Supporting Information

Efficient synthesis of new indenopyridotriazine [4.3.3]propellanes and spiroindenopyridotriazine-4*H*-pyran derivatives

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Experimental Section

General remarks:

All commercially available reagents and other solvents were purchased from Aldrich and Merck Chemical Co. and used without further purification. The NMR spectra were recorded with a Bruker DRX-300 AVANCE instrument (300 MHz for ^{1}H and 75.4 MHz for ^{13}C) with DMSO-d_6 as solvent. Chemical shifts are given in ppm (*d*) relative to the internal TMS, and the coupling constant (*J*) reported in hertz (Hz). Melting points were measured with an electrotherma1 9100 apparatus. Mass spectra were recorded with an Agilent 5975C VL MSD with a Triple-Axis detector operating at an ionization potential of 70 eV. IR spectra were measured with a Bruker Tensor 27 spectrometer.

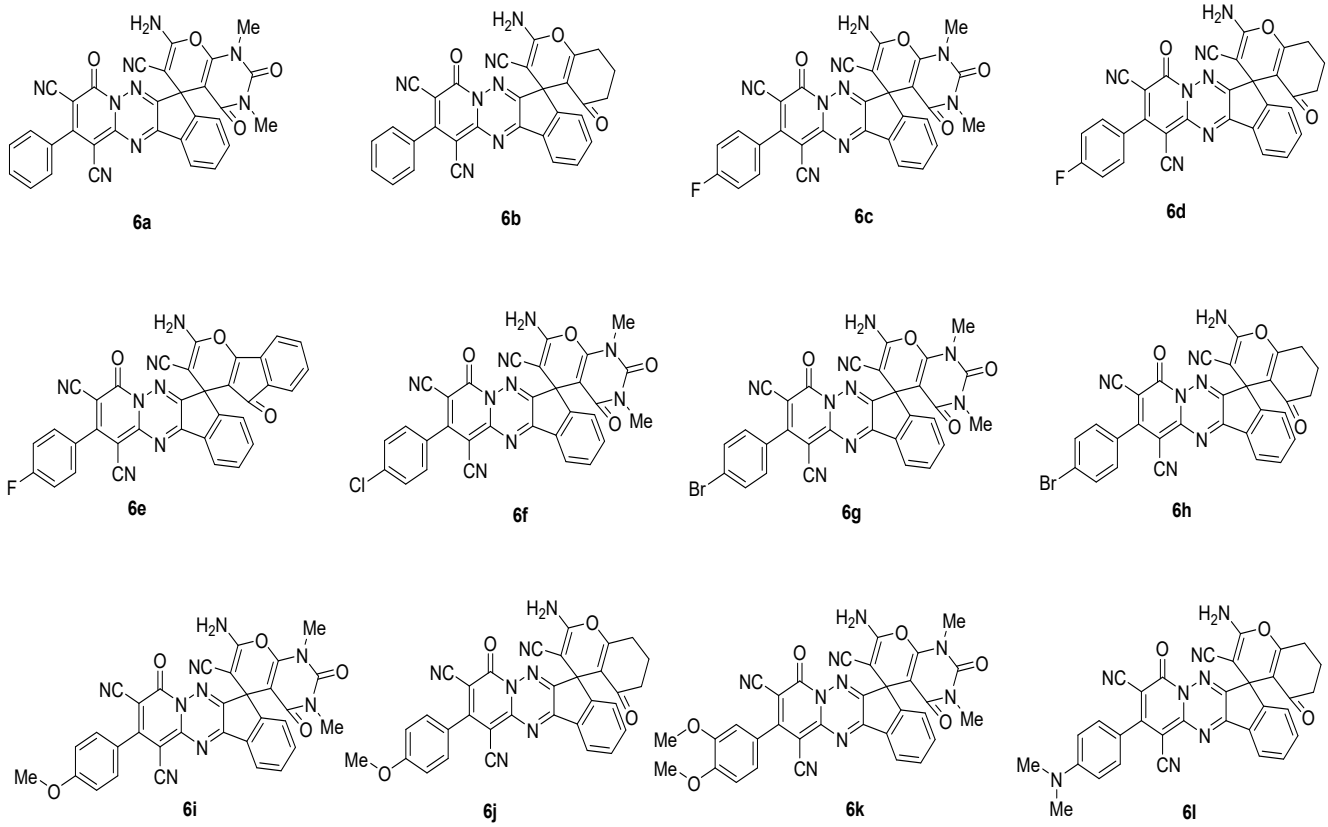


Figure 1. Structure of all products **6a-l**

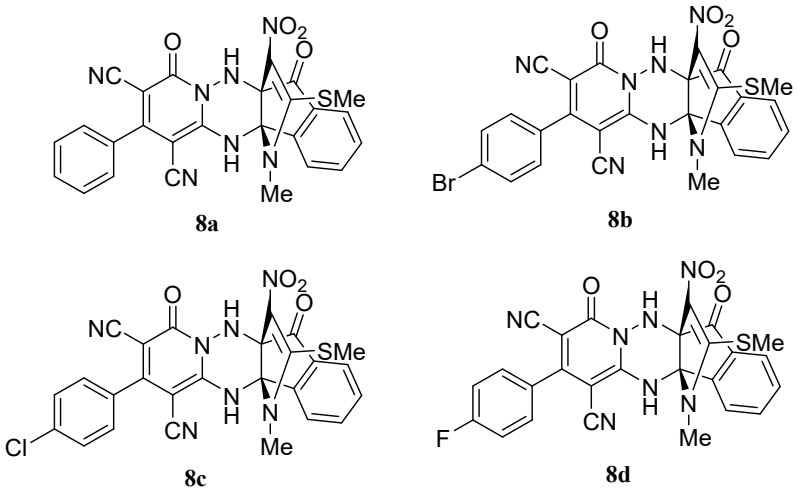
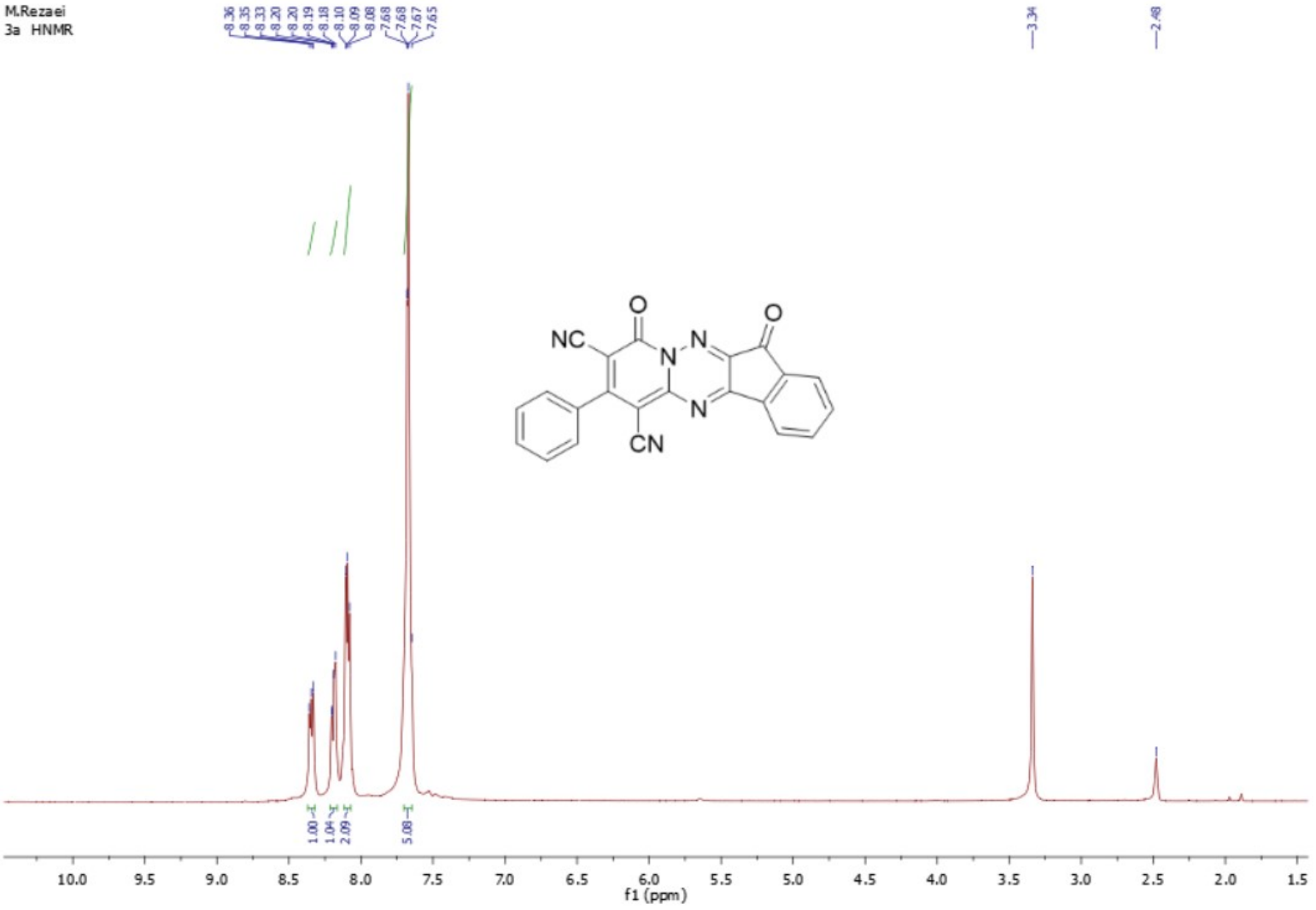


Figure 2. Structure of all products **8a-d**

The structures all of the products **6a-l** and **8a-d** were deduced from their IR, ^{1}H NMR, ^{13}C NMR and Mass spectra (see the Supporting Information).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8.18
8.10
8.09
8.08
7.68
7.68
7.67
7.65
3.34
2.48
NC
O
N
N
O
N
CN
1.00
1.04
2.09
5.08
10.0
9.5
9.0
8.5
8.0
7.5
7.0
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6.0
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2.5
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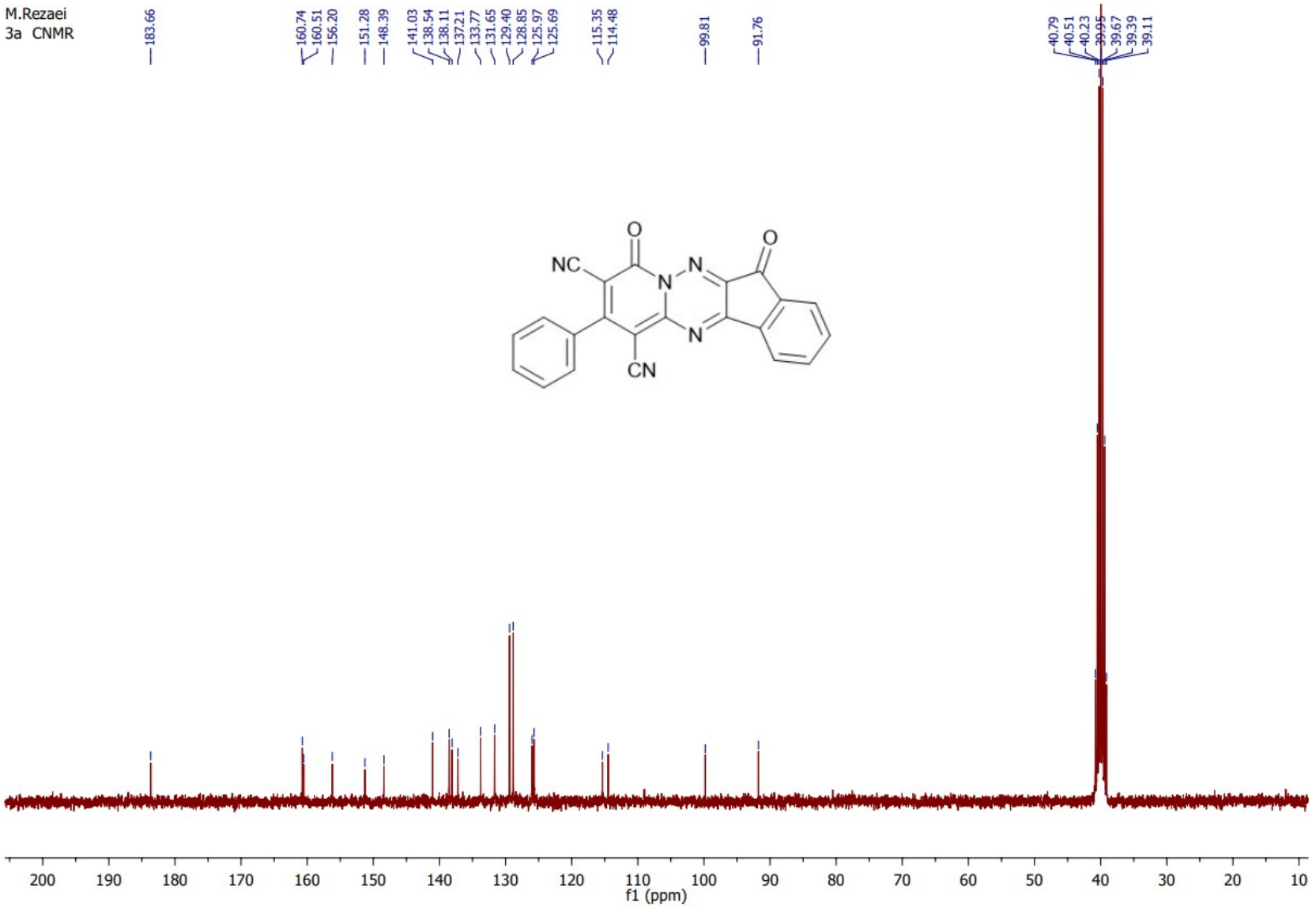
1.5
f1 (ppm)

^{1}H NMR of 3a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141.03
138.54
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137.21
133.77
131.65
129.40
128.85
125.97
125.69
115.35
114.48
99.81
91.76
40.79
40.51
40.23
39.95
39.67
39.39
39.11
O
NC
N
N
O
N
CN
200
190
180
170
160
150
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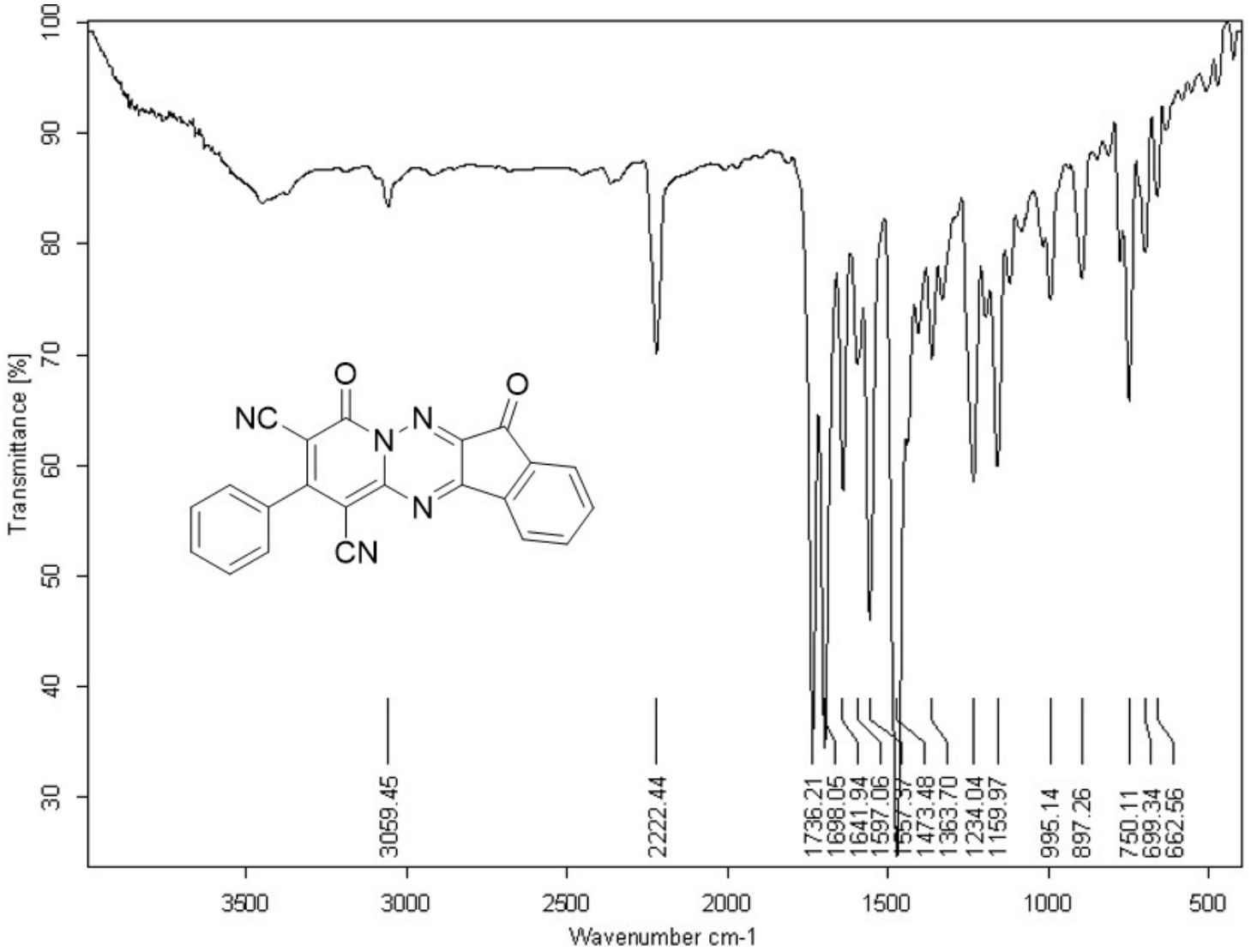
30
20
10
f1 (ppm)

^{13}C NMR of 3a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CN
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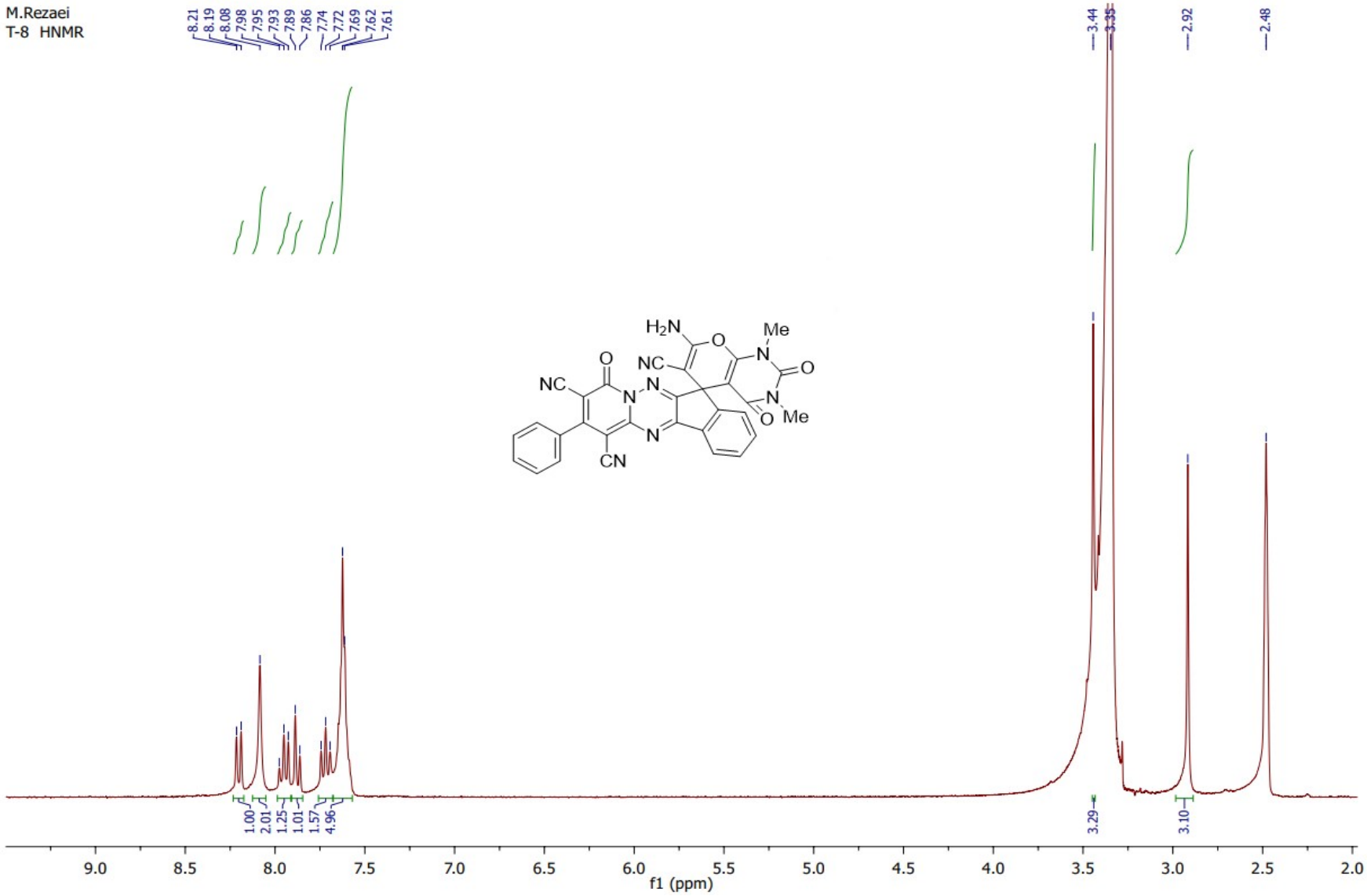
N
N
N

IR of 3a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7.72
7.69
7.62
7.61
3.44
3.35
2.92
2.48
H2N
O
Me
NC
N
O
NC
O
N
N
N
O
Me
N
CN
1.00
2.01
1.25
1.01
1.57
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3.29
3.10
9.0
8.5
8.0
7.5
7.0
6.5
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3.5
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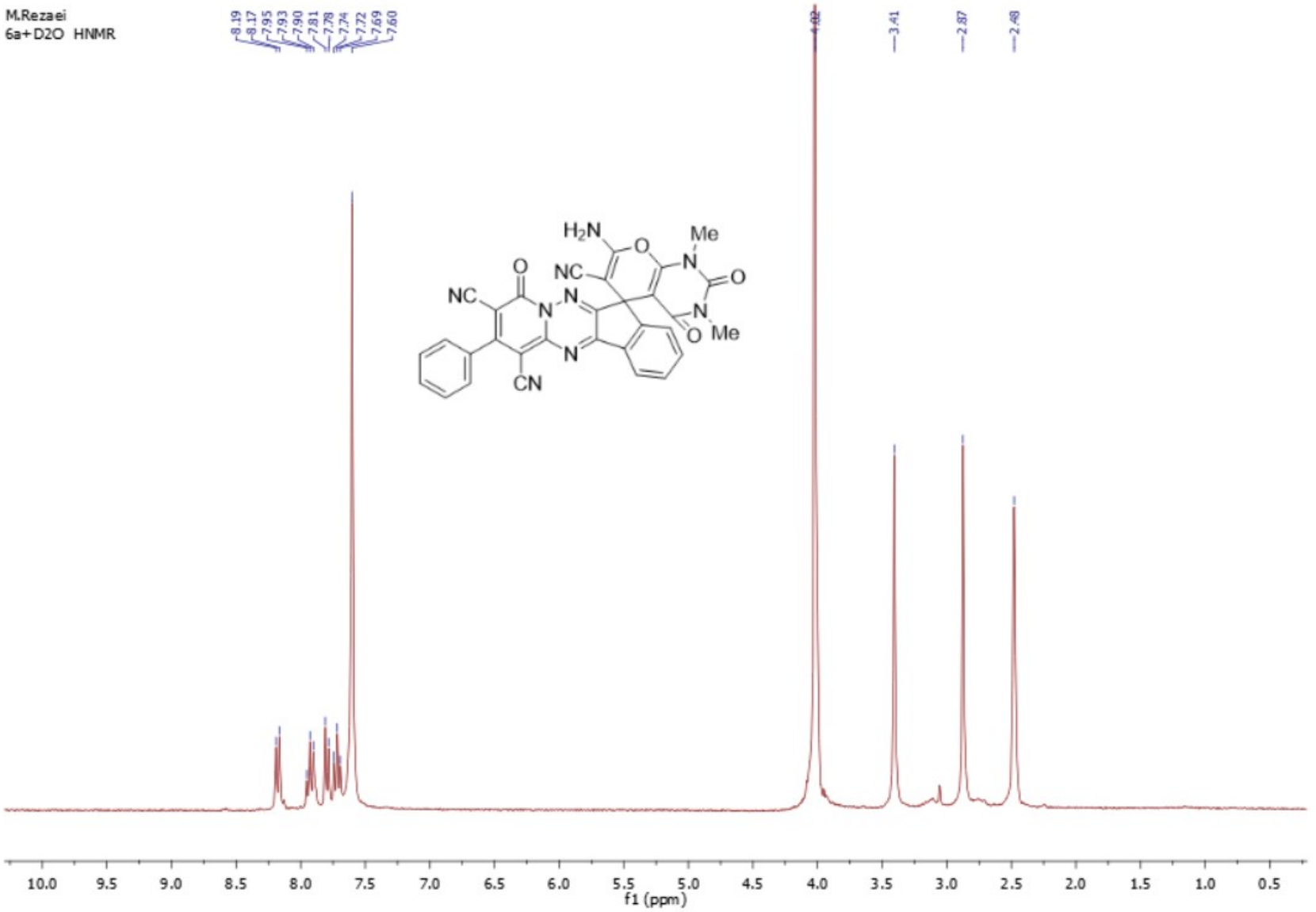
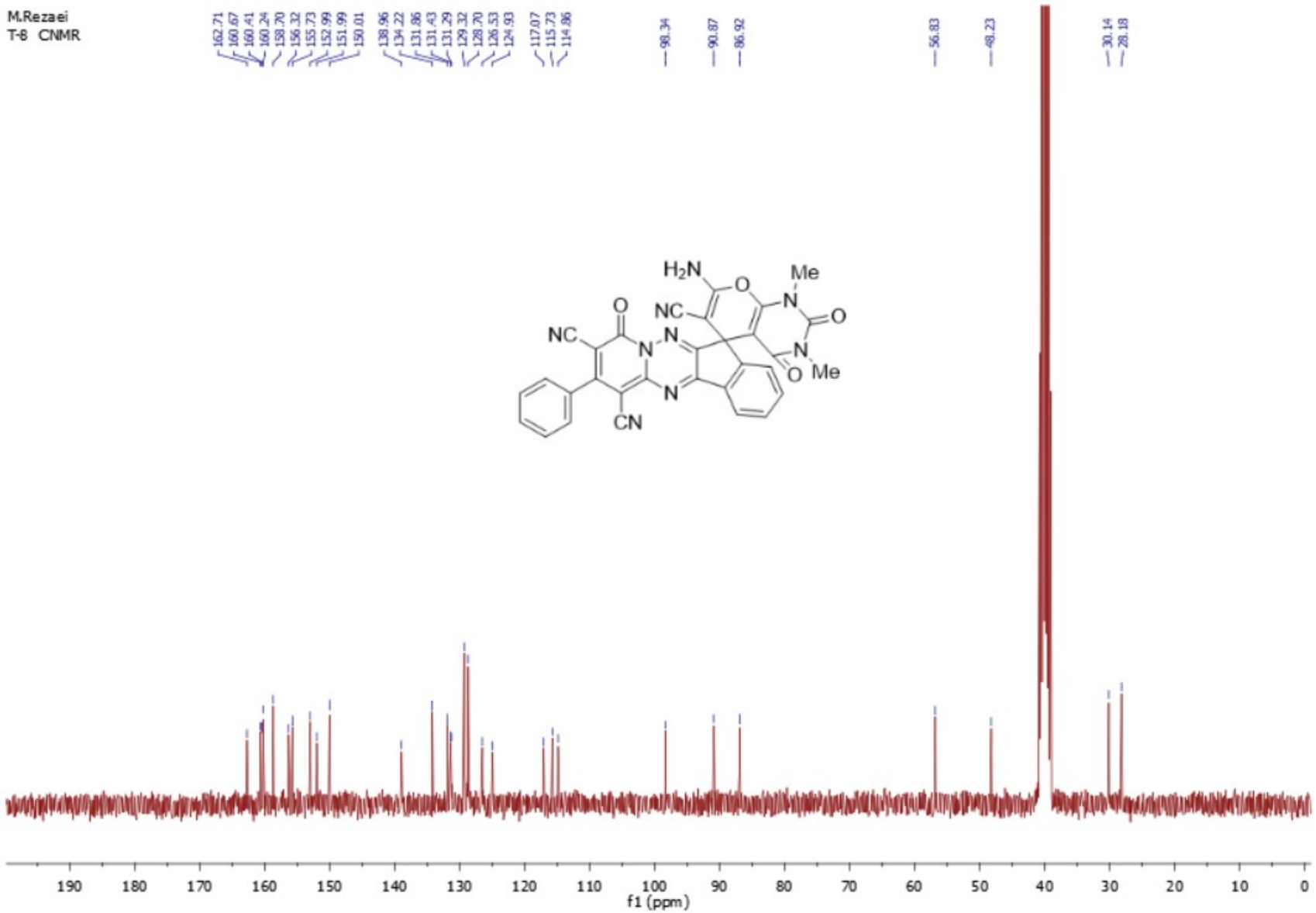
2.0
f1 (ppm)

^{1}H NMR of 6a



^{1}H NMR of 6a (D_2O exchangeable)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150.01
138.96
134.22
131.86
131.43
131.29
129.32
128.70
126.53
124.93
117.07
115.73
114.86
98.34
90.87
86.92
56.83
48.23
30.14
28.18
H2N
O
Me
NC
O
NC
N
N
N
O
N
O
Me
CN
190
180
170
160
150
140
130
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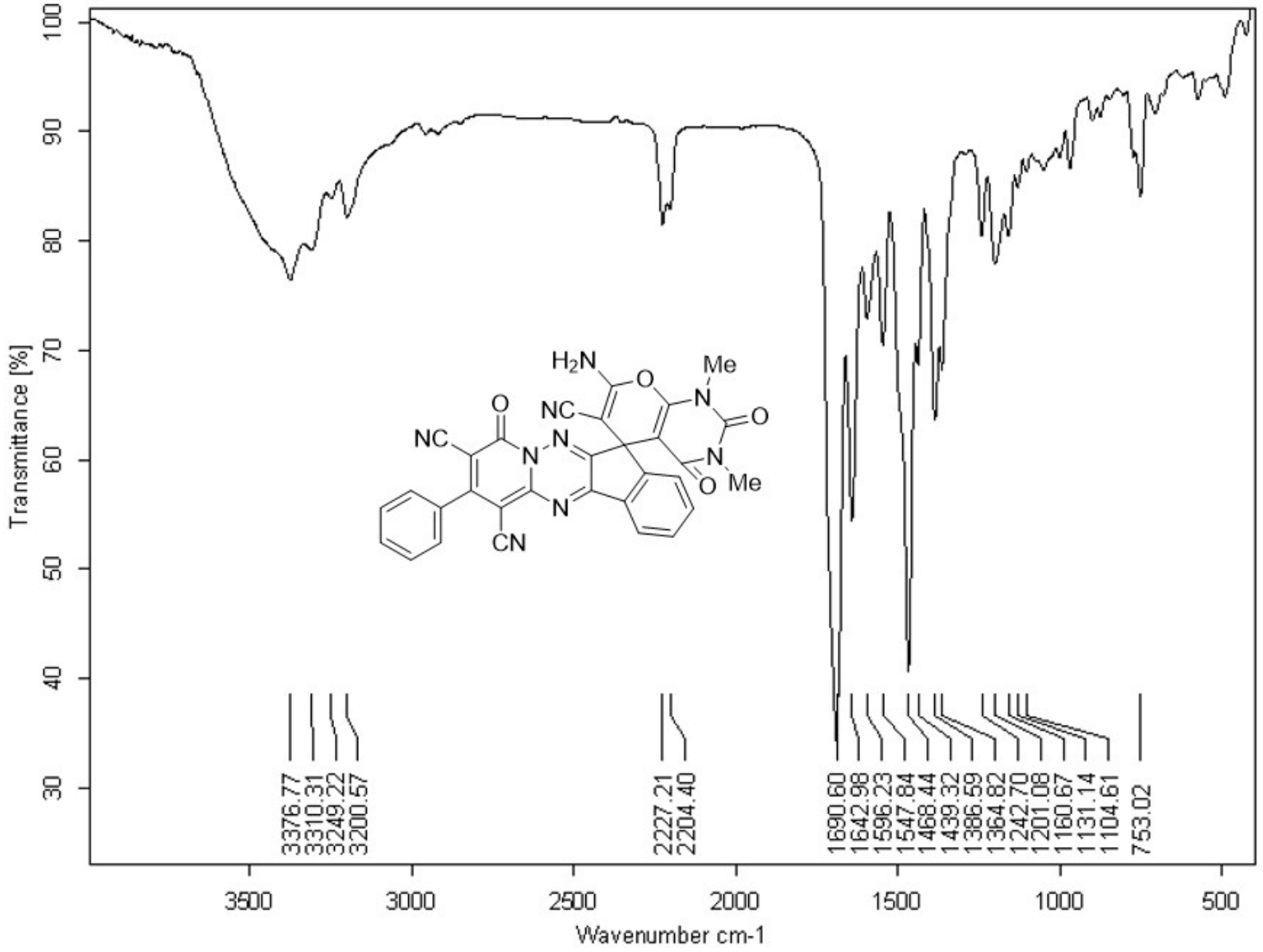
20
10
0
f1 (ppm)

^{13}C NMR of 6a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3200.57
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1547.84
1468.44
1439.32
1386.59
1364.82
1242.70
1201.08
1160.67
1131.14
1104.61
753.02
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Me
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N
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O
Me
CN

IR of 6a

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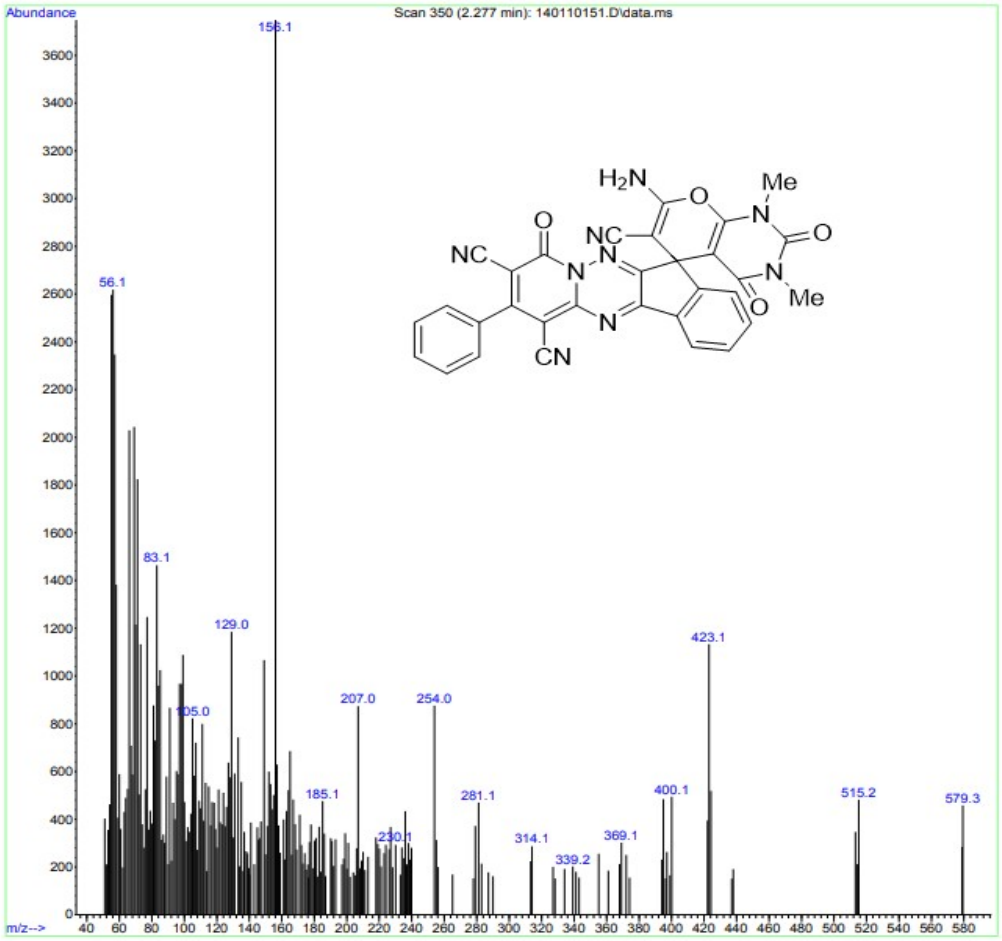
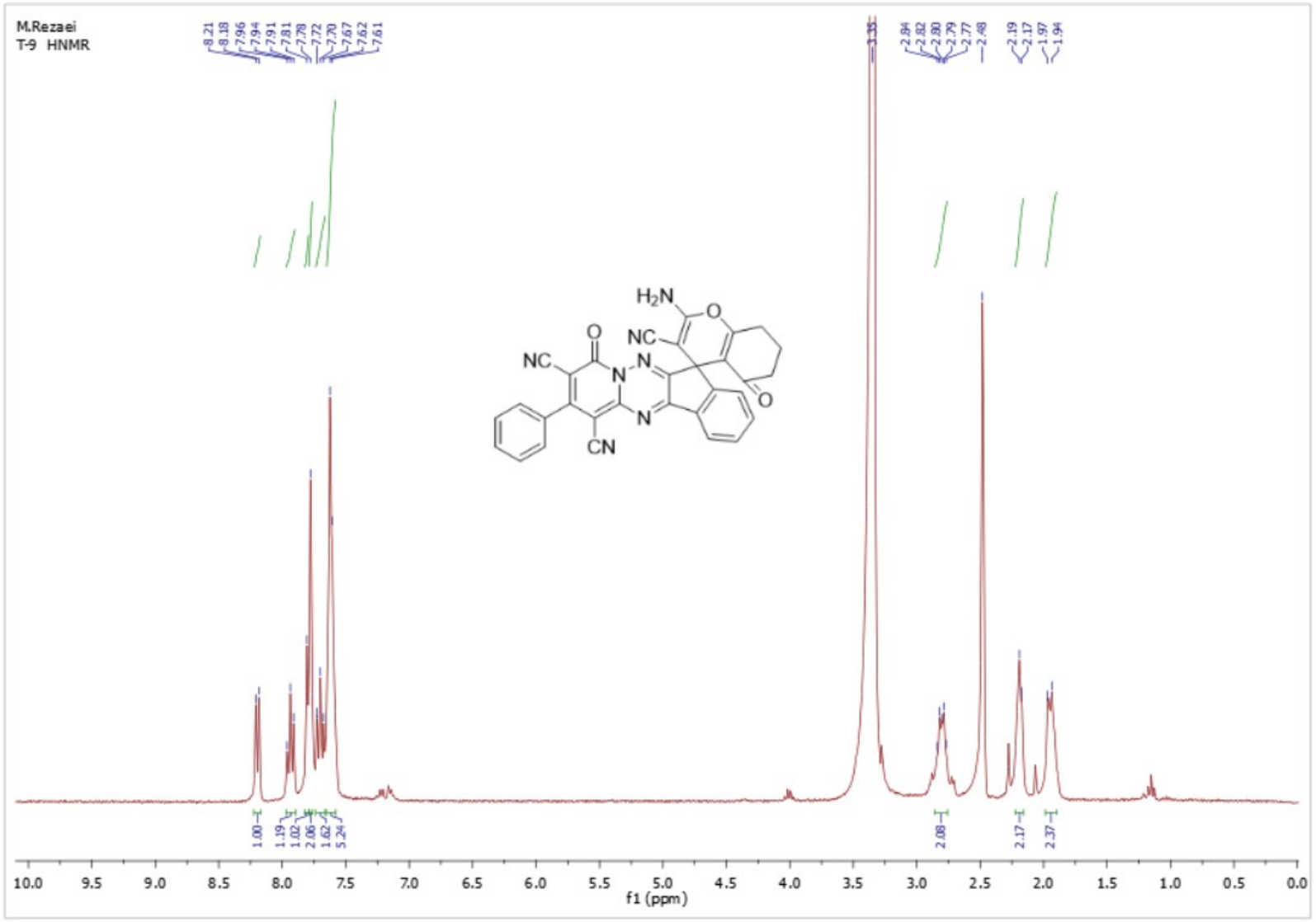


MS of 6a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7.67
7.62
7.61
3.35
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2.77
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2.19
2.17
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1.94
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NC
O
NC
N
N
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N
CN
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1.19
1.02
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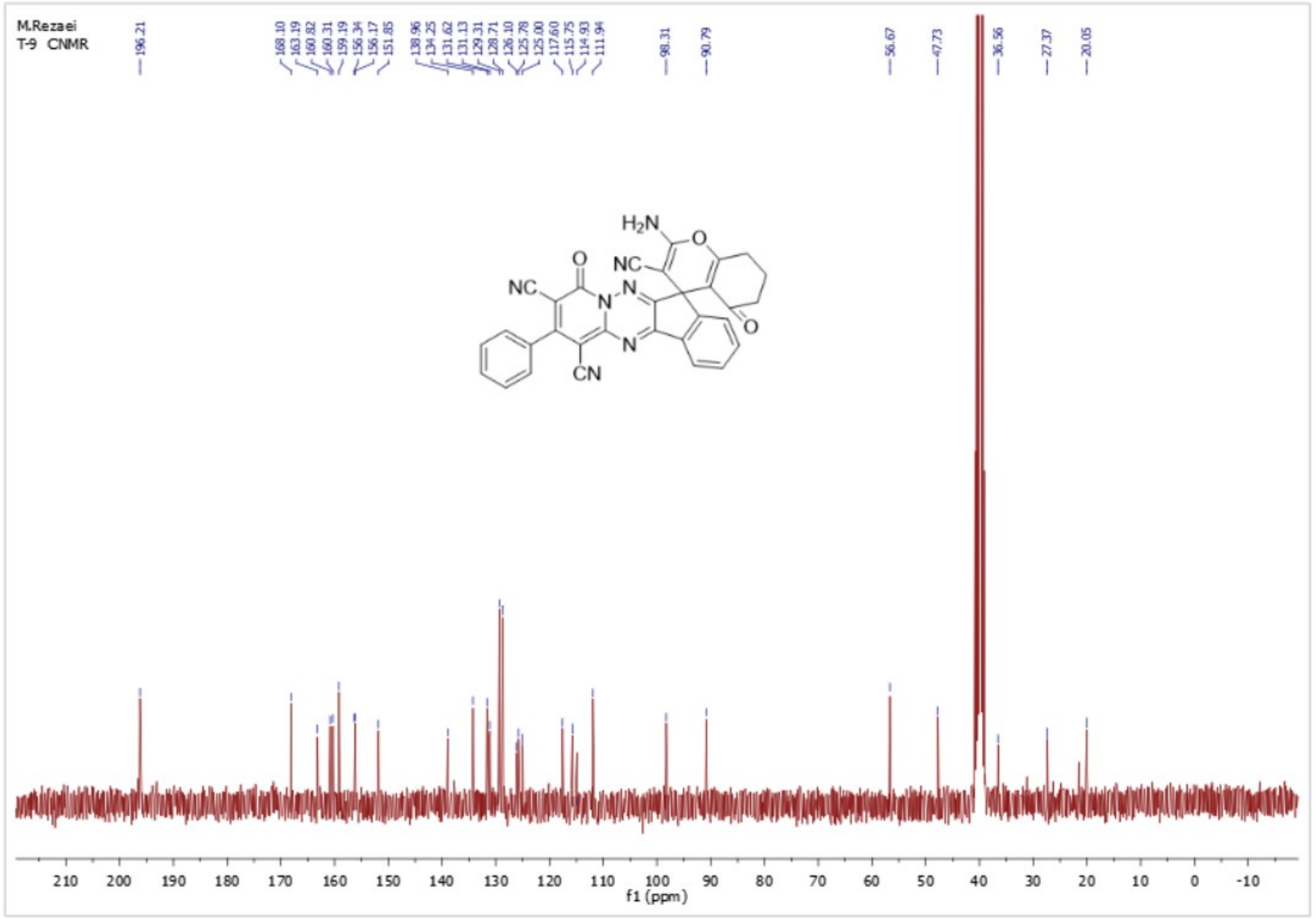
f1 (ppm)

^{1}H NMR of 6b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134.25
131.62
131.13
129.31
128.71
126.10
125.78
125.00
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114.93
111.94
98.31
90.79
56.67
47.73
36.56
27.37
20.05
H2N
O
NC
O
NC
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O
CN
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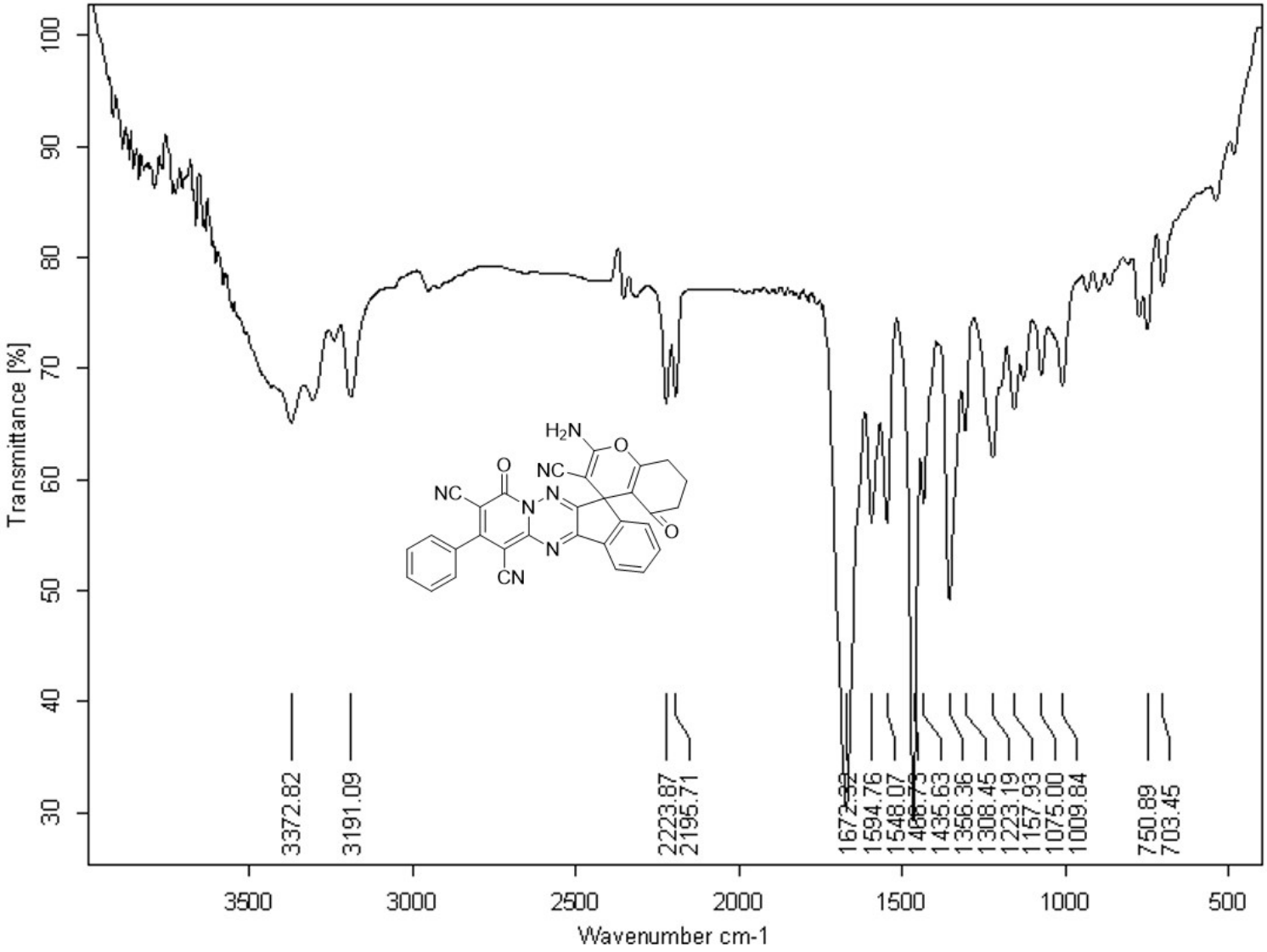
f1 (ppm)

^{13}C NMR of 6b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1435.63
1356.36
1308.45
1223.19
1157.93
1075.00
1009.84
750.89
703.45
3500
3000
2500
2000
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1000
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Wavenumber cm-1
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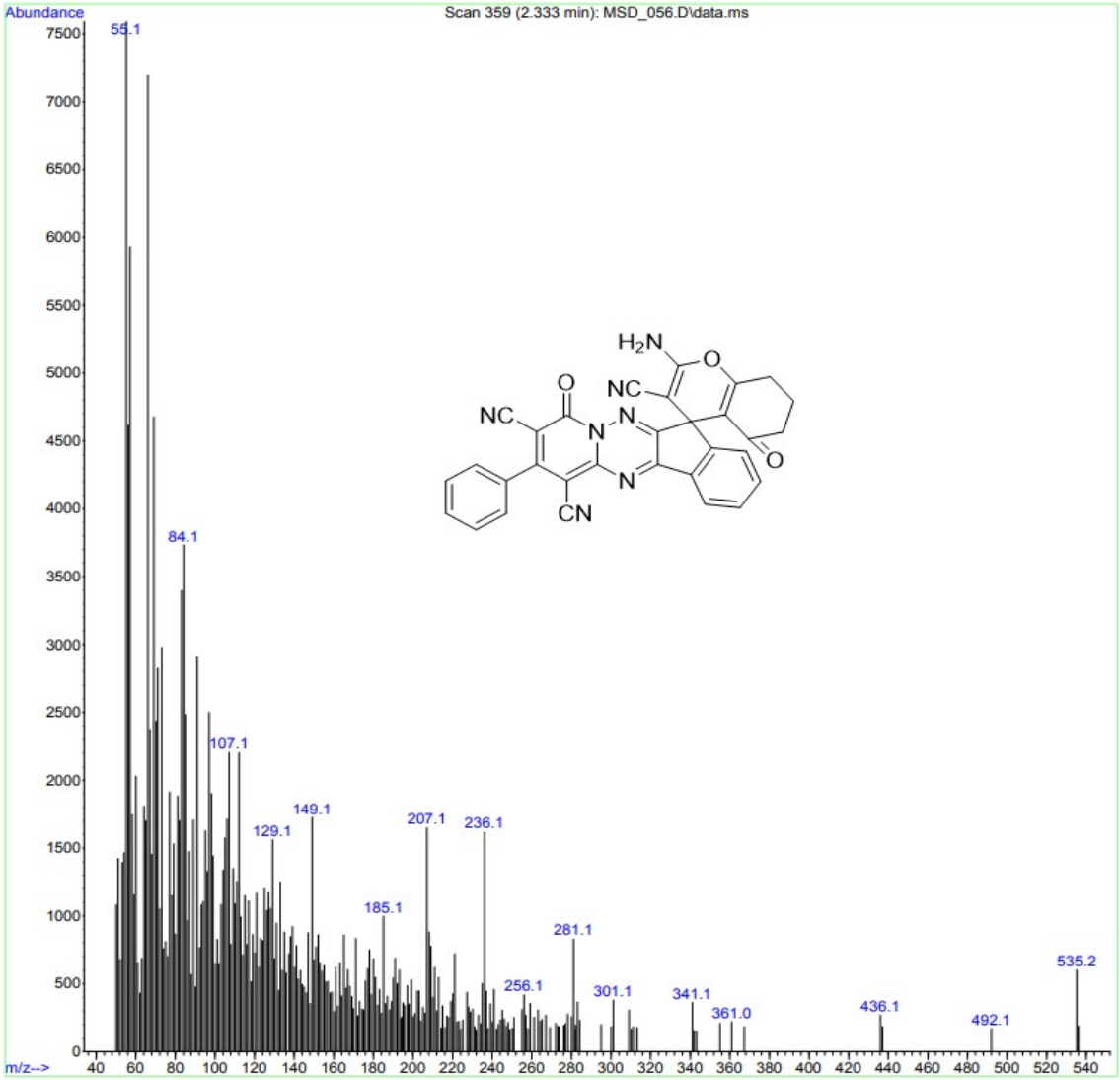
O
NC
O
NC
N
N
N
O
CN

IR of 6b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535.2
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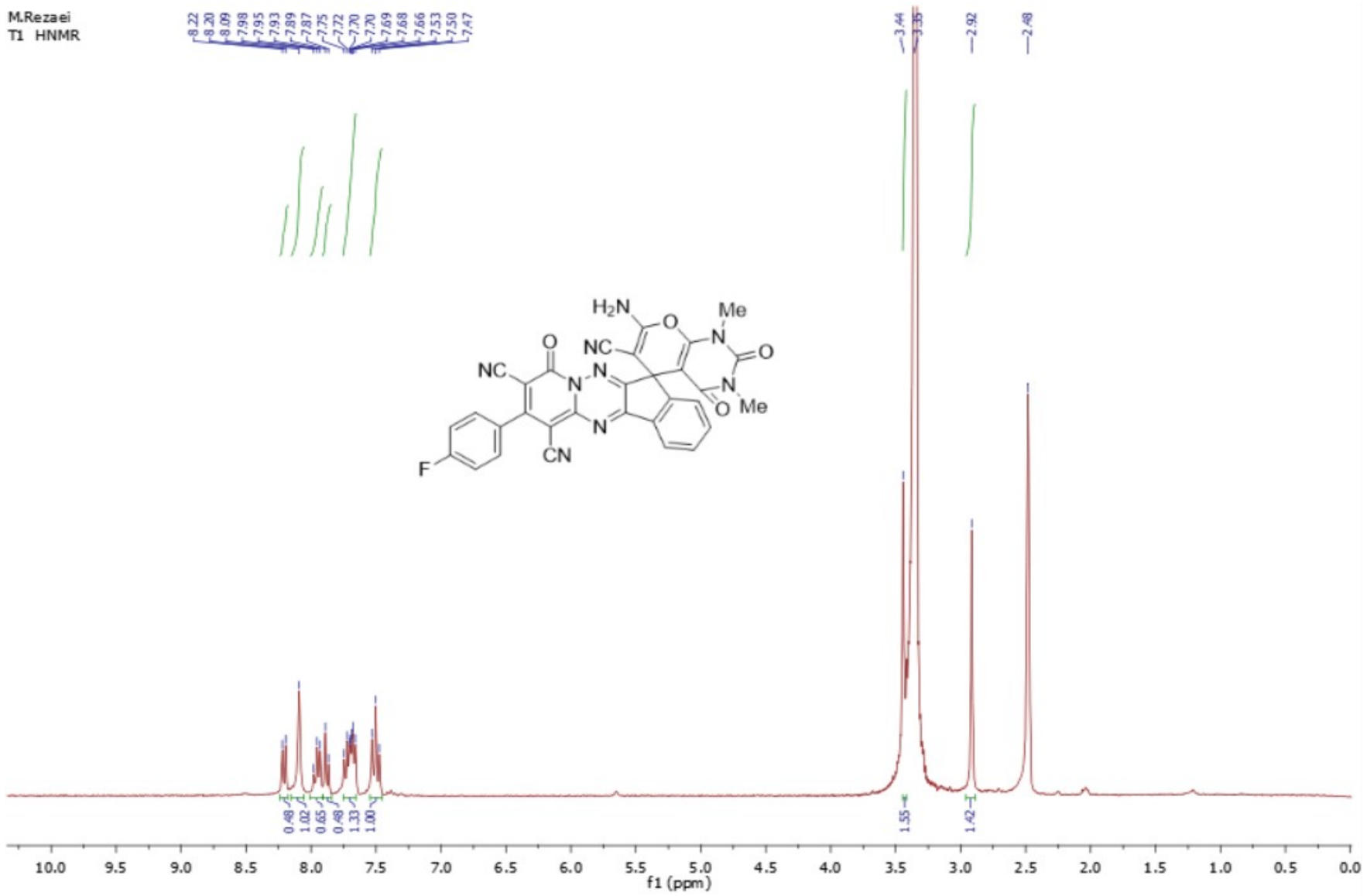
N
O
CN

MS of 6b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7.72
7.70
7.70
7.69
7.68
7.66
7.53
7.50
7.47
3.44
3.35
2.92
2.48
H2N
O
Me
N
NC
O
O
NC
N
N
N
O
Me
N
F
CN
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5.0
4.5
4.0
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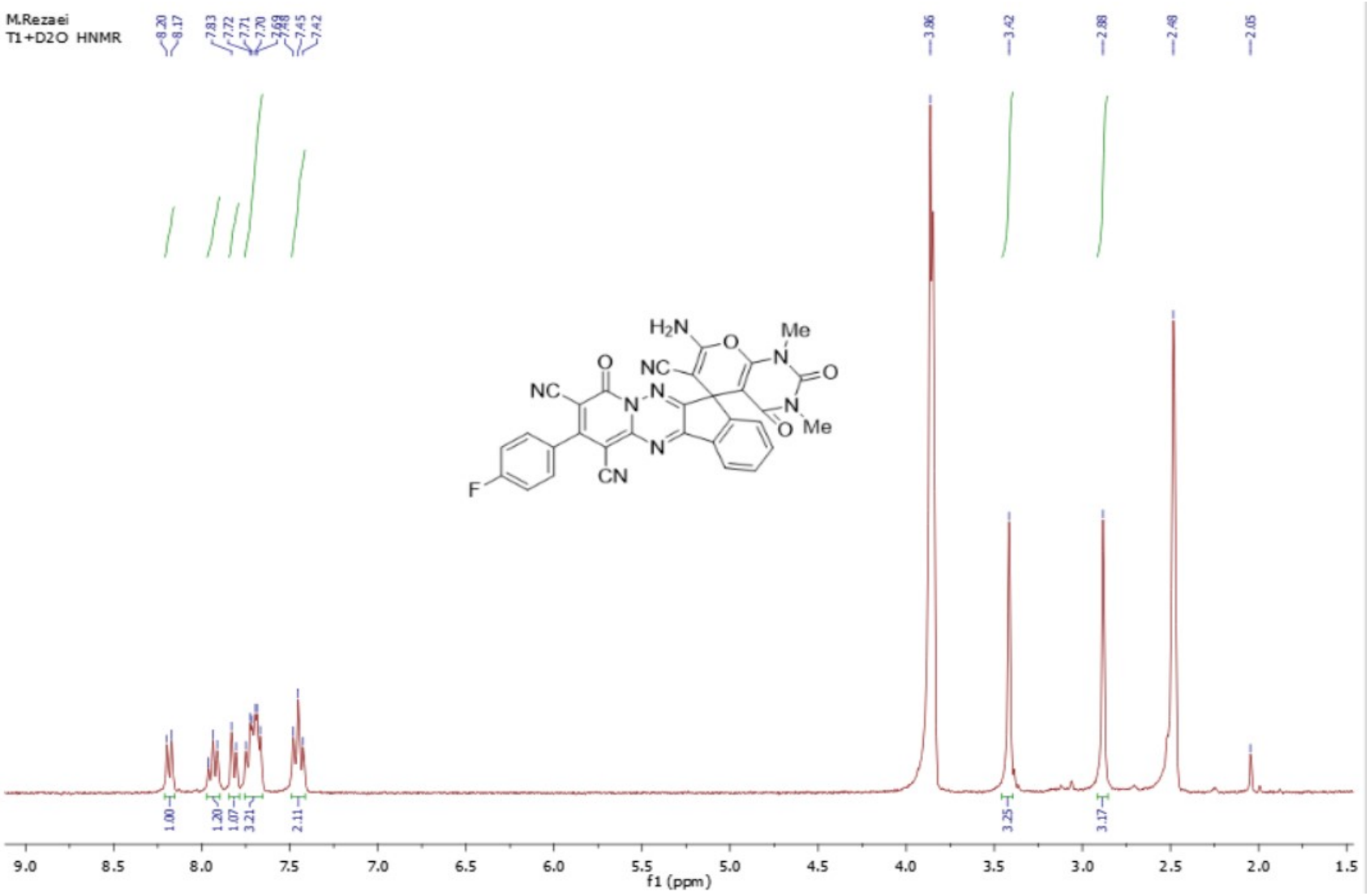
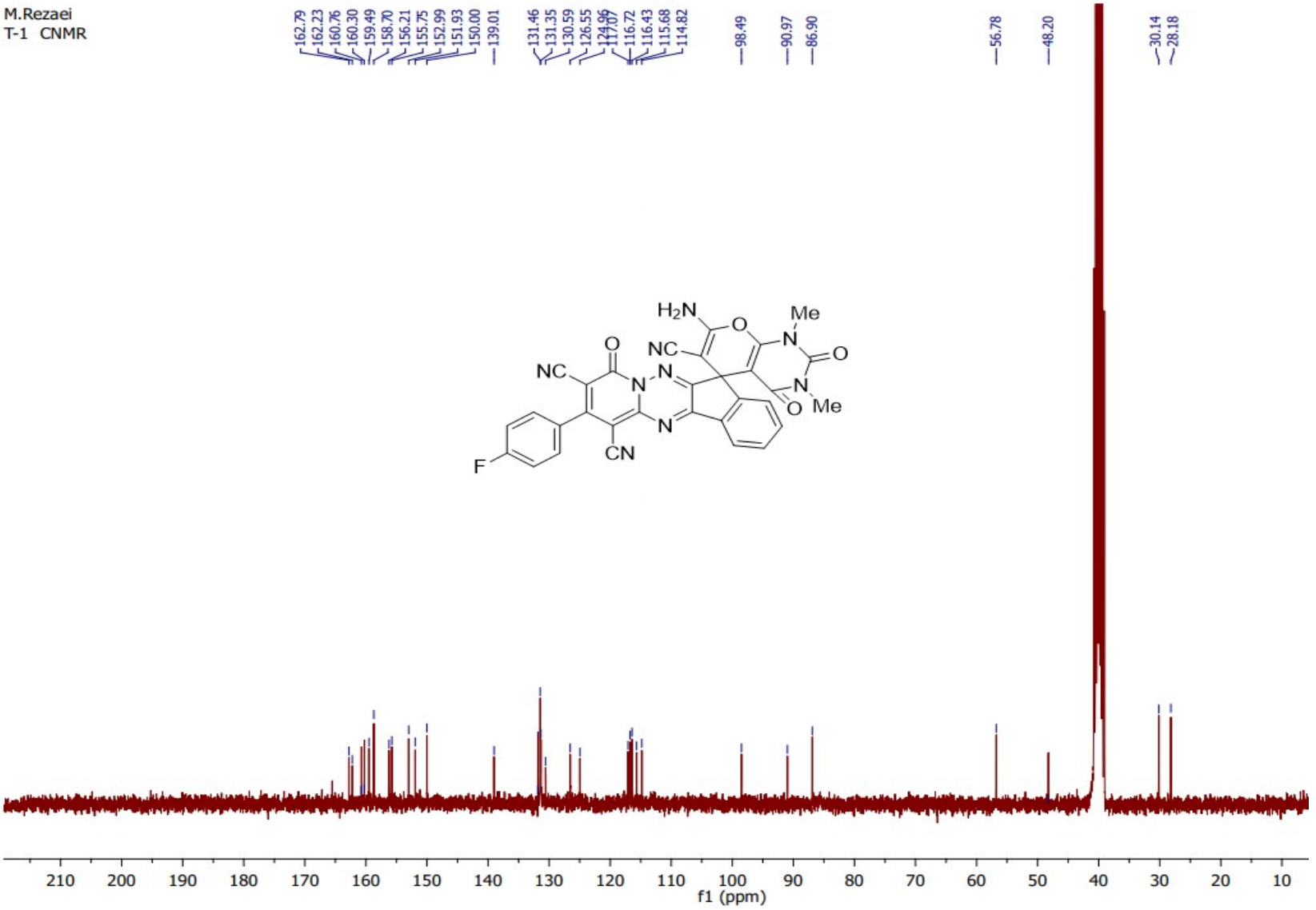
0.0
f1 (ppm)

^{1}H NMR of 6c



^{1}H NMR of 6c (D_2O exchangeable)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155.75
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151.93
150.00
139.01
131.46
131.35
130.59
126.55
124.96
117.07
116.72
116.43
115.68
114.82
98.49
90.97
86.90
56.78
48.20
30.14
28.18
H2N
O
Me
N
O
NC
O
NC
N
N
N
O
Me
F
CN
210
200
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180
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160
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20
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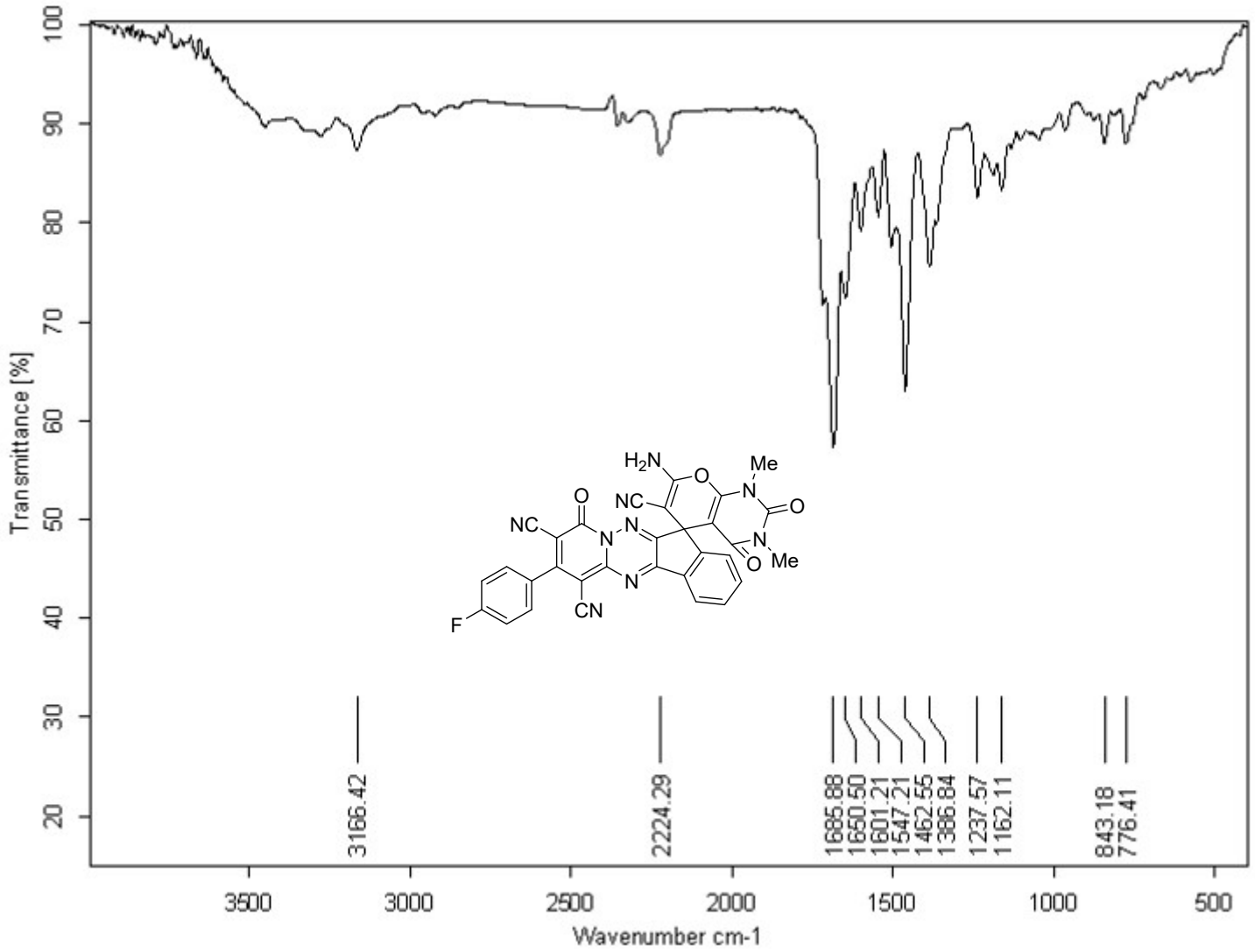
f1 (ppm)

^{13}C NMR of 6c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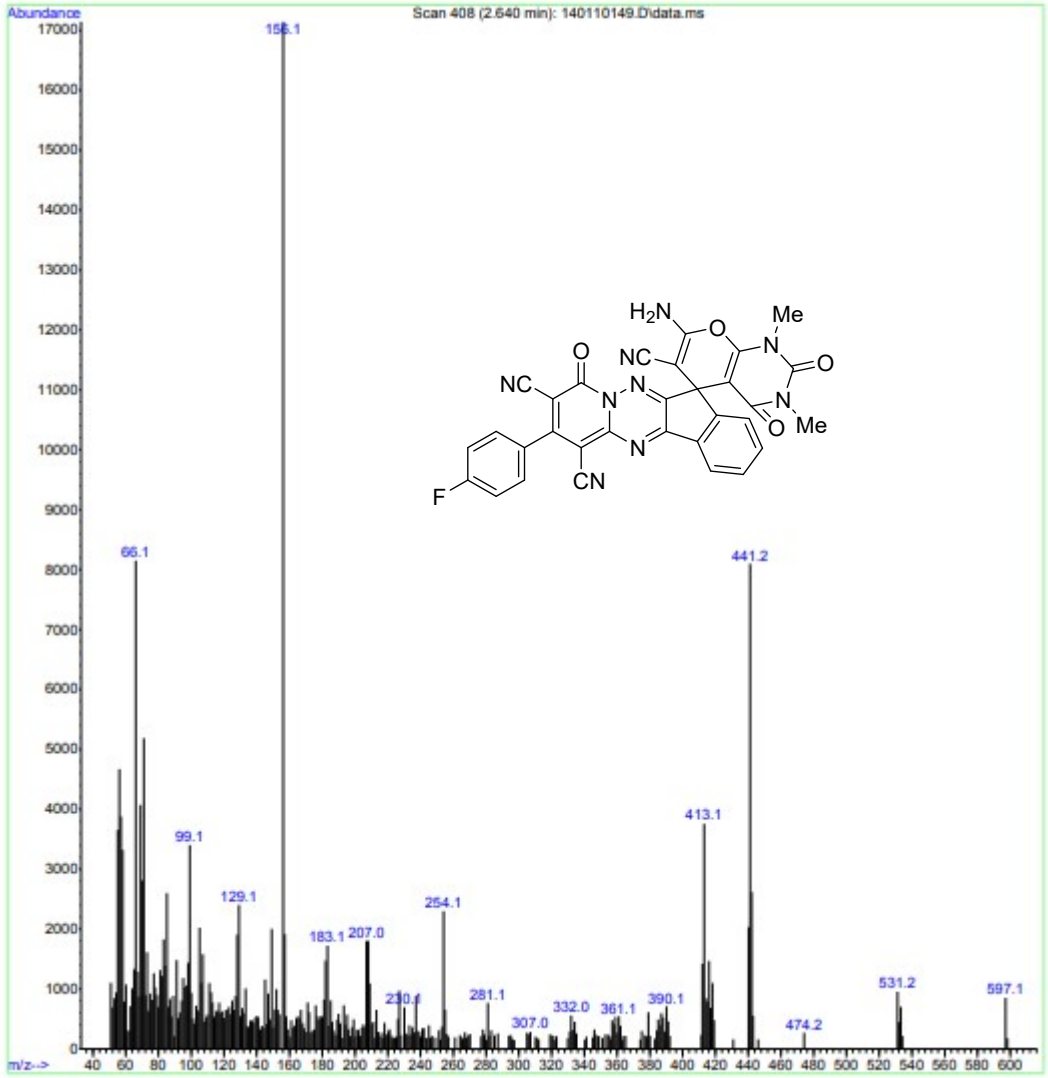
CN

IR of 6c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129.1
183.1
207.0
254.1
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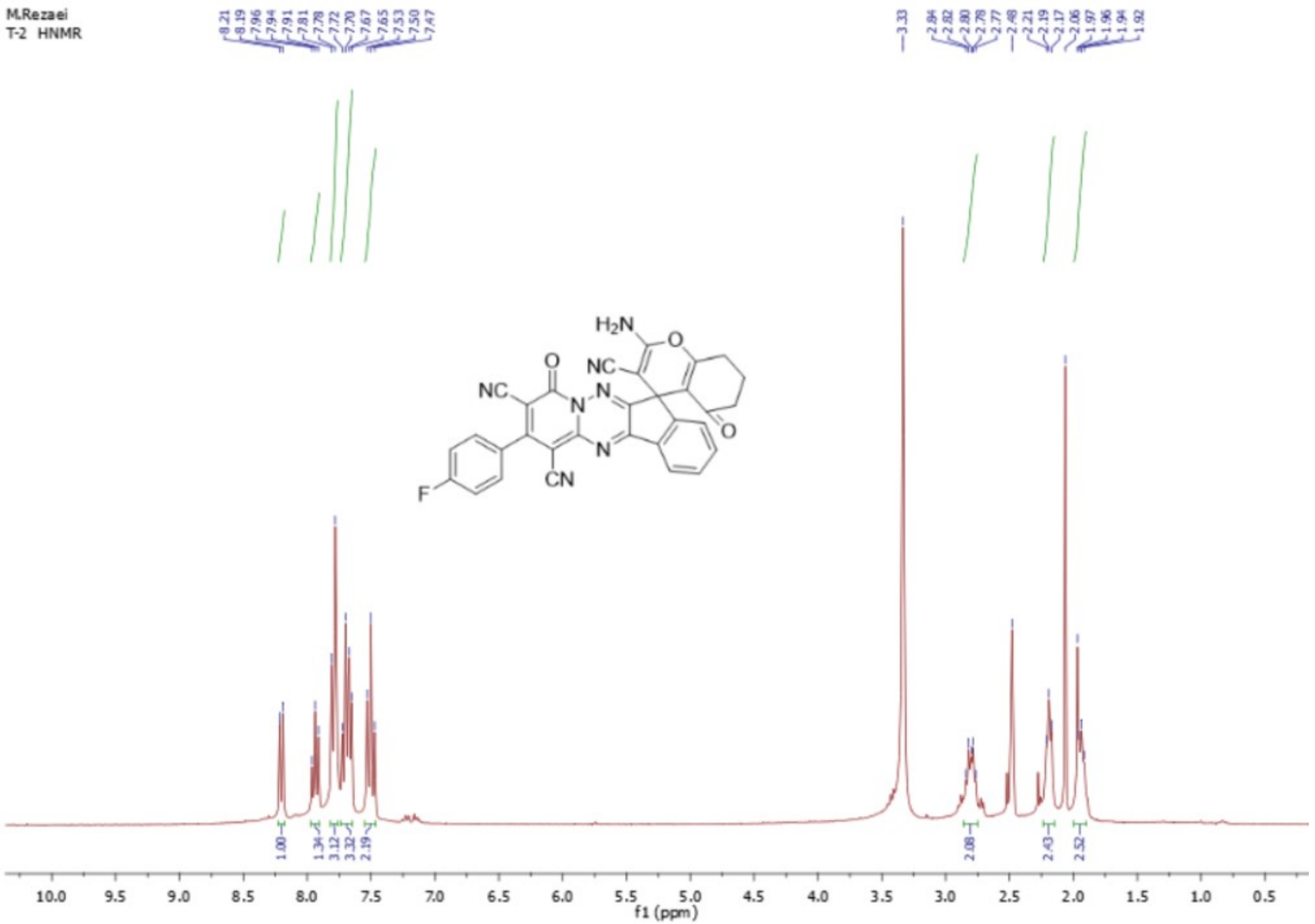
332.0
361.1
390.1
413.1
441.2
474.2
531.2
597.1

MS of 6c


M.Rezaei
T-2 HNMR
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8.19
7.96
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7.67
7.65
7.53
7.50
7.47
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2.82
2.80
2.78
2.77
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2.21
2.19
2.17
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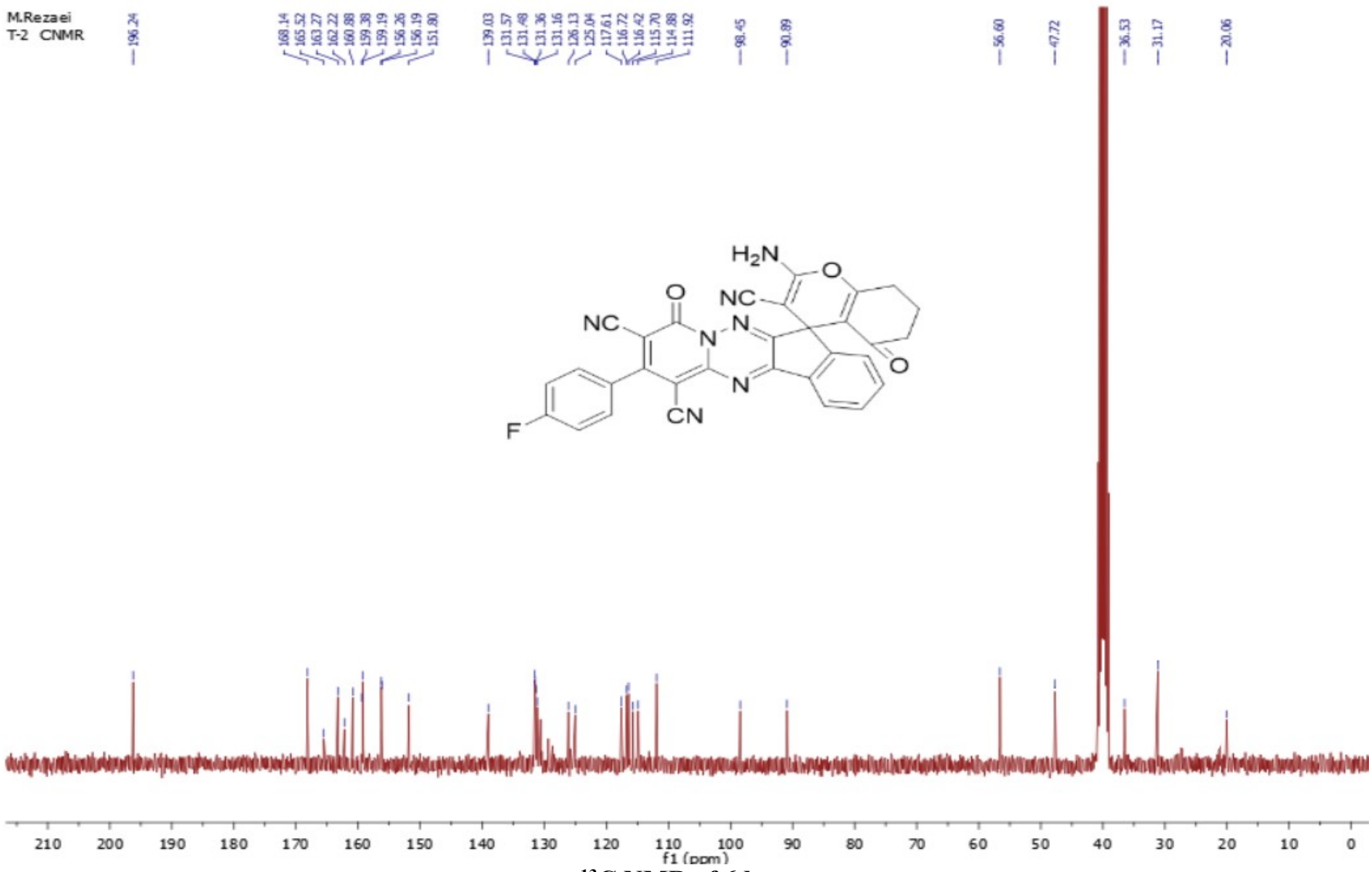
f1 (ppm)

^{1}H NMR of 6d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131.48
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200
190
180
170
160
150
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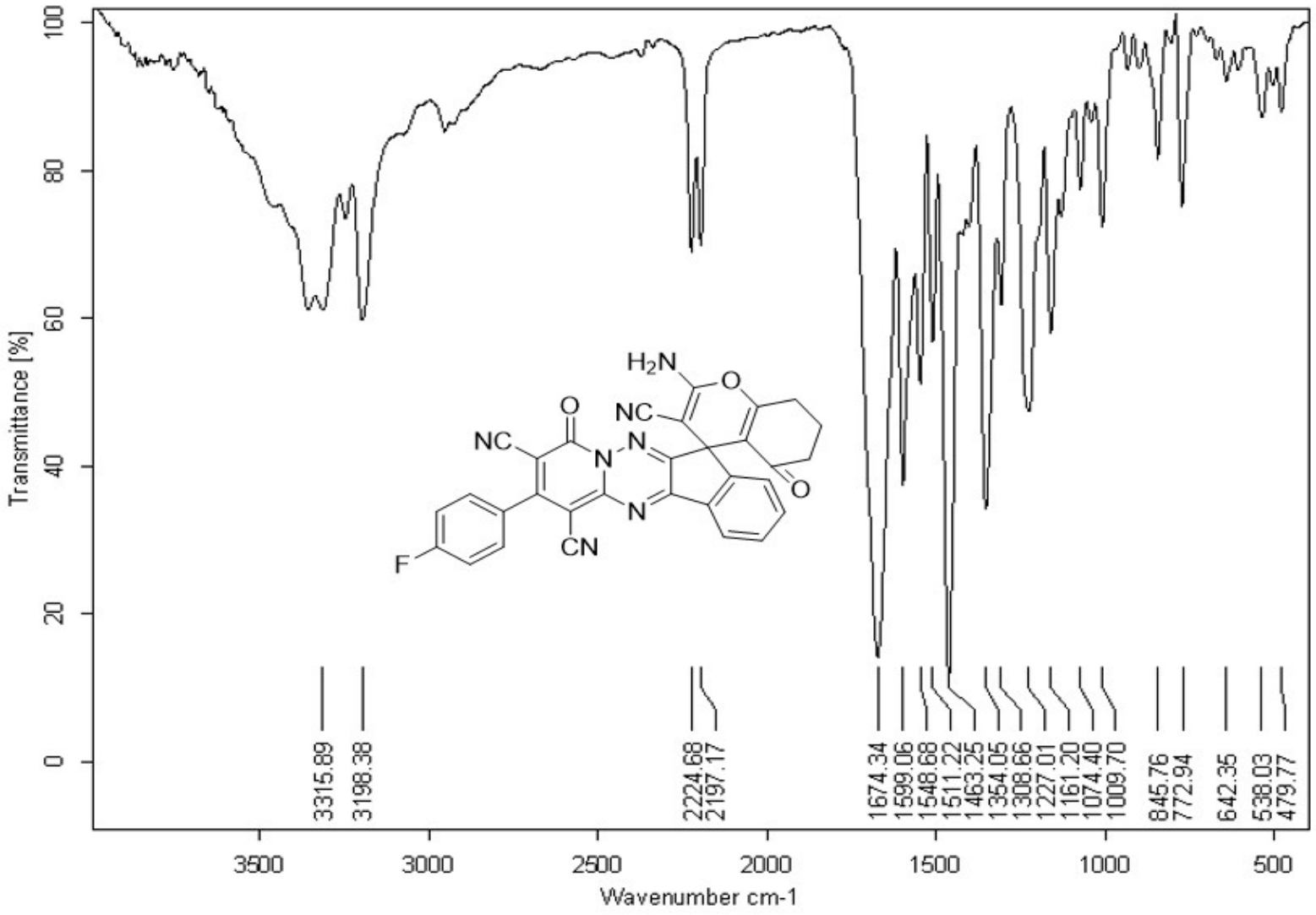
f1 (ppm)

^{13}C NMR of 6d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1548.68
1511.22
1463.25
1354.05
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1227.01
1161.20
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N
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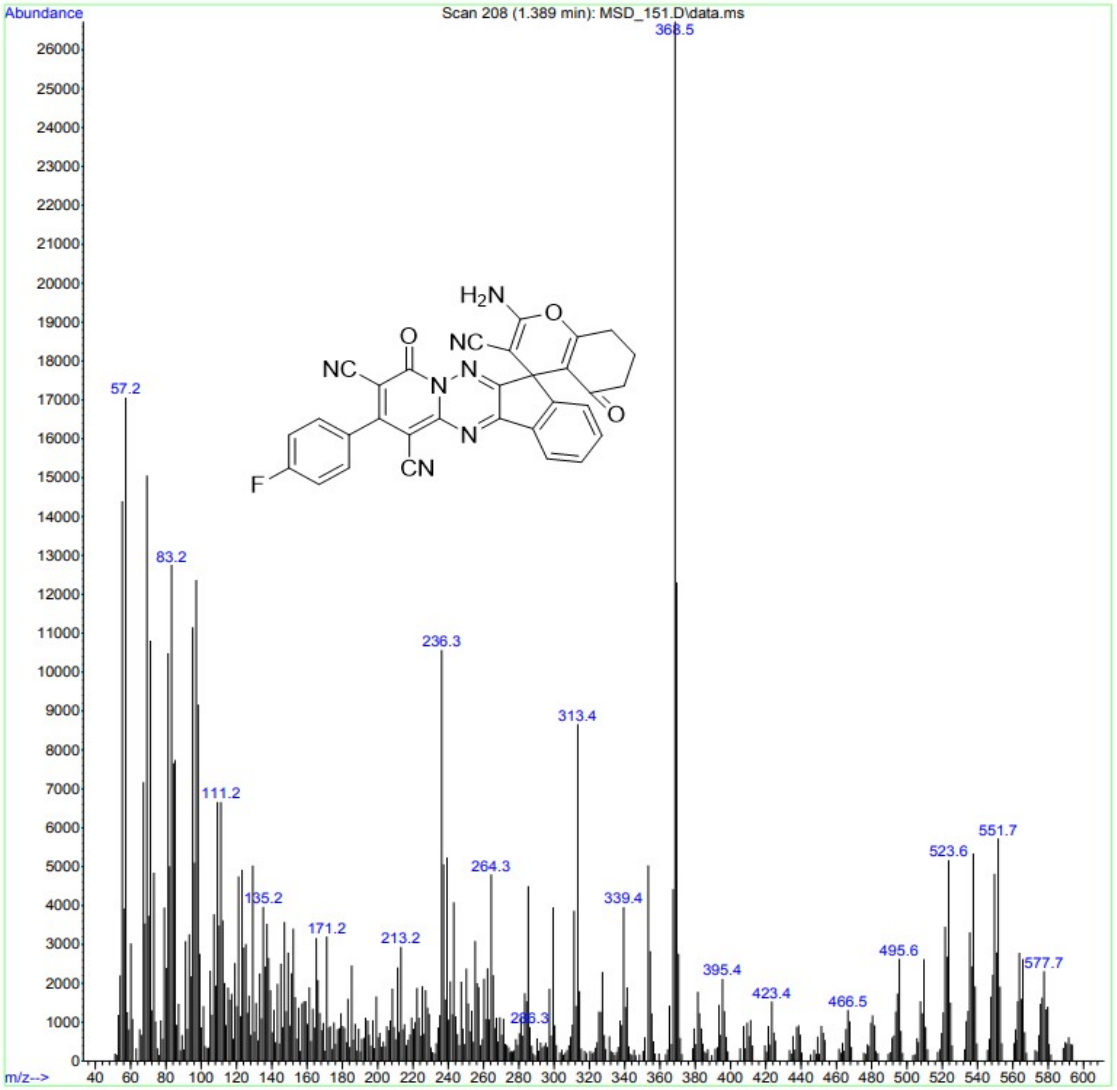
O
F
CN

IR of 6d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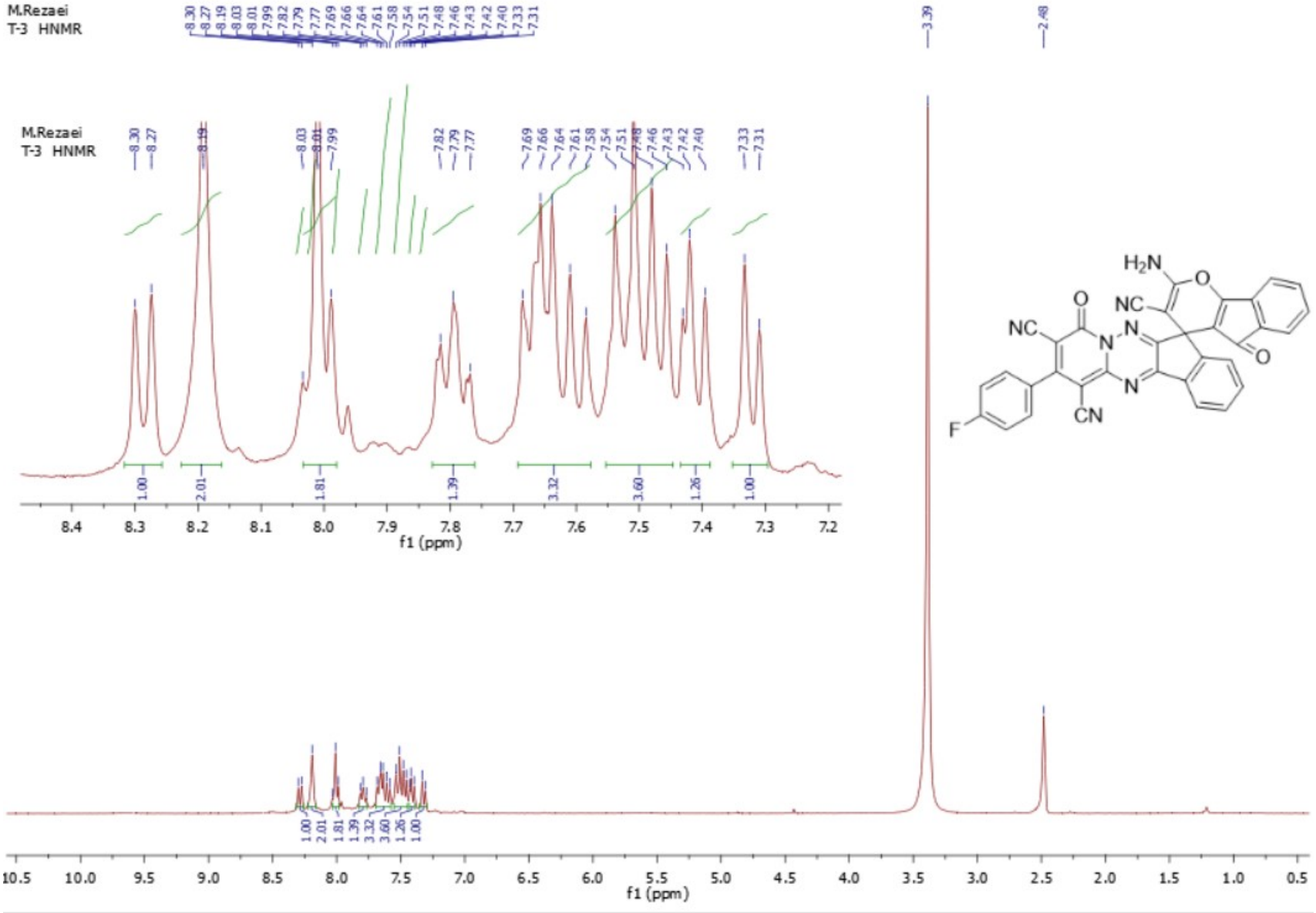
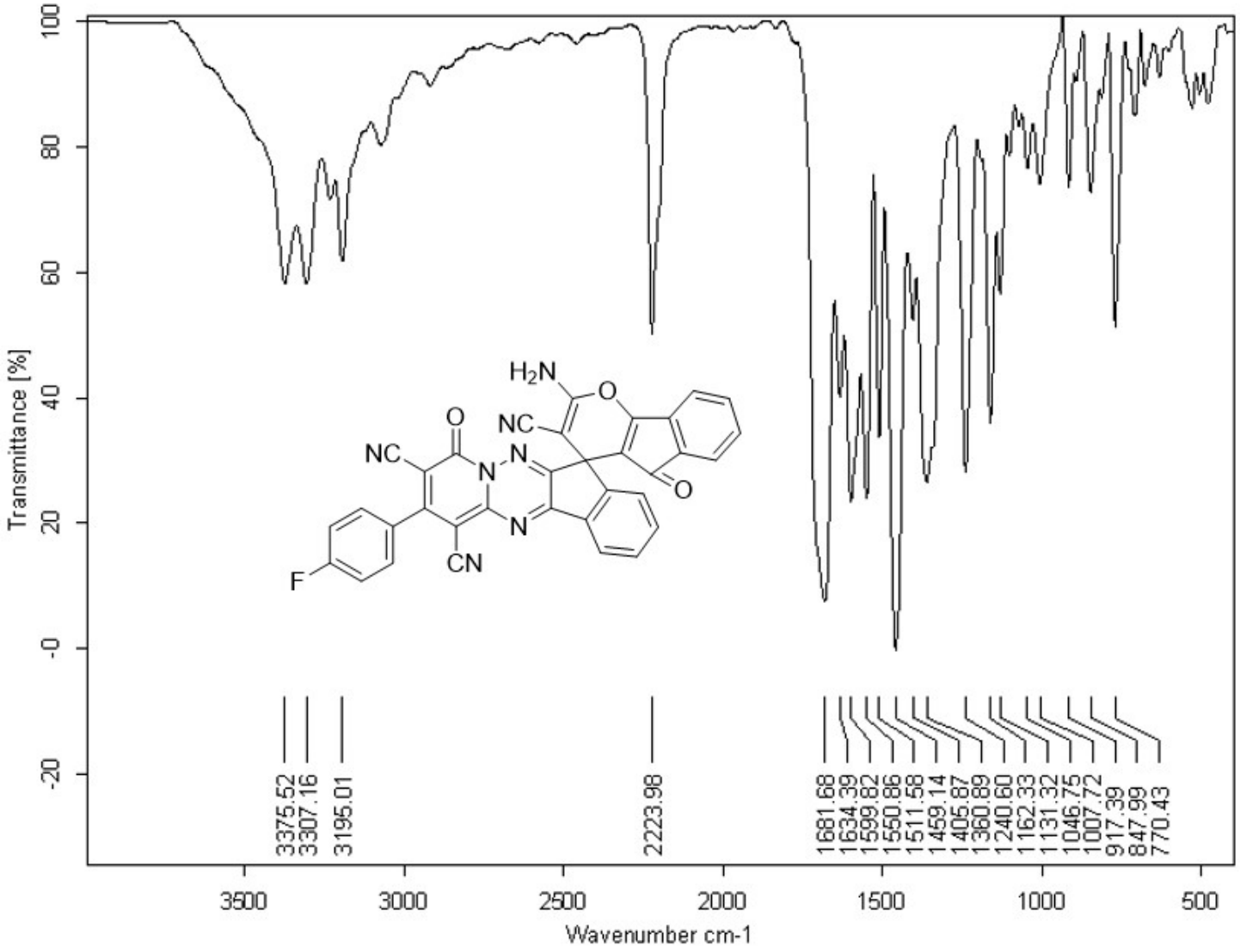
111.2
135.2
171.2
213.2
236.3
264.3
286.3
313.4
339.4
395.4
423.4
466.5
495.6
523.6
551.7
577.7
m/z-->

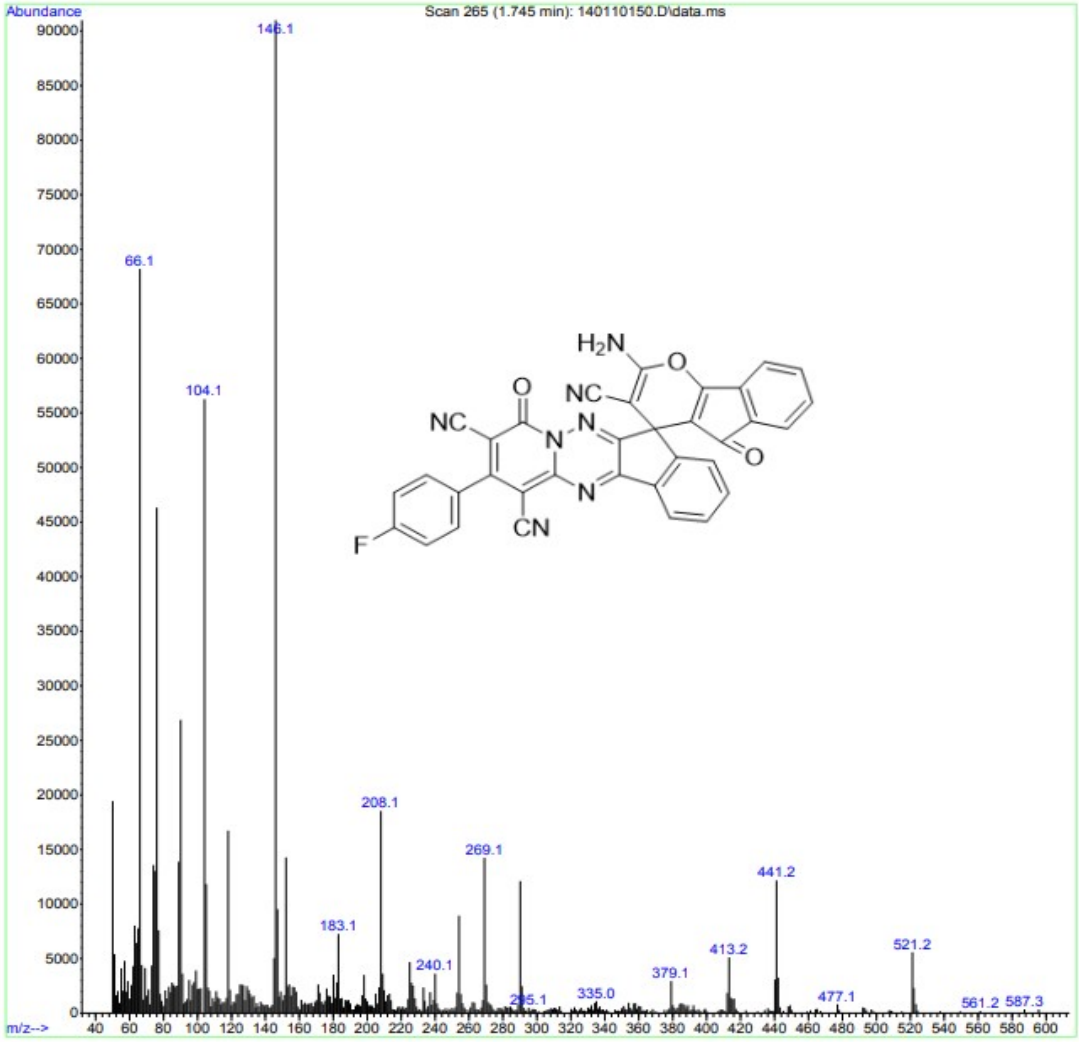
MS of 6d



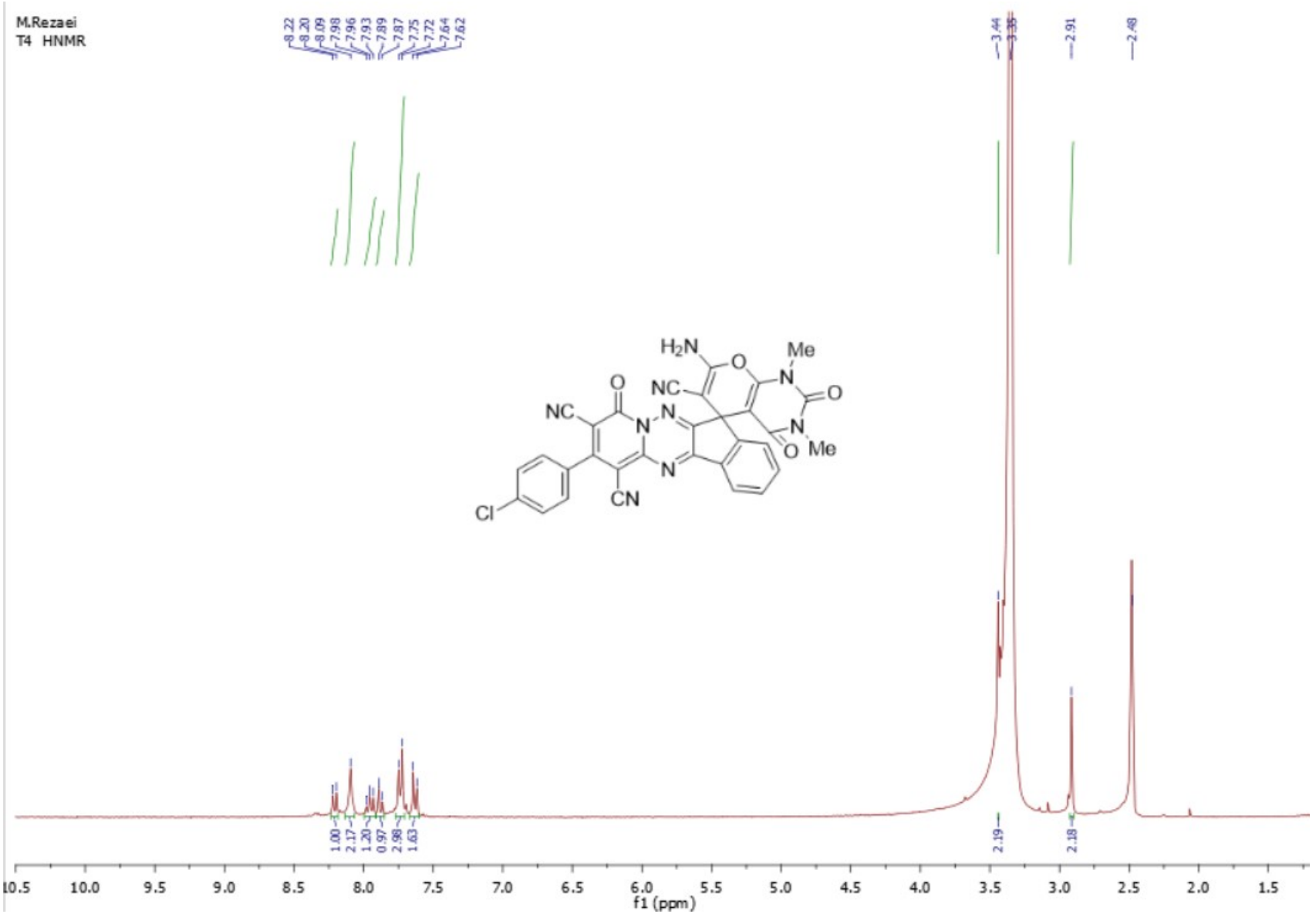
^{1}H NMR of 6e


Transmittance [%]
100
80
60
40
20
-0
-20
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
3375.52
3307.16
3195.01
2223.98
1681.68
1634.39
1599.82
1550.86
1511.58
1459.14
1405.87
1360.89
1240.60
1162.33
1131.32
1046.75
1007.72
917.39
847.99
770.43
H2N
O
NC
O
NC
N
N
O
N
CN
F

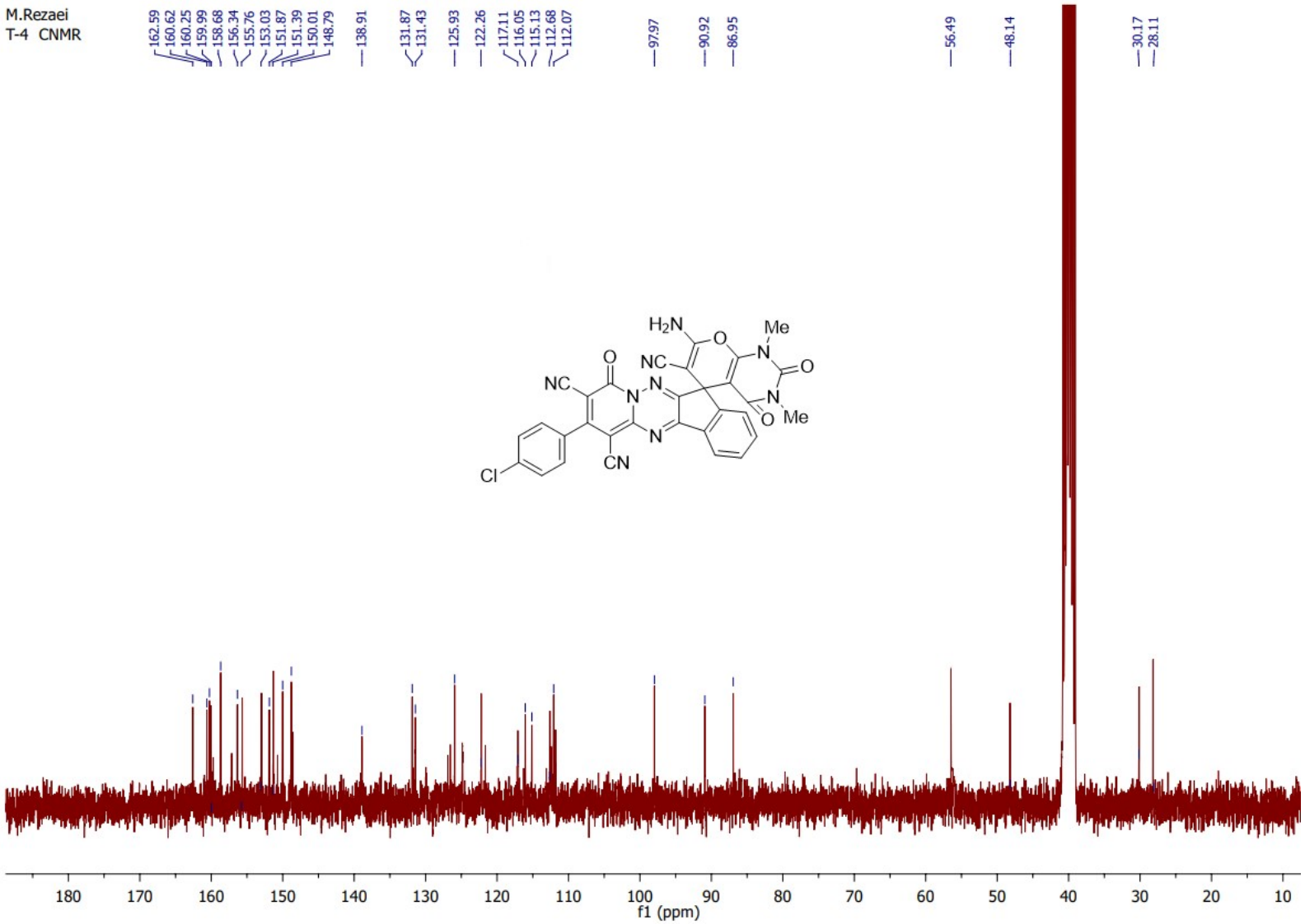
IR of 6e


Abundance
Scan 265 (1.745 min): 140110150.D\data.ms
146.1
66.1
104.1
208.1
269.1
441.2
183.1
240.1
413.2
521.2
379.1
335.0
477.1
561.2
587.3
m/z-->
H2N
O
NC
O
NC
N
N
N
F
CN

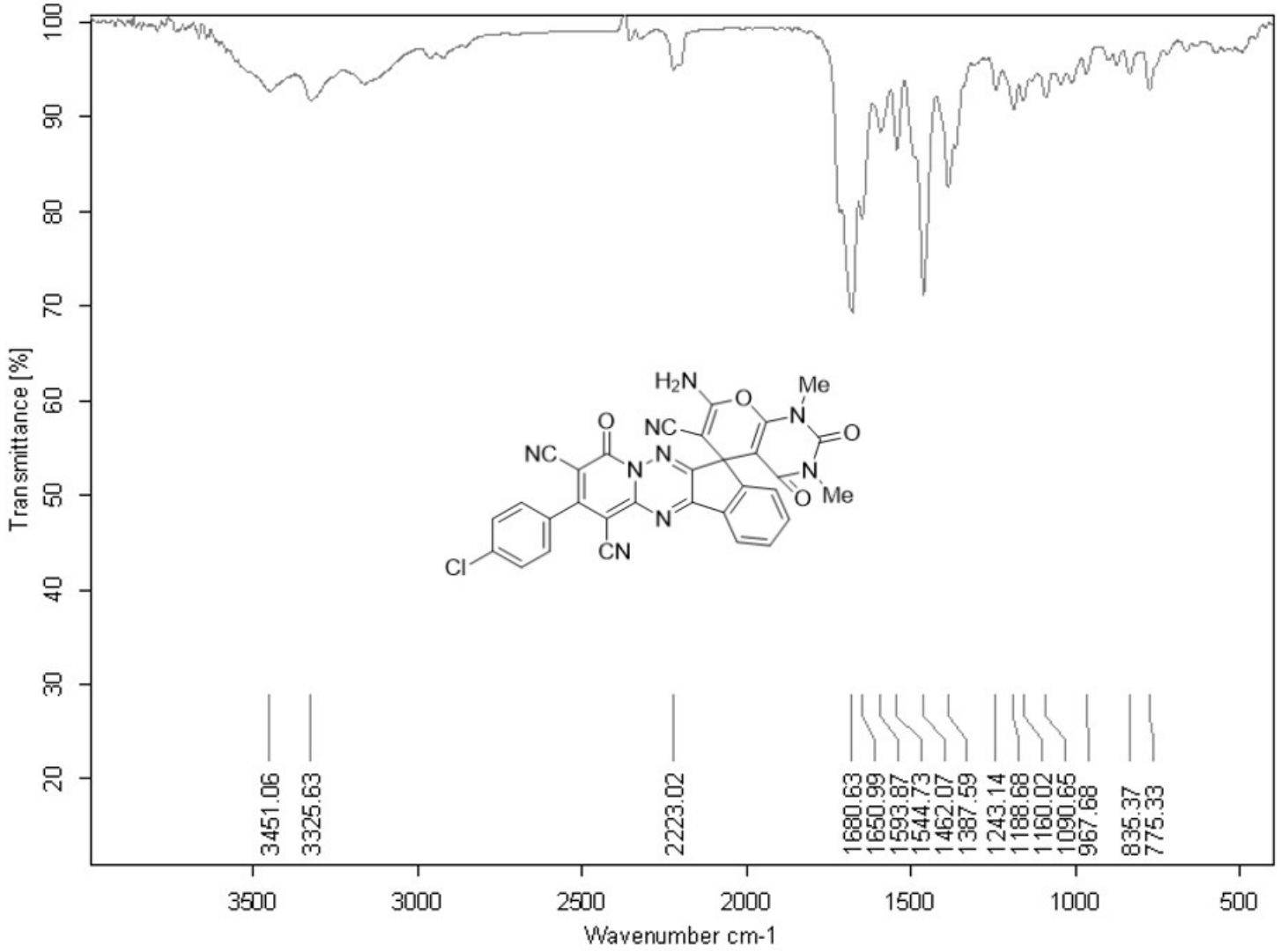
MS of 6e


M.Rezaei
T4 HNMR
8.22
8.20
8.09
7.98
7.96
7.93
7.89
7.87
7.75
7.72
7.64
7.62
3.44
3.35
2.91
2.48
H2N
Me
O
NC
N
O
NC
N
N
O
N
O
Me
N
Cl
CN
1.00
2.17
1.20
0.97
2.98
1.63
2.19
2.18
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
f1 (ppm)

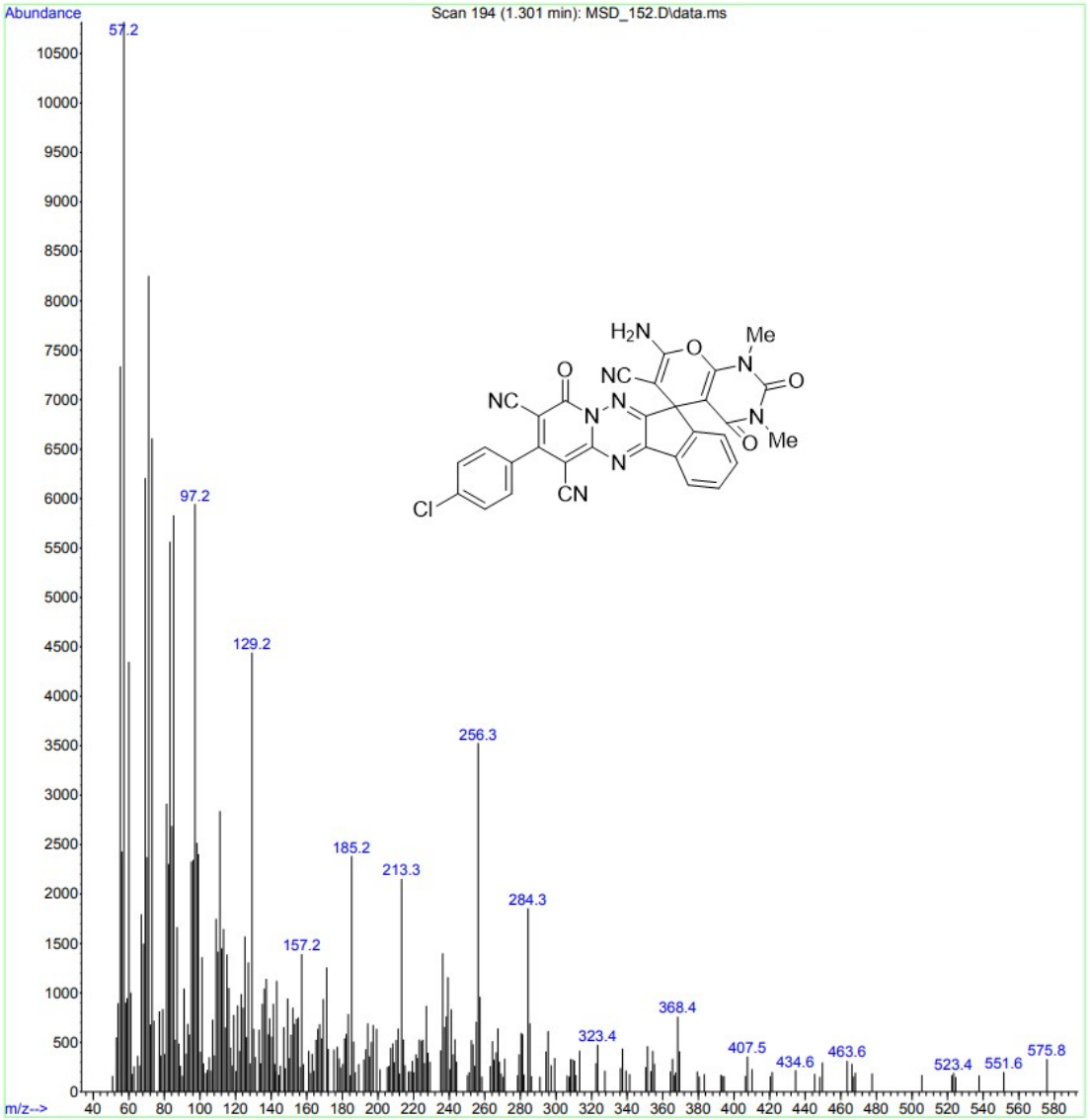
^{1}H NMR of 6f


M.Rezaei
T-4 CNMR
162.59
160.62
160.25
159.99
158.68
156.34
155.76
153.03
151.87
151.39
150.01
148.79
138.91
131.87
131.43
125.93
122.26
117.11
116.05
115.13
112.68
112.07
97.97
90.92
86.95
56.49
48.14
30.17
28.11
H2N
O
Me
NC
O
NC
N
N
N
N
O
Me
Cl
CN
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

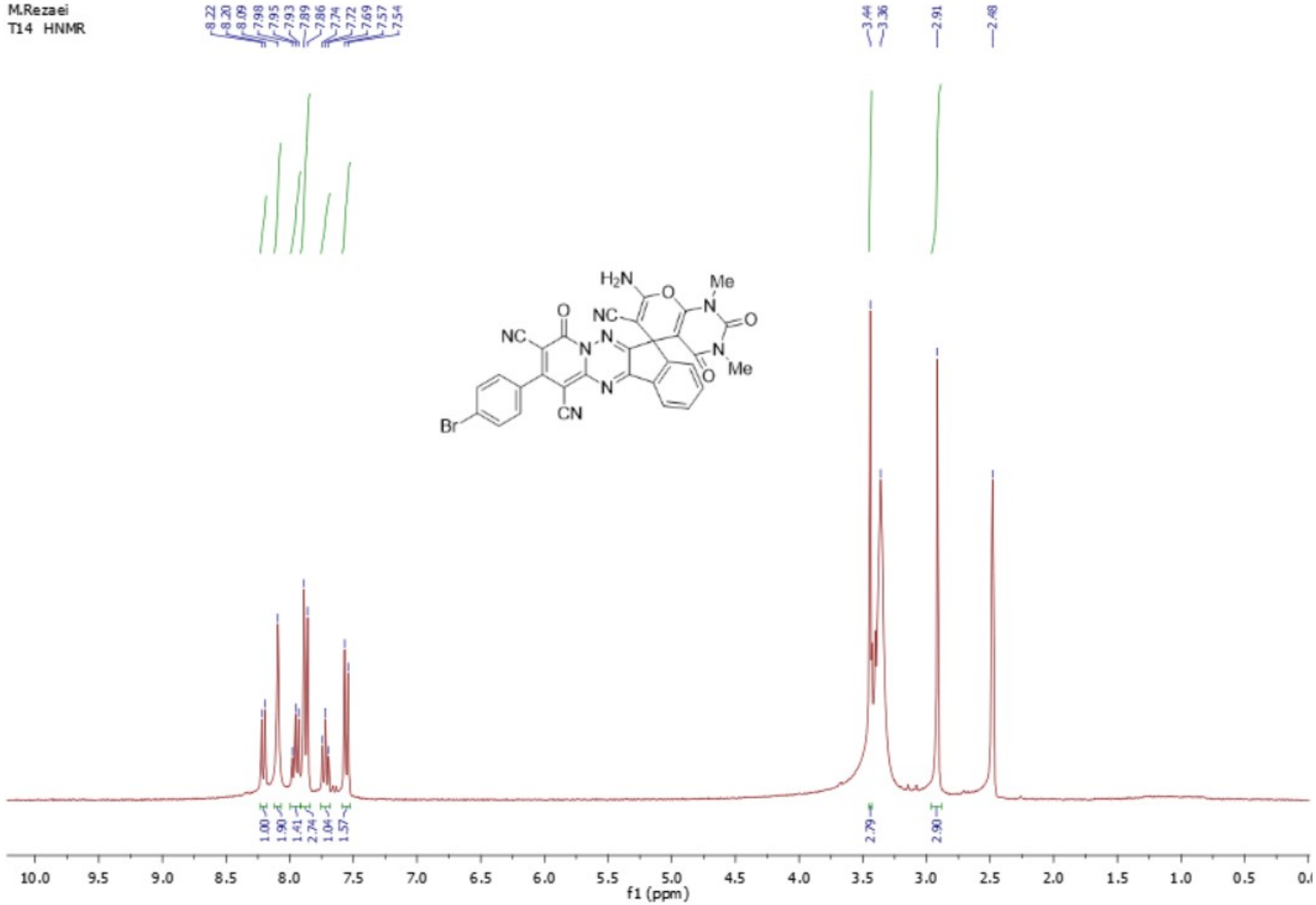
^{13}C NMR of 6f


Transmittance [%]
100
90
80
70
60
50
40
30
20
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
3451.06
3325.63
2223.02
1680.63
1650.99
1593.87
1544.73
1462.07
1387.59
1243.14
1188.68
1160.02
1090.65
967.68
835.37
775.33
H2N
O
Me
N
O
NC
NC
O
N
N
N
O
Me
N
Cl
CN

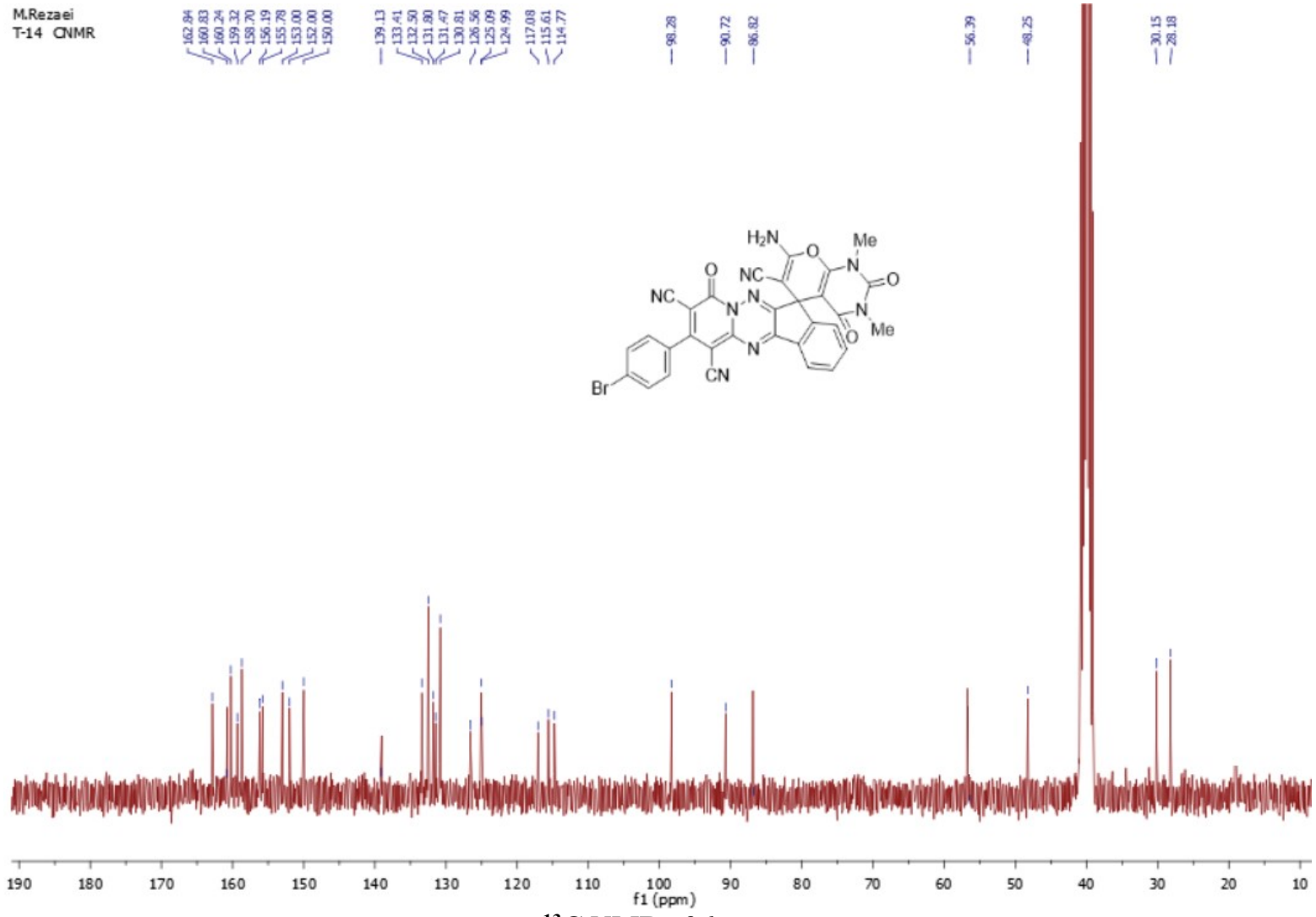
IR of 6f


Abundance
Scan 194 (1.301 min): MSD_152.D\data.ms
57.2
97.2
129.2
157.2
185.2
213.3
256.3
284.3
323.4
368.4
407.5
434.6
463.6
523.4
551.6
575.8
m/z-->
H2N
Me
NC
NC
CN
Cl
Me

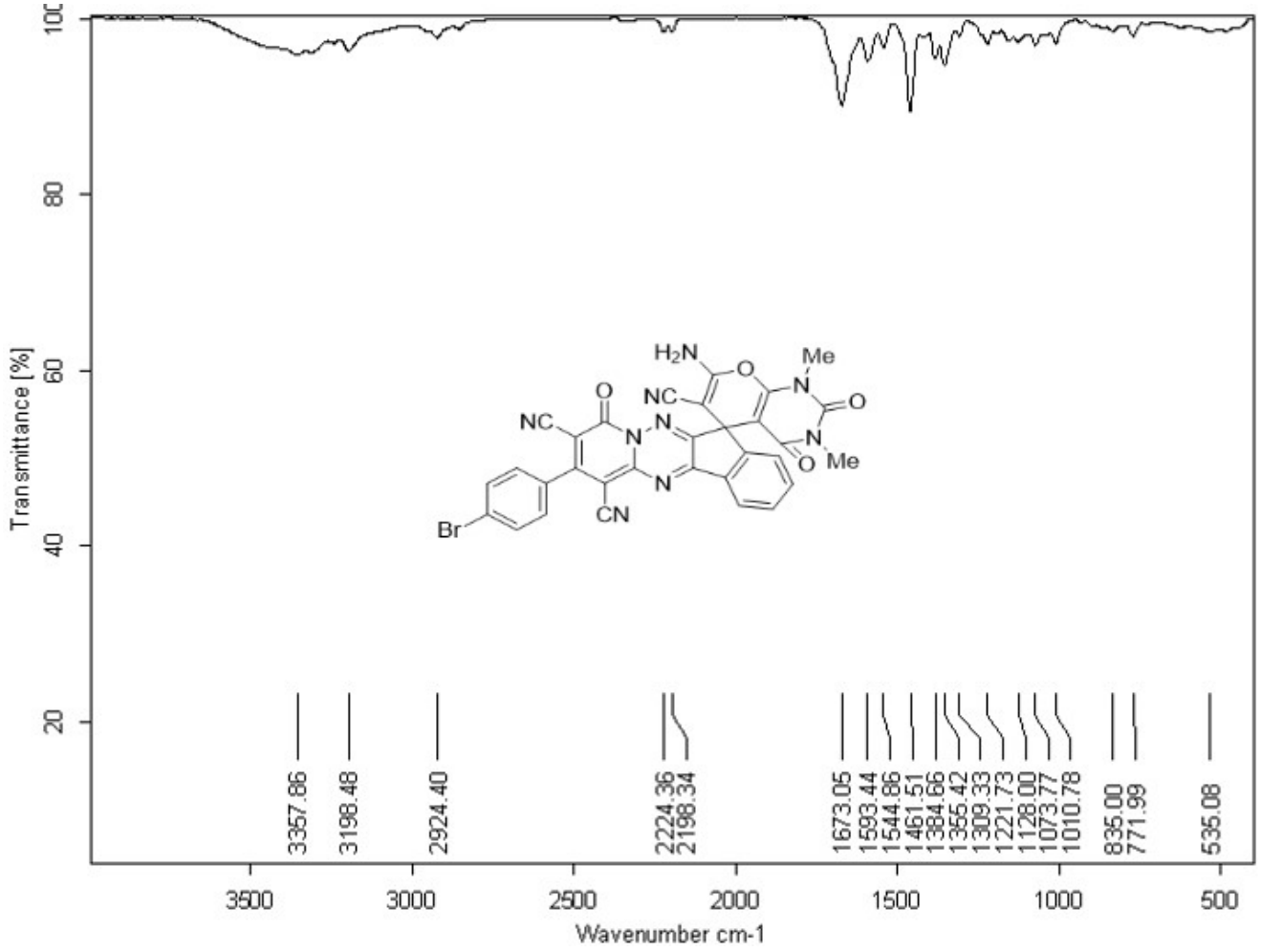
MS of 6f


M.Rezaei
T14 HNMR
8.22
8.20
8.09
7.98
7.95
7.93
7.89
7.86
7.74
7.72
7.69
7.57
7.54
3.44
3.36
2.91
2.49
H2N
O
Me
N
NC
O
NC
N
N
N
O
N
Me
O
Br
CN
1.00
1.90
1.41
2.74
1.04
1.57
2.79
2.90
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
f1 (ppm)

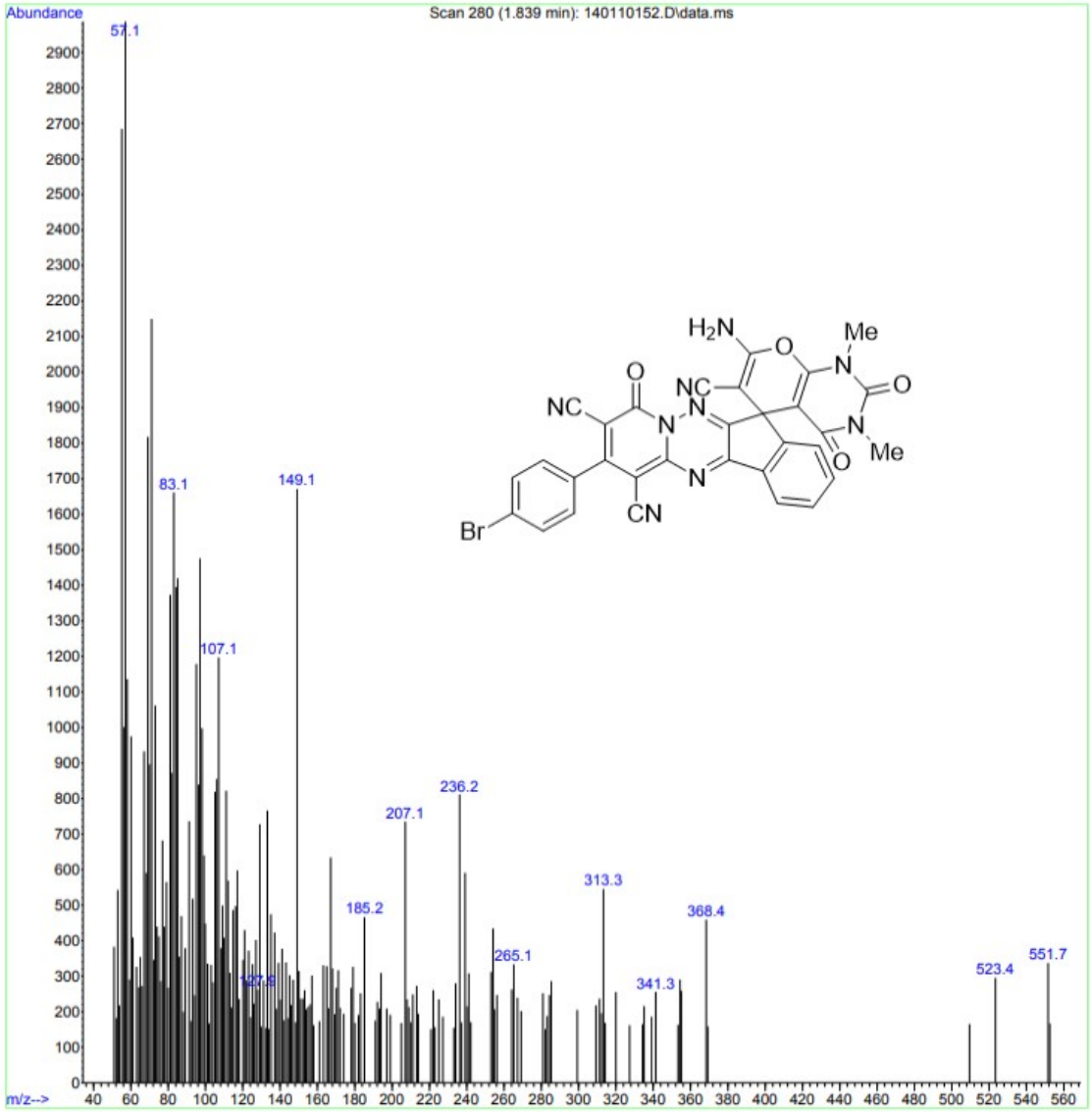
^{1}H NMR of 6g


M.Rezaei
T-14 CNMR
162.84
160.83
160.24
159.32
158.70
156.19
155.78
153.00
152.00
150.00
139.13
133.41
132.50
131.80
131.47
130.81
126.56
125.09
124.99
117.08
115.61
114.77
98.28
90.72
86.82
56.39
48.25
30.15
28.18
H2N
Me
NC
O
NC
N
N
O
N
Me
O
N
Br
CN
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

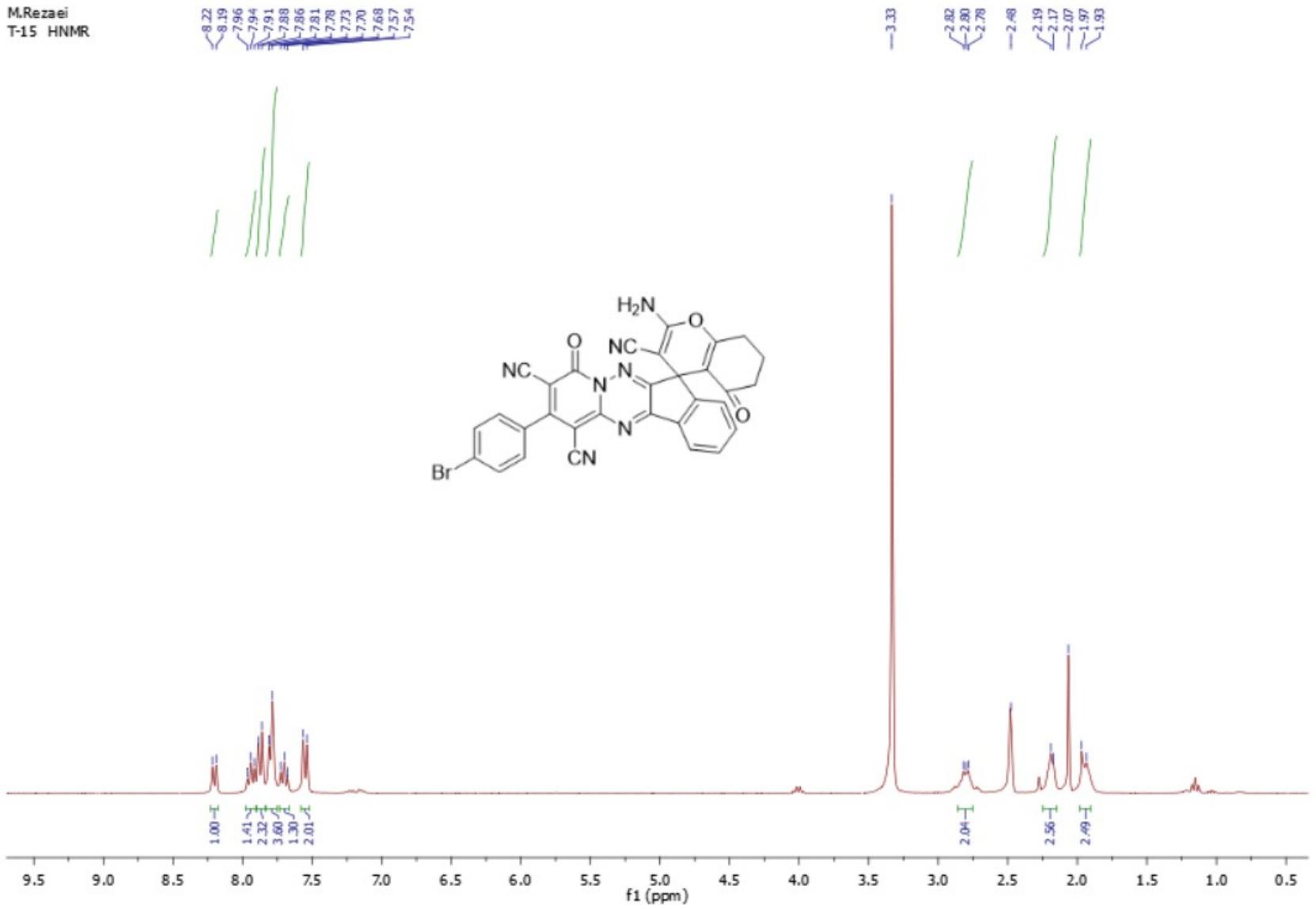
^{13}C NMR of 6g


Transmittance [%]
100
80
60
40
20
3357.86
3198.48
2924.40
2224.36
2198.34
1673.05
1593.44
1544.86
1461.51
1384.66
1355.42
1309.33
1221.73
1128.00
1073.77
1010.78
835.00
771.99
535.08
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
H2N
Me
NC
O
N
O
NC
N
N
O
N
Me
Br
CN

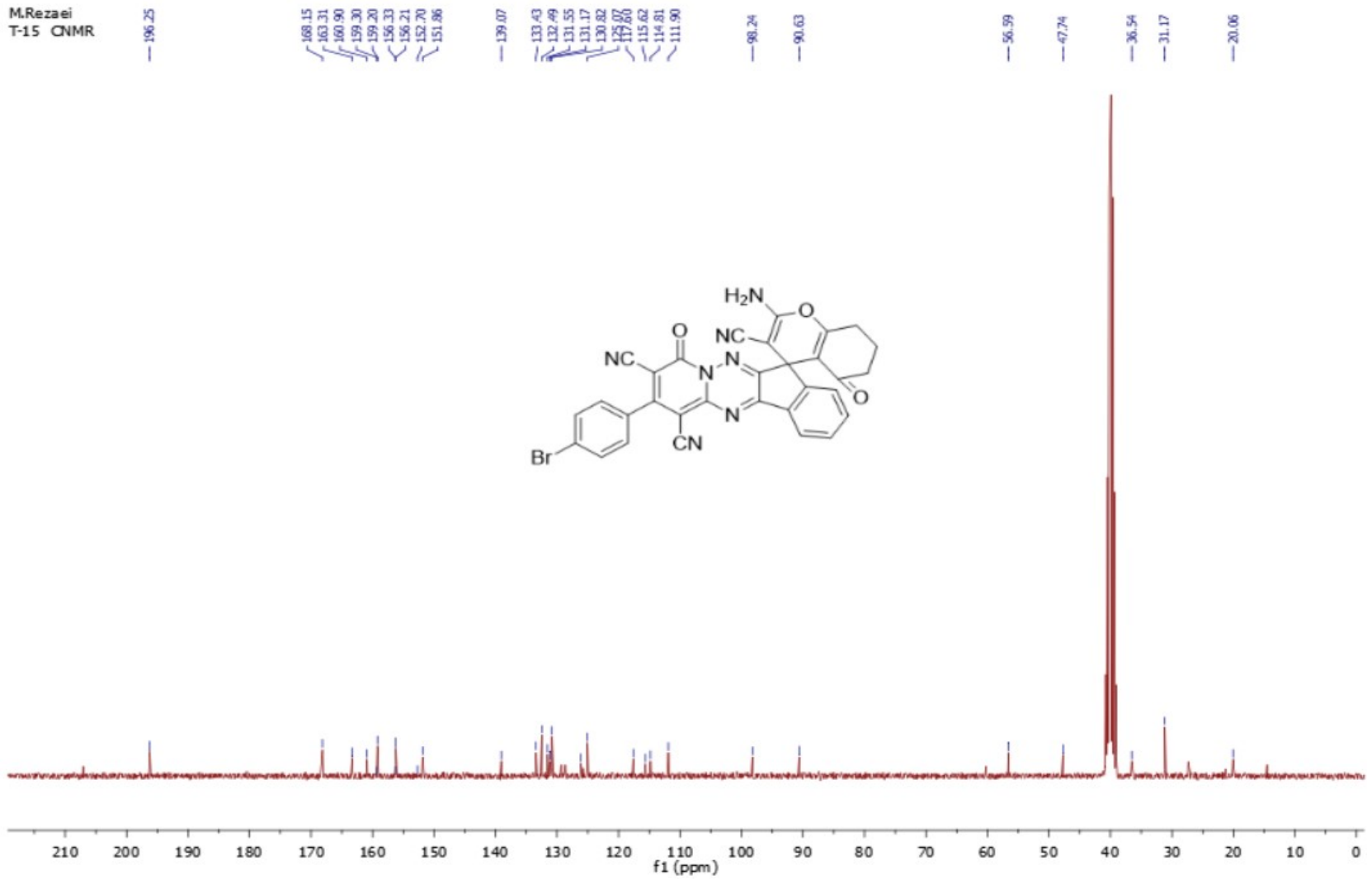
IR of 6g


Abundance
Scan 280 (1.839 min): 140110152.D\data.ms
m/z-->
57.1
83.1
107.1
149.1
185.2
207.1
236.2
265.1
313.3
341.3
368.4
523.4
551.7
H2N
Me
NC
NC
CN
Br

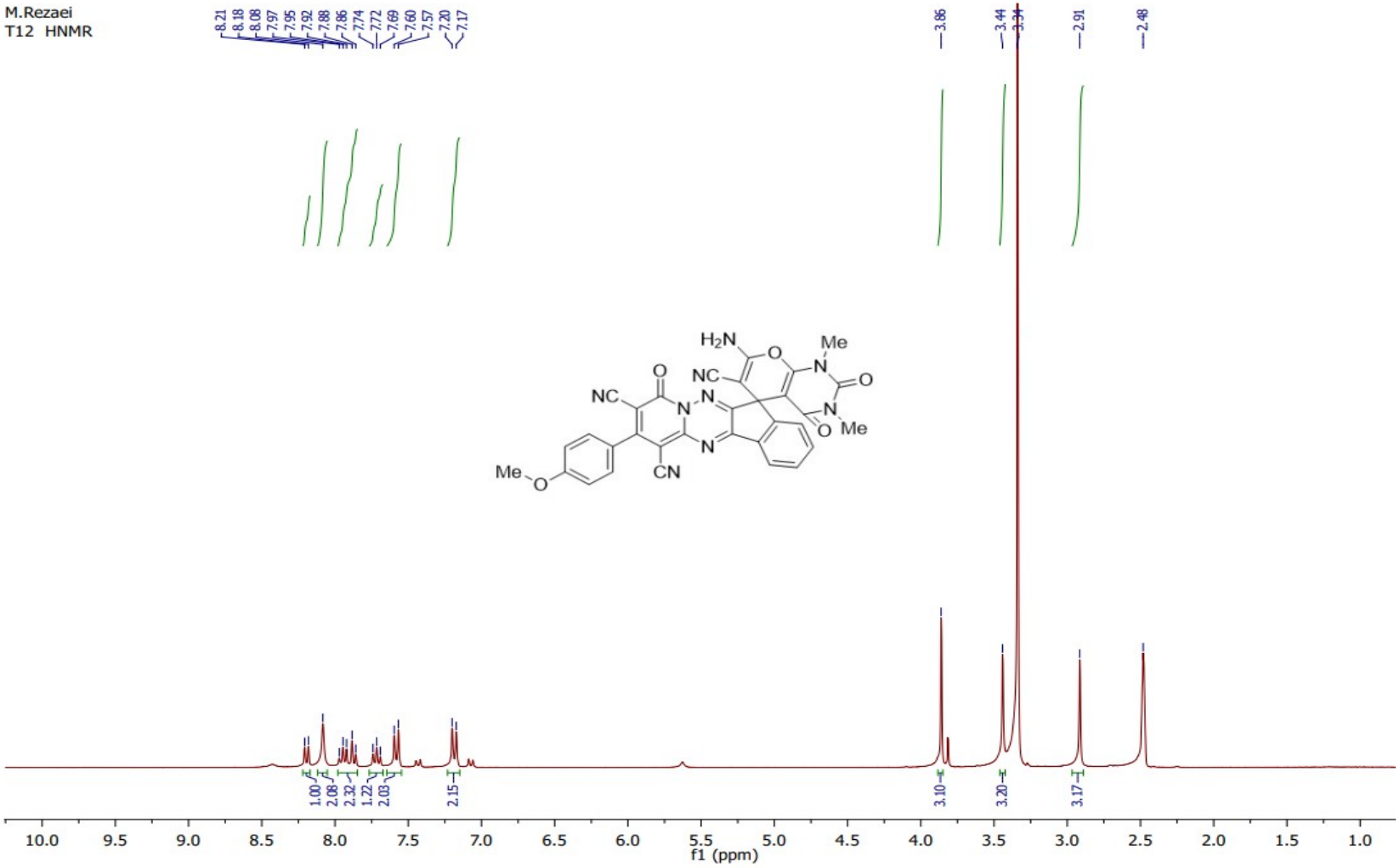
MS of 6g


M.Rezaei
T-15 HNMR
8.22
8.19
7.96
7.94
7.91
7.88
7.86
7.81
7.78
7.73
7.70
7.68
7.57
7.54
3.33
2.82
2.80
2.78
2.48
2.19
2.17
2.07
1.97
1.93
H2N
O
NC
O
NC
N
N
N
O
Br
CN
1.00
1.41
2.32
3.60
1.30
2.01
2.04
2.56
2.49
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
f1 (ppm)

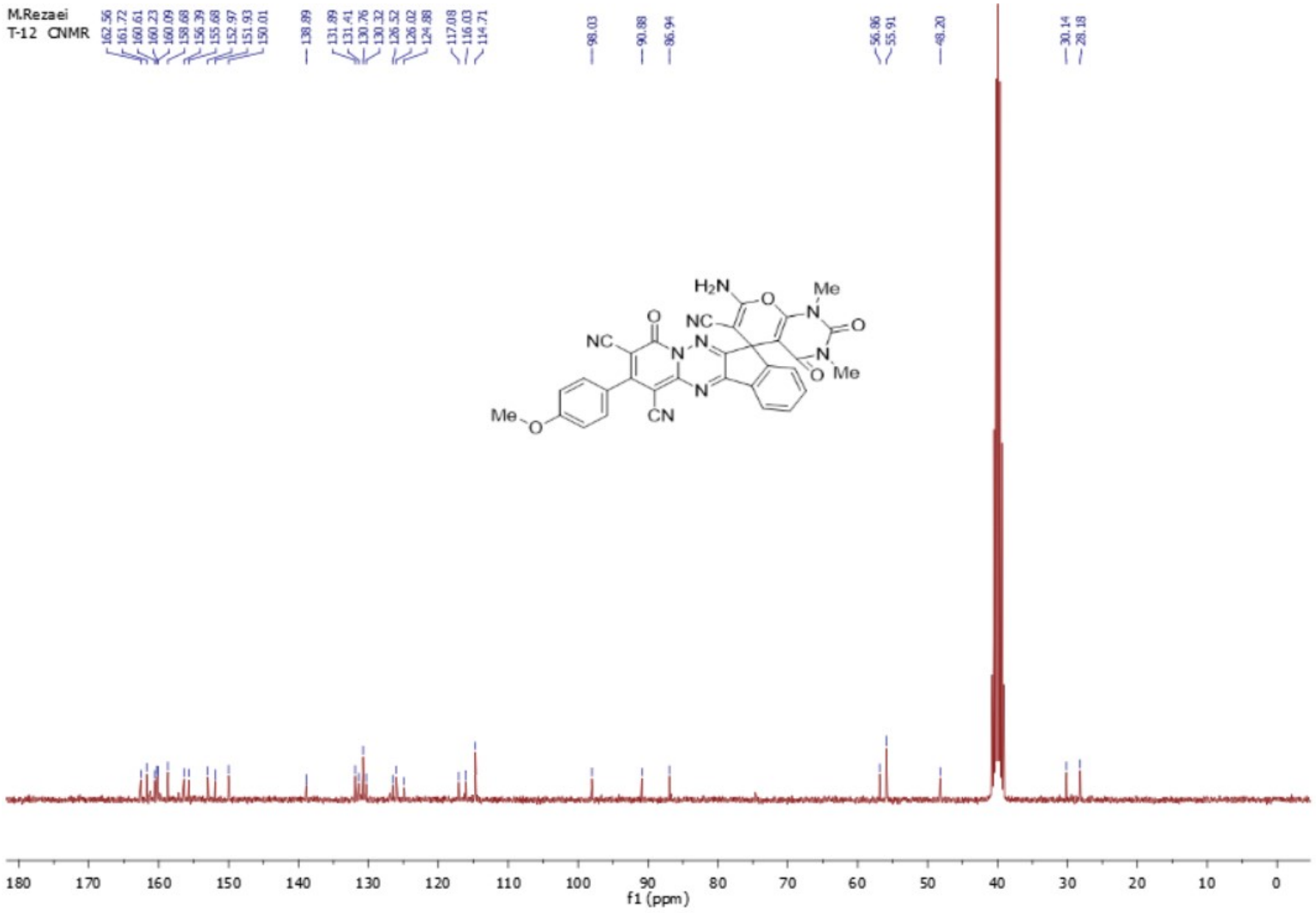
^{1}H NMR of 6h


M.Rezaei
T-15 CNMR
196.25
168.15
163.31
160.90
159.30
159.20
156.33
156.21
152.70
151.86
139.07
133.43
132.49
131.55
131.17
130.82
125.07
117.60
115.62
114.81
111.90
98.24
90.63
56.59
47.74
36.54
31.17
20.06
H2N
O
NC
O
NC
N
N
N
O
Br
CN
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

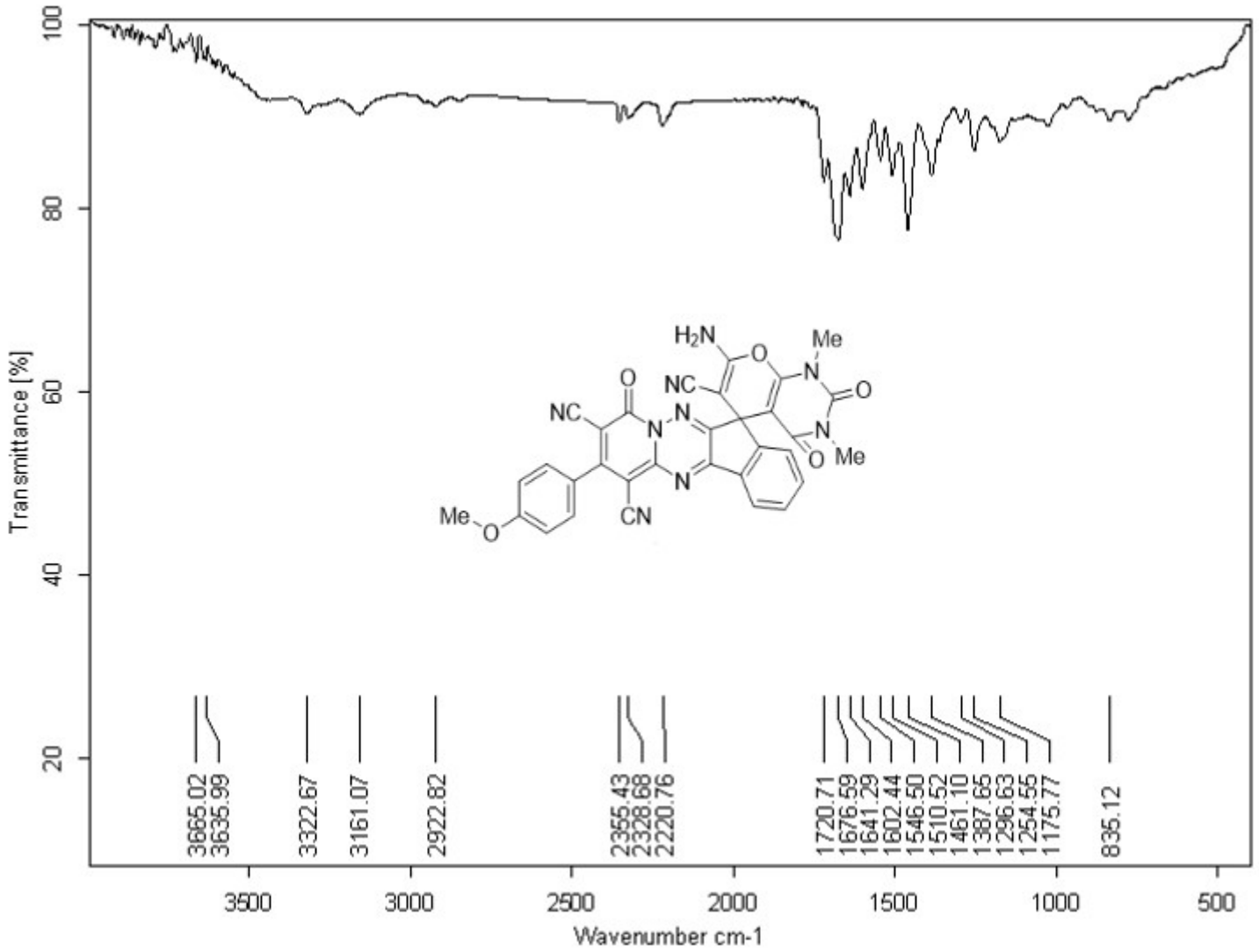
^{13}C NMR of 6h


M.Rezaei
T12 HNMR
8.21
8.18
8.08
7.97
7.95
7.92
7.88
7.86
7.74
7.72
7.69
7.60
7.57
7.20
7.17
3.86
3.44
3.34
2.91
2.48
H2N
Me
NC
NC
CN
Me
Me
f1 (ppm)

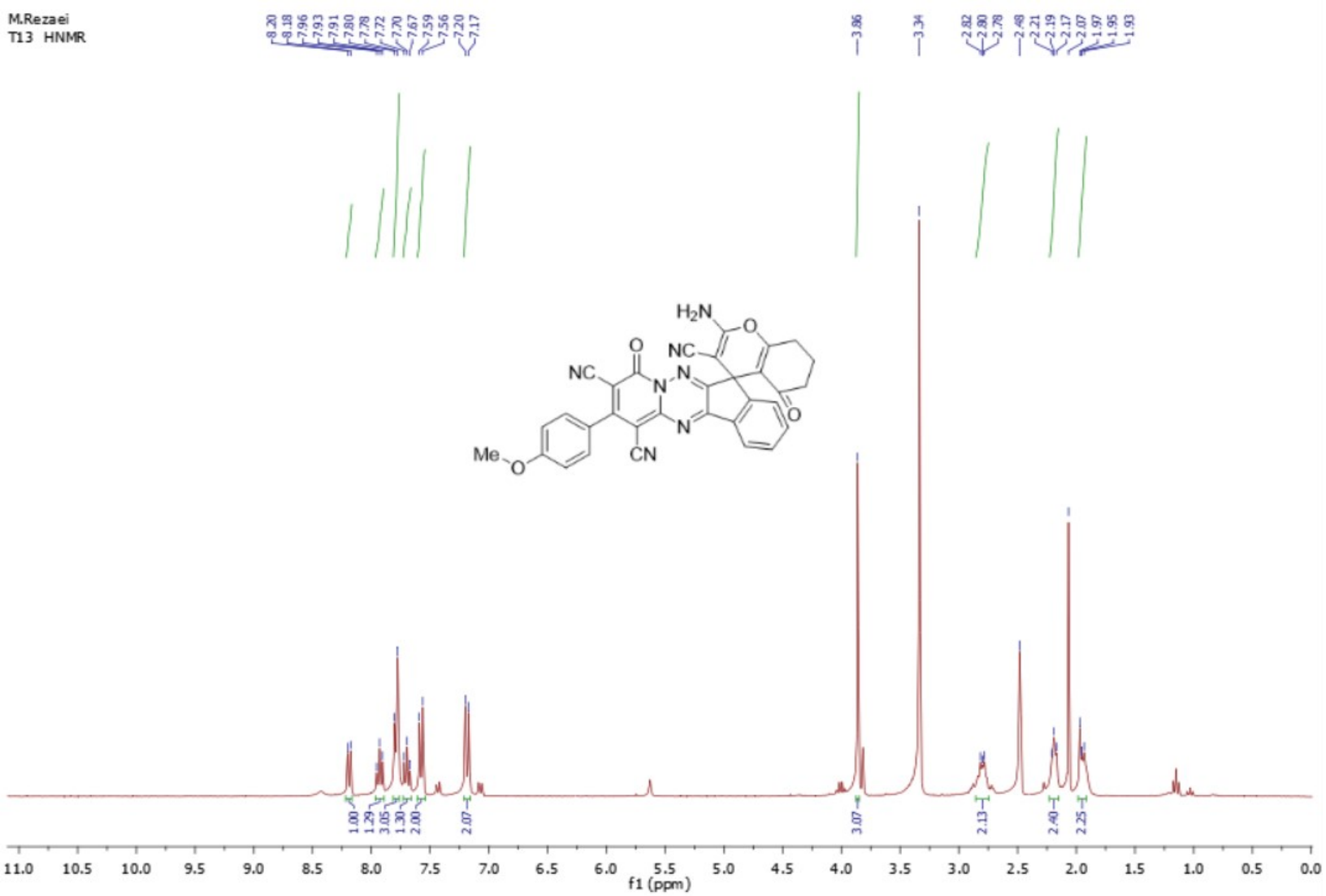
^{1}H NMR of 6i


M.Rezaei
T-12 CNMR
162.56
161.72
160.61
160.23
160.09
158.68
156.39
155.68
152.97
151.93
150.01
138.89
131.89
131.41
130.76
130.32
126.52
126.02
124.88
117.08
116.03
114.71
98.03
90.88
86.94
56.86
55.91
48.20
30.14
28.18
H2N
O
Me
N
NC
O
NC
N
N
O
N
O
Me
N
Me
O
CN
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

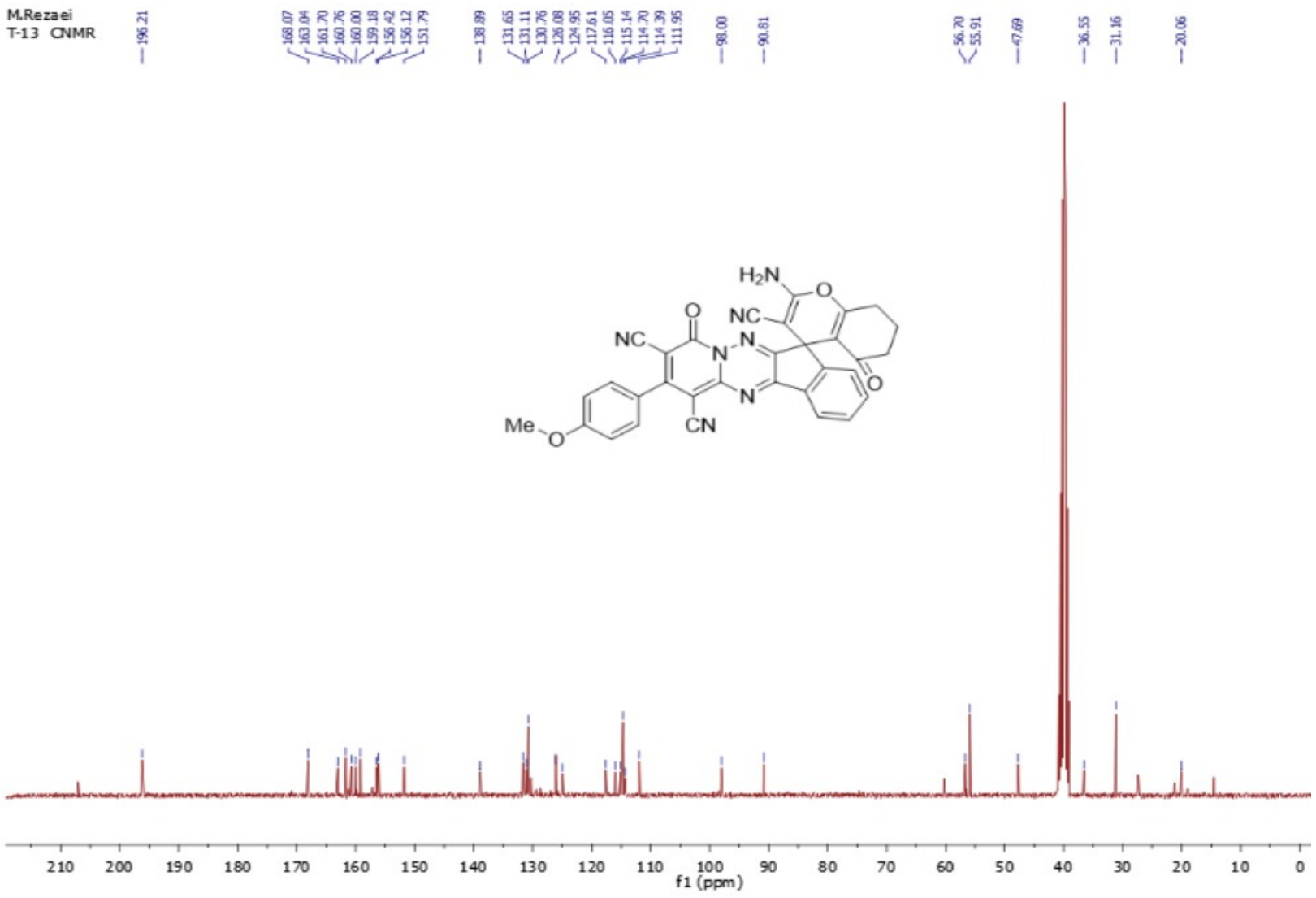
^{13}C NMR of 6i


Transmittance [%]
100
80
60
40
20
3665.02
3635.99
3322.67
3161.07
2922.82
2355.43
2328.68
2220.76
1720.71
1676.59
1641.29
1602.44
1546.50
1510.52
1461.10
1387.65
1296.63
1254.55
1175.77
835.12
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
H2N
O
Me
N
NC
O
O
NC
N
N
N
O
Me
Me
O
CN

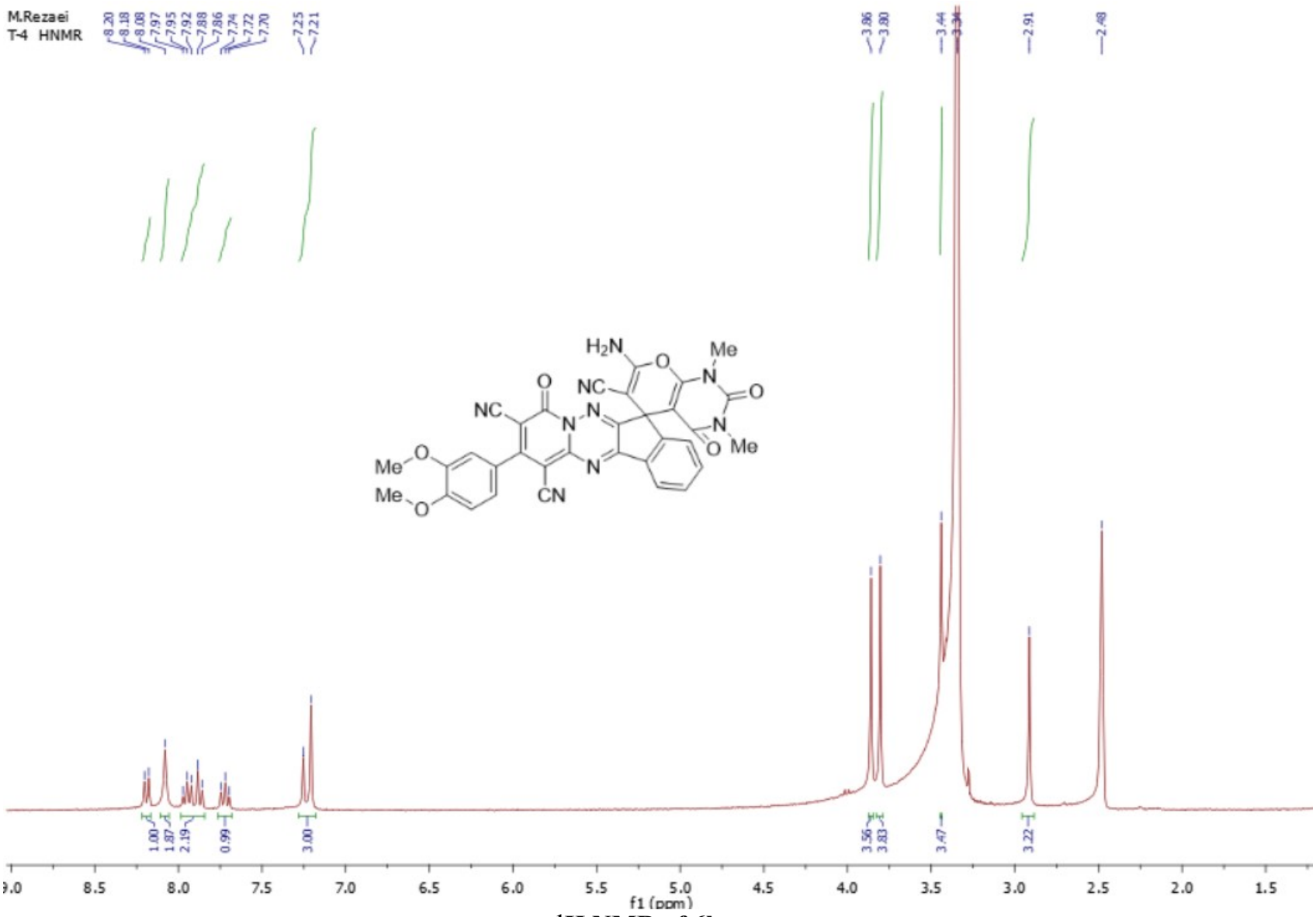
IR of 6i


M.Rezaei
T13 HNMR
8.20
8.18
7.96
7.93
7.91
7.80
7.78
7.72
7.70
7.67
7.59
7.56
7.20
7.17
3.86
3.34
2.82
2.80
2.78
2.48
2.21
2.19
2.17
2.07
1.97
1.95
1.93
H2N
O
NC
O
NC
N
N
N
O
Me
O
CN
1.00
1.29
3.05
1.30
2.00
2.07
3.07
2.13
2.40
2.25
11.0
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)

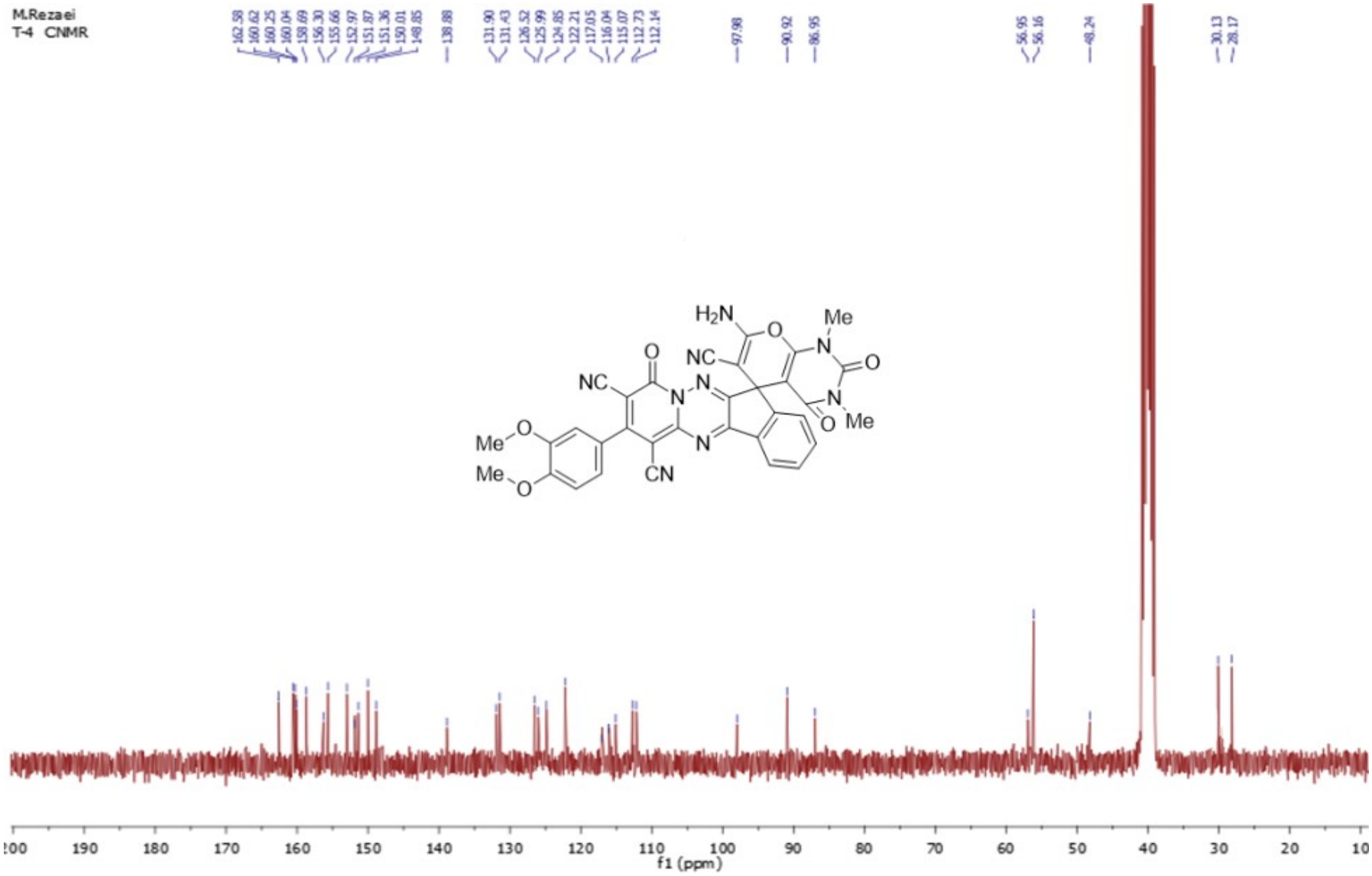
^{1}H NMR of 6j


M.Rezaei
T-13 CNMR
196.21
168.07
163.04
161.70
160.76
160.00
159.18
156.42
156.12
151.79
138.89
131.65
131.11
130.76
126.08
124.95
117.61
116.05
115.14
114.70
114.39
111.95
98.00
90.81
56.70
55.91
47.69
36.55
31.16
20.06
H2N
O
NC
O
NC
N
N
N
O
Me
O
CN
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

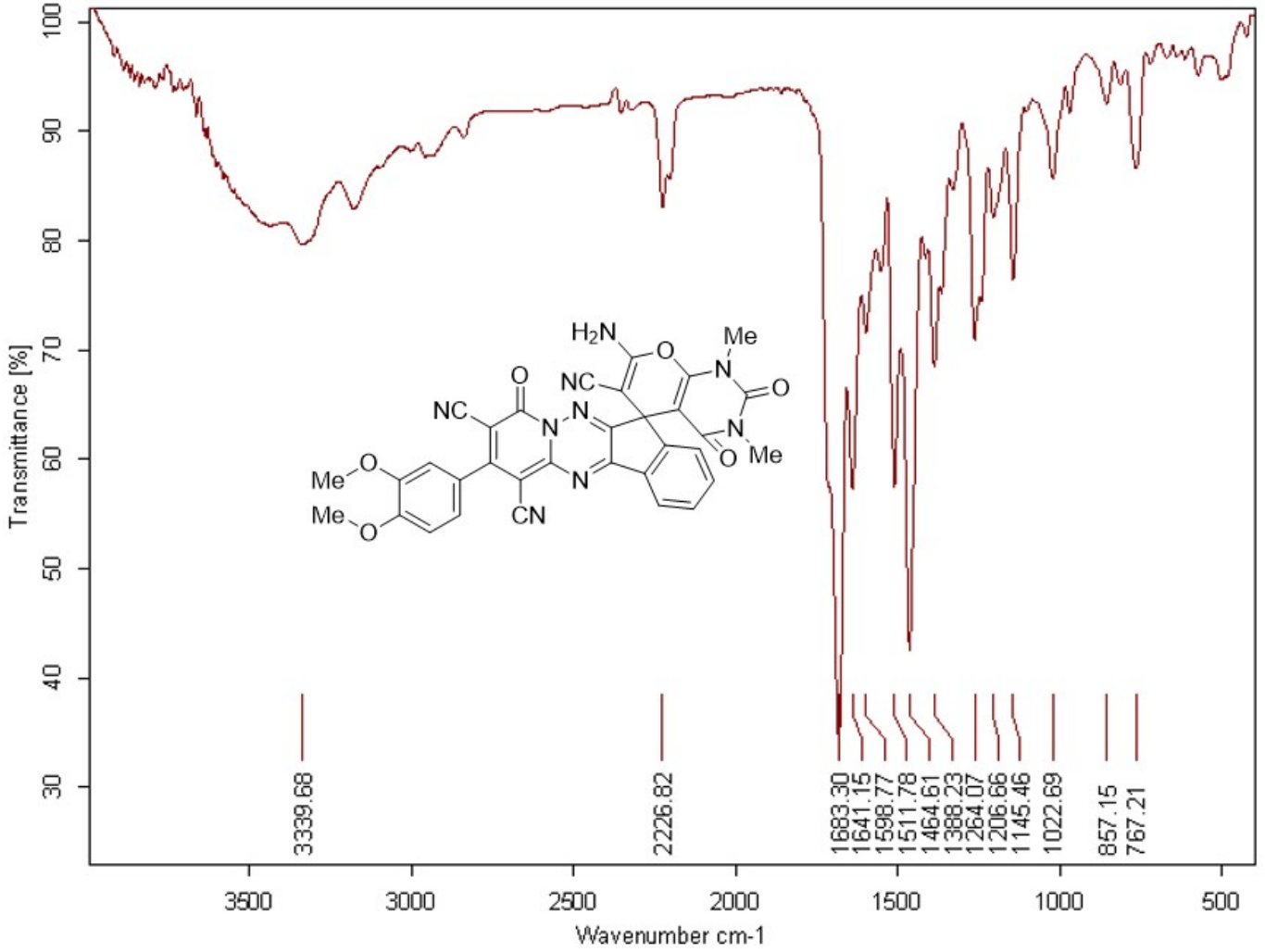
^{13}C NMR of 6j


M.Rezaei
T-4 HNMR
8.20
8.18
8.08
7.97
7.95
7.92
7.88
7.86
7.74
7.72
7.70
7.25
7.21
3.86
3.80
3.44
3.34
2.91
2.48
H2N
NC
NC
CN
Me
Me
Me
O
N
O
f1 (ppm)

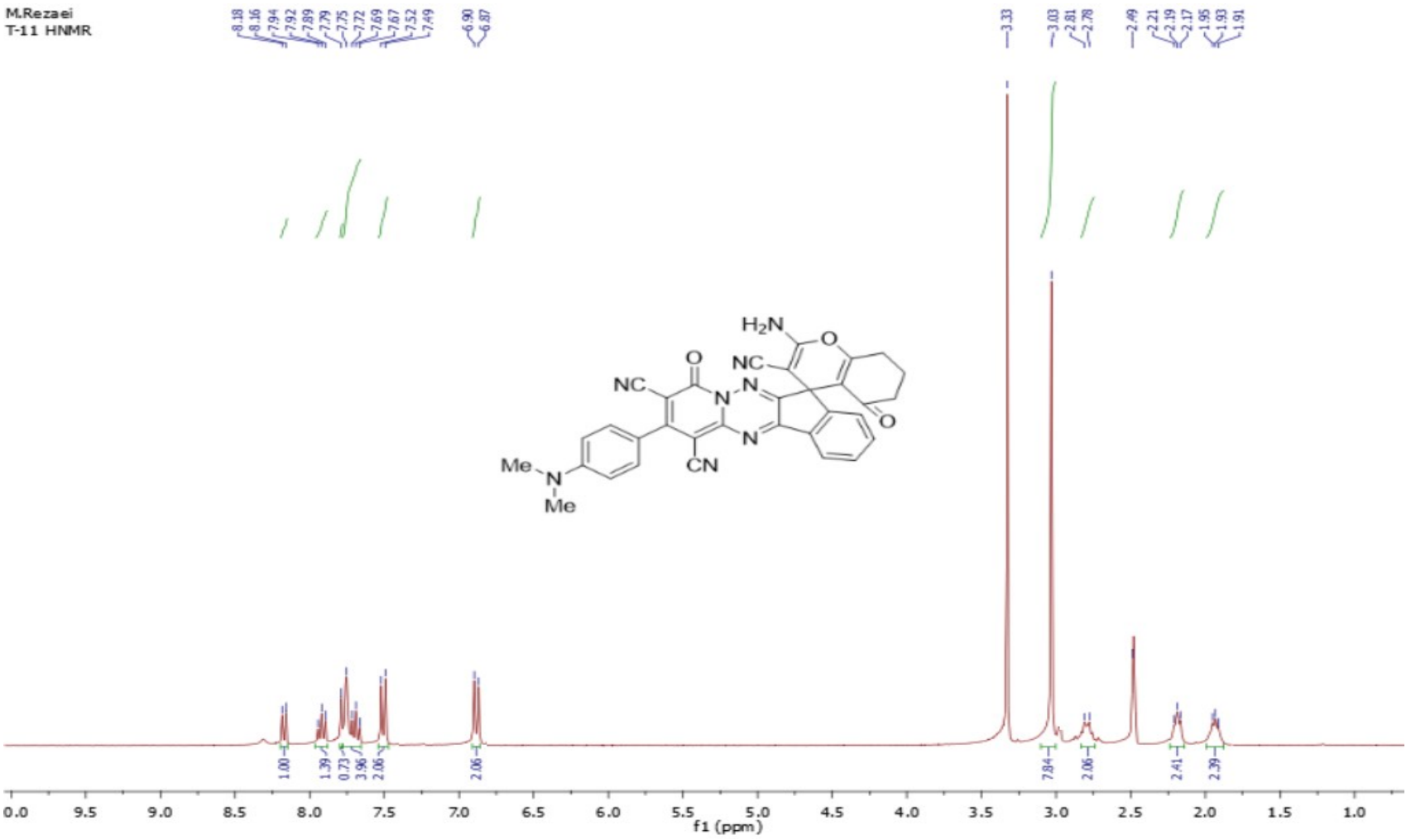
^{1}H NMR of 6k


M.Rezaei
T-4 CNMR
162.58
160.62
160.25
160.04
158.69
156.30
155.66
152.97
151.87
151.36
150.01
148.85
138.88
131.90
131.43
126.52
125.99
124.85
122.21
117.05
116.04
115.07
112.73
112.14
97.98
90.92
86.95
56.95
56.16
48.24
30.13
28.17
H2N
O
Me
N
NC
O
NC
N
N
O
N
Me
O
Me
Me
O
N
Me
O
CN
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

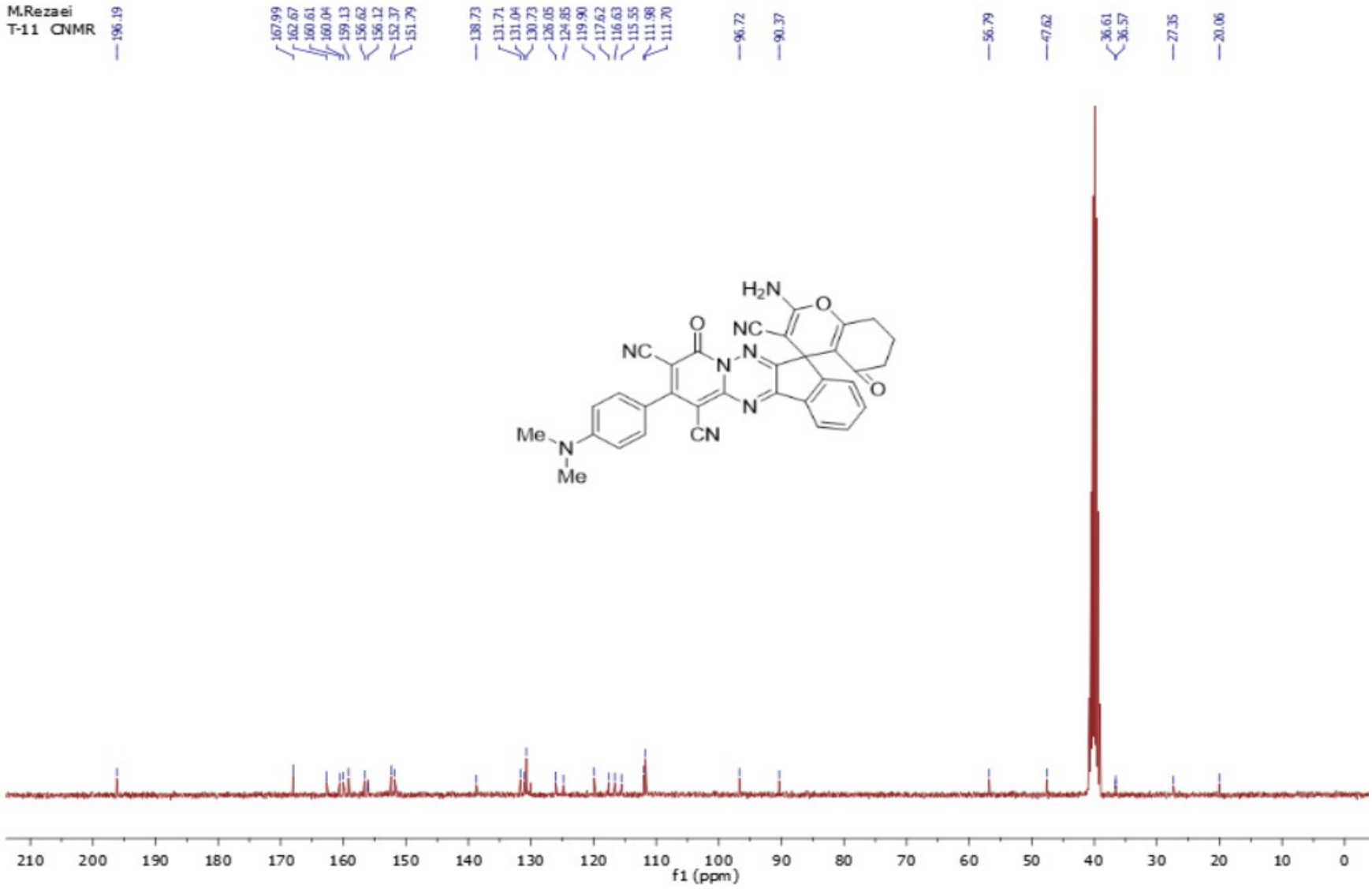
^{13}C NMR of 6k


Transmittance [%]
100
90
80
70
60
50
40
30
3339.68
2226.82
1683.30
1641.15
1598.77
1511.78
1464.61
1388.23
1264.07
1206.66
1145.46
1022.69
857.15
767.21
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
H2N
O
Me
NC
O
N
O
NC
N
N
O
Me
Me
O
N
Me
O
CN

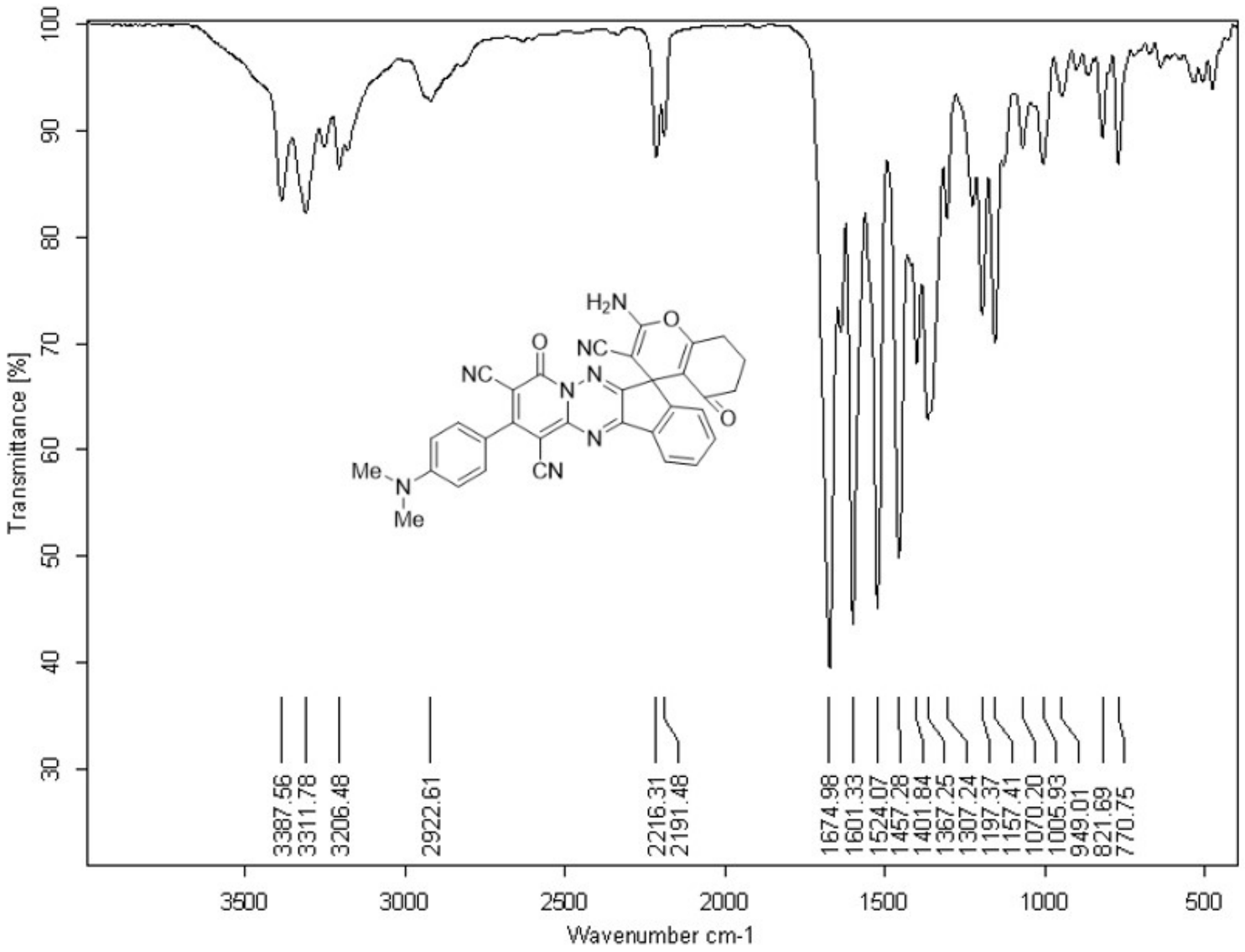
IR of 6k


M.Rezaei
T-11 HNMR
8.18
8.16
7.94
7.92
7.89
7.79
7.75
7.72
7.69
7.67
7.52
7.49
6.90
6.87
3.33
3.03
2.81
2.78
2.49
2.21
2.19
2.17
1.95
1.93
1.91
H2N
O
NC
O
NC
N
N
N
O
Me
N
Me
CN
1.00
1.39
0.73
3.96
2.06
2.06
7.84
2.06
2.41
2.39
0.0
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
f1 (ppm)

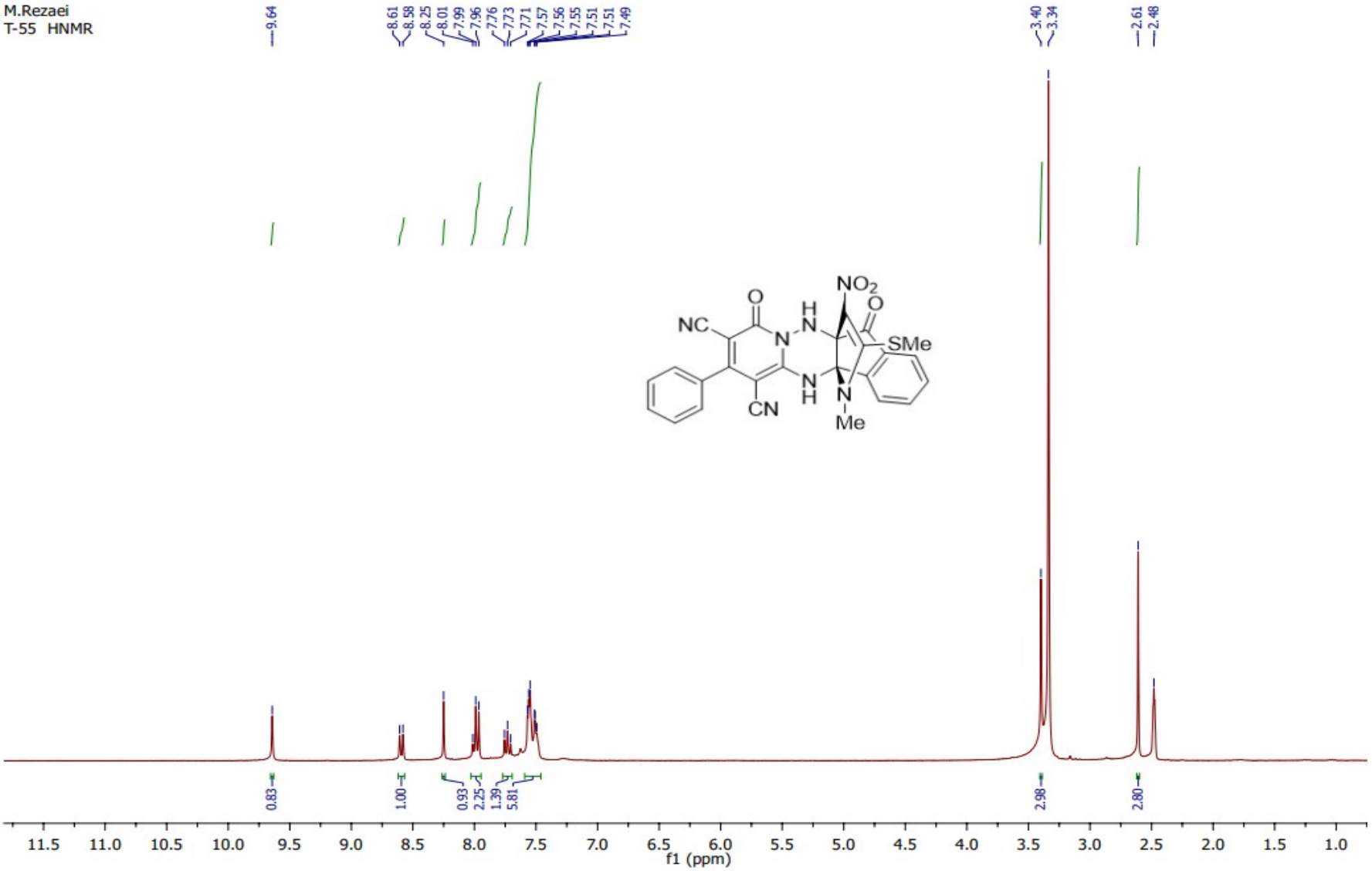
^{1}H NMR of 6l


M.Rezaei
T-11 CNMR
196.19
167.99
162.67
160.61
160.04
159.13
156.62
156.12
152.37
151.79
138.73
131.71
131.04
130.73
126.05
124.85
119.90
117.62
116.63
115.55
111.98
111.70
96.72
90.37
56.79
47.62
36.61
36.57
27.35
20.06
H2N
O
NC
O
NC
N
N
O
N
CN
Me
N
Me
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

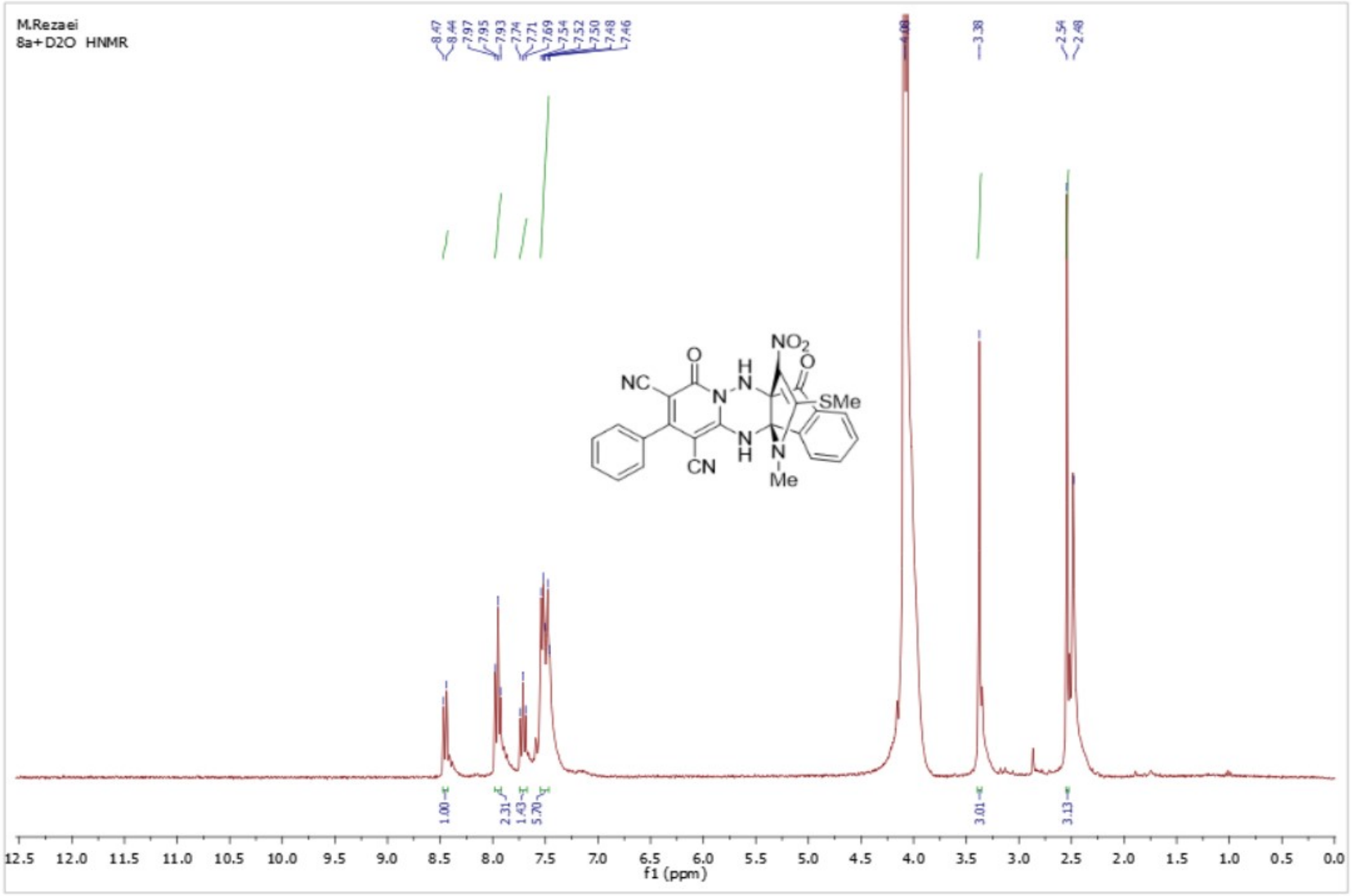
^{13}C NMR of 6l


Transmittance [%]
100
90
80
70
60
50
40
30
3387.56
3311.78
3206.48
2922.61
2216.31
2191.48
1674.98
1601.33
1524.07
1457.28
1401.84
1367.25
1307.24
1197.37
1157.41
1070.20
1005.93
949.01
821.69
770.75
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
H2N
O
NC
O
NC
N
N
O
N
CN
Me
N
Me

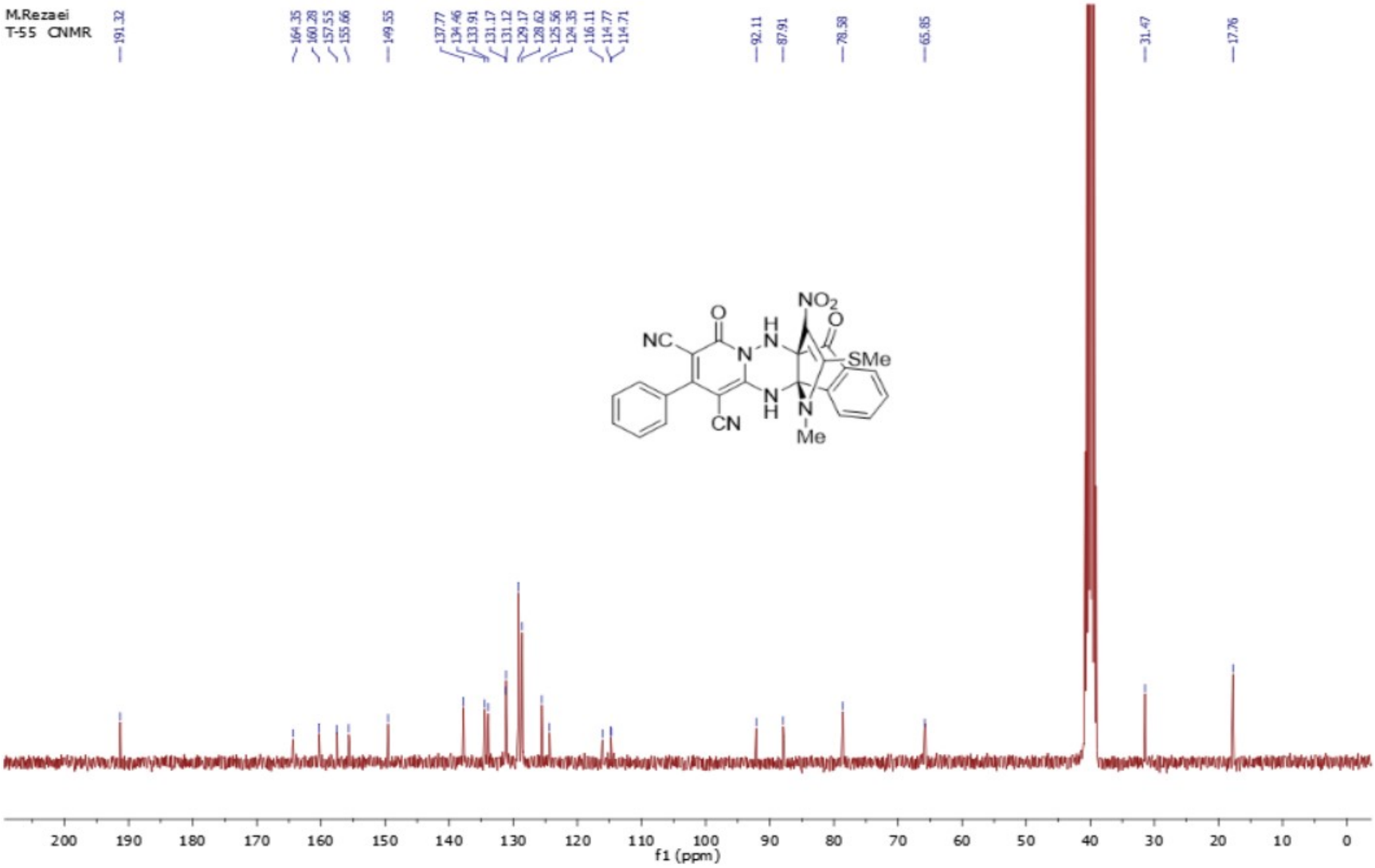
IR of 6l


M.Rezaei
T-55 HNMR
9.64
8.61
8.58
8.25
8.01
7.99
7.96
7.76
7.73
7.71
7.57
7.56
7.55
7.51
7.51
7.49
3.40
3.34
2.61
2.48
NC
O
H
N
N
NO2
O
SMe
N
H
N
CN
Me
0.83
1.00
0.93
2.25
1.39
5.81
2.98
2.80
11.5
11.0
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
f1 (ppm)

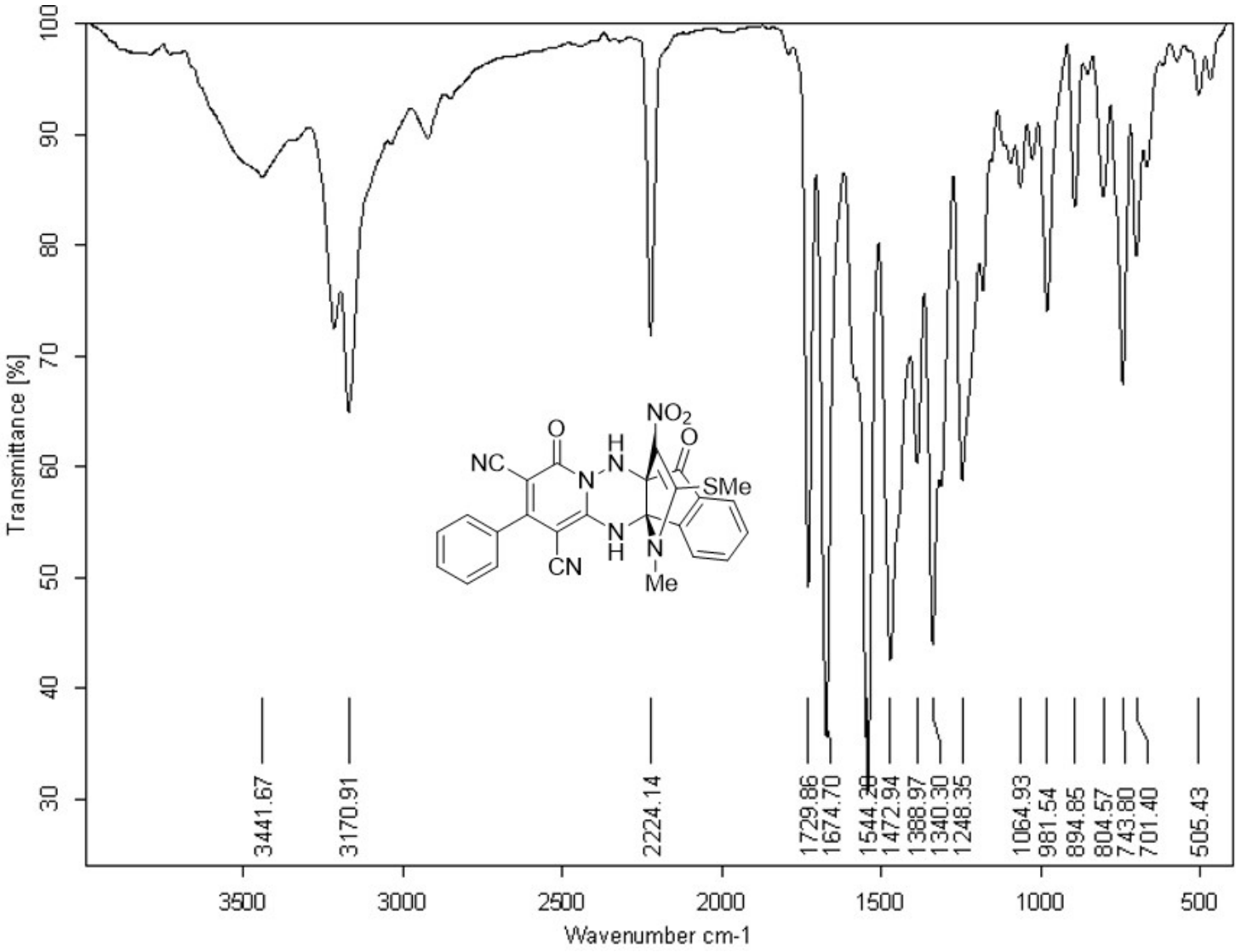
^{1}H NMR of 8a



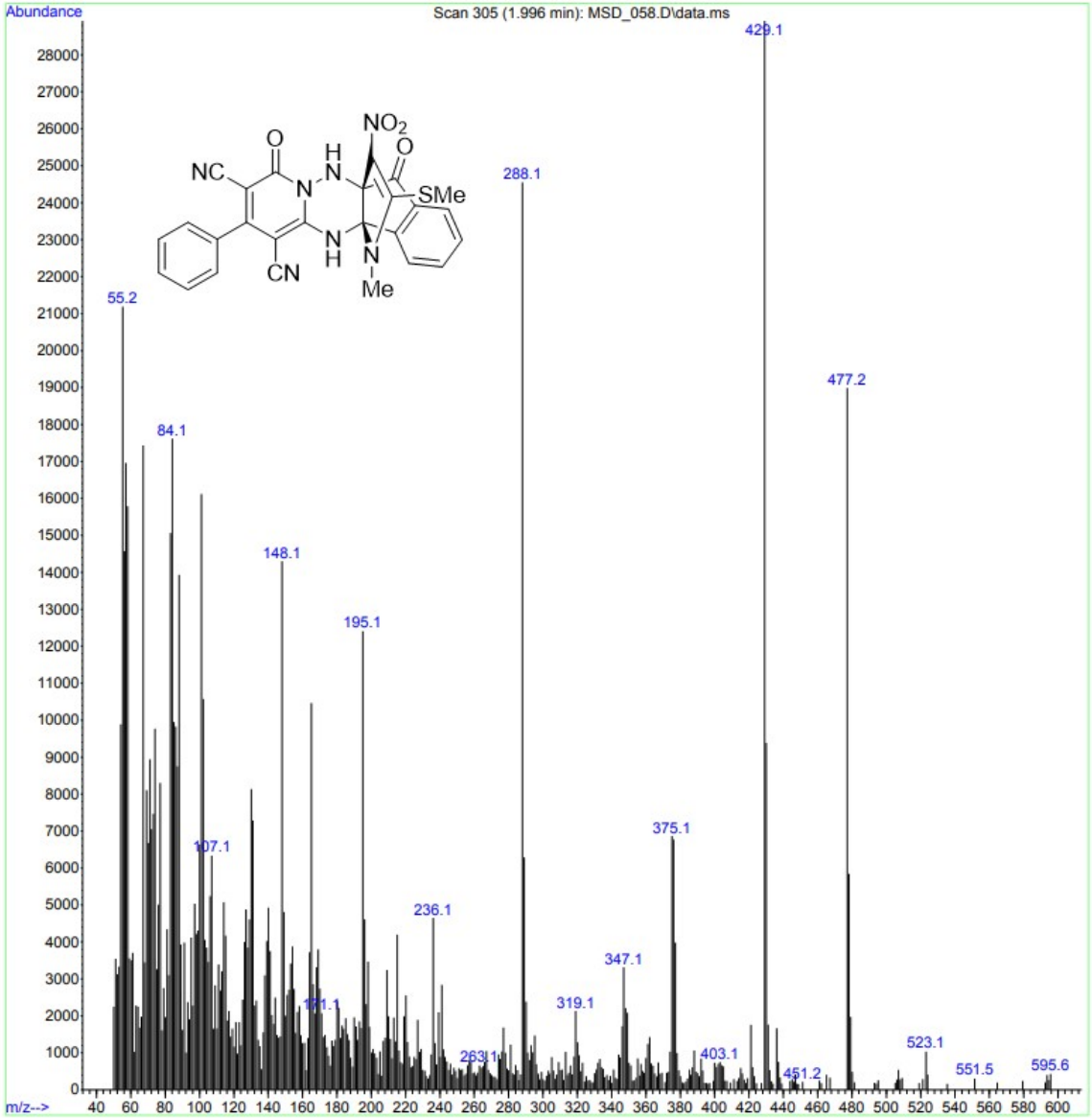
^{1}H NMR of 8a (D_2O exchangeable)


M.Rezaei
T-55 CNMR
191.32
164.35
160.28
157.55
155.66
149.55
137.77
134.46
133.91
131.17
131.12
129.17
128.62
125.56
124.35
116.11
114.77
114.71
92.11
87.91
78.58
65.85
31.47
17.76
NC
O
N
H
N
NO2
O
SMe
N
H
N
CN
Me
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

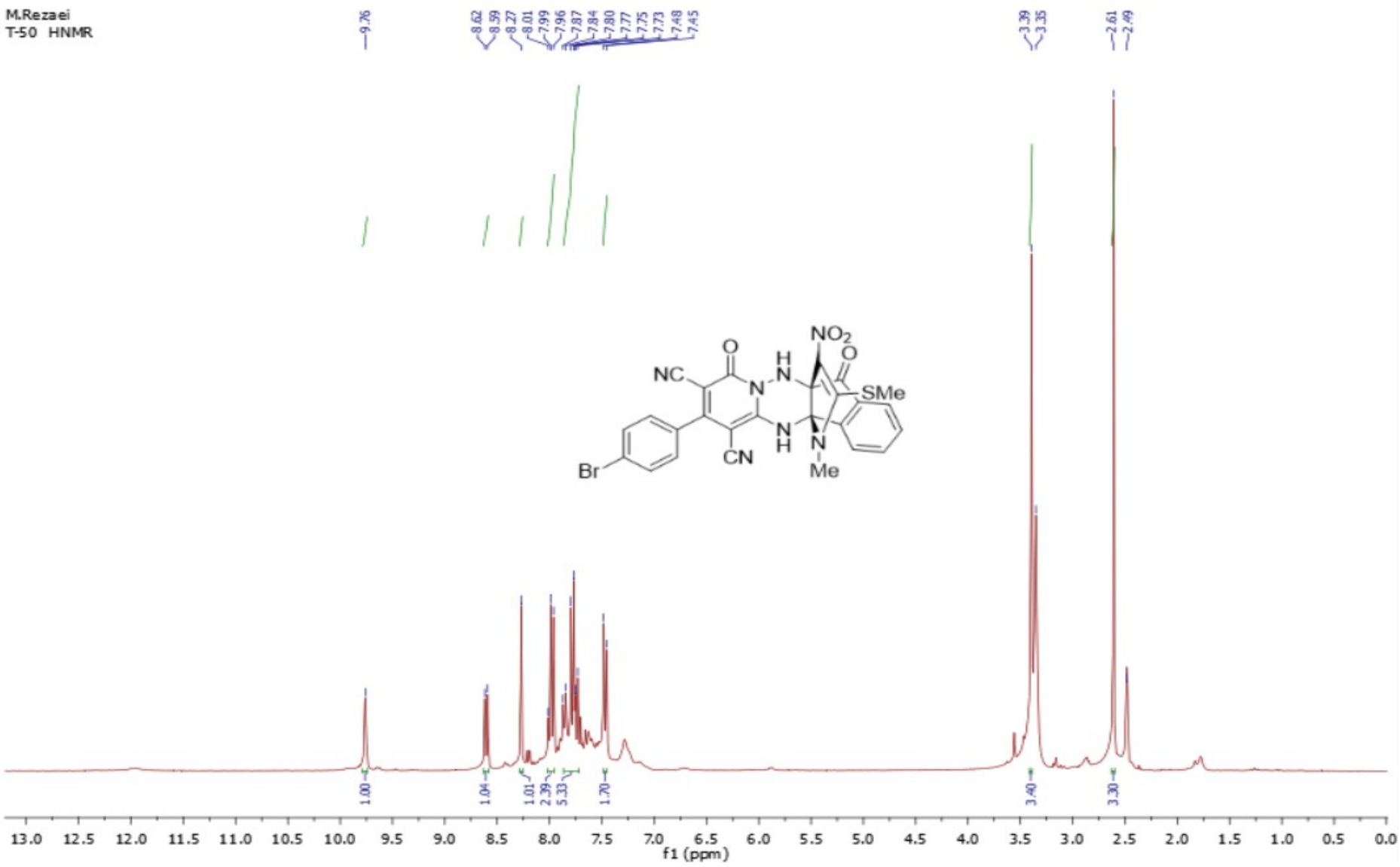
^{13}C NMR of 8a


Transmittance [%]
100
90
80
70
60
50
40
30
3441.67
3170.91
2224.14
1729.86
1674.70
1544.20
1472.94
1388.97
1340.30
1248.35
1064.93
981.54
894.85
804.57
743.80
701.40
505.43
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
NC
O
N
H
N
NO2
O
SMe
CN
N
Me

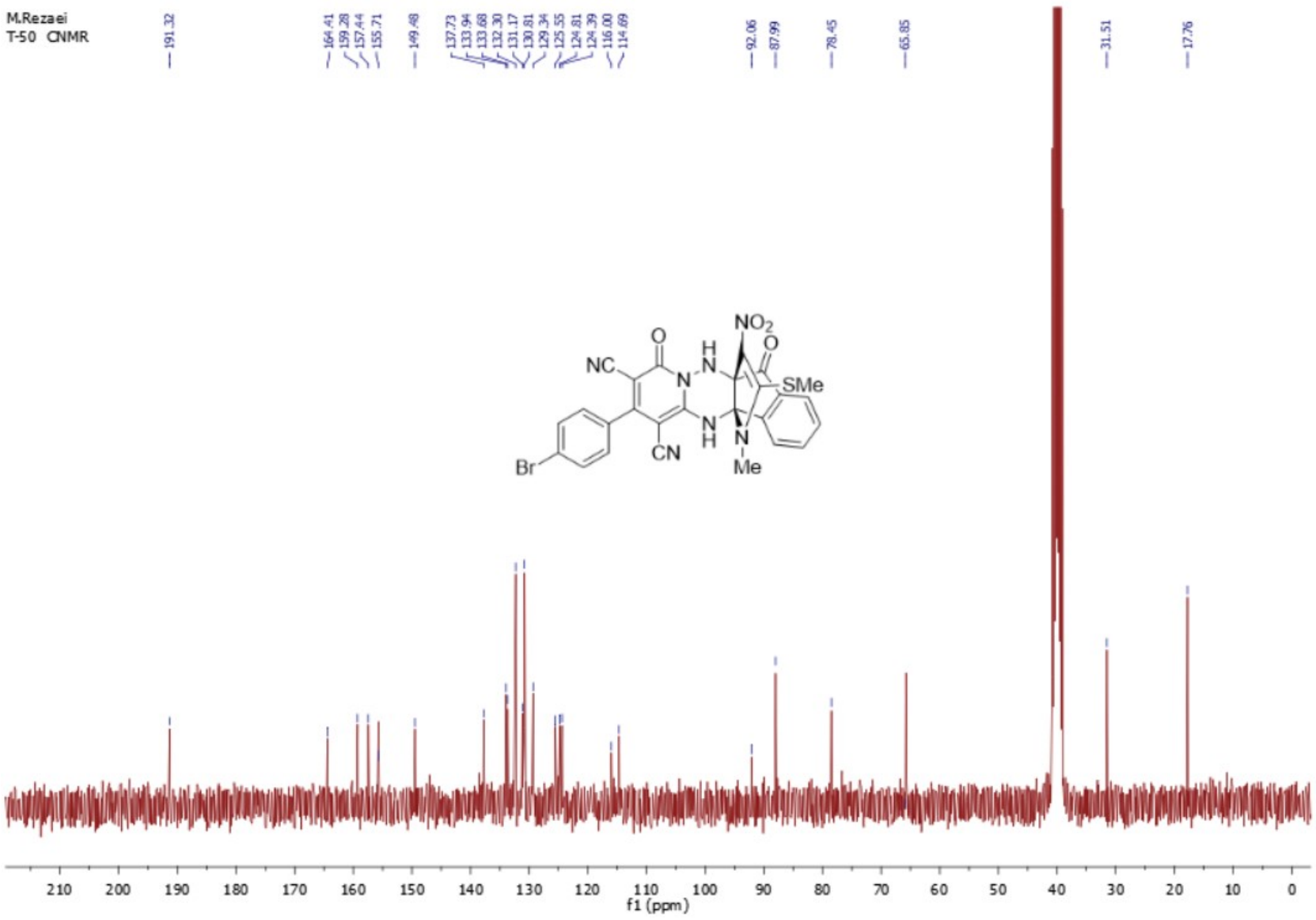
IR of 8a


Abundance
Scan 305 (1.996 min): MSD_058.D\data.ms
m/z-->
NC
O
H
N
N
NO2
O
SMe
N
H
N
CN
Me
55.2
84.1
107.1
148.1
195.1
236.1
263.1
288.1
319.1
347.1
375.1
403.1
429.1
451.2
477.2
523.1
551.5
595.6

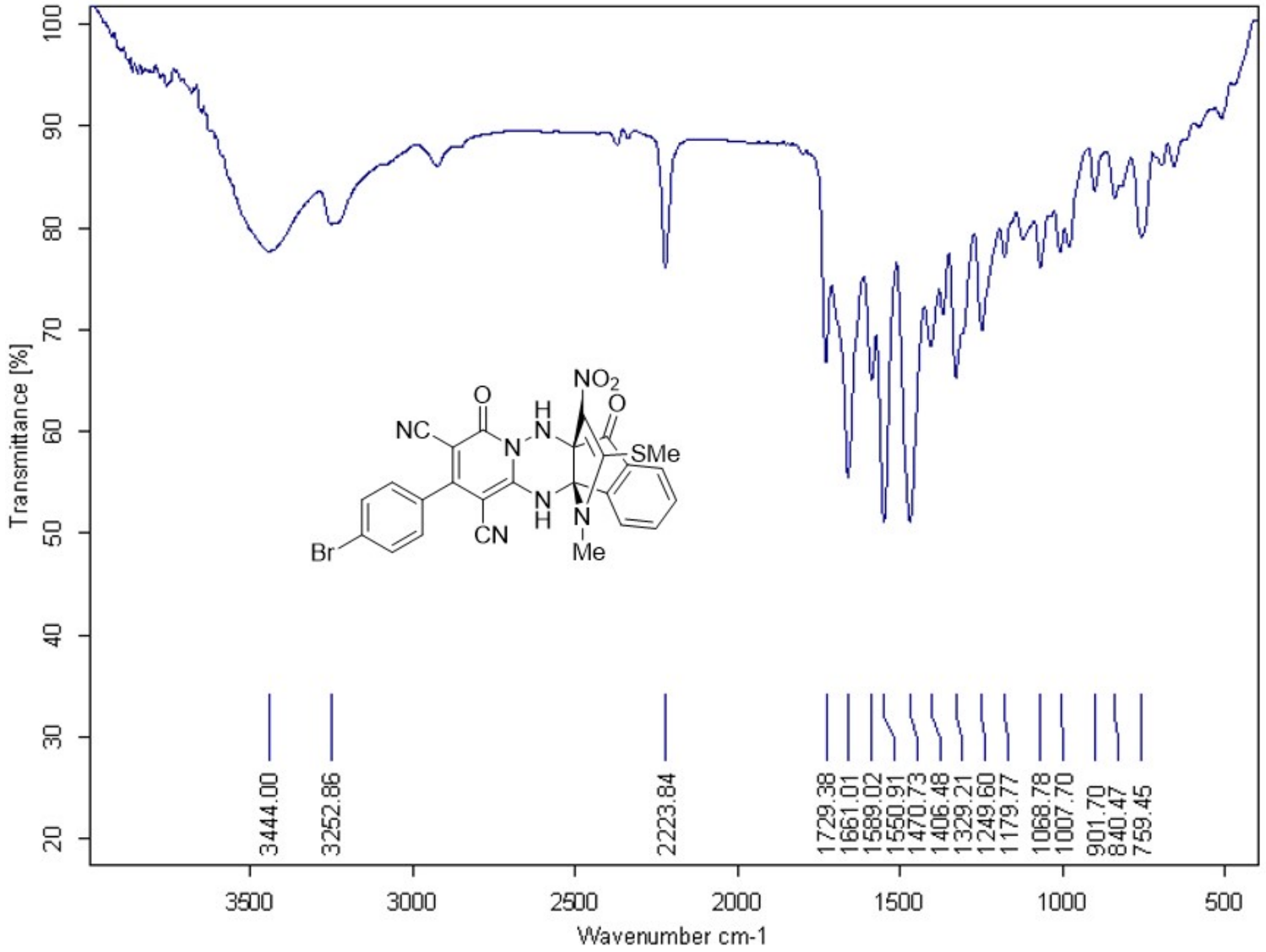
MS of 8a


M.Rezaei
T-50 HNMR
9.76
8.62
8.59
8.27
8.01
7.99
7.96
7.87
7.84
7.80
7.77
7.75
7.73
7.48
7.45
3.39
3.35
2.61
2.49
NC
O
H
N
N
NO2
O
SMe
N
H
N
Me
CN
Br
1.00
1.04
1.01
2.39
5.33
1.70
3.40
3.30
13.0
12.5
12.0
11.5
11.0
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)

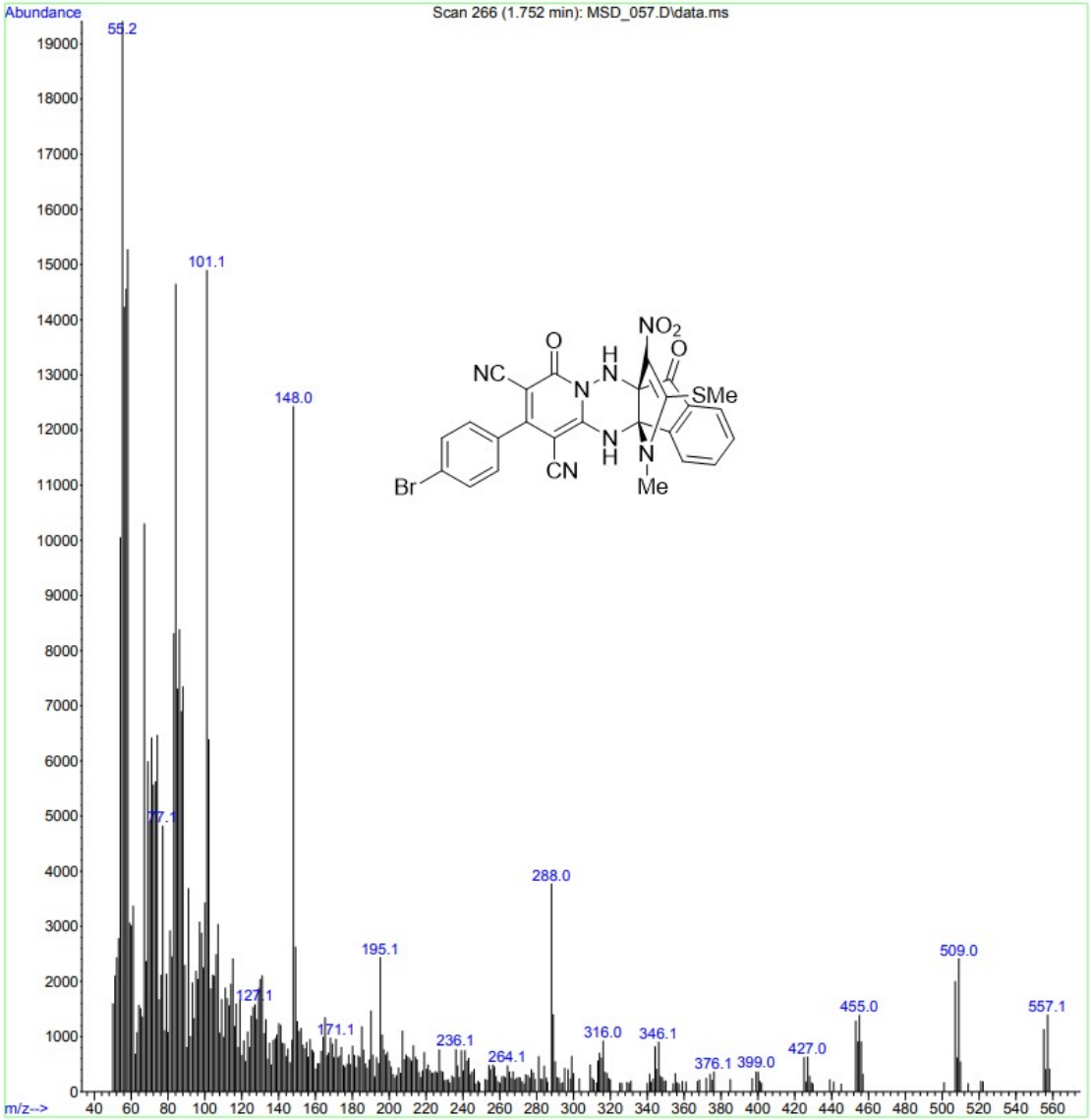
^{1}H NMR of 8b


M.Rezaei
T-50 CNMR
191.32
164.41
159.28
157.44
155.71
149.48
137.73
133.94
133.68
132.30
131.17
130.81
129.34
125.55
124.81
124.39
116.00
114.69
92.06
87.99
78.45
65.85
31.51
17.76
NO2
O
O
NC
H
N
N
N
SMe
H
N
CN
Br
Me
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

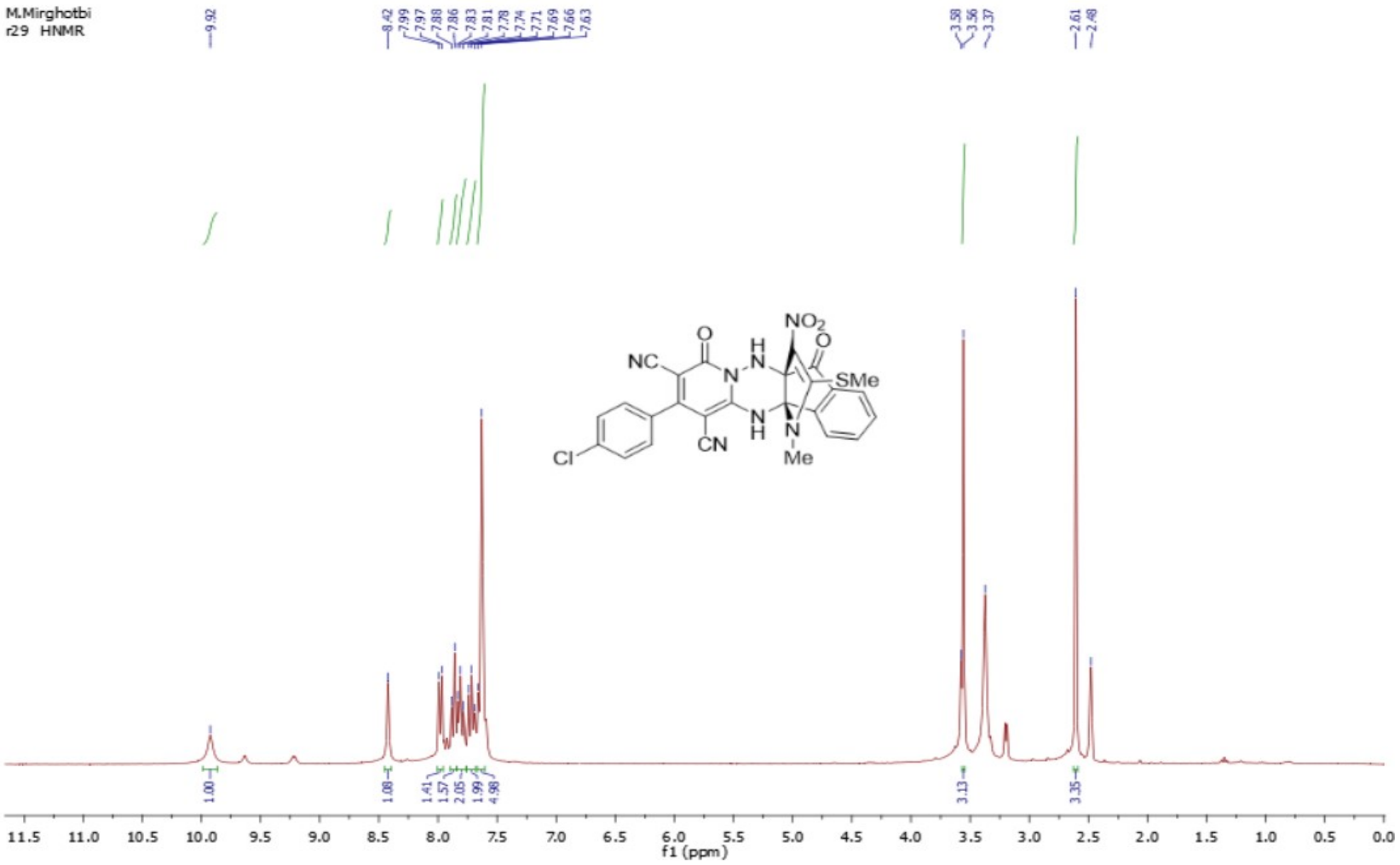
^{13}C NMR of 8b


Transmittance [%]
100
90
80
70
60
50
40
30
20
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
3444.00
3252.86
2223.84
1729.38
1661.01
1589.02
1550.91
1470.73
1406.48
1329.21
1249.60
1179.77
1068.78
1007.70
901.70
840.47
759.45
NC
O
N
H
N
NO2
O
SMe
Br
CN
H
N
Me

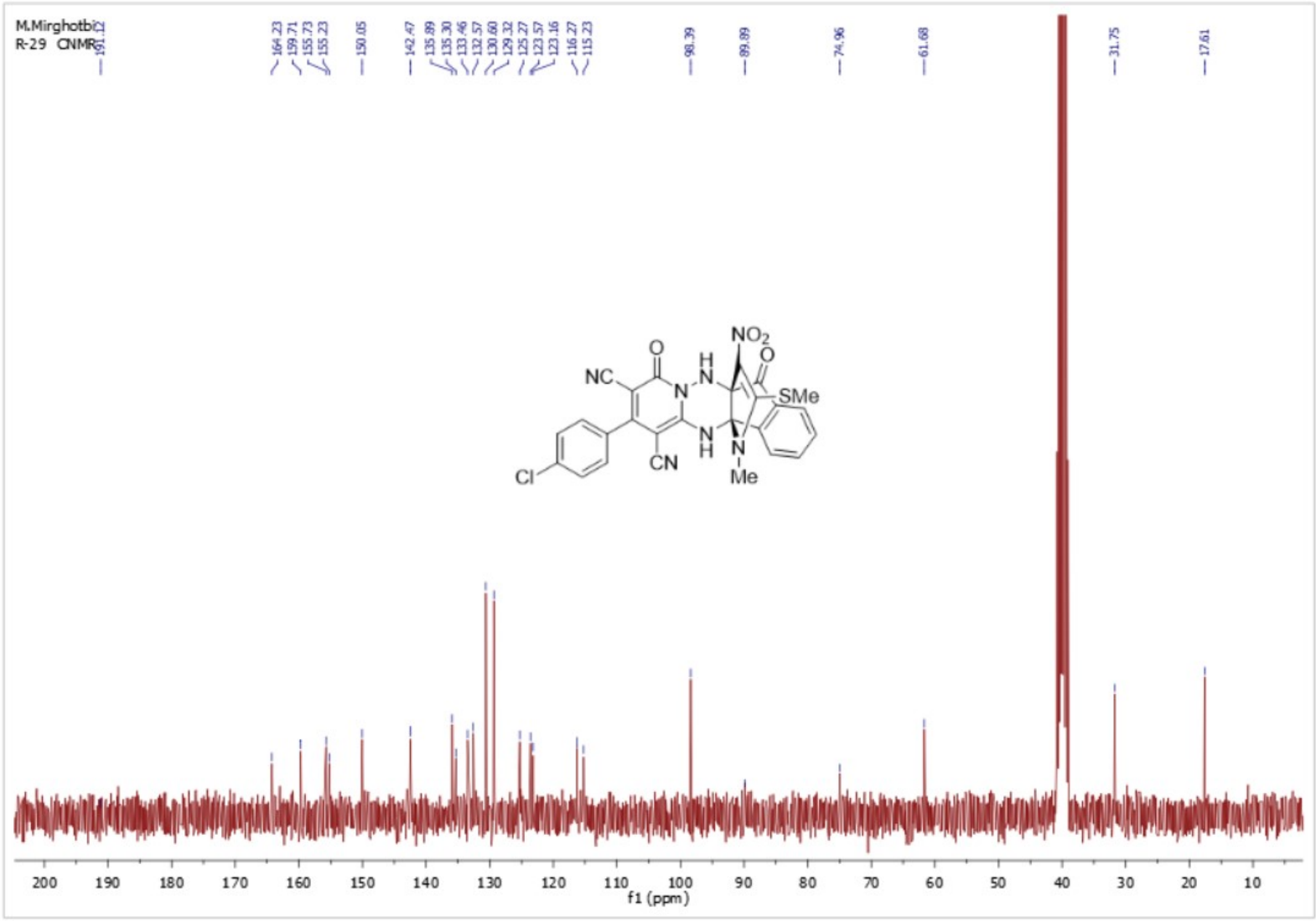
IR of 8b


Abundance
Scan 266 (1.752 min): MSD_057.D\data.ms
55.2
101.1
148.0
77.1
127.1
171.1
195.1
236.1
264.1
288.0
316.0
346.1
376.1
399.0
427.0
455.0
509.0
557.1
m/z-->
NC
O
H
N
N
NO2
O
SMe
N
H
N
CN
Me
Br

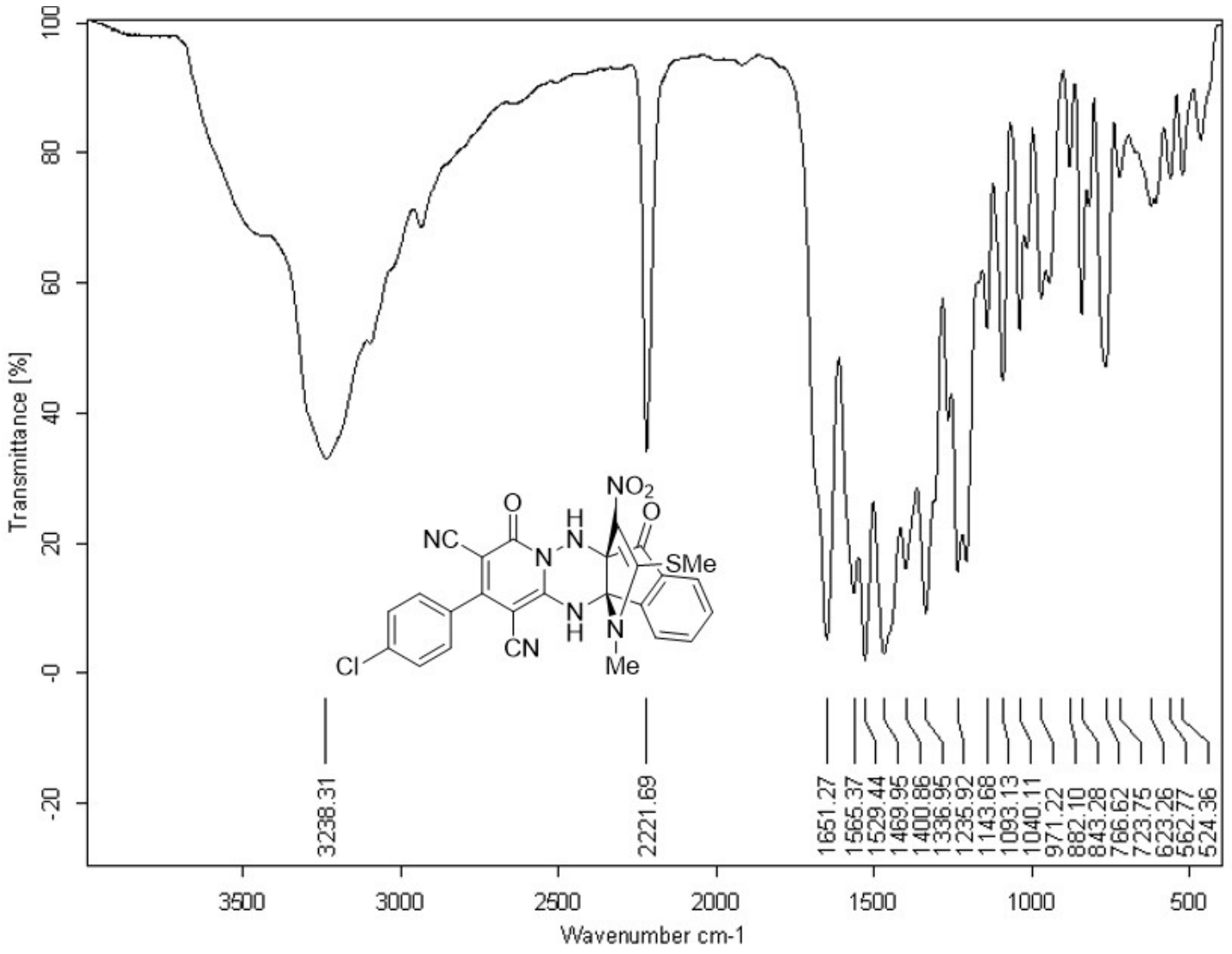
MS of 8b


M.Mirghotbi
r29 HNMR
9.92
8.42
7.99
7.97
7.88
7.86
7.83
7.81
7.78
7.74
7.71
7.69
7.66
7.63
3.58
3.56
3.37
2.61
2.48
NC
O
H
N
N
NO2
O
SMe
Cl
CN
N
H
N
Me
1.00
1.08
1.41
1.57
2.05
1.99
4.98
3.13
3.35
11.5
11.0
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)

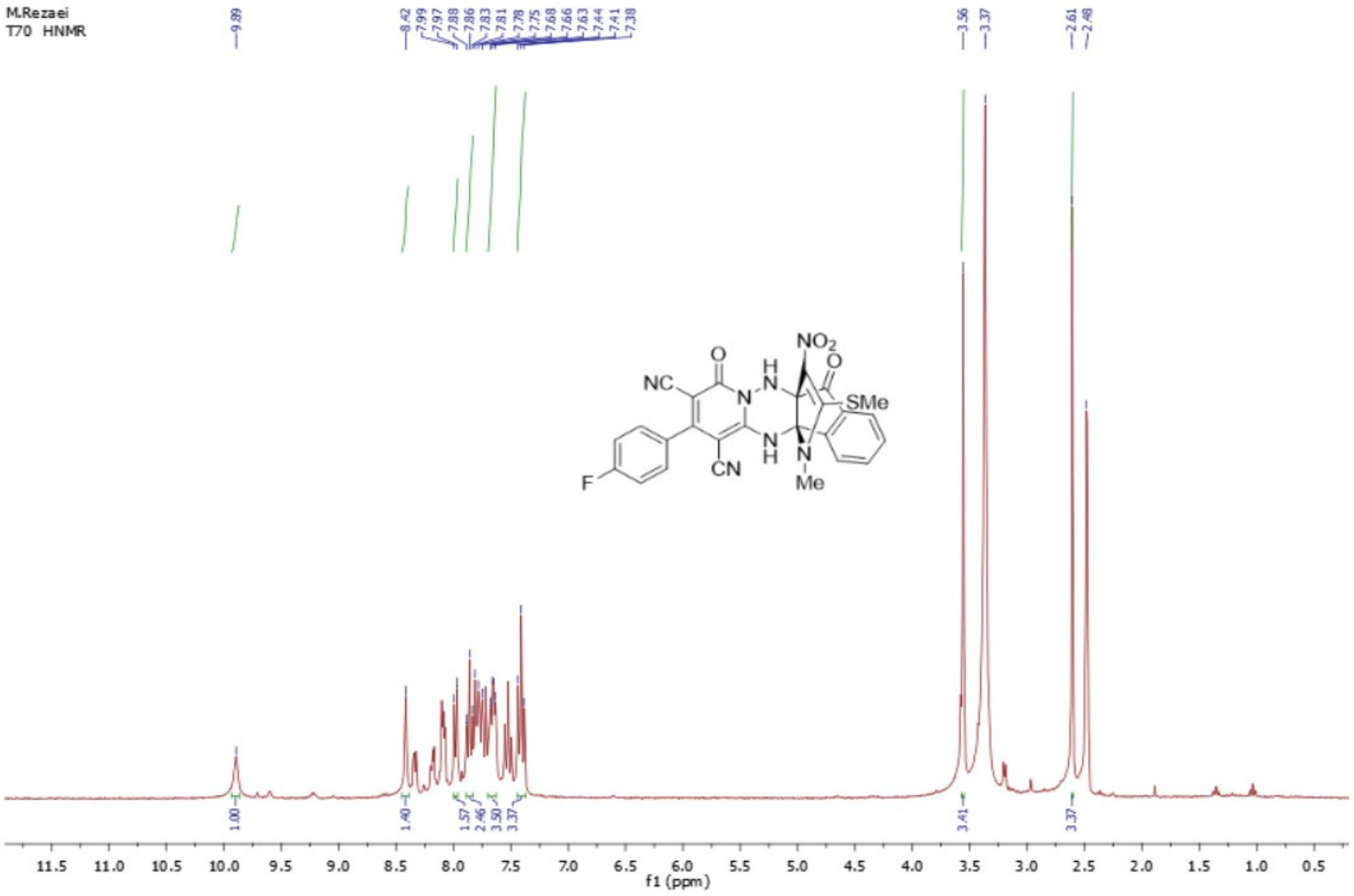
^{1}H NMR of 8c


M.Mirghotbi
R-29 CNMR
164.23
159.71
155.73
155.23
150.05
142.47
135.89
135.30
133.46
132.57
130.60
129.32
125.27
123.57
123.16
116.27
115.23
98.39
89.89
74.96
61.68
31.75
17.61
NC
O
N
H
N
NO2
O
SMe
N
H
N
Me
CN
Cl
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

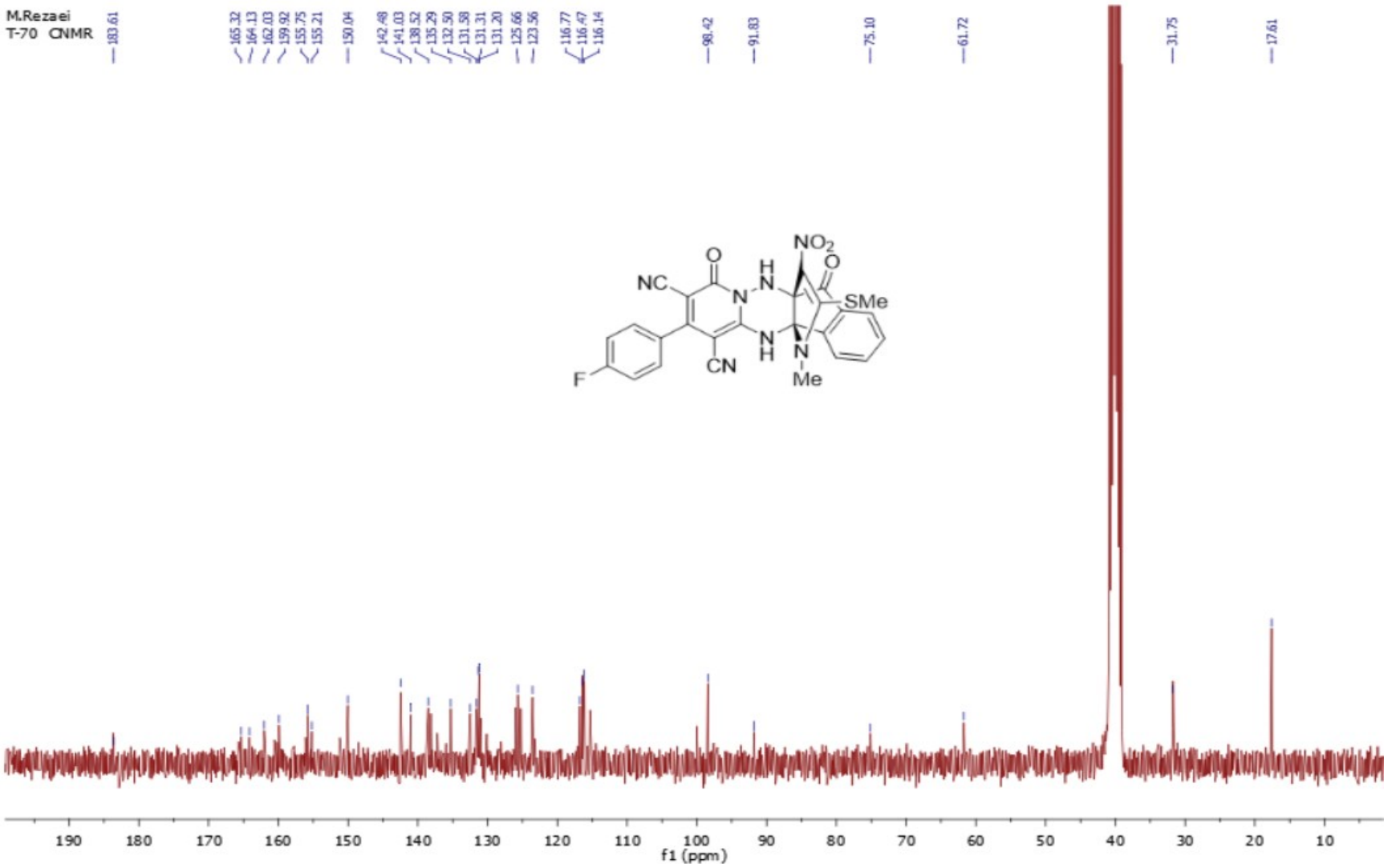
^{13}C NMR of 8c


Transmittance [%]
100
80
60
40
20
-0
-20
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
3238.31
2221.69
1651.27
1565.37
1529.44
1469.95
1400.86
1336.95
1235.92
1143.68
1093.13
1040.11
971.22
882.10
843.28
766.62
723.75
623.26
562.77
524.36
NC
O
H
N
N
NO2
O
SMe
N
Me
N
H
CN
Cl

IR of 8c


M.Rezaei
T70 HNMR
9.89
8.42
7.99
7.97
7.88
7.86
7.83
7.81
7.78
7.75
7.68
7.66
7.63
7.44
7.41
7.38
3.56
3.37
2.61
2.48
NC
O
N
H
N
NO2
O
SMe
F
CN
N
Me
1.00
1.40
1.57
2.46
3.50
3.37
3.41
3.37
f1 (ppm)

^{1}H NMR of 8d


M.Rezaei
T-70 CNMR
183.61
165.32
164.13
162.03
159.92
155.75
155.21
150.04
142.48
141.03
138.52
135.29
132.50
131.58
131.31
131.20
125.66
123.56
116.77
116.47
116.14
98.42
91.83
75.10
61.72
31.75
17.61
NC
O
N
H
N
NO2
O
SMe
N
H
N
Me
CN
F
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

^{13}C NMR of 8d