# Supplementary Materials

# A facile one-pot construction of succimide-fused spiro[pyrrolidine-2,3'-oxindoles] via 1,3-dipolar cycloaddition involving 3-amino oxindoles and maleimides

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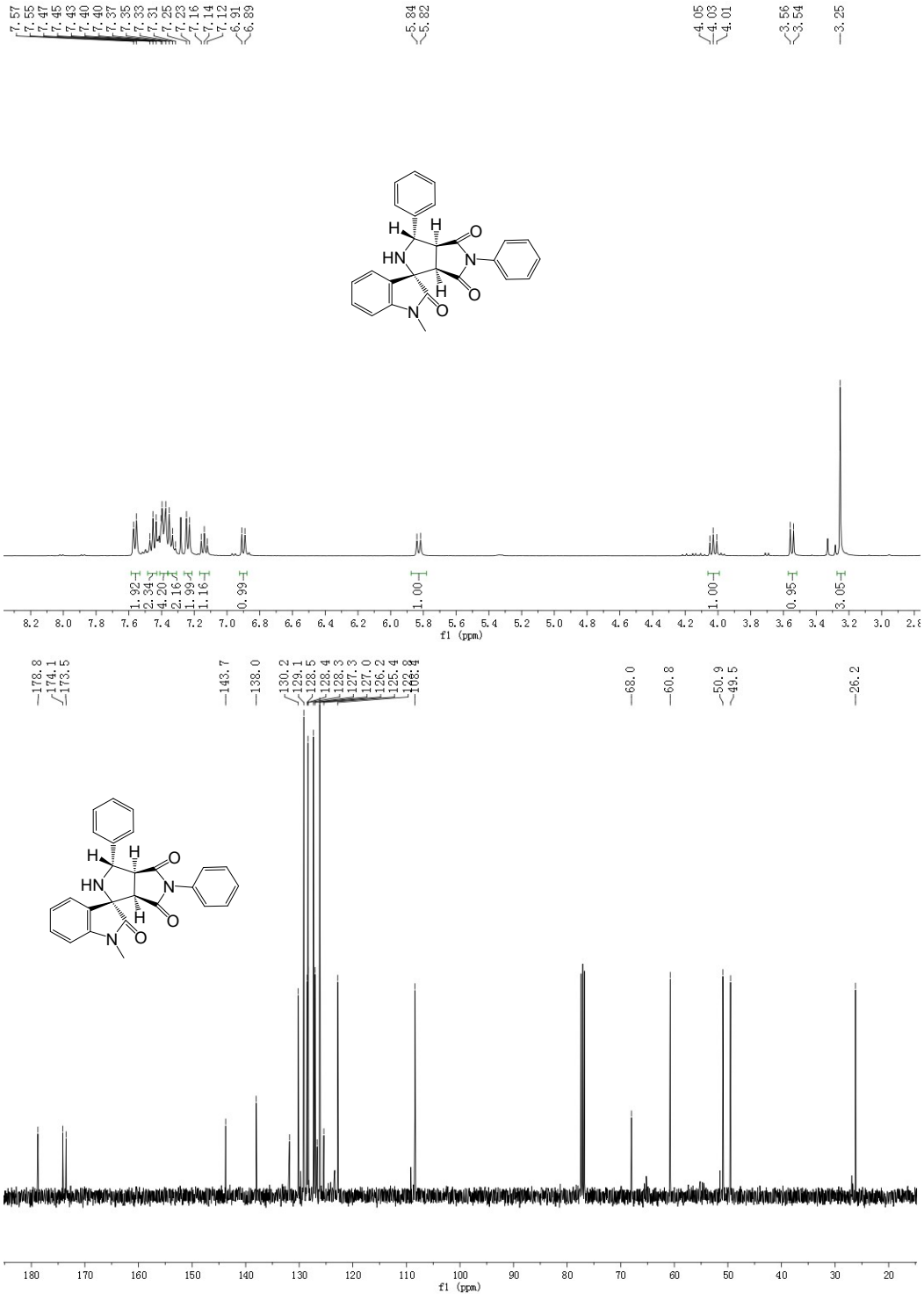
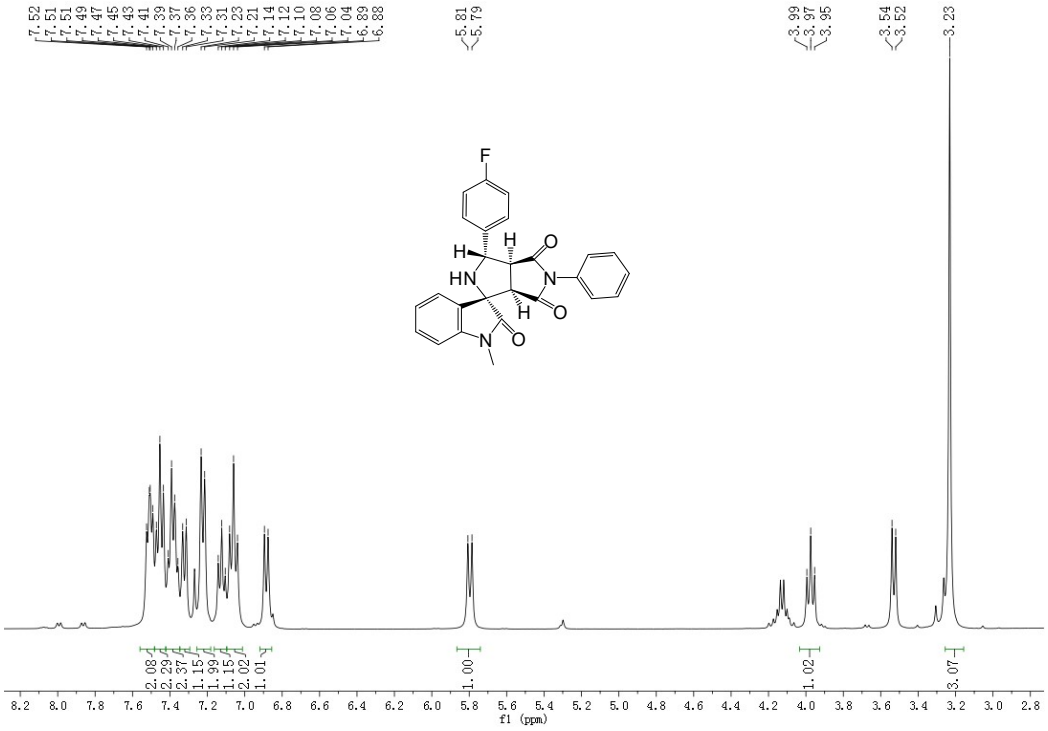
The State Key Laboratory of Refractories and Metallurgy, School of Chemistry & Chemical Engineering,Wuhan University of Science and Technology, Wuhan 430081, China

**NMR Spectra**

**4a**



**4b**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7.31
7.23
7.21
7.14
7.12
7.10
7.08
7.06
7.04
6.89
6.88
5.81
5.79
3.99
3.97
3.95
3.54
3.52
3.23
F
H
H
HN
O
N
H
O
N
O
2.08
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1.99
1.15
2.02
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1.00
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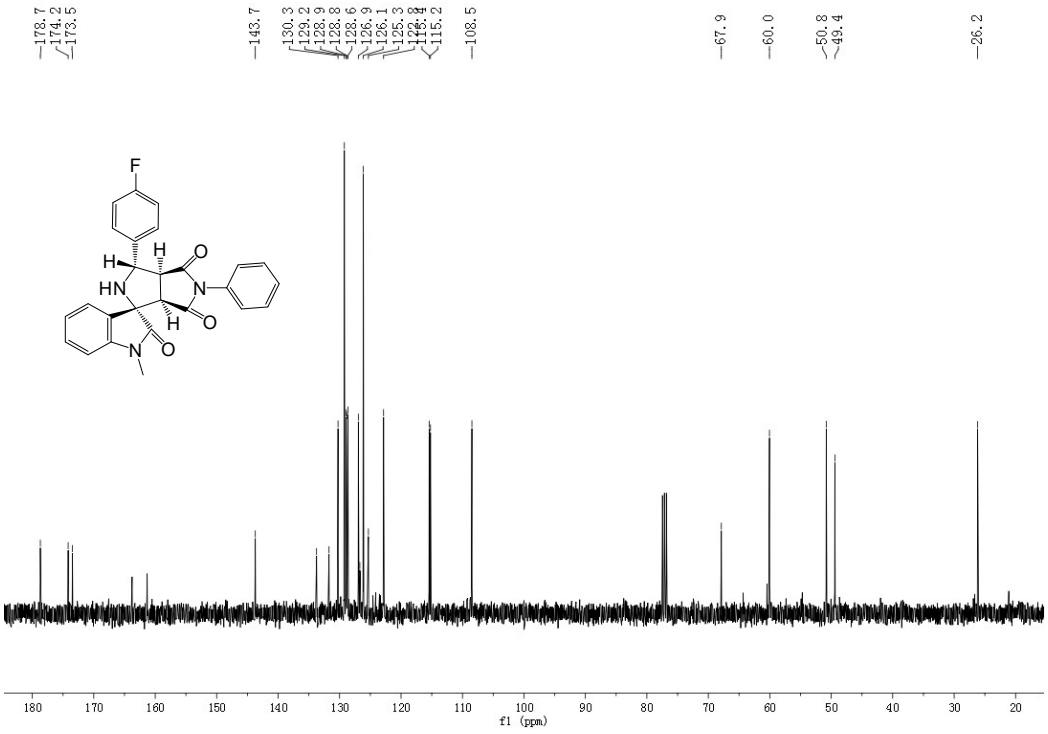
f1 (ppm)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115.2
108.5
67.9
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H
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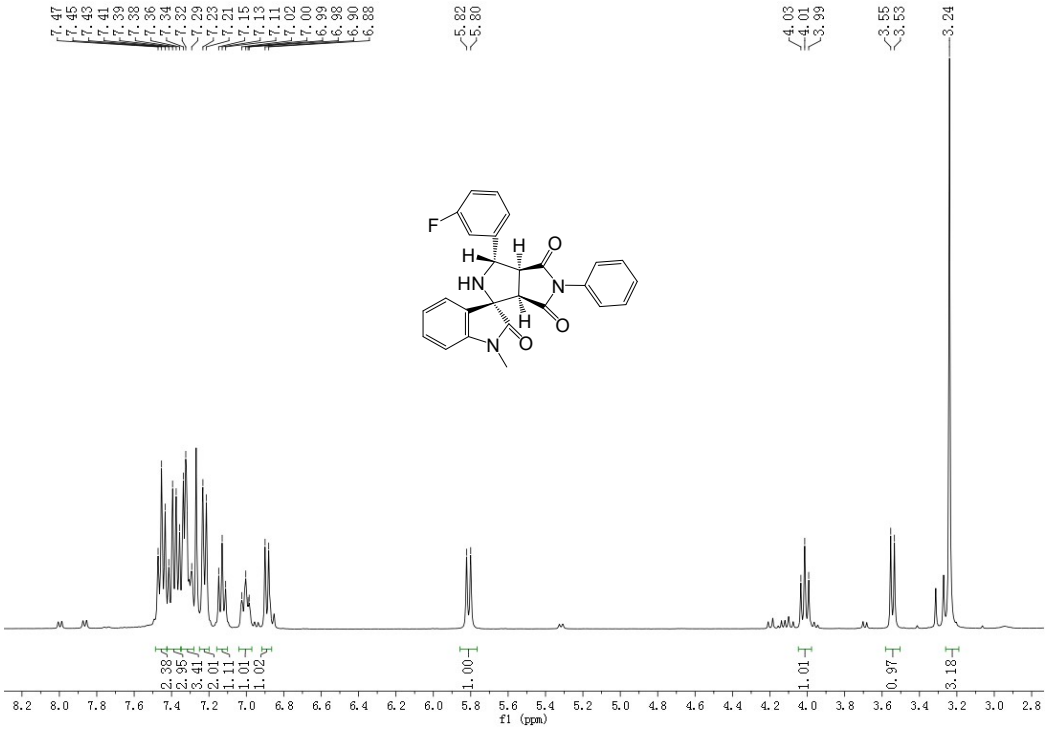
O
N
H
O
N
O
f1 (ppm)

**4c**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7.15
7.13
7.11
7.02
7.00
6.99
6.98
6.90
6.88
5.82
5.80
4.03
4.01
3.99
3.55
3.53
3.24
F
H
HN
H
O
N
O
H
O
N
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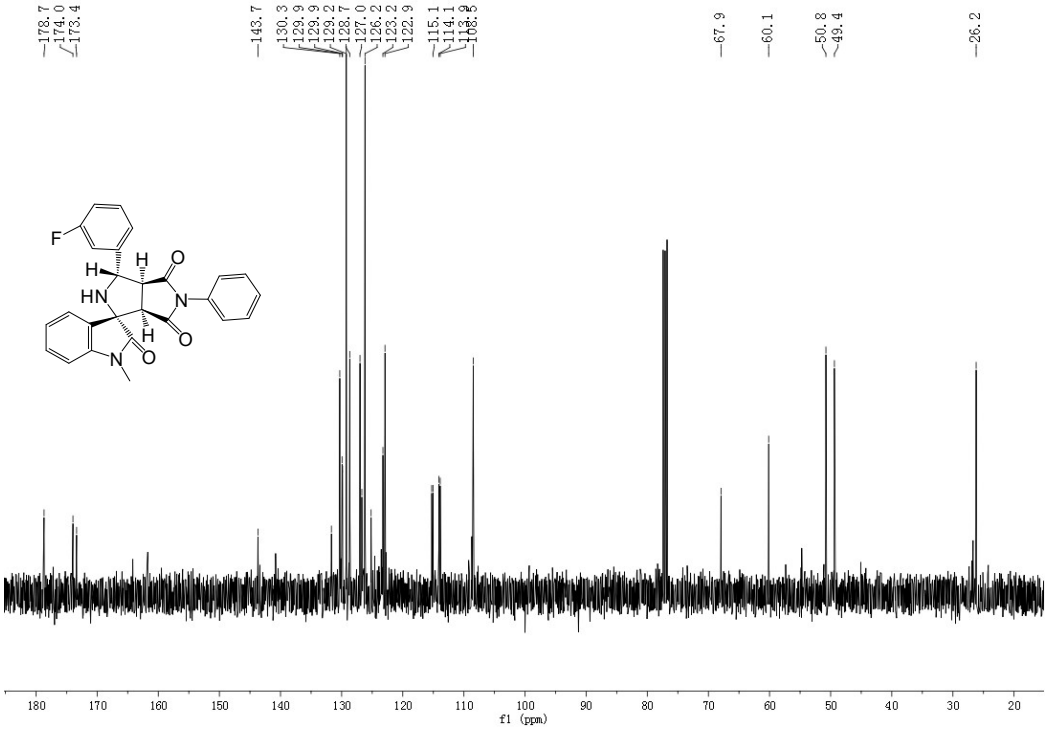
f1 (ppm)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113.9
108.5
67.9
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O
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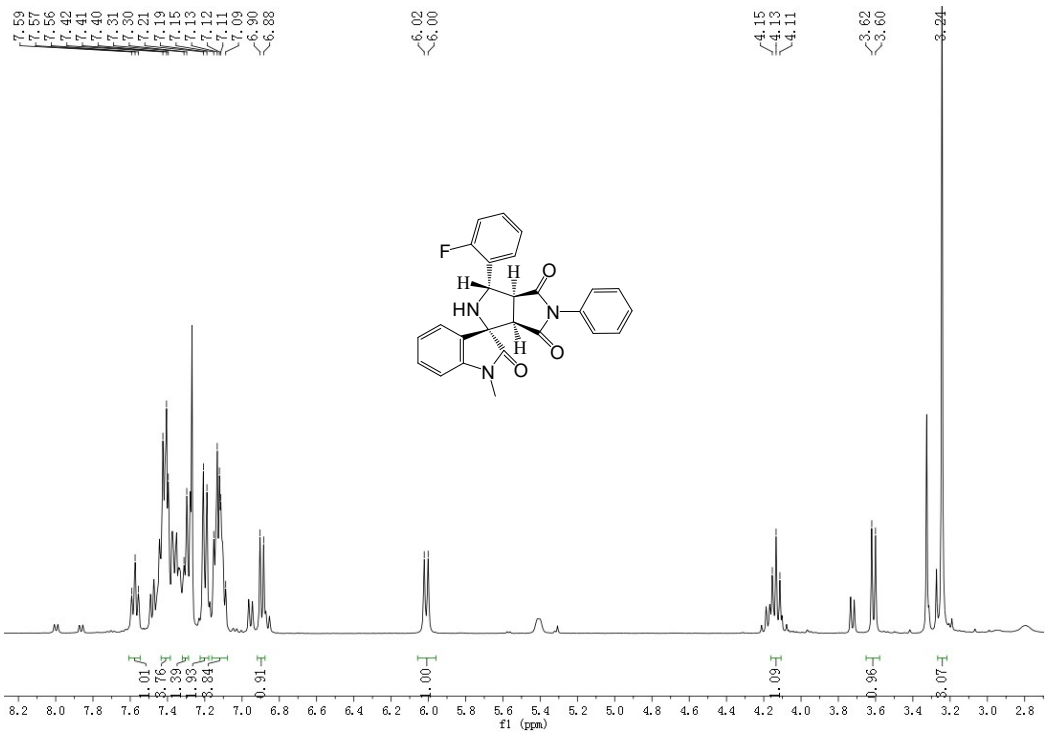
O
H
O
N
f1 (ppm)

**4d**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7.11
7.09
6.90
6.88
6.02
6.00
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4.13
4.11
3.62
3.60
3.24
F
H
HN
H
O
N
O
H
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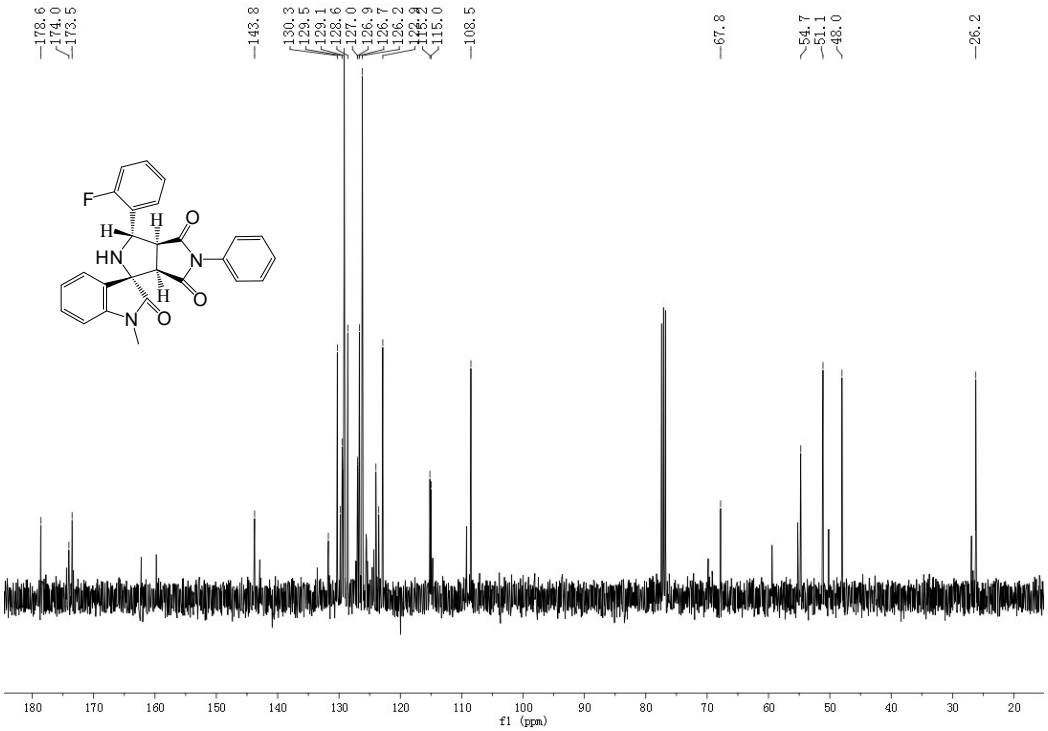
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115.0
108.5
67.8
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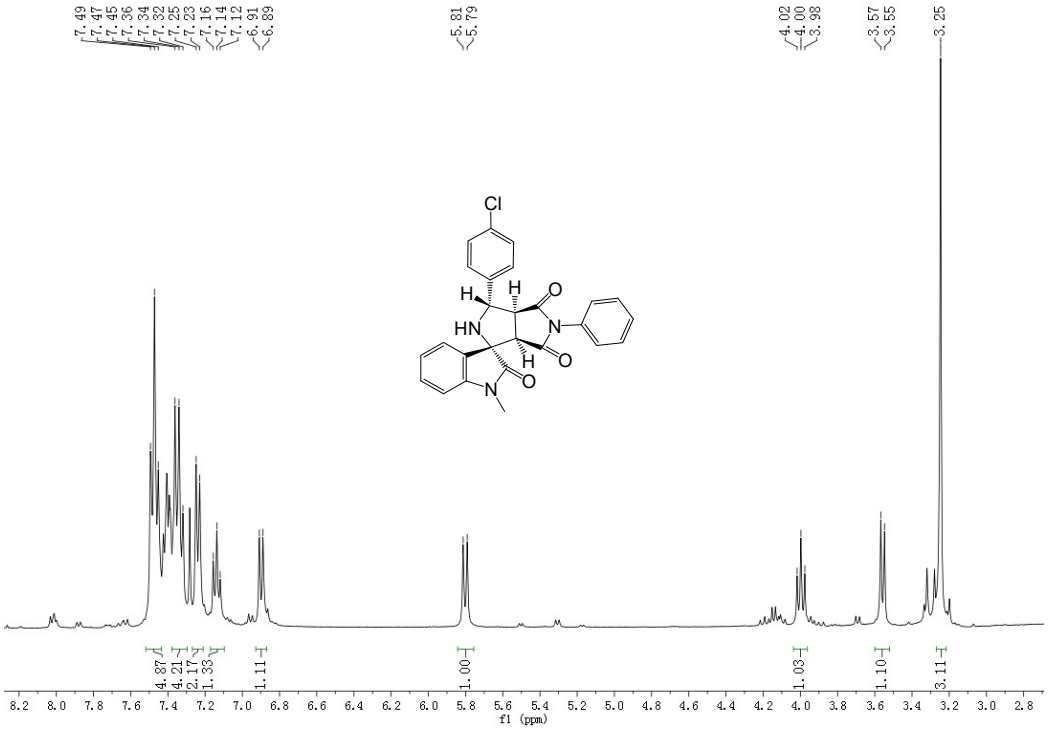
O
H
N
O
f1 (ppm)

**4e**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6.89
5.81
5.79
4.02
4.00
3.98
3.57
3.55
3.25
Cl
H
H
O
HN
N
O
H
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1.33
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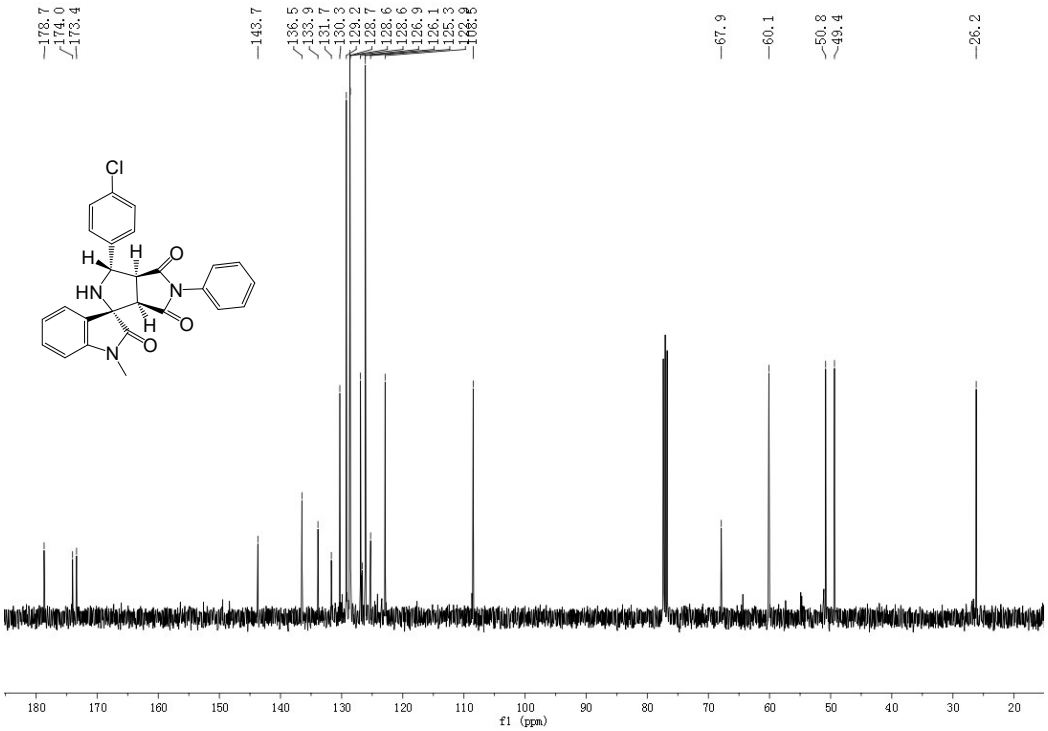
1.00
1.03
1.10
3.11
f1 (ppm)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126.1
125.3
122.9
118.5
67.9
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Cl
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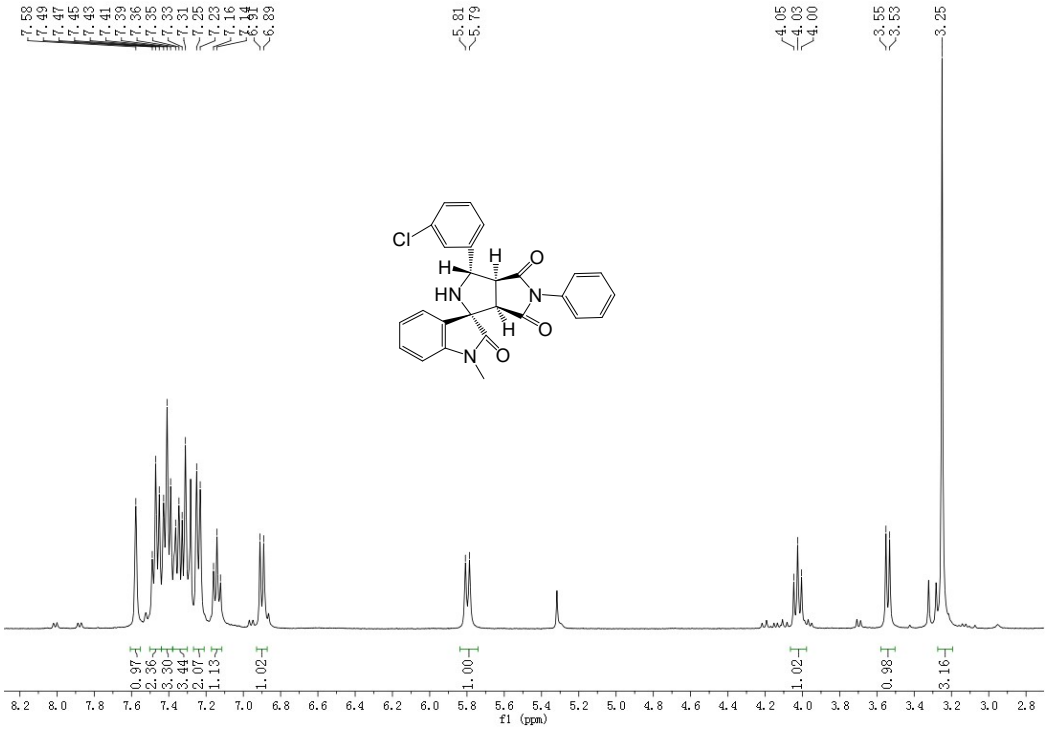
H
O
HN
N
O
H
O
N
f1 (ppm)

**4f**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7.23
7.16
6.91
6.89
5.81
5.79
4.05
4.03
4.00
3.55
3.53
3.25
Cl
H
H
O
HN
N
H
O
N
O
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1.02
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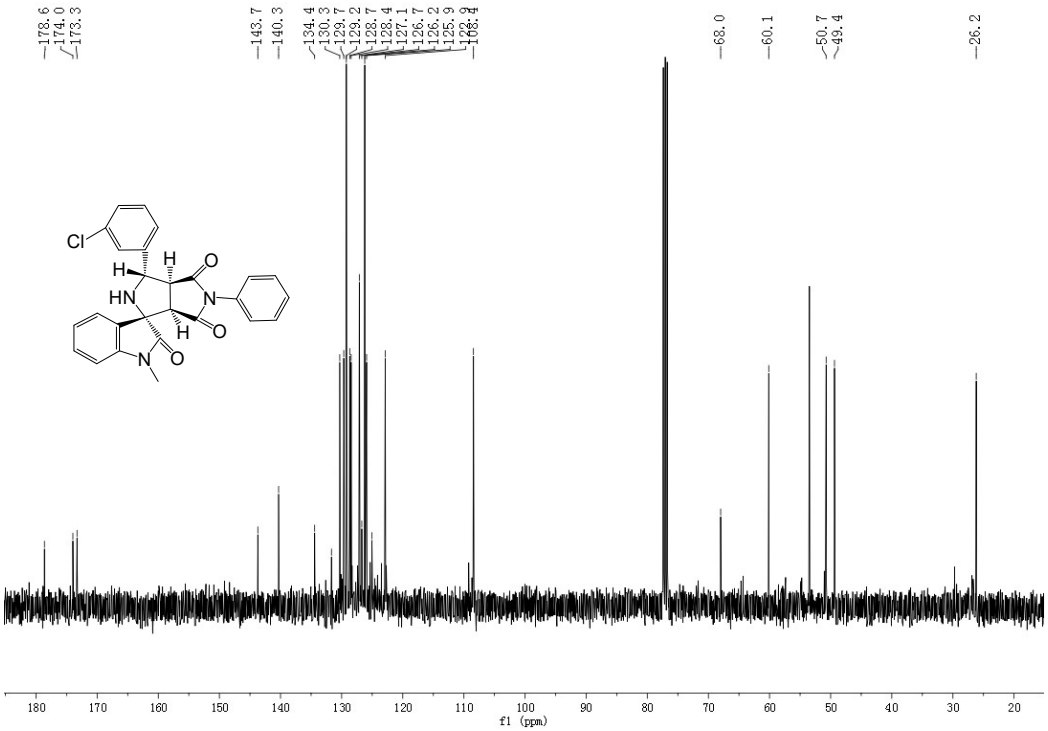
f1 (ppm)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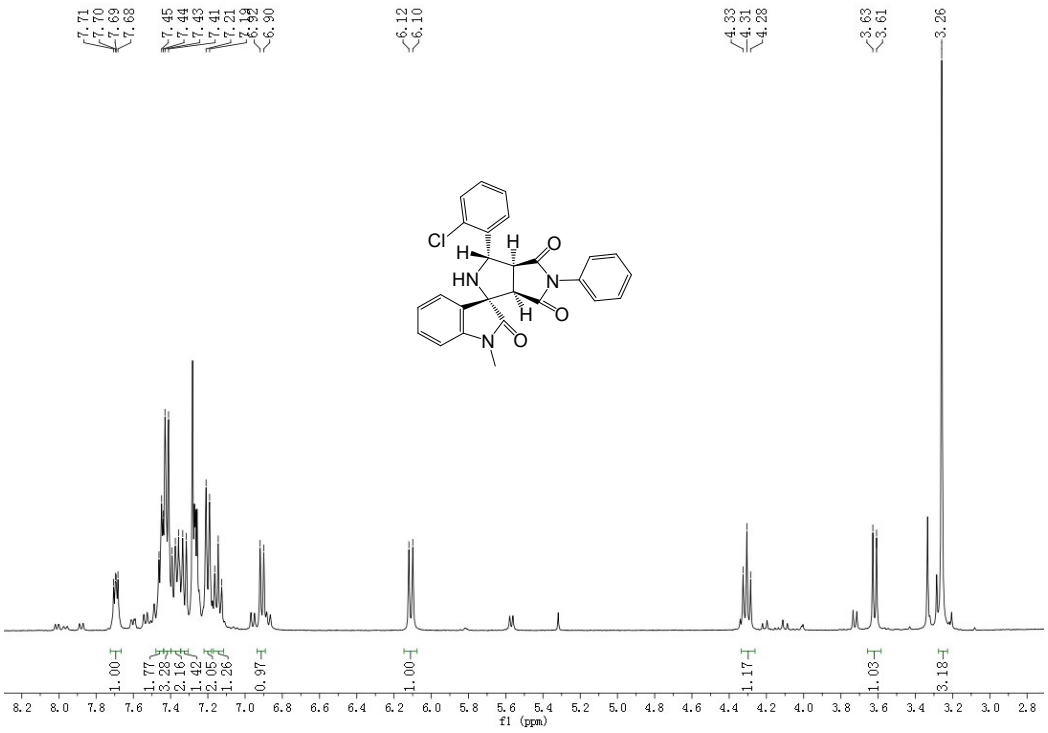
128.4
127.1
126.7
126.2
125.9
122.9
118.4
68.0
60.1
50.7
49.4
26.2
Cl
H
H
O
HN
N
H
O
N
O
f1 (ppm)

**4g**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6.10
4.33
4.31
4.28
3.63
3.61
3.26
Cl
H
HN
O
N
H
O
O
N
1.00
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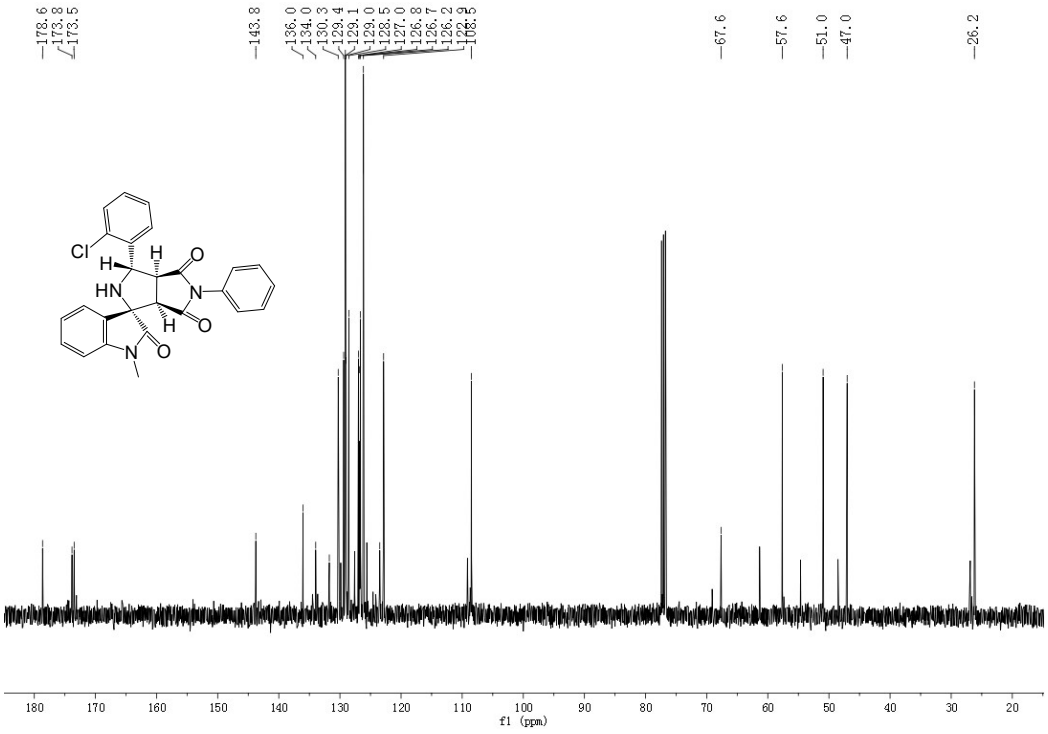
3.18
f1 (ppm)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128.5
127.0
126.8
126.7
126.2
122.9
108.5
67.6
57.6
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47.0
26.2
Cl
H
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O
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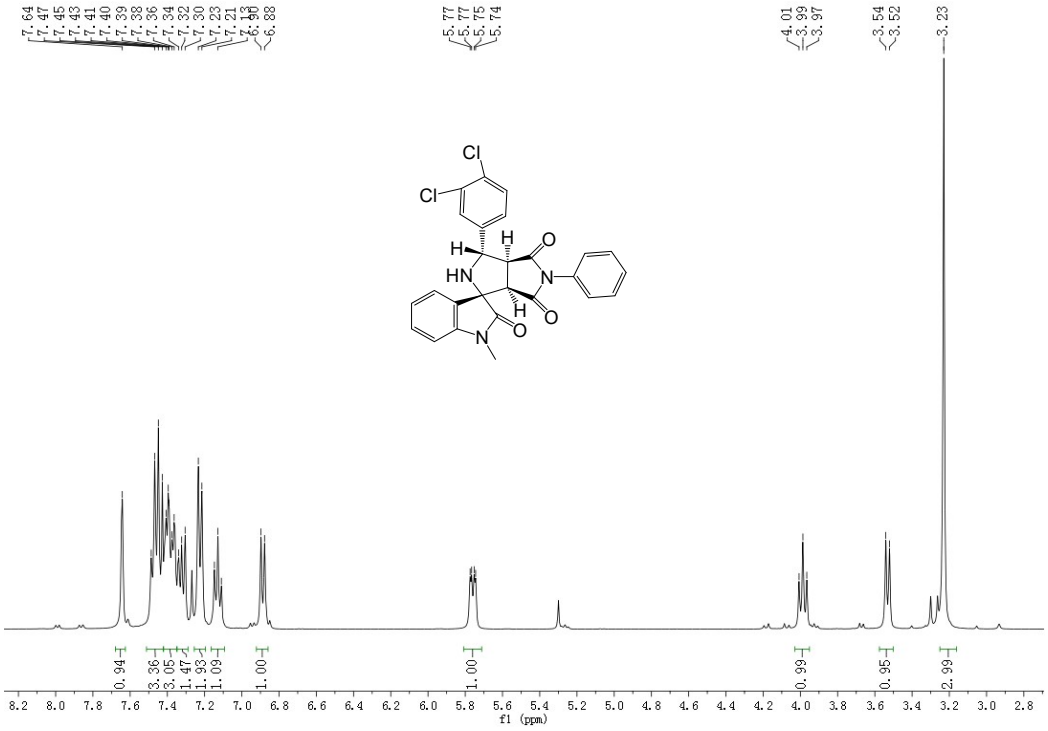
H
O
O
N
f1 (ppm)

**4h**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7.23
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6.88
5.77
5.77
5.75
5.74
4.01
3.99
3.97
3.54
3.52
3.23
Cl
Cl
H
H
HN
O
N
H
O
O
N
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1.09
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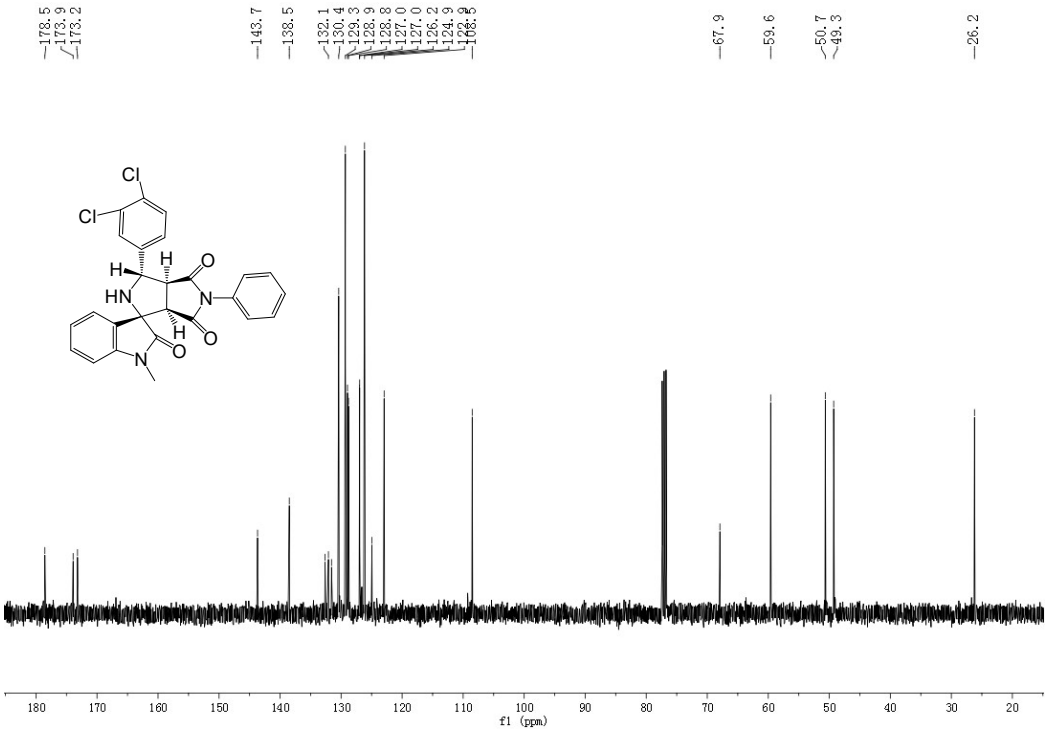
2.99
f1 (ppm)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127.0
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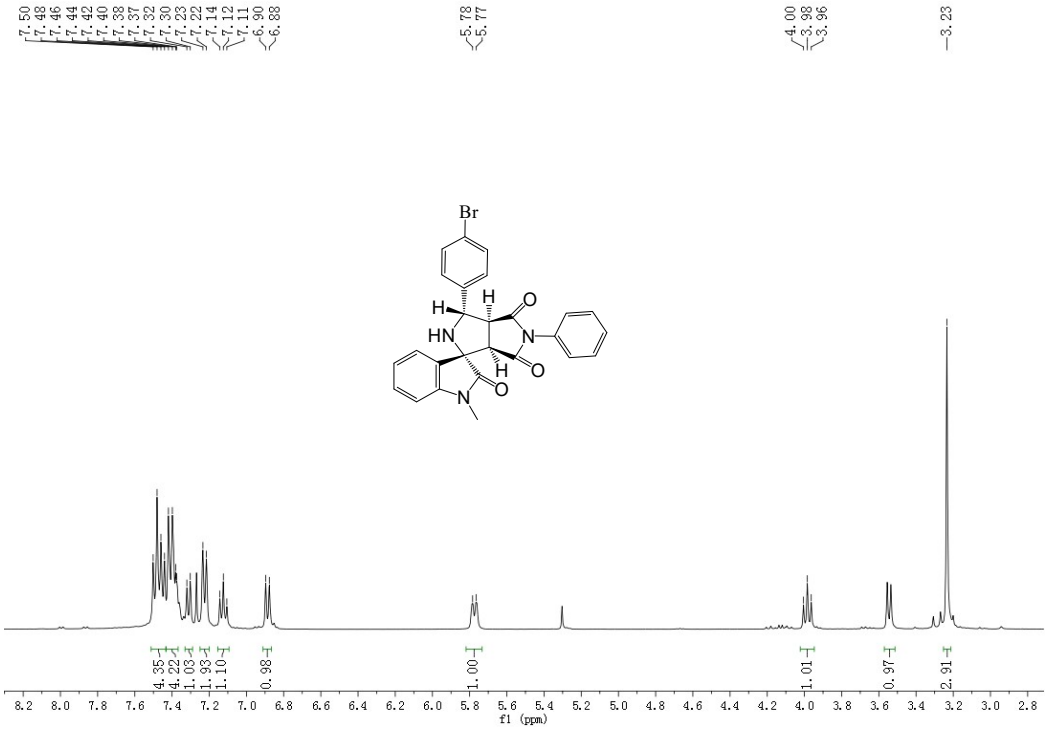
124.9
122.9
108.5
67.9
59.6
50.7
49.3
26.2
Cl
Cl
H
H
HN
O
N
H
O
O
N
f1 (ppm)

**4i**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7.23
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7.14
7.12
7.11
6.90
6.88
5.78
5.77
4.00
3.98
3.96
3.23
Br
H
H
HN
O
N
O
H
O
N
4.35
4.22
1.03
1.93
1.10
0.98
1.00
1.01
0.97
2.91
8.2 8.0 7.8 7.6 7.4 7.2 7.0 6.8 6.6 6.4 6.2 6.0 5.8 5.6 5.4 5.2 5.0 4.8 4.6 4.4 4.2 4.0 3.8 3.6 3.4 3.2 3.0 2.8
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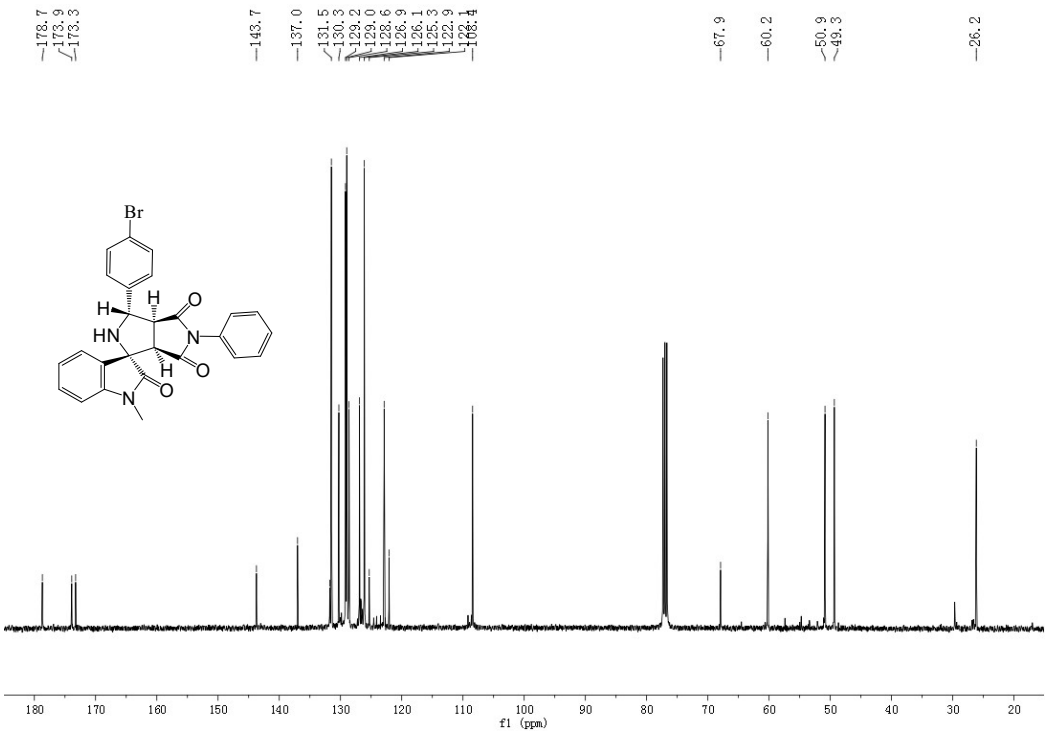
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126.1
125.3
122.9
122.1
118.4
67.9
60.2
50.9
49.3
26.2
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N
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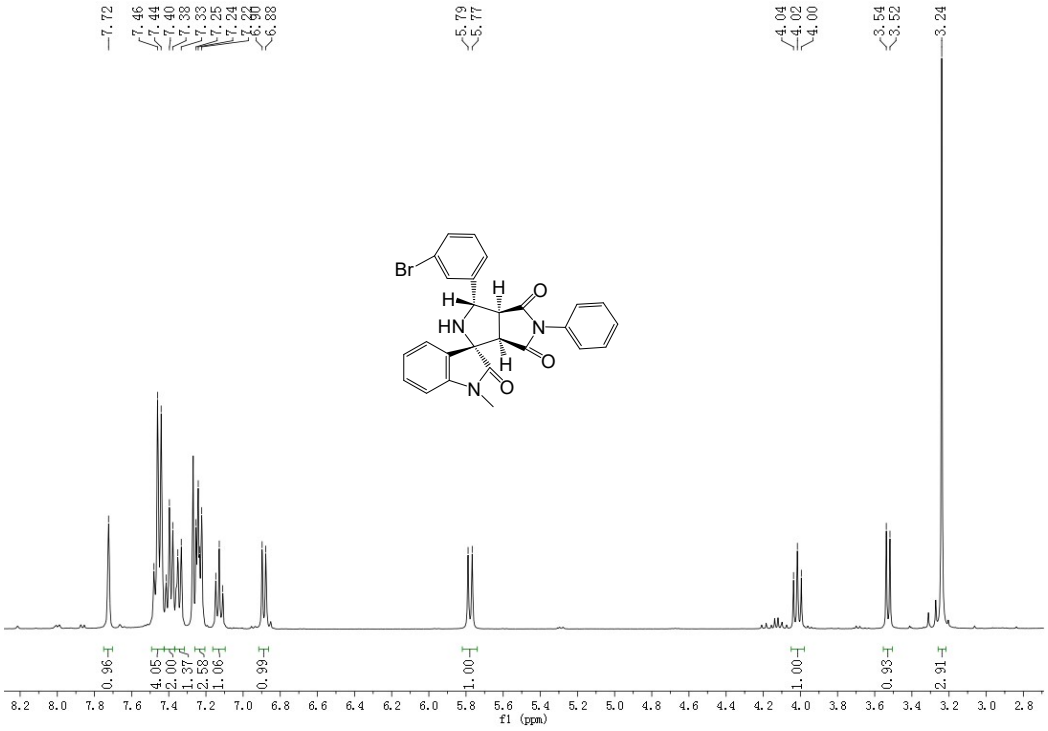
f1 (ppm)

**4j**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4.02
4.00
3.54
3.52
3.24
Br
H
H
O
HN
N
O
H
O
N
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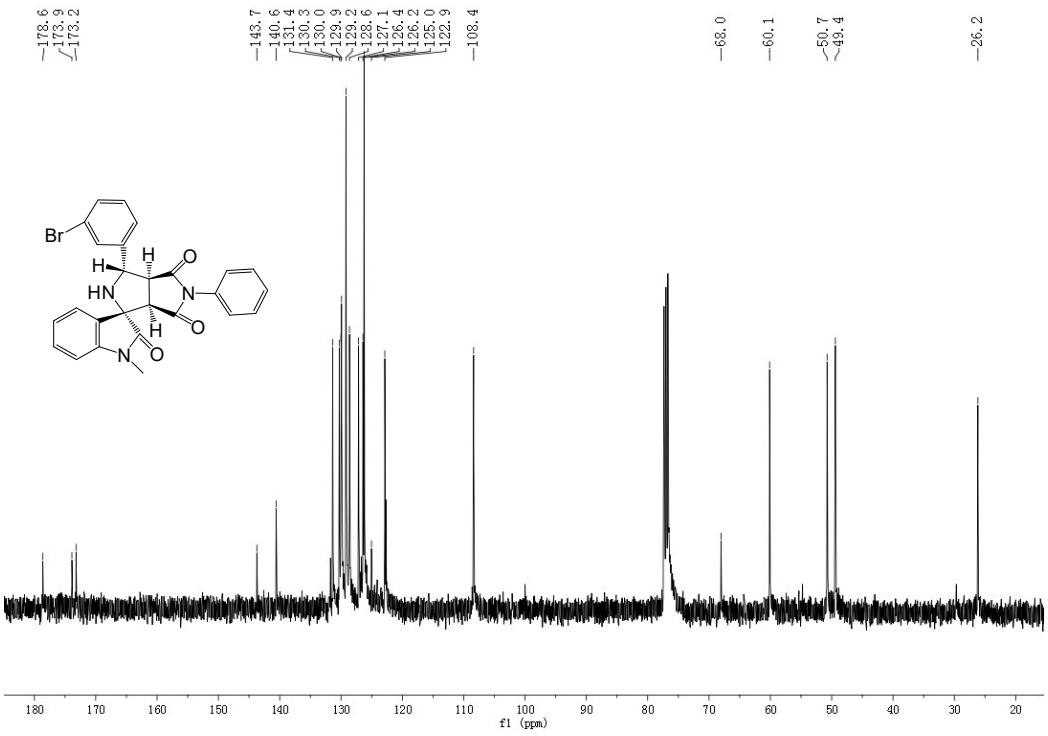
2.91
f1 (ppm)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127.1
126.4
126.2
125.0
122.9
108.4
68.0
60.1
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26.2
Br
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H
O
HN
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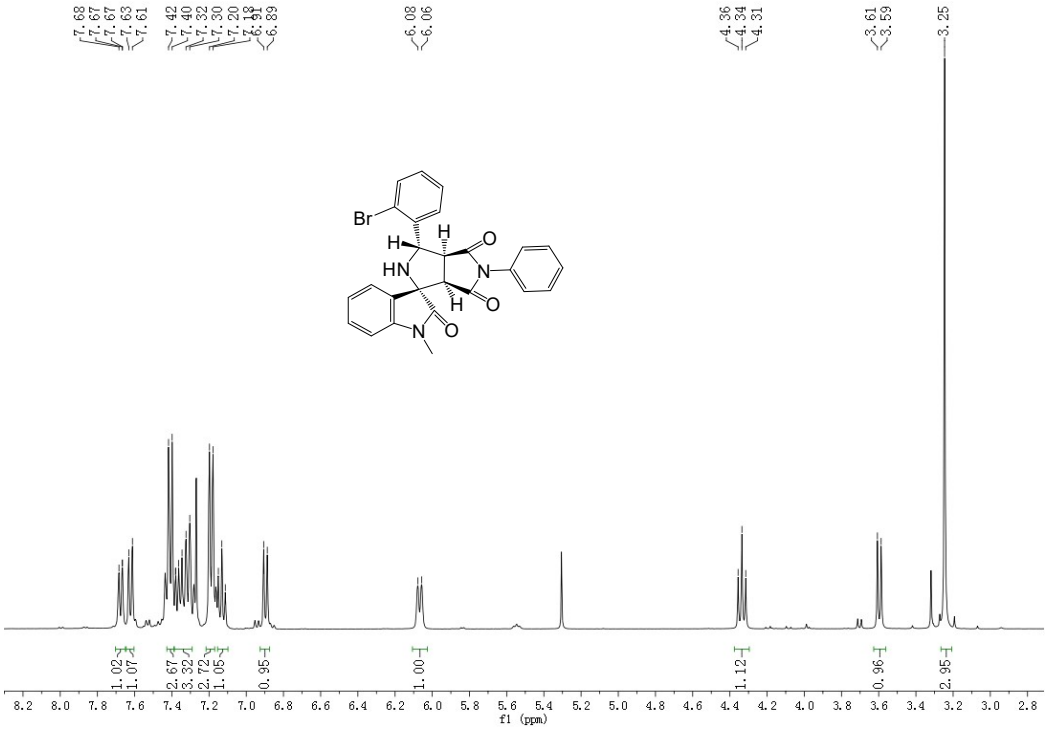
O
H
O
N
f1 (ppm)

**4k**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6.08
6.06
4.36
4.34
4.31
3.61
3.59
3.25
Br
H
H
HN
O
N
H
O
N
O
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3.32
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1.05
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1.12
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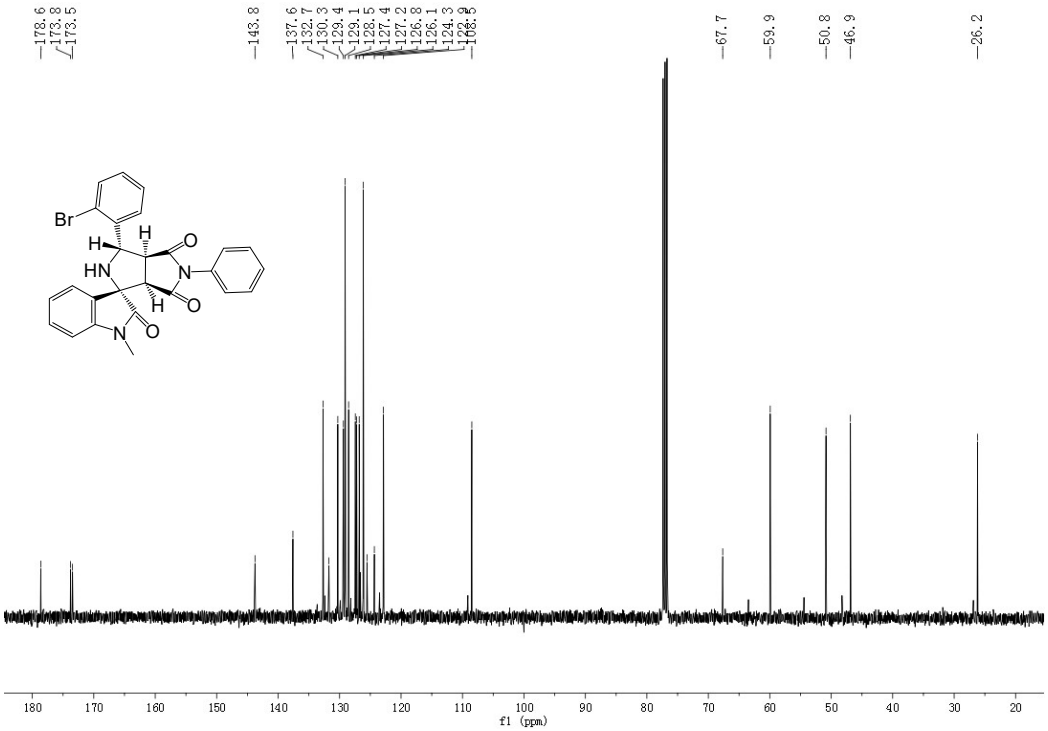
2.95
f1 (ppm)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126.1
124.3
122.9
108.5
67.7
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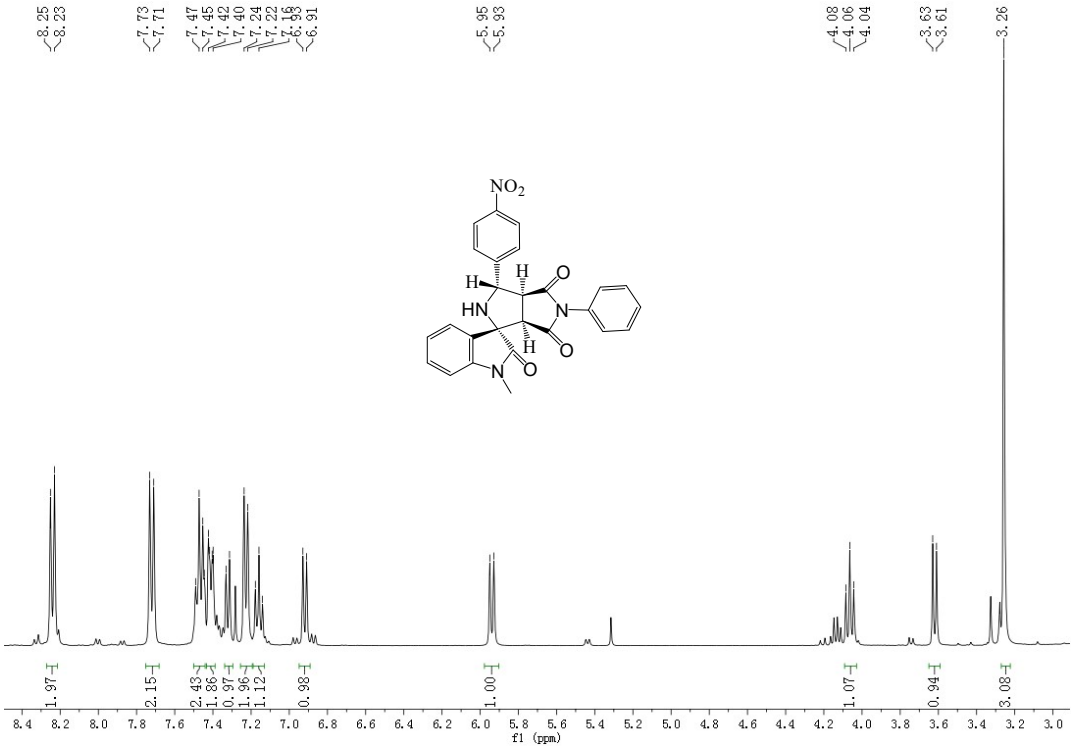
H
O
N
O
f1 (ppm)

**4l**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7.24
7.22
6.91
5.95
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4.08
4.06
4.04
3.63
3.61
3.26
NO2
H
H
HN
O
N
O
H
O
N
1.97
2.15
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1.12
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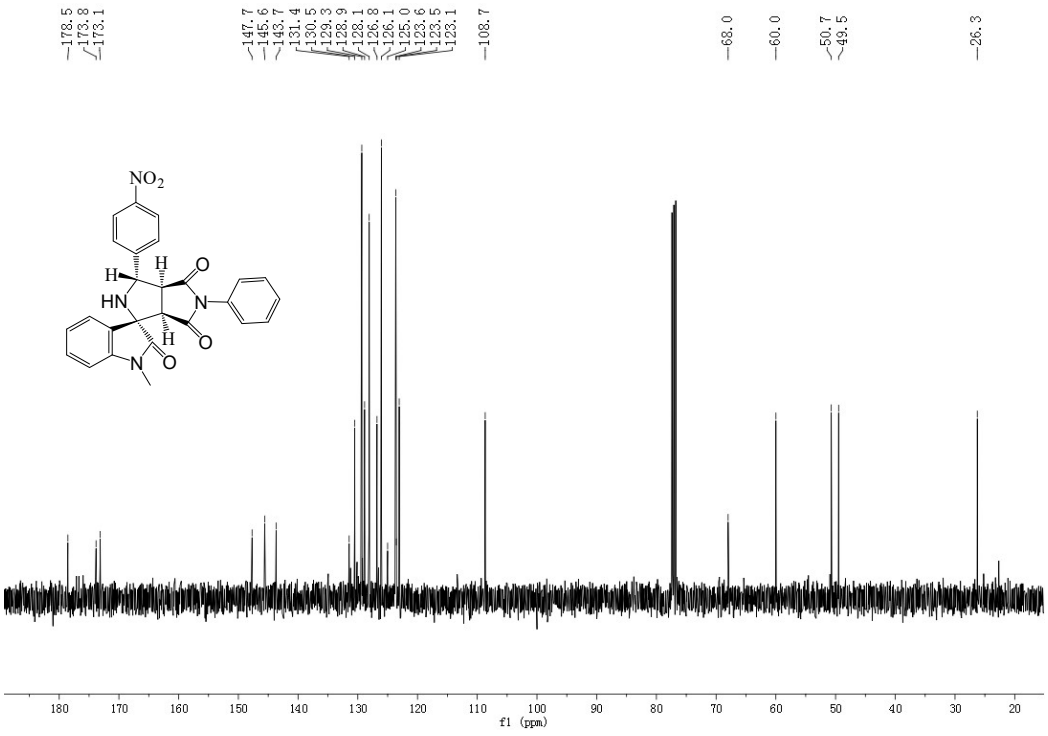
1.07
0.94
3.08
f1 (ppm)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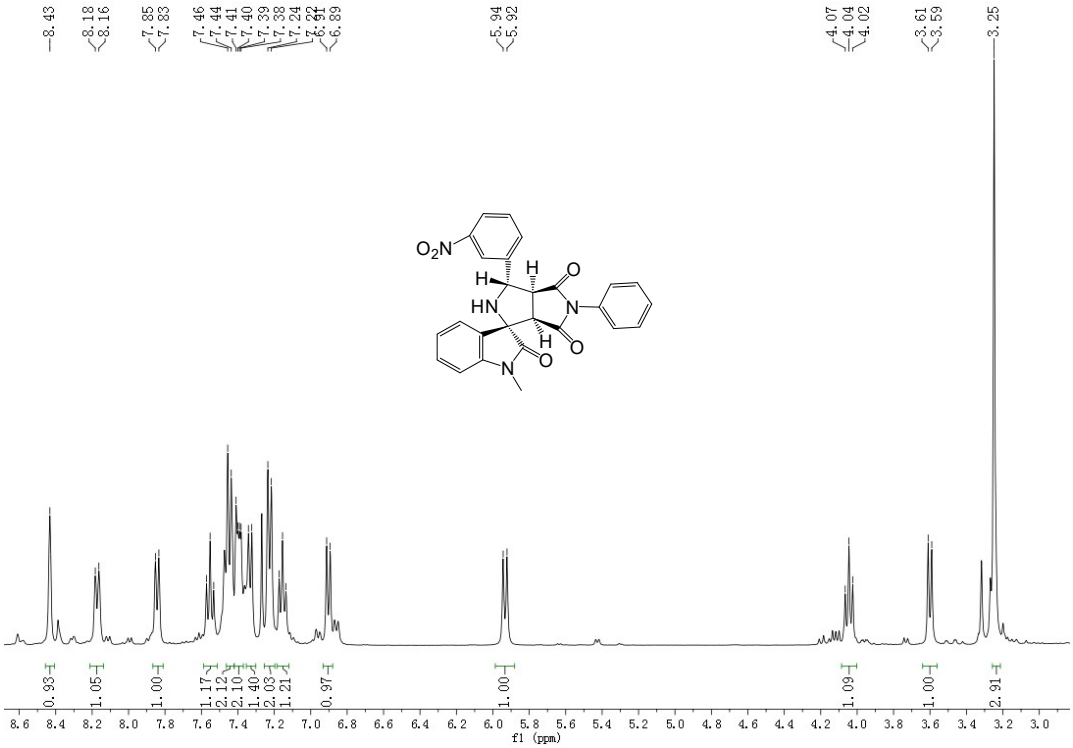
126.1
125.0
123.6
123.5
123.1
108.7
68.0
60.0
50.7
49.5
26.3
NO2
H
H
HN
O
N
O
H
O
N
f1 (ppm)

**4m**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7.44
7.41
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7.39
7.38
7.24
6.89
5.94
5.92
4.07
4.04
4.02
3.61
3.59
3.25
O2N
H
H
HN
O
N
O
H
O
N
0.93
1.05
1.00
1.17
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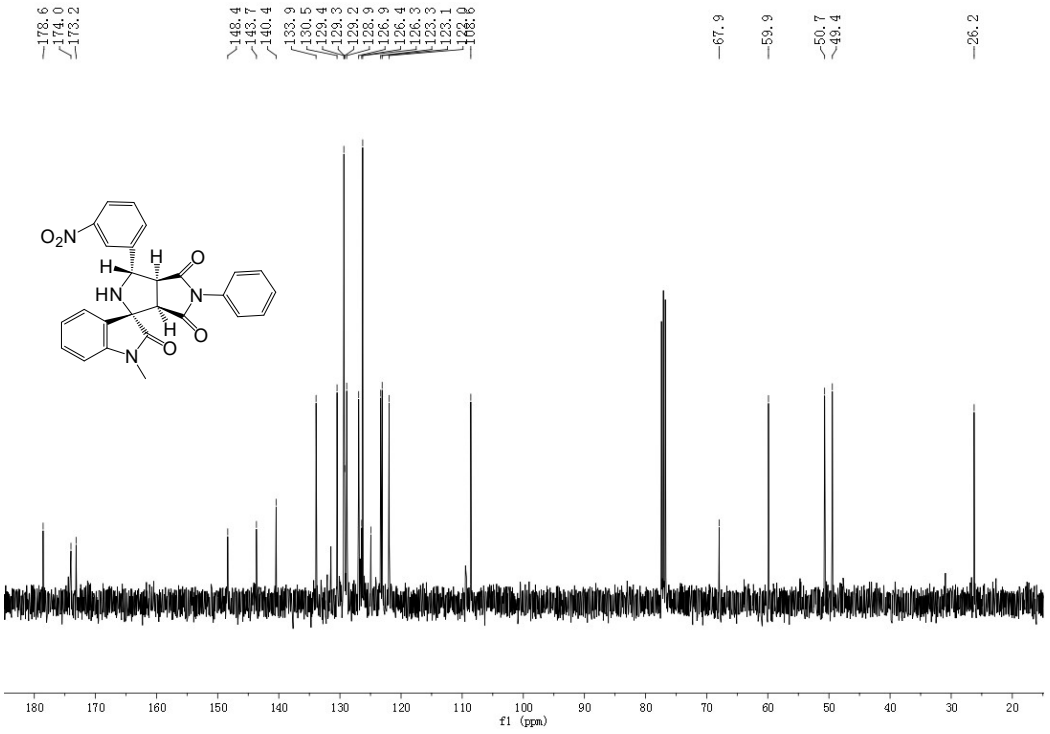
1.40
2.03
1.21
0.97
1.00
1.09
1.00
2.91
f1 (ppm)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148.4
143.7
140.4
133.9
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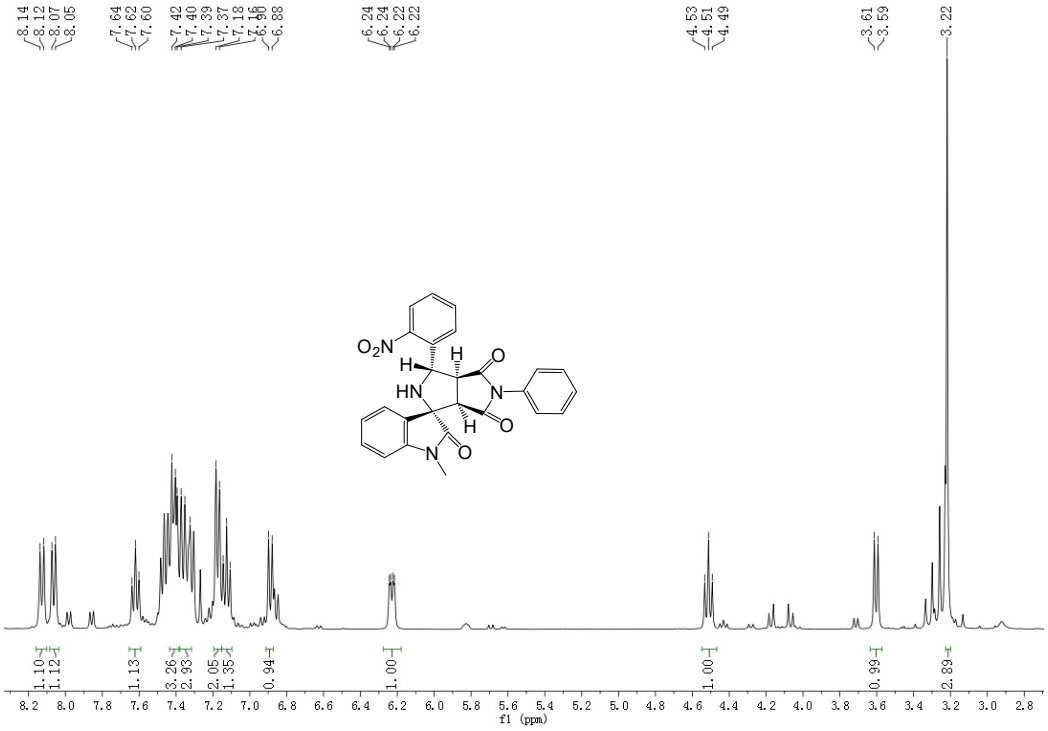
129.2
128.9
126.9
126.4
126.3
123.3
123.1
122.0
108.6
67.9
59.9
50.7
49.4
26.2
O2N
H
H
HN
O
N
O
H
O
N
f1 (ppm)

**4n**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7.42
7.40
7.39
7.37
7.18
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6.24
6.24
6.22
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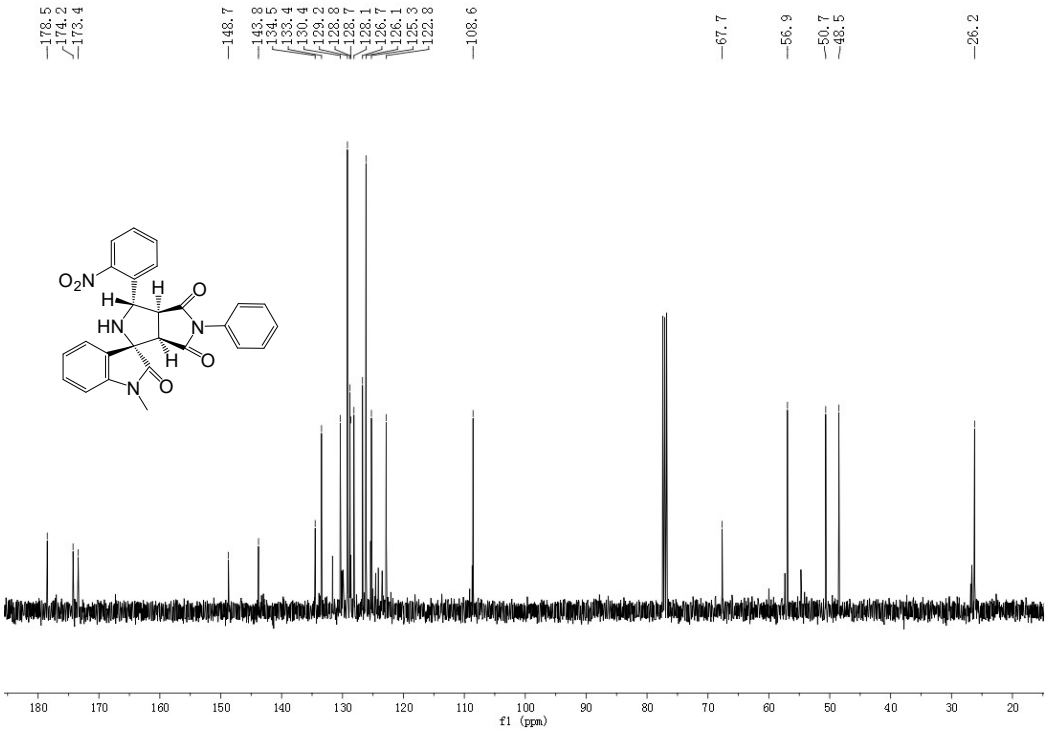
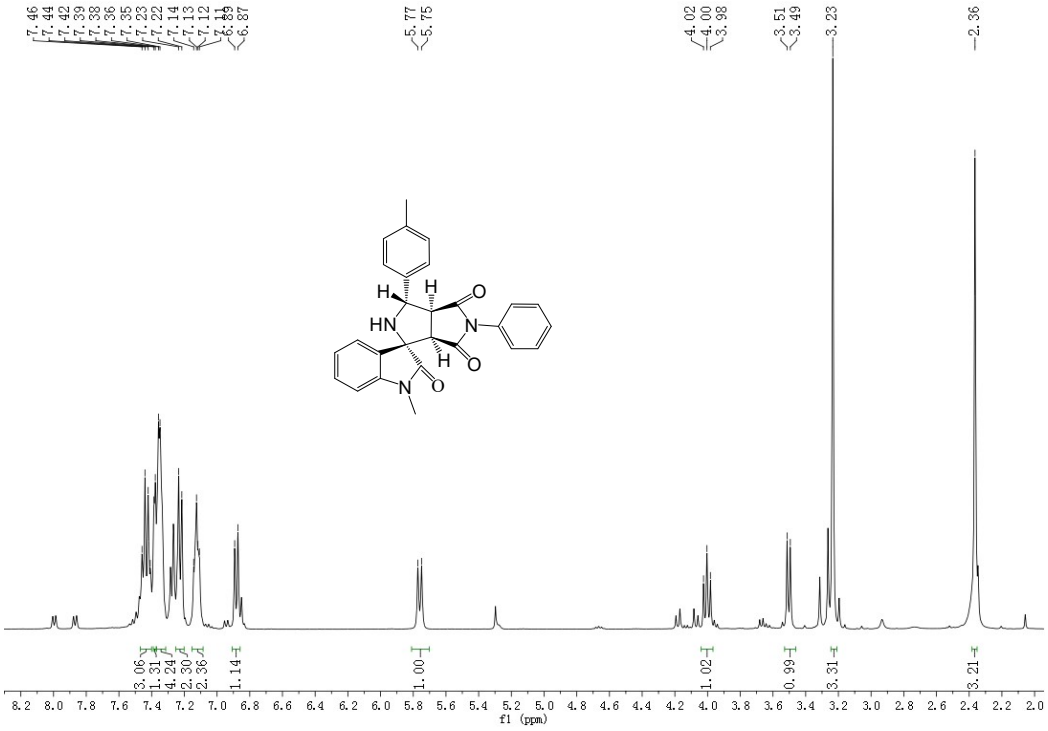
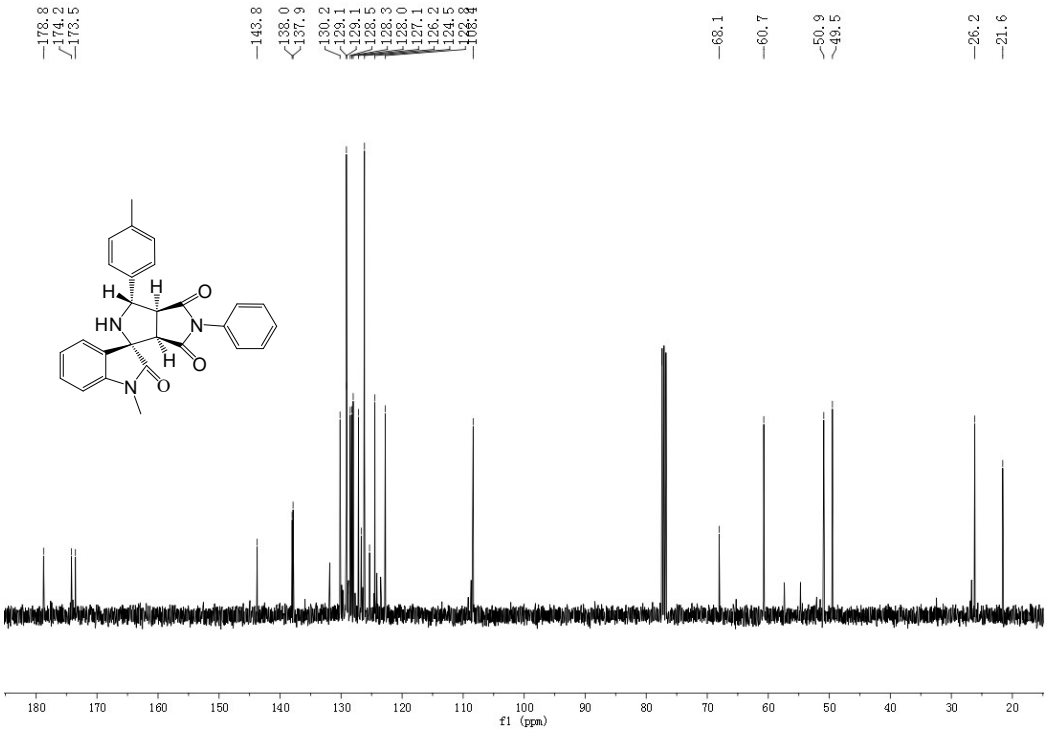
4.53
4.51
4.49
3.61
3.59
3.22
1.10
1.12
1.13
3.26
2.93
2.05
1.35
0.94
1.00
1.00
0.99
2.89
f1 (ppm)

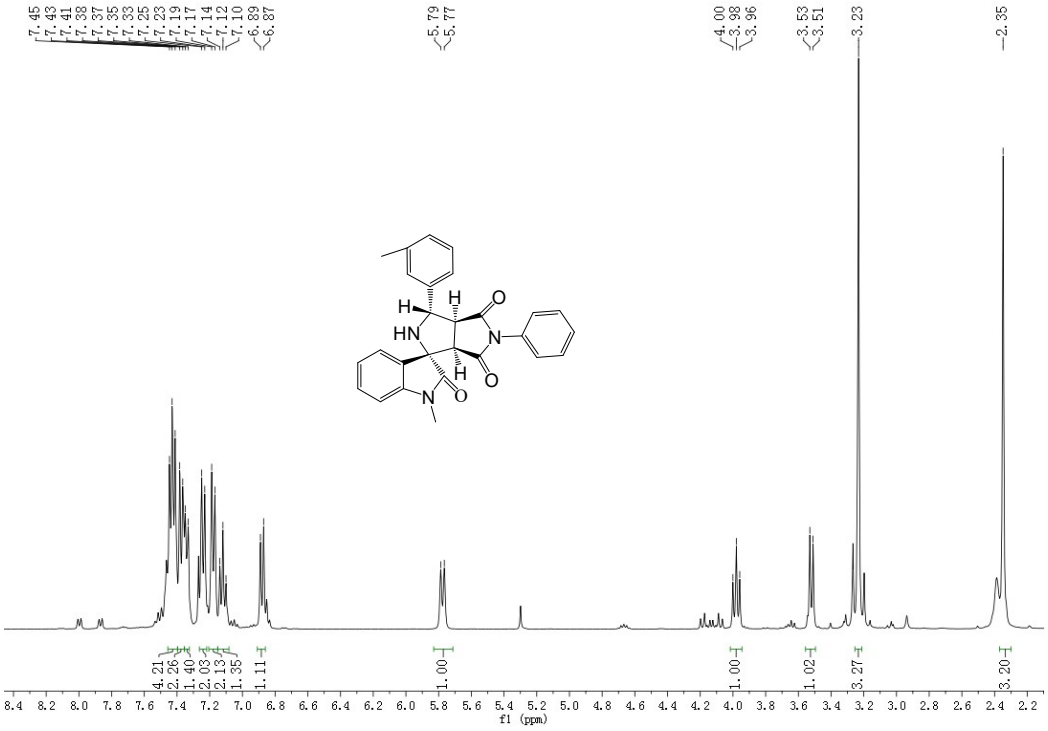

178.5
174.2
173.4
148.7
143.8
134.5
133.4
130.4
129.2
128.8
128.7
128.1
126.7
126.1
125.3
122.8
108.6
67.7
56.9
50.7
48.5
26.2
f1 (ppm)

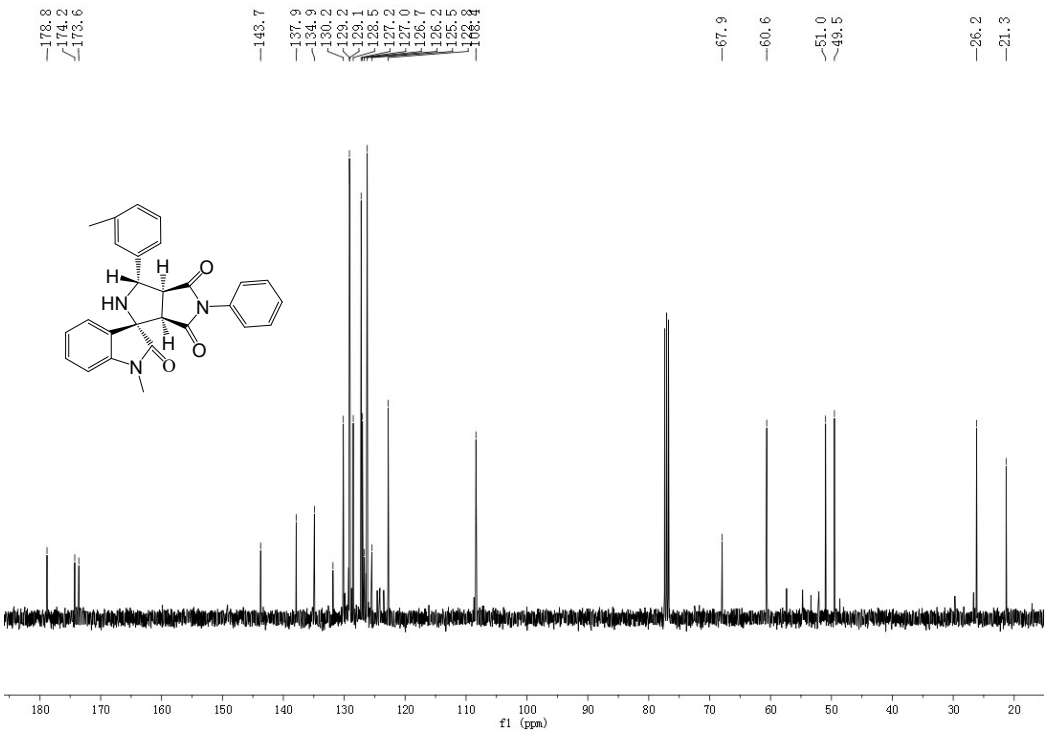
**4o**


7.46
7.44
7.42
7.39
7.38
7.36
7.35
7.23
7.22
7.14
7.13
7.12
6.89
6.87
5.77
5.75
4.02
4.00
3.98
3.51
3.49
3.23
2.36
3.06
1.31
4.24
2.30
2.36
1.14
1.00
1.02
0.99
3.31
3.21
f1 (ppm)

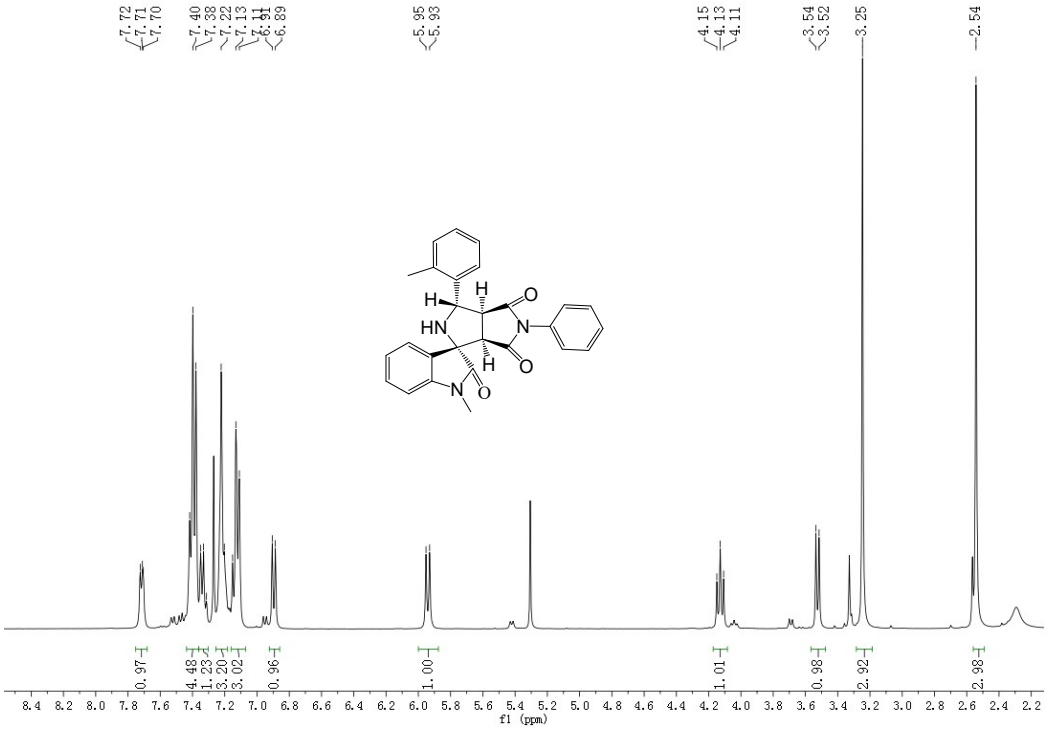

178.8
174.2
173.5
143.8
138.0
137.9
130.2
129.1
129.1
128.5
128.3
128.0
127.1
126.2
124.5
122.8
110.4
68.1
60.7
50.9
49.5
26.2
21.6
f1 (ppm)

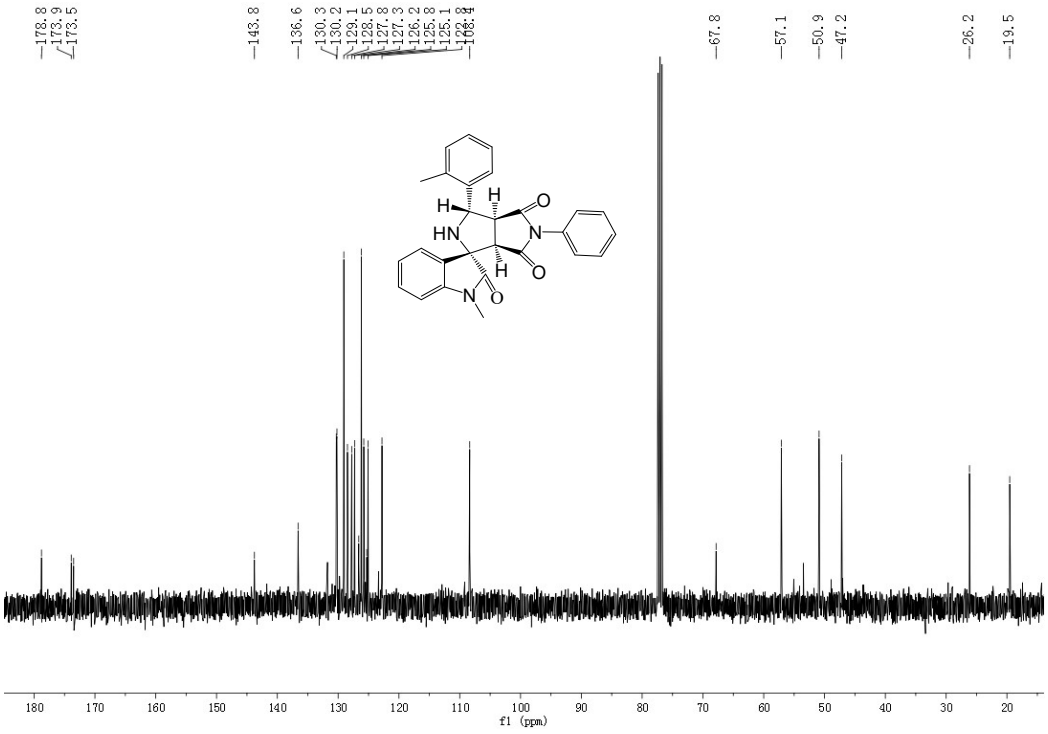
**4p**


7.45
7.43
7.41
7.38
7.37
7.35
7.33
7.25
7.23
7.19
7.17
7.14
7.12
7.10
6.89
6.87
5.79
5.77
4.00
3.98
3.96
3.53
3.51
3.23
2.35
4.21
2.26
1.40
2.03
2.13
1.35
1.11
1.00
1.00
1.02
3.27
3.20
f1 (ppm)

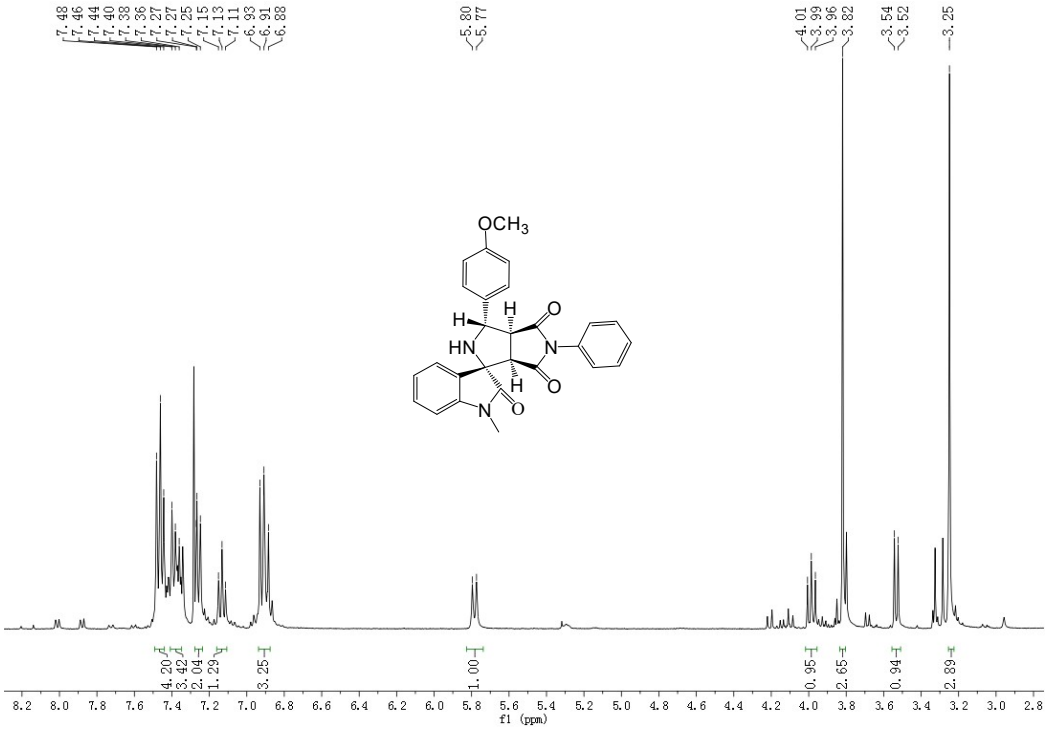

178.8
174.2
173.6
143.7
137.9
134.9
130.2
129.2
129.1
128.5
127.2
127.0
126.7
126.2
125.5
67.9
60.6
51.0
49.5
26.2
21.3
f1 (ppm)

**4q**


7.72
7.71
7.70
7.40
7.38
7.22
7.13
6.91
6.89
5.95
5.93
4.15
4.13
4.11
3.54
3.52
3.25
2.54
0.97
4.48
1.23
3.20
3.02
0.96
1.00
1.01
0.98
2.92
2.98
fl (ppm)


178.8
173.9
173.5
143.8
136.6
130.3
130.2
129.1
128.5
127.8
127.3
126.2
125.8
125.1
67.8
57.1
50.9
47.2
26.2
19.5
fl (ppm)

**4r**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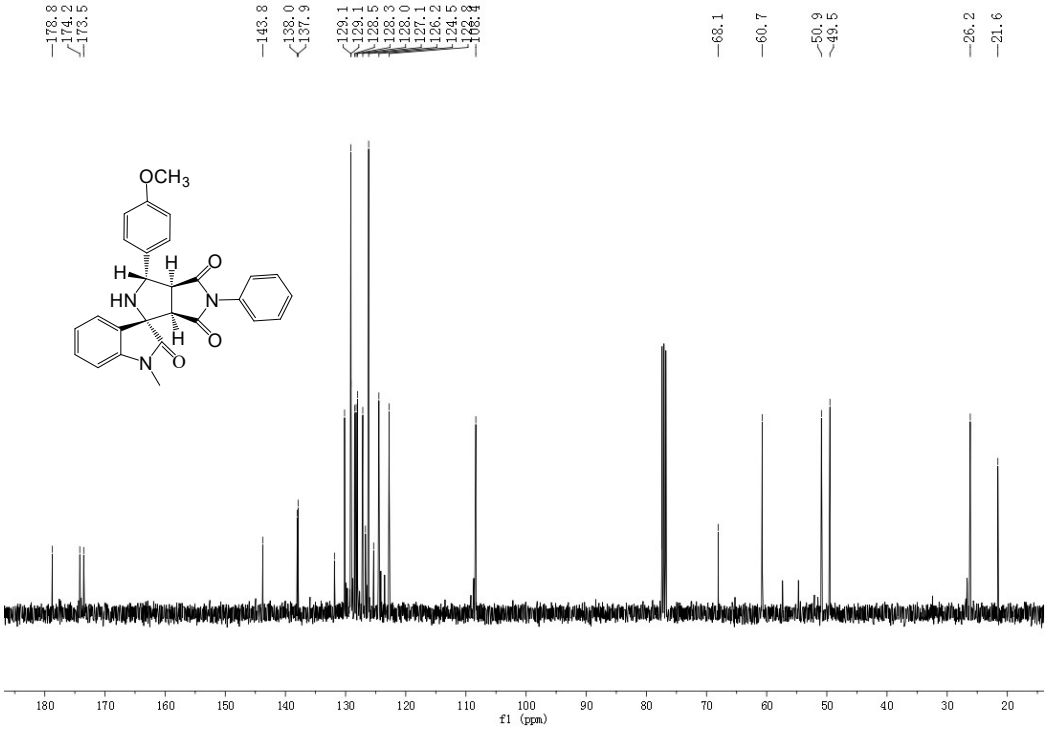
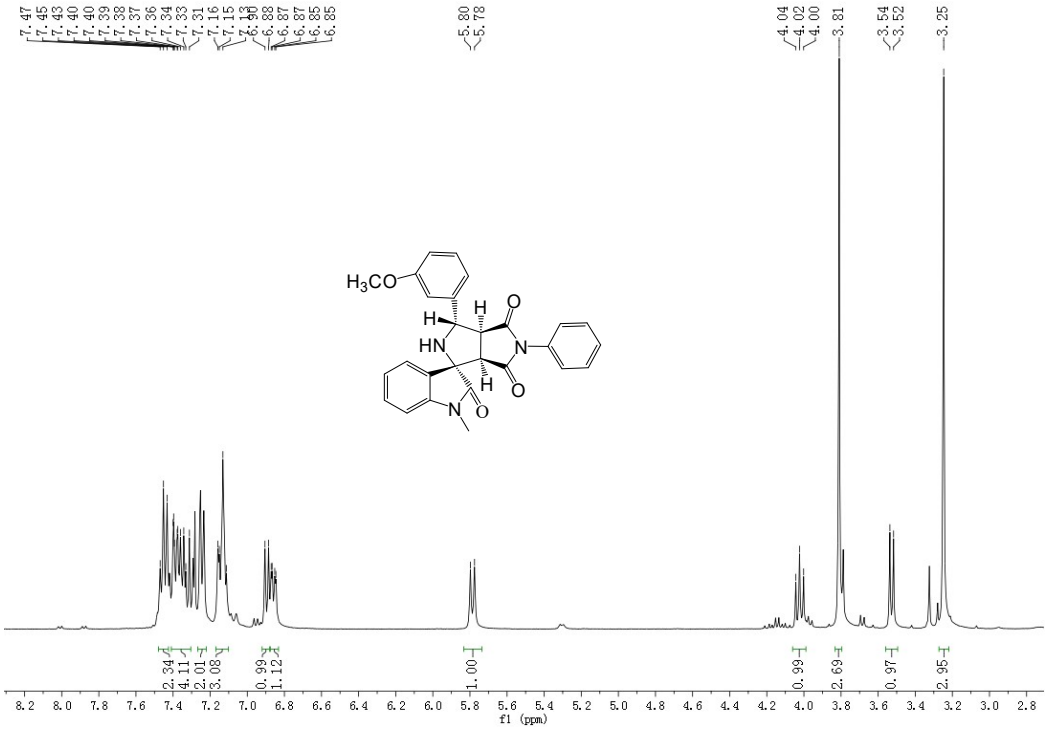
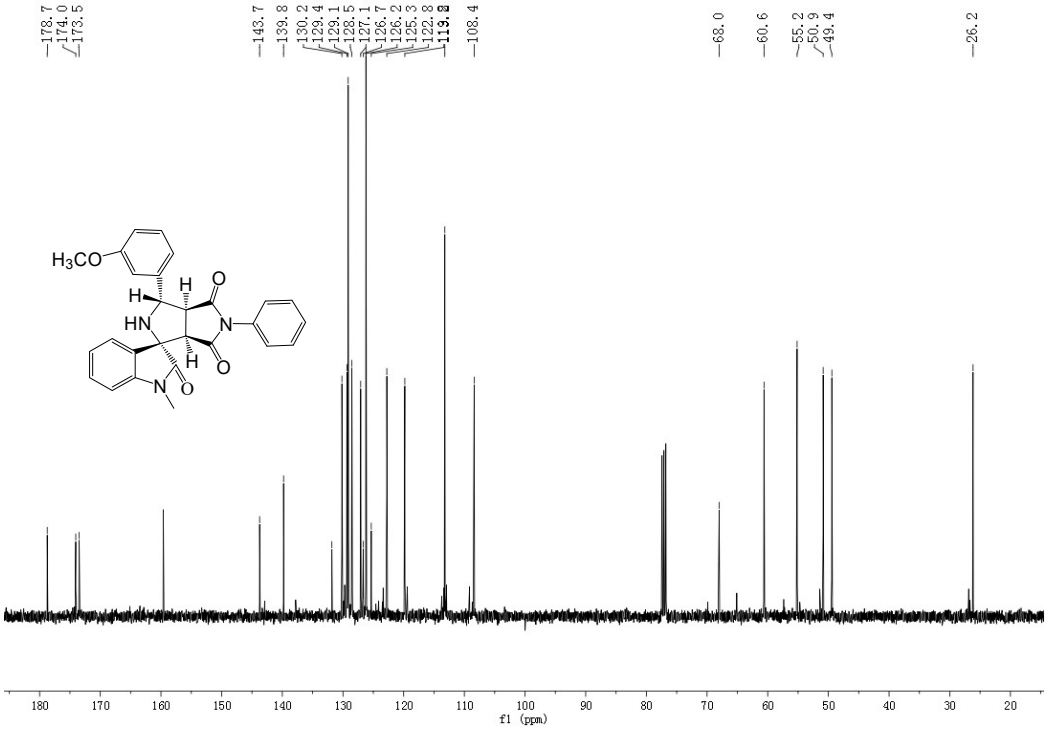
7.46
7.44
7.40
7.38
7.36
7.27
7.27
7.25
7.15
7.13
7.11
6.93
6.91
6.88
5.80
5.77
4.01
3.99
3.96
3.82
3.54
3.52
3.25
OCH3
H
HN
H
O
N
O
H
O
N
O
4.20
3.42
2.04
1.29
3.25
1.00
0.95
2.65
0.94
2.89
f1 (ppm)

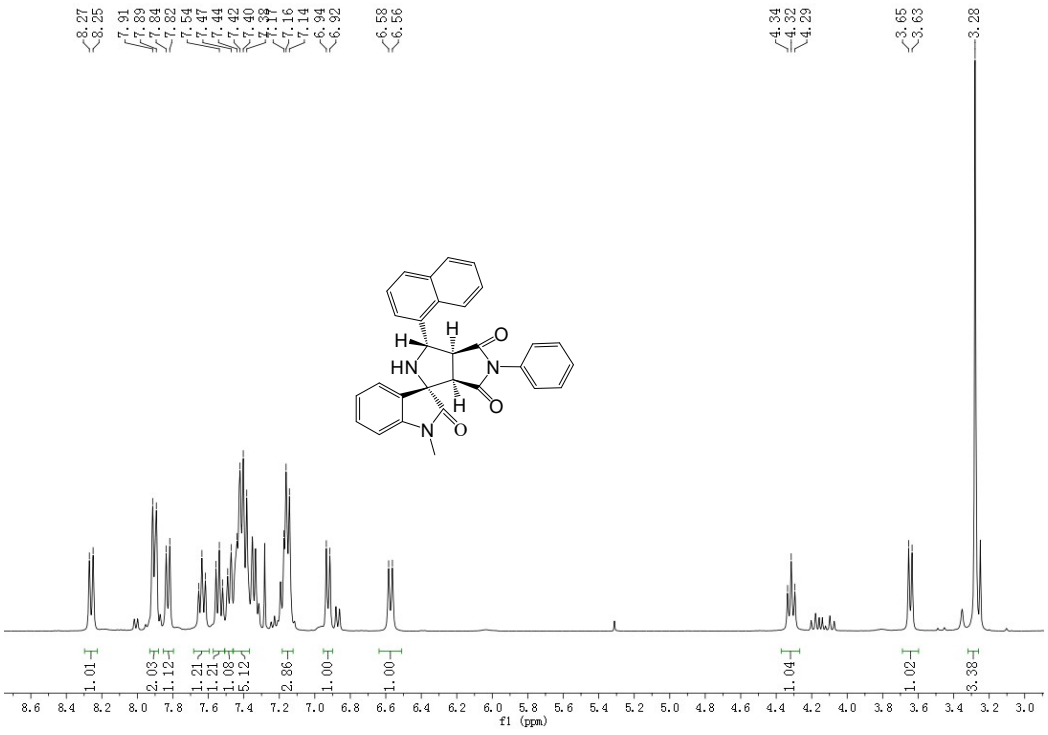

178.8
174.2
173.5
143.8
138.0
137.9
129.1
129.1
128.5
128.3
128.0
127.1
126.2
124.5
120.3
110.4
68.1
60.7
50.9
49.5
26.2
21.6
OCH3
H
HN
H
O
N
O
H
O
N
O
f1 (ppm)

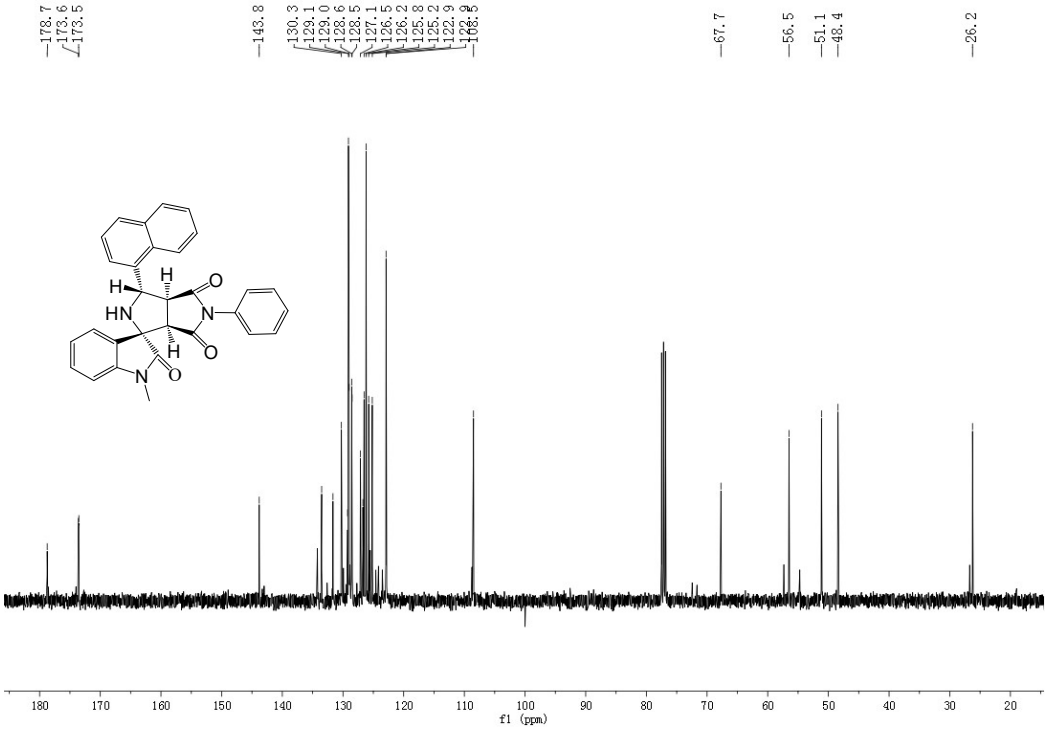
**4s**


7.47
7.45
7.43
7.40
7.40
7.39
7.38
7.37
7.36
7.34
7.33
7.31
7.16
7.15
6.88
6.87
6.85
6.85
5.80
5.78
4.04
4.02
4.00
3.81
3.54
3.52
3.25
H3CO
H
H
HN
O
N
O
H
N
O
2.34
4.11
2.01
3.08
0.99
1.12
1.00
0.99
2.69
0.97
2.95
f1 (ppm)

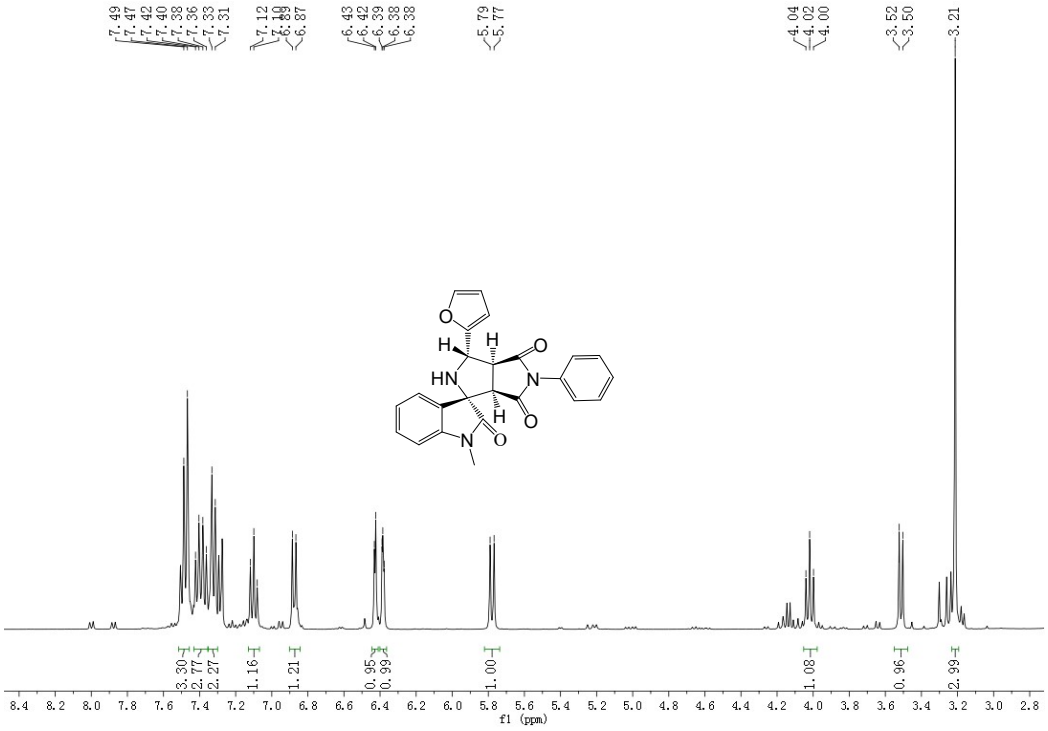

178.7
174.0
173.5
143.7
139.8
130.2
129.4
129.1
128.5
127.1
126.7
126.2
125.3
122.8
108.4
68.0
60.6
55.2
50.9
49.4
26.2
H3CO
H
H
HN
O
N
O
H
N
O
f1 (ppm)

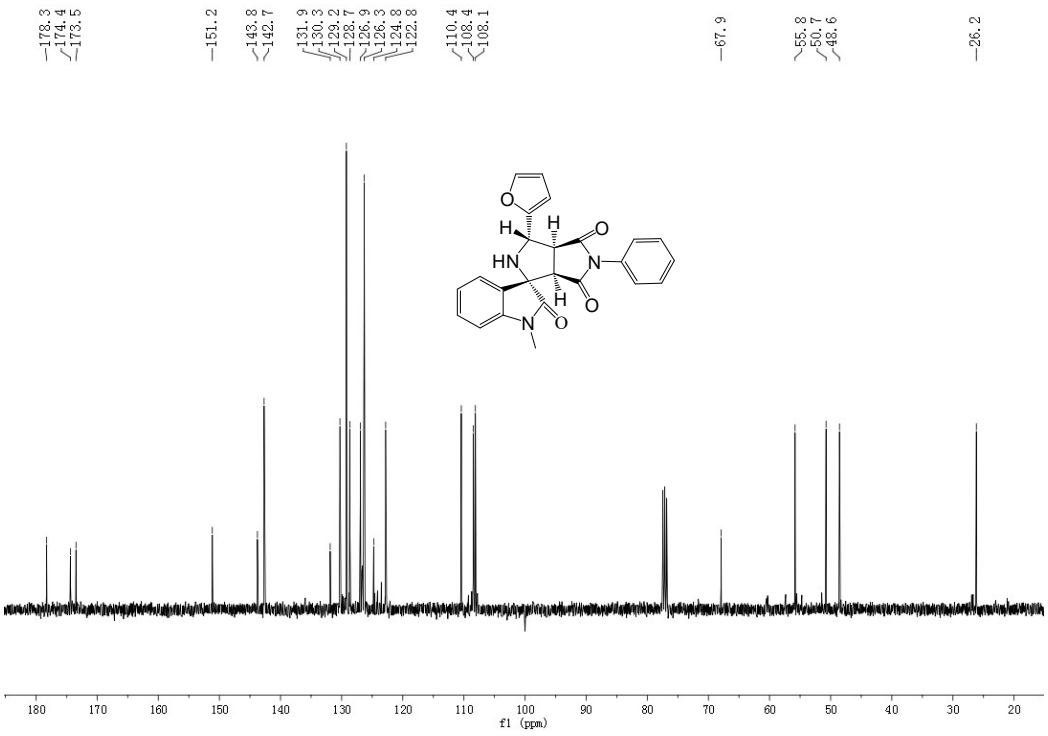
**4t**


8.27
8.25
7.91
7.89
7.84
7.82
7.54
7.47
7.44
7.42
7.40
7.38
7.17
7.16
7.14
6.94
6.92
6.58
6.56
4.34
4.32
4.29
3.65
3.63
3.28
1.01
2.03
1.12
1.21
1.21
1.08
5.12
2.86
1.00
1.00
1.04
1.02
3.38
f1 (ppm)

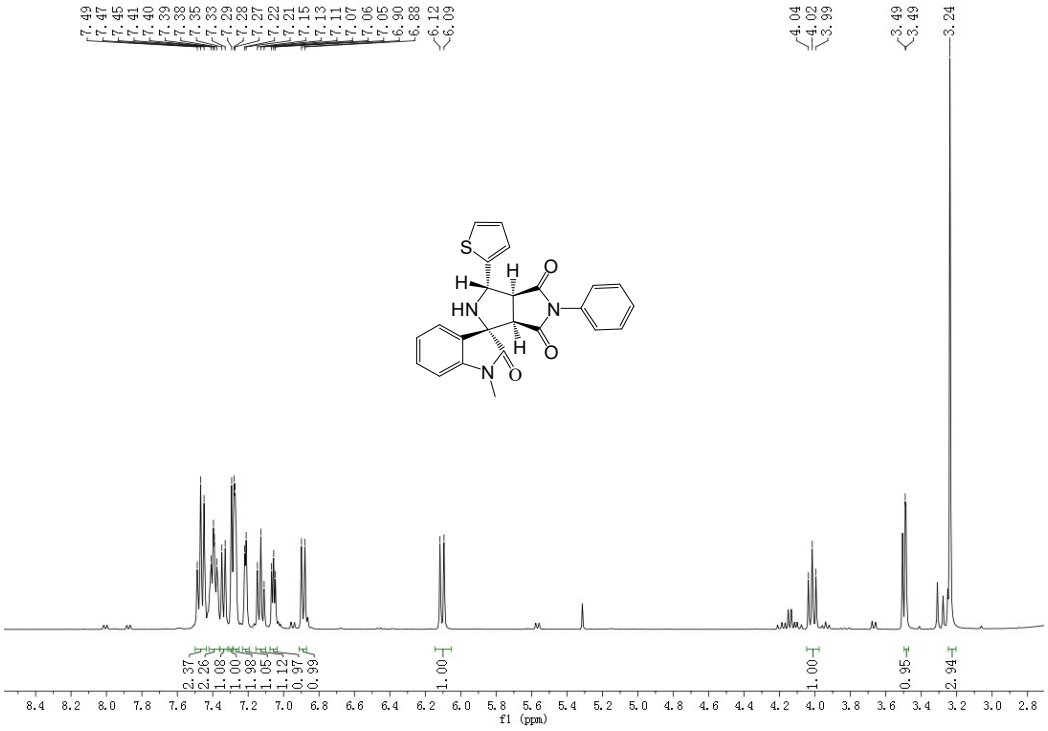

178.7
173.6
173.5
143.8
130.3
129.1
129.0
128.6
128.5
127.1
126.5
126.2
125.8
125.2
122.9
122.8
108.5
67.7
56.5
51.1
48.4
26.2
f1 (ppm)

**4u**


7.49
7.47
7.42
7.40
7.38
7.36
7.33
7.31
7.12
7.10
6.89
6.87
6.43
6.42
6.39
6.38
6.38
5.79
5.77
4.04
4.02
4.00
3.52
3.50
3.21
3.30
2.77
2.27
1.16
1.21
0.95
0.99
1.00
1.08
0.96
2.99
f1 (ppm)


178.3
174.4
173.5
151.2
143.8
142.7
131.9
130.3
129.2
128.7
126.9
126.3
124.8
122.8
110.4
108.4
108.1
67.9
55.8
50.7
48.6
26.2
f1 (ppm)

**4v**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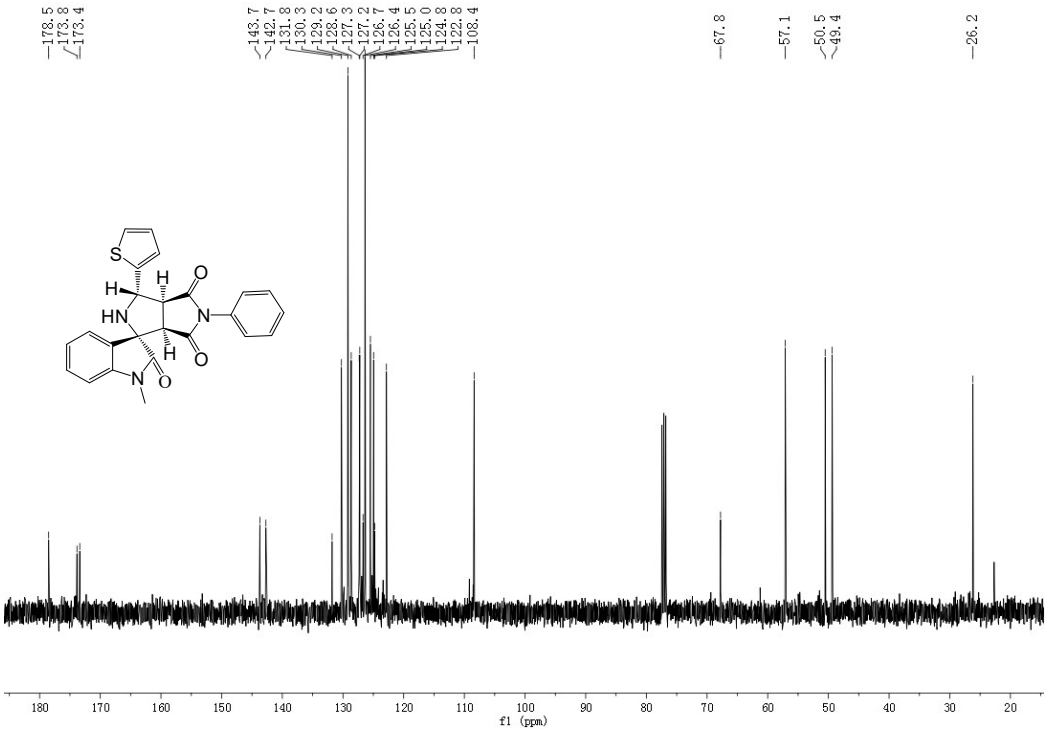
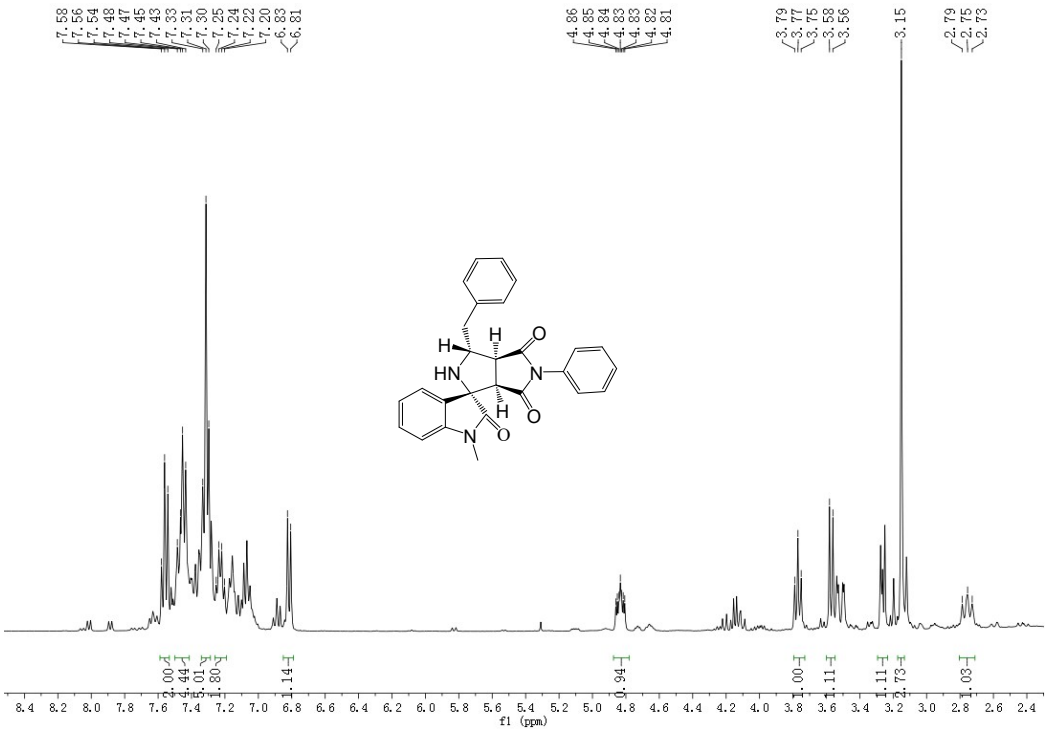
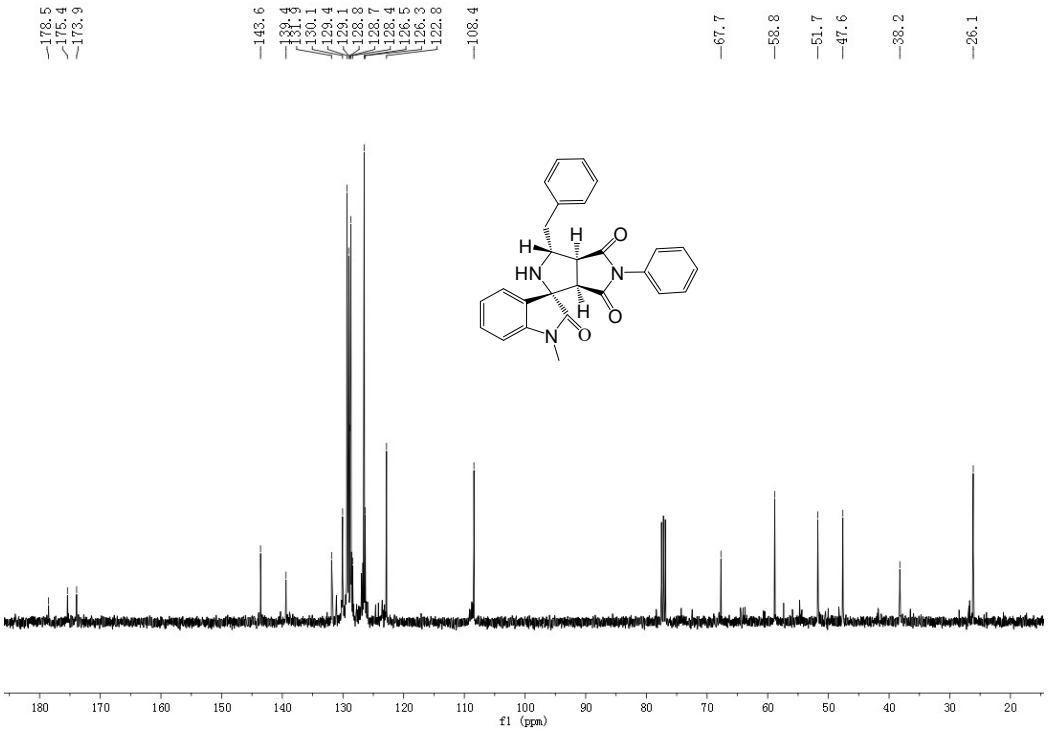
7.47
7.45
7.41
7.40
7.39
7.38
7.35
7.33
7.29
7.28
7.27
7.22
7.21
7.15
7.13
7.11
7.07
7.06
7.05
6.90
6.88
6.12
6.09
4.04
4.02
3.99
3.49
3.49
3.24
2.37
2.26
1.08
1.00
1.98
1.05
1.12
0.97
0.99
1.00
1.00
0.95
2.94
f1 (ppm)

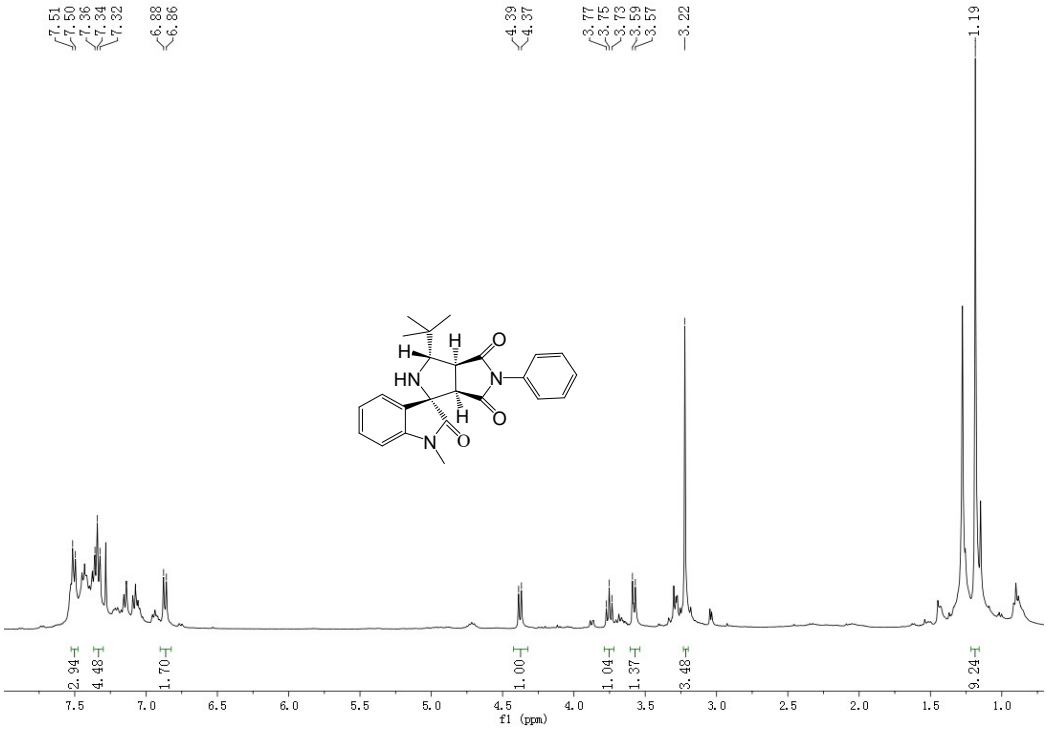

178.5
173.8
173.4
143.7
142.7
131.8
130.3
129.2
128.6
127.3
127.2
126.7
126.4
125.5
125.0
124.8
122.8
108.4
67.8
57.1
50.5
49.4
26.2
f1 (ppm)

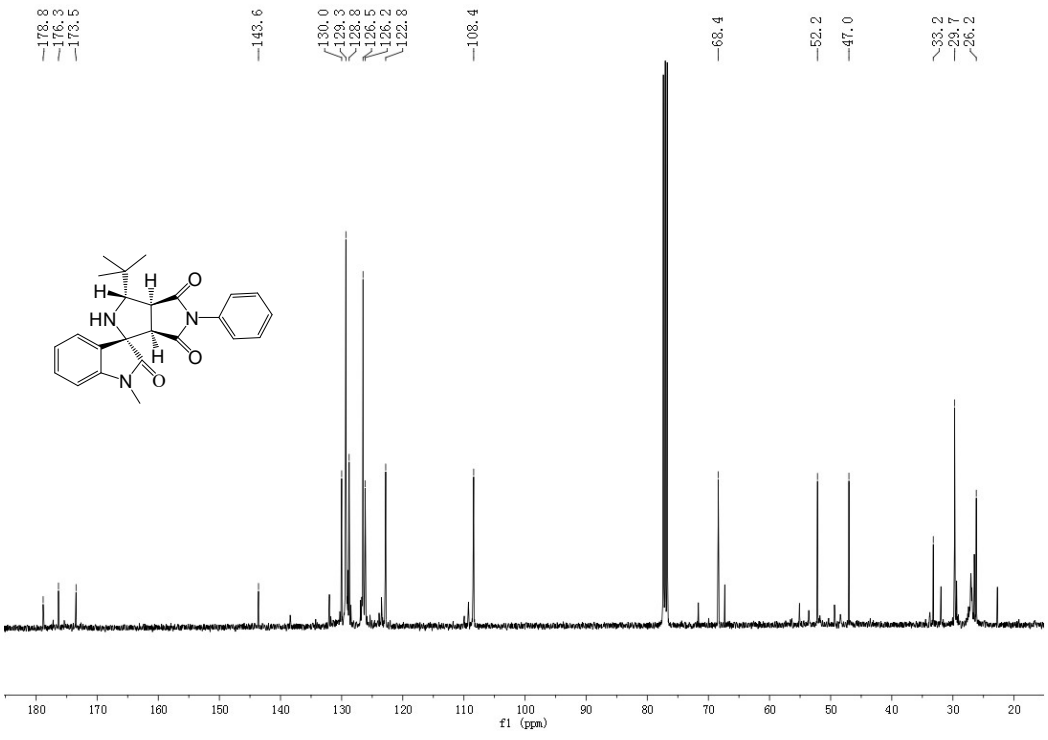
**4w**


7.58
7.56
7.54
7.48
7.47
7.45
7.43
7.33
7.31
7.30
7.25
7.24
7.22
7.20
6.83
6.81
4.86
4.85
4.84
4.83
4.83
4.82
4.81
3.79
3.77
3.75
3.58
3.56
3.15
2.79
2.75
2.73
2.00
2.44
3.01
1.80
1.14
0.94
1.00
1.11
1.11
2.73
1.03
f1 (ppm)

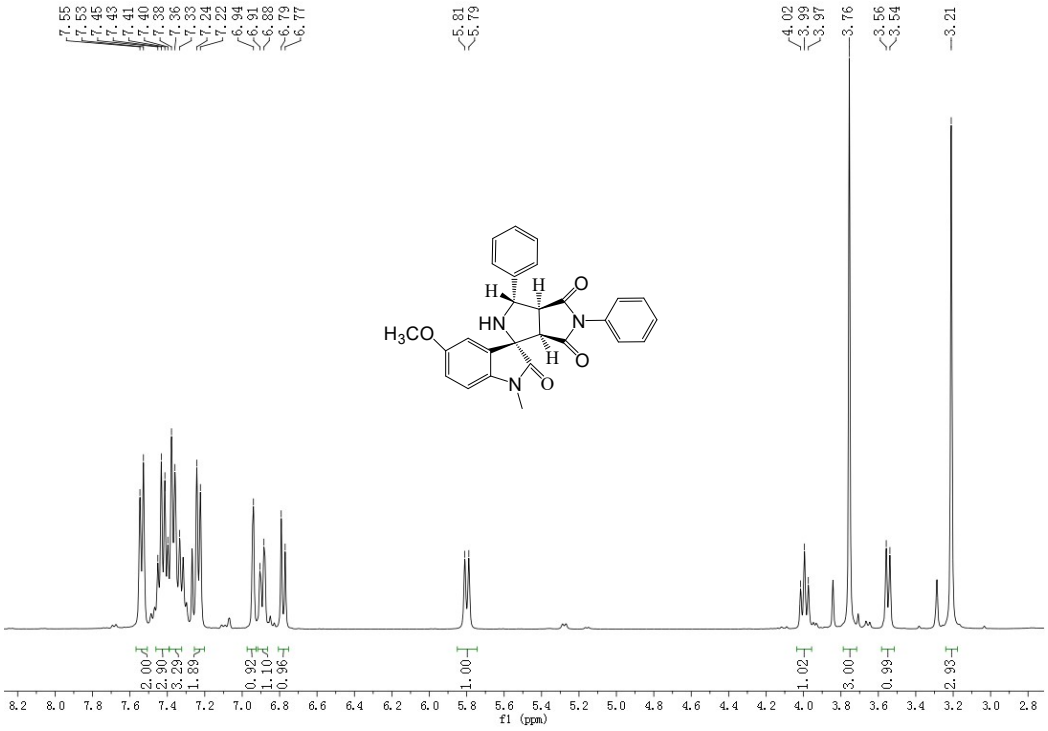

178.5
175.4
173.9
143.6
139.4
131.3
130.1
129.4
129.1
128.8
128.7
128.4
126.5
126.3
122.8
108.4
67.7
58.8
51.7
47.6
38.2
26.1
f1 (ppm)

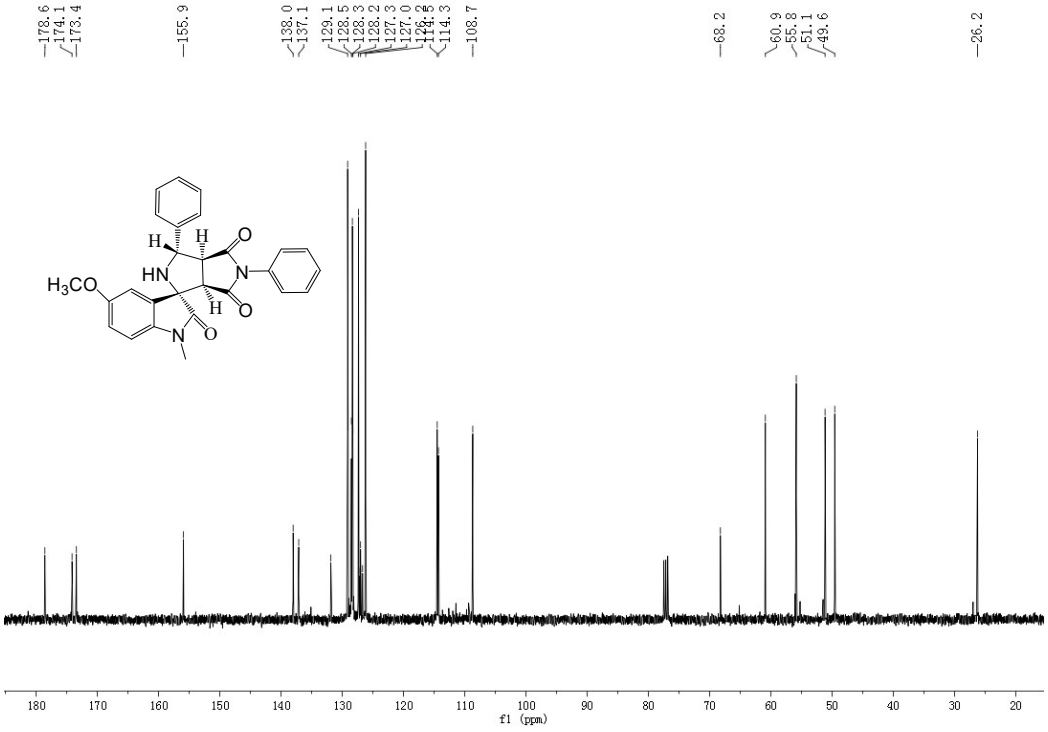
**4x**


7.51
7.50
7.36
7.34
7.32
6.88
6.86
4.39
4.37
3.77
3.75
3.73
3.59
3.57
3.22
1.19
2.94
4.48
1.70
1.00
1.04
1.37
3.48
9.24
f1 (ppm)

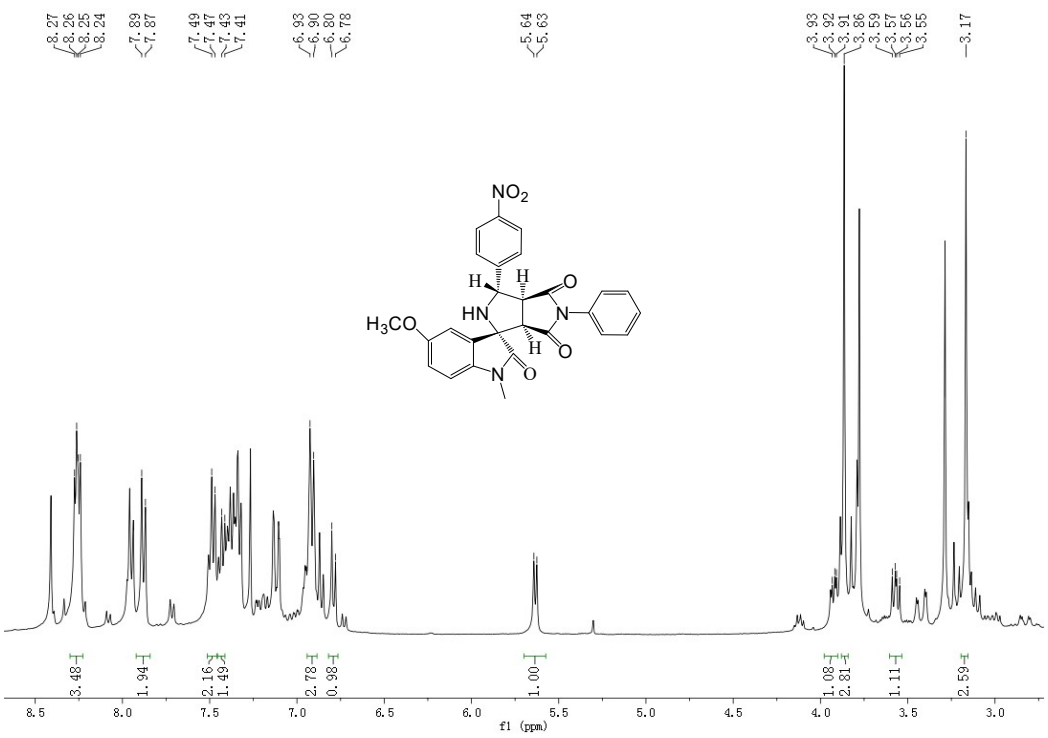

178.8
176.3
173.5
143.6
130.0
129.3
128.8
126.5
126.2
122.8
108.4
68.4
52.2
47.0
33.2
29.7
26.2
f1 (ppm)

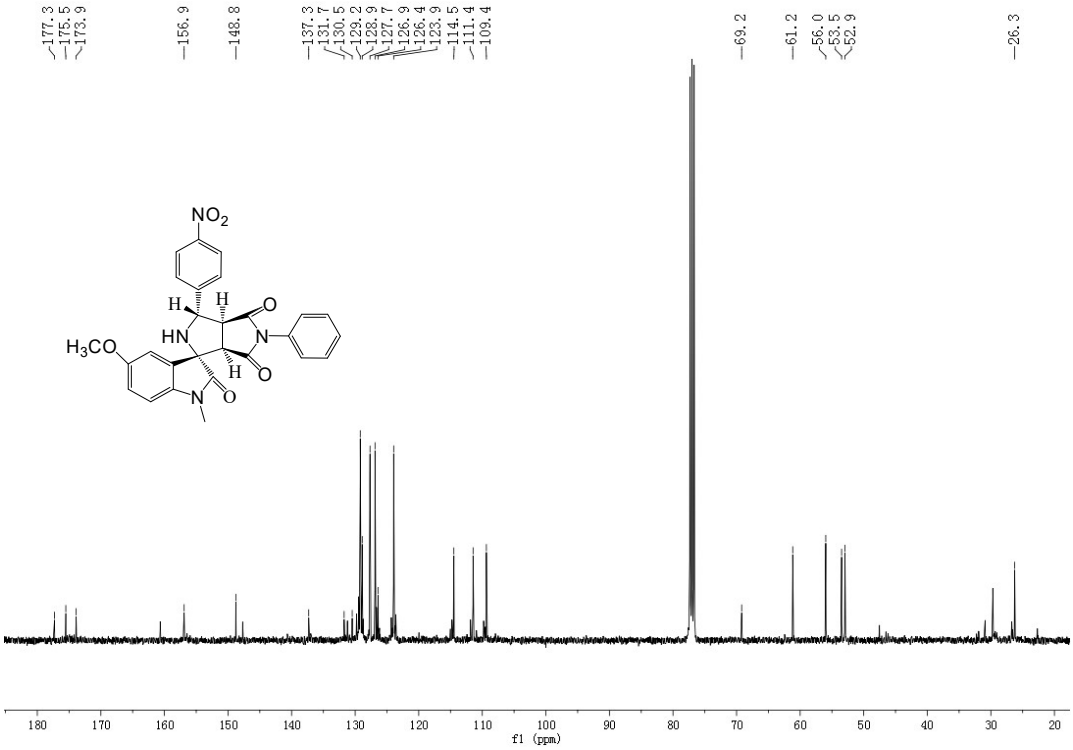
**5a**


7.55
7.53
7.45
7.43
7.41
7.40
7.38
7.36
7.33
7.24
7.22
6.94
6.91
6.88
6.79
6.77
5.81
5.79
4.02
3.99
3.97
3.76
3.56
3.54
3.21
2.00
2.90
3.29
1.89
0.92
1.10
0.96
1.00
1.02
3.00
0.99
2.93
f1 (ppm)

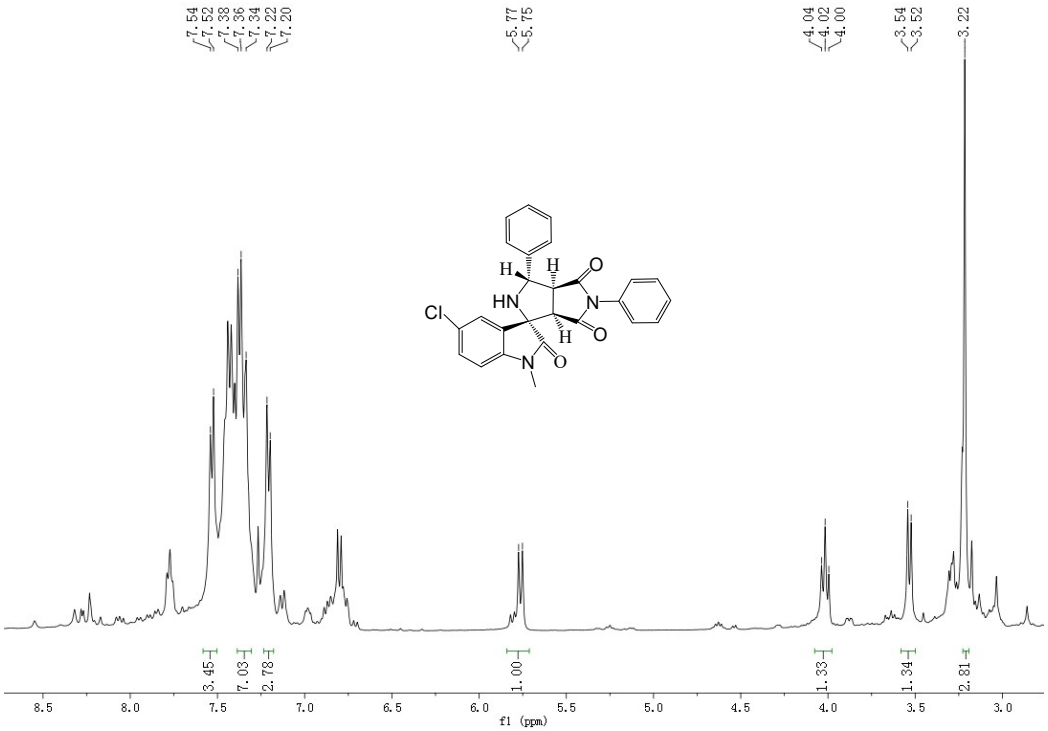

178.6
174.1
173.4
155.9
138.0
137.1
129.1
128.5
128.3
128.2
127.3
127.0
126.2
114.5
114.3
108.7
68.2
60.9
55.8
51.1
49.6
26.2
f1 (ppm)

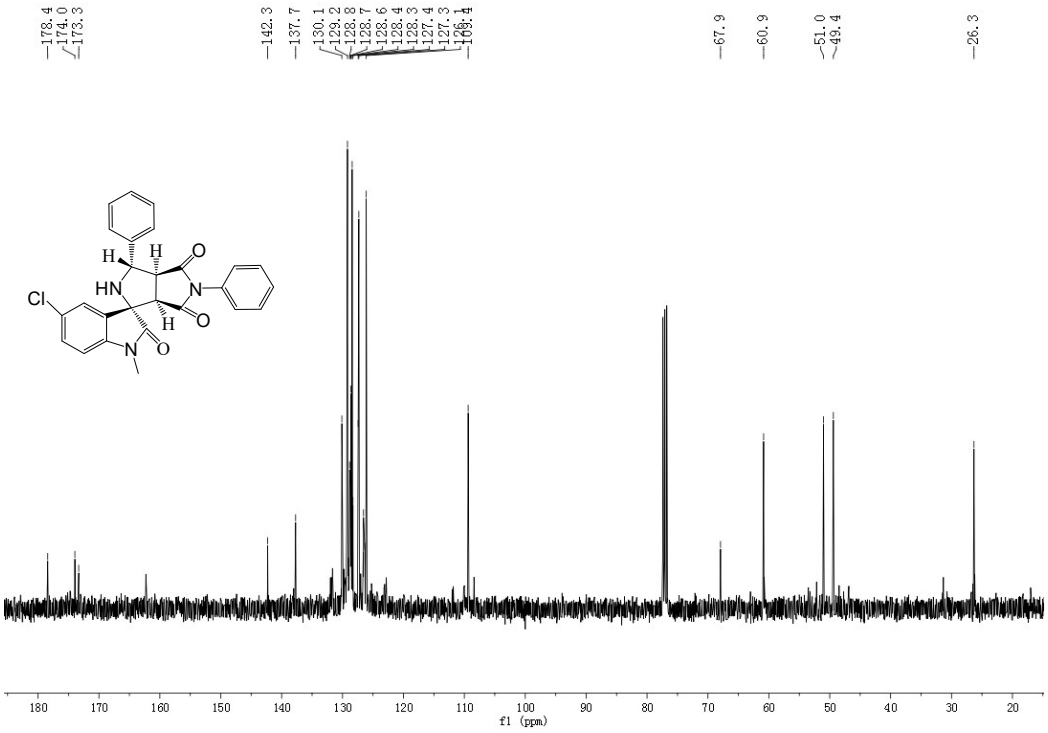
**5b**


8.27
8.26
8.25
8.24
7.89
7.87
7.49
7.47
7.43
7.41
6.93
6.90
6.80
6.78
5.64
5.63
3.93
3.92
3.91
3.86
3.59
3.57
3.56
3.55
3.17
NO2
H3CO
HN
O
N
H
3.48
1.94
2.16
1.49
2.78
0.98
1.00
1.08
2.81
1.11
2.59
f1 (ppm)

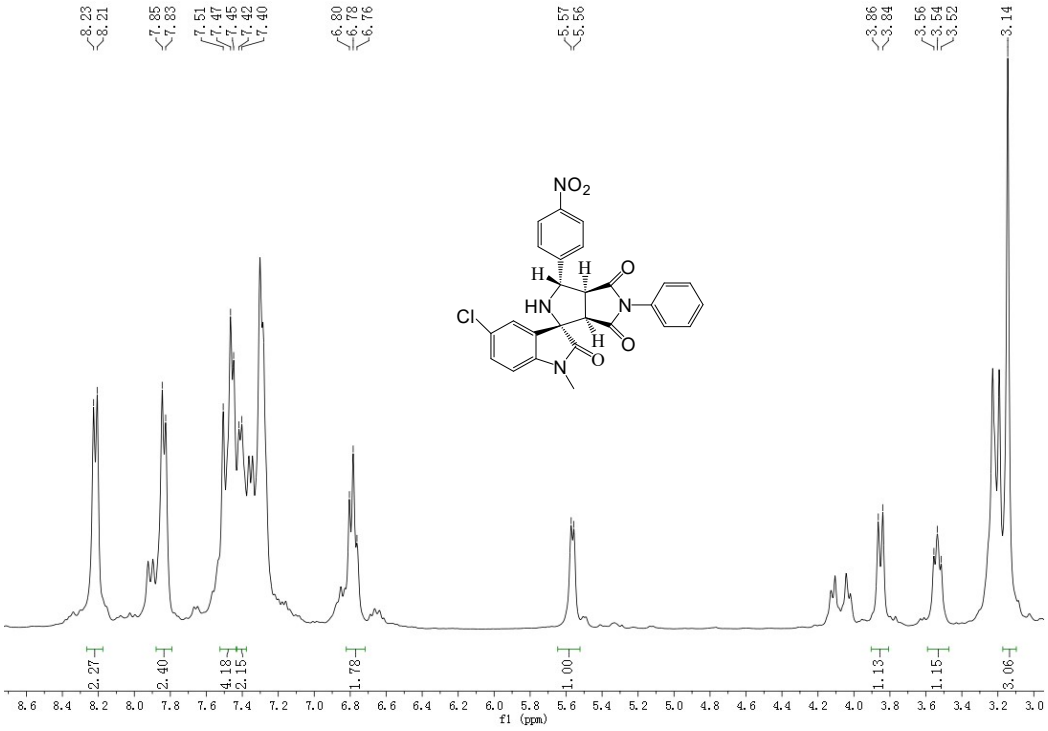

177.3
175.5
173.9
156.9
148.8
137.3
131.7
130.5
129.2
128.9
127.7
126.9
126.4
123.9
114.5
111.4
109.4
69.2
61.2
56.0
53.5
52.9
26.3
NO2
H3CO
HN
O
N
H
f1 (ppm)

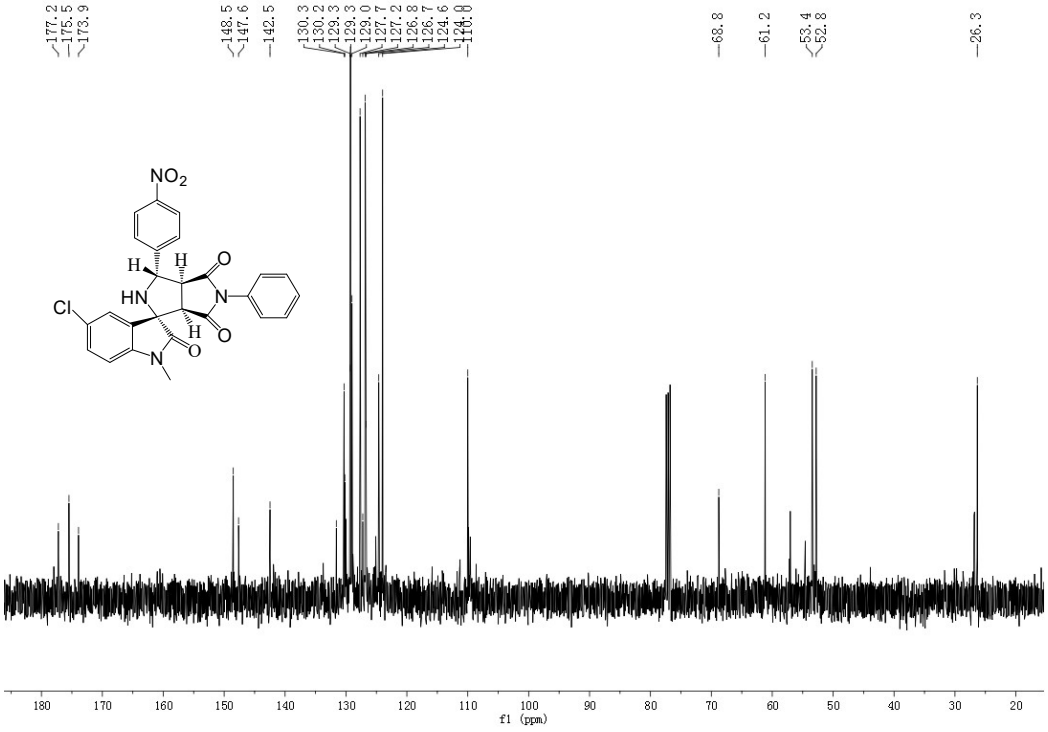
**5c**


7.54
7.52
7.38
7.36
7.34
7.22
7.20
5.77
5.75
4.04
4.02
4.00
3.54
3.52
3.22
3.45
7.03
2.78
1.00
1.33
1.34
2.81
f1 (ppm)

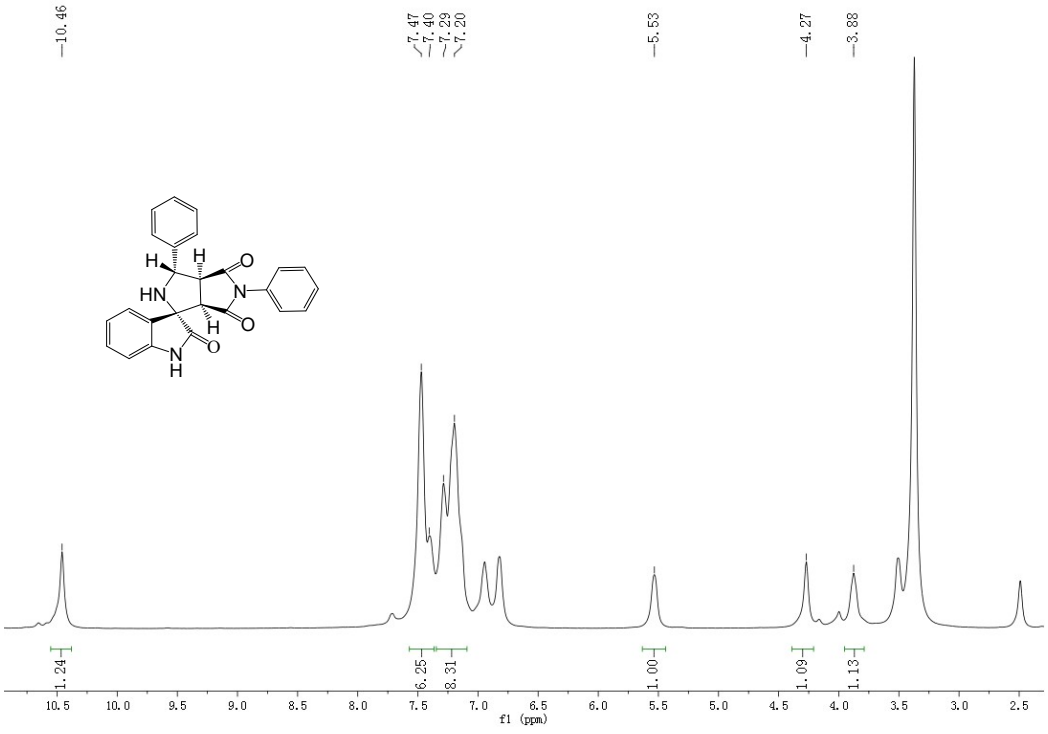

178.4
174.0
173.3
142.3
137.7
130.1
129.2
128.8
128.7
128.6
128.4
128.3
127.4
127.3
67.9
60.9
51.0
49.4
26.3
f1 (ppm)

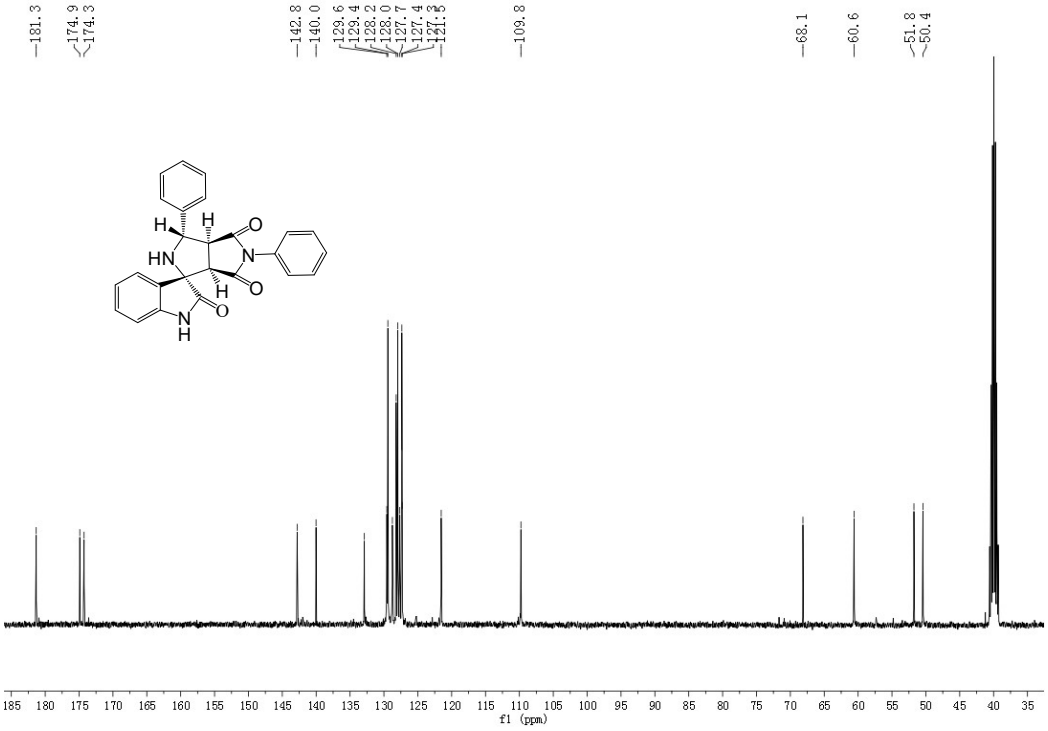
**5d**


8.23
8.21
7.85
7.83
7.51
7.47
7.45
7.42
7.40
6.80
6.78
6.76
5.57
5.56
3.86
3.84
3.56
3.54
3.52
3.14
NO2
H
H
O
HN
N
Cl
H
O
O
N
2.27
2.40
4.18
2.15
1.78
1.00
1.13
1.15
3.06
fl (ppm)

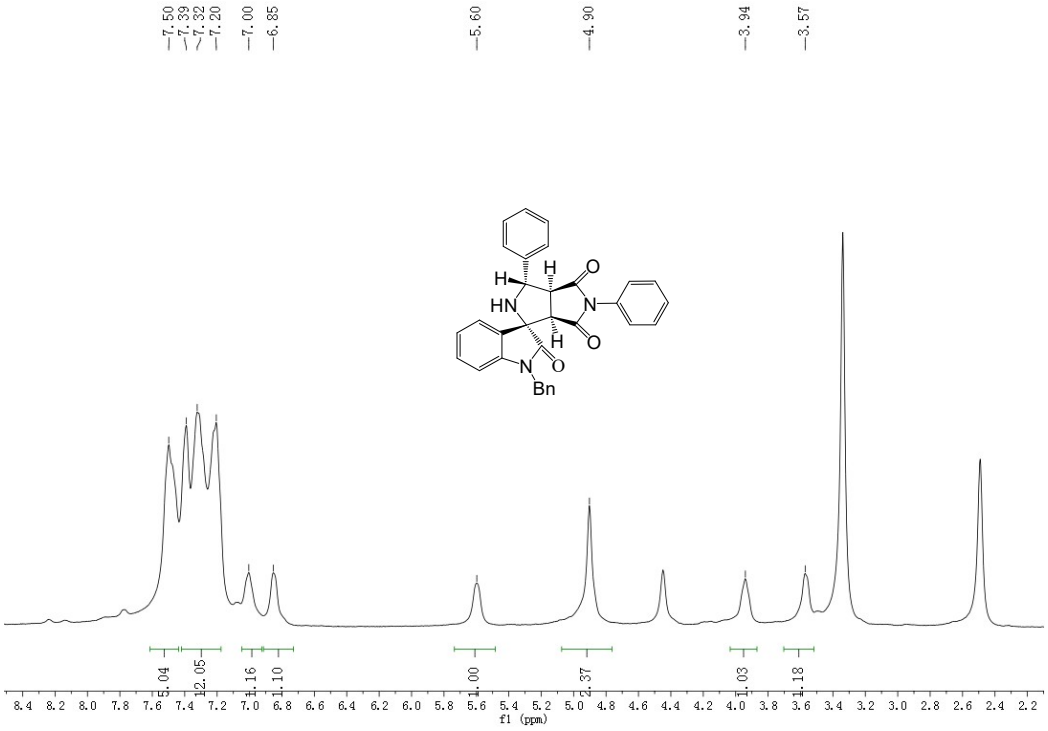

177.2
175.5
173.9
148.5
147.6
142.5
130.3
130.2
129.3
129.3
129.0
127.7
127.2
126.8
126.7
124.6
124.0
110.0
68.8
61.2
53.4
52.8
26.3
NO2
H
H
O
HN
N
Cl
H
O
O
N
fl (ppm)

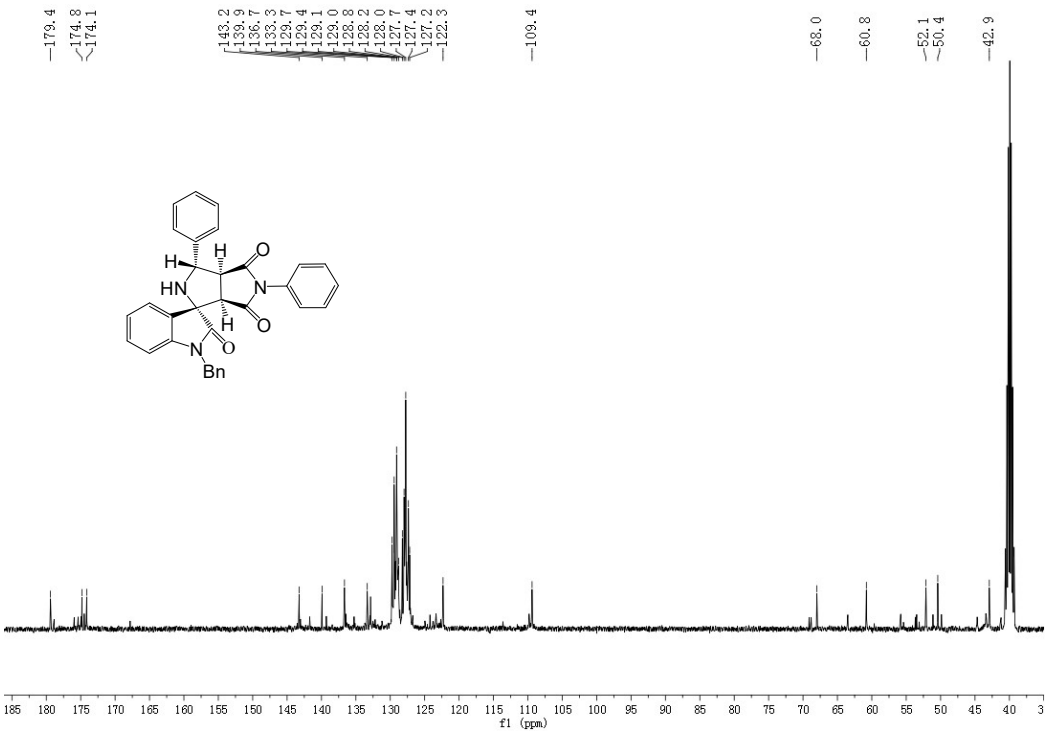
**5e**


10.46
7.47
7.40
7.29
7.20
5.53
4.27
3.88
1.24
6.25
8.31
1.00
1.09
1.13
f1 (ppm)

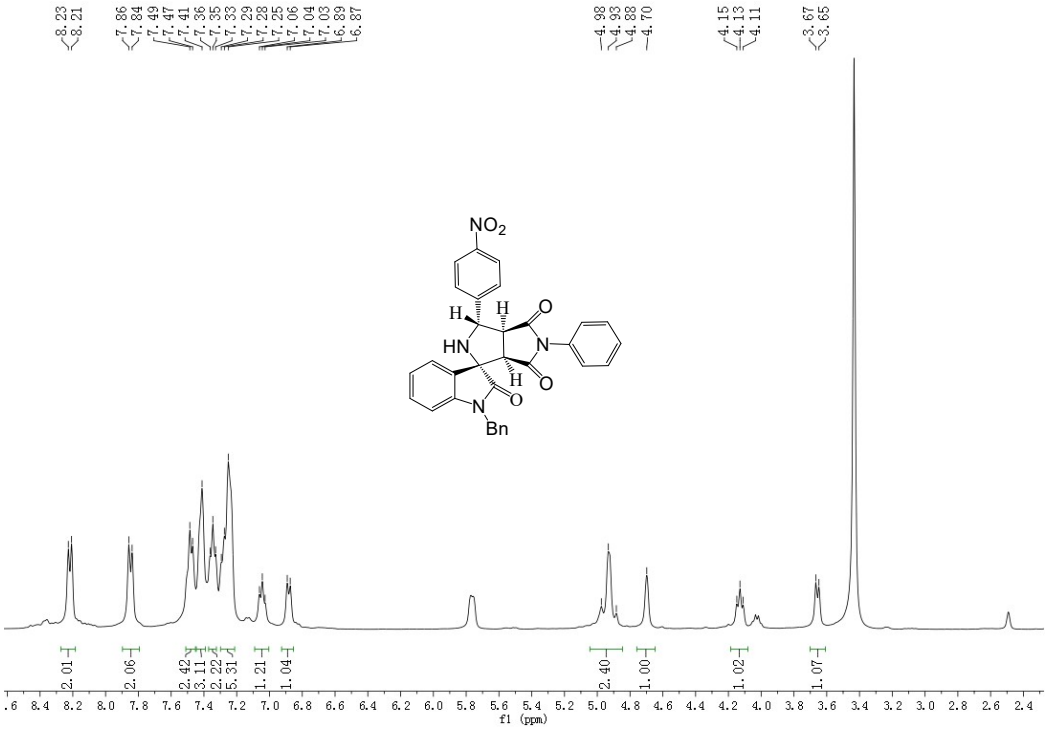

181.3
174.9
174.3
142.8
140.0
129.6
129.4
128.2
128.0
127.7
127.4
121.5
109.8
68.1
60.6
51.8
50.4
f1 (ppm)

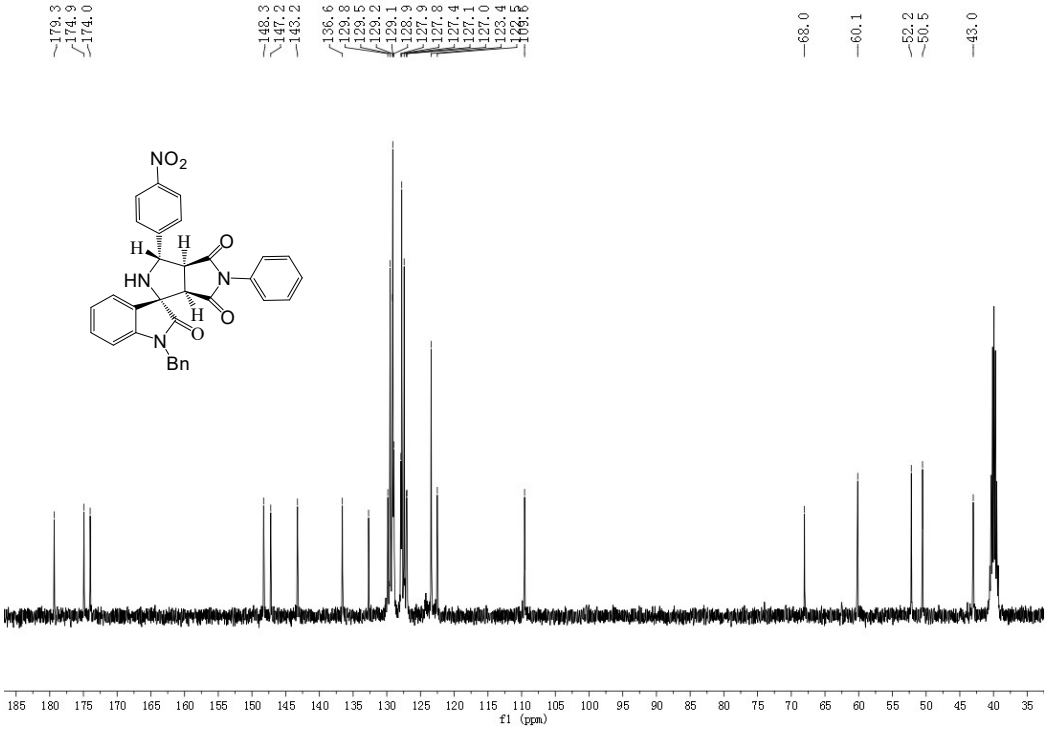
**5f**


7.50
7.39
7.32
7.20
7.00
6.85
5.60
4.90
3.94
3.57
H
H
HN
O
N
H
O
N
O
Bn
5.04
12.05
3.16
1.10
1.00
2.37
1.03
1.18
f1 (ppm)

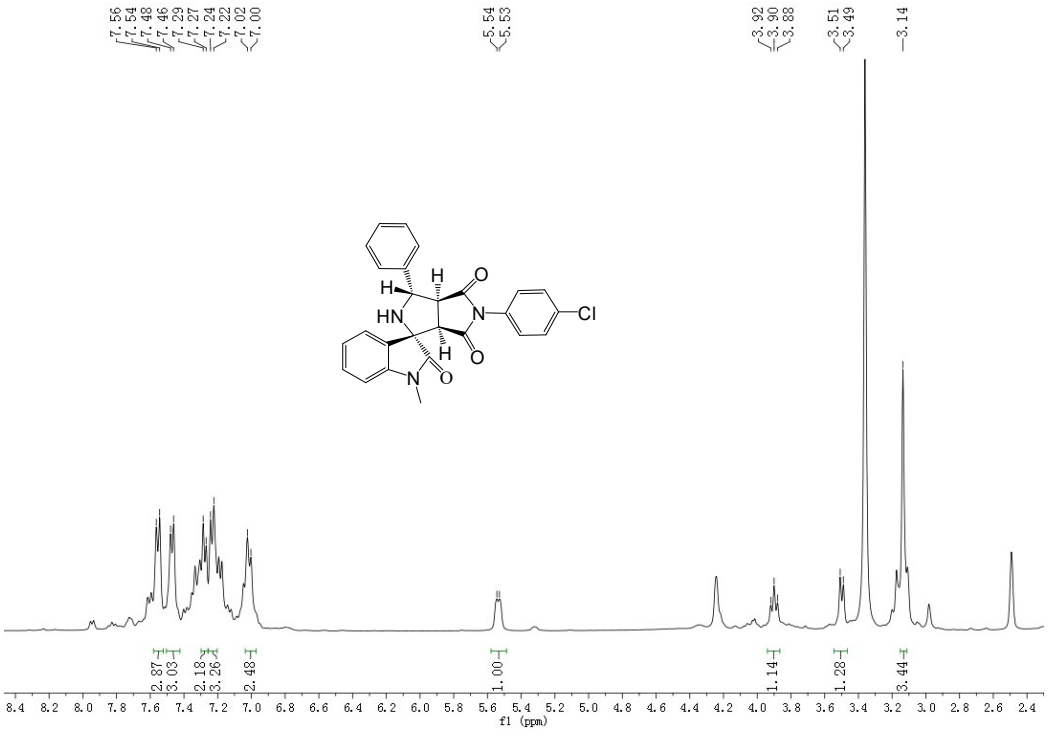

179.4
174.8
174.1
143.2
139.9
136.7
133.3
129.7
129.4
129.1
129.0
128.8
128.2
128.0
127.7
127.4
127.2
122.3
109.4
68.0
60.8
52.1
50.4
42.9
H
H
HN
O
N
H
O
N
O
Bn
f1 (ppm)

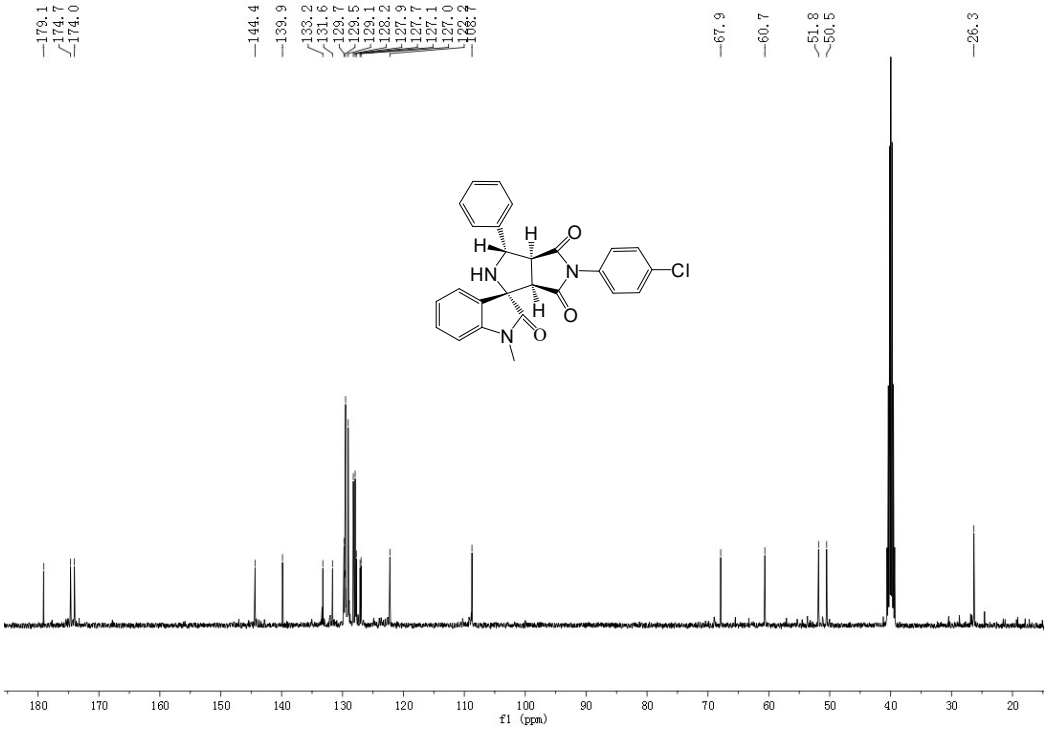
**5g**


8.23
8.21
7.86
7.84
7.49
7.47
7.41
7.36
7.35
7.33
7.29
7.28
7.25
7.06
7.04
7.03
6.89
6.87
4.98
4.93
4.88
4.70
4.15
4.13
4.11
3.67
3.65
NO2
H
H
O
HN
N
O
H
O
N
Bn
2.01
2.06
2.42
3.11
2.22
5.31
1.21
1.04
2.40
1.00
1.02
1.07
f1 (ppm)

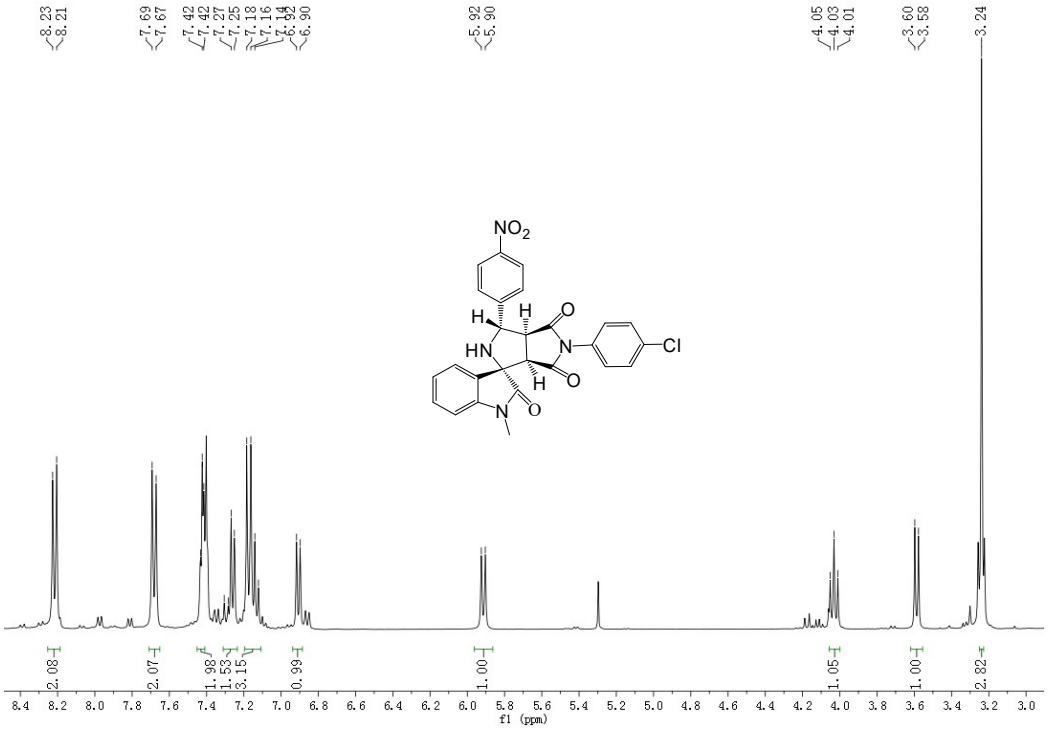

179.3
174.9
174.0
148.3
147.2
143.2
136.6
129.8
129.5
129.2
129.1
128.9
127.9
127.8
127.4
127.1
127.0
123.4
109.6
68.0
60.1
52.2
50.5
43.0
NO2
H
H
O
HN
N
O
H
O
N
Bn
f1 (ppm)

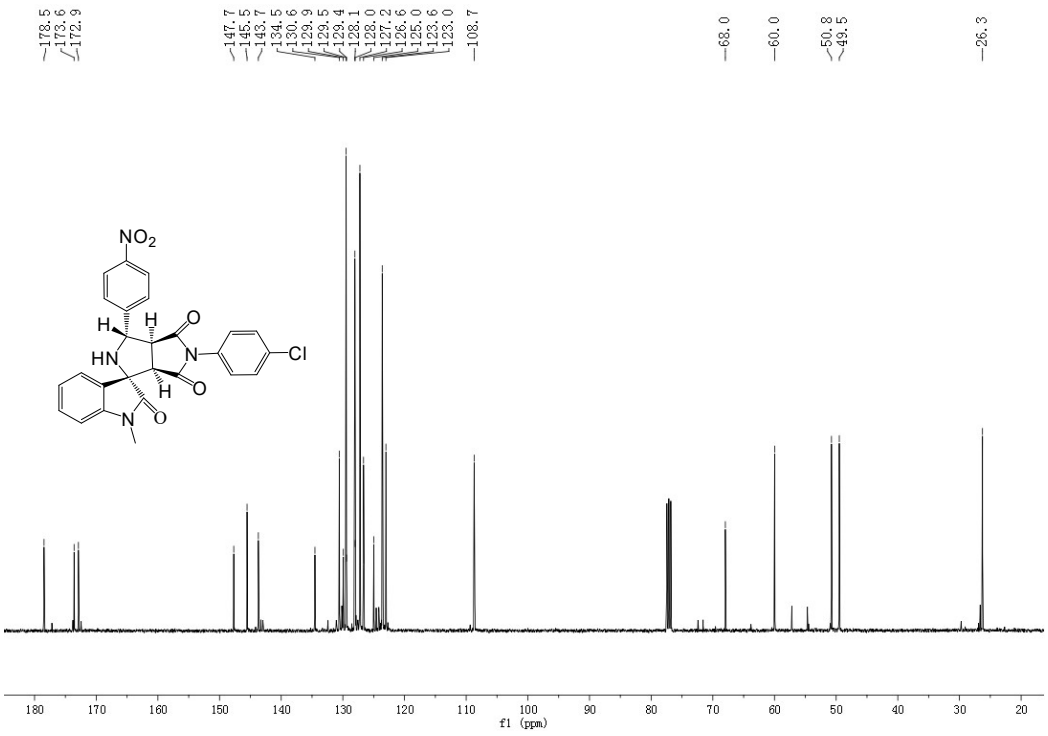
**5h**


7.56
7.54
7.48
7.46
7.29
7.27
7.24
7.22
7.02
7.00
5.54
5.53
3.92
3.90
3.88
3.51
3.49
3.14
H
H
O
HN
N
Cl
H
O
N
O
2.87
3.03
2.18
3.26
2.48
1.00
1.14
1.28
3.44
f1 (ppm)

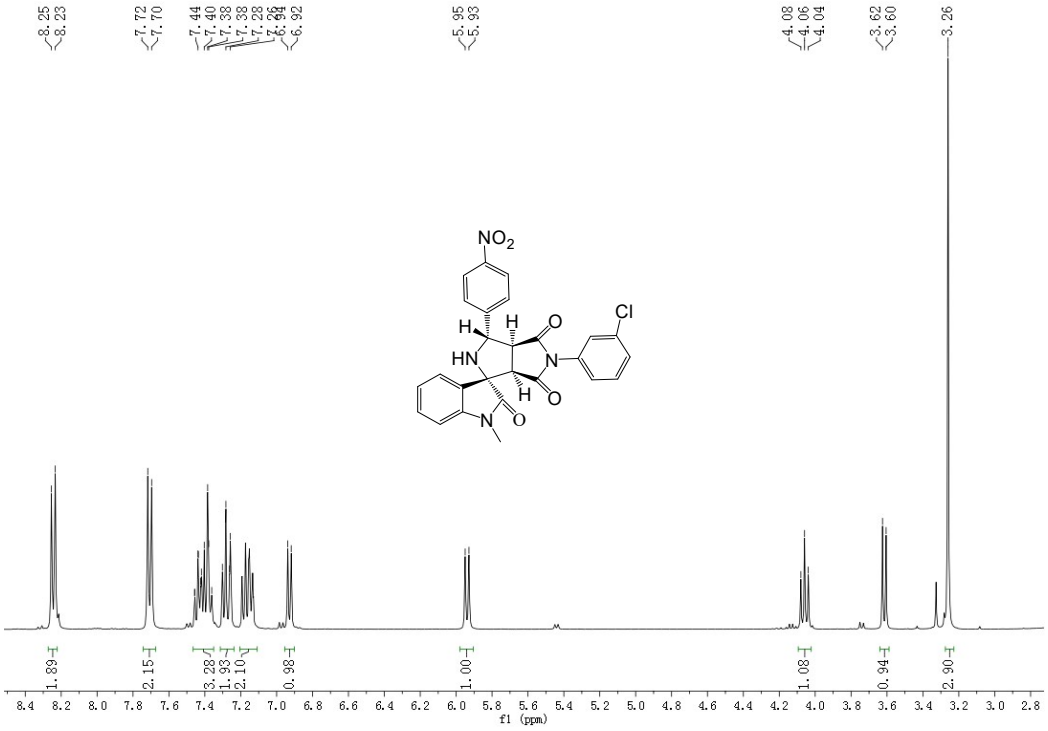

179.1
174.7
174.0
144.4
139.9
133.2
131.6
129.7
129.5
129.1
128.2
127.9
127.7
127.1
127.0
122.2
67.9
60.7
51.8
50.5
26.3
H
H
O
HN
N
Cl
H
O
N
O
f1 (ppm)

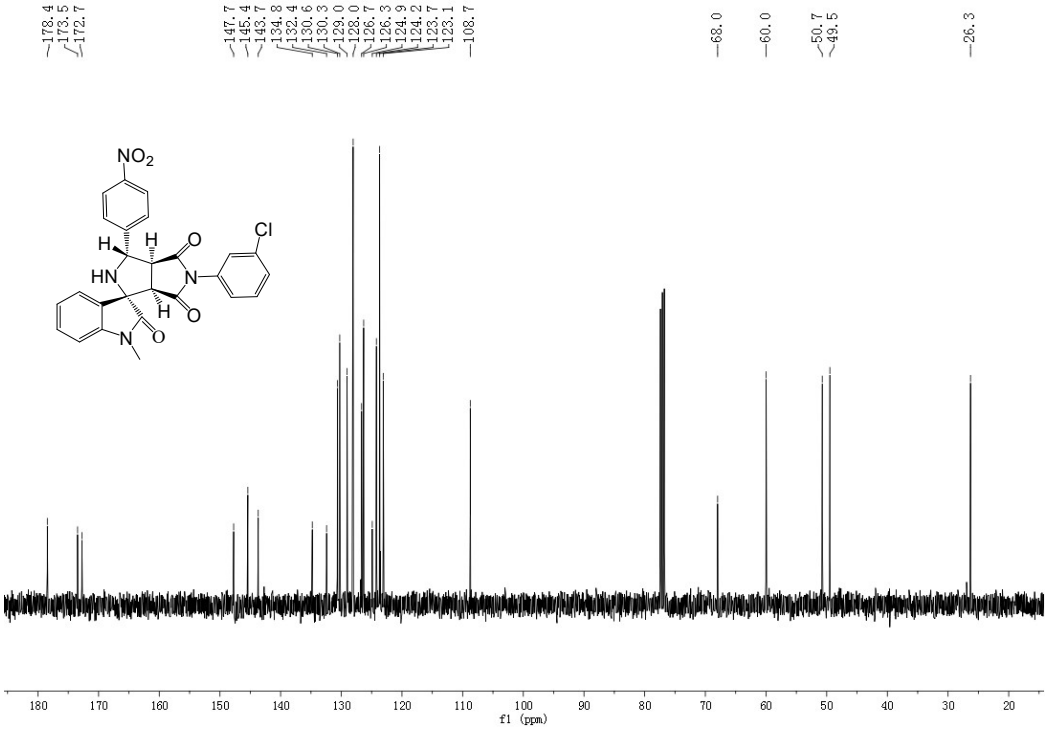
**5i**


8.23
8.21
7.69
7.67
7.42
7.42
7.27
7.25
7.18
7.16
7.14
6.92
6.90
5.92
5.90
4.05
4.03
4.01
3.60
3.58
3.24
NO2
H
H
O
HN
N
Cl
H
O
N
O
2.08
2.07
1.98
1.53
3.15
0.99
1.00
1.05
1.00
2.82
f1 (ppm)

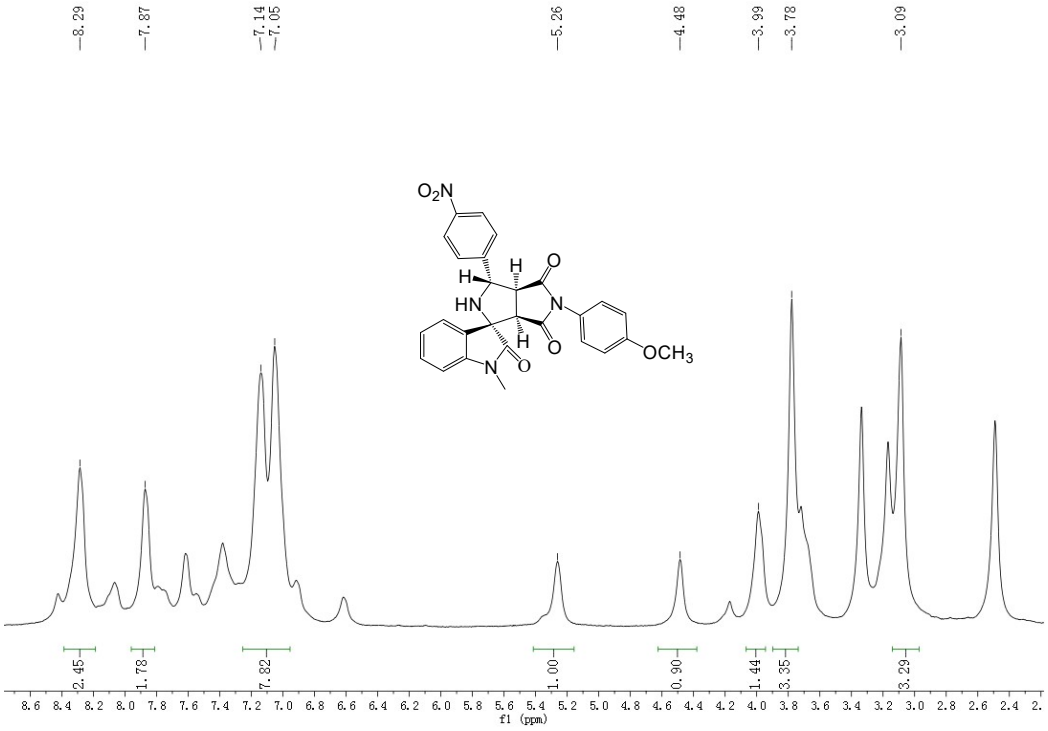

178.5
173.6
172.9
147.7
145.5
143.7
134.5
130.6
129.9
129.5
129.4
128.1
128.0
127.2
126.6
125.0
123.6
123.0
108.7
68.0
60.0
50.8
49.5
26.3
NO2
H
H
O
HN
N
Cl
H
O
N
O
f1 (ppm)

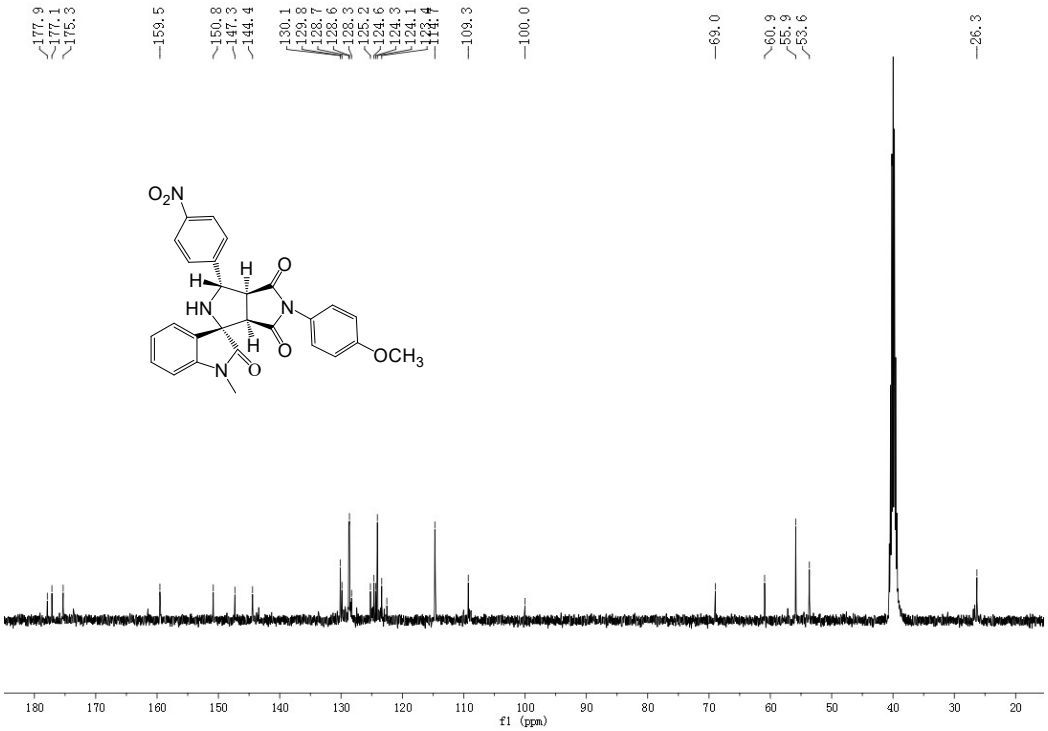
**5j**


8.25
8.23
7.72
7.70
7.44
7.40
7.38
7.28
6.92
5.95
5.93
4.08
4.06
4.04
3.62
3.60
3.26
NO2
Cl
H
HN
O
N
1.89
2.15
3.28
1.93
2.10
0.98
1.00
1.08
0.94
2.90
f1 (ppm)

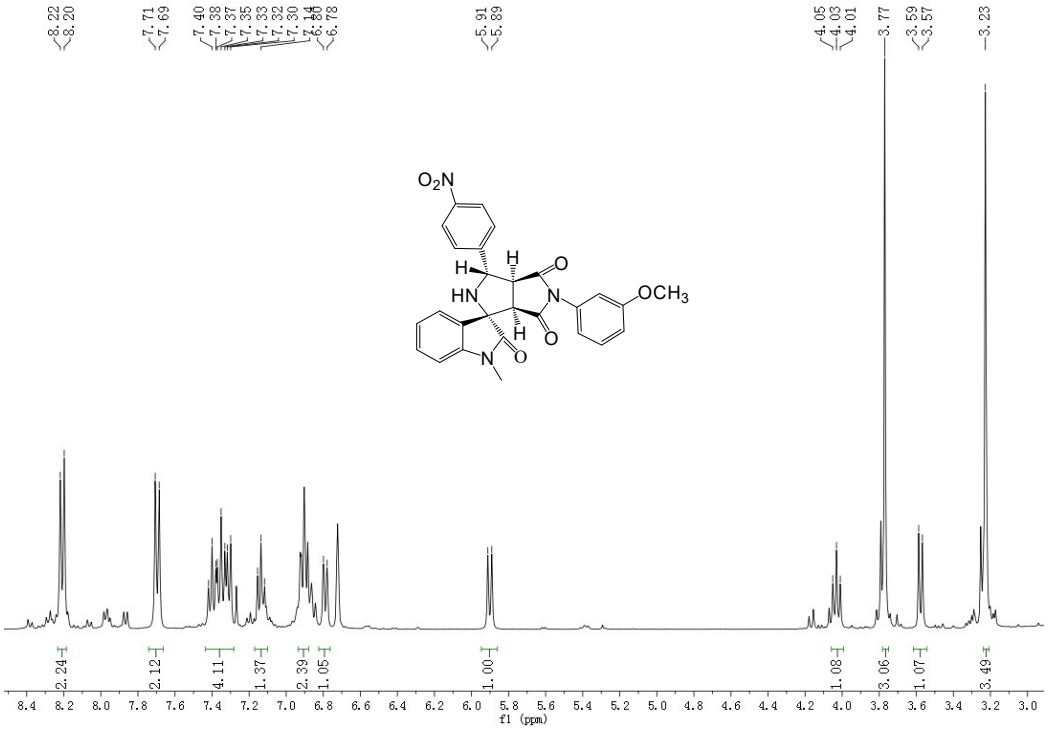

178.4
173.5
172.7
147.7
145.4
143.7
134.8
132.4
130.6
130.3
129.0
128.0
126.7
126.3
124.9
124.2
123.7
123.1
108.7
68.0
60.0
50.7
49.5
26.3
NO2
Cl
H
HN
O
N
f1 (ppm)

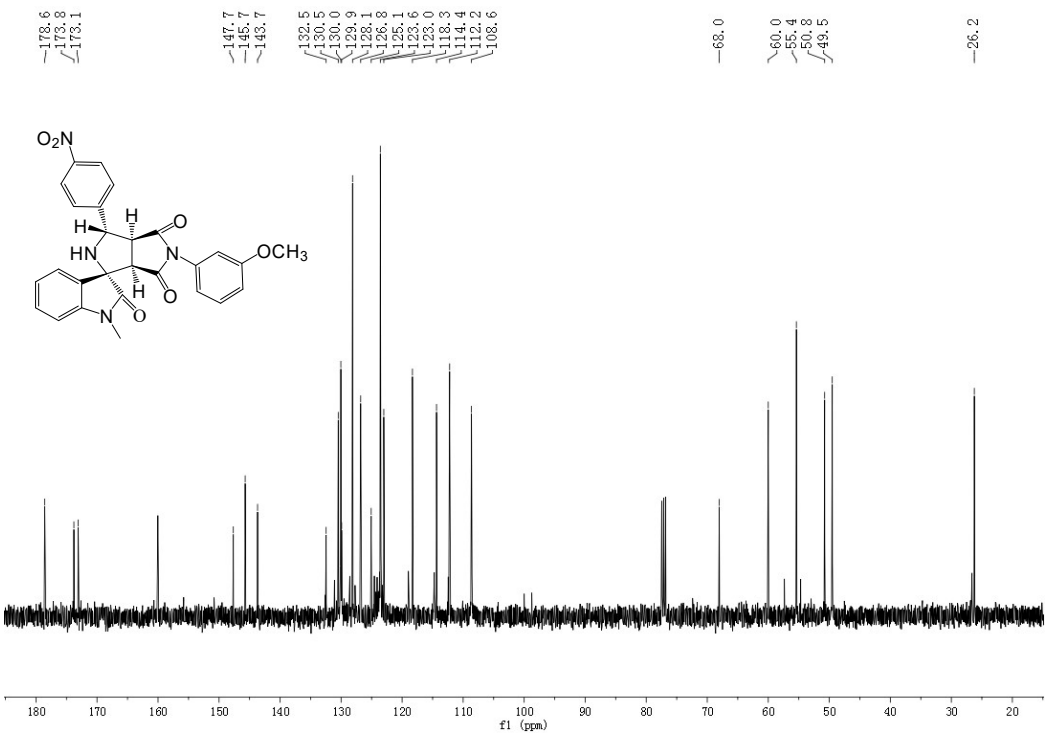
**5k**


8.29
7.87
7.14
7.05
5.26
4.48
3.99
3.78
3.09
O2N
H
O
HN
N
OCH3
2.45
1.78
7.82
1.00
0.90
1.44
3.35
3.29
f1 (ppm)

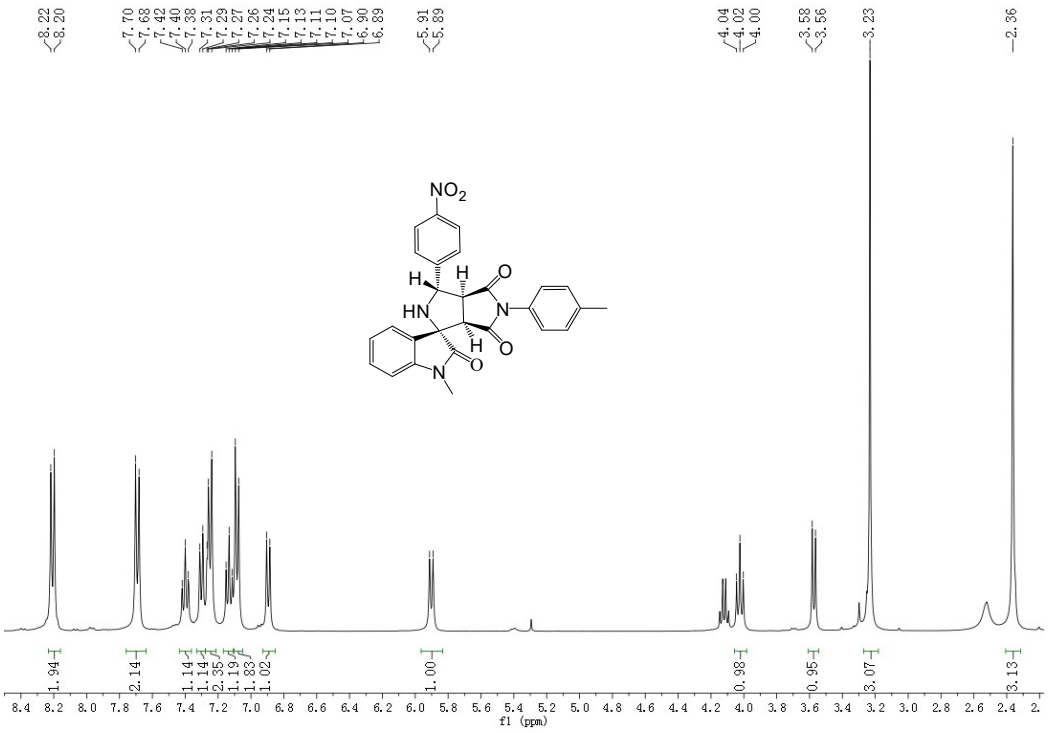

177.9
177.1
175.3
159.5
150.8
147.3
144.4
130.1
129.8
128.7
128.6
128.3
125.2
124.6
124.3
124.1
123.4
123.1
109.3
100.0
69.0
60.9
55.9
53.6
26.3
O2N
H
O
HN
N
OCH3
f1 (ppm)

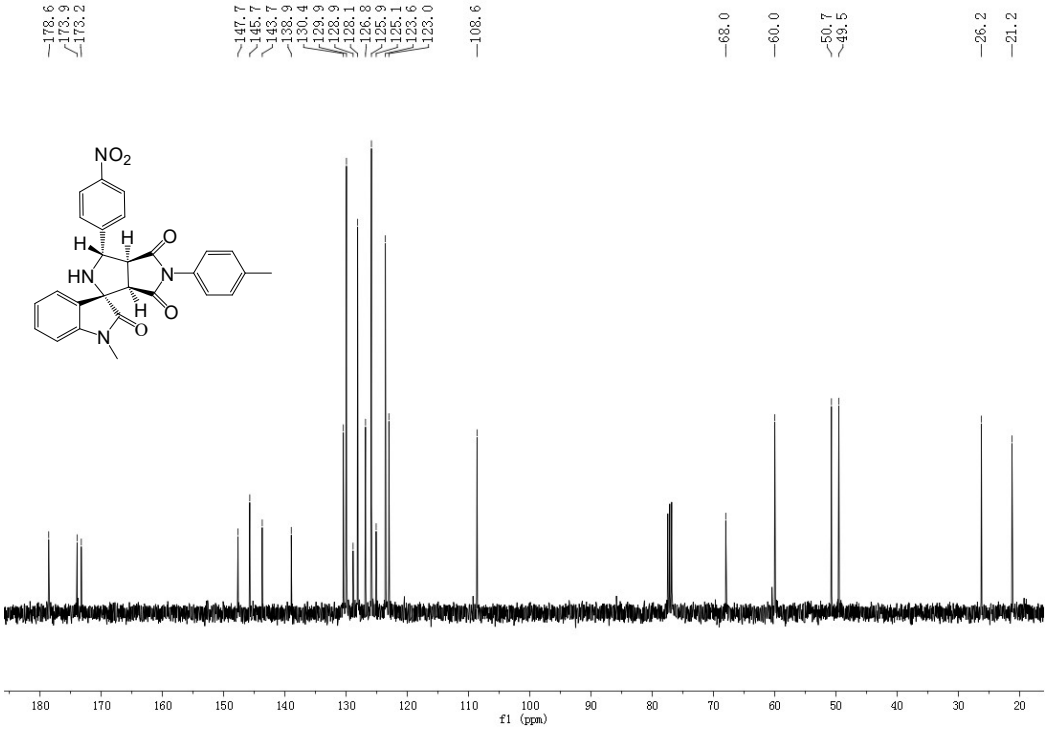
**5l**


8.22
8.20
7.71
7.69
7.40
7.38
7.37
7.35
7.33
7.32
7.30
7.14
6.80
6.78
5.91
5.89
4.05
4.03
4.01
3.77
3.59
3.57
3.23
O2N
H
HN
H
O
N
OCH3
O
H
O
N
2.24
2.12
4.11
1.37
2.39
1.05
1.00
1.08
3.06
1.07
3.49
f1 (ppm)


178.6
173.8
173.1
147.7
145.7
143.7
132.5
130.5
130.0
129.9
128.1
126.8
125.1
123.6
123.0
118.3
114.4
112.2
108.6
68.0
60.0
55.4
50.8
49.5
26.2
O2N
H
HN
H
O
N
OCH3
O
H
O
N
f1 (ppm)

**5m**


8.22
8.20
7.70
7.68
7.42
7.40
7.38
7.31
7.29
7.27
7.26
7.24
7.15
7.13
7.11
7.10
7.07
6.90
6.89
5.91
5.89
4.04
4.02
4.00
3.58
3.56
3.23
2.36
NO2
H
H
O
HN
N
H
O
O
N
1.94
2.14
1.14
1.14
2.35
1.19
1.83
1.02
1.00
0.98
0.95
3.07
3.13
f1 (ppm)


178.6
173.9
173.2
147.7
145.7
143.7
138.9
130.4
129.9
128.9
128.1
126.8
125.9
125.1
123.6
123.0
108.6
68.0
60.0
50.7
49.5
26.2
21.2
NO2
H
H
O
HN
N
H
O
O
N
f1 (ppm)

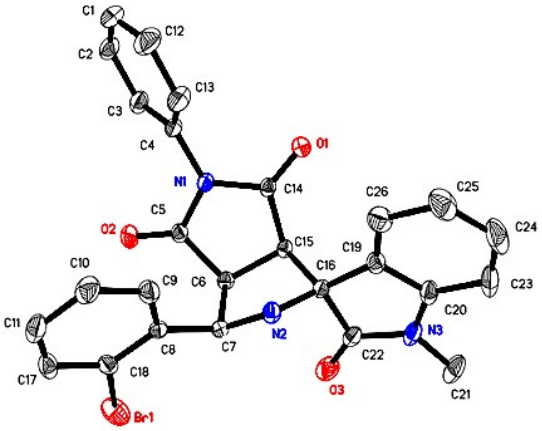
The crystallographic data of **4k**

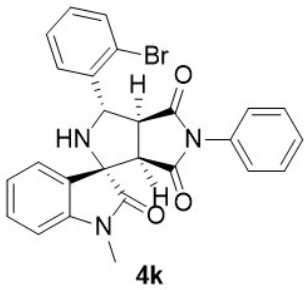
Chemical Formula: C26H20BrN3O3

Molecular Weight: 502.3680
Temperature (K) 173(2)

Crystal system Monoclinic
Bond precision: C-C = 0.0042 A Wavelength=0.71073
Cell: a=10.0641(5) b=10.7045(6) c=11.0214(7)
alpha=74.935(2) beta=73.244(2) gamma=81.118(2)
Temperature: 298 K
Calculated Reported
Volume 1093.80(11) 1093.80(11)
Space group P -1 P -1
Hall group -P 1 -P 1
Moiety formula C26 H20 Br N3 O3 C26 H20 Br N3 O3
Sum formula C26 H20 Br N3 O3 C26 H20 Br N3 O3
Mr 502.35 502.36
Dx, g cm-3 1.525 1.525
Z 2 2
Mu (mm-1) 1.914 1.914
F000 512.0 512.0
F000’ 511.62
h, k, lmax 12,13,13 12,13,13
Nref 4500 4487
Tmin, Tmax 0.638,0.682 0.638,0.682
Tmin’ 0.558
Correction method= # Reported T Limits: Tmin=0.638 Tmax=0.682
AbsCorr = MULTI-SCAN
Data completeness= 0.997 Theta(max)= 26.387
R(reflections)= 0.0405(3736) wR2(reflections)= 0.1183(4487)

S = 1.071 Npar= 30




**4k**