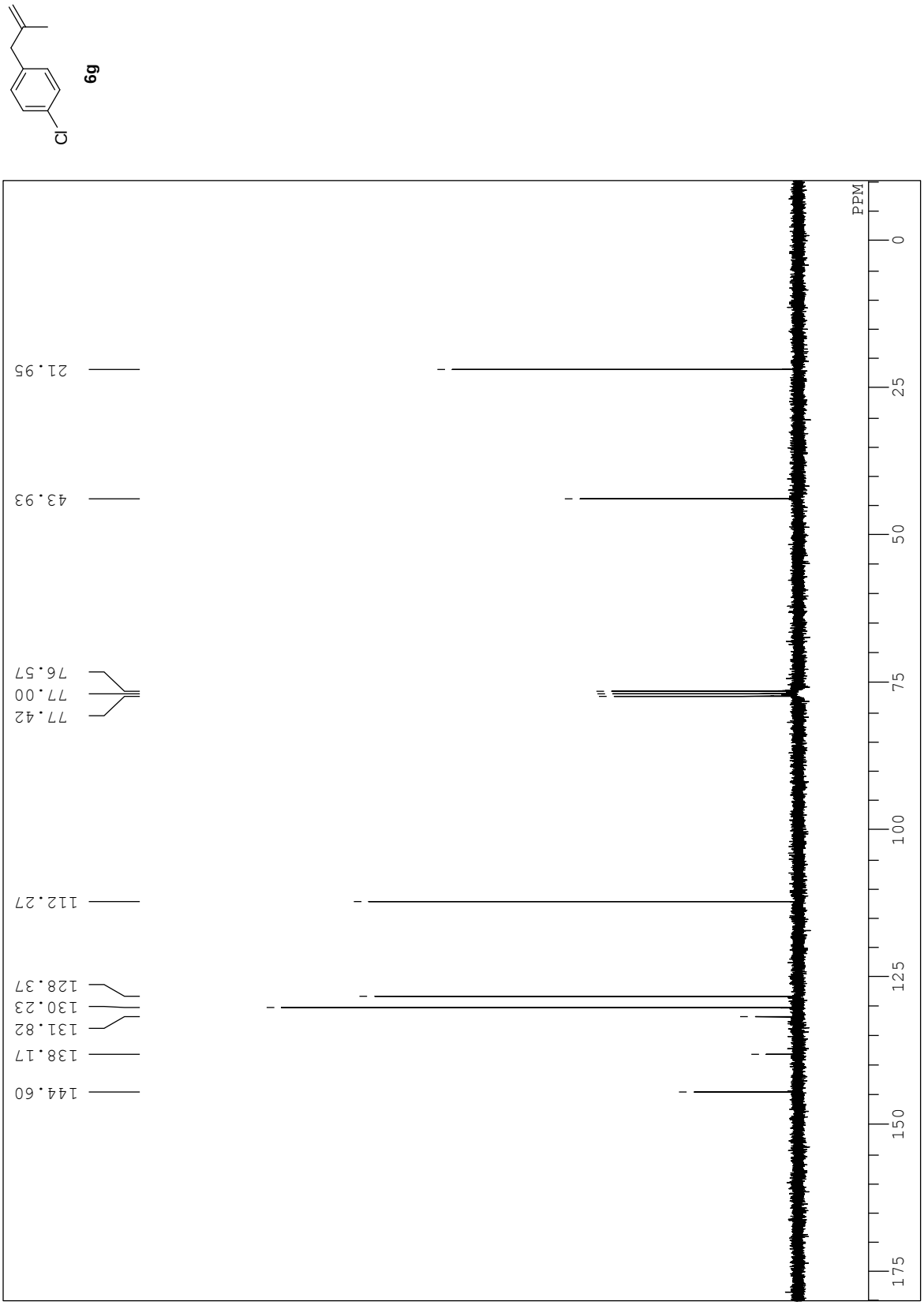

OMe
6e
Ph
PPM
0
2
4
6
8
0.00
3.79
3.97
2.97
2.00
2.08
1.90
3.36
1.00
2.10
4.07
7.58
7.56
7.52
7.50
7.44
7.42
7.39
7.34
7.32
7.26
7.26
7.23
7.16
7.13
6.86
6.84

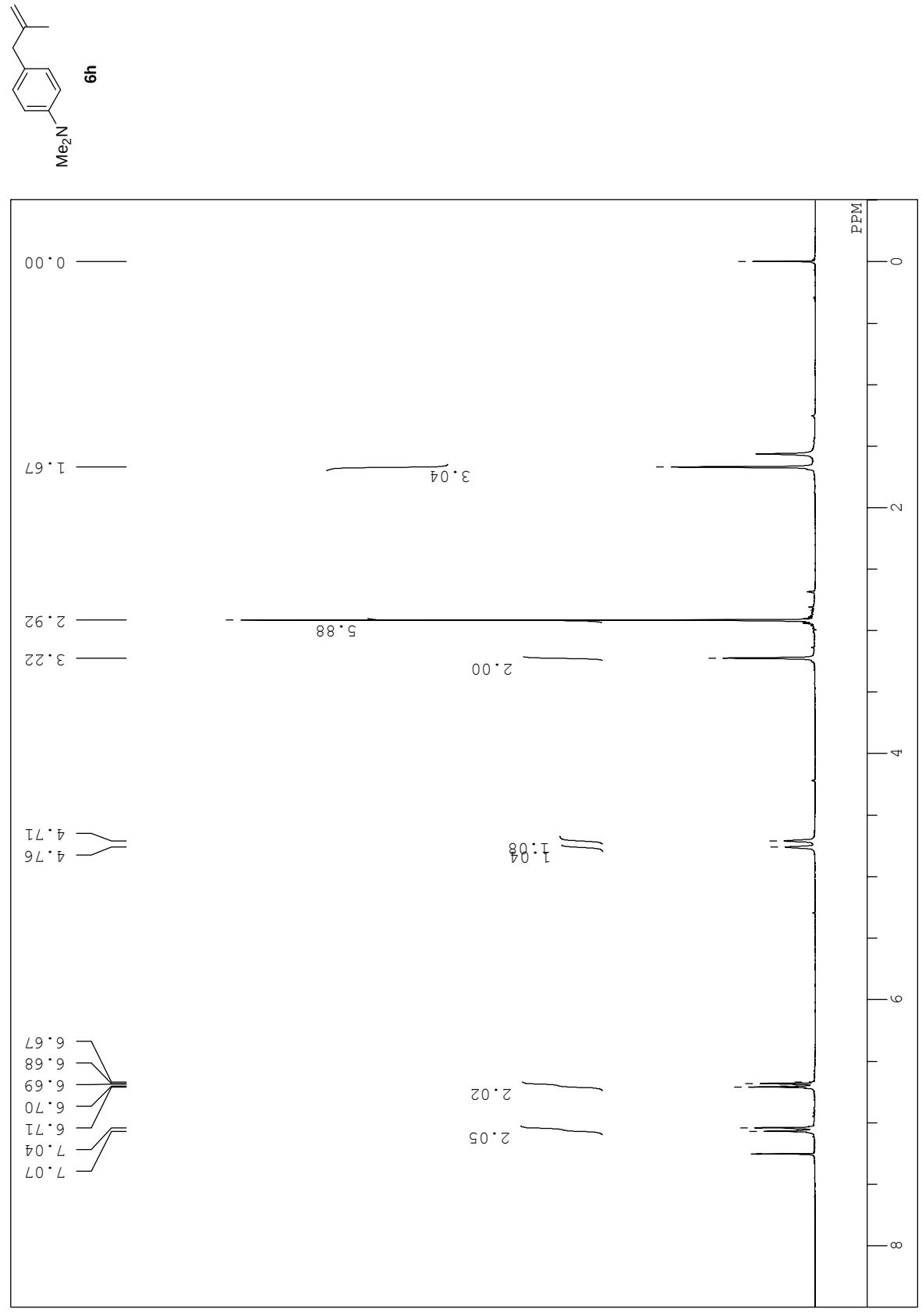

OMe
6e
Ph
40.65
55.25
76.58
77.00
77.43
113.89
126.99
127.04
127.17
128.70
129.17
129.88
133.10
138.92
140.70
141.00
157.97
PPM
0
25
50
75
100
125
150
175

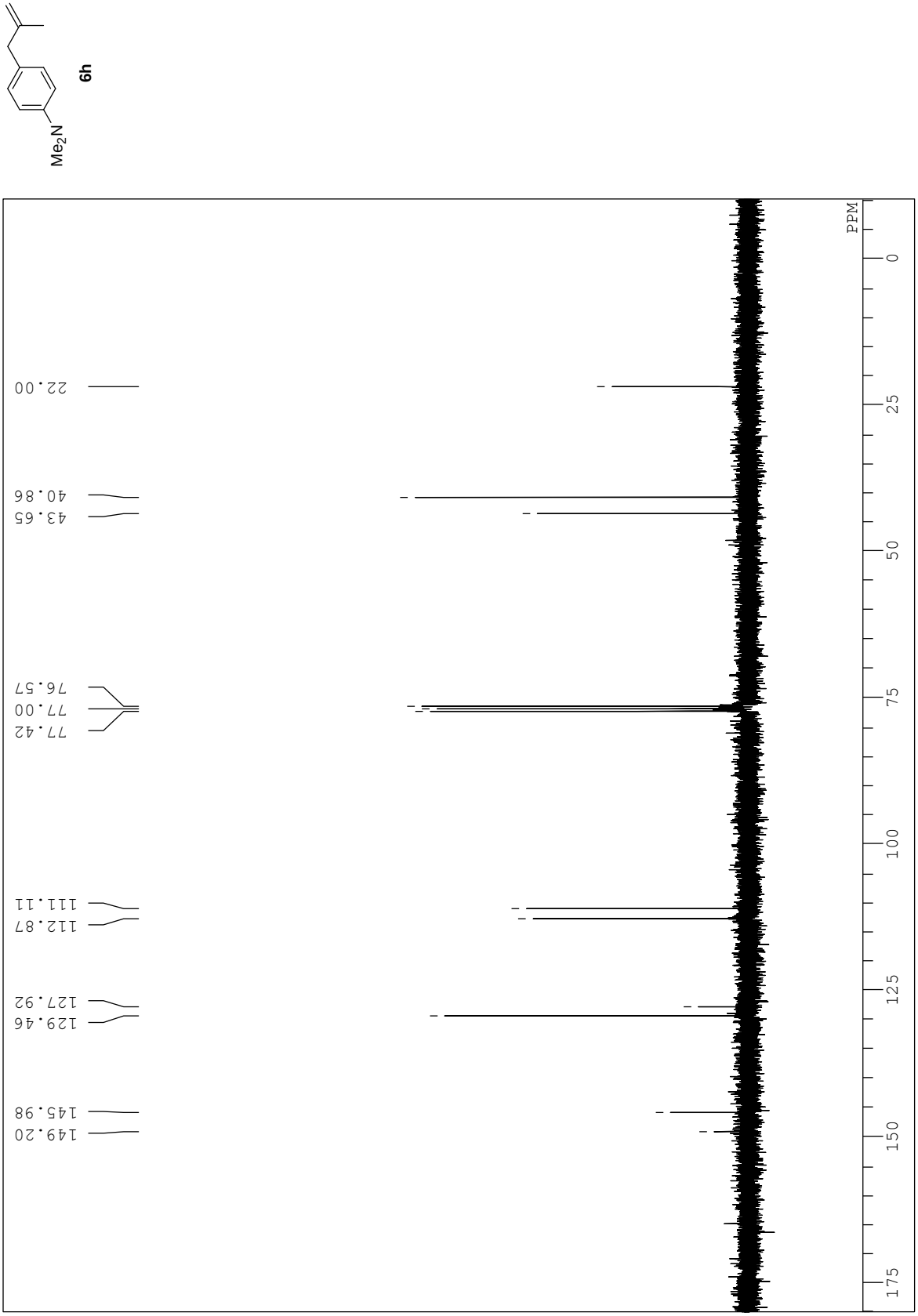

Ph
6f
+
PPM
0
2
4
6
8
0.00
2.38
3.00
17.81
7.21
7.23
7.25
7.31
7.33
7.36
7.36
7.39
7.41
7.43
7.46
7.47
7.50
7.56
7.57
7.58
7.60
7.60
7.61

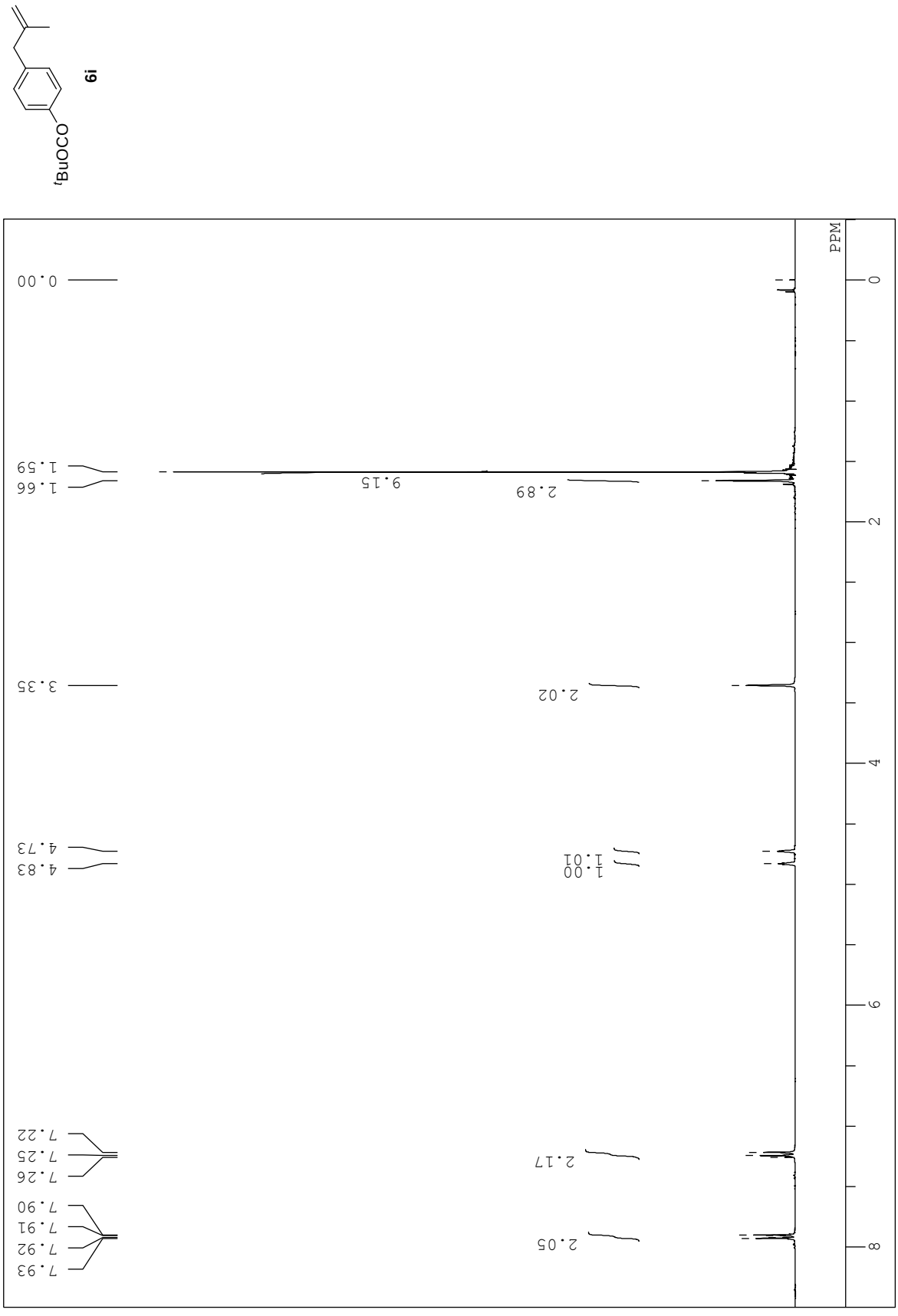

Ph
6f
+
21.07
77.42
77.00
76.57
141.21
141.14
138.33
136.98
129.45
128.72
128.68
127.22
127.14
126.97
126.94
PPM

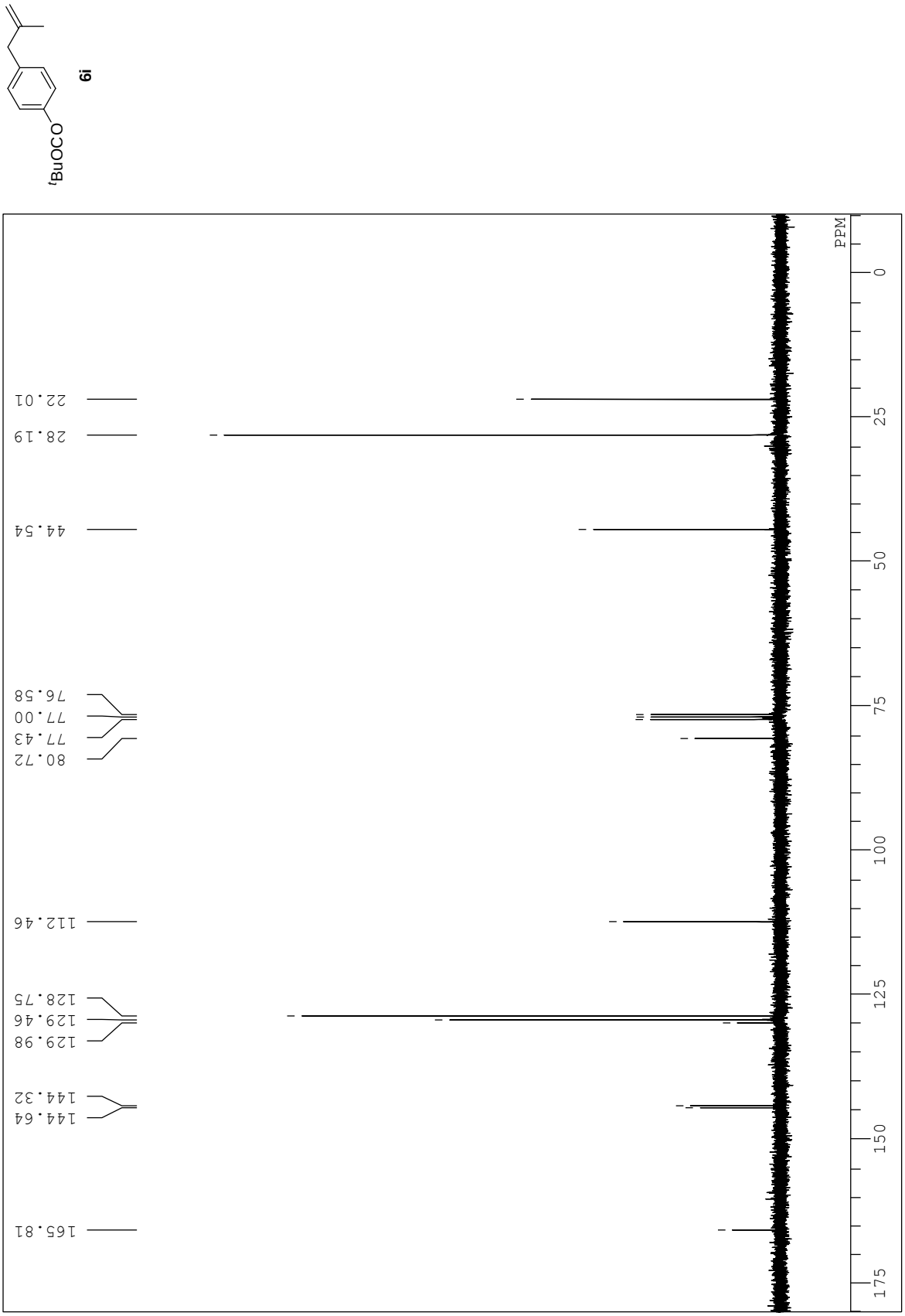

6g
Cl
PPM
0
2
4
6
8
7.28
7.27
7.26
7.25
7.25
7.24
7.23
7.13
7.12
7.11
7.10
1.99
1.93
0.99
0.99
4.82
4.71
2.00
3.28
3.09
1.66
0.00

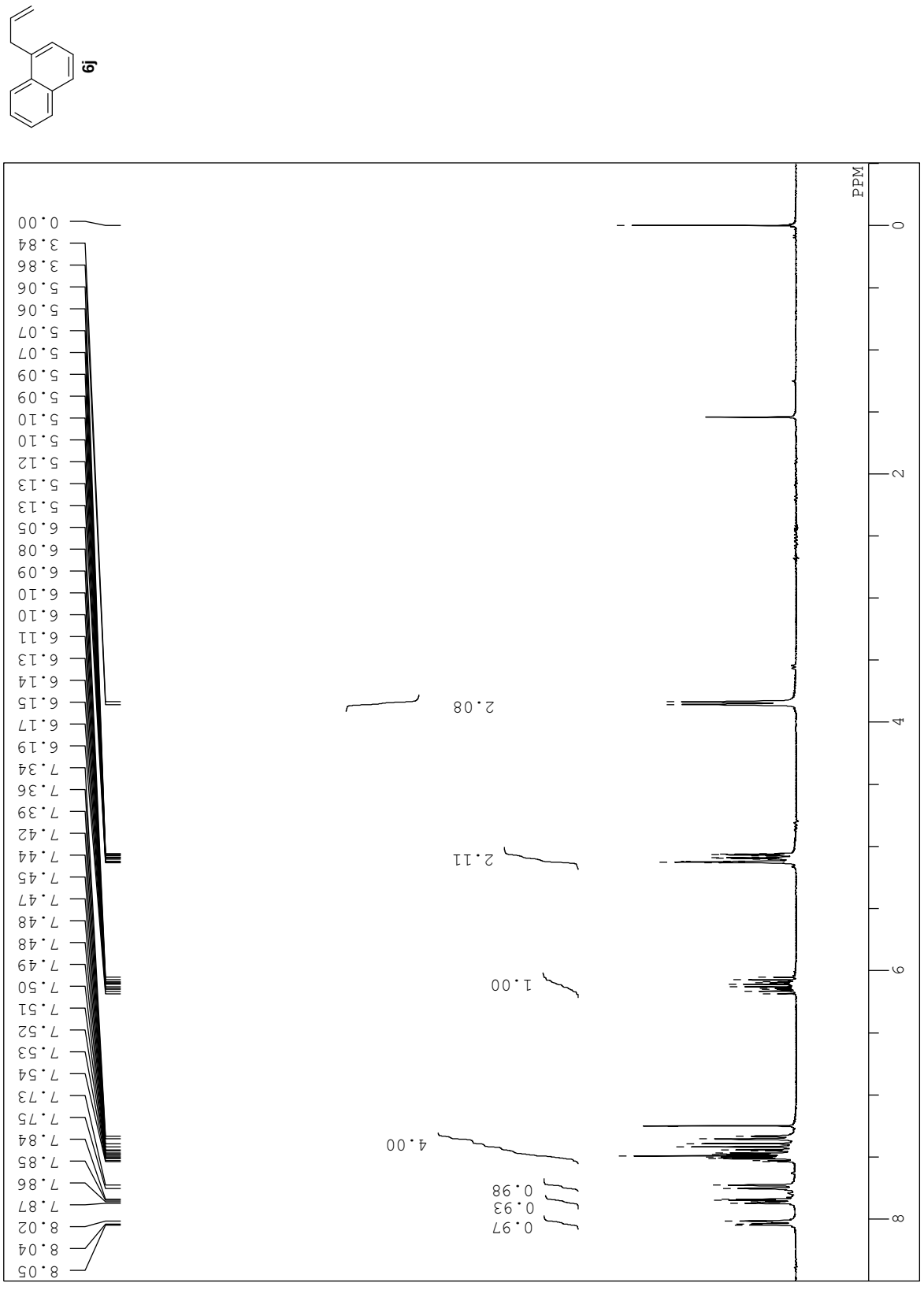

6g
Cl
PPM
0
25
50
75
100
125
150
175
21.95
43.93
76.57
77.00
77.42
112.27
128.37
130.23
131.82
138.17
144.60

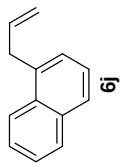

6h
Me2N
PPM
0
2
4
6
8
0.00
1.67
2.92
3.22
4.71
4.76
6.67
6.68
6.69
6.70
6.71
7.04
7.07
3.04
5.88
2.00
1.08
2.02
2.05

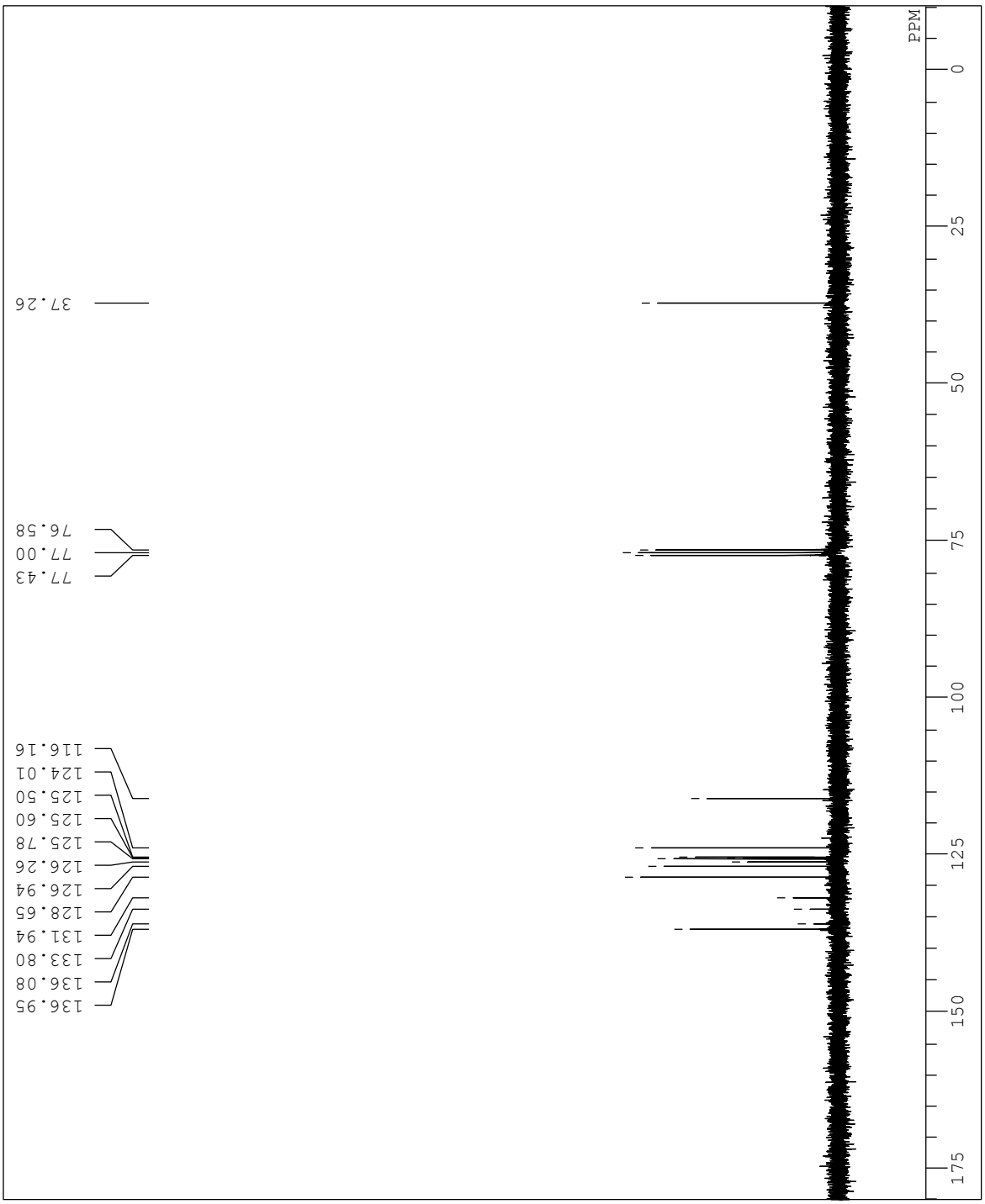

6h
Me2N
22.00
40.86
43.65
76.57
77.00
77.42
111.11
112.87
127.92
129.46
145.98
149.20
PPM
0
25
50
75
100
125
150
175

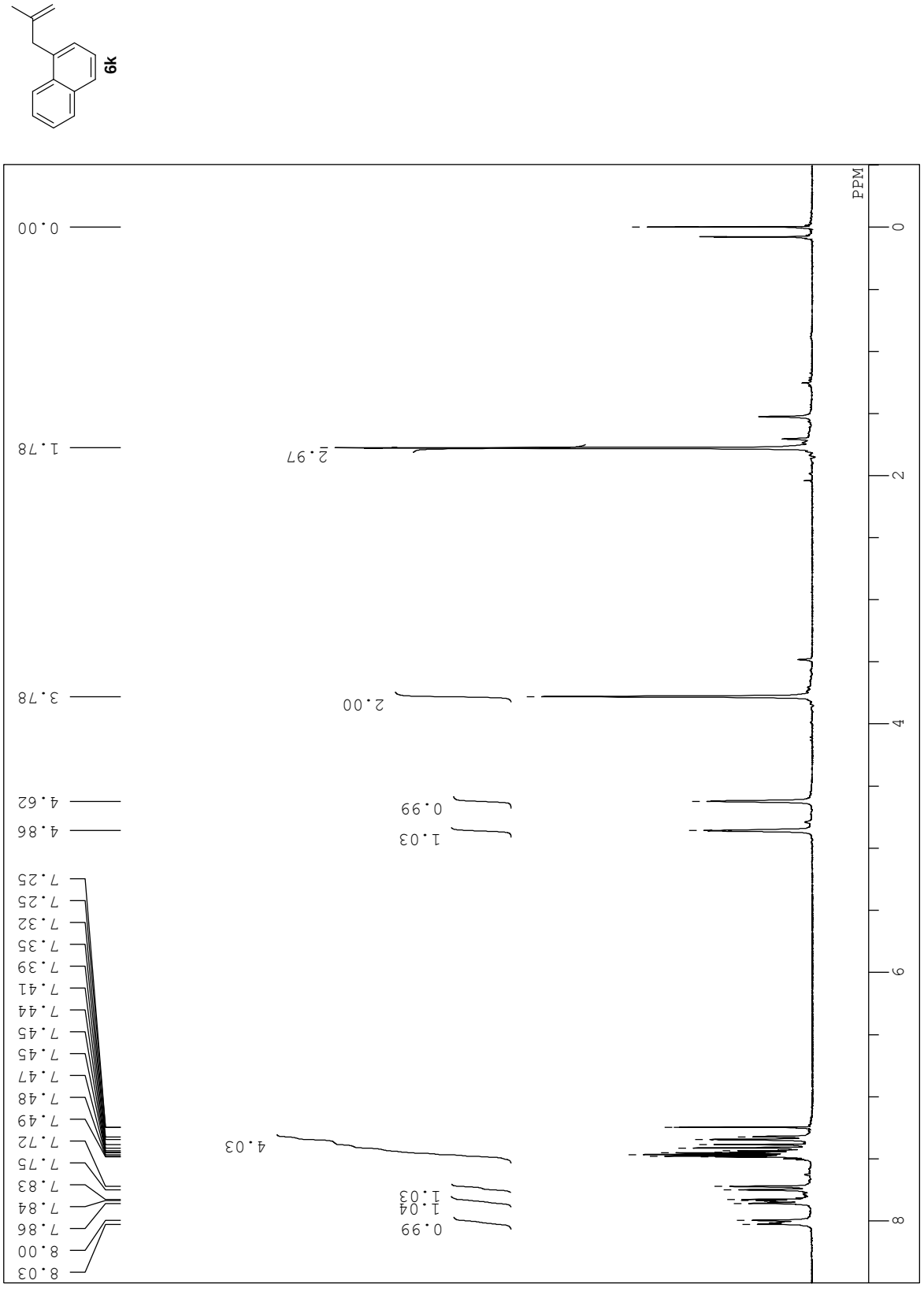

6i
tBuOCO
PPM
0
2
4
6
8
0.00
1.59
1.66
4.73
4.83
3.35
7.22
7.25
7.26
7.90
7.91
7.92
7.93
2.89
9.15
1.00
1.01
2.02
2.17
2.05

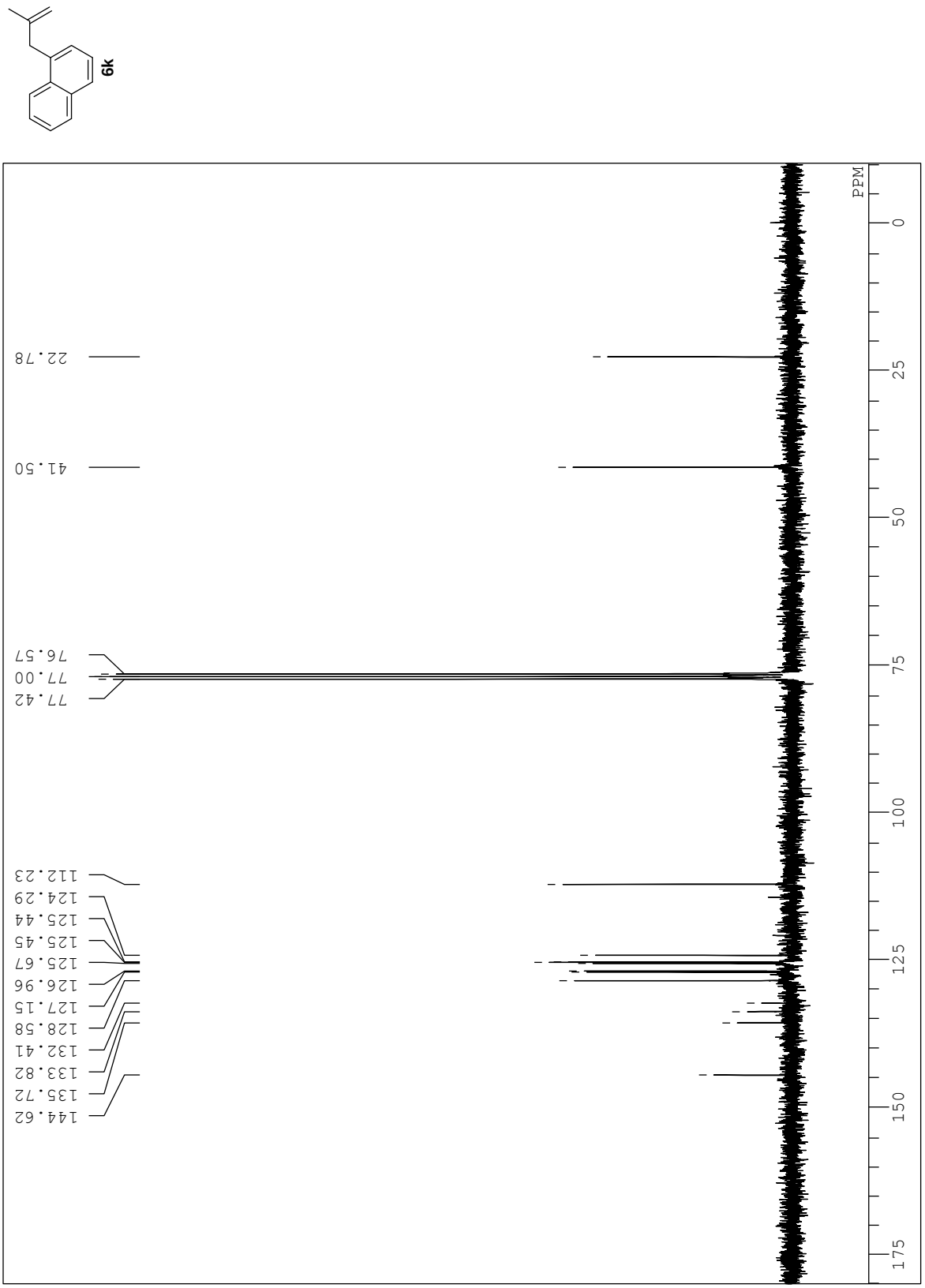

6i
tBuOCO
22.01
28.19
44.54
76.58
77.00
77.43
80.72
112.46
128.75
129.46
129.98
144.32
144.64
165.81
PPM
0
25
50
75
100
125
150
175

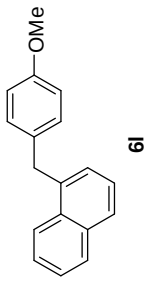

6j
PPM
0
2
4
6
8
0.97
0.93
0.98
4.00
1.00
2.11
2.08
0.00
3.84
3.86
5.06
5.06
5.07
5.07
5.09
5.09
5.10
5.10
5.12
5.13
5.13
6.05
6.08
6.09
6.10
6.10
6.11
6.13
6.14
6.15
6.17
6.19
7.34
7.36
7.39
7.42
7.44
7.45
7.47
7.48
7.48
7.49
7.50
7.51
7.52
7.53
7.54
7.73
7.75
7.84
7.85
7.86
7.87
8.02
8.04
8.05


6j

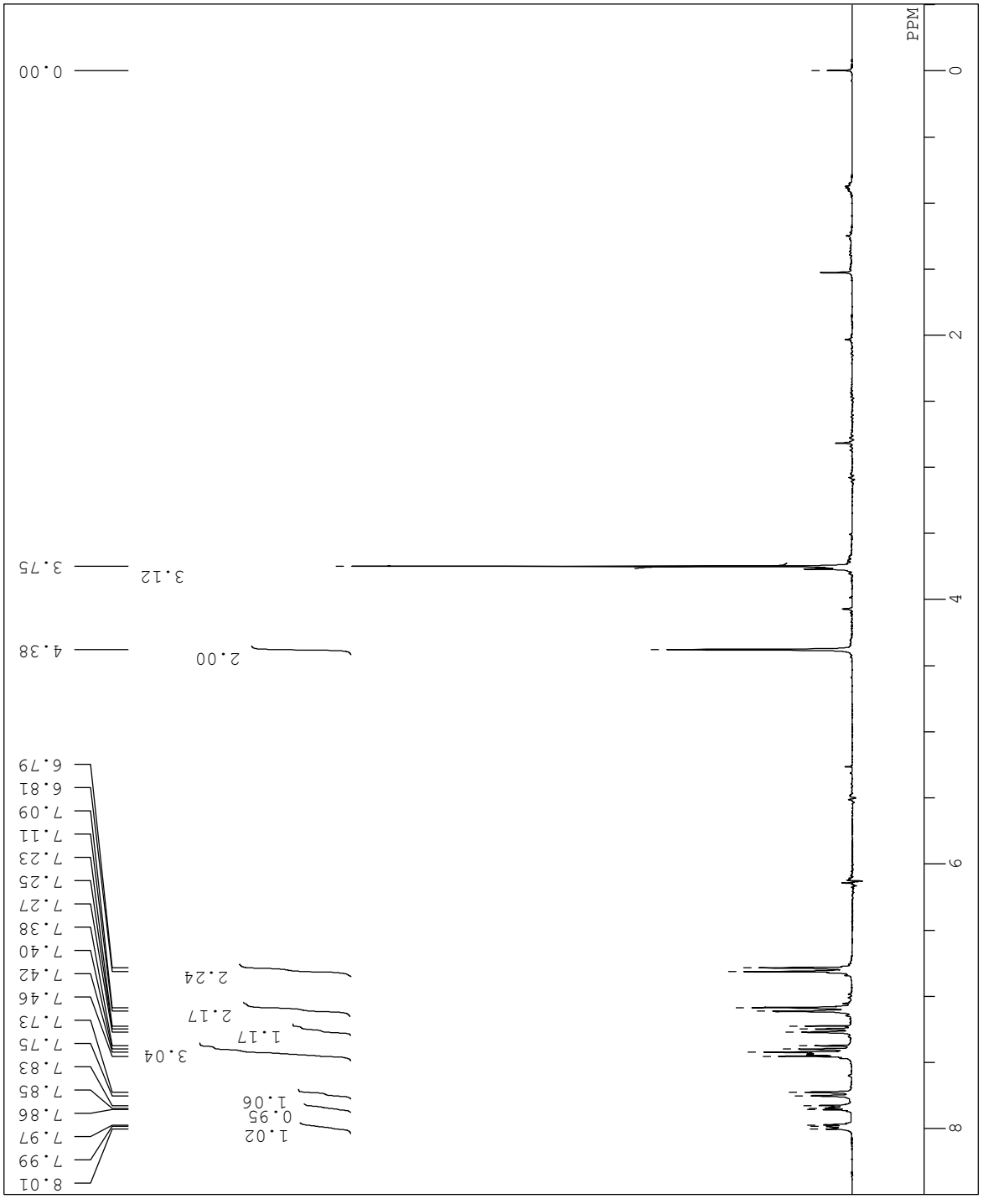

PPM
0
25
50
75
100
125
150
175
37.26
76.58
77.00
77.43
116.16
124.01
125.50
125.60
125.78
126.26
126.94
128.65
131.94
133.80
136.08
136.95

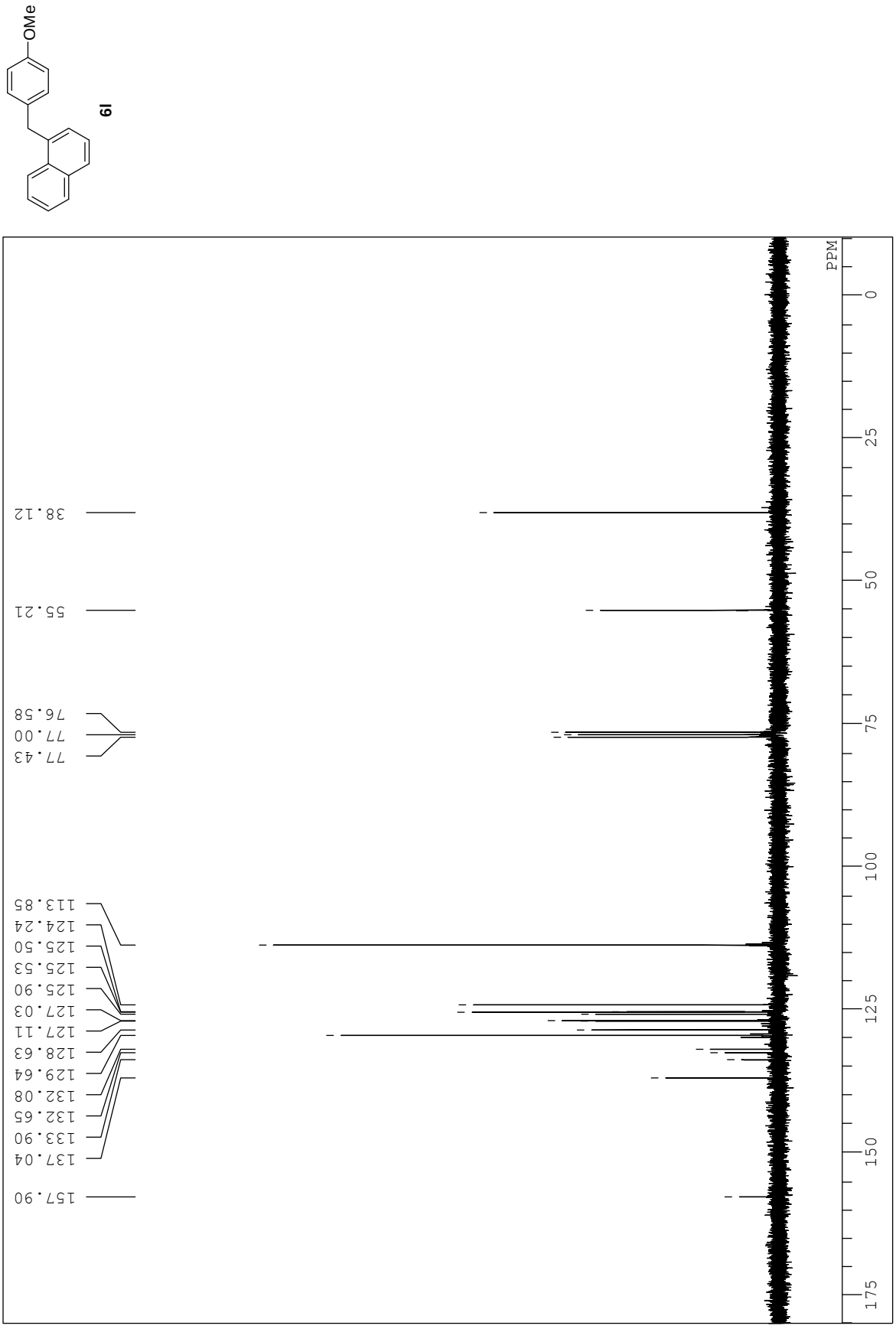

6k
PPM
0
2
4
6
8
0.00
1.78
3.78
4.62
4.86
8.03
8.00
7.86
7.84
7.83
7.75
7.72
7.49
7.48
7.47
7.45
7.45
7.44
7.41
7.39
7.35
7.32
7.25
7.25
0.99
1.03
2.00
2.97
4.03
0.99
1.04
1.03

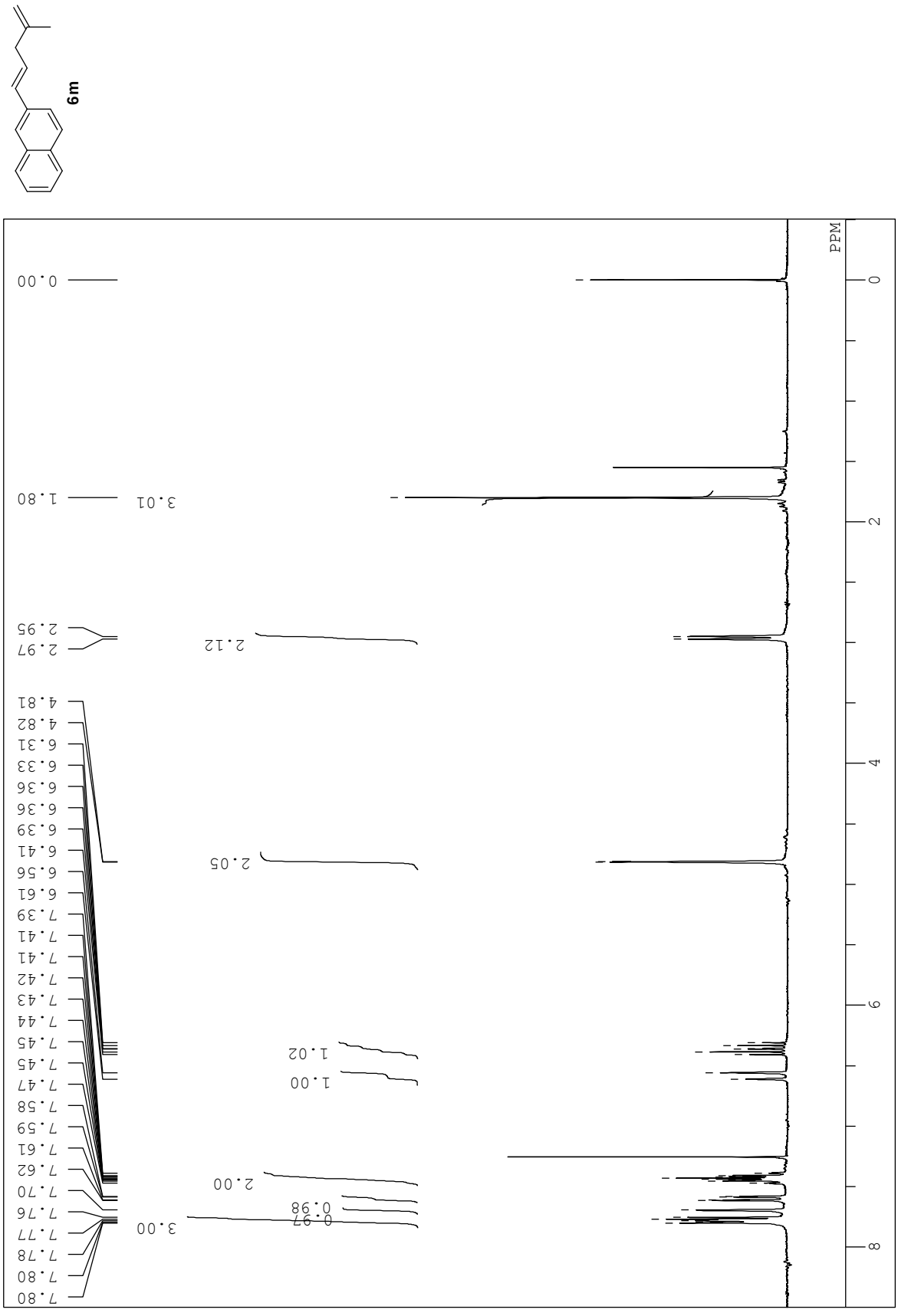

6k
22.78
41.50
76.57
77.00
77.42
112.23
124.29
125.44
125.45
125.67
126.96
127.15
128.58
132.41
133.82
135.72
144.62
PPM
0
25
50
75
100
125
150
175

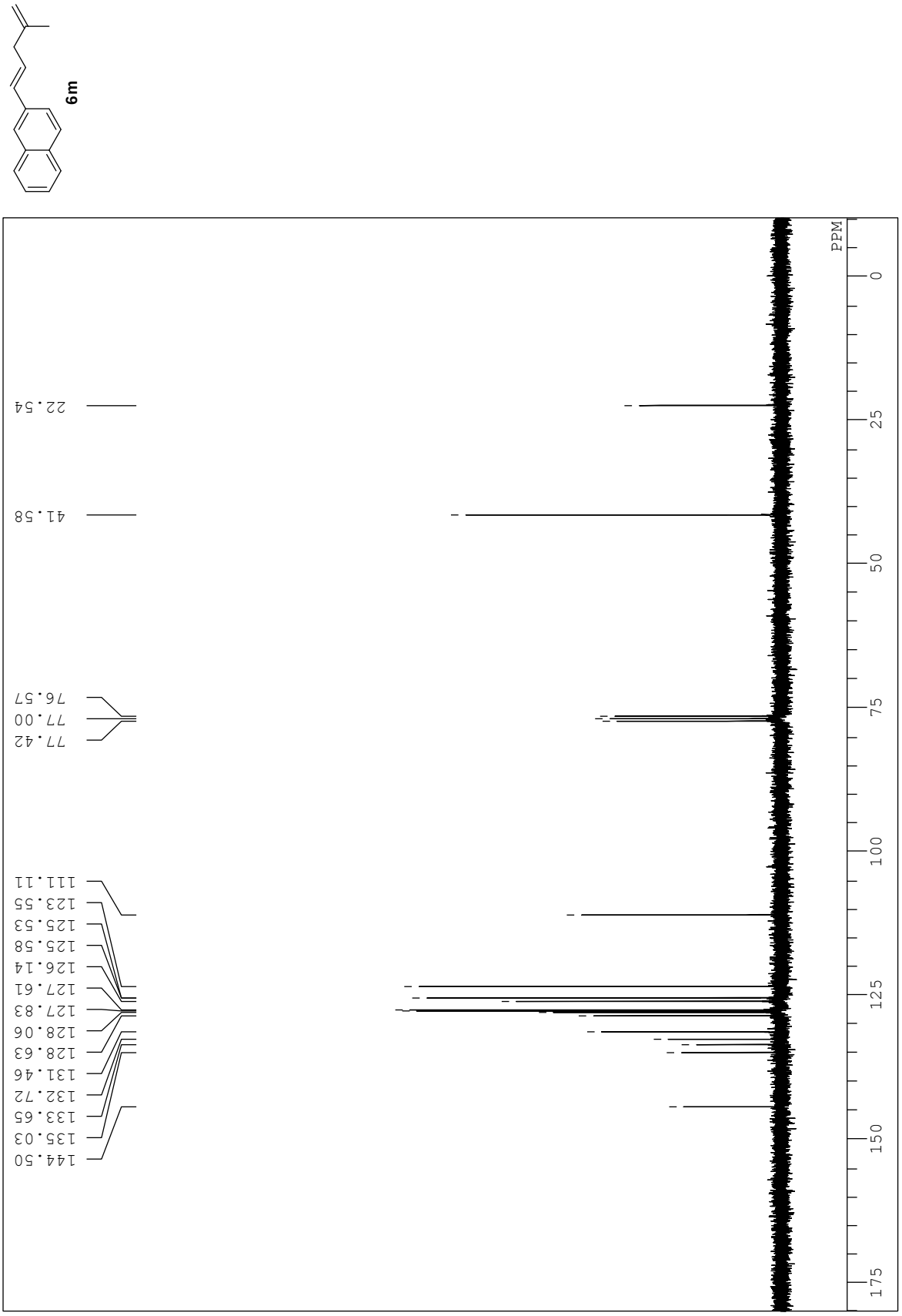

OMe

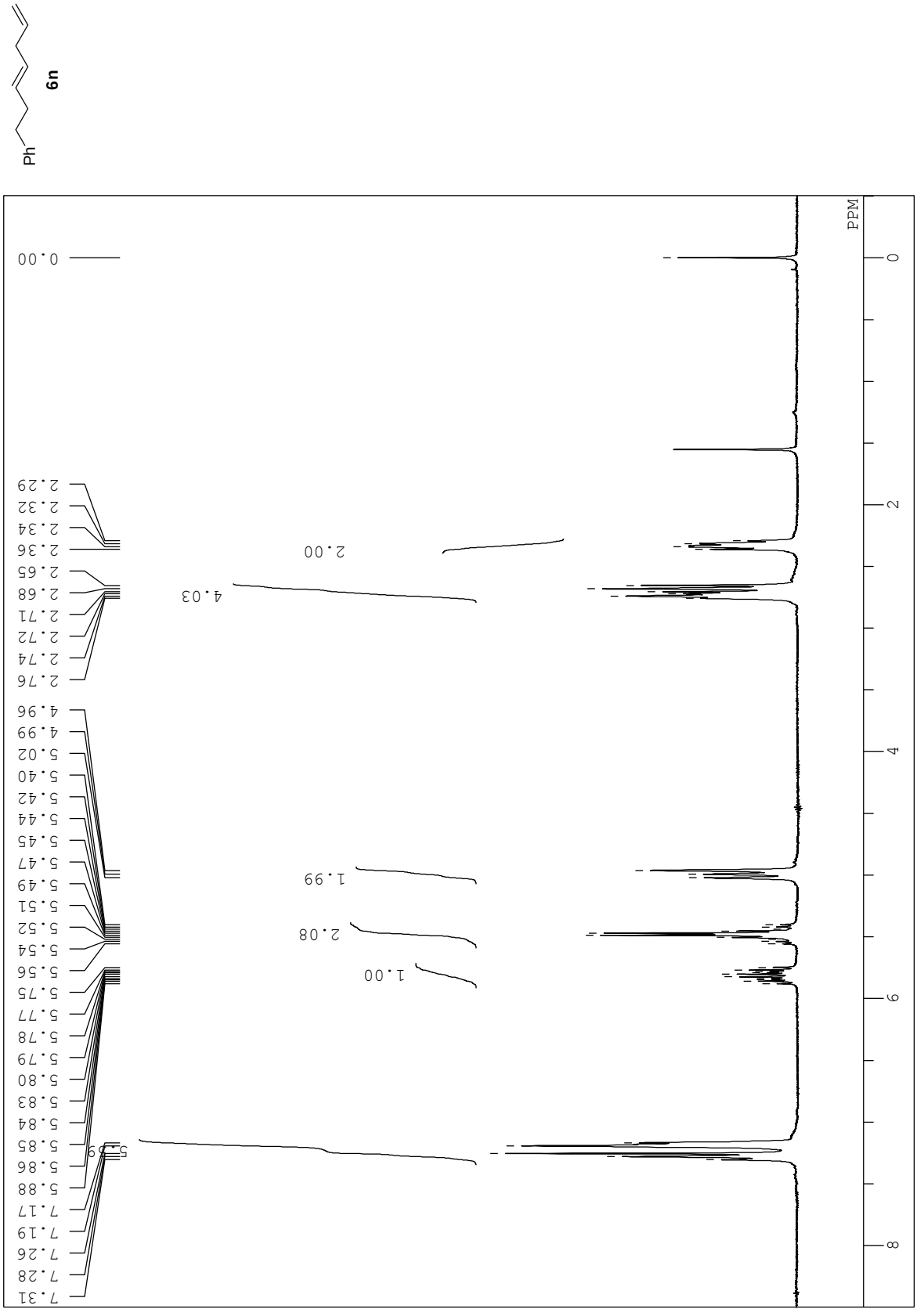
6l

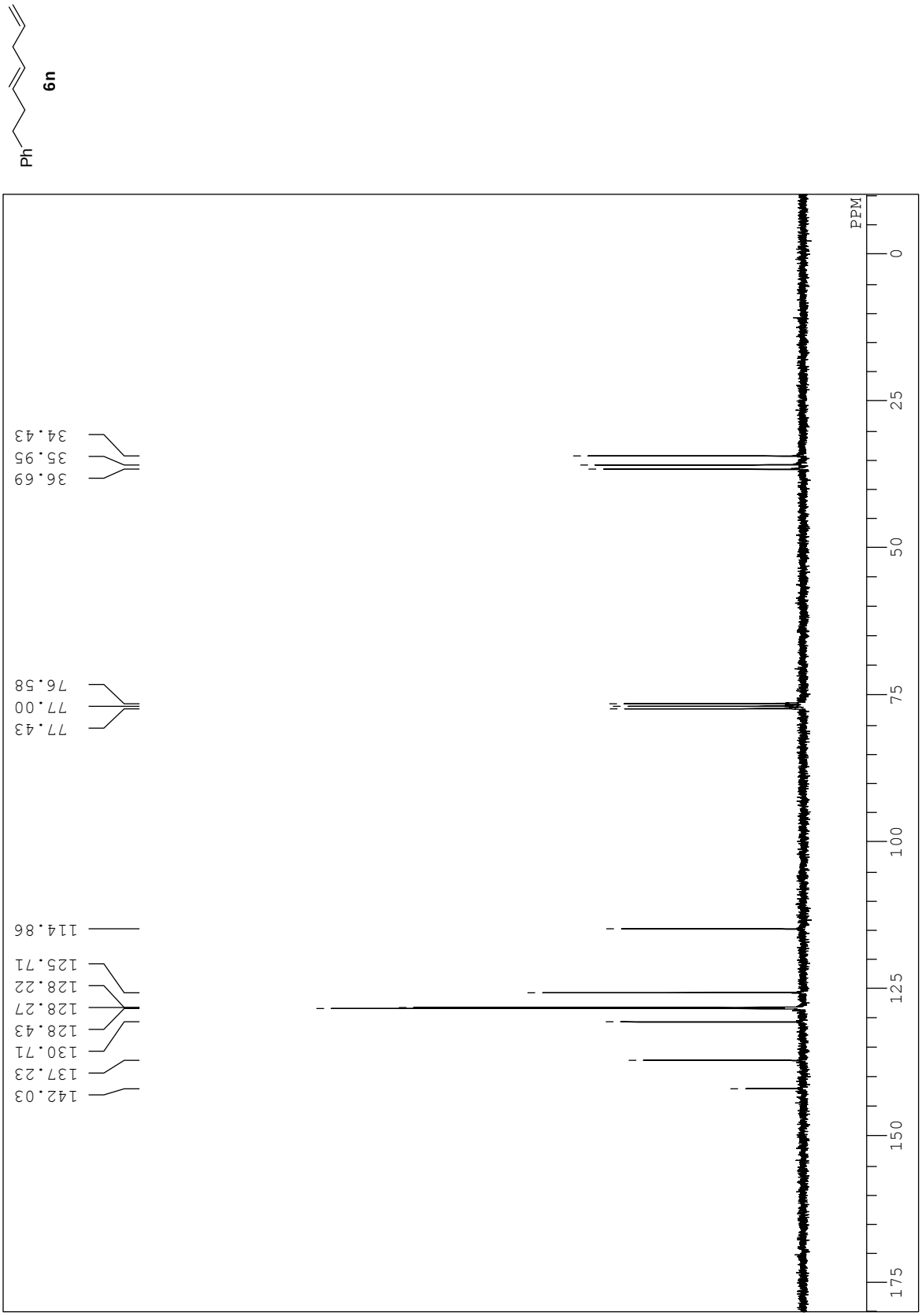

PPM
0
2
4
6
8
0.00
3.75
4.38
6.79
6.81
7.09
7.11
7.23
7.25
7.27
7.38
7.40
7.42
7.46
7.73
7.75
7.83
7.85
7.86
7.97
7.99
8.01
3.12
2.00
2.24
2.17
1.17
3.04
1.02
0.95
1.06

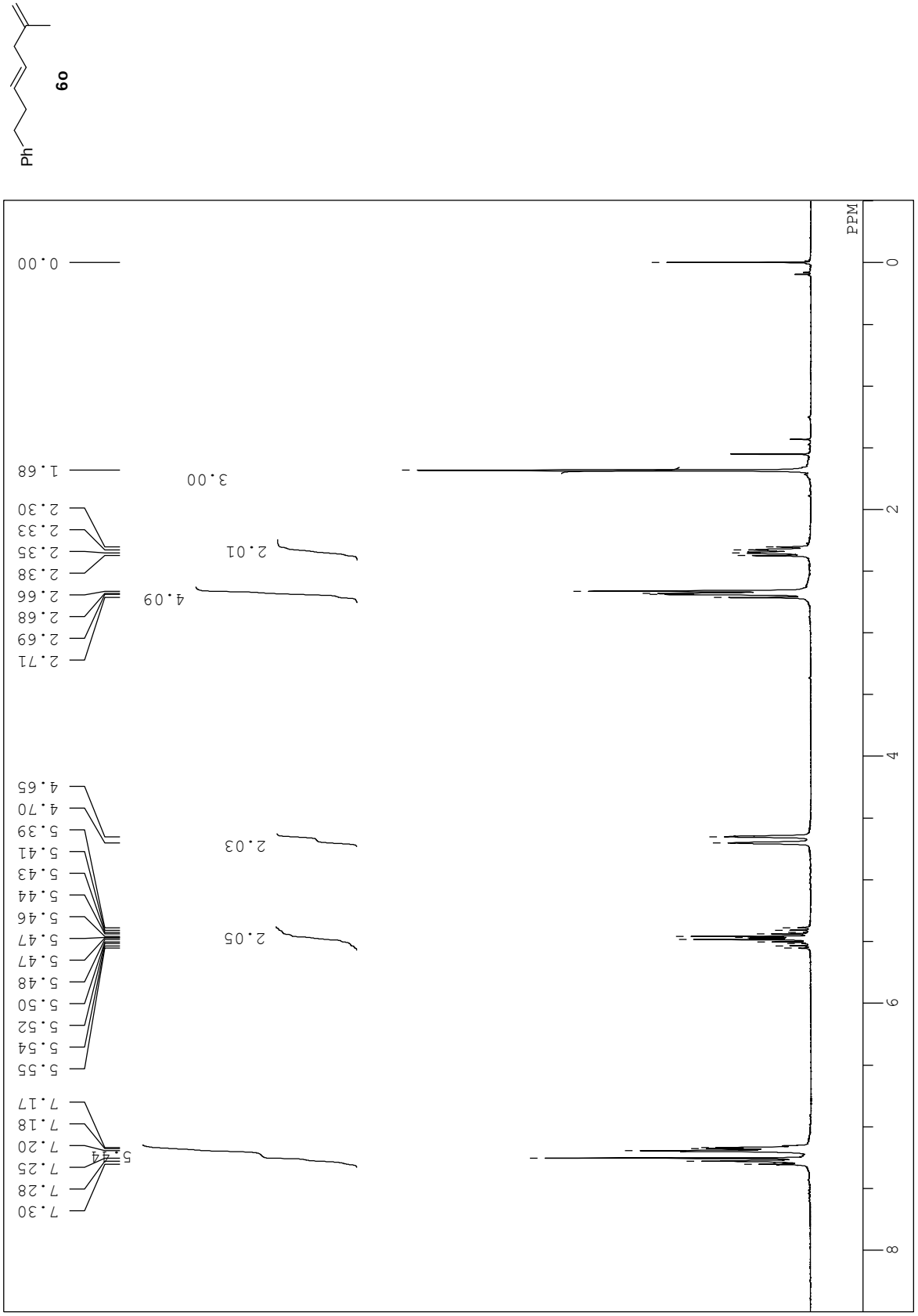

OMe
6l
38.12
55.21
76.58
77.00
77.43
113.85
124.24
125.50
125.53
125.90
127.03
127.11
128.63
129.64
132.08
132.65
133.90
137.04
157.90
PPM
0
25
50
75
100
125
150
175

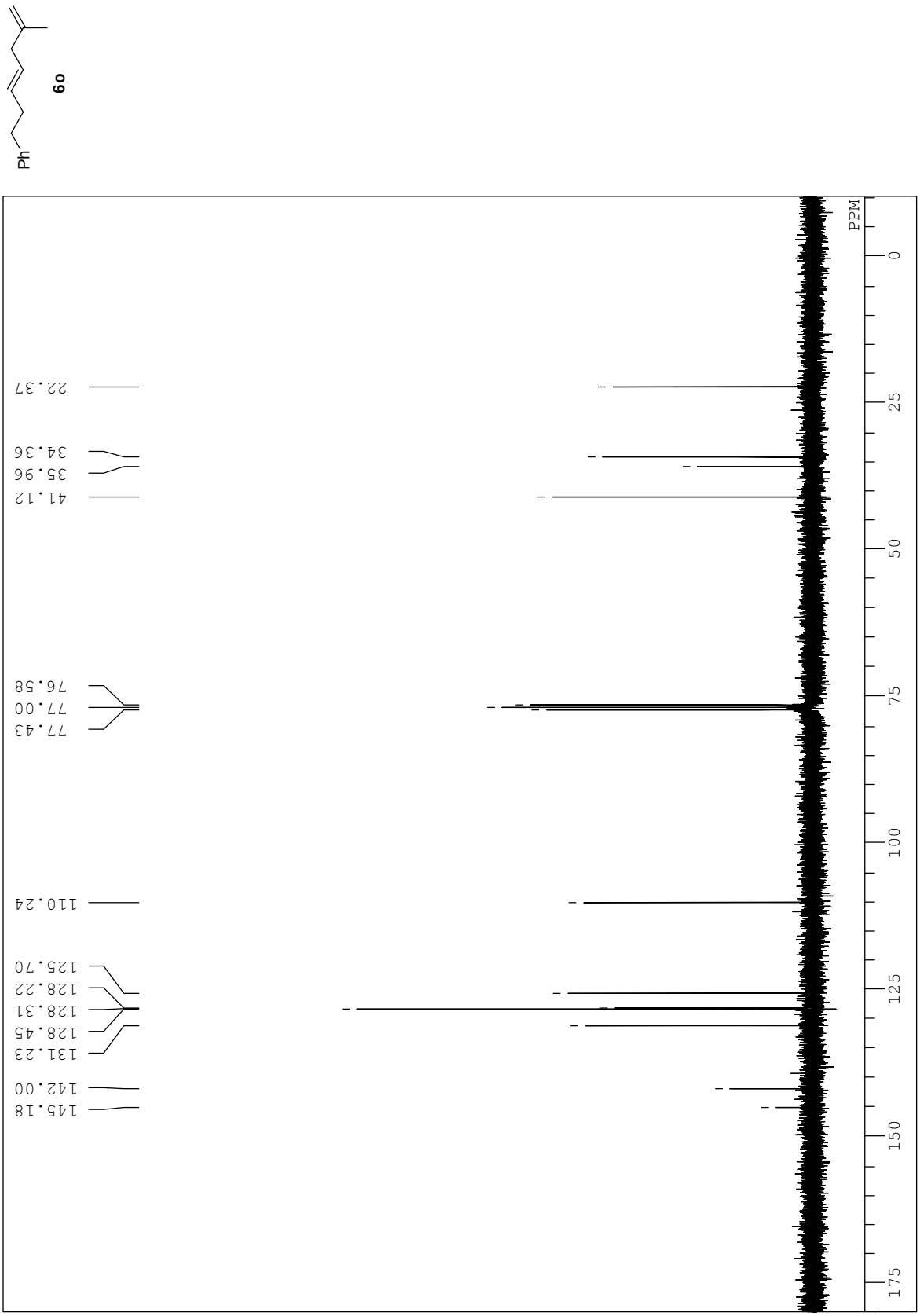

6m
PPM
0
2
4
6
8
0.00
1.80
3.01
2.97
2.95
2.12
4.81
4.82
6.31
6.33
6.36
6.36
6.39
6.41
6.56
2.05
6.61
7.39
7.41
7.41
7.42
7.43
7.44
7.45
7.45
7.47
1.02
1.00
7.58
7.59
7.61
7.62
7.70
2.00
7.76
0.97
0.98
7.77
3.00
7.78
7.80
7.80

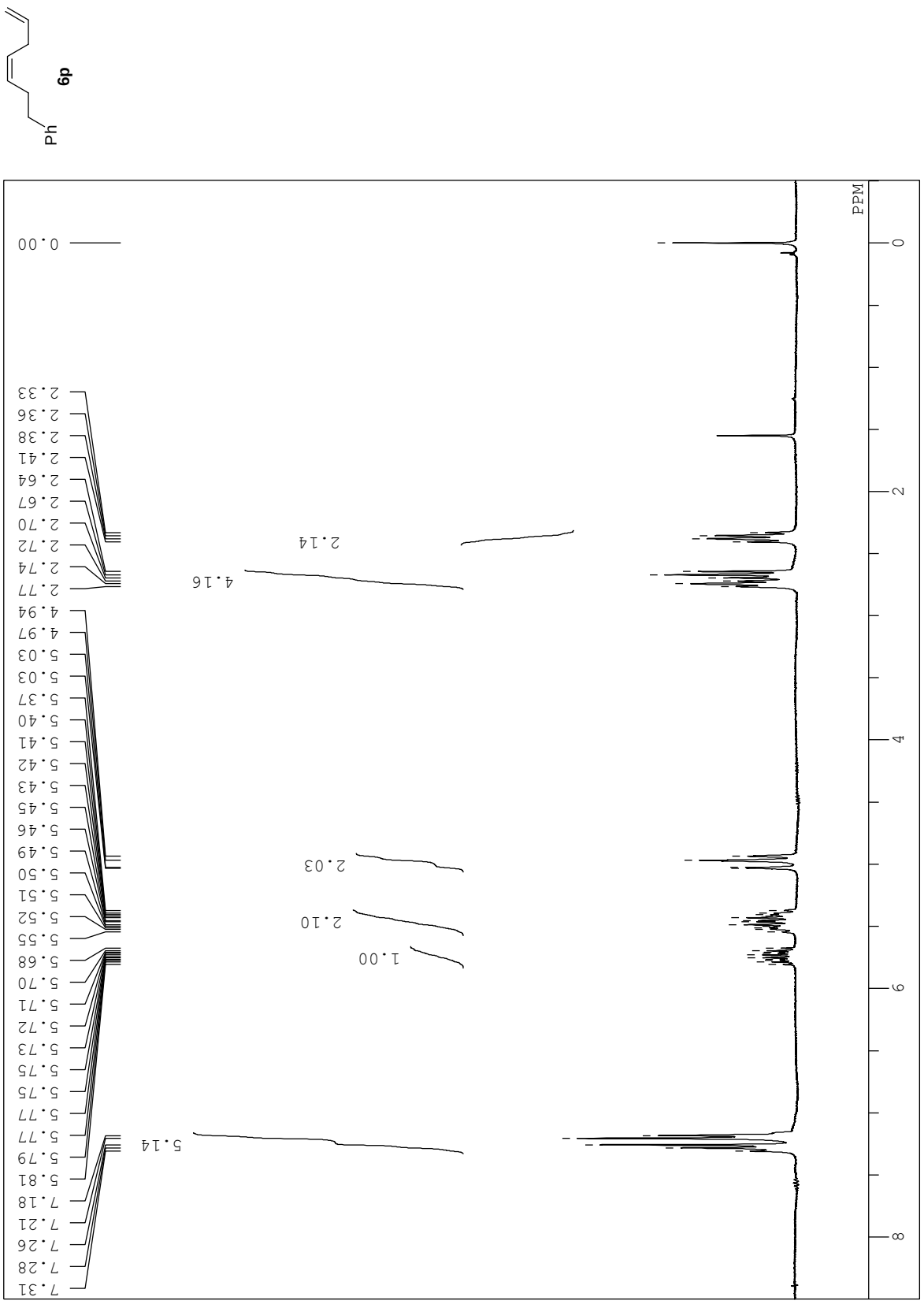

6m
PPM
0
25
50
75
100
125
150
175
22.54
41.58
76.57
77.00
77.42
111.11
123.55
125.53
125.58
126.14
127.61
127.83
128.06
128.63
131.46
132.72
133.65
135.03
144.50


Ph
6n
PPM
0
2
4
6
8
0.00
2.29
2.32
2.34
2.36
2.65
2.68
2.71
2.72
2.74
2.76
4.96
4.99
5.02
5.40
5.42
5.44
5.45
5.47
5.49
5.51
5.52
5.54
5.56
5.75
5.77
5.78
5.79
5.80
5.83
5.84
5.85
5.86
5.88
7.17
7.19
7.26
7.28
7.31
4.03
2.00
1.99
2.08
1.00


Ph
6n
34.43
35.95
36.69
76.58
77.00
77.43
114.86
125.71
128.22
128.27
128.43
130.71
137.23
142.03
PPM
0
25
50
75
100
125
150
175


Ph
6o
PPM
0
2
4
6
8
7.30
7.28
7.25
7.20
7.18
7.17
5.55
5.54
5.52
5.50
5.48
5.47
5.47
5.46
5.44
5.43
5.41
5.39
4.70
4.65
2.71
2.69
2.68
2.66
2.38
2.35
2.33
2.30
1.68
0.00
5.24
2.03
2.05
4.09
2.01
3.00


6o
Ph
22.37
34.36
35.96
41.12
76.58
77.00
77.43
110.24
125.70
128.22
128.31
128.45
131.23
142.00
145.18
PPM
0
25
50
75
100
125
150
175


Ph
6p
PPM
0
2
4
6
8
0.00
2.33
2.36
2.38
2.41
2.64
2.67
2.70
2.72
2.74
2.77
4.16
2.14
4.94
4.97
5.03
5.03
5.37
5.40
5.41
5.42
5.43
5.45
5.46
5.49
5.50
5.51
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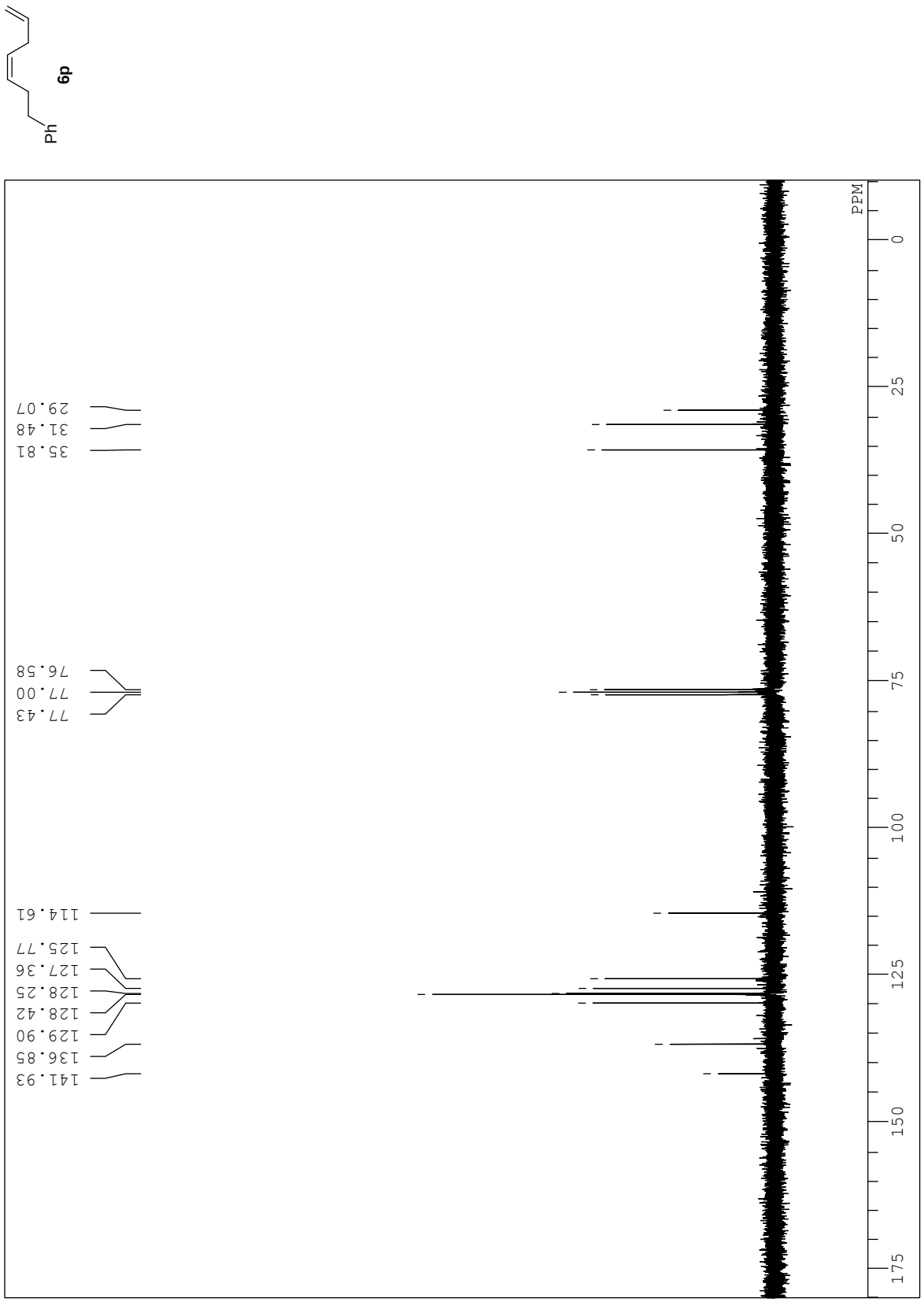
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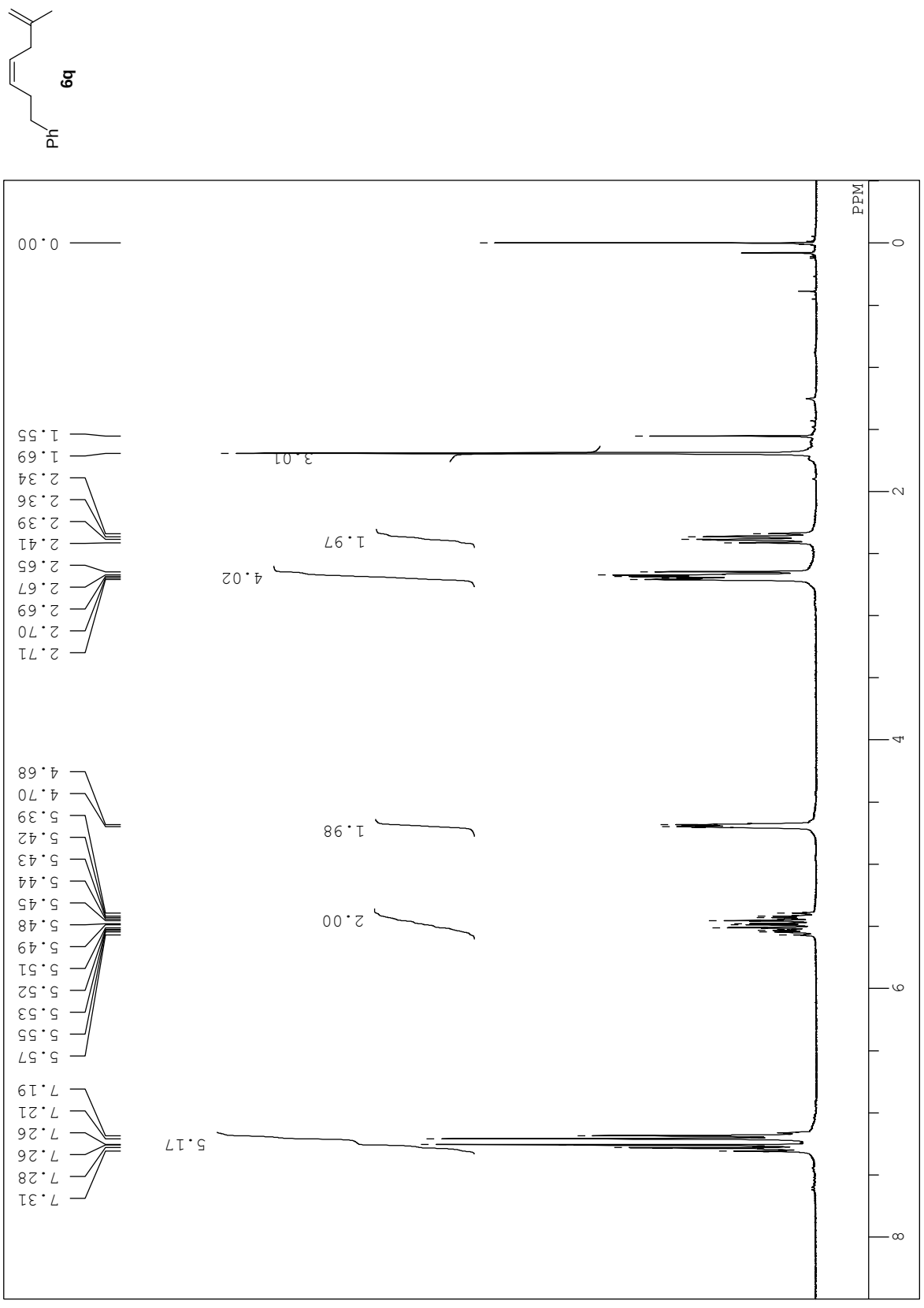
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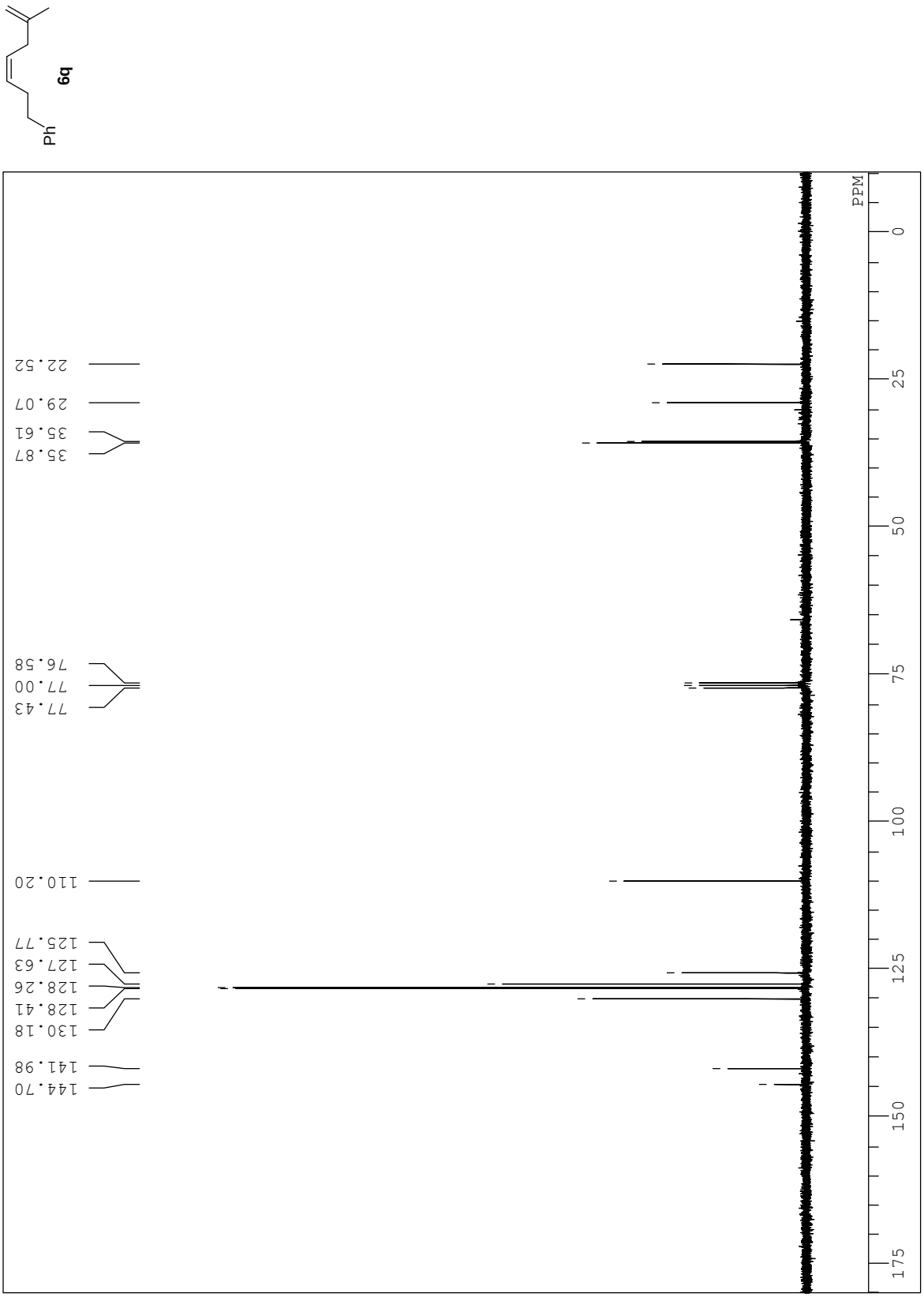
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