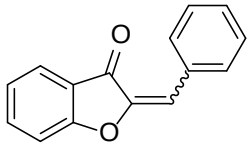
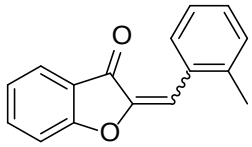
$Pd(PPh_3)_4$ (3 mol%), 2-iodophenol (1.0 mmol), and terminal acetylenes (2.0 mmol) were transferred into an oven-dried tube which was filled with nitrogen and equipped with a string bar. Toluene (2.0 mL), and Et_3N (5.0 eq.) were added into the reaction tube via syringe. Then a mixture of formic acid (2.0 mmol) and acetic anhydride (2.0 mmol) was stirred at 30°C for 1.5 h, and added drop wise to the reaction tube. The final mixture was stirred at 80°C for another 12-18 h. After the reaction was complete, the reaction mixture was filtered, concentrated, and purified by column chromatography on silica gel (petroleum ether/ethyl acetate) to give the pure product.



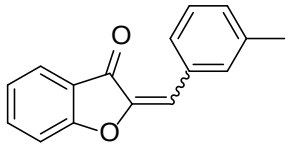
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.90 (d, *J* = 7.3 Hz, 2H), 7.79 (dd, *J* = 7.6, 0.6 Hz, 1H), 7.66 – 7.59 (m, 1H), 7.49 – 7.41 (m, 2H), 7.38 (dd, *J* = 10.4, 4.2 Hz, 1H), 7.30 (d, *J* = 8.3 Hz, 1H), 7.19 (dd, *J* = 11.0, 3.8 Hz, 1H), 6.87 (s, 1H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 184.83 (s), 166.21 (s), 146.96 (s), 136.99 (s), 132.38 (s), 131.64 (s), 130.00 (s), 128.99 (s), 124.73 (s), 123.57 (s), 121.71 (s), 113.13 (s), 113.03 (s).



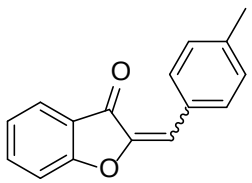
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.27 (dd, *J* = 7.4 Hz, 1H), 7.83 (dd, *J* = 7.6, 0.6 Hz, 1H), 7.68 – 7.64 (m, 1H), 7.39 – 7.19 (m, 5H), 7.16 (s, 1H), 2.53 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 184.97 (s), 166.41 (s), 147.18 (s), 139.40 (s), 137.05 (s), 131.38 (s), 130.99 (s), 130.88 (s), 130.03 (s), 126.59 (s), 124.90 (s), 123.61 (s), 121.91 (s), 113.16 (s), 110.09 (s), 20.41 (s).



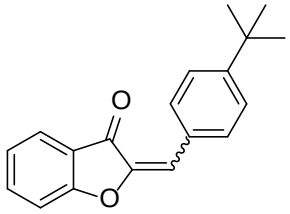
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (d, *J* = 7.3 Hz, 1H), 7.73 (d, *J* = 7.6 Hz, 1H), 7.67 (s, 1H), 7.65 – 7.60 (m, 1H), 7.33 (dd, *J* = 14.2, 7.8 Hz, 2H), 7.20 (d, *J* = 7.2 Hz, 2H), 6.84 (s, 1H), 2.41 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 184.80 (s), 166.17 (s), 146.87 (s), 138.57 (s), 136.89 (s), 132.26 (d, *J* = 5.3 Hz), 130.92 (s), 128.86 (d, *J* = 4.8 Hz), 124.68 (s), 123.49 (s), 121.74 (s), 113.37 (s), 113.04 (s), 21.52 (s).

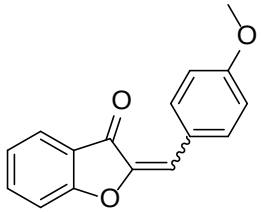


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.82 – 7.75 (m, 3H), 7.64 – 7.57 (m, 1H), 7.29 (d, *J* = 8.3 Hz, 1H), 7.23 (d, *J* = 7.9 Hz, 2H), 7.18 (t, *J* = 7.4 Hz, 1H), 6.85 (s, 1H), 2.38 (s, 3H).

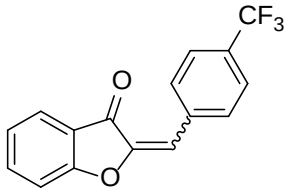
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.72 (s), 166.05 (s), 146.57 (s), 140.54 (s), 136.77 (s), 131.66 (s), 129.77 (s), 129.59 (s), 124.62 (s), 123.41 (s), 121.83 (s), 113.41 (s), 112.99 (s), 21.71 (s).



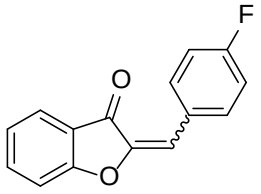
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.85 (d, *J* = 8.4 Hz, 2H), 7.78 (d, *J* = 7.6 Hz, 1H), 7.64 – 7.57 (m, 1H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.30 (d, *J* = 8.3 Hz, 1H), 7.18 (t, *J* = 7.4 Hz, 1H), 6.89 (s, 1H), 1.35 (s, 9H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.72 (s), 166.08 (s), 153.58 (s), 146.73 (s), 136.80 (s), 131.53 (s), 129.58 (s), 126.00 (s), 124.64 (s), 123.42 (s), 121.84 (s), 113.28 (s), 112.97 (s), 35.03 (s), 31.21 (s).



^{13}C NMR (126 MHz, $CDCl_3$) δ 184.70 (s), 165.99 (s), 161.24 (s), 146.04 (s), 136.69 (s), 133.61 (s), 125.21 (s), 124.70 (s), 123.43 (s), 122.10 (s), 114.67 (s), 113.59 (s), 113.03 (s), 55.55 (s).

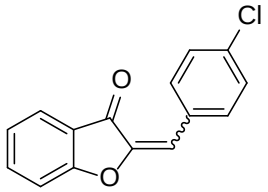


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.91 (d, *J* = 8.1 Hz, 2H), 7.72 (dd, 1H), 7.61 (dd, *J* = 10.8, 4.7 Hz, 3H), 7.27 (d, *J* = 8.3 Hz, 1H), 7.18 (t, *J* = 11.0, 3.8 Hz, 1H), 6.76 (s, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.57 (s), 166.28 (s), 147.81 (s), 137.37 (s), 135.79 (s), 131.47 (s), 125.76 (s), 125.73 (s), 124.85 (s), 123.94 (s), 121.31 (s), 113.03 (s), 110.60 (s).

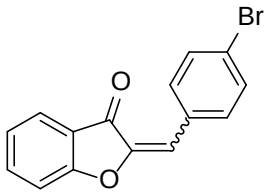


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.90 (dd, *J* = 8.5, 5.6 Hz, 2H), 7.79 (d, *J* = 7.2 Hz, 1H), 7.65 (dd, *J* = 11.4, 4.2 Hz, 1H), 7.31 (d, *J* = 8.3 Hz, 1H), 7.22 (t, *J* = 7.4 Hz, 1H), 7.14 (t, *J* = 8.6 Hz, 2H), 6.84 (s, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.79 (s), 166.22 (s), 163.59 (d, *J* = 252.5 Hz), 146.66 (s), 137.05 (d, *J* = 12.9 Hz), 133.72 (s), 133.65 (s), 128.75 (d, *J* = 3.3 Hz), 124.82 (d, *J* = 8.8 Hz), 123.72 (s), 121.71

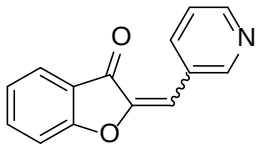
(d, *J* = 13.0 Hz), 116.37 (s), 116.19 (s), 113.07 (s), 111.98 (s).



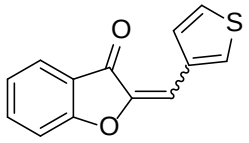
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.5 Hz, 2H), 7.77 (dd, *J* = 7.6, 0.5 Hz, 1H), 7.68 – 7.59 (m, 1H), 7.38 (d, *J* = 8.5 Hz, 2H), 7.29 (d, *J* = 8.3 Hz, 1H), 7.20 (t, *J* = 7.4 Hz, 1H), 6.77 (s, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.64 (s), 166.15 (s), 147.08 (s), 137.14 (s), 135.95 (s), 132.71 (s), 130.91 (s), 129.29 (s), 124.82 (s), 123.76 (s), 121.60 (s), 113.04 (s), 111.60 (s).



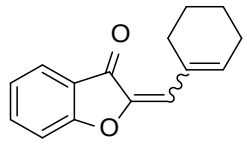
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (d, *J* = 7.6 Hz, 1H), 7.75 (d, *J* = 8.5 Hz, 2H), 7.68 – 7.63 (m, 1H), 7.56 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 8.3 Hz, 1H), 7.22 (t, *J* = 7.4 Hz, 1H), 6.81 (d, *J* = 22.7 Hz, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.74 (s), 166.21 (s), 147.22 (s), 137.17 (d, *J* = 12.5 Hz), 132.93 (s), 132.39 (d, *J* = 20.0 Hz), 131.59 (d, *J* = 57.0 Hz), 124.87 (d, *J* = 6.6 Hz), 124.48 (s), 123.82 (s), 121.48 (d, *J* = 39.7 Hz), 113.10 (s), 111.72 (s).



^{1}H NMR (500 MHz, $CDCl_3$) δ 8.98 (d, *J* = 1.3 Hz, 1H), 8.55 (dd, *J* = 4.6, 1.3 Hz, 1H), 8.24 (d, 1H), 7.75 (dd, *J* = 7.6, 0.6 Hz, 1H), 7.66 – 7.59 (m, 1H), 7.36 (dd, *J* = 7.8, 4.8 Hz, 1H), 7.28 (d, *J* = 8.3 Hz, 1H), 7.19 (t, *J* = 11.0, 3.8 Hz, 1H), 6.77 (s, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.36 (s), 166.22 (s), 152.09 (s), 149.95 (s), 148.11 (s), 137.89 (s), 137.41 (s), 128.73 (s), 124.91 (s), 123.95 (s), 123.91 (s), 121.36 (s), 113.06 (s), 108.81 (s).

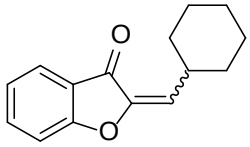


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.87 (d, *J* = 2.3 Hz, 1H), 7.75 (dd, *J* = 7.6, 0.7 Hz, 1H), 7.64 – 7.53 (m, 2H), 7.36 (dd, *J* = 4.9, 2.9 Hz, 1H), 7.26 (d, *J* = 8.3 Hz, 1H), 7.17 (t, *J* = 11.0, 3.9 Hz, 1H), 6.93 (s, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.56 (s), 165.85 (s), 146.16 (s), 136.67 (s), 133.82 (s), 130.54 (s), 129.33 (s), 126.40 (s), 124.59 (s), 123.44 (s), 122.06 (s), 112.92 (s), 107.24 (s).



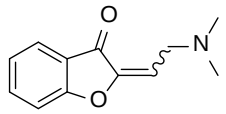
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 (d, *J* = 7.5 Hz, 1H), 7.62-7.58 (m, 1H), 7.23 (d, *J* = 8.3 Hz, 1H), 7.17 (t, *J* = 7.5 Hz, 1H), 6.51 (s, 1H), 6.43 (t, *J* = 4.1 Hz, 1H), 2.63 (dd, *J* = 8.0, 6.0, Hz, 2H), 2.29-2.25 (m, 2H), 1.77-1.73 (m, 2H), 1.67-1.63 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 185.12, 166.03, 145.27, 140.89, 136.59, 133.87, 124.62, 123.12, 122.03, 117.59, 112.96, 27.38, 27.19, 22.64, 21.73.



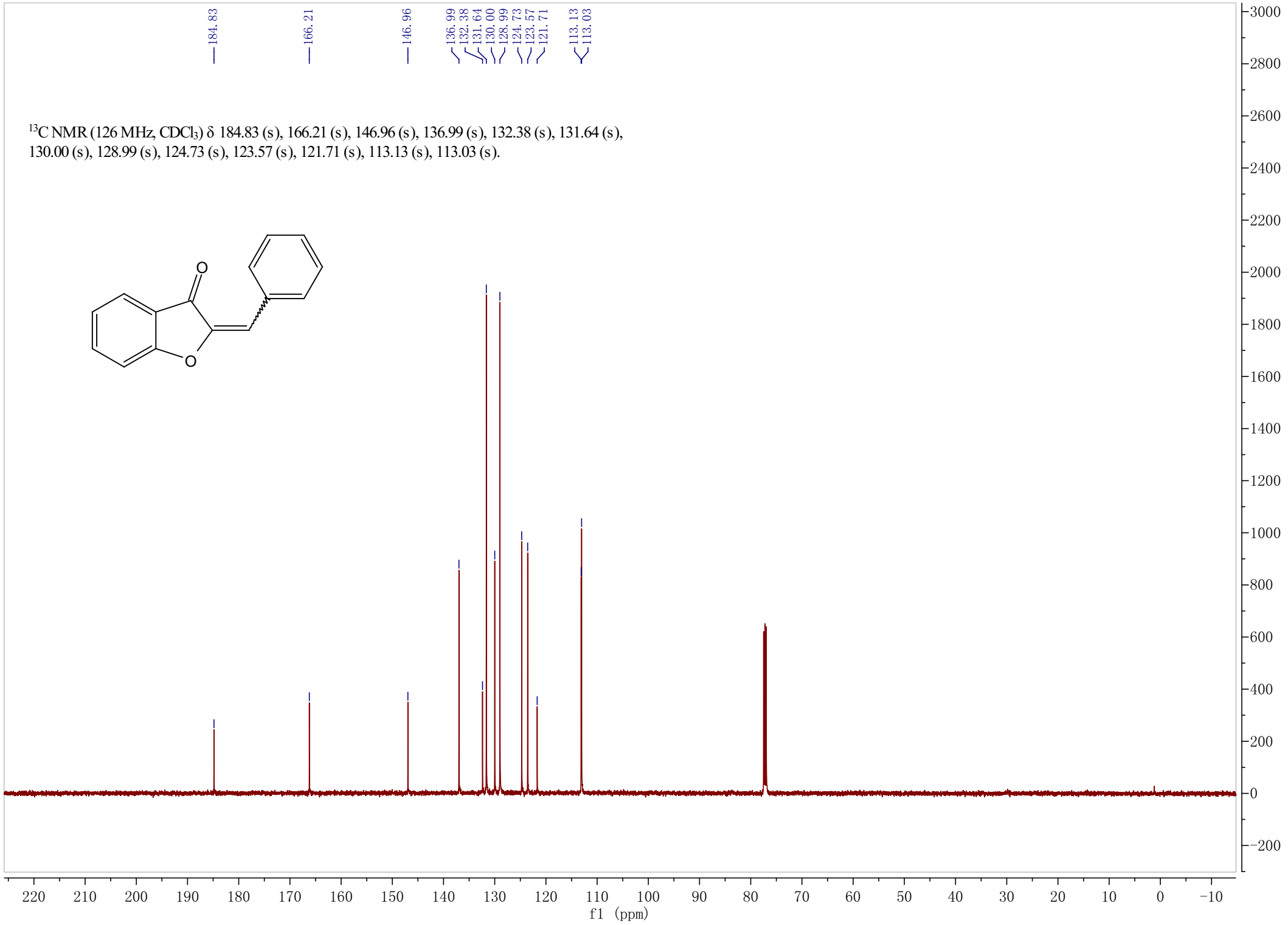
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.74 (dd, *J*= 7.6, 0.7 Hz, 1H), 7.61 (td, *J* = 8.6, 7.4, 1.4 Hz, 1H), 7.21 (d, *J* = 8.4 Hz, 1H), 7.15 (t, *J* = 7.4 Hz, 1H), 6.06 (d, *J* = 9.7 Hz, 1H), 2.81-2.64 (m, 1H), 1.93-1.73 (m, 4 H), 1.37-1.23 (m, 6H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 184.54 (s), 166.36 (s), 147.69 (s), 137.11 (s), 124.80 (s), 123.06 (s), 122.55 (d, *J* = 6.3 Hz), 112.99 (s), 35.54 (s), 32.31 (s), 25.99 (s), 25.65 (s).

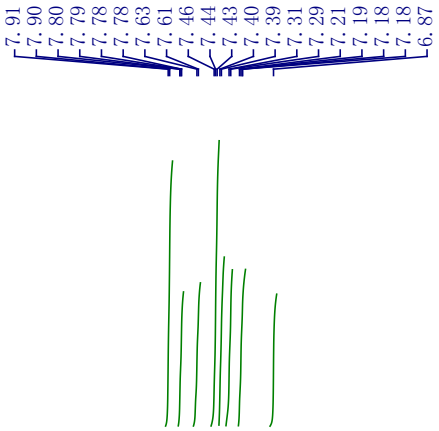


^{1}H NMR (500 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.67-7.65 (m, 1H), 7.47 (d, *J* = 6.3 Hz, 1H), 7.39-7.34 (m, 1H), 6.35 (s, 1H), 3.43 (s, 2H), 2.36 (s, 6H).

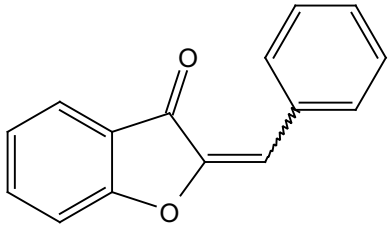
^{13}C NMR (126 MHz, $CDCl_3$) δ 178.47, 164.89, 156.66, 133.98, 125.86, 125.42, 124.01, 118.33, 111.92, 61.08, 45.20.

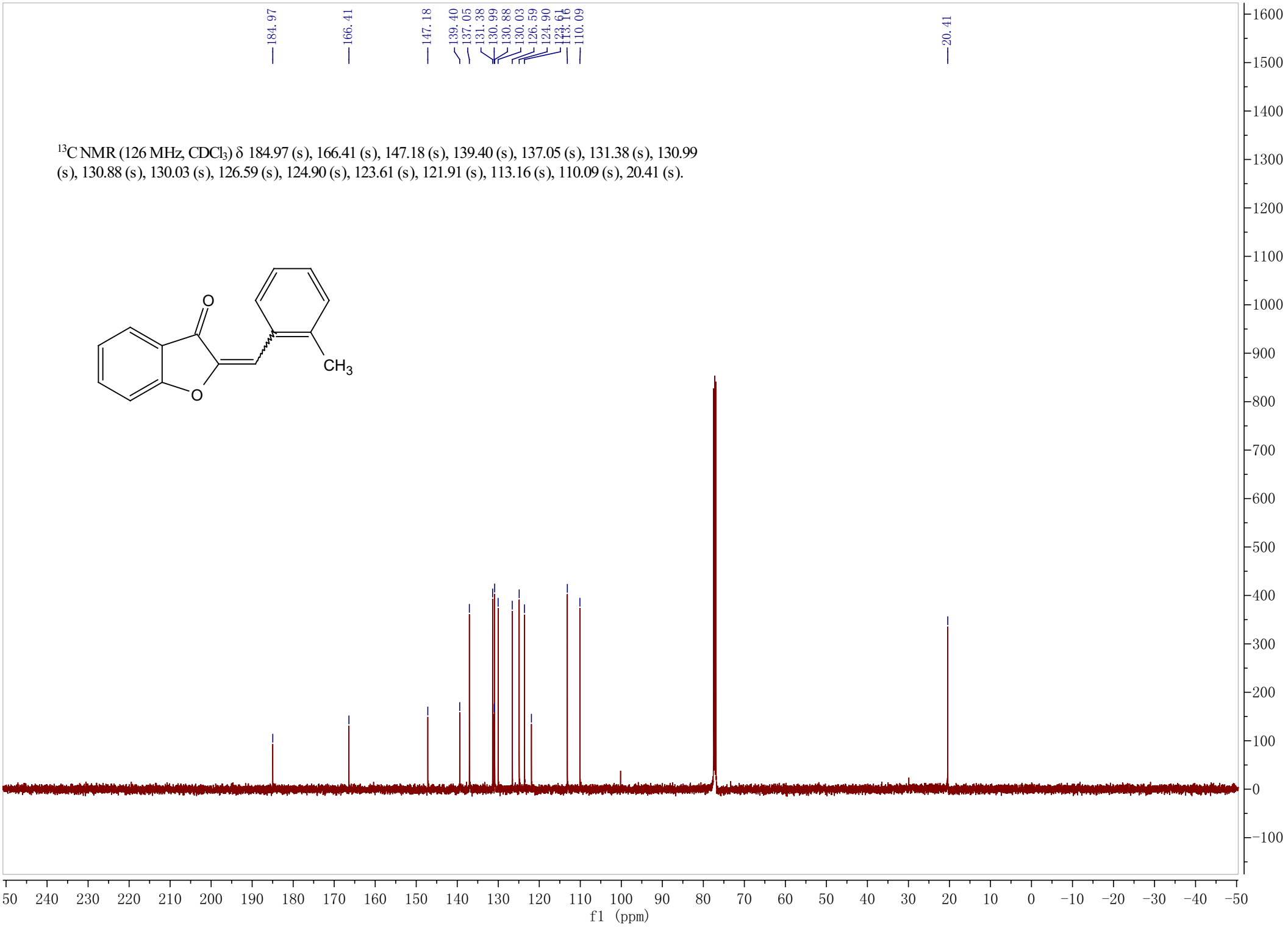


^{13}C NMR (126 MHz, $CDCl_3$) δ 184.83 (s), 166.21 (s), 146.96 (s), 136.99 (s), 132.38 (s), 131.64 (s), 130.00 (s), 128.99 (s), 124.73 (s), 123.57 (s), 121.71 (s), 113.13 (s), 113.03 (s).



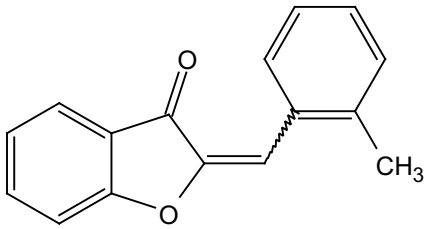
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.90 (d, *J* = 7.3 Hz, 2H), 7.79 (dd, *J* = 7.6, 0.6 Hz, 1H), 7.66 – 7.59 (m, 1H), 7.49 – 7.41 (m, 2H), 7.38 (dd, *J* = 10.4, 4.2 Hz, 1H), 7.30 (d, *J* = 8.3 Hz, 1H), 7.19 (dd, *J* = 11.0, 3.8 Hz, 1H), 6.87 (s, 1H).

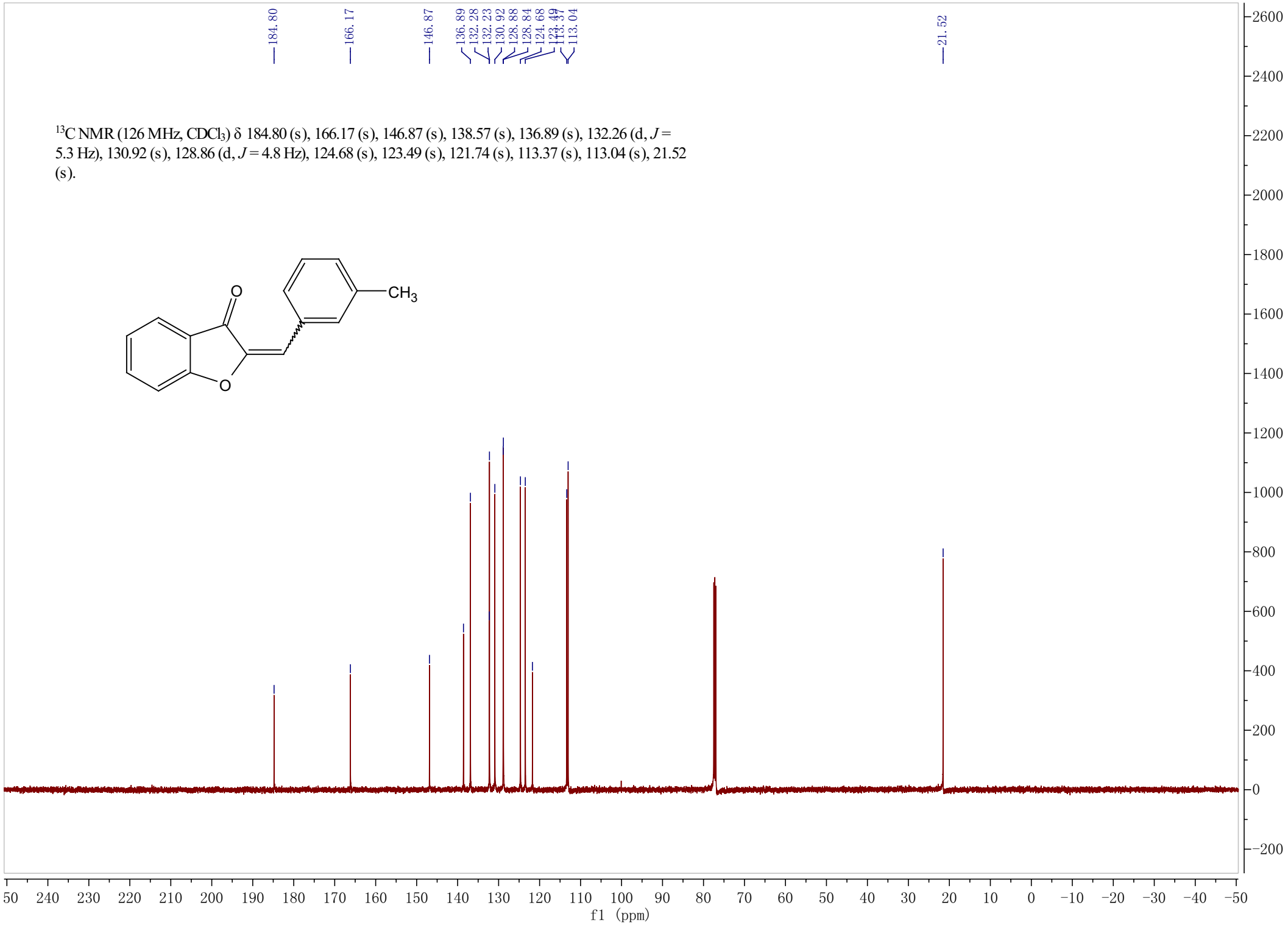




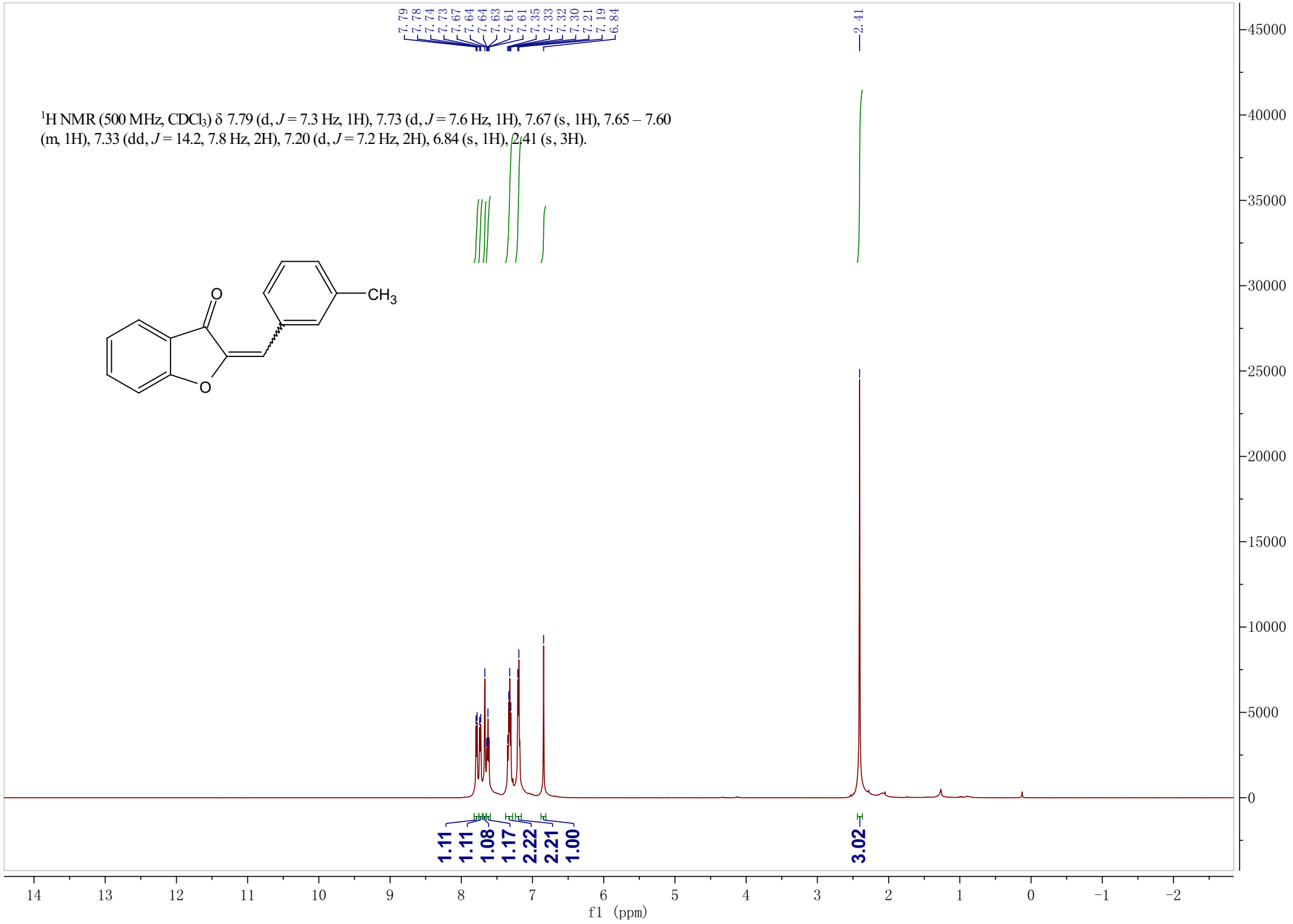
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.97 (s), 166.41 (s), 147.18 (s), 139.40 (s), 137.05 (s), 131.38 (s), 130.99 (s), 130.88 (s), 130.03 (s), 126.59 (s), 124.90 (s), 123.61 (s), 121.91 (s), 113.16 (s), 110.09 (s), 20.41 (s).

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.27 (dd, *J* = 7.4 Hz, 1H), 7.83 (dd, *J* = 7.6, 0.6 Hz, 1H), 7.68 – 7.64 (m, 1H), 7.39 – 7.19 (m, 5H), 7.16 (s, 1H), 2.53 (s, 3H).

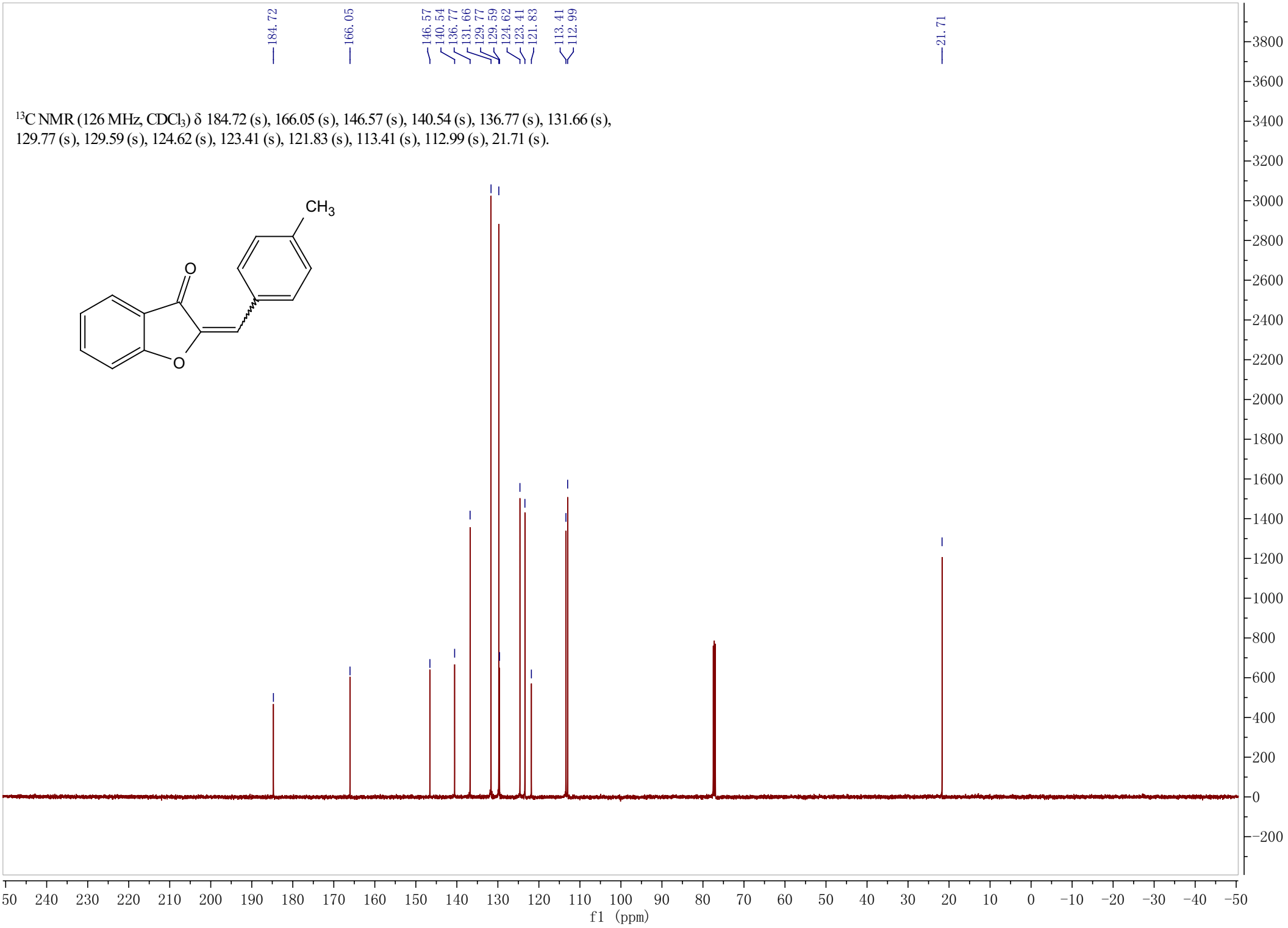


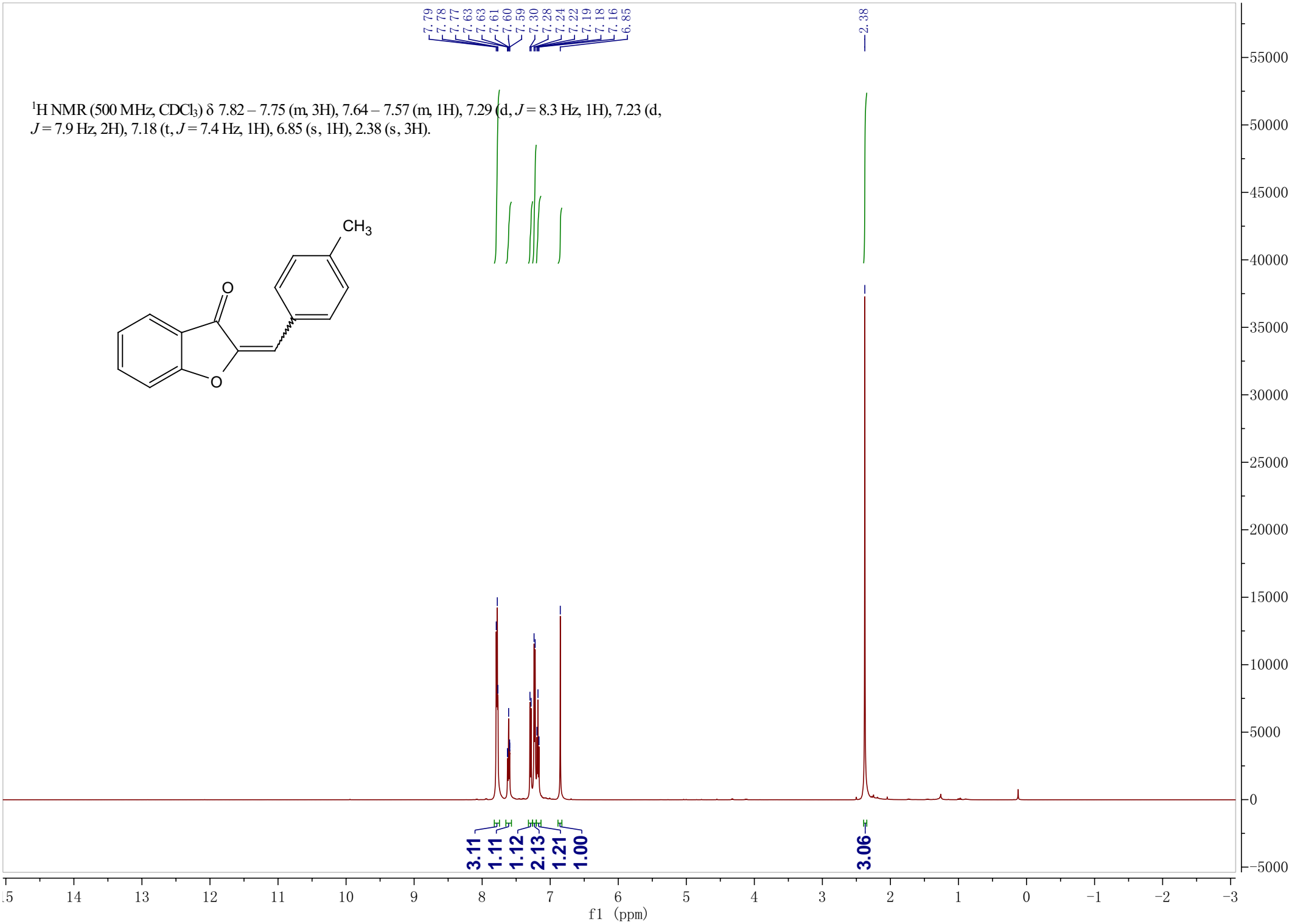


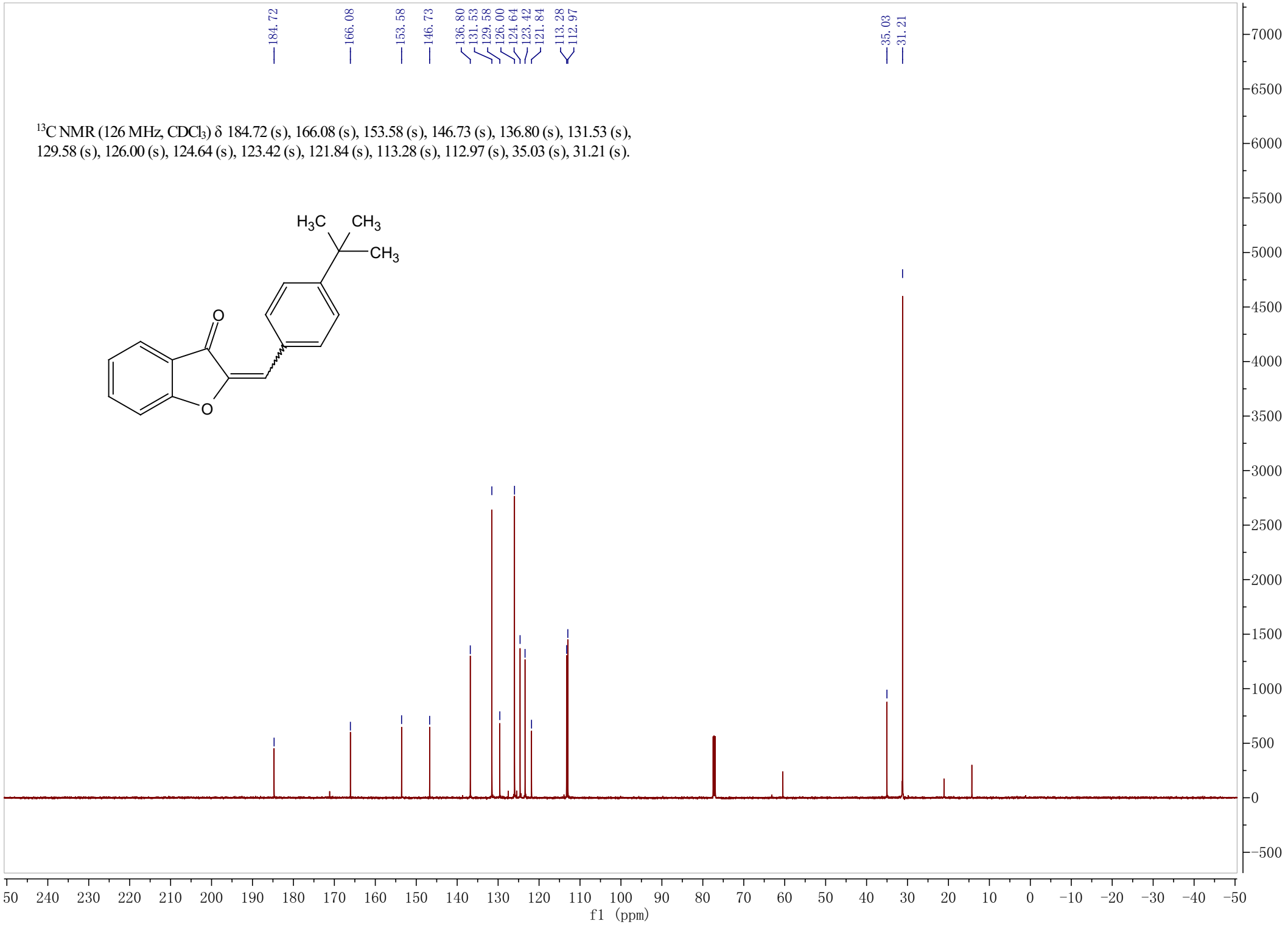
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.80 (s), 166.17 (s), 146.87 (s), 138.57 (s), 136.89 (s), 132.26 (d, *J* = 5.3 Hz), 130.92 (s), 128.86 (d, *J* = 4.8 Hz), 124.68 (s), 123.49 (s), 121.74 (s), 113.37 (s), 113.04 (s), 21.52 (s).



^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (d, *J* = 7.3 Hz, 1H), 7.73 (d, *J* = 7.6 Hz, 1H), 7.67 (s, 1H), 7.65 – 7.60 (m, 1H), 7.33 (dd, *J* = 14.2, 7.8 Hz, 2H), 7.20 (d, *J* = 7.2 Hz, 2H), 6.84 (s, 1H), 2.41 (s, 3H).


184.72
166.05
146.57
140.54
136.77
131.66
129.77
129.59
124.62
123.41
121.83
113.41
112.99
21.71
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.72 (s), 166.05 (s), 146.57 (s), 140.54 (s), 136.77 (s), 131.66 (s), 129.77 (s), 129.59 (s), 124.62 (s), 123.41 (s), 121.83 (s), 113.41 (s), 112.99 (s), 21.71 (s).
CH3
O
O
f1 (ppm)


7.79
7.78
7.77
7.63
7.63
7.61
7.60
7.59
7.30
7.28
7.24
7.22
7.19
7.18
7.16
6.85
2.38
[1]H NMR (500 MHz, CDCl3) δ 7.82 – 7.75 (m, 3H), 7.64 – 7.57 (m, 1H), 7.29 (d, J = 8.3 Hz, 1H), 7.23 (d, J = 7.9 Hz, 2H), 7.18 (t, J = 7.4 Hz, 1H), 6.85 (s, 1H), 2.38 (s, 3H).
CH3
O
O
3.11
1.11
1.12
2.13
1.21
1.00
3.06
f1 (ppm)


184.72
166.08
153.58
146.73
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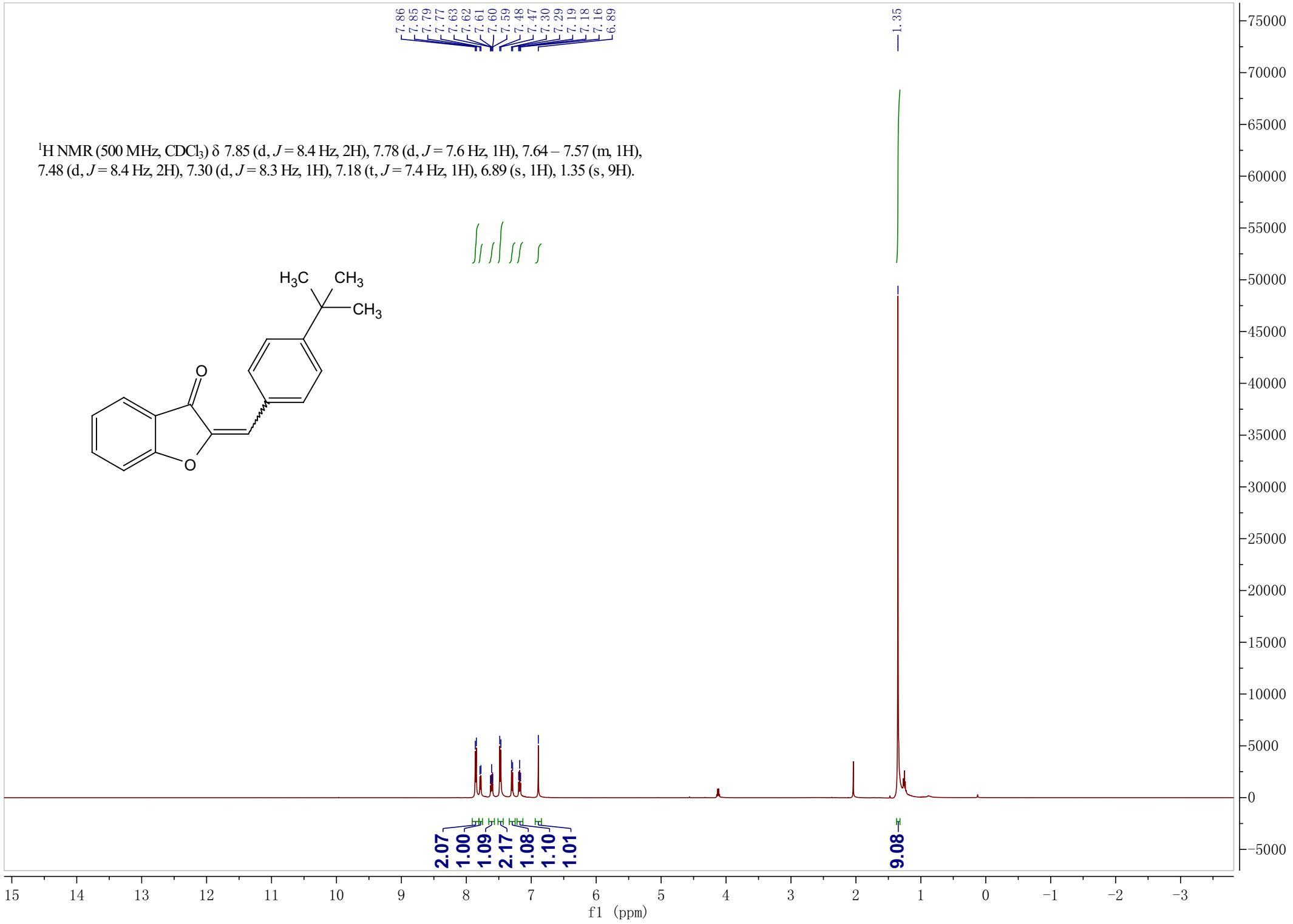
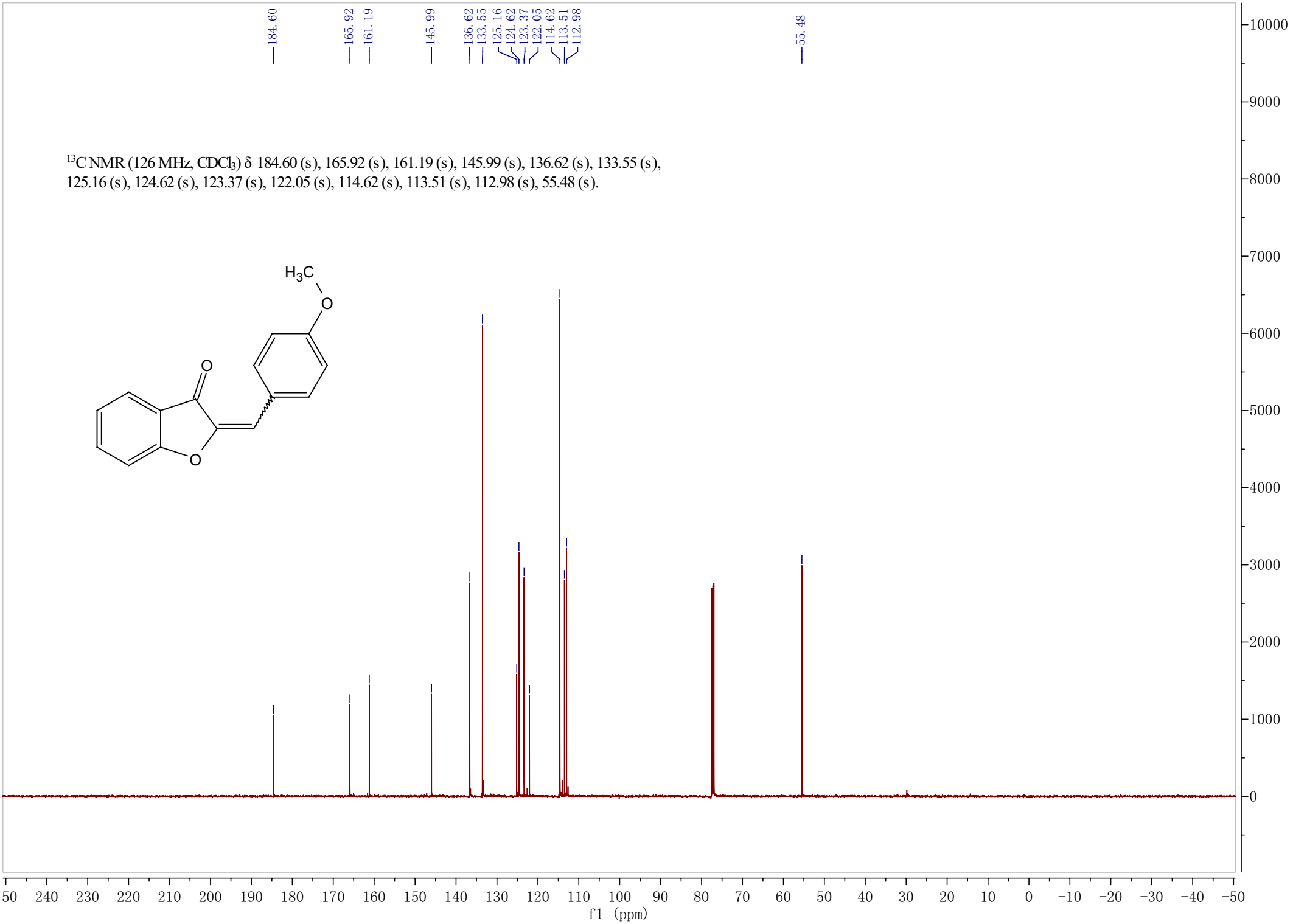
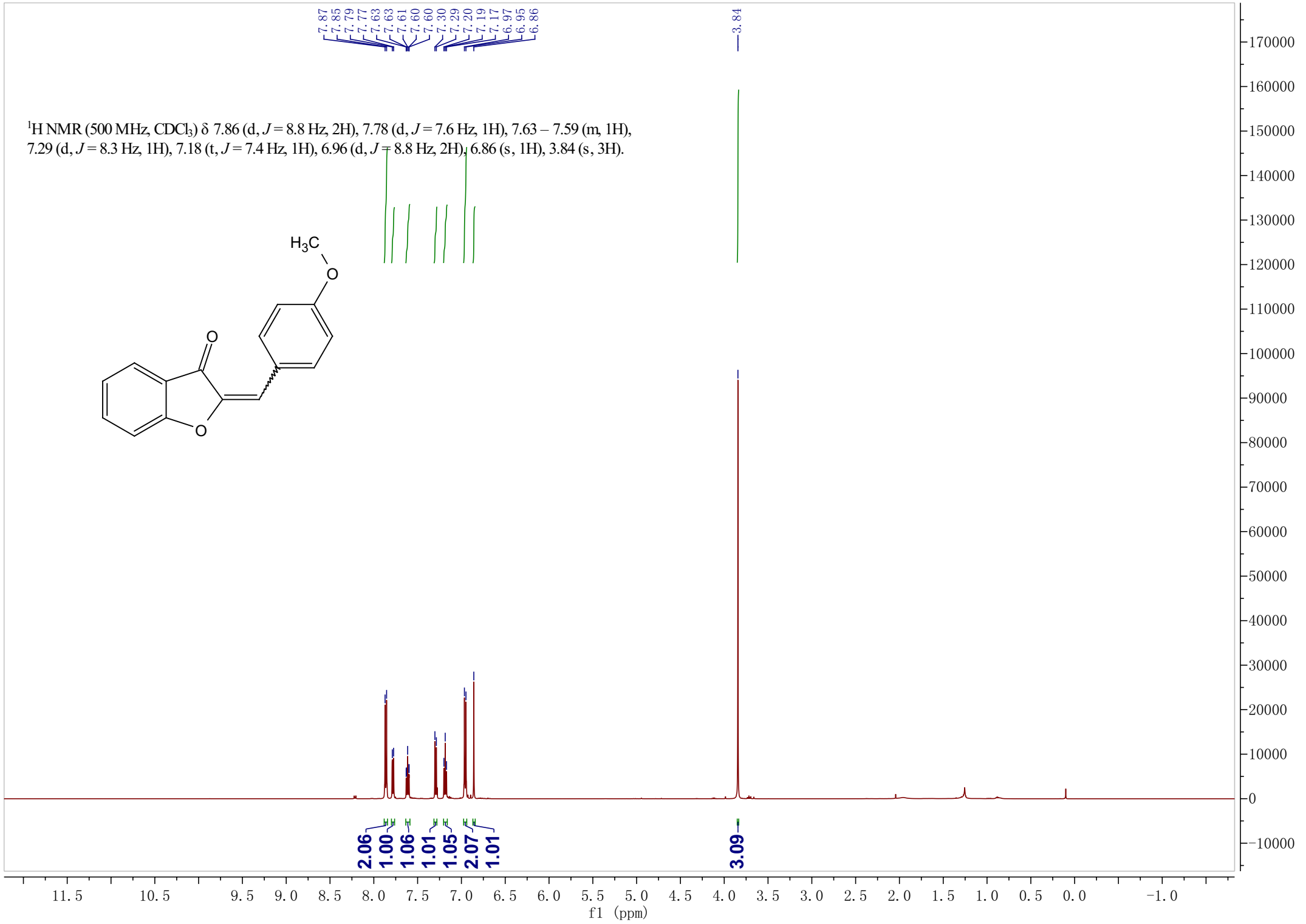
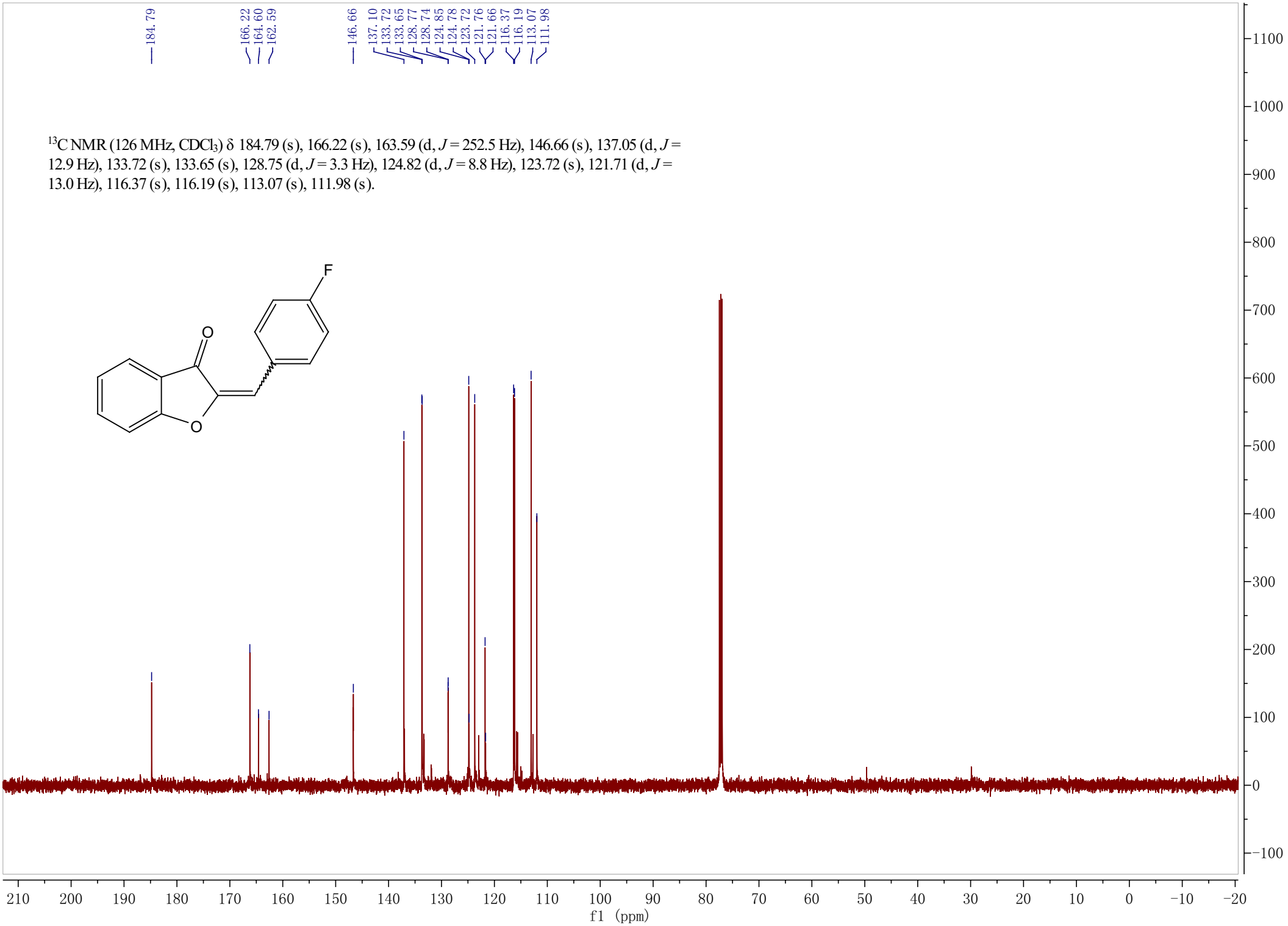
129.58
126.00
124.64
123.42
121.84
113.28
112.97
35.03
31.21
^{13}C NMR (126 MHz, CDCl$_3$) δ 184.72 (s), 166.08 (s), 153.58 (s), 146.73 (s), 136.80 (s), 131.53 (s), 129.58 (s), 126.00 (s), 124.64 (s), 123.42 (s), 121.84 (s), 113.28 (s), 112.97 (s), 35.03 (s), 31.21 (s).
H3C
CH3
CH3
O
O
f1 (ppm)

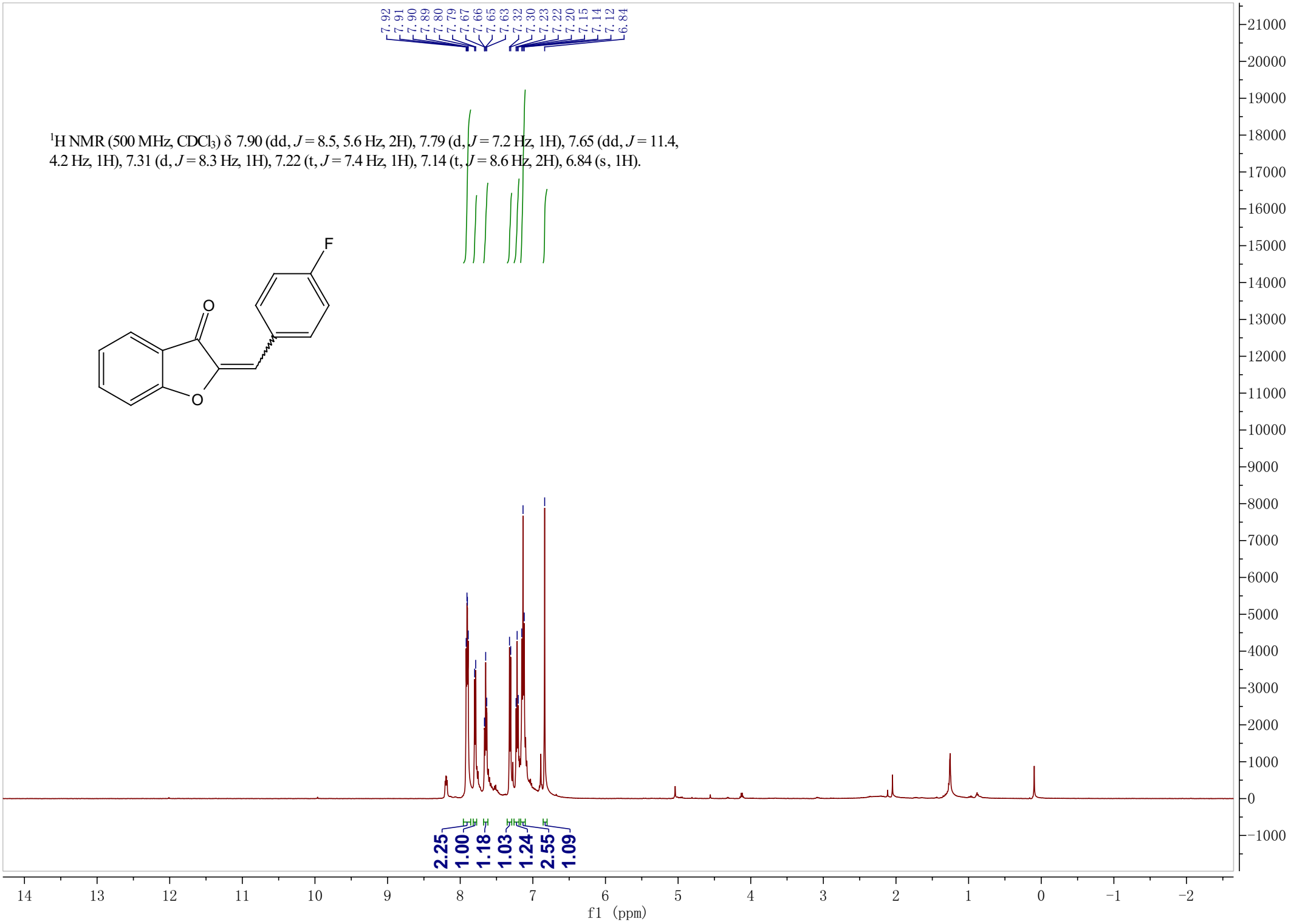

7.86
7.85
7.79
7.77
7.63
7.62
7.61
7.60
7.59
7.48
7.47
7.30
7.29
7.19
7.18
7.16
6.89
1.35
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.85 (d, J = 8.4 Hz, 2H), 7.78 (d, J = 7.6 Hz, 1H), 7.64 – 7.57 (m, 1H), 7.48 (d, J = 8.4 Hz, 2H), 7.30 (d, J = 8.3 Hz, 1H), 7.18 (t, J = 7.4 Hz, 1H), 6.89 (s, 1H), 1.35 (s, 9H).
H3C
CH3
CH3
O
O
2.07
1.00
1.09
2.17
1.08
1.10
1.01
9.08
f1 (ppm)


184.60
165.92
161.19
145.99
136.62
133.55
125.16
124.62
123.37
122.05
114.62
113.51
112.98
55.48
^{13}C NMR (126 MHz, CDCl$_3$) δ 184.60 (s), 165.92 (s), 161.19 (s), 145.99 (s), 136.62 (s), 133.55 (s), 125.16 (s), 124.62 (s), 123.37 (s), 122.05 (s), 114.62 (s), 113.51 (s), 112.98 (s), 55.48 (s).
H3C
O
O
O
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
50 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −10 −20 −30 −40 −50
f1 (ppm)

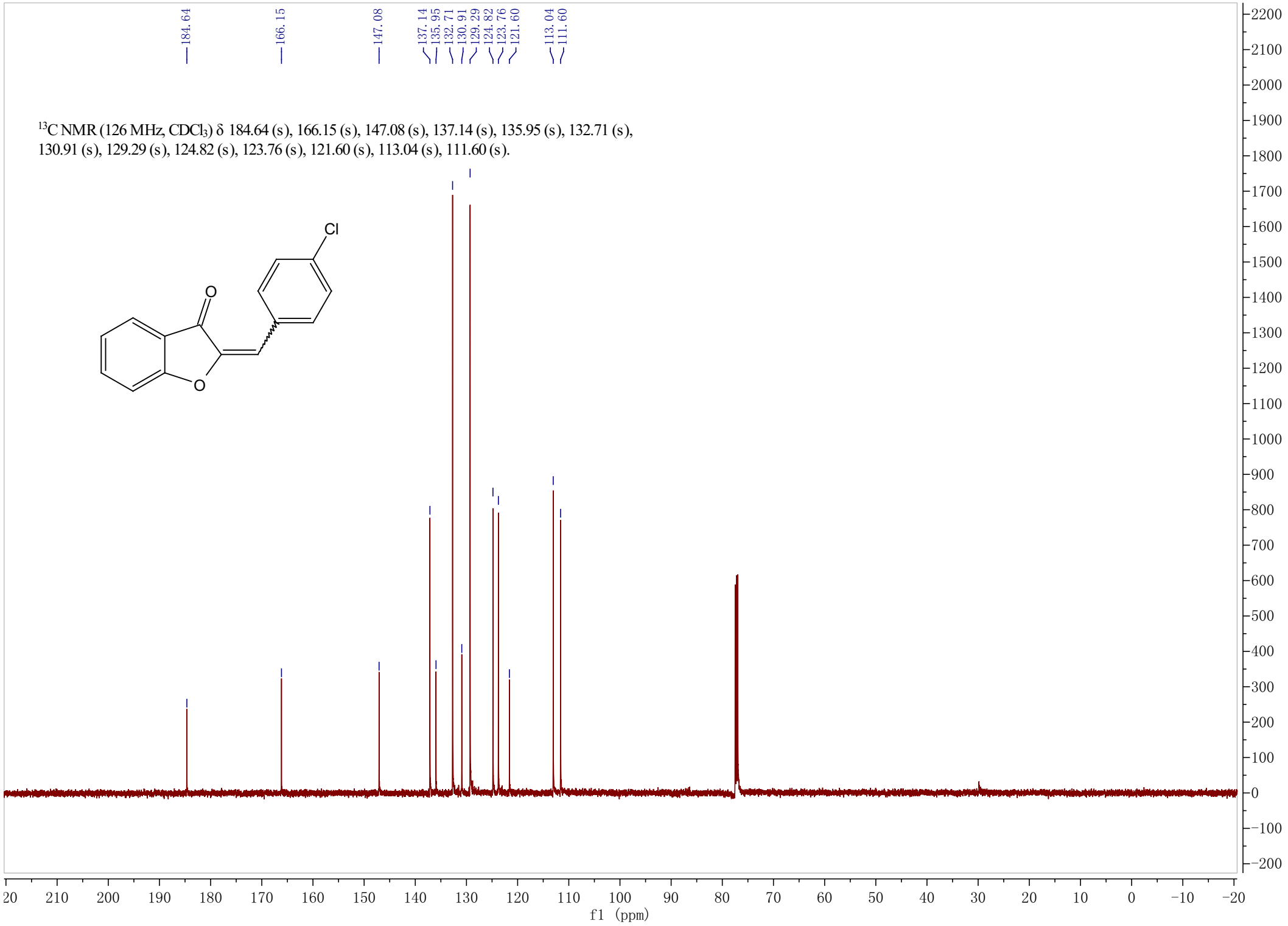

7.87
7.85
7.79
7.77
7.63
7.63
7.61
7.60
7.60
7.30
7.29
7.20
7.19
7.17
6.97
6.95
6.86
3.84
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.86 (d, J = 8.8 Hz, 2H), 7.78 (d, J = 7.6 Hz, 1H), 7.63 – 7.59 (m, 1H), 7.29 (d, J = 8.3 Hz, 1H), 7.18 (t, J = 7.4 Hz, 1H), 6.96 (d, J = 8.8 Hz, 2H), 6.86 (s, 1H), 3.84 (s, 3H).
H_3C
O
O
O
2.06
1.00
1.06
1.01
1.05
2.07
1.01
3.09
f1 (ppm)

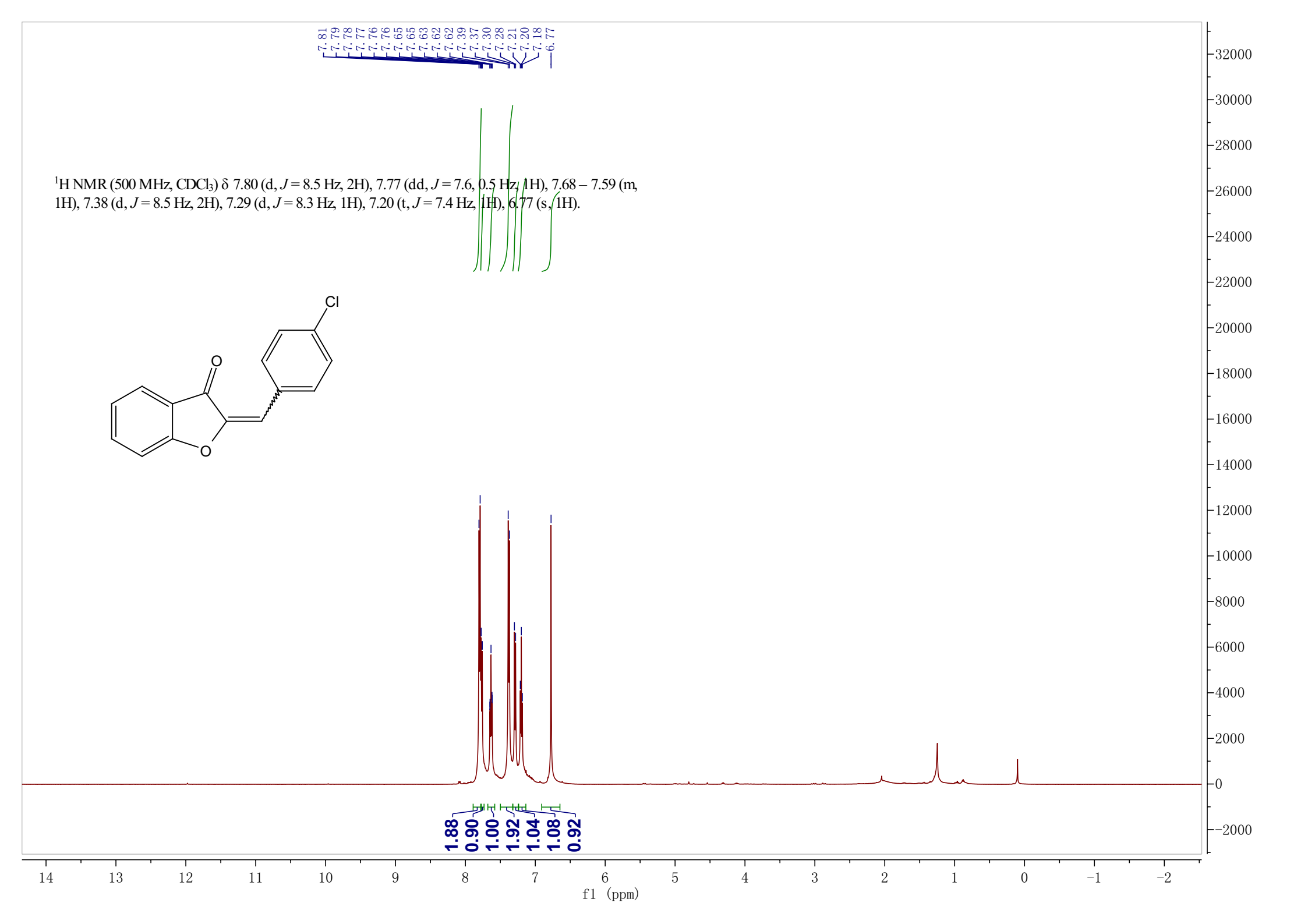


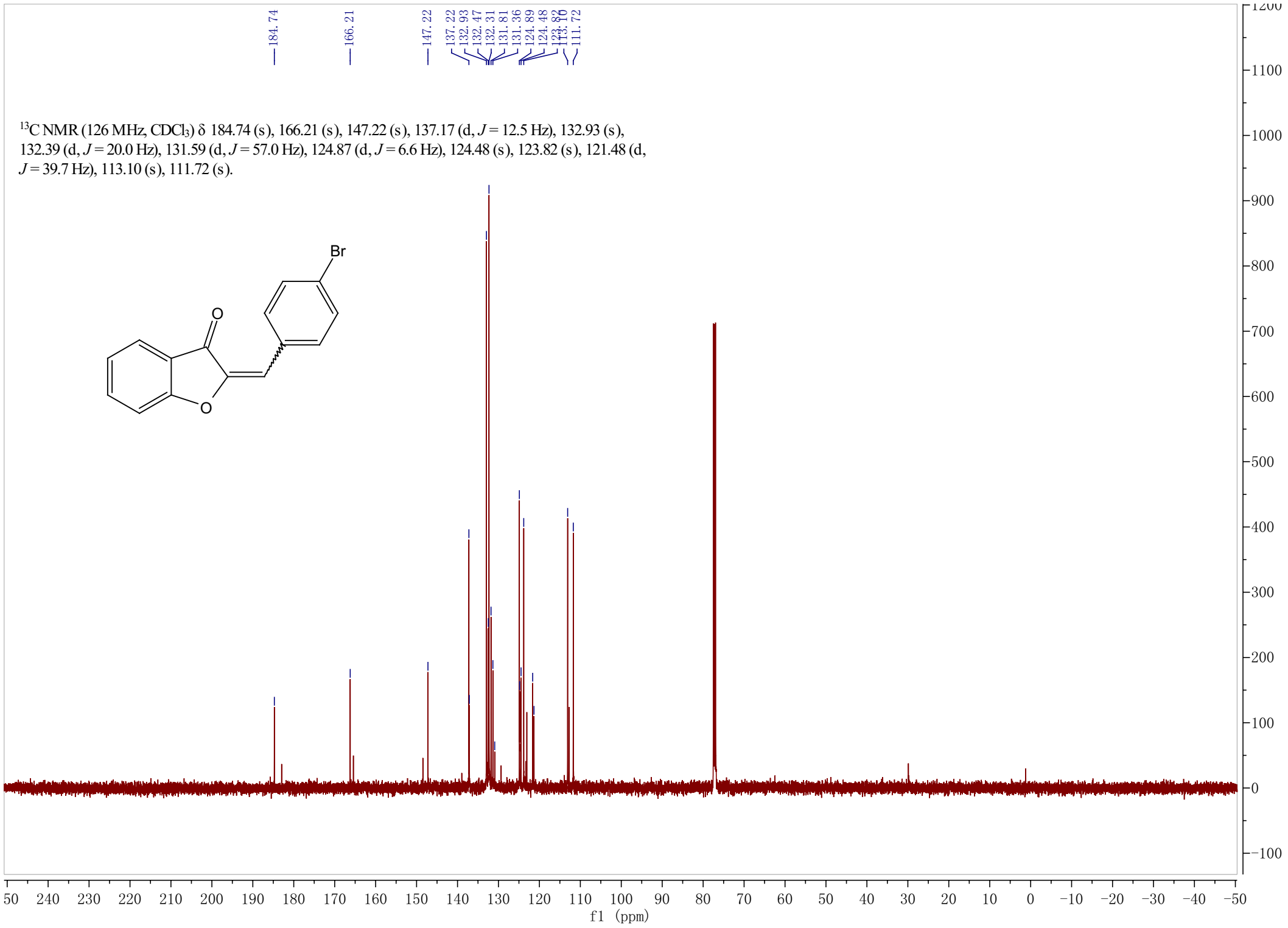
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.79 (s), 166.22 (s), 163.59 (d, *J* = 252.5 Hz), 146.66 (s), 137.05 (d, *J* = 12.9 Hz), 133.72 (s), 133.65 (s), 128.75 (d, *J* = 3.3 Hz), 124.82 (d, *J* = 8.8 Hz), 123.72 (s), 121.71 (d, *J* = 13.0 Hz), 116.37 (s), 116.19 (s), 113.07 (s), 111.98 (s).



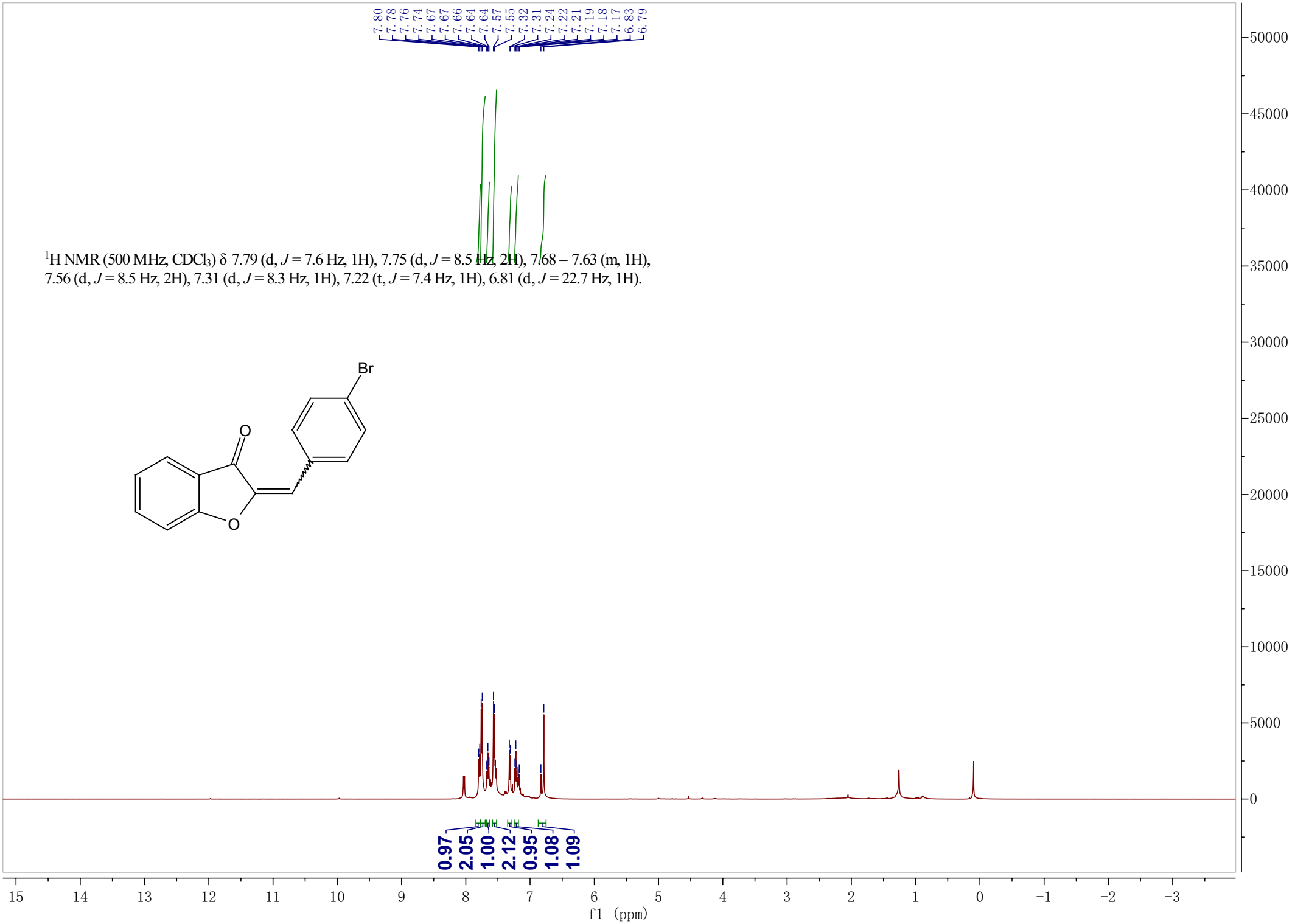
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.90 (dd, *J* = 8.5, 5.6 Hz, 2H), 7.79 (d, *J* = 7.2 Hz, 1H), 7.65 (dd, *J* = 11.4, 4.2 Hz, 1H), 7.31 (d, *J* = 8.3 Hz, 1H), 7.22 (t, *J* = 7.4 Hz, 1H), 7.14 (t, *J* = 8.6 Hz, 2H), 6.84 (s, 1H).


184.64
166.15
147.08
137.14
135.95
132.71
130.91
129.29
124.82
123.76
121.60
113.04
111.60
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.64 (s), 166.15 (s), 147.08 (s), 137.14 (s), 135.95 (s), 132.71 (s), 130.91 (s), 129.29 (s), 124.82 (s), 123.76 (s), 121.60 (s), 113.04 (s), 111.60 (s).
Cl
O
O
f1 (ppm)

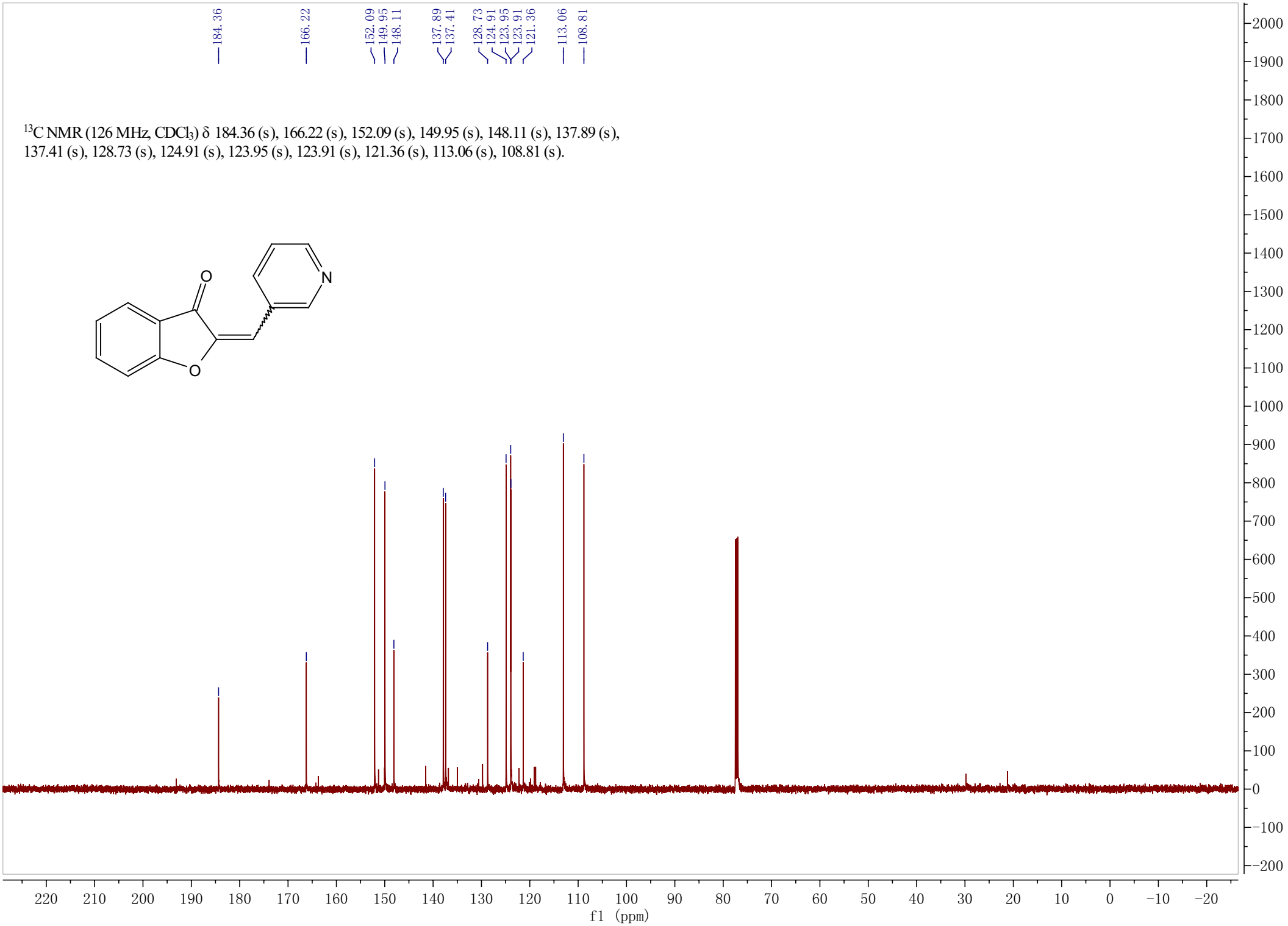

7.81
7.79
7.78
7.77
7.76
7.76
7.65
7.65
7.63
7.62
7.62
7.39
7.37
7.30
7.28
7.21
7.20
7.18
6.77
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (d, J = 8.5 Hz, 2H), 7.77 (dd, J = 7.6, 0.5 Hz, 1H), 7.68 – 7.59 (m, 1H), 7.38 (d, J = 8.5 Hz, 2H), 7.29 (d, J = 8.3 Hz, 1H), 7.20 (t, J = 7.4 Hz, 1H), 6.77 (s, 1H).
Cl
O
O
1.88
0.90
1.00
1.92
1.04
1.08
0.92
f1 (ppm)



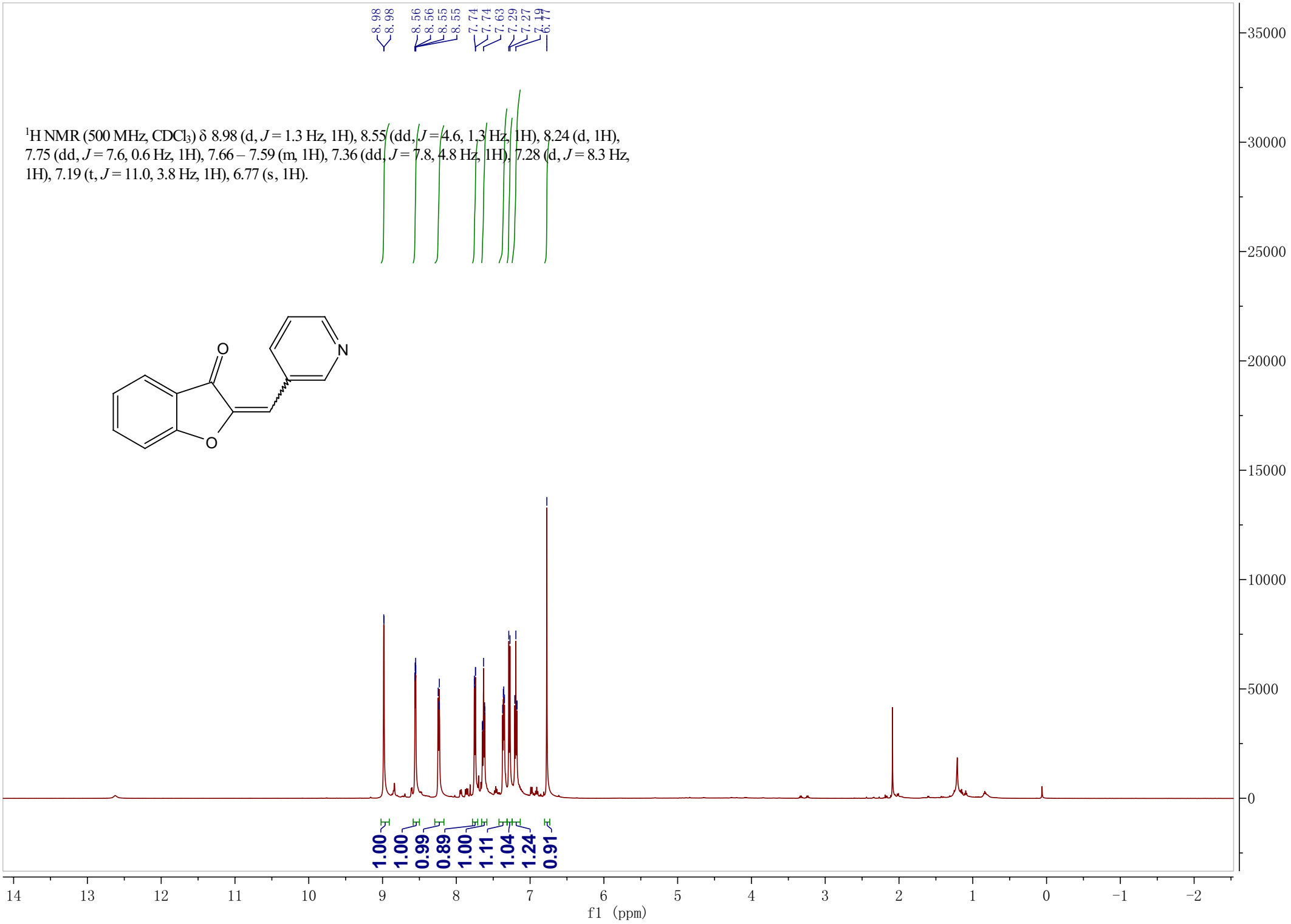
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.74 (s), 166.21 (s), 147.22 (s), 137.17 (d, *J* = 12.5 Hz), 132.93 (s), 132.39 (d, *J* = 20.0 Hz), 131.59 (d, *J* = 57.0 Hz), 124.87 (d, *J* = 6.6 Hz), 124.48 (s), 123.82 (s), 121.48 (d, *J* = 39.7 Hz), 113.10 (s), 111.72 (s).

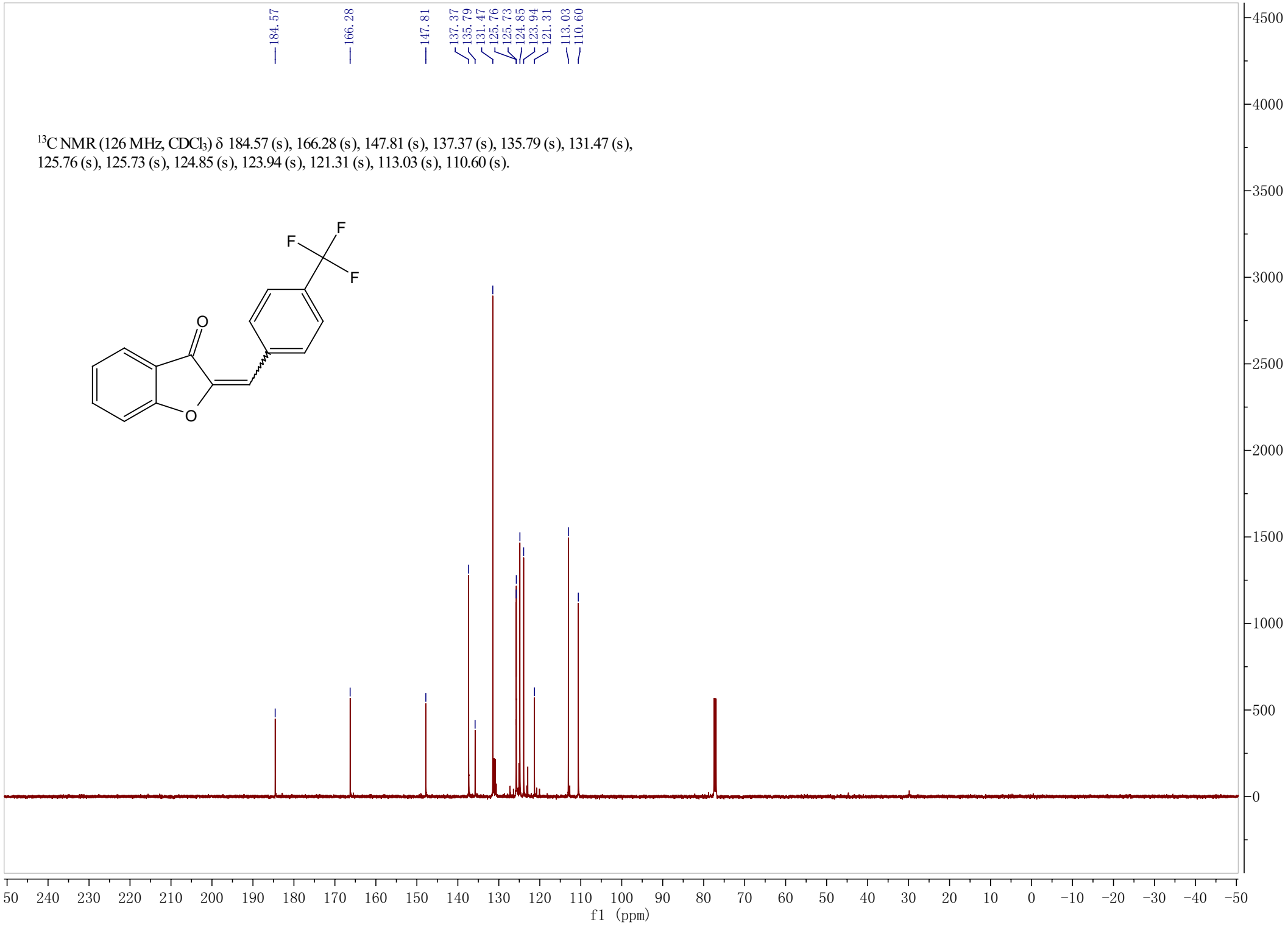


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (d, J = 7.6 Hz, 1H), 7.75 (d, J = 8.5 Hz, 2H), 7.68 – 7.63 (m, 1H), 7.56 (d, J = 8.5 Hz, 2H), 7.31 (d, J = 8.3 Hz, 1H), 7.22 (t, J = 7.4 Hz, 1H), 6.81 (d, J = 22.7 Hz, 1H).

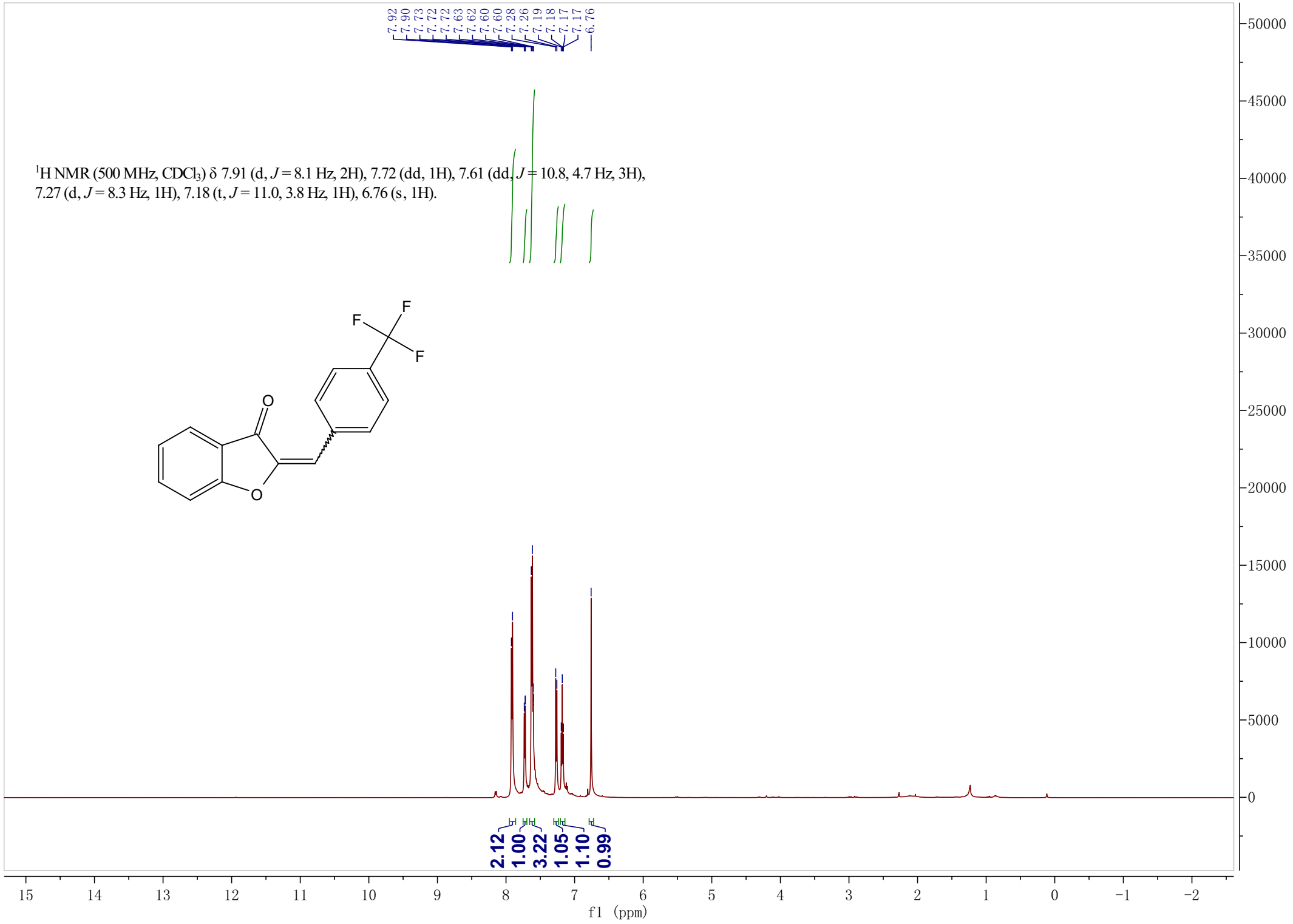


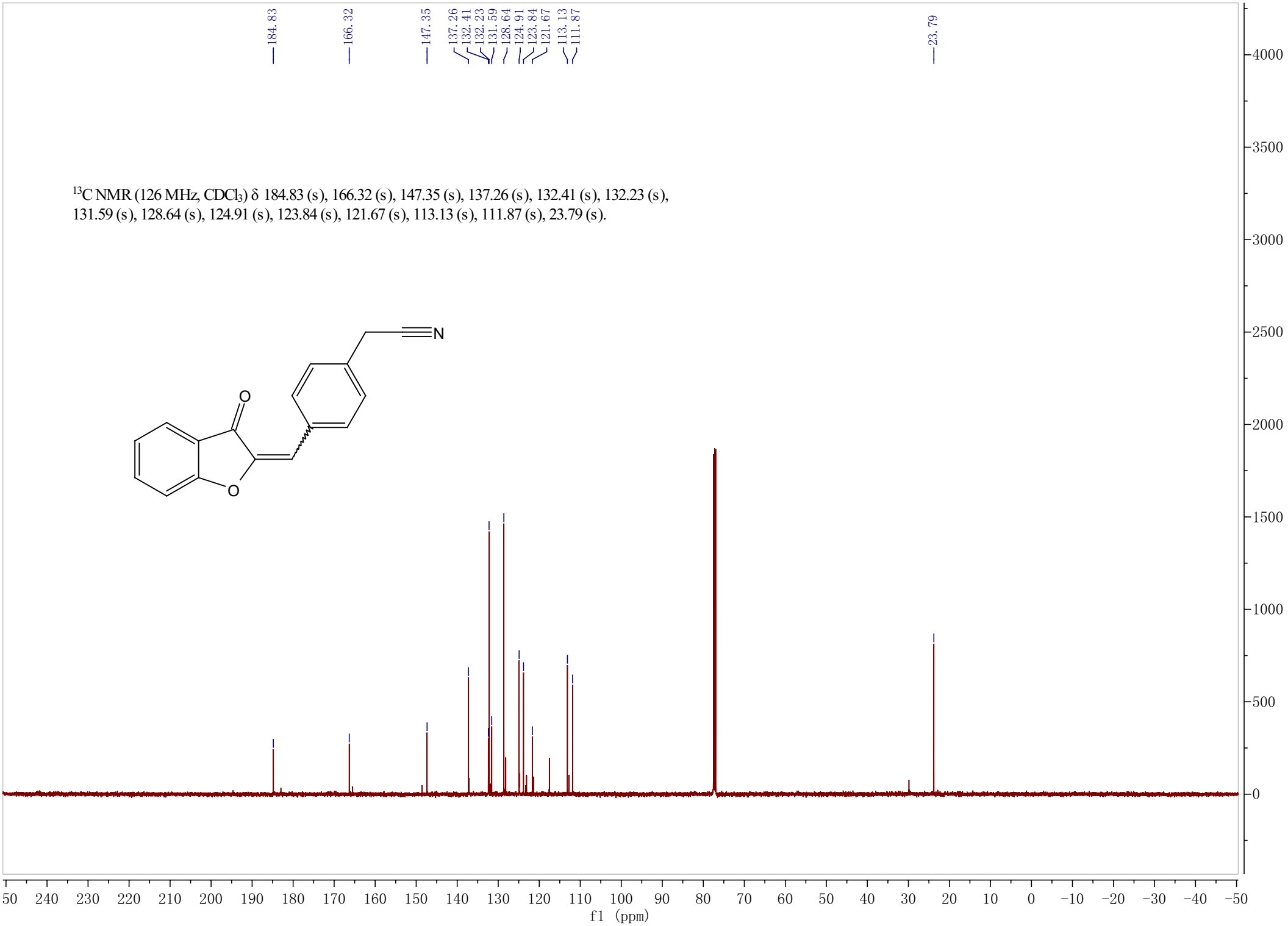
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.36 (s), 166.22 (s), 152.09 (s), 149.95 (s), 148.11 (s), 137.89 (s), 137.41 (s), 128.73 (s), 124.91 (s), 123.95 (s), 123.91 (s), 121.36 (s), 113.06 (s), 108.81 (s).


8.98
8.98
8.56
8.56
8.55
8.55
7.74
7.74
7.63
7.29
7.27
7.19
6.77
1H NMR (500 MHz, CDCl3) δ 8.98 (d, J = 1.3 Hz, 1H), 8.55 (dd, J = 4.6, 1.3 Hz, 1H), 8.24 (d, 1H), 7.75 (dd, J = 7.6, 0.6 Hz, 1H), 7.66 – 7.59 (m, 1H), 7.36 (dd, J = 7.8, 4.8 Hz, 1H), 7.28 (d, J = 8.3 Hz, 1H), 7.19 (t, J = 11.0, 3.8 Hz, 1H), 6.77 (s, 1H).
O
N
O
1.00
1.00
0.99
0.89
1.00
1.11
1.04
1.24
0.91
35000
30000
25000
20000
15000
10000
5000
0
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
f1 (ppm)

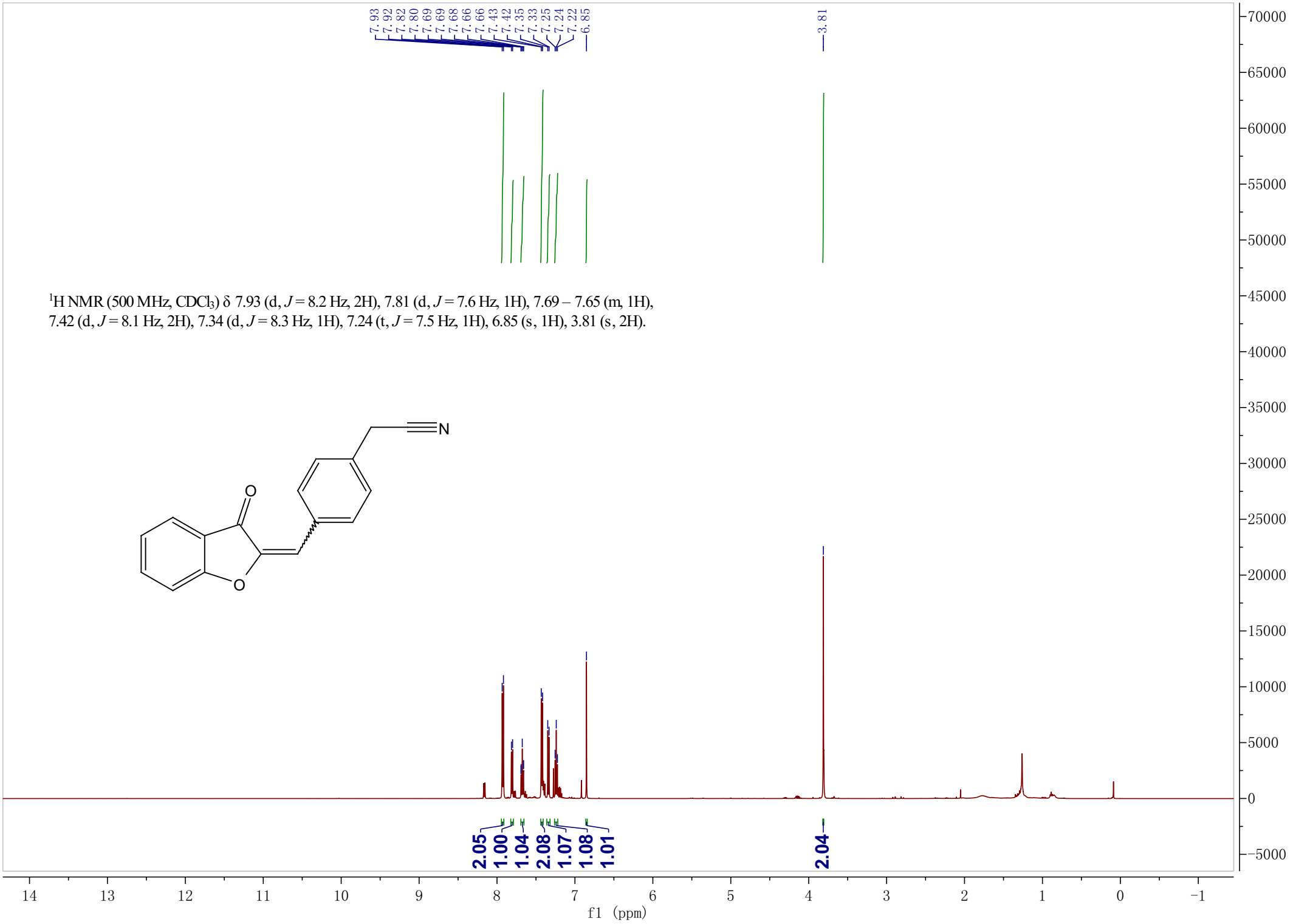


^{13}C NMR (126 MHz, $CDCl_3$) δ 184.57 (s), 166.28 (s), 147.81 (s), 137.37 (s), 135.79 (s), 131.47 (s), 125.76 (s), 125.73 (s), 124.85 (s), 123.94 (s), 121.31 (s), 113.03 (s), 110.60 (s).

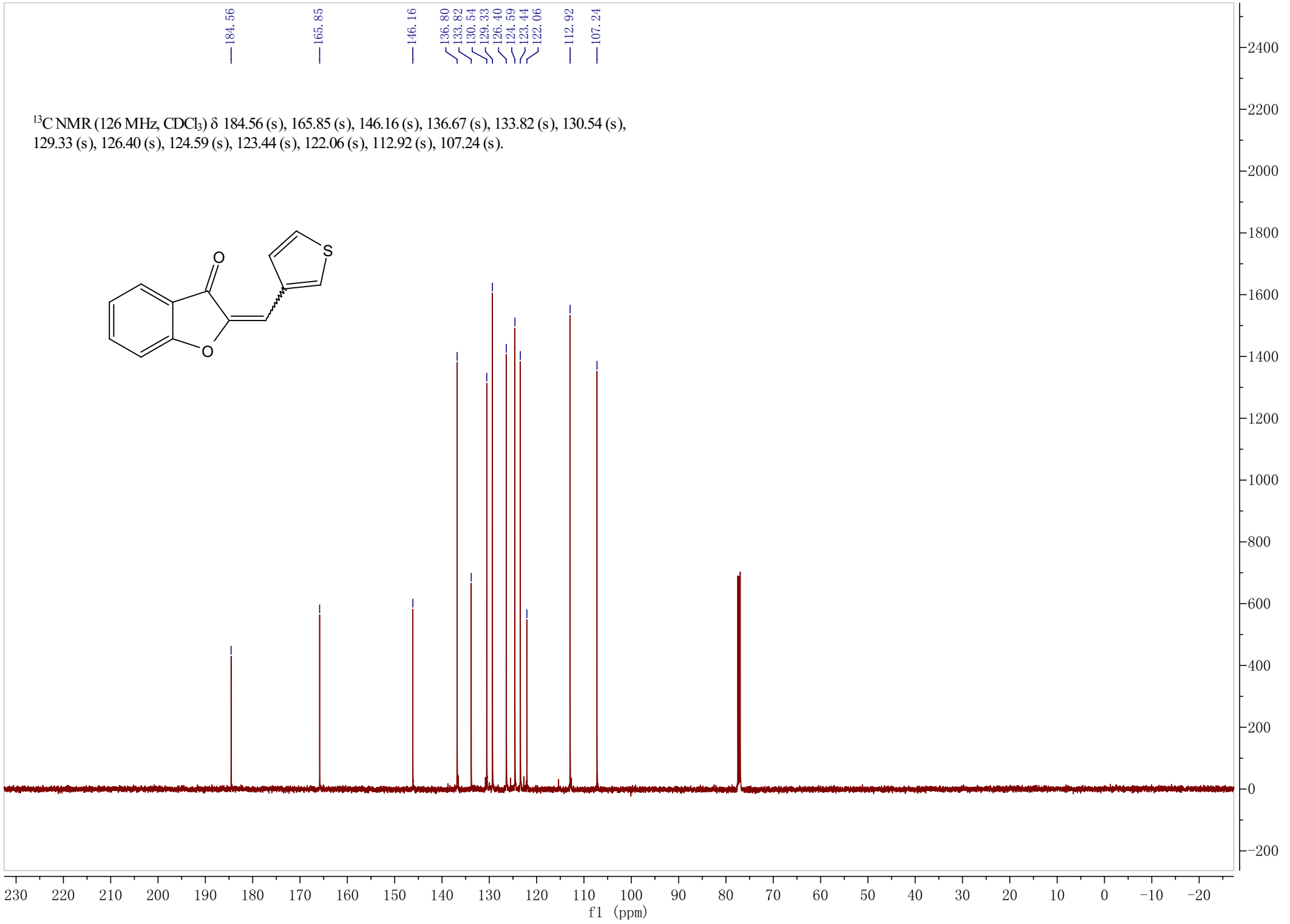

7.92
7.90
7.73
7.72
7.72
7.63
7.62
7.60
7.60
7.28
7.26
7.19
7.18
7.17
7.17
6.76
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.91 (d, J = 8.1 Hz, 2H), 7.72 (dd, 1H), 7.61 (dd, J = 10.8, 4.7 Hz, 3H), 7.27 (d, J = 8.3 Hz, 1H), 7.18 (t, J = 11.0, 3.8 Hz, 1H), 6.76 (s, 1H).
F
F
F
O
O
2.12
1.00
3.22
1.05
1.10
0.99
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
f1 (ppm)



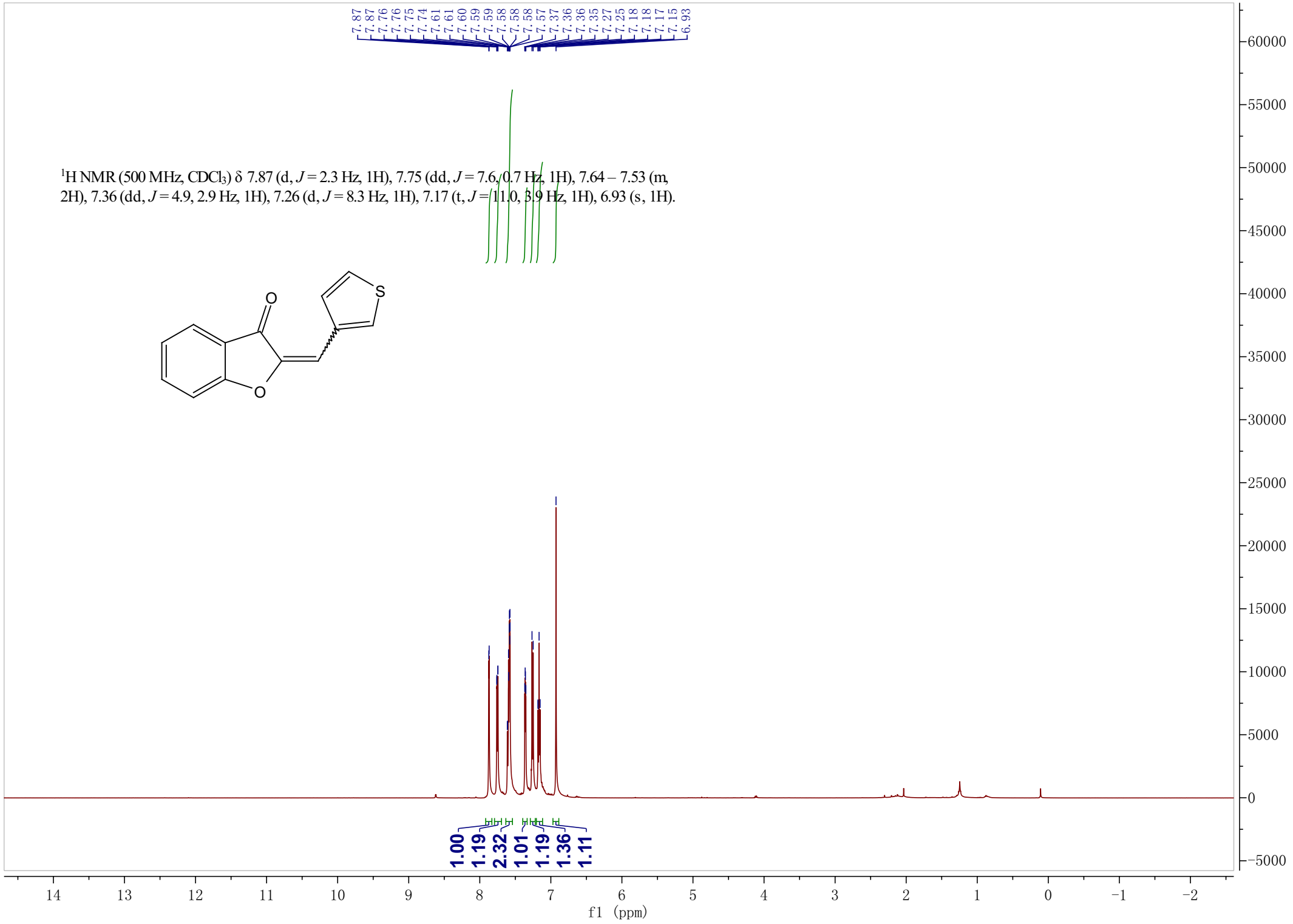
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.83 (s), 166.32 (s), 147.35 (s), 137.26 (s), 132.41 (s), 132.23 (s), 131.59 (s), 128.64 (s), 124.91 (s), 123.84 (s), 121.67 (s), 113.13 (s), 111.87 (s), 23.79 (s).

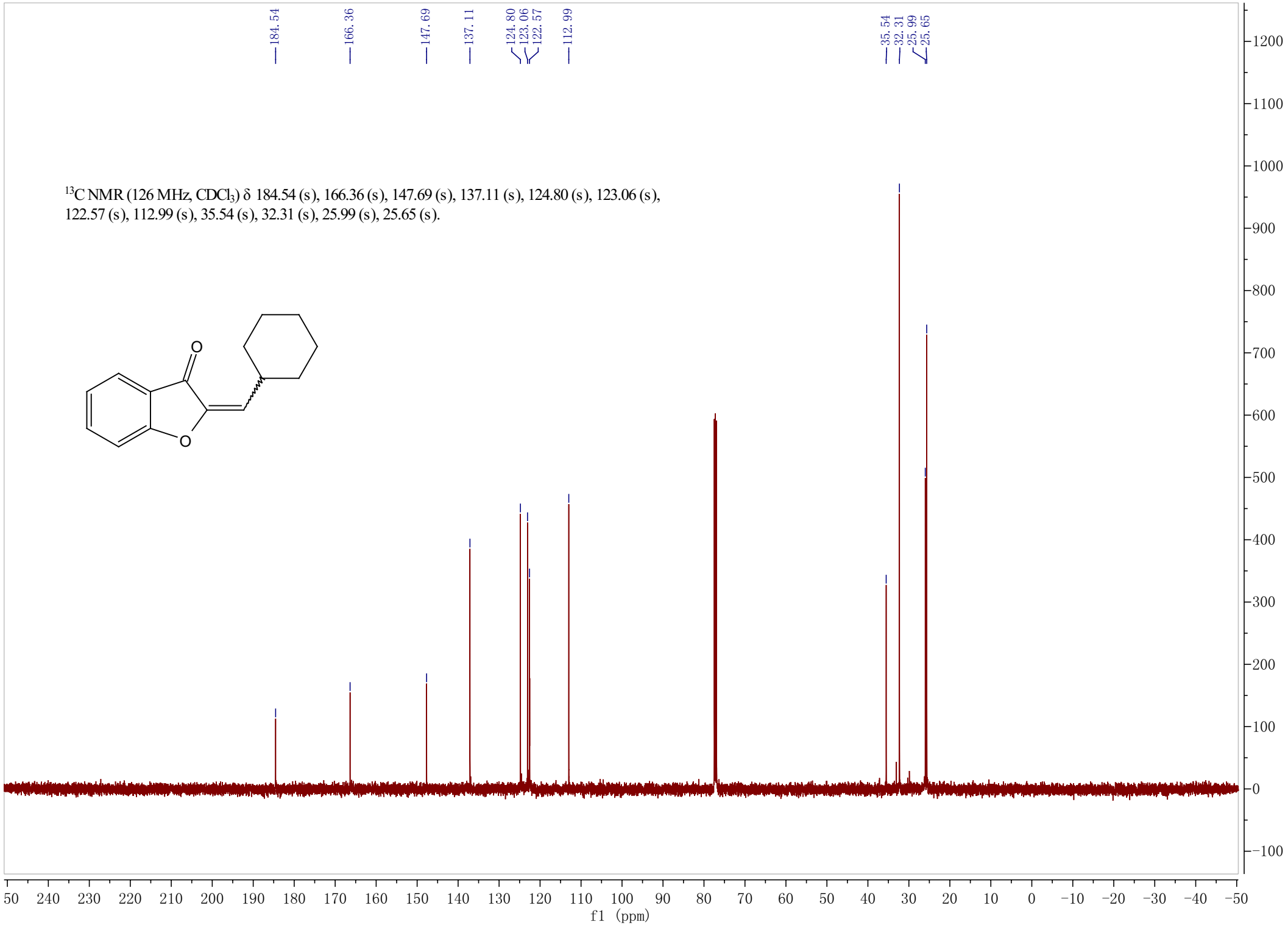


^{1}H NMR (500 MHz, $CDCl_3$) δ 7.93 (d, J = 8.2 Hz, 2H), 7.81 (d, J = 7.6 Hz, 1H), 7.69 – 7.65 (m, 1H), 7.42 (d, J = 8.1 Hz, 2H), 7.34 (d, J = 8.3 Hz, 1H), 7.24 (t, J = 7.5 Hz, 1H), 6.85 (s, 1H), 3.81 (s, 2H).



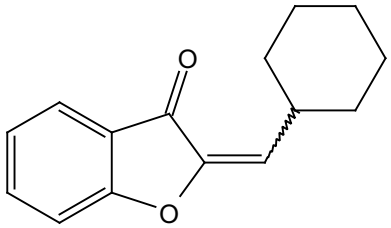
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.56 (s), 165.85 (s), 146.16 (s), 136.67 (s), 133.82 (s), 130.54 (s), 129.33 (s), 126.40 (s), 124.59 (s), 123.44 (s), 122.06 (s), 112.92 (s), 107.24 (s).

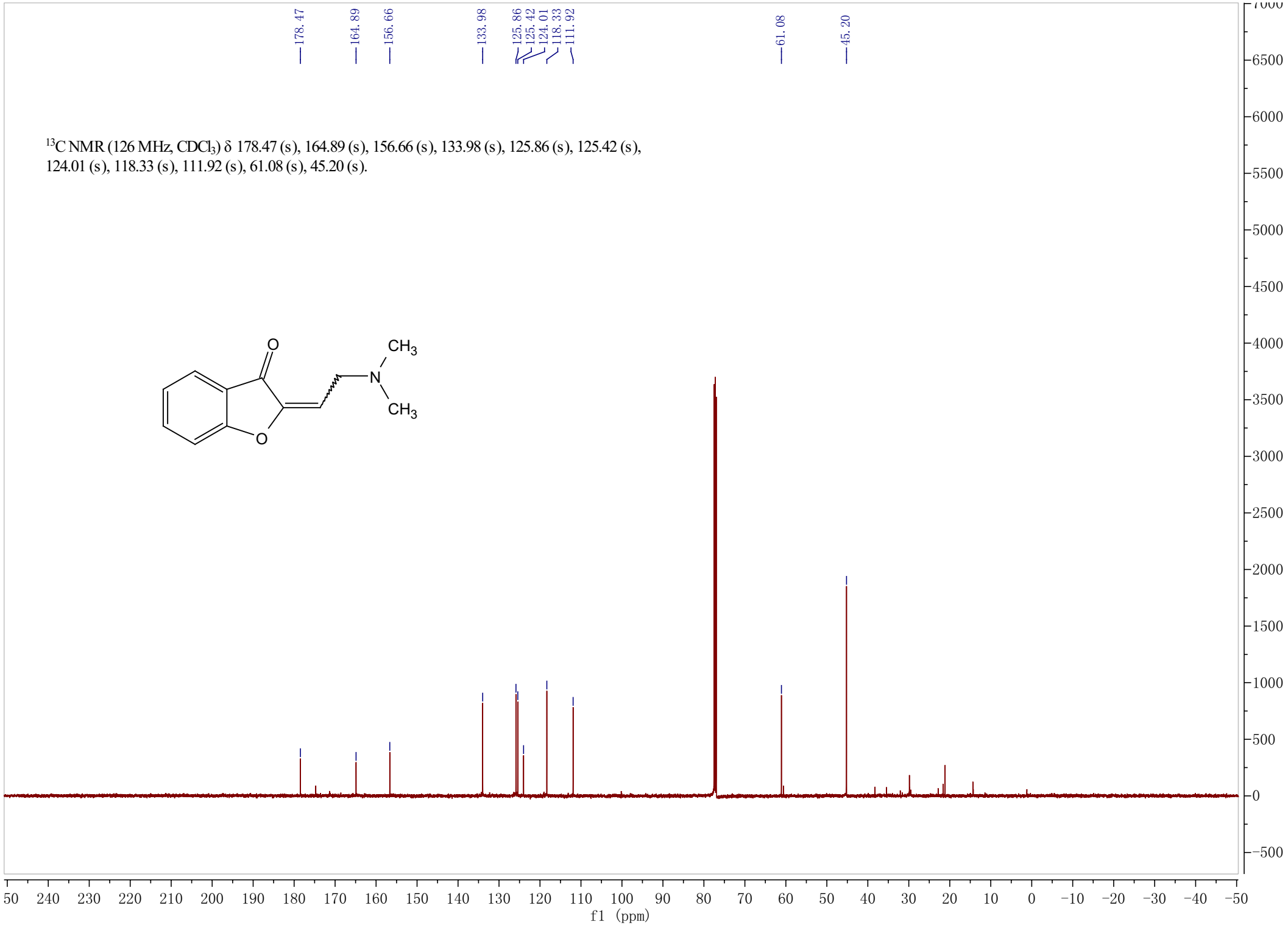

7.87
7.87
7.76
7.76
7.75
7.74
7.61
7.61
7.60
7.59
7.59
7.58
7.58
7.58
7.57
7.37
7.36
7.36
7.35
7.27
7.25
7.18
7.17
7.15
6.93
[1]H NMR (500 MHz, CDCl3) δ 7.87 (d, J = 2.3 Hz, 1H), 7.75 (dd, J = 7.6, 0.7 Hz, 1H), 7.64 – 7.53 (m, 2H), 7.36 (dd, J = 4.9, 2.9 Hz, 1H), 7.26 (d, J = 8.3 Hz, 1H), 7.17 (t, J = 11.0, 3.9 Hz, 1H), 6.93 (s, 1H).
O
S
O
1.00
1.19
2.32
1.01
1.19
1.36
1.11
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
−5000
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
f1 (ppm)



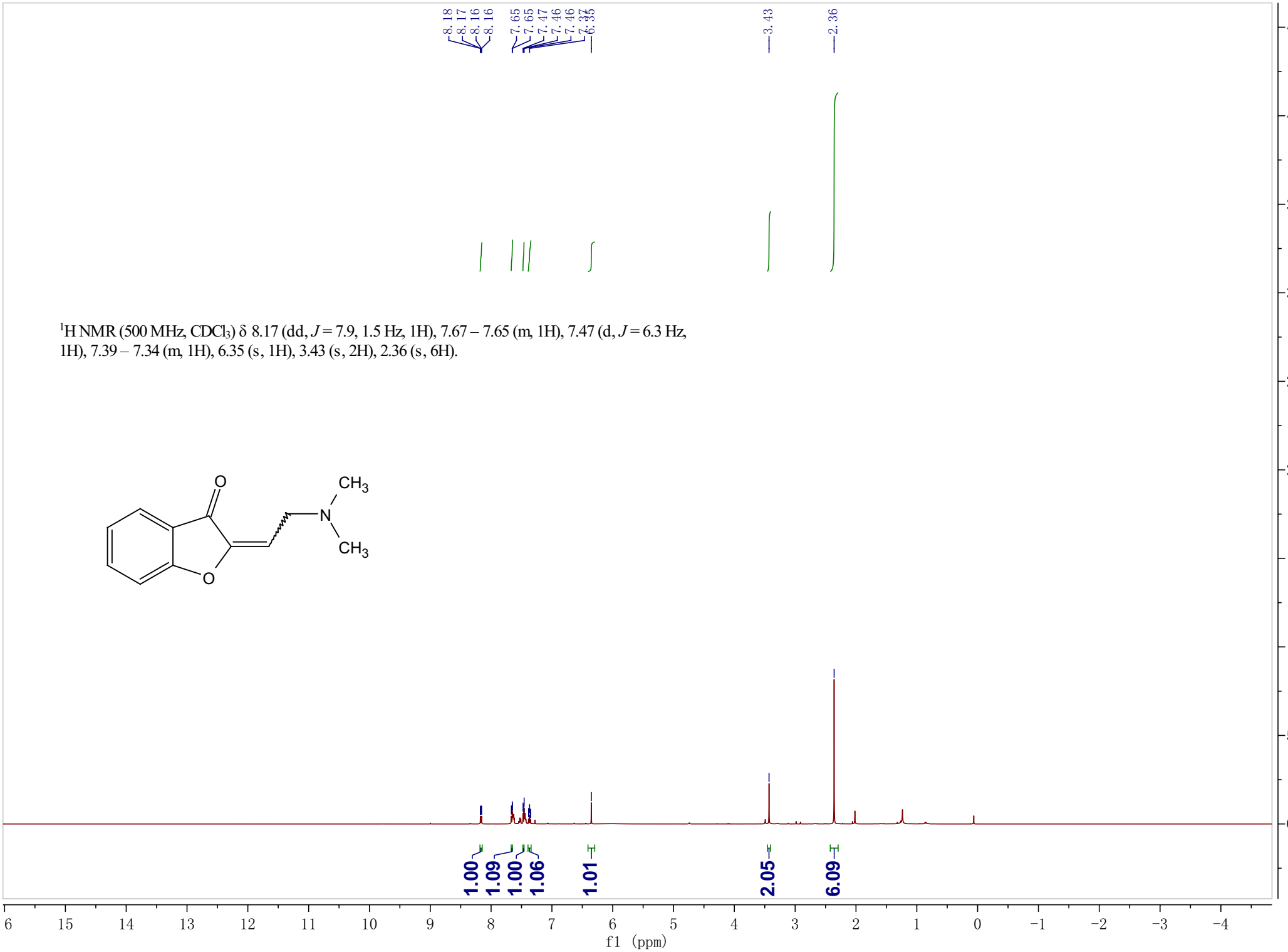
^{13}C NMR (126 MHz, $CDCl_3$) δ 184.54 (s), 166.36 (s), 147.69 (s), 137.11 (s), 124.80 (s), 123.06 (s), 122.57 (s), 112.99 (s), 35.54 (s), 32.31 (s), 25.99 (s), 25.65 (s).

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.74 (dd, *J* = 7.6, 0.7 Hz, 1H), 7.61 (td, *J* = 8.6, 7.4, 1.4 Hz, 1H), 7.21 (d, *J* = 8.4 Hz, 1H), 7.15 (t, *J* = 7.4 Hz, 1H), 6.06 (d, *J* = 9.7 Hz, 1H), 2.81 – 2.64 (m, 1H), 1.93 – 1.73 (m, 6H), 1.37 – 1.23 (m, 7H).

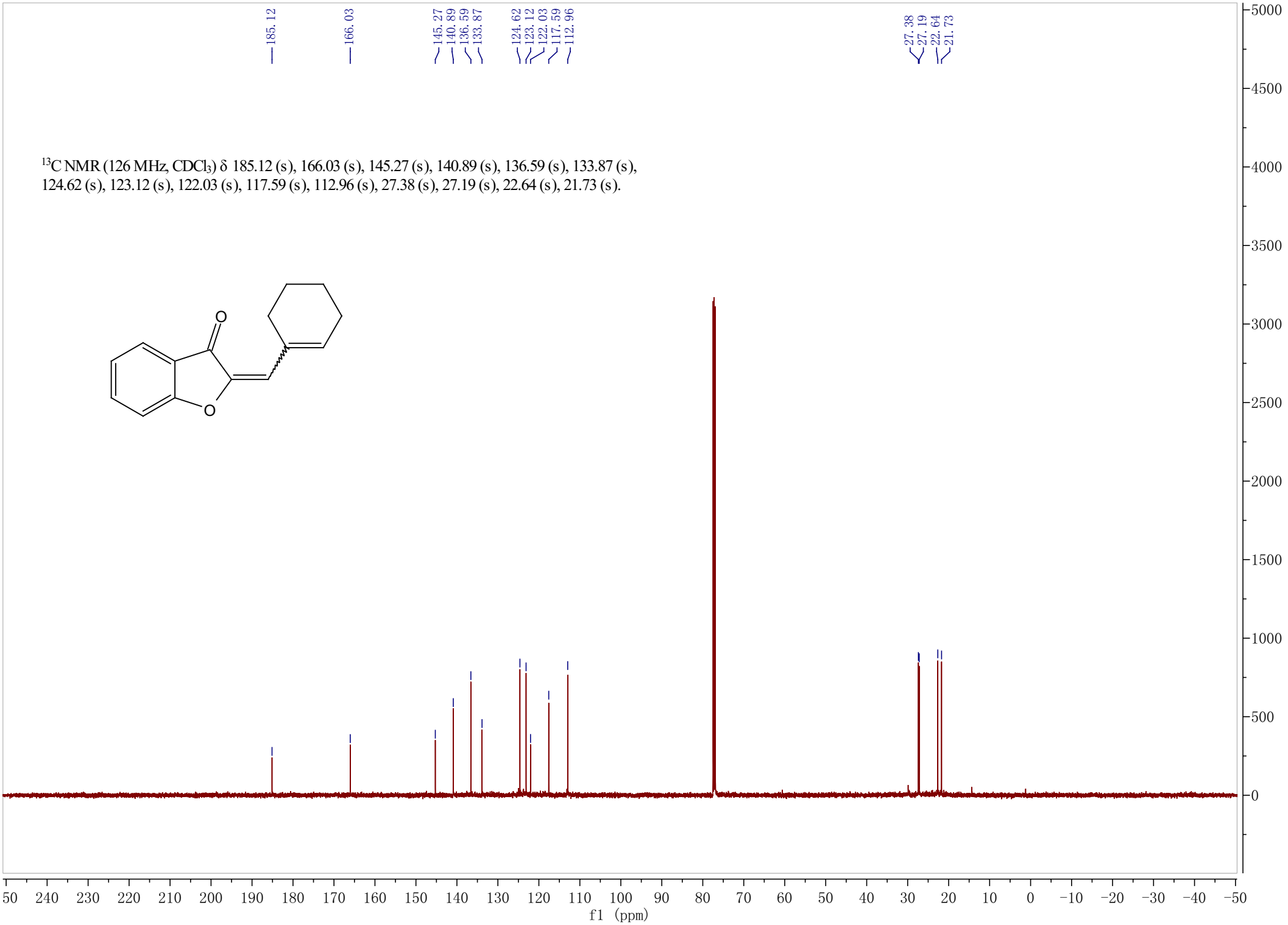




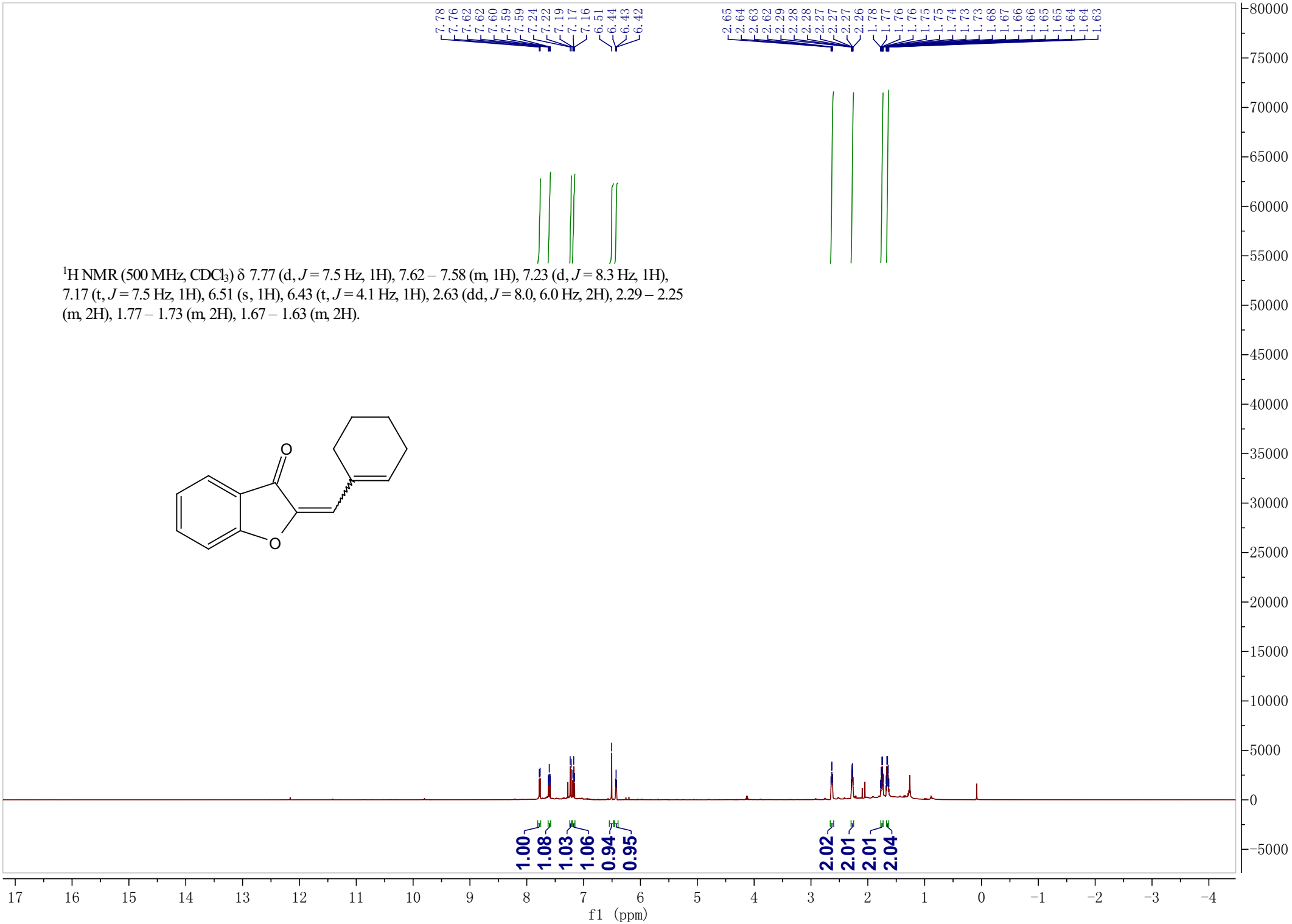
^{13}C NMR (126 MHz, $CDCl_3$) δ 178.47 (s), 164.89 (s), 156.66 (s), 133.98 (s), 125.86 (s), 125.42 (s), 124.01 (s), 118.33 (s), 111.92 (s), 61.08 (s), 45.20 (s).



^{1}H NMR (500 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.67 – 7.65 (m, 1H), 7.47 (d, *J* = 6.3 Hz, 1H), 7.39 – 7.34 (m, 1H), 6.35 (s, 1H), 3.43 (s, 2H), 2.36 (s, 6H).



^{13}C NMR (126 MHz, $CDCl_3$) δ 185.12 (s), 166.03 (s), 145.27 (s), 140.89 (s), 136.59 (s), 133.87 (s), 124.62 (s), 123.12 (s), 122.03 (s), 117.59 (s), 112.96 (s), 27.38 (s), 27.19 (s), 22.64 (s), 21.73 (s).



^{1}H NMR (500 MHz, $CDCl_3$) δ 7.77 (d, *J* = 7.5 Hz, 1H), 7.62 – 7.58 (m, 1H), 7.23 (d, *J* = 8.3 Hz, 1H), 7.17 (t, *J* = 7.5 Hz, 1H), 6.51 (s, 1H), 6.43 (t, *J* = 4.1 Hz, 1H), 2.63 (dd, *J* = 8.0, 6.0 Hz, 2H), 2.29 – 2.25 (m, 2H), 1.77 – 1.73 (m, 2H), 1.67 – 1.63 (m, 2H).