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1. General procedure for preparation of carbonized loofah (CL)

Firstly, loaded Loofah into a tube furnace and heated at a heating rate of 10 °C min^{-1} up to 600 °C for 3 hours under an Ar atmosphere to furnish carbonized loofah (CL).

2. Repeating Experiments

After the photocatalysis of Suzuki reaction was performed, the catalyst was filtered, washed with water and acetone, dried and reused for the next cycle. Each cycle followed the general procedure mentioned above.

Table S1 The comparison of Pd content using carrier with/without PDA[a]

Catalyst	Pd content (wt%)[b]
Pd@B-BO_3	3.0 [S8]
Pd@ PDA-CL	12.5
Pd@CL	3.6
Pd@SG	4.7
Pd@PDA-SG	12.1

[a] The catalysts were prepared according to literature: carrier (200 mg) in water (20 mL) mixed with acetone solution (5 mL) of $Pd(OAc)_2$ (70 mg) and stirred at 90 ^oC for 1 h. [b] Pd content in catalysts were determined via inductively coupled plasma (ICP).

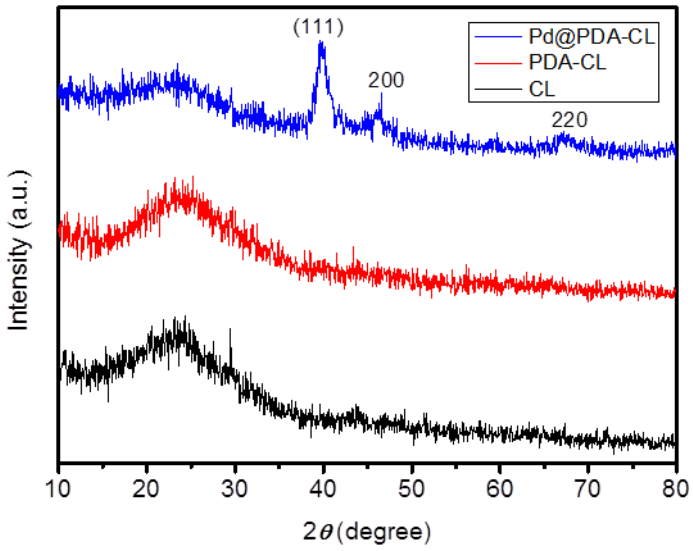

Figure S1 XRD patterns of CL, PDA-CL and Pd@PDA-CL

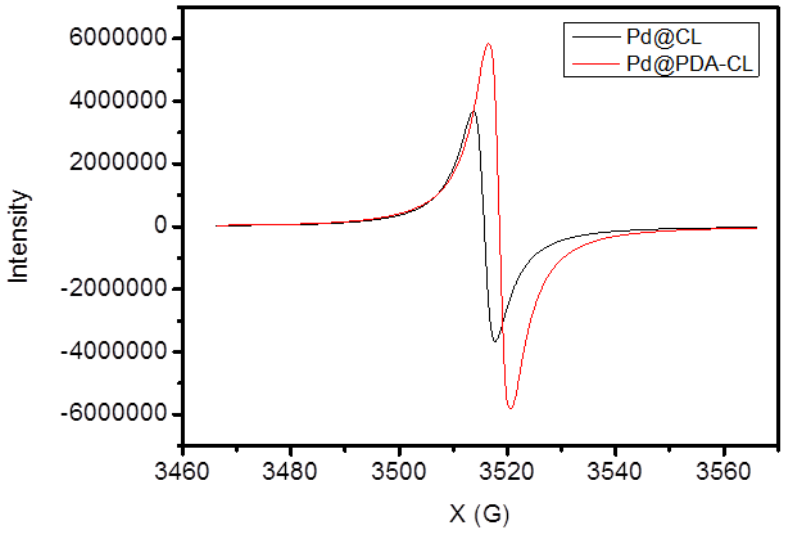

Figure S2 Electron paramagnetic resonance (EPR) spectra of Pd@CL and Pd@PDA-CL under light irradiation

Table S2 Photocatalytic Suzuki Coupling Reaction Using Recycled Pd@PDA-CL catalyst [a]

Entry	Yield[b] (%)	Pd content[c] (wt%)
1	96	3.2
2	93	3.2
3	95	3.0
4	97	3.1
5	92	3.0

[a] Reaction conditions: iodobenzene (1 mmol), phenylboronic acid (1.1 mmol), K_2CO_3 (1.5 mmol), recycled Pd@PDA-CL (20 mg), DMF/H_2O (3 mL/3 mL), white LED lamp (1.2 W/cm^2), room temperature, 2 h. [b] Isolated yields. [c] Pd content in catalysts were determined via inductively coupled plasma (ICP).

3. NMR data of coupling products.

2-Methoxy-1,1'-biphenyl[S1] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.54 (dd, J = 6.5, 0.9 Hz), 7.42 (t, J = 6.1 Hz), 7.33 (m), 7.04 (td, J = 6.0, 0.8 Hz), 7.01 – 6.98 (m), 3.82 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 156.51, 138.60, 130.95, 130.77, 129.60, 128.67, 128.03, 126.97, 120.88, 111.28, 55.59 ppm.

1-([1,1'-Biphenyl]-2-yl)ethanone[S2] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.56 (dd, J = 6.1, 0.9 Hz), 7.52 (td, J = 6.0, 1.1 Hz), 7.46 – 7.38 (m), 7.35 (t, J = 1.6 Hz), 7.34 (t, J = 1.2 Hz), 2.01 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 204.89, 140.92, 140.75, 140.54, 130.74, 130.26, 128.88, 128.70, 127.90, 127.47, 30.45 ppm.

4-Methoxy-1,1'-biphenyl[S1] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.61 – 7.54 (m), 7.45 (t, J = 6.2 Hz), 7.34 (t, J = 5.9 Hz), 7.04 – 6.99 (m), 3.89 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 159.20, 140.87, 133.81, 128.78, 128.20, 126.78, 126.71, 114.25, 55.36 ppm.

4-Nitro-1,1'-biphenyl[S1] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 8.33 (d, J = 7.0 Hz), 7.77 (d, J = 7.0 Hz), 7.66 (d, J = 6.0 Hz), 7.53 (t, J = 6.0 Hz), 7.48 (t, J = 5.8 Hz) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 147.63, 147.09, 138.76, 129.17, 128.94, 127.80, 127.39, 124.11 ppm.

1-([1,1'-Biphenyl]-4-yl)ethanone[S1] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 8.04 (d, J = 6.6 Hz), 7.69 (d, J = 6.6 Hz), 7.63 (d, J = 5.9 Hz), 7.47 (t, J = 6.0 Hz), 7.40 (t, J = 5.9 Hz), 2.64 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 197.75,

145.78, 139.88, 135.86, 128.95, 128.25, 127.27, 127.24, 26.68 ppm.

Methyl 6-phenyl-2-naphthoate[S3] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 8.66 (s), 8.14 – 8.08 (m), 8.05 (d, J = 6.8 Hz), 7.96 (d, J = 6.9 Hz), 7.84 (dd, J = 6.8, 1.4 Hz), 7.76 (d, J = 6.8 Hz), 7.53 (t, J = 6.1 Hz), 7.44 (t, J = 5.9 Hz), 4.03 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 167.23, 140.95, 140.55, 135.82, 131.65, 130.83, 129.88, 128.98, 128.41, 127.85, 127.49, 127.38, 126.41, 125.71, 125.57, 52.25 ppm.

2-Methoxy-6-phenylnaphthalene[S3] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 8.01 (d, J = 1.2 Hz), 7.84 (t, J = 6.3 Hz), 7.75 (ddd, J = 6.3, 4.9, 1.1 Hz), 7.54 – 7.48 (m), 7.44 – 7.36 (m), 7.23 – 7.18 (m), 3.98 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 157.81, 141.25, 136.42, 133.82, 129.77, 129.23, 128.87, 127.27, 127.11, 126.08, 125.66, 119.20, 105.62, 55.36 ppm.

1,1'-Biphenyl[S4] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.64 (d, J = 5.7 Hz), 7.48 (t, J = 6.1 Hz), 7.39 (t, J = 5.9 Hz) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 141.30, 128.81, 127.30, 127.23 ppm.

1,1':4',1''-Terphenyl[S5] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.67 (s), 7.64 (d, J = 5.7 Hz), 7.46 (t, J = 6.1 Hz), 7.36 (t, J = 5.9 Hz) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 140.73, 140.15, 128.83, 127.51, 127.36, 127.07 ppm.

2-Chloro-1,1'-biphenyl[S4] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.50 (dd, J = 7.7, 1.5 Hz, 1H), 7.47 (s, 2H), 7.47 (d, J = 3.0 Hz, 2H), 7.44 – 7.39 (m, 1H), 7.37 (dd, J = 7.4, 2.0 Hz, 1H), 7.35 (dd, J = 7.2, 1.4 Hz, 1H), 7.33 – 7.29 (m, 1H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 140.59, 139.47, 132.56, 131.42,

129.98, 129.49, 128.56, 128.08, 127.64, 126.85 ppm.

3-Methoxy-1,1'-biphenyl[S6] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.64 – 7.60 (m, 1H), 7.46 (t, J = 7.6 Hz, 1H), 7.38 (dt, J = 7.3, 4.0 Hz, 1H), 7.21 (d, J = 7.6 Hz, 1H), 7.18 – 7.15 (m, 1H), 6.93 (dd, J = 8.2, 2.5 Hz, 1H), 3.89 (s, 1H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 160.01, 142.83, 141.16, 129.79, 128.78, 127.46, 127.24, 119.73, 112.96, 112.73, 55.32 ppm.

[1,1'-Biphenyl]-3-carbonitrile[S7] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.88 (s, 1H), 7.83 (d, J = 7.9 Hz, 1H), 7.65 (d, J = 7.7 Hz, 1H), 7.60 – 7.54 (m, 3H), 7.50 (t, J = 7.6 Hz, 2H), 7.44 (t, J = 7.3 Hz, 1H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 142.45, 138.87, 131.49, 130.70, 129.61, 129.14, 128.41, 127.09, 118.85, 112.97 ppm.

4-Fluoro-1,1'-biphenyl[S4] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.61 – 7.55 (m), 7.49 – 7.44 (m), 7.40 – 7.35 (m), 7.19 – 7.13 (m) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 163.49, 161.53, 140.29, 137.38, 128.85, 128.74, 128.69, 127.29, 127.05, 115.72, 115.55 ppm.

4-Methyl-1,1'-biphenyl[S5] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.62 (dd, J = 8.1, 1.0 Hz, 1H), 7.53 (d, J = 8.1 Hz, 1H), 7.46 (t, J = 7.7 Hz, 1H), 7.36 (t, J = 7.4 Hz, 1H), 7.31 – 7.27 (m, 1H), 2.43 (s, 1H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 141.23, 138.43, 137.05, 129.53, 128.76, 127.03, 21.14 ppm.

[1,1'-Biphenyl]-3-carbaldehyde[S6] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 10.11 (s, 1H), 8.13 (t, J = 1.6 Hz, 1H), 7.88 (dd, J = 7.7, 1.6 Hz, 2H), 7.64 (ddd, J = 13.1, 8.7, 4.5 Hz, 3H), 7.50 (dd, J = 10.6, 4.8 Hz, 2H), 7.42 (dd, J = 8.2, 6.5

Hz, 1H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 192.33, 142.17, 139.70, 136.95, 133.05, 129.50, 129.02, 128.63, 128.19, 128.03, 127.15 ppm.

Methyl [1,1'-biphenyl]-4-carboxylate[S4] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 8.15 – 8.10 (m), 7.70 – 7.66 (m), 7.65 (dd, J = 4.2, 2.7 Hz), 7.49 (dd, J = 8.3, 3.8 Hz), 7.44 – 7.39 (m), 3.96 (s) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 166.99, 145.64, 140.01, 130.11, 128.93, 128.15, 127.28, 127.05, 52.11 ppm.

3-Phenylquinoline[S9] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 9.19 (d, J = 2.1 Hz, 1H), 8.29 (d, J = 2.1 Hz, 1H), 8.16 (d, J = 8.4 Hz, 1H), 7.87 (d, J = 7.9 Hz, 1H), 7.75 – 7.67 (m, 3H), 7.60 – 7.55 (m, 1H), 7.55 – 7.50 (m, 2H), 7.44 (ddd, J = 7.4, 4.0, 1.1 Hz, 1H). ^{13}C NMR (125 MHz, $CDCl_3$) δ = 149.94, 147.33, 137.89, 133.88, 133.30, 129.45, 129.22, 128.16, 128.06, 127.46, 127.06.

1-(5-Phenylthiophen-2-yl)ethanone[S4] ^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.65 (m, 3H), 7.44 – 7.39 (m, 2H), 7.39 – 7.34 (m, 1H), 7.31 (d, J = 3.9 Hz, 1H), 2.56 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ = 190.62, 152.80, 143.14, 133.49, 133.37, 129.16, 129.08, 126.31, 123.94, 26.59.

4. References

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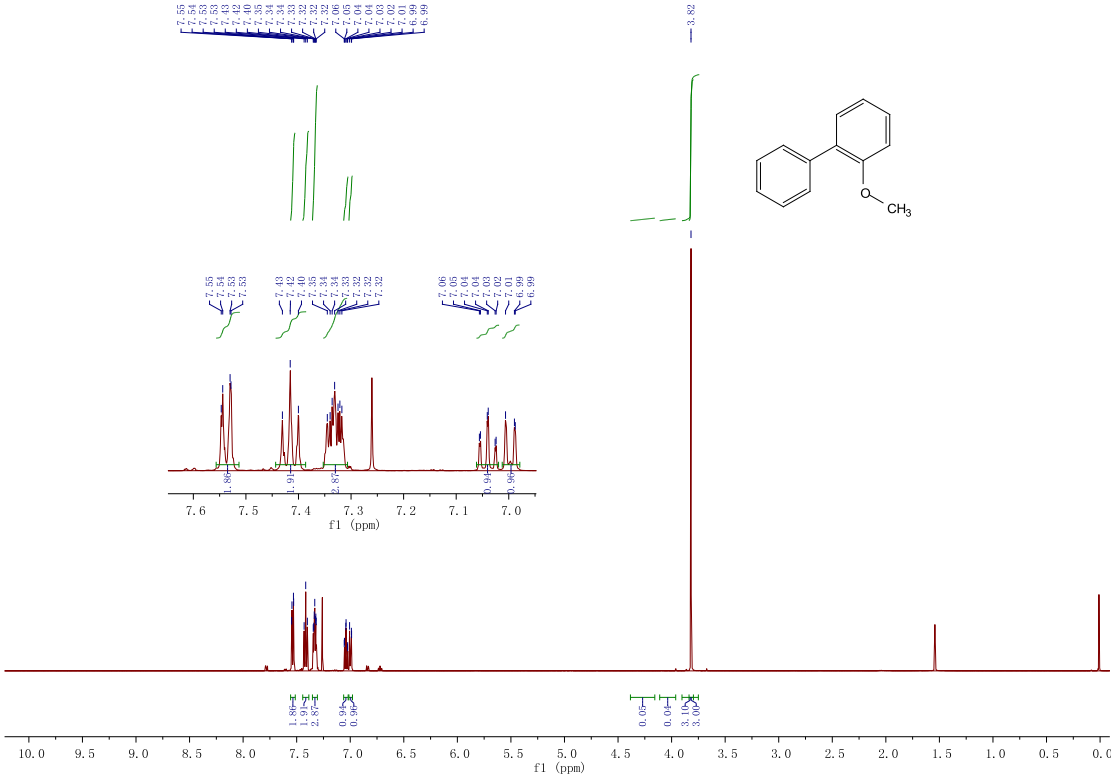
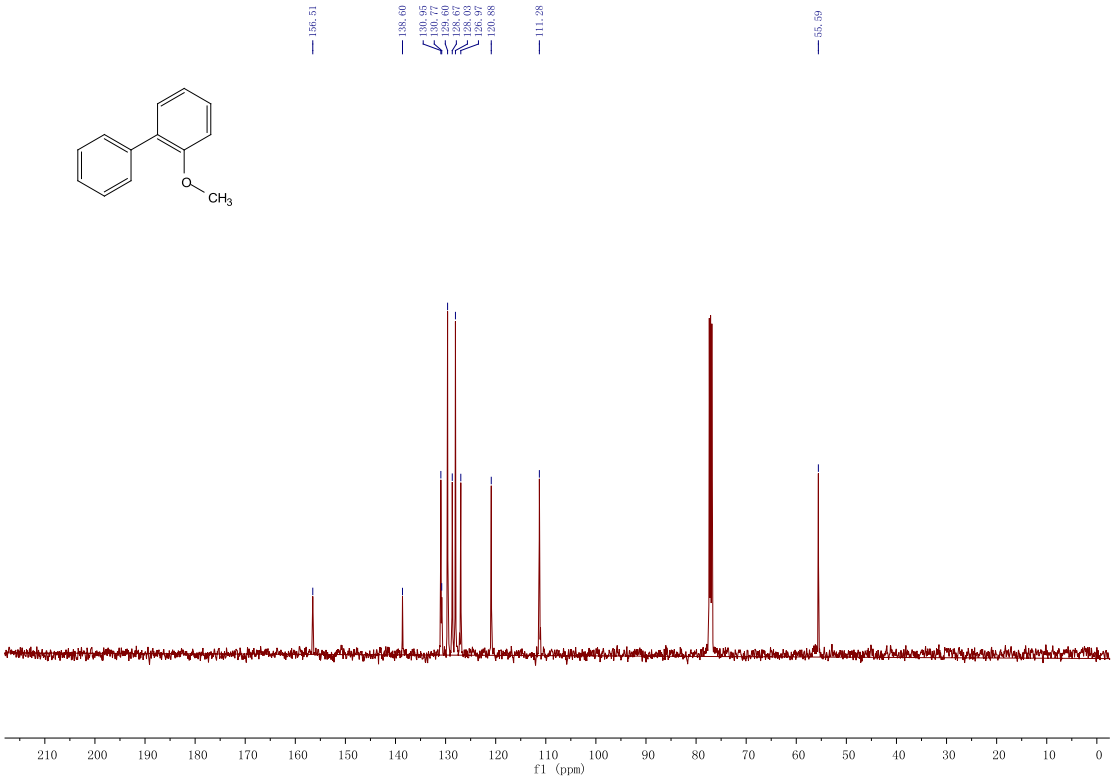
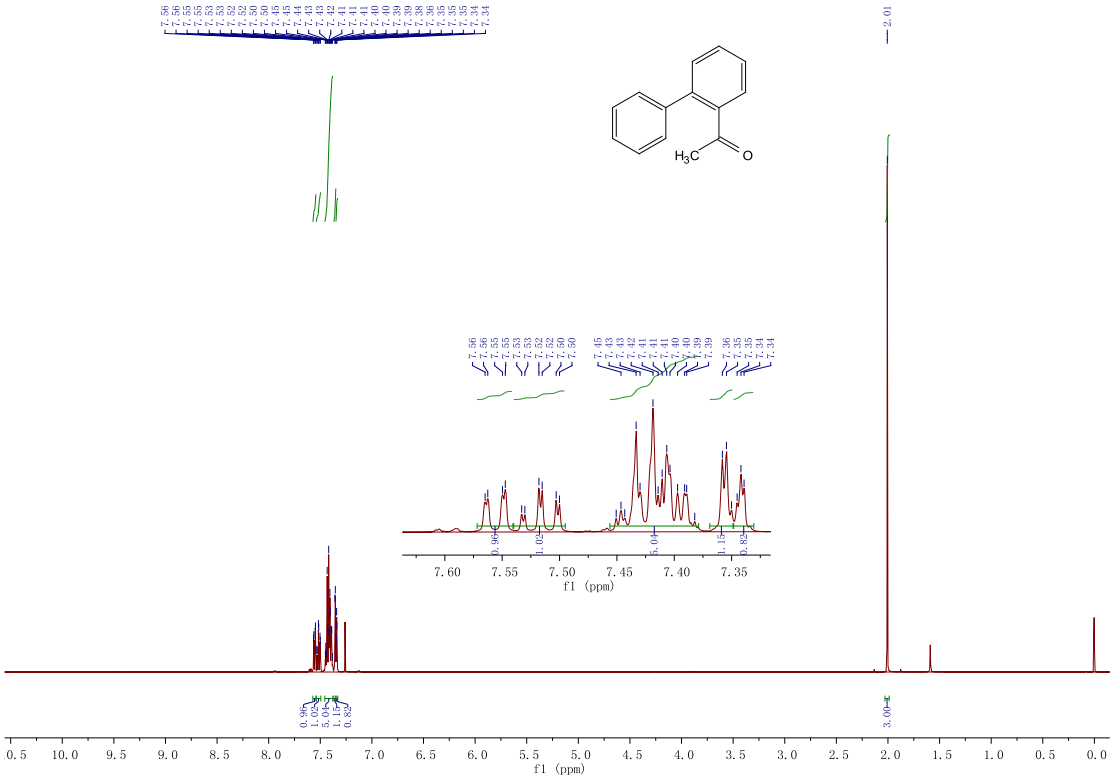
5. ^{1}H and ^{13}C-NMR spectra of products of the photocatalytic Suzuki coupling reactions using different substrates.



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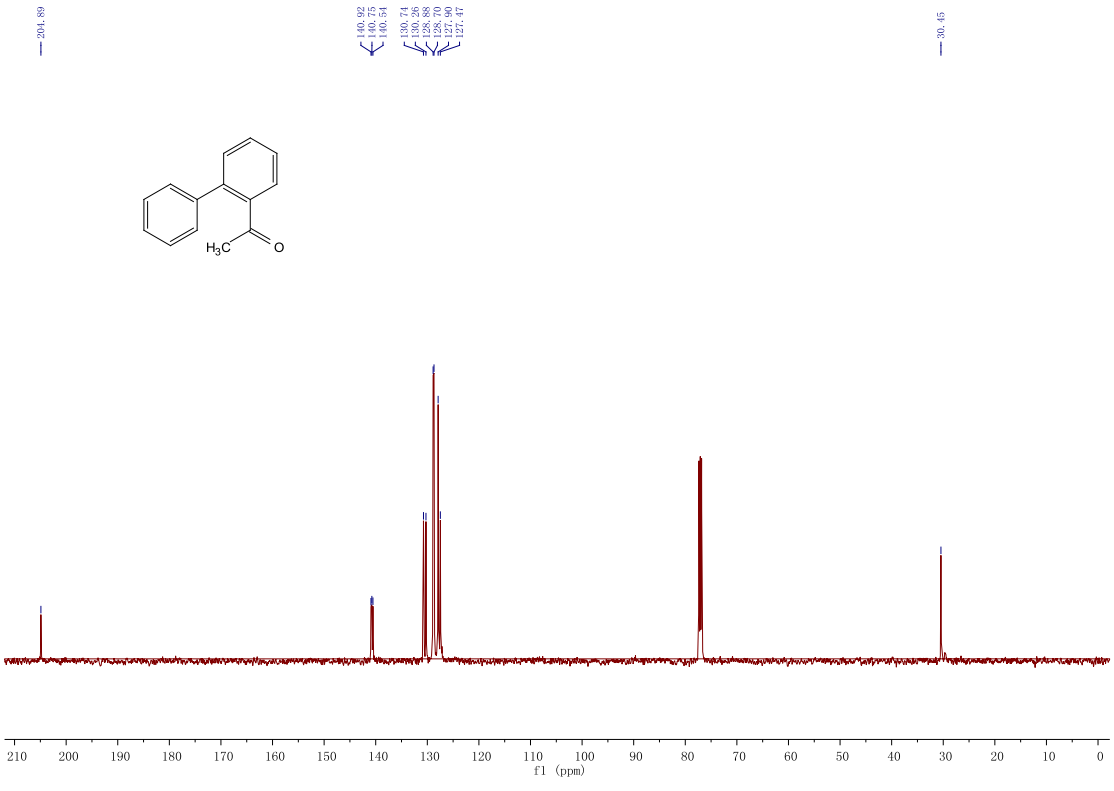
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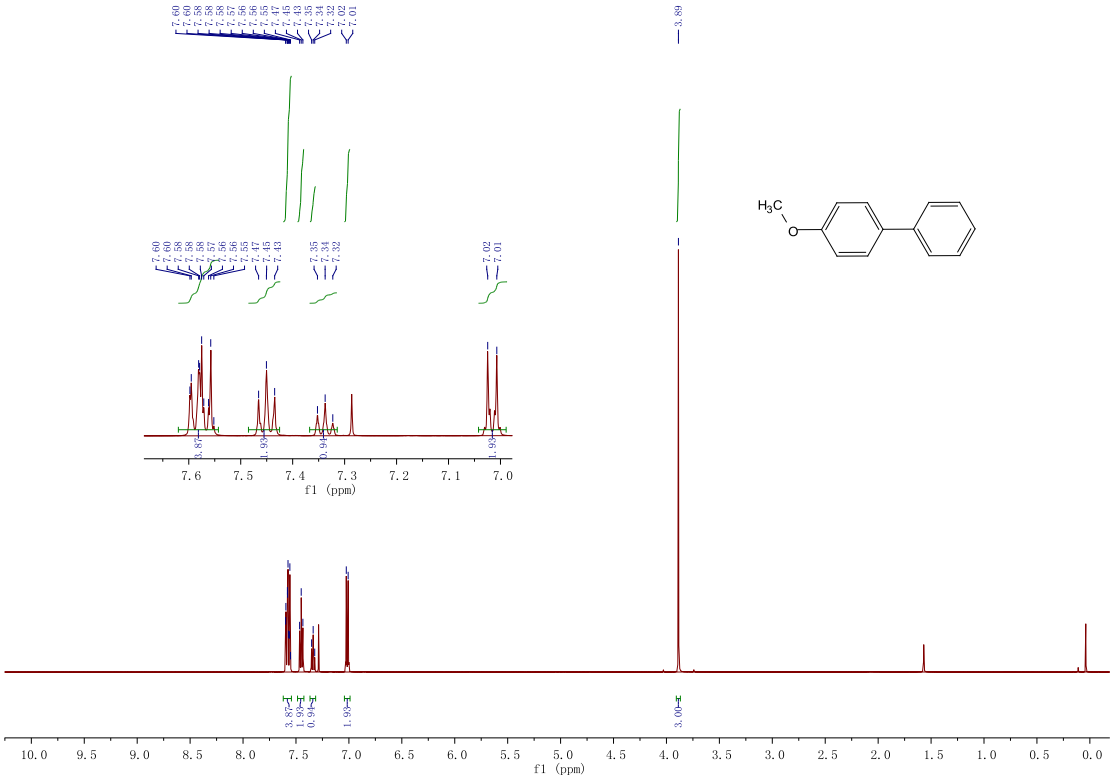
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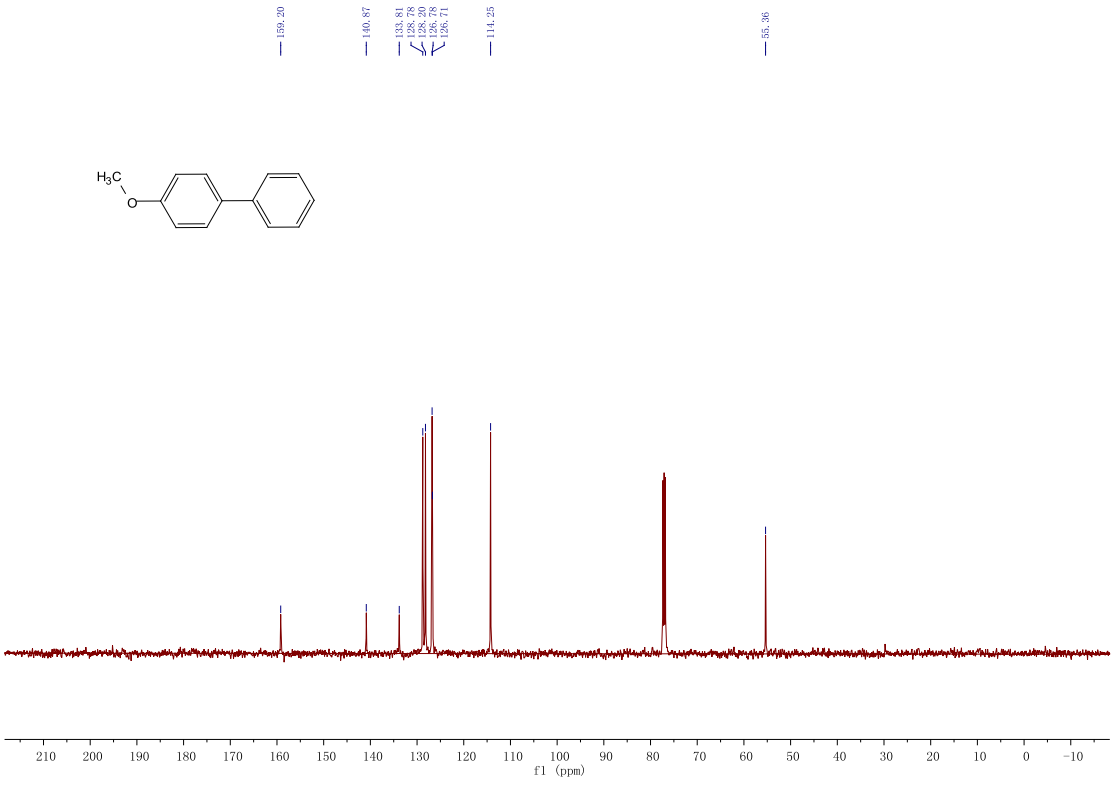
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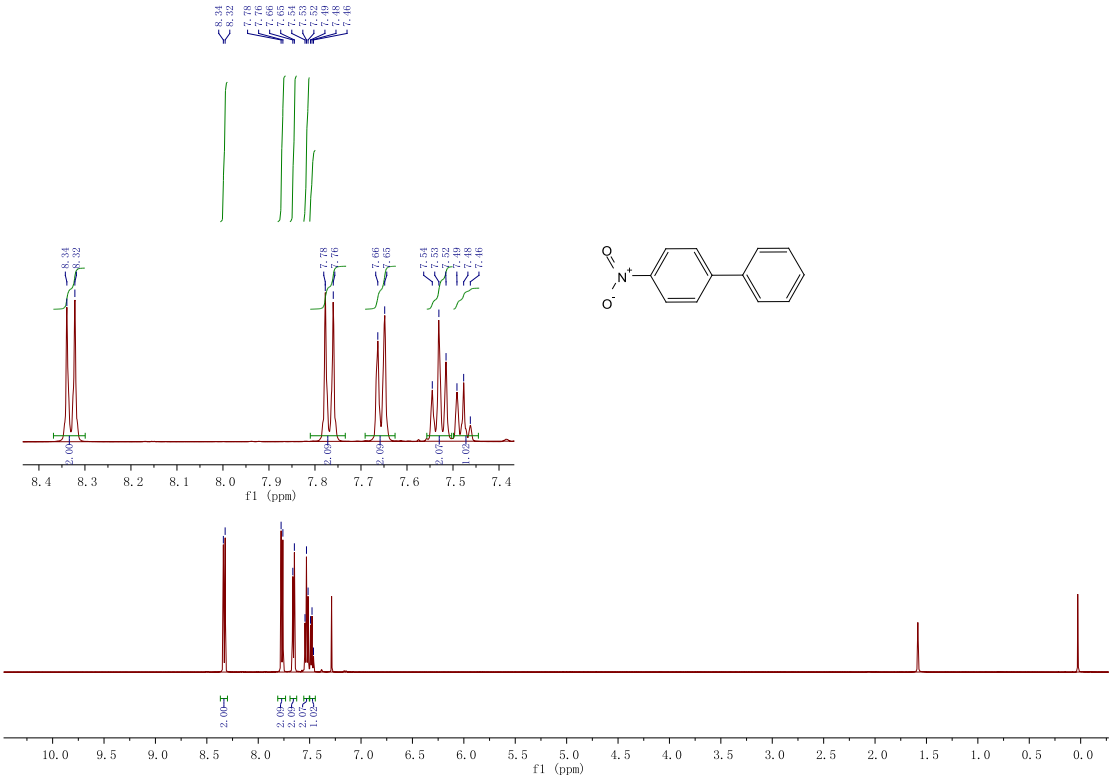
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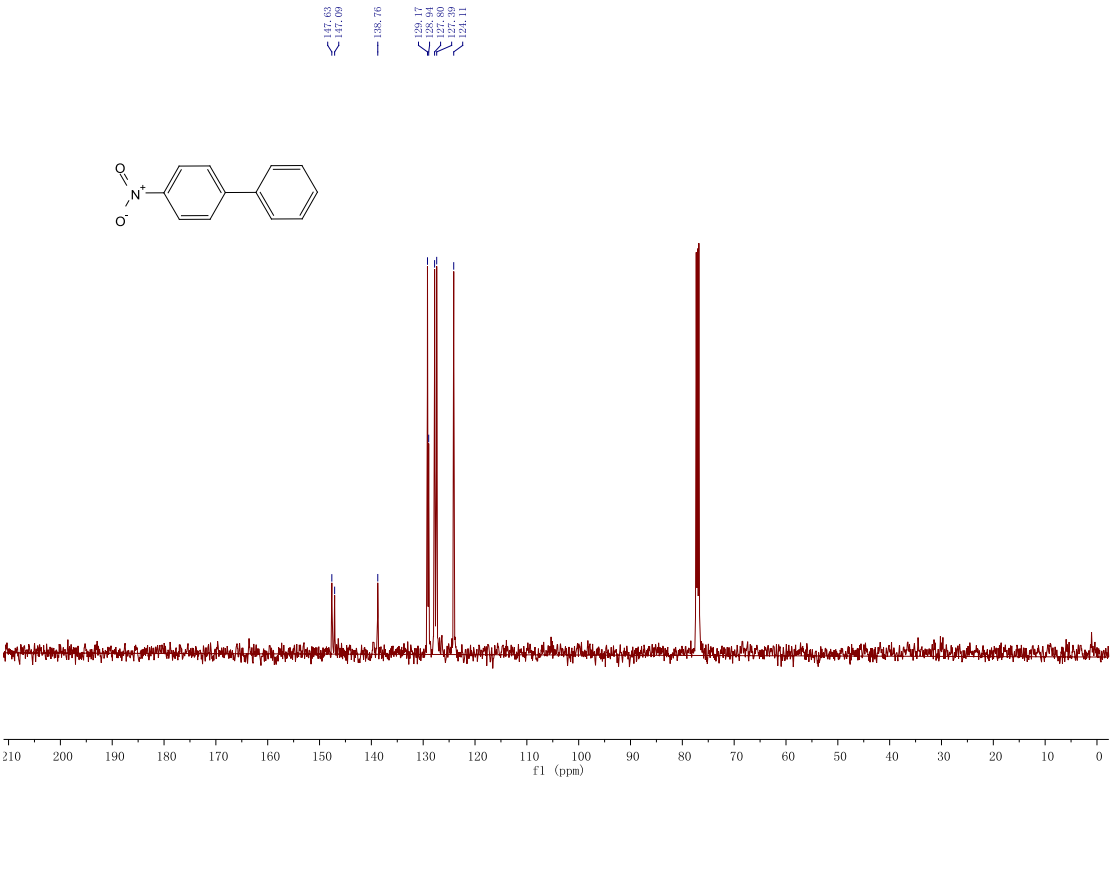
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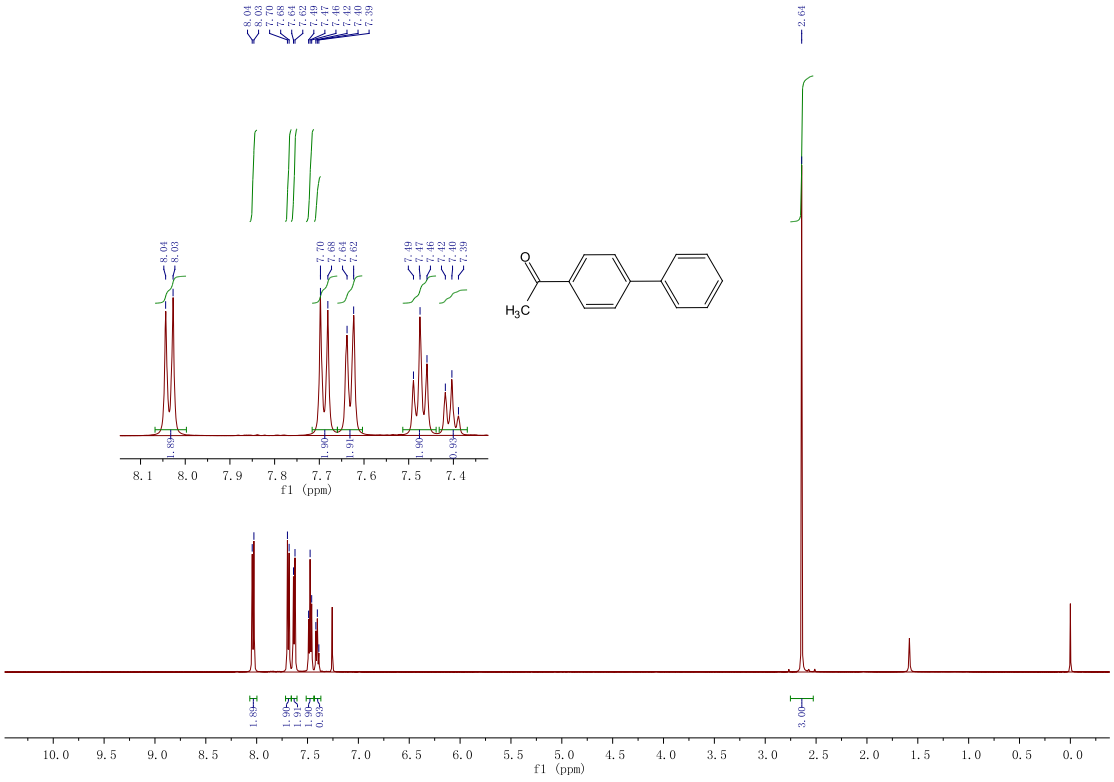
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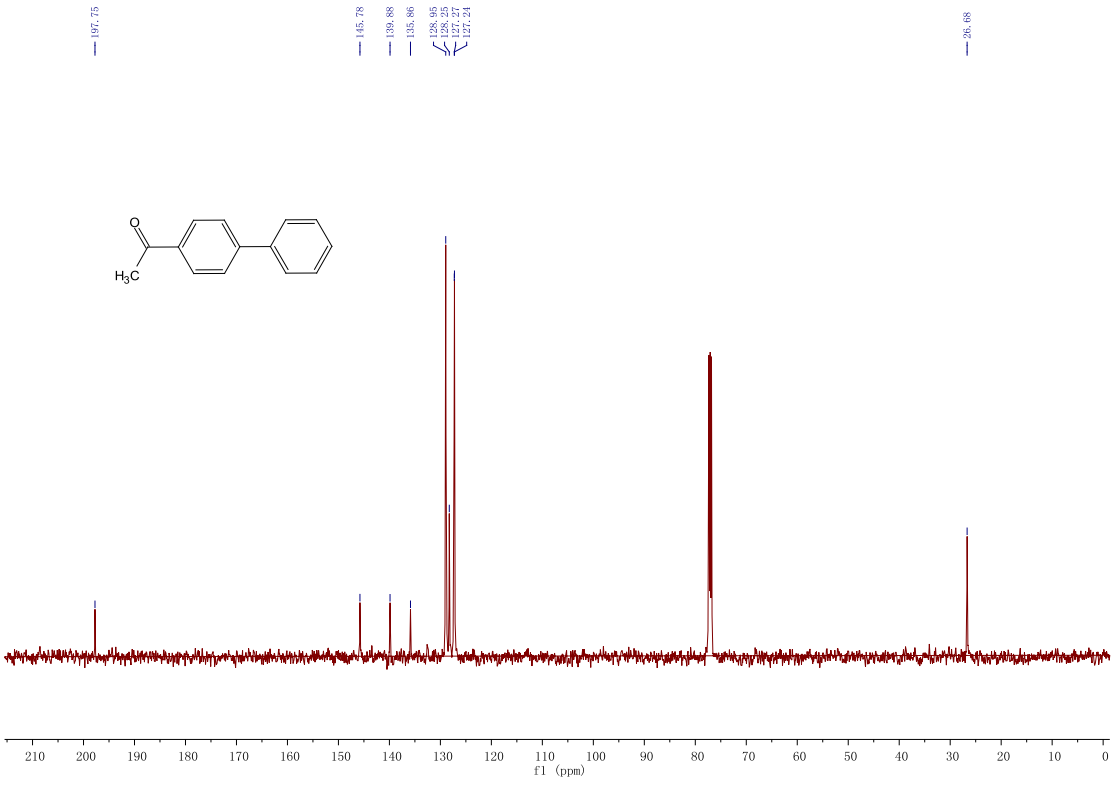
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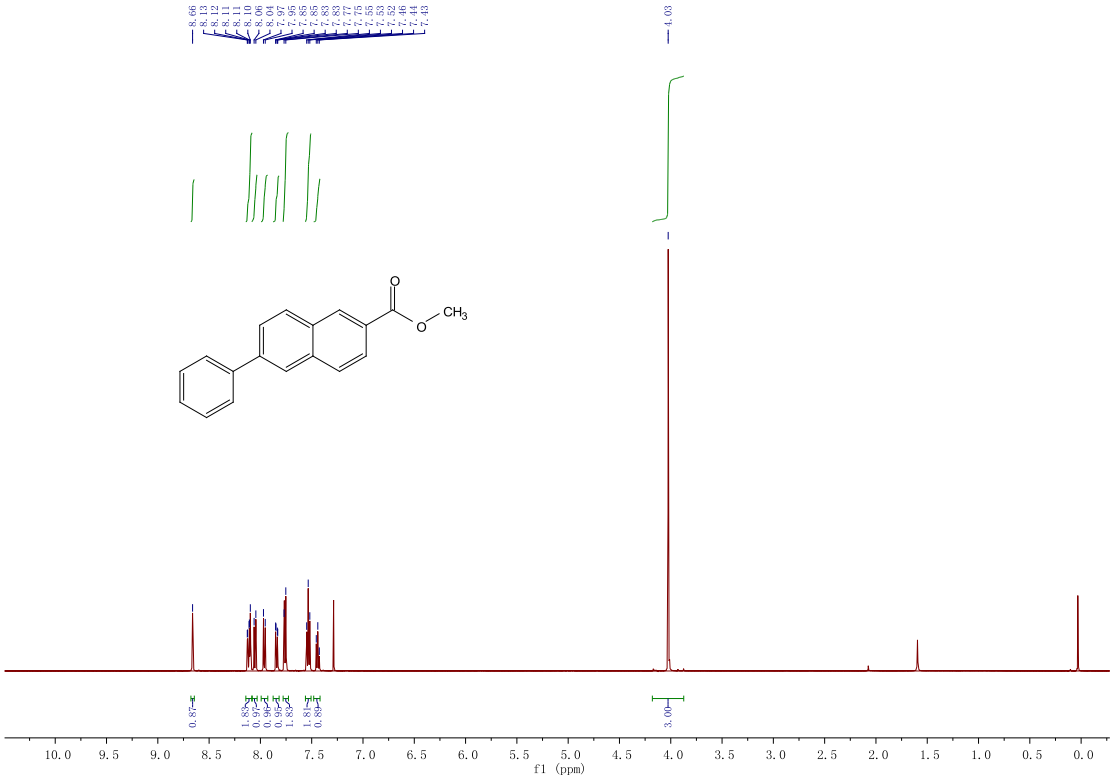
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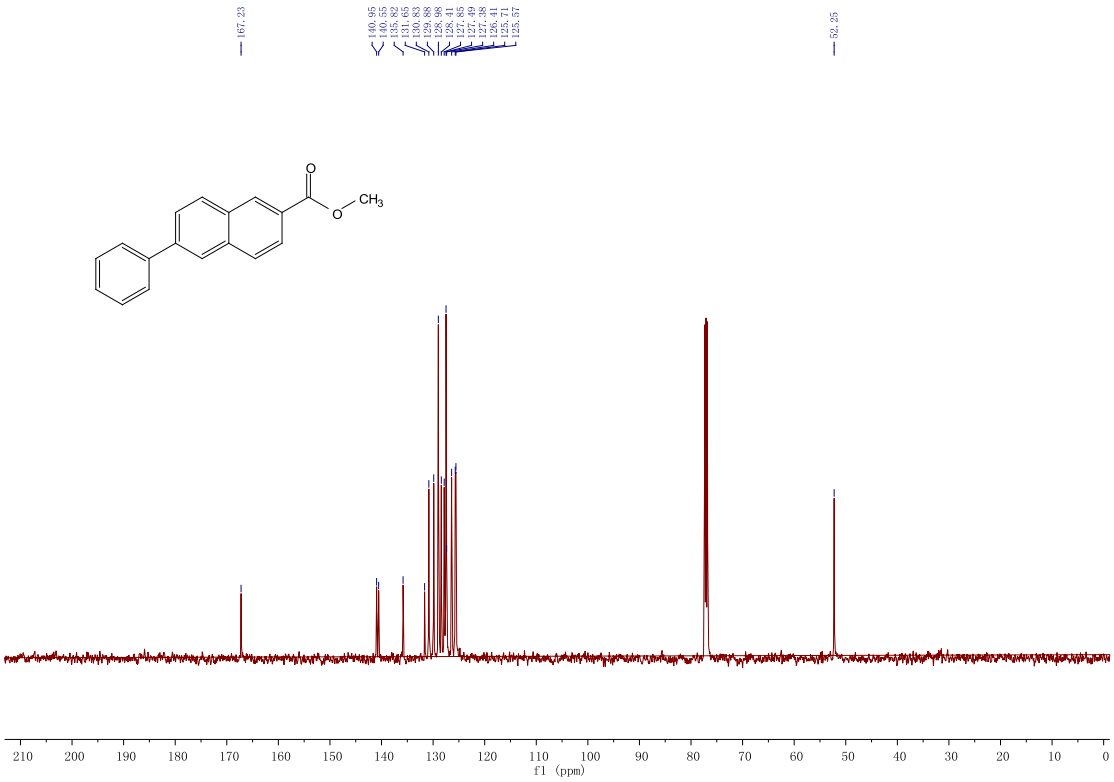
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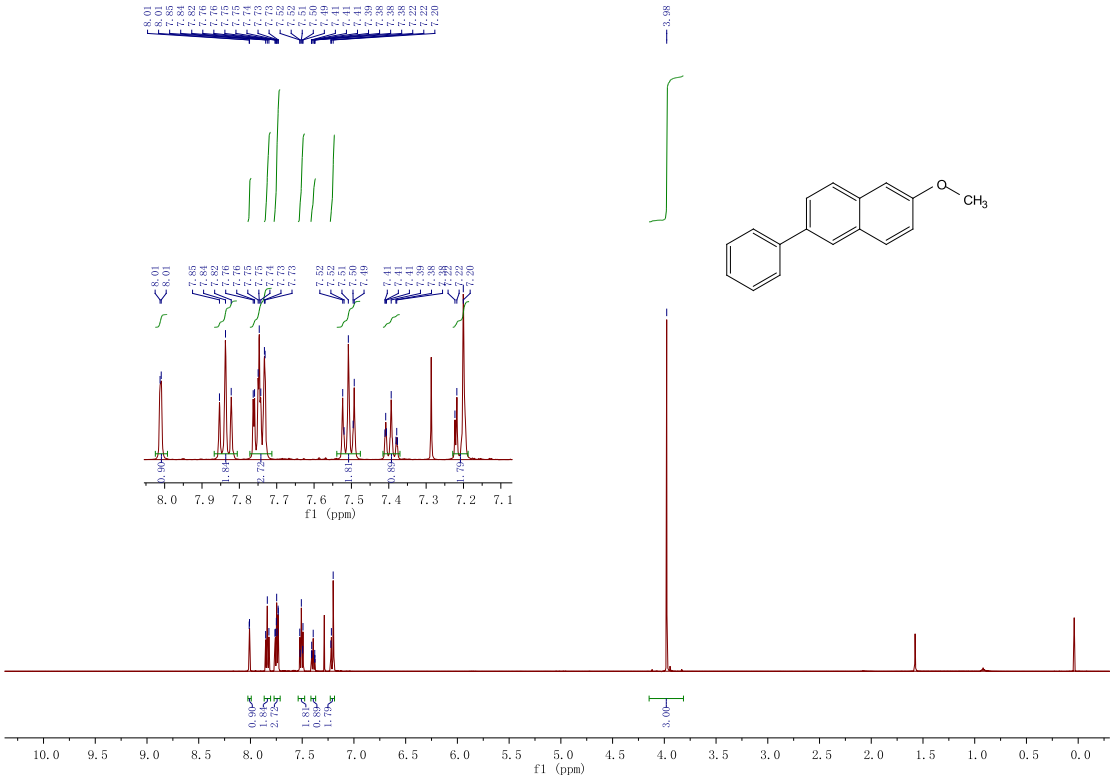
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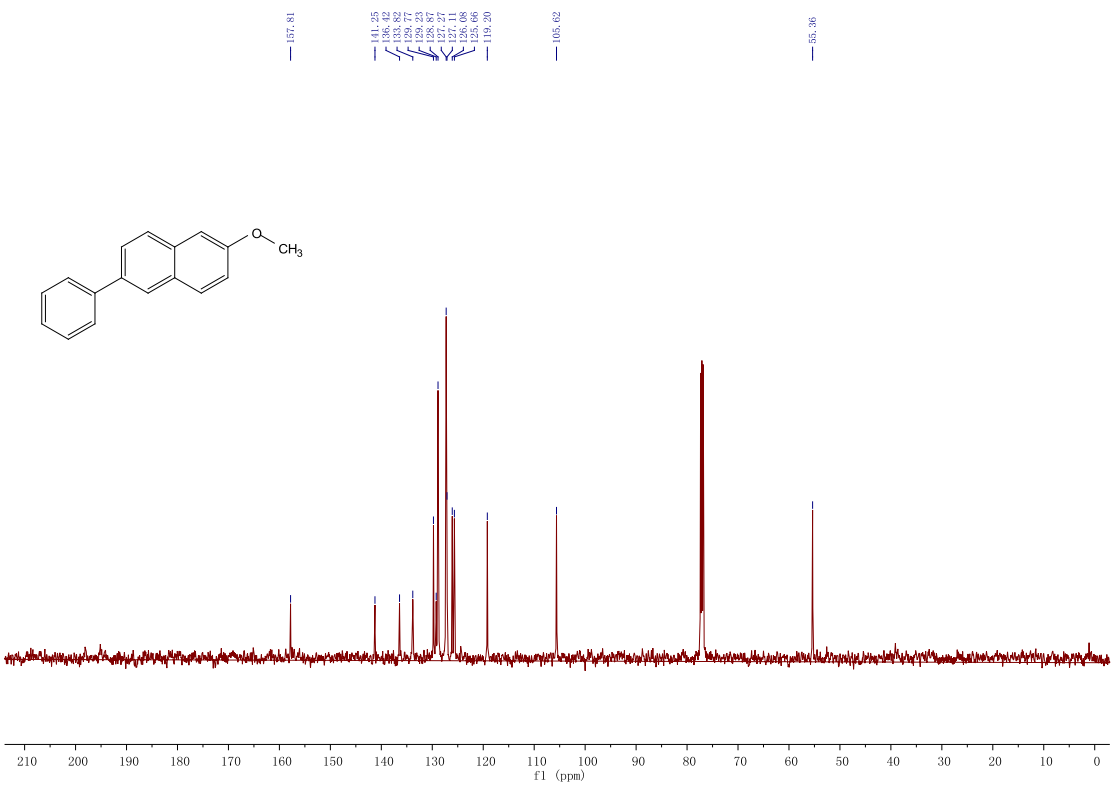
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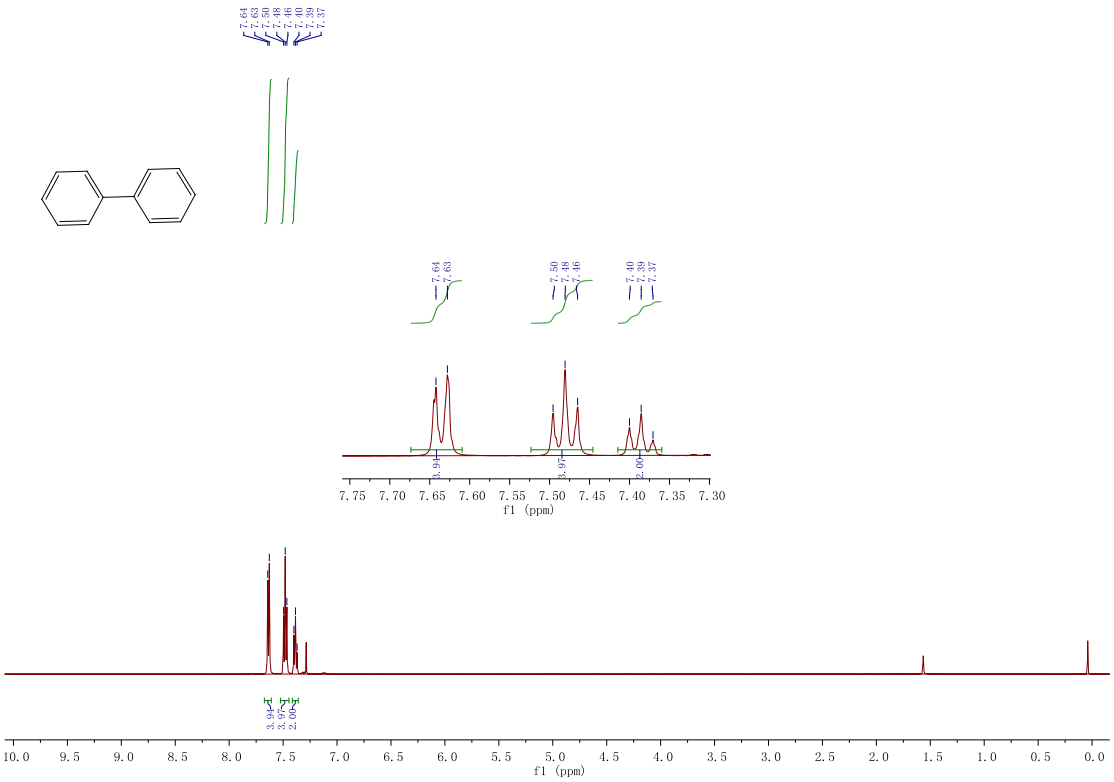
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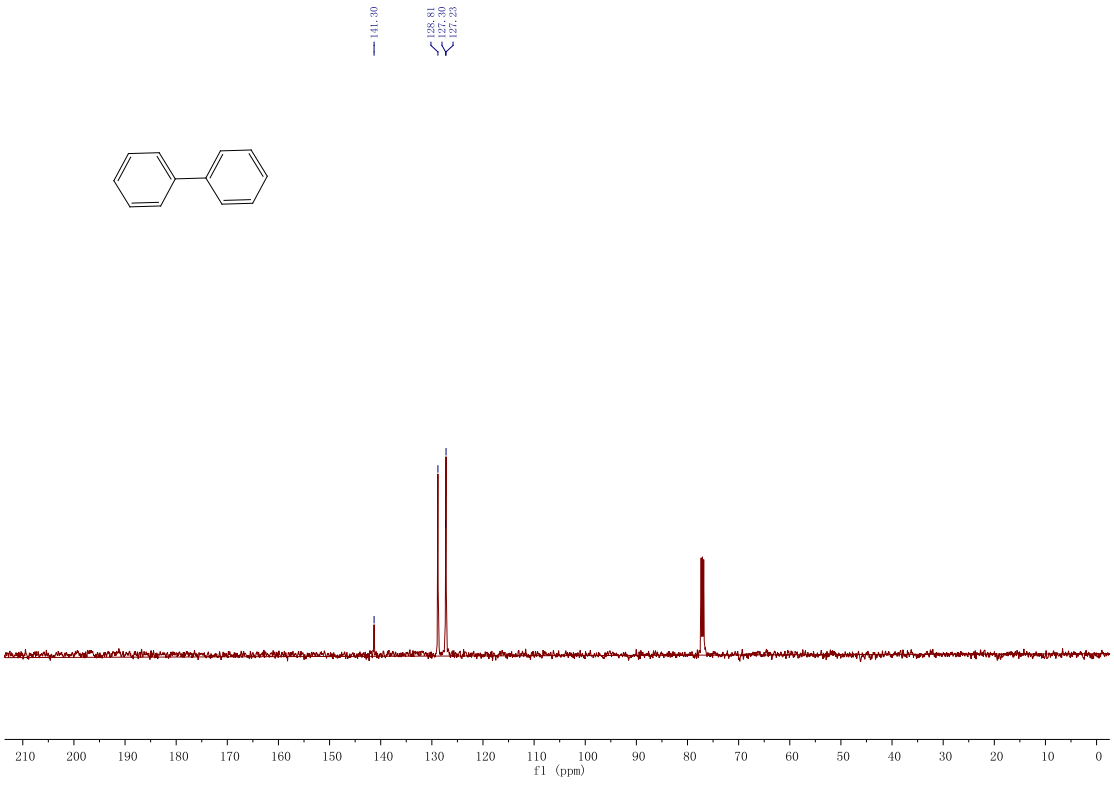
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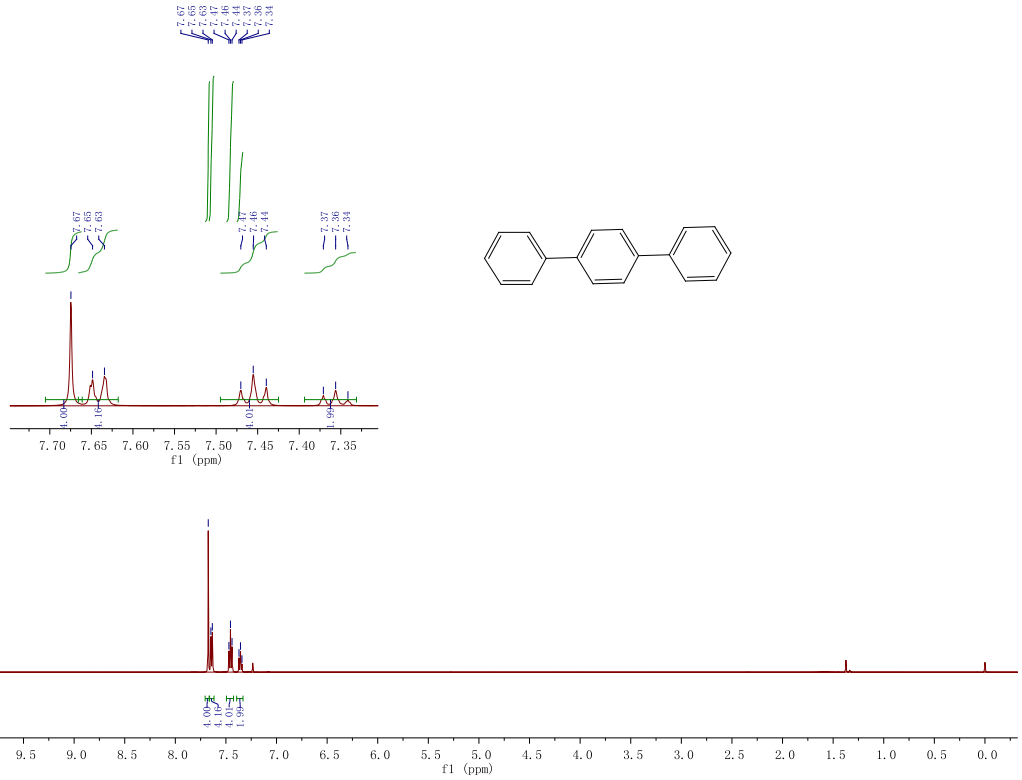
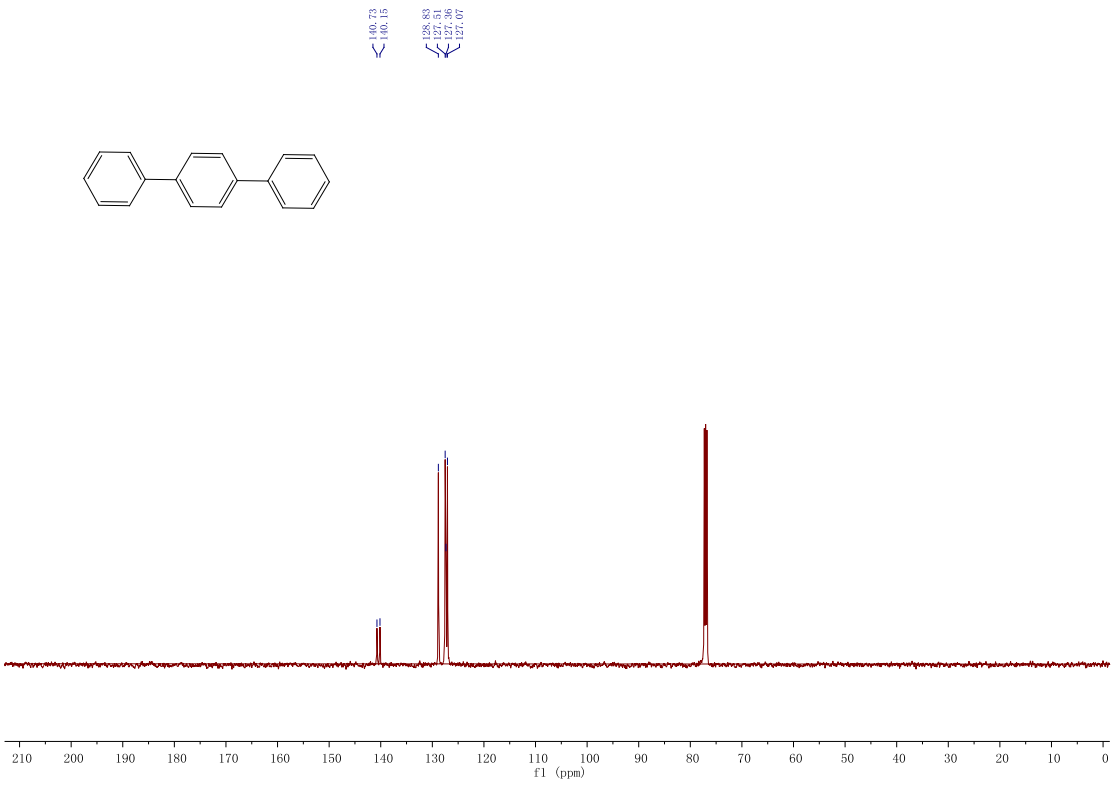
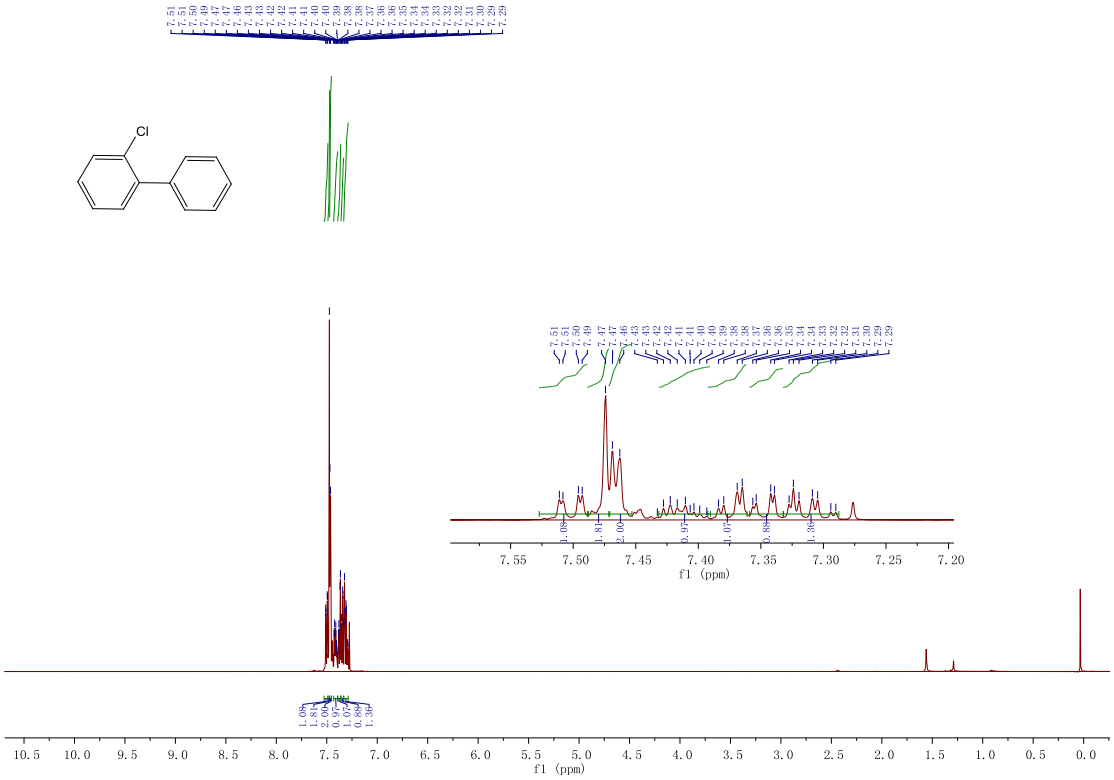
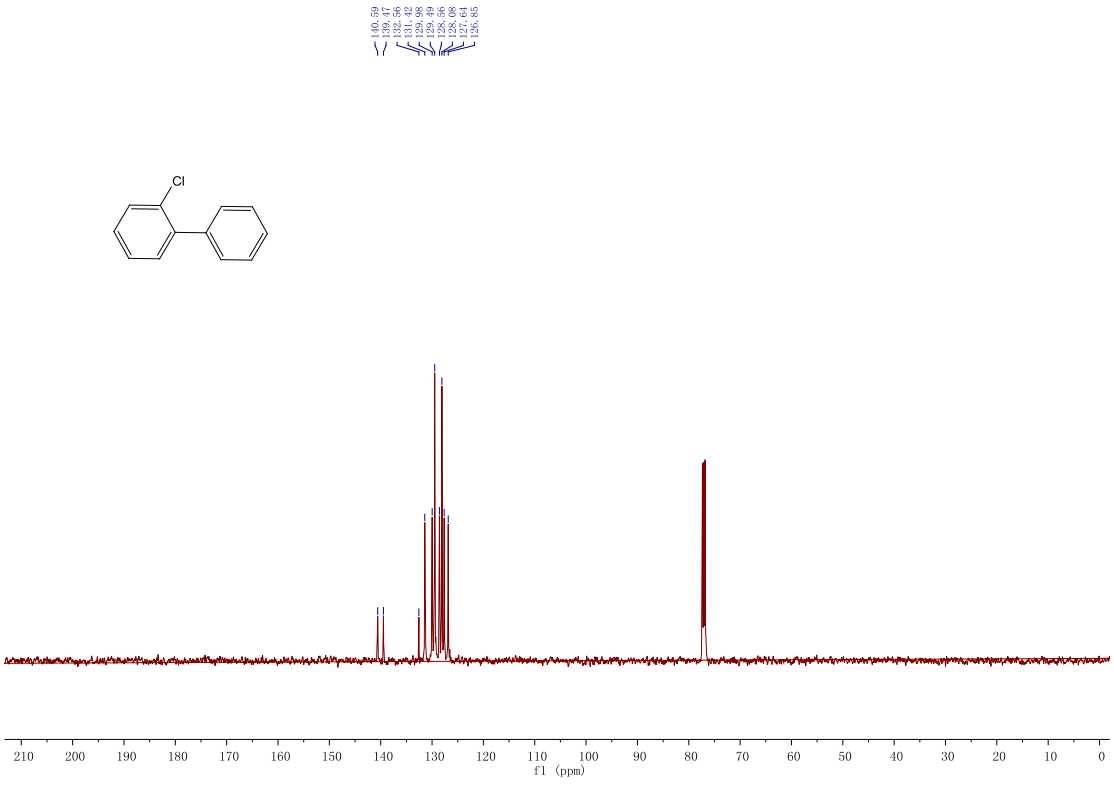
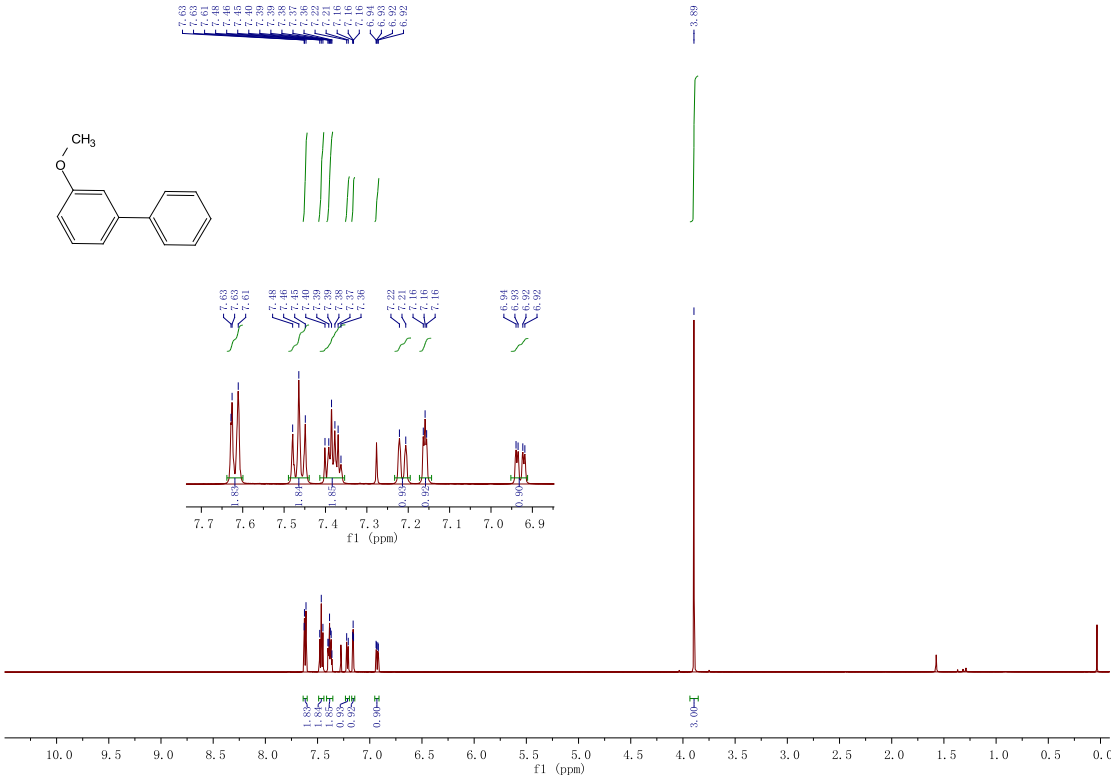
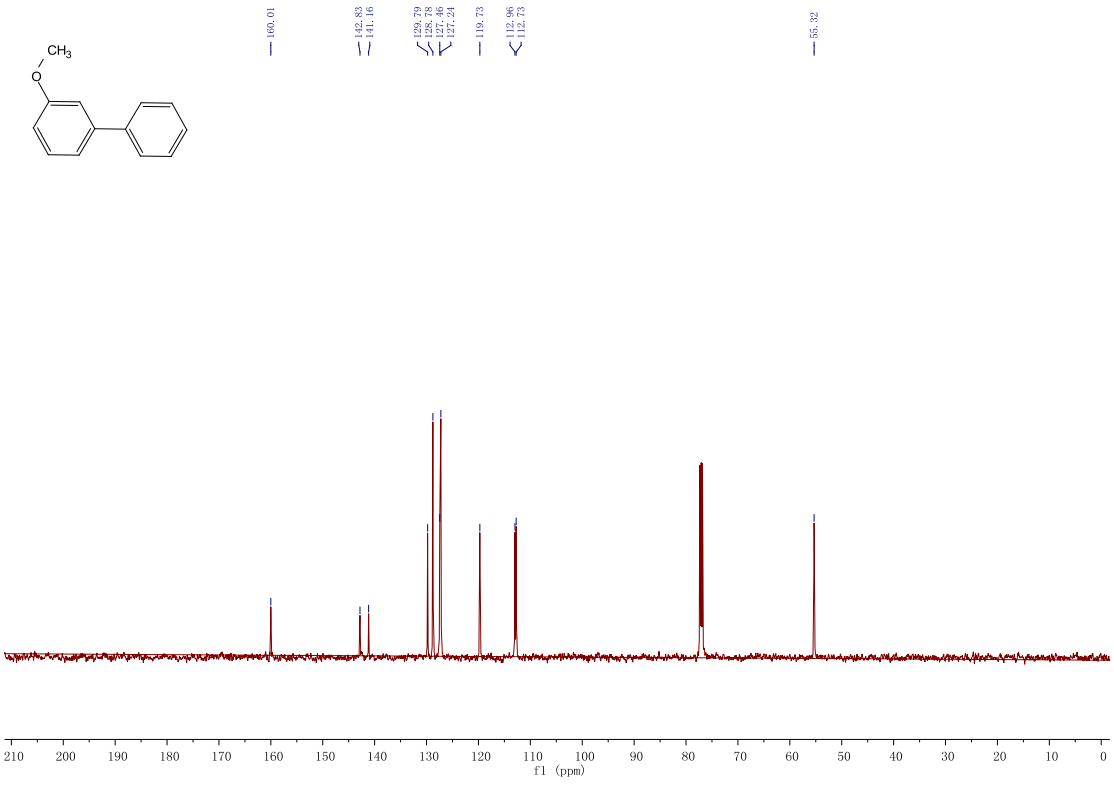

7.67
7.65
7.63
7.47
7.46
7.44
7.37
7.36
7.34
4.00
4.16
4.01
1.99
7.70 7.65 7.60 7.55 7.50 7.45 7.40 7.35
f1 (ppm)
4.00
4.16
4.01
1.99
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

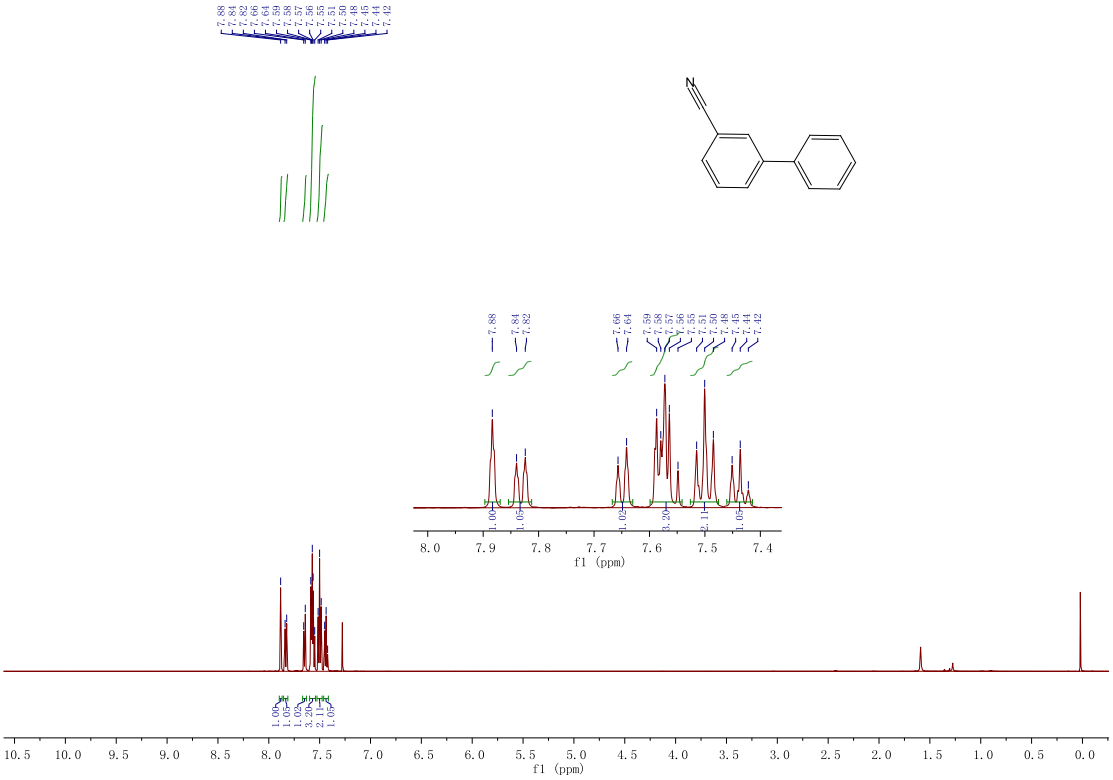

140.73
140.15
128.83
127.31
127.36
127.07
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

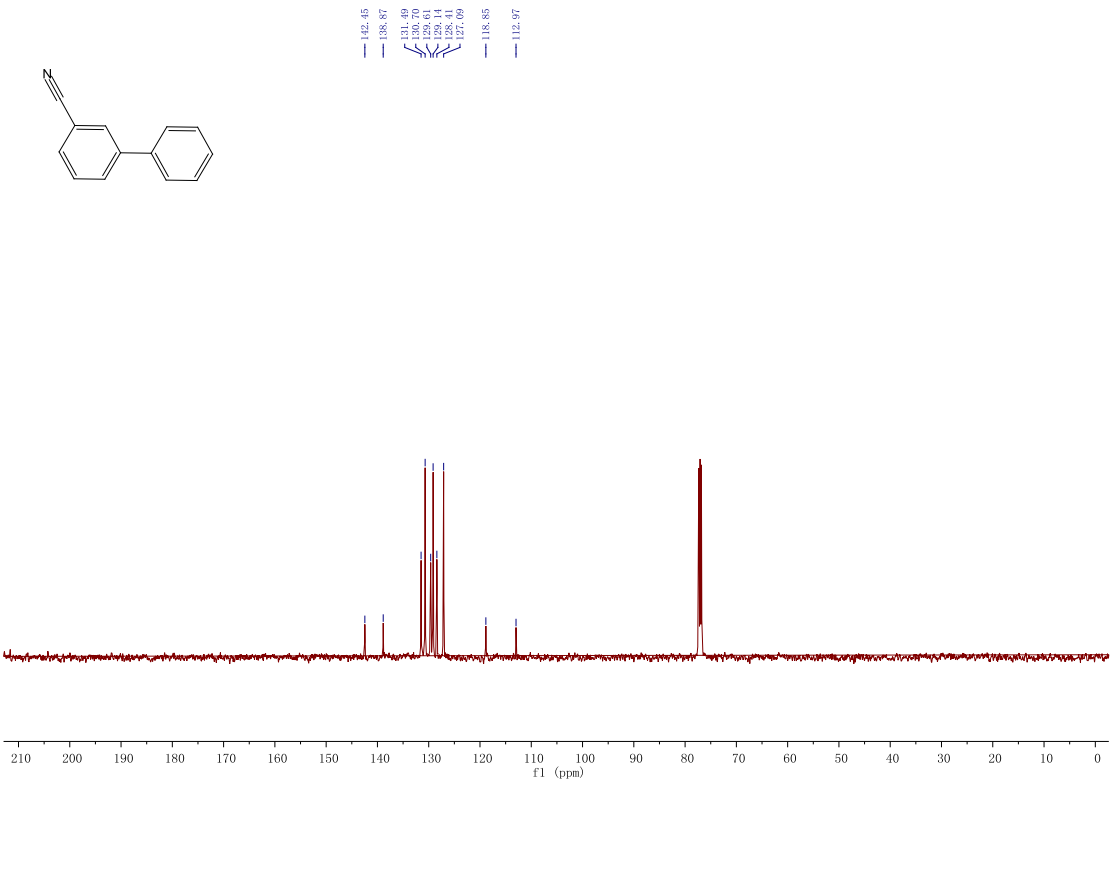

Cl
f1 (ppm)

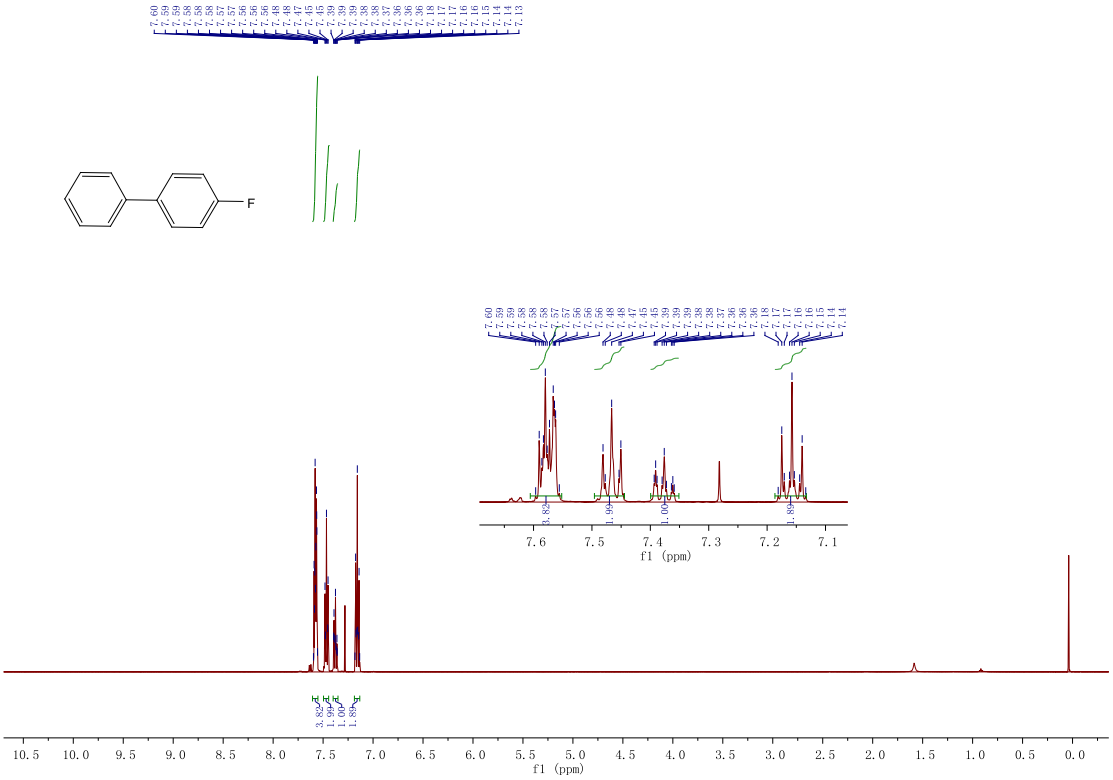

Cl
f1 (ppm)

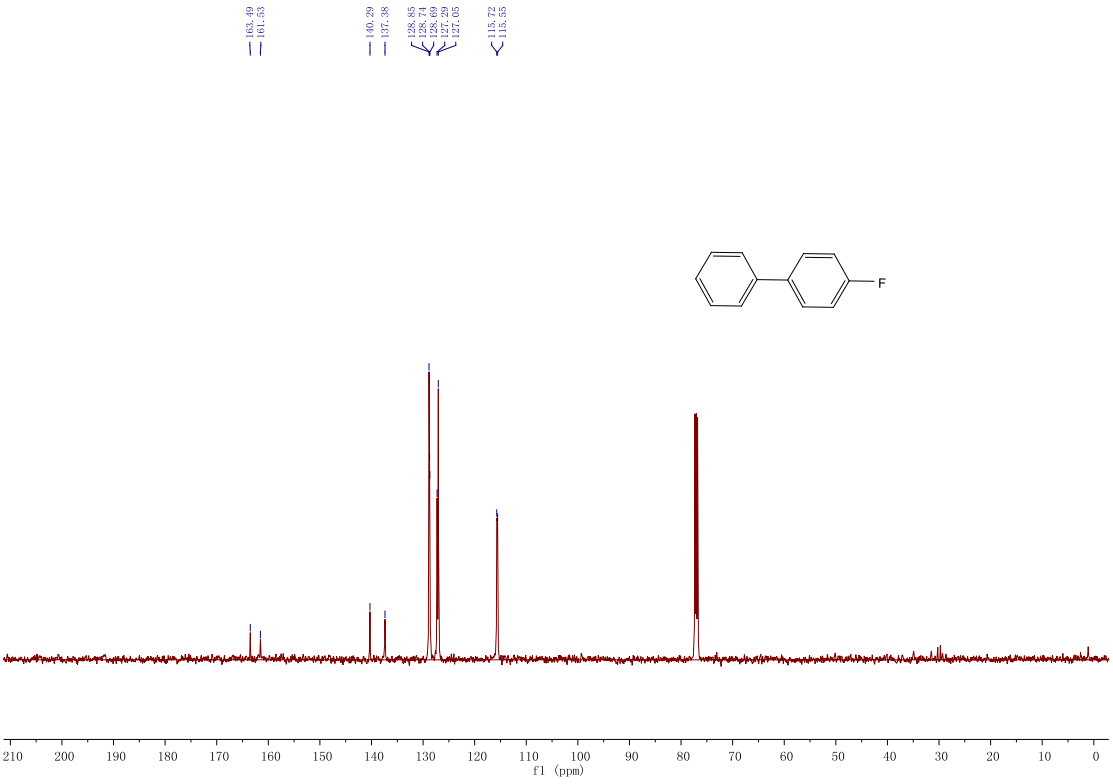

7.63
7.63
7.61
7.48
7.46
7.45
7.40
7.39
7.38
7.37
7.36
7.22
7.21
7.16
7.16
6.94
6.93
6.92
6.92
3.89
CH3
O
1.83
1.84
1.85
0.95
0.95
0.90
3.00
f1 (ppm)

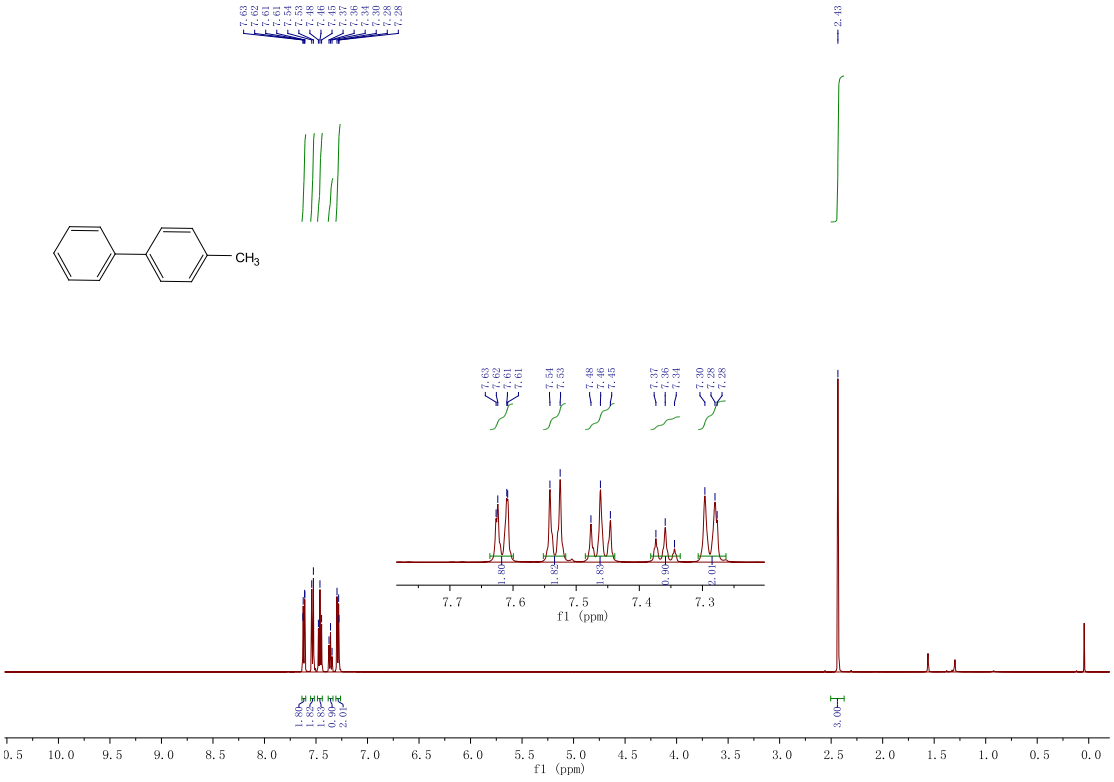

160.01
142.83
141.16
129.79
128.78
127.46
127.24
119.73
112.96
112.73
55.32
CH3
O
f1 (ppm)

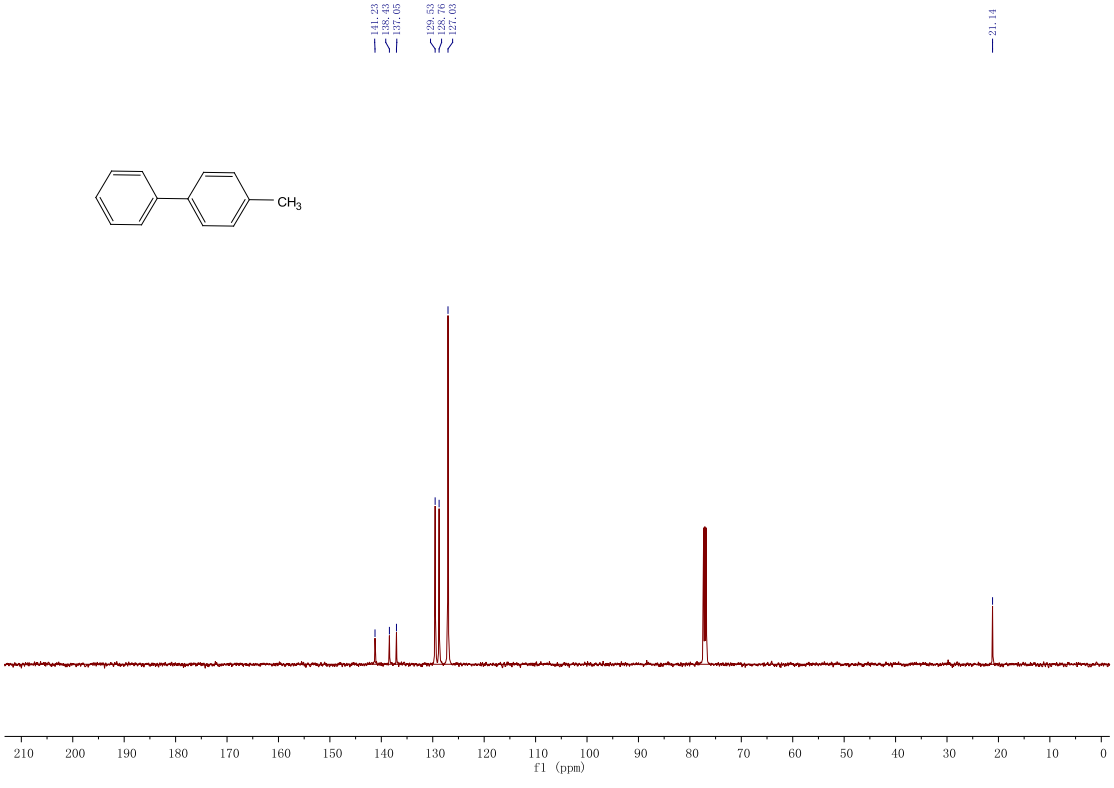

7.88
7.84
7.82
7.66
7.64
7.59
7.58
7.57
7.56
7.55
7.51
7.50
7.48
7.45
7.44
7.42
N
f1 (ppm)

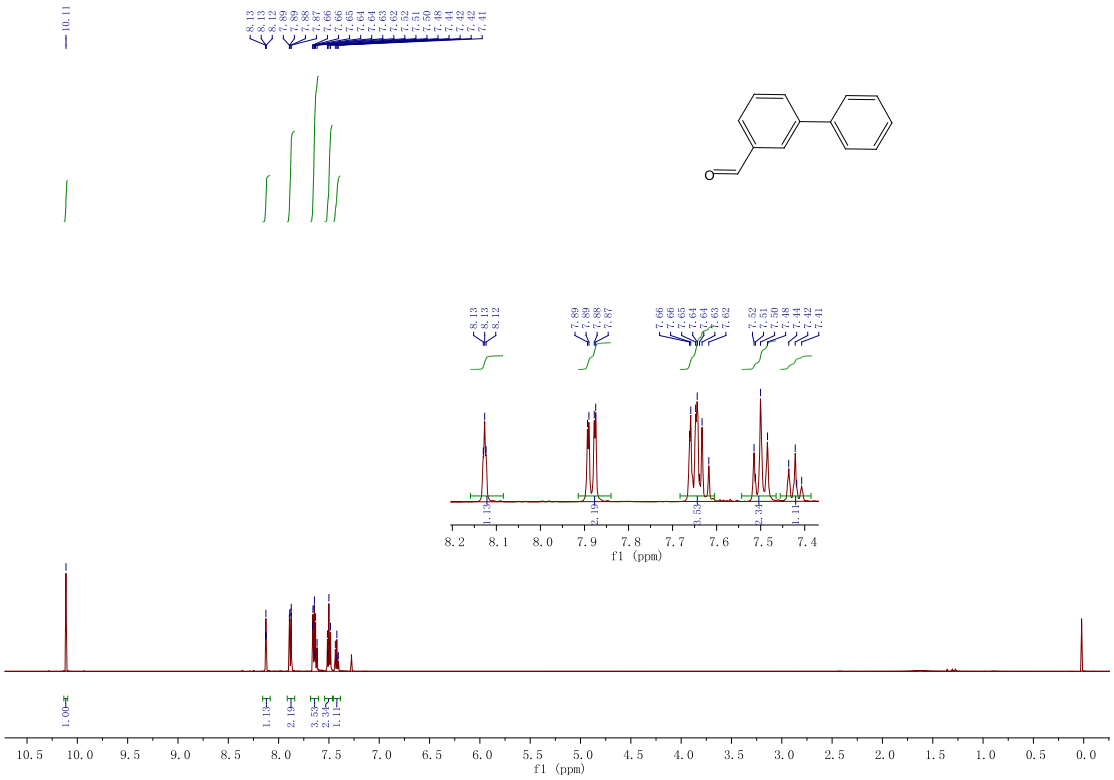

142.45
138.87
131.49
130.70
129.61
129.14
128.41
127.09
118.85
112.97
N
f1 (ppm)


F
f1 (ppm)


F
f1 (ppm)


7.63
7.62
7.61
7.61
7.54
7.53
7.48
7.46
7.45
7.37
7.36
7.34
7.30
7.28
7.28
2.43
CH3
1.80
1.82
1.89
0.90
2.01
3.00
f1 (ppm)


141.23
138.43
137.05
129.53
128.76
127.03
21.14
CH3
f1 (ppm)


10.11
8.13
8.13
8.12
7.89
7.88
7.87
7.66
7.65
7.64
7.64
7.63
7.62
7.52
7.51
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7.48
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7.42
7.41
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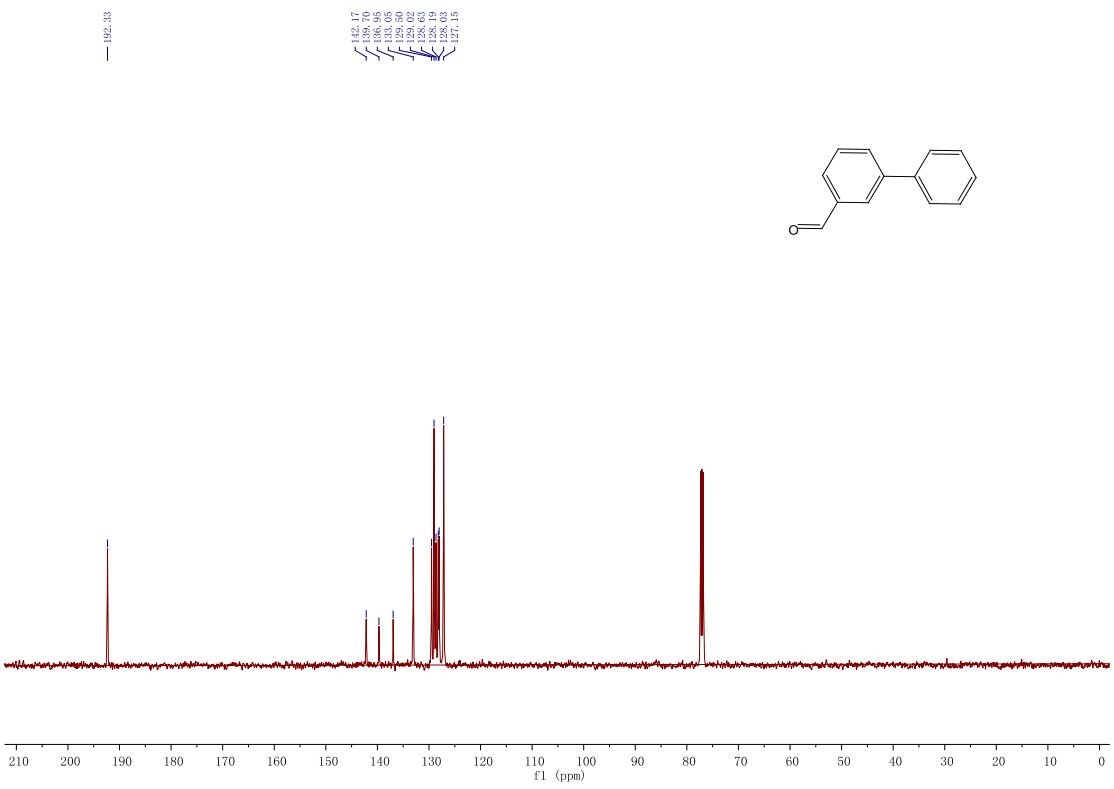
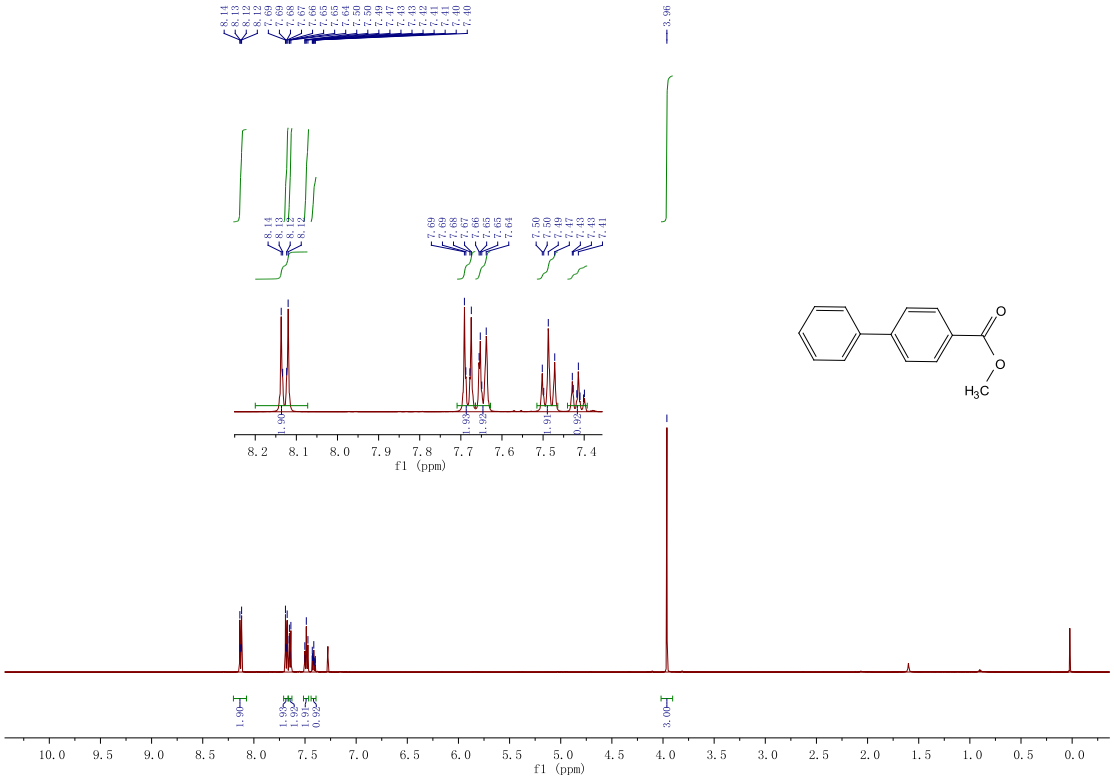
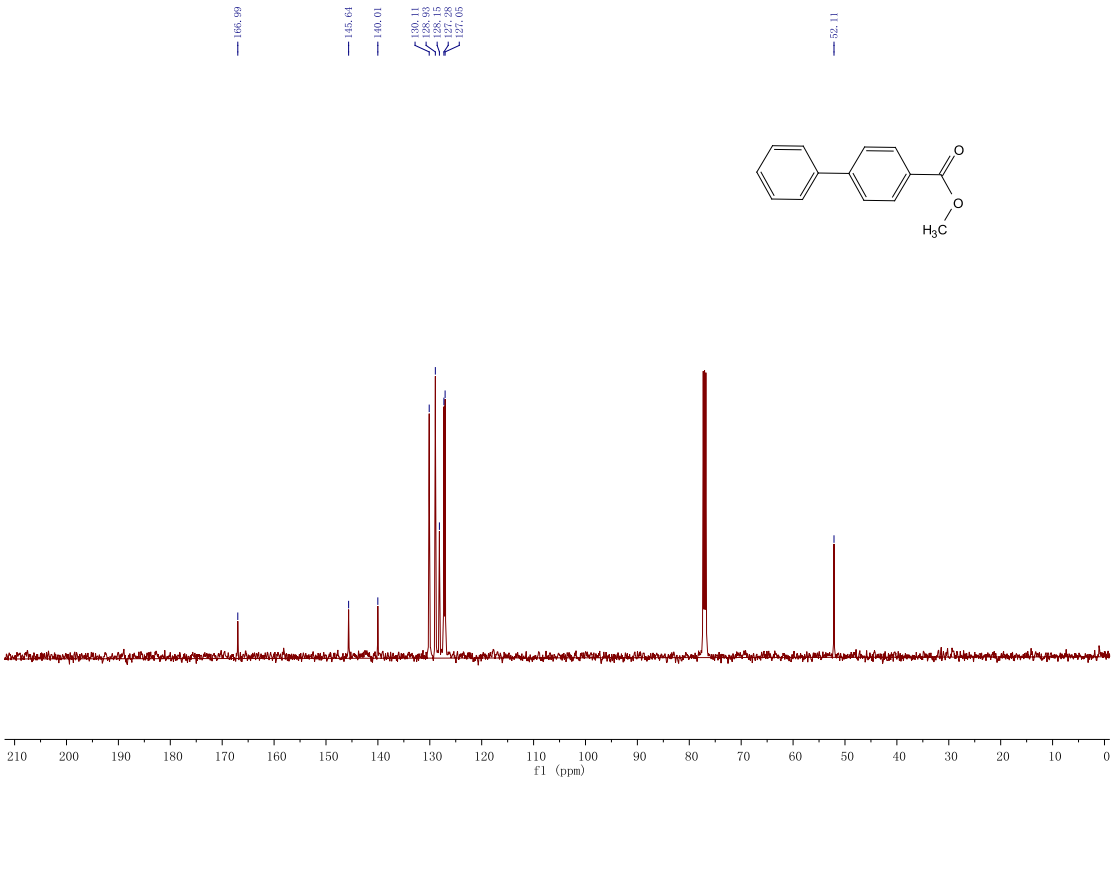
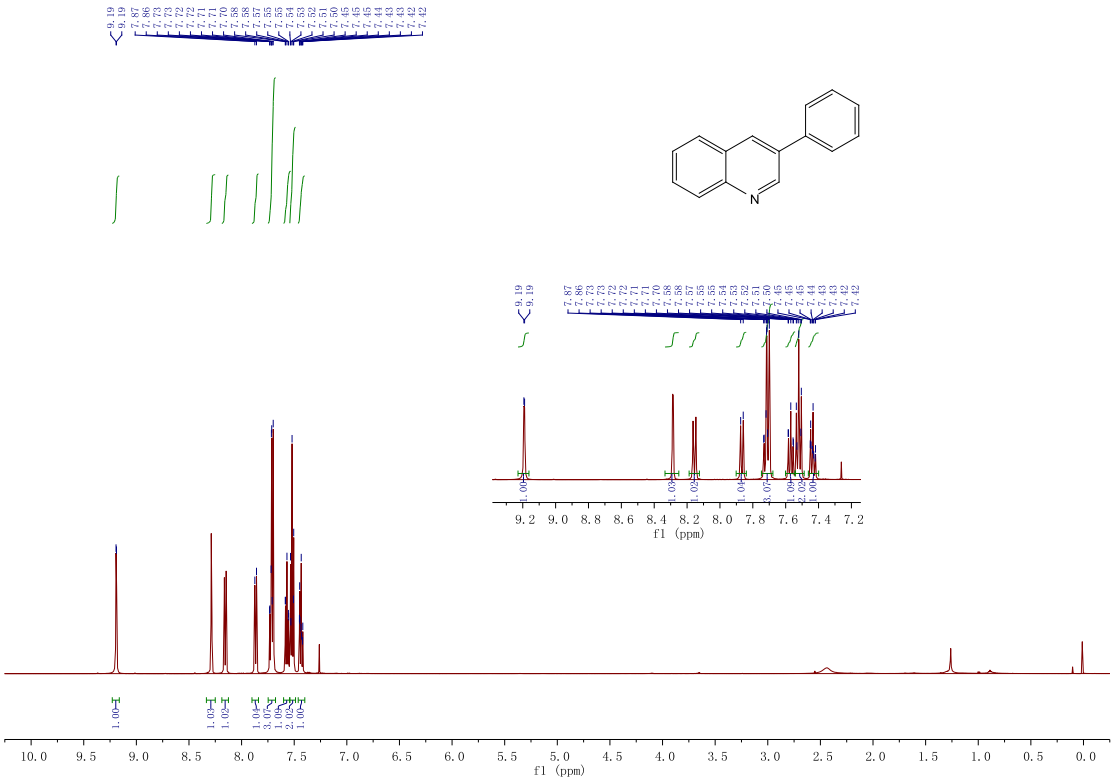
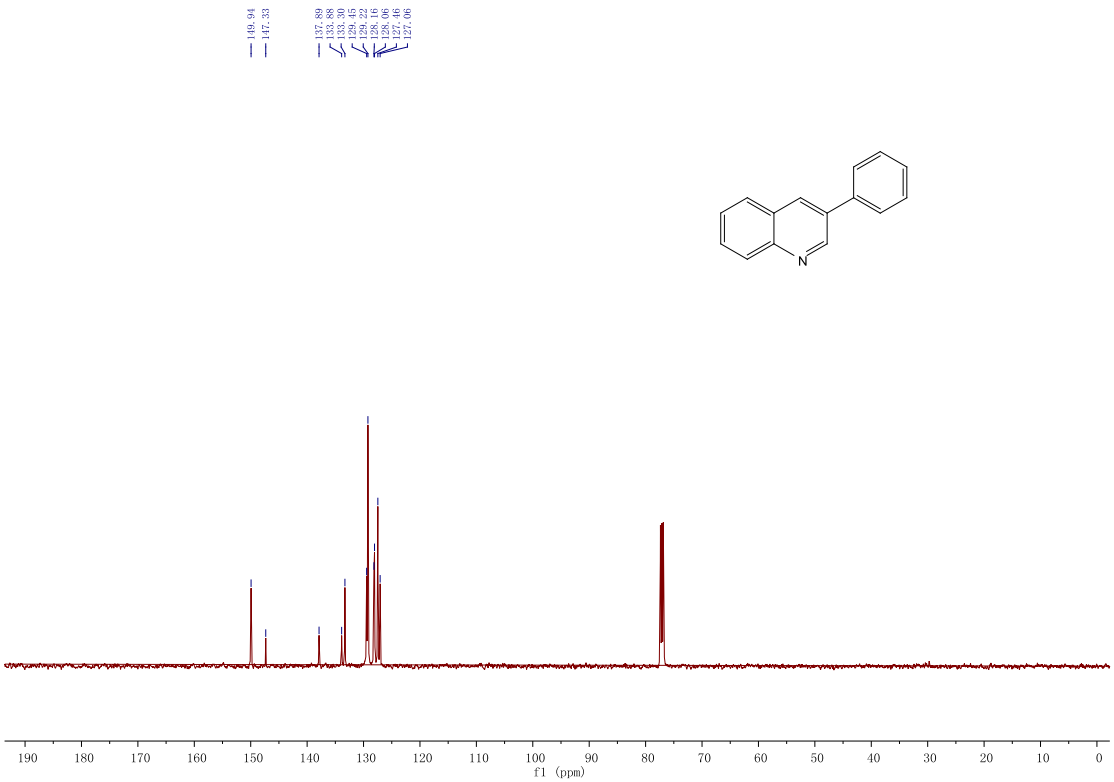
1.13
2.19
3.53
2.34
1.11
f1 (ppm)

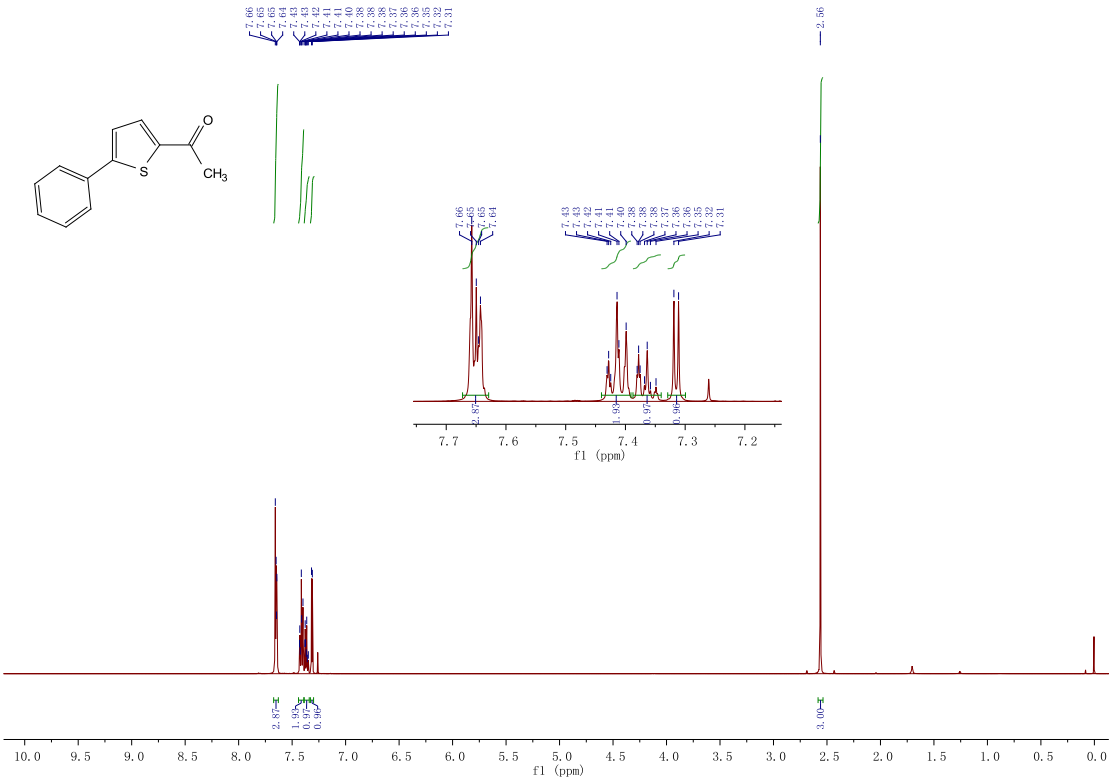

192.33
142.17
139.70
136.95
133.05
129.50
129.02
128.63
128.19
128.03
127.15
f1 (ppm)

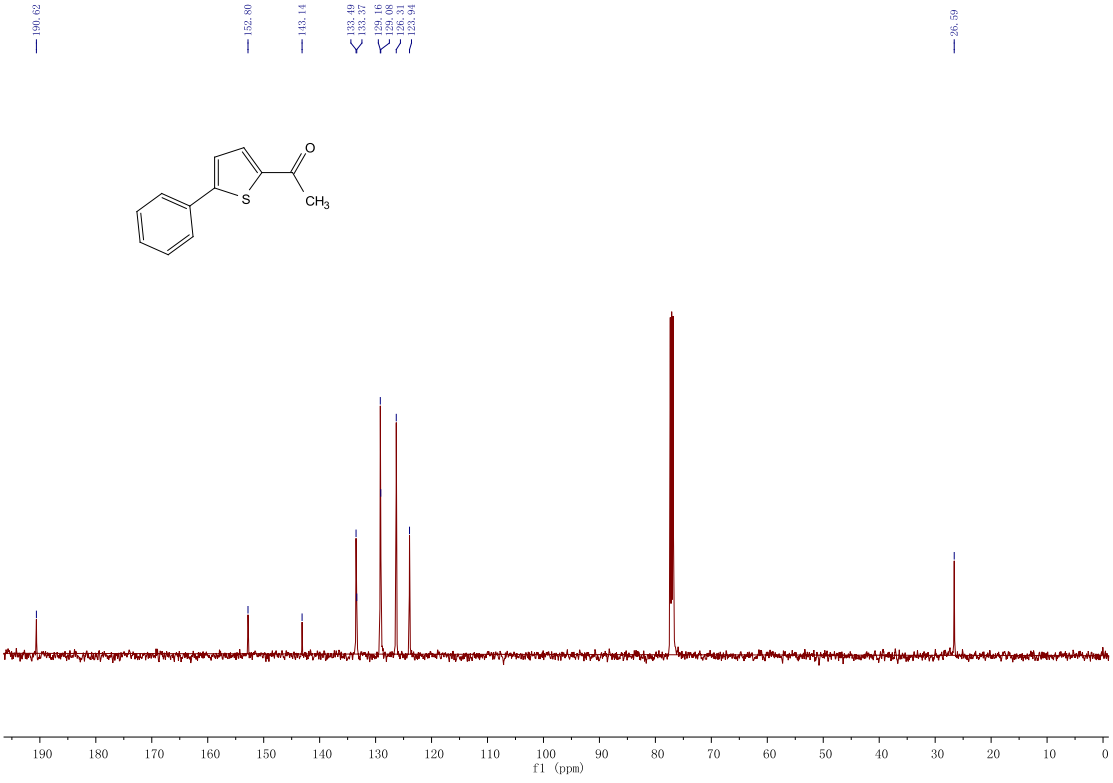

8.14
8.13
8.12
7.69
7.68
7.67
7.66
7.65
7.64
7.50
7.49
7.47
7.43
7.42
7.41
7.40
3.96
1.90
1.93
1.92
0.92
3.00
f1 (ppm)
O
O
H3C


166.99
145.64
140.01
130.11
128.93
128.15
127.38
127.05
52.11
O
O
H3C
f1 (ppm)


9.19
9.19
7.87
7.86
7.73
7.73
7.72
7.72
7.71
7.71
7.70
7.70
7.58
7.57
7.55
7.55
7.54
7.53
7.52
7.51
7.50
7.45
7.45
7.44
7.43
7.43
7.42
7.42
N
1.00
1.04
1.02
1.02
1.04
3.05
1.04
2.02
2.02
1.06
f1 (ppm)


149.94
147.33
137.89
133.88
133.30
129.45
129.22
128.16
128.06
127.46
127.06
N
f1 (ppm)


7.66
7.65
7.64
7.43
7.42
7.41
7.40
7.38
7.37
7.36
7.35
7.32
7.31
2.56
O
S
CH3
2.87
1.93
0.97
0.96
3.00
f1 (ppm)


190.62
152.80
143.14
133.49
133.37
129.16
129.08
126.31
123.94
26.59
O
S
CH3
f1 (ppm)