SUPPORTING INFORMATION

Acyclonucleosides Bearing Coplanar Arylethynyltriazole Nucleobases: Synthesis, Structural Analysis and Biological Evaluation

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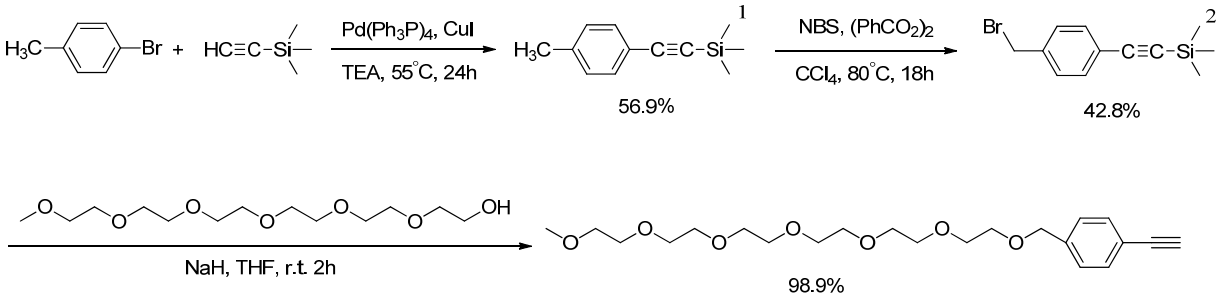
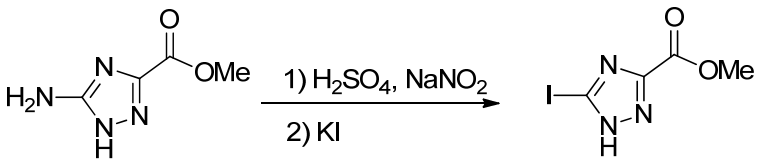
Scheme S1. Synthesis of 1-(4-ethynylphenyl)-2,5,8,11,14,17,20-heptaoxahenicosane



Scheme S2. Synthesis of 5-iodotriazole.



3 (29.3%)

X-ray crystallographic Data of Compound **1a**

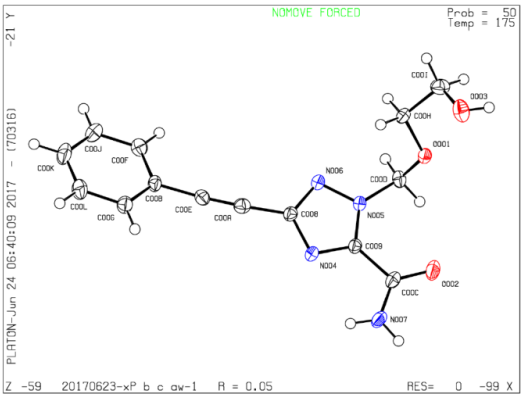


Figure. X-ray derived ORTEP representation of **1g**

Crystal data and structure refinement for 1a (CCDC: 1441262)

Empirical formula	$C_{14}H_{14}N_4O_3$
Formula weight	268.29
Temperature/K	175(2)
Crystal system	orthorhombic
Space group	Pbca
a/Å	11.4857(7)
b/Å	6.9956(4)
c/Å	33.950(3)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	2727.8(3)
Z	8
ρ_{calc}g/cm^3	1.394
μ/mm^{-1}	0.101
F(000)	1200.0
Crystal size/mm^3	0.5 × 0.25 × 0.15
2Θ range for data collection/°	6.924 to 52.744
Index ranges	$-13 \le h \le 14$, $-8 \le k \le 5$, $-18 \le l \le 42$
Reflections collected	7406
Independent reflections	2788[R(int) =0.0226]
Data/restraints/parameters	2788/0/199
Goodness-of-fit on F^2	1.165
Final R indexes [I>=2σ (I)]	R_1 = 0.0487, wR_2 = 0.1321
Final R indexes [all data]	R_1 = 0.0596, wR_2 = 0.1368
Largest diff. peak/hole / e Å^{-3}	0.37/-0.23

X-ray crystallographic Data of Compound **1g**

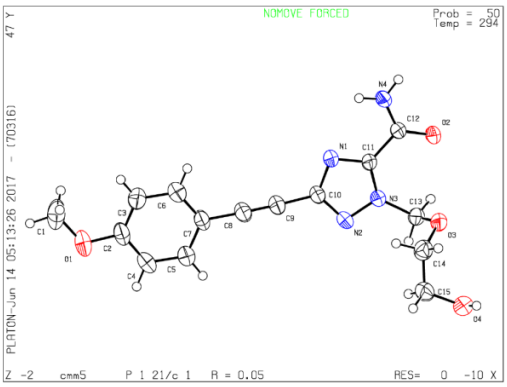


Figure. X-ray derived ORTEP representation of **1g**

Crystal data and structure refinement for 1g (CCDC: 1441261)

Empirical formula	$C_{15}H_{16}N_4O_4$
Formula weight	316.32
Temperature/K	293(2)
Crystal system	monoclinic
Space group	$P2_1/c$
a/Å	17.5680(9)
b/Å	9.9977(5)
c/Å	8.8328(5)
α/°	90
β/°	104.264(6)
γ/°	90
Volume/Å^3	1503.55(15)
Z	4
ρ_{calc}g/cm^3	1.397
μ/mm^{-1}	0.104
F(000)	664.0
Crystal size/mm^3	0.3 × 0.25 × 0.08
2Θ range for data collection/°	7.114 to 52.74
Index ranges	$-16 \le h \le 21$, $-12 \le k \le 12$, $-10 \le l \le 11$
Reflections collected	6130
Independent reflections	3071[R(int) =0.0229]
Data/restraints/parameters	3071/0/218
Goodness-of-fit on F^2	1.051
Final R indexes [I>=2σ (I)]	R_1 = 0.0518, wR_2 = 0.1228
Final R indexes [all data]	R_1 = 0.0803, wR_2 = 0.1418
Largest diff. peak/hole / e Å^{-3}	0.23/-0.18

X-ray crystallographic Data of Compound **1h**

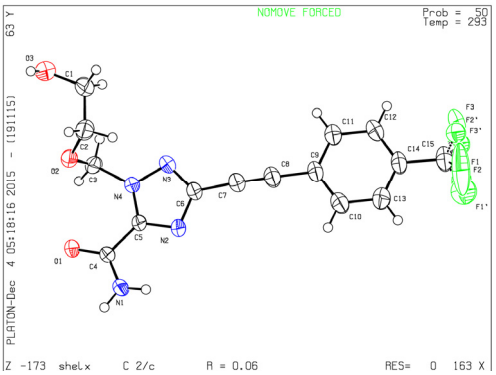
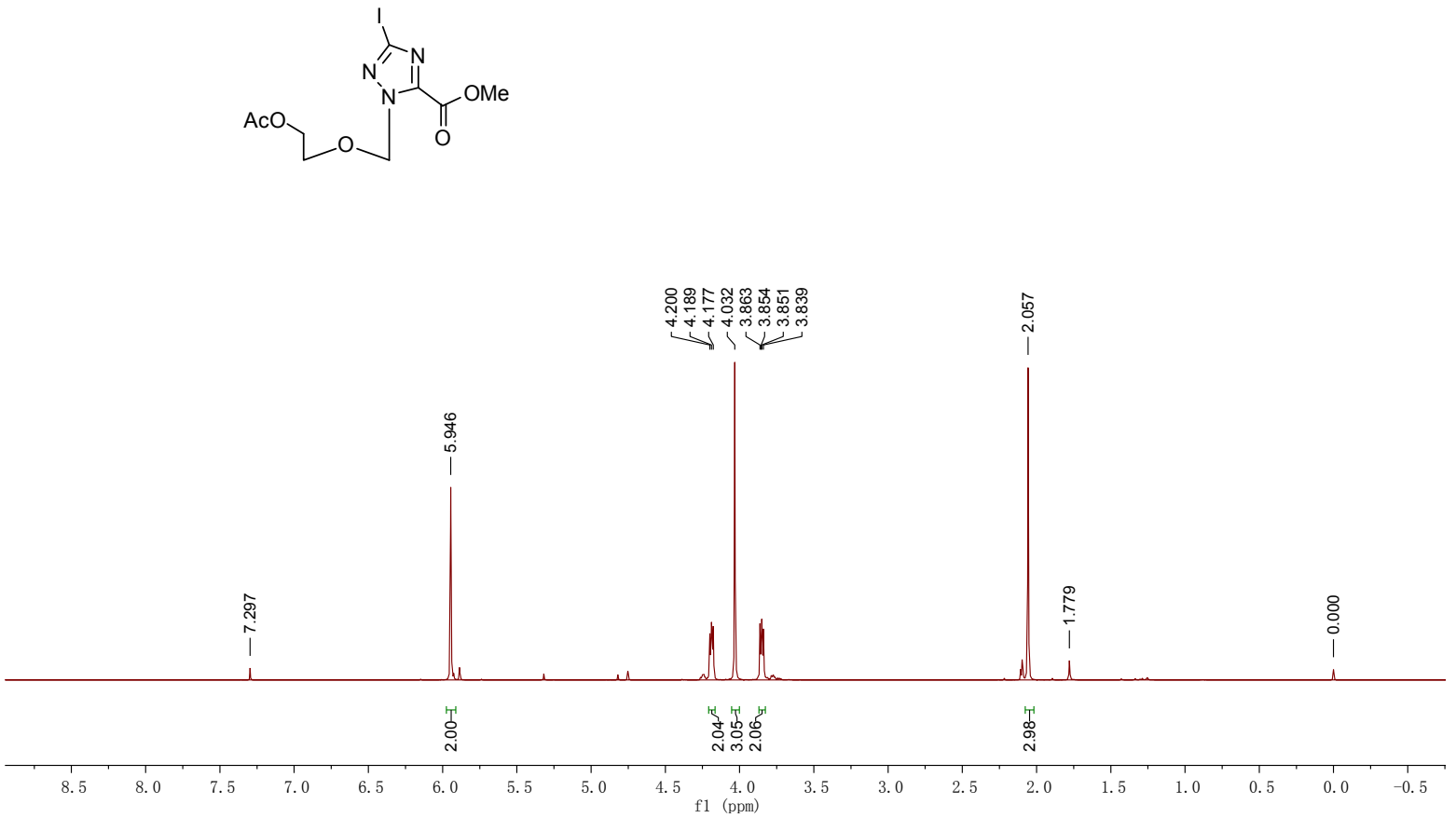


Figure. X-ray derived ORTEP representation of **1h**

Crystal data and structure refinement for 1h (CCDC: 1441152)

Empirical formula	$C_{15}H_{13}F_3N_4O_3$
Formula weight	354.29
Temperature/K	293(2)
Crystal system	monoclinic
Space group	C2/c
a/Å	35.076(3)
b/Å	10.0258(6)
c/Å	8.8087(5)
α/°	90
β/°	94.027(6)
γ/°	90
Volume/Å^3	3090.1(4)
Z	8
ρ_{calc}g/cm^3	1.523
μ/mm^{-1}	0.132
F(000)	1456.0
Crystal size/mm^3	0.3 × 0.3 × 0.2
2Θ range for data collection/°	6.924 to 57.98
Index ranges	$-45 \leq h \leq 44$, $-11 \leq k \leq 13$, $-11 \leq l \leq 6$
Reflections collected	6266
Independent reflections	3552[R(int) =0.0144]
Data/restraints/parameters	3552/0/240
Goodness-of-fit on F^2	1.083
Final R indexes [I>=2σ (I)]	R_1 = 0.0577, wR_2 = 0.1478
Final R indexes [all data]	R_1 = 0.0758, wR_2 = 0.1627
Largest diff. peak/hole / e Å^{-3}	0.37/-0.39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N
N
N
OMe
O
AcO
O
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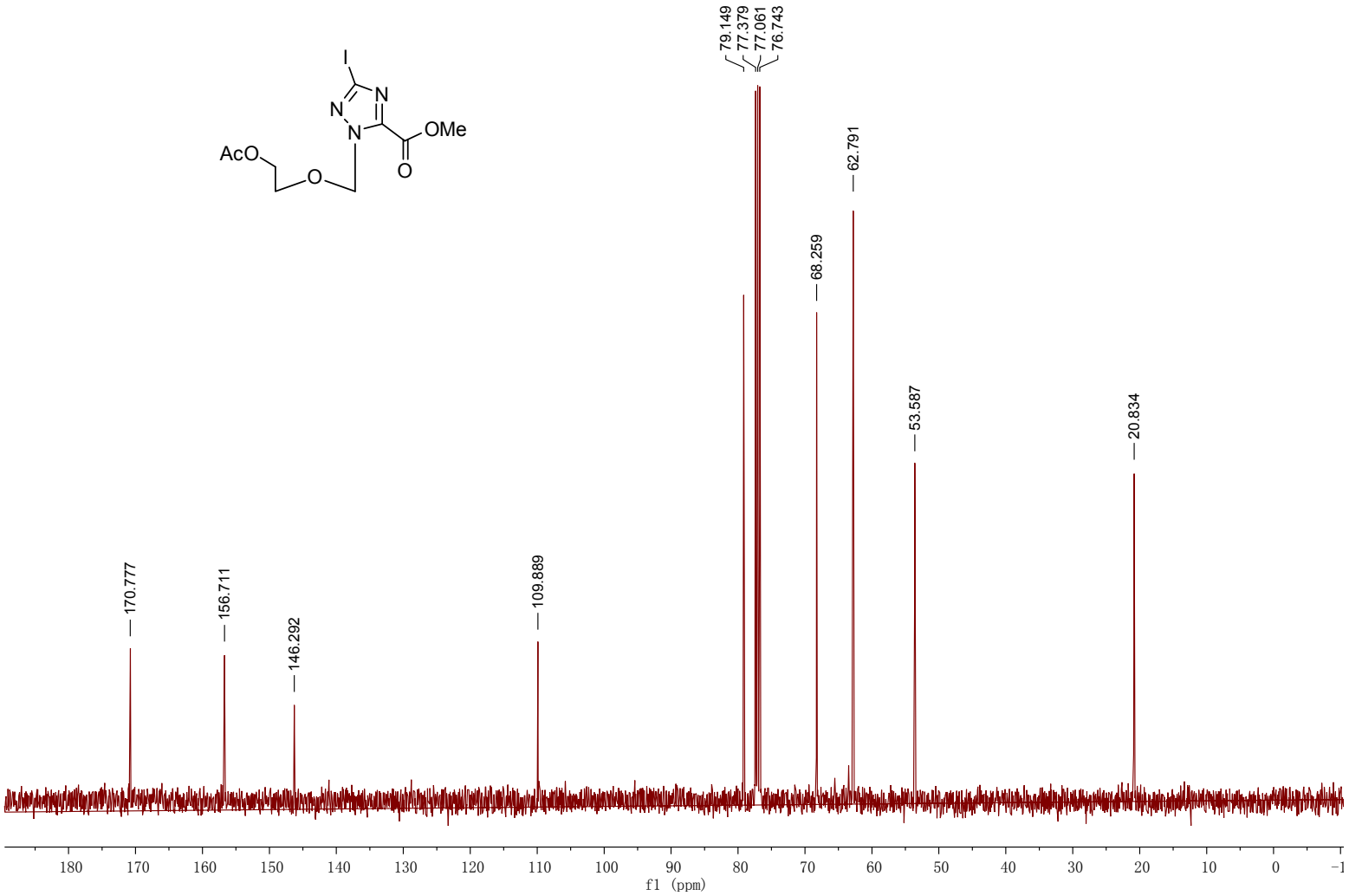
4.189
4.177
4.032
3.863
3.854
3.851
3.839
2.057
5.946
7.297
1.779
0.000
2.00
2.04
3.05
2.06
2.98
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)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N
N
OMe
O
AcO
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68.259
53.587
20.834
170.777
156.711
146.292
109.889
180
170
160
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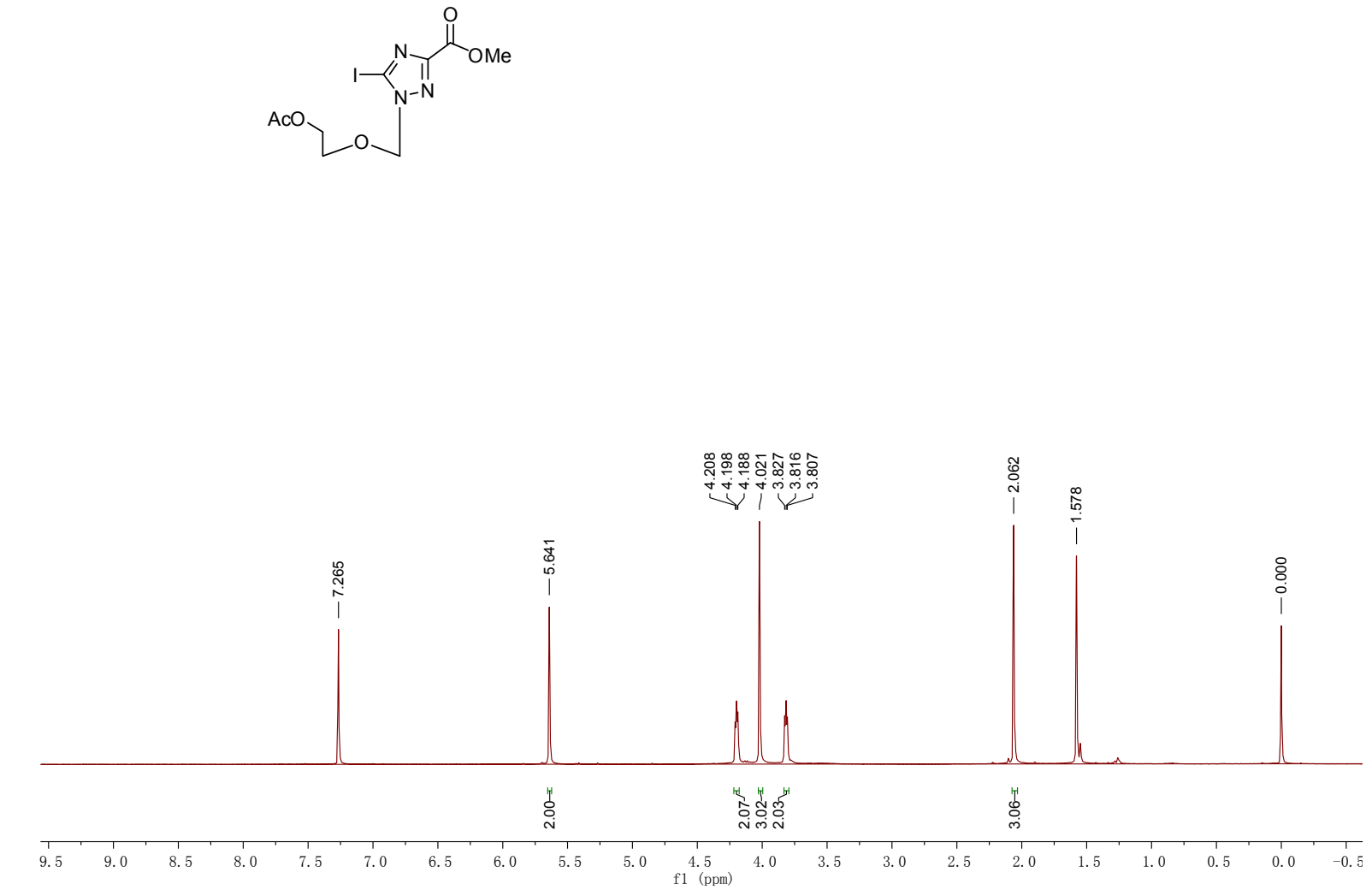
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−1
f1 (ppm)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N
I
N
N
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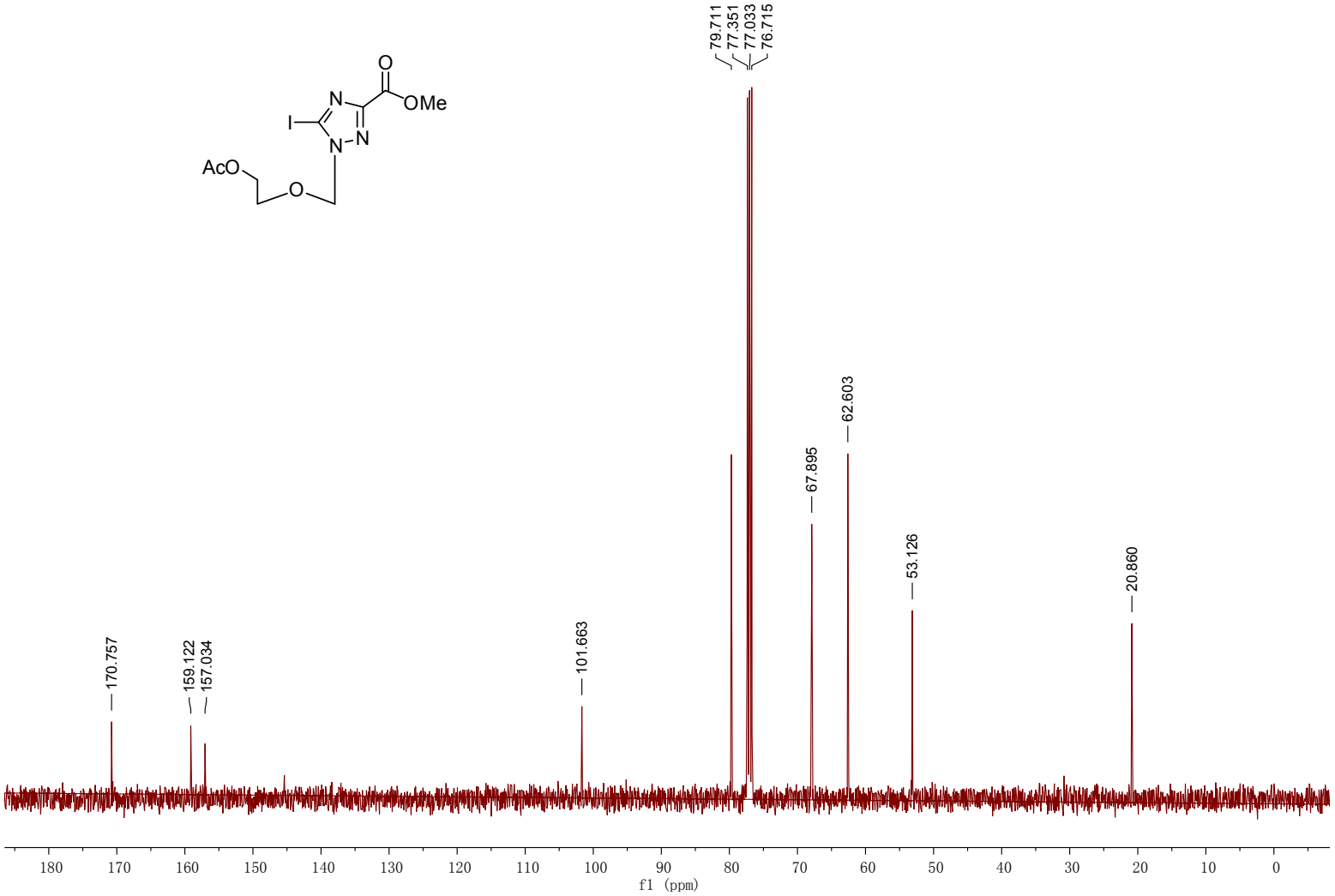
3.816
3.807
2.062
1.578
0.000
2.00
2.07
3.02
2.03
3.06
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


O
OMe
N
I
N
N
AcO
O
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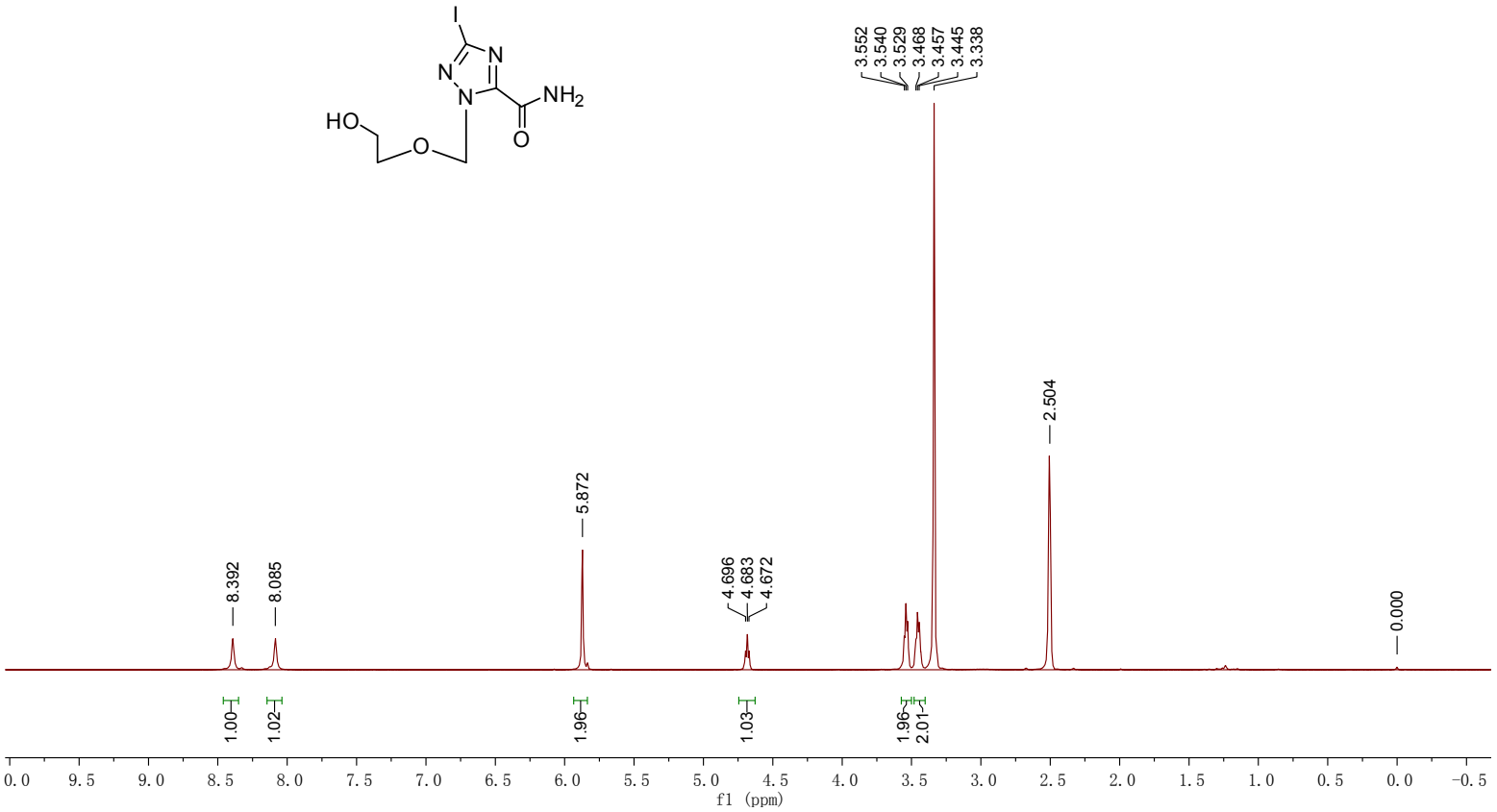
77.033
76.715
67.895
62.603
53.126
20.860
170.757
159.122
157.034
101.663
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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N
N
NH2
O
HO
O
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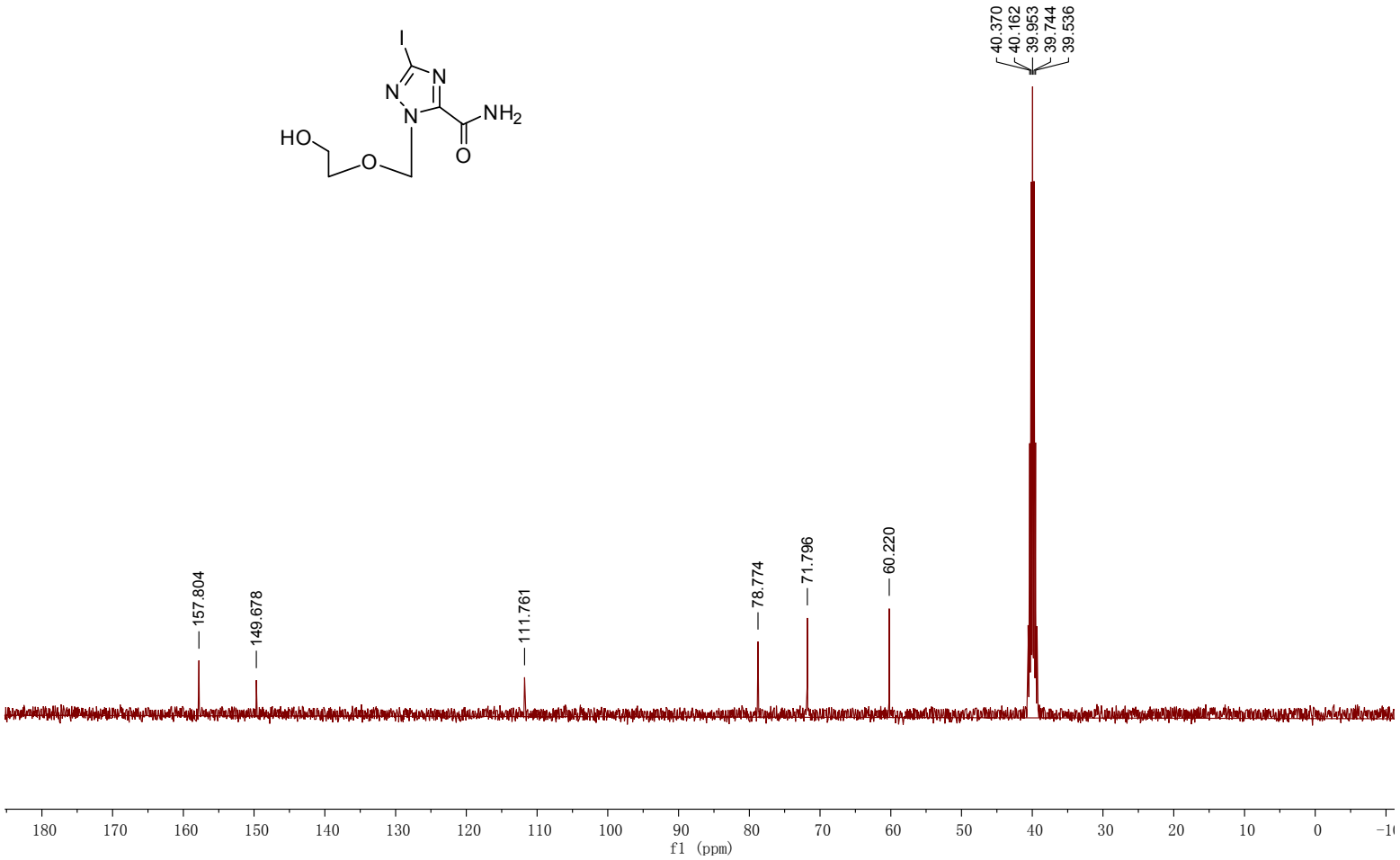
8.085
5.872
4.696
4.683
4.672
3.552
3.540
3.529
3.468
3.457
3.445
3.338
2.504
0.000
1.00
1.02
1.96
1.03
1.96
2.01
0.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)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N
N
N
NH2
O
HO
O
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39.953
39.744
39.536
157.804
149.678
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78.774
71.796
60.220
180
170
160
150
140
130
120
110
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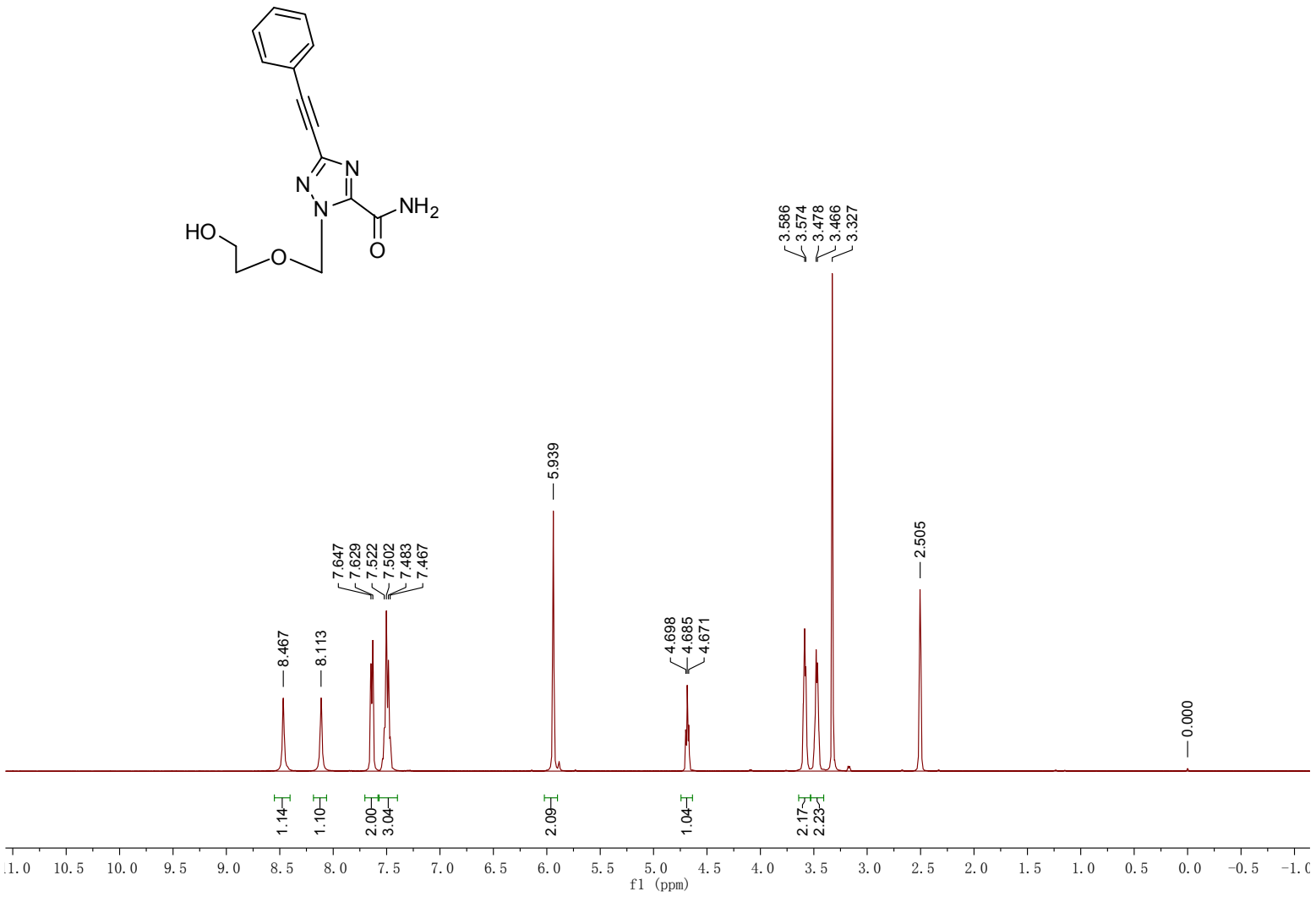
60
50
40
30
20
10
0
f1 (ppm)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N
N
N
O
NH2
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7.467
5.939
4.698
4.685
4.671
3.586
3.574
3.478
3.466
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1.10
2.00
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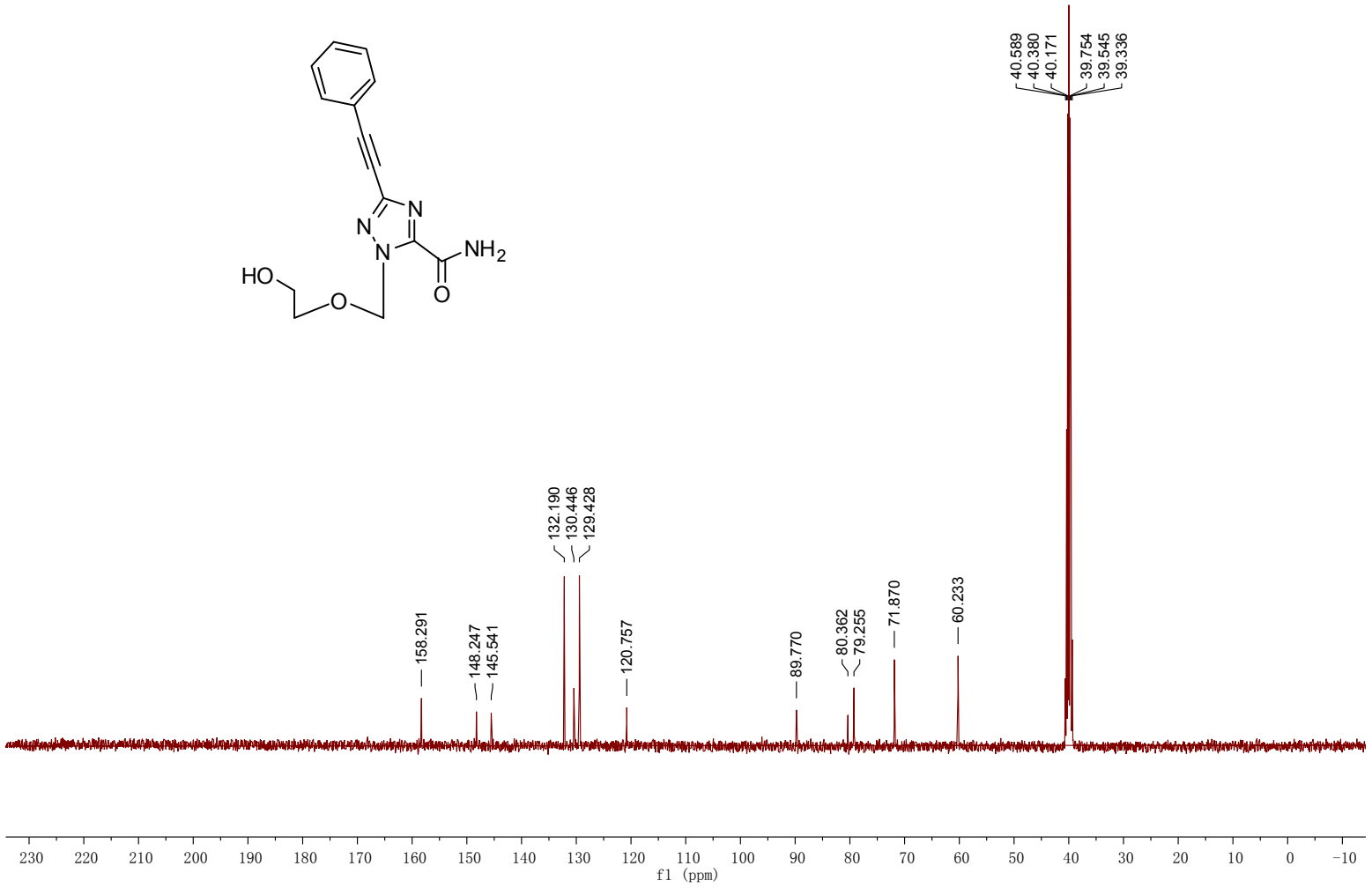
2.09
1.04
2.17
2.23
f1 (ppm)


HO
O
N
N
N
NH2
O
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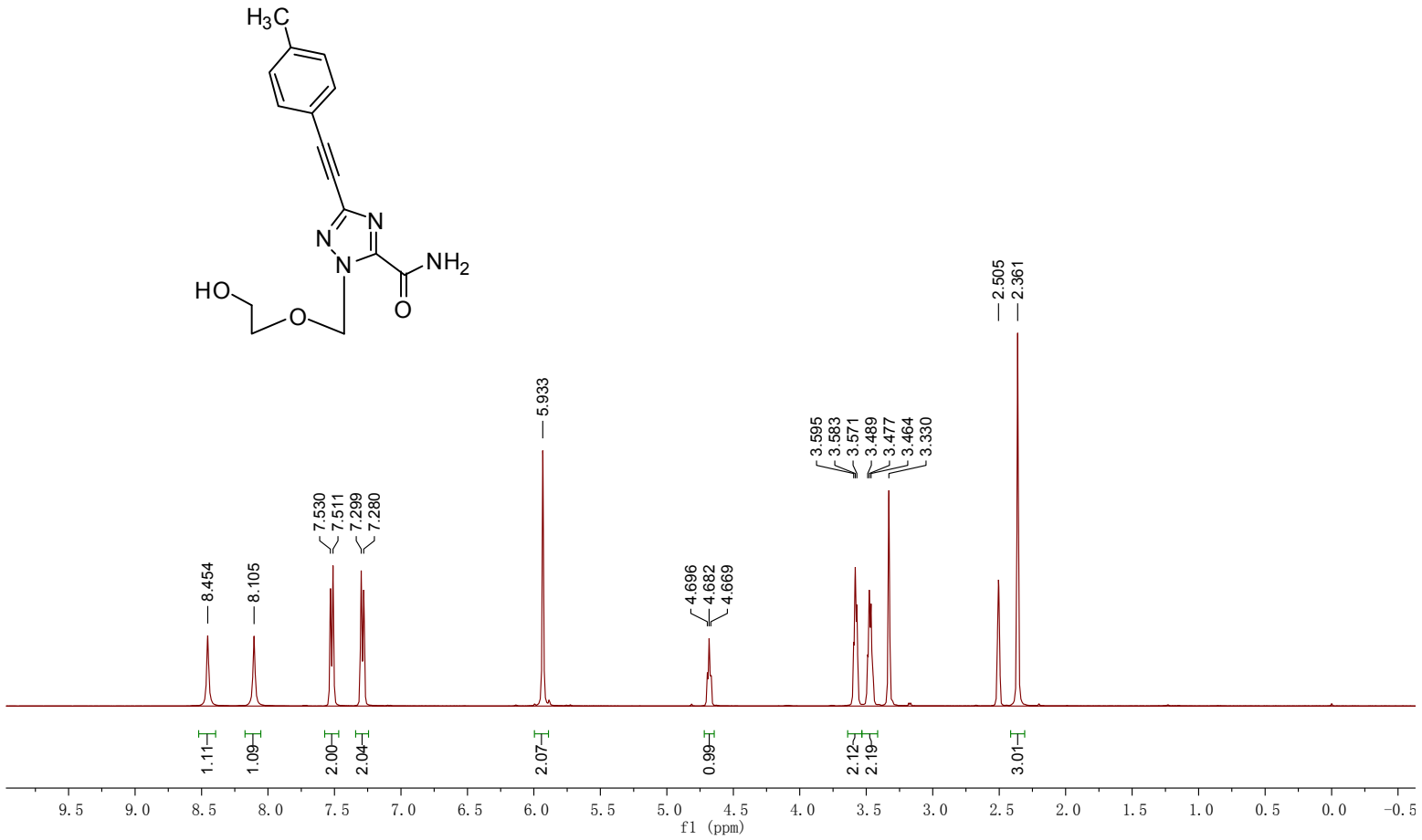
40.380
40.171
39.754
39.545
39.336
158.291
148.247
145.541
132.190
130.446
129.428
120.757
89.770
80.362
79.255
71.870
60.233
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


H3C
N
N
N
NH2
O
HO
O
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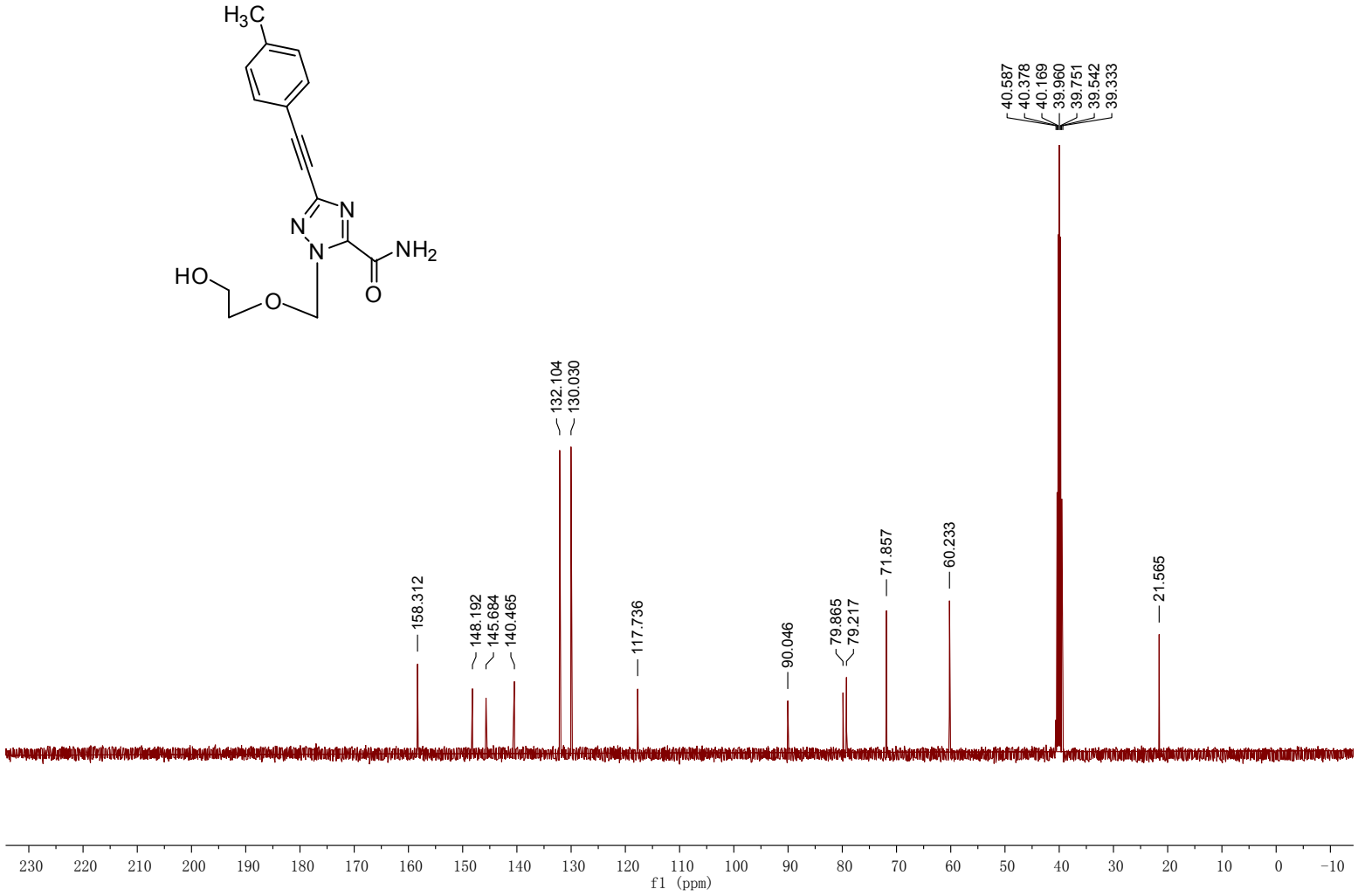
8.105
7.530
7.511
7.299
7.280
5.933
4.696
4.682
4.669
3.595
3.583
3.571
3.489
3.477
3.464
3.330
2.505
2.361
1.11
1.09
2.00
2.04
2.07
0.99
2.12
2.19
3.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)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N
N
NH2
HO
O
O
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40.378
40.169
39.960
39.751
39.542
39.333
158.312
148.192
145.684
140.465
132.104
130.030
117.736
90.046
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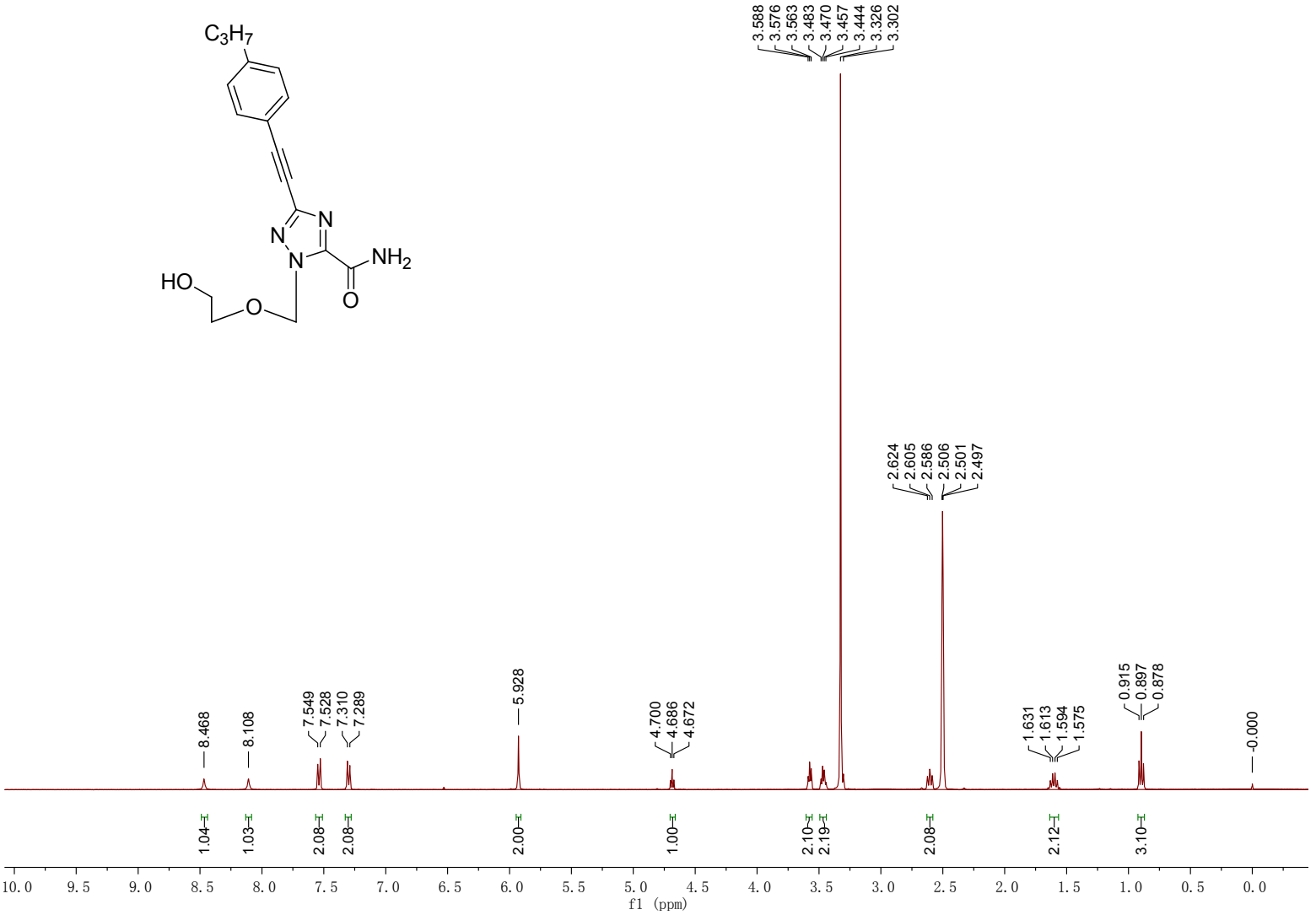
f1 (ppm)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3.302
2.624
2.605
2.586
2.506
2.501
2.497
8.468
8.108
7.549
7.528
7.310
7.289
5.928
4.700
4.686
4.672
1.631
1.613
1.594
1.575
0.915
0.897
0.878
-0.000
1.04
1.03
2.08
2.08
2.00
1.00
2.10
2.19
2.08
2.12
3.10
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
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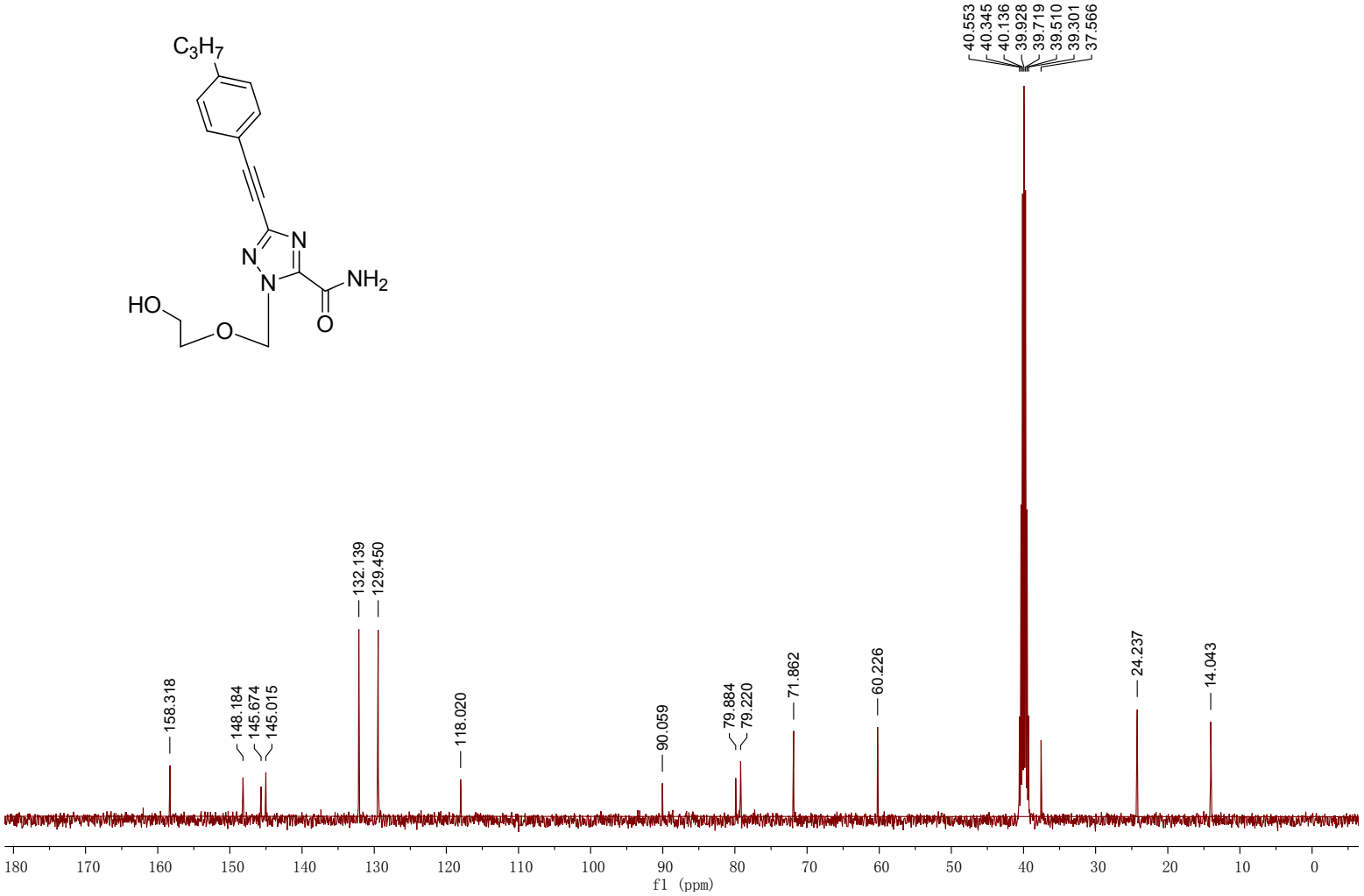
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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N
NH2
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HO
O
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40.136
39.928
39.719
39.510
39.301
37.566
158.318
148.184
145.674
145.015
132.139
129.450
118.020
90.059
79.884
79.220
71.862
60.226
24.237
14.043
180
170
160
150
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130
120
110
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90
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70
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50
40
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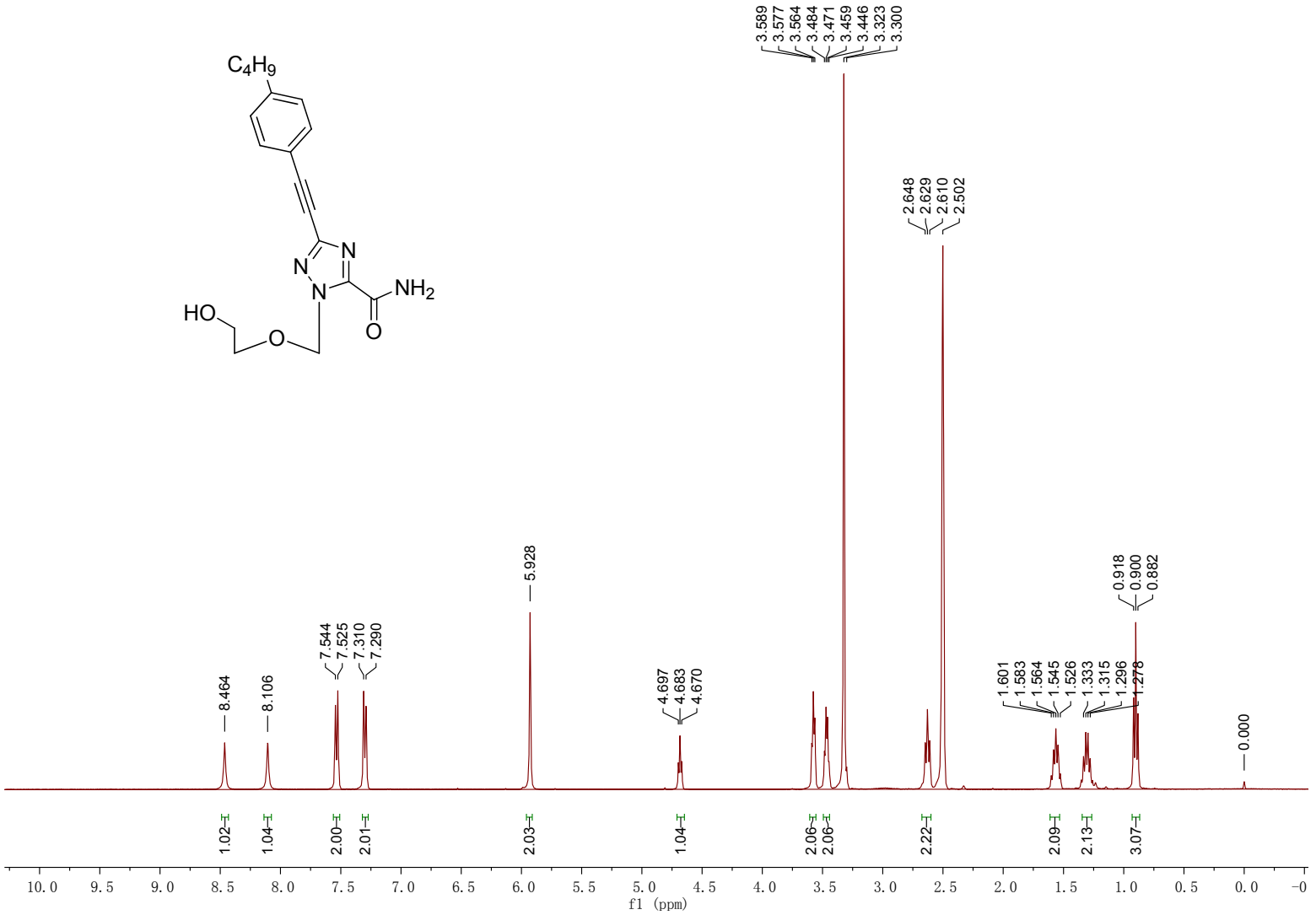
f1 (ppm)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NH2
HO
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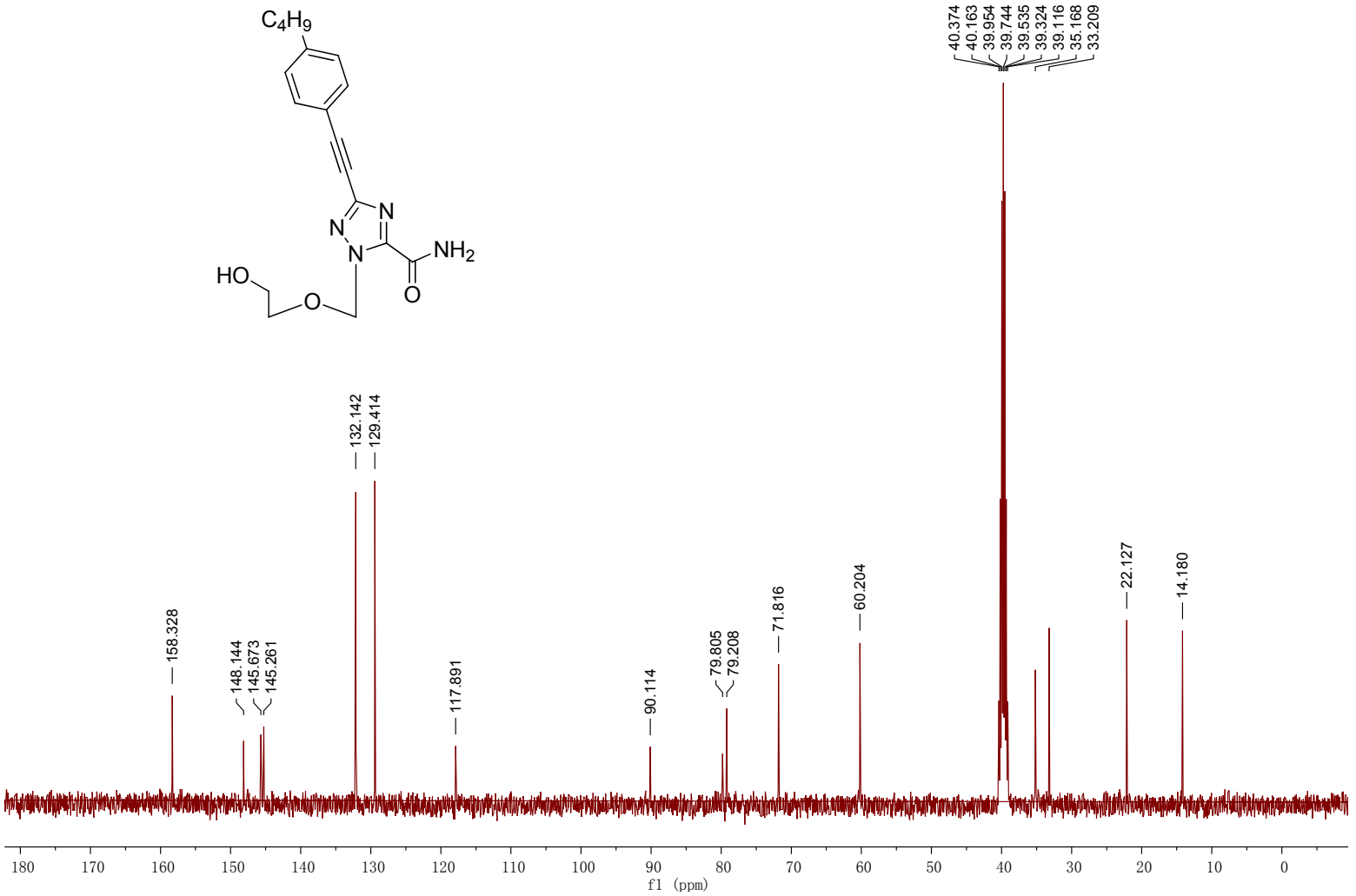
3.446
3.323
3.300
2.648
2.629
2.610
2.502
8.464
8.106
7.544
7.525
7.310
7.290
5.928
4.697
4.683
4.670
1.601
1.583
1.564
1.545
1.526
1.333
1.315
1.296
1.278
0.918
0.900
0.882
0.000
1.02
1.04
2.00
2.01
2.03
1.04
2.06
2.06
2.22
2.09
2.13
3.07
f1 (ppm)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N
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HO
O
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40.163
39.954
39.744
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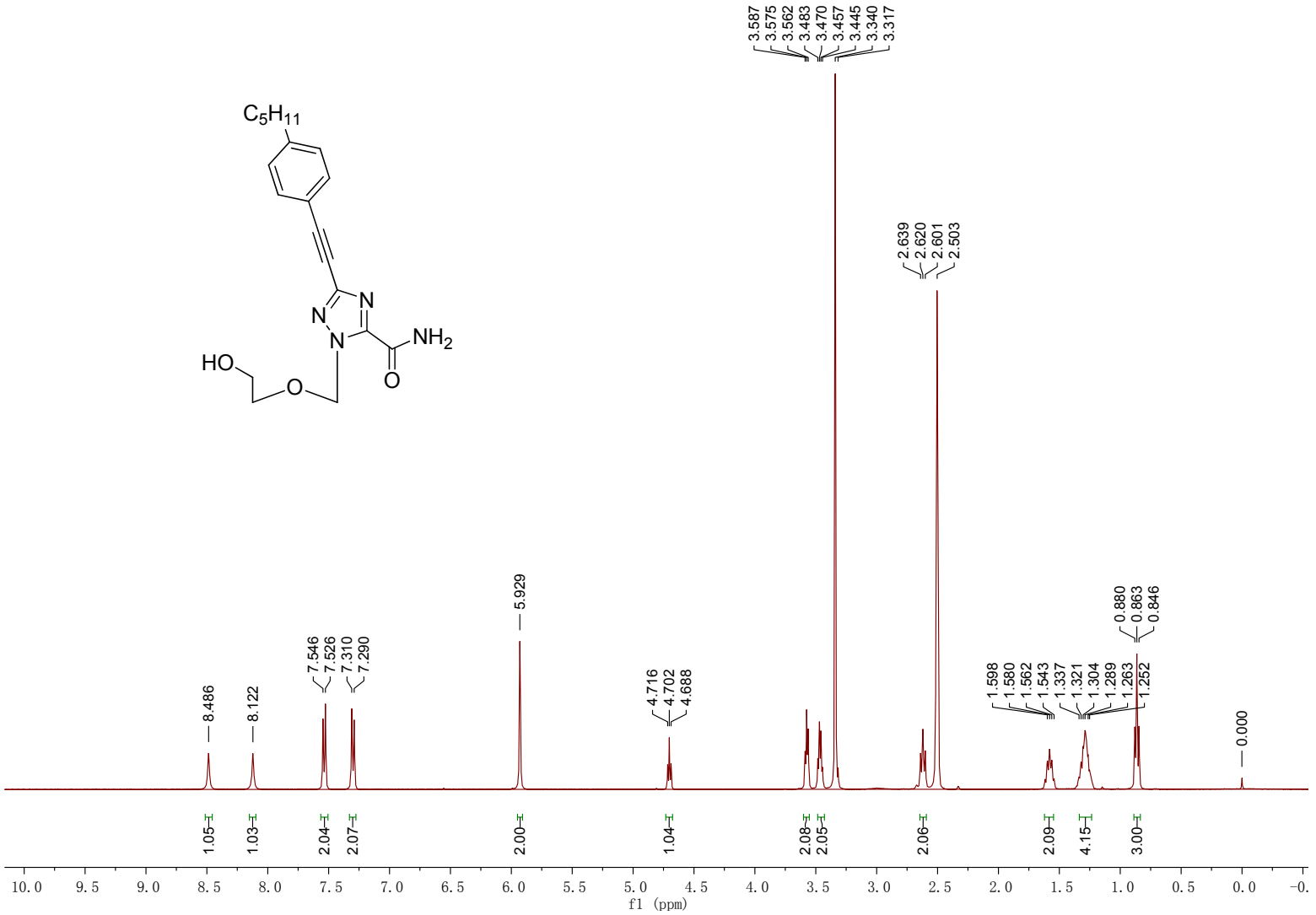
39.324
39.116
35.168
33.209
132.142
129.414
158.328
148.144
145.673
145.261
117.891
90.114
79.805
79.208
71.816
60.204
22.127
14.180
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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NH2
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HO
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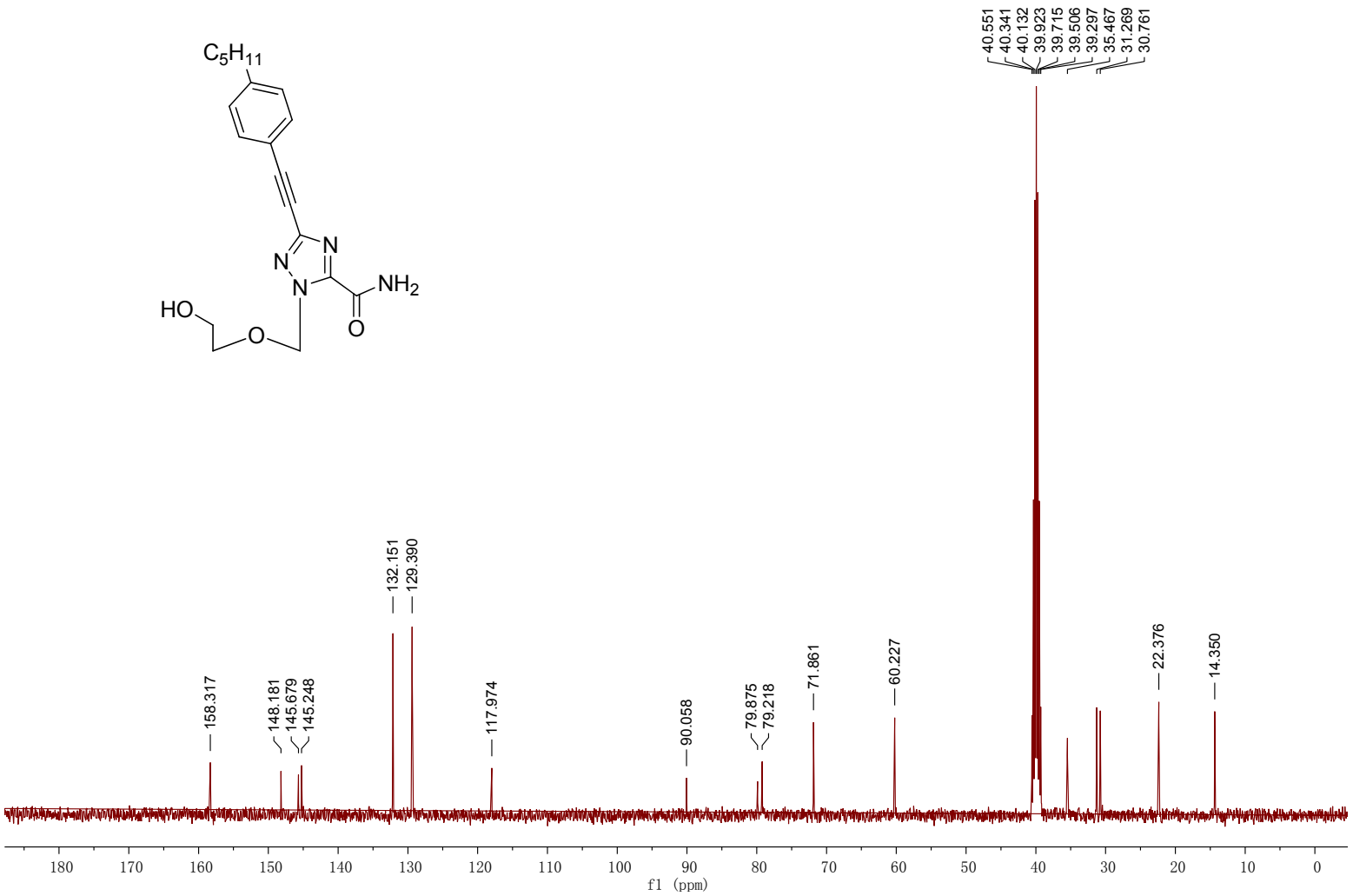
3.562
3.483
3.470
3.457
3.445
3.340
3.317
2.639
2.620
2.601
2.503
8.486
8.122
7.546
7.526
7.310
7.290
5.929
4.716
4.702
4.688
1.598
1.580
1.562
1.543
1.337
1.321
1.304
1.289
1.263
1.252
0.880
0.863
0.846
0.000
1.05
1.03
2.04
2.07
2.00
1.04
2.08
2.05
2.06
2.09
4.15
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 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 -0.
f1 (ppm)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N
N
NH2
O
HO
O
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39.297
35.467
31.269
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158.317
148.181
145.679
145.248
132.151
129.390
117.974
90.058
79.875
79.218
71.861
60.227
22.376
14.350
180
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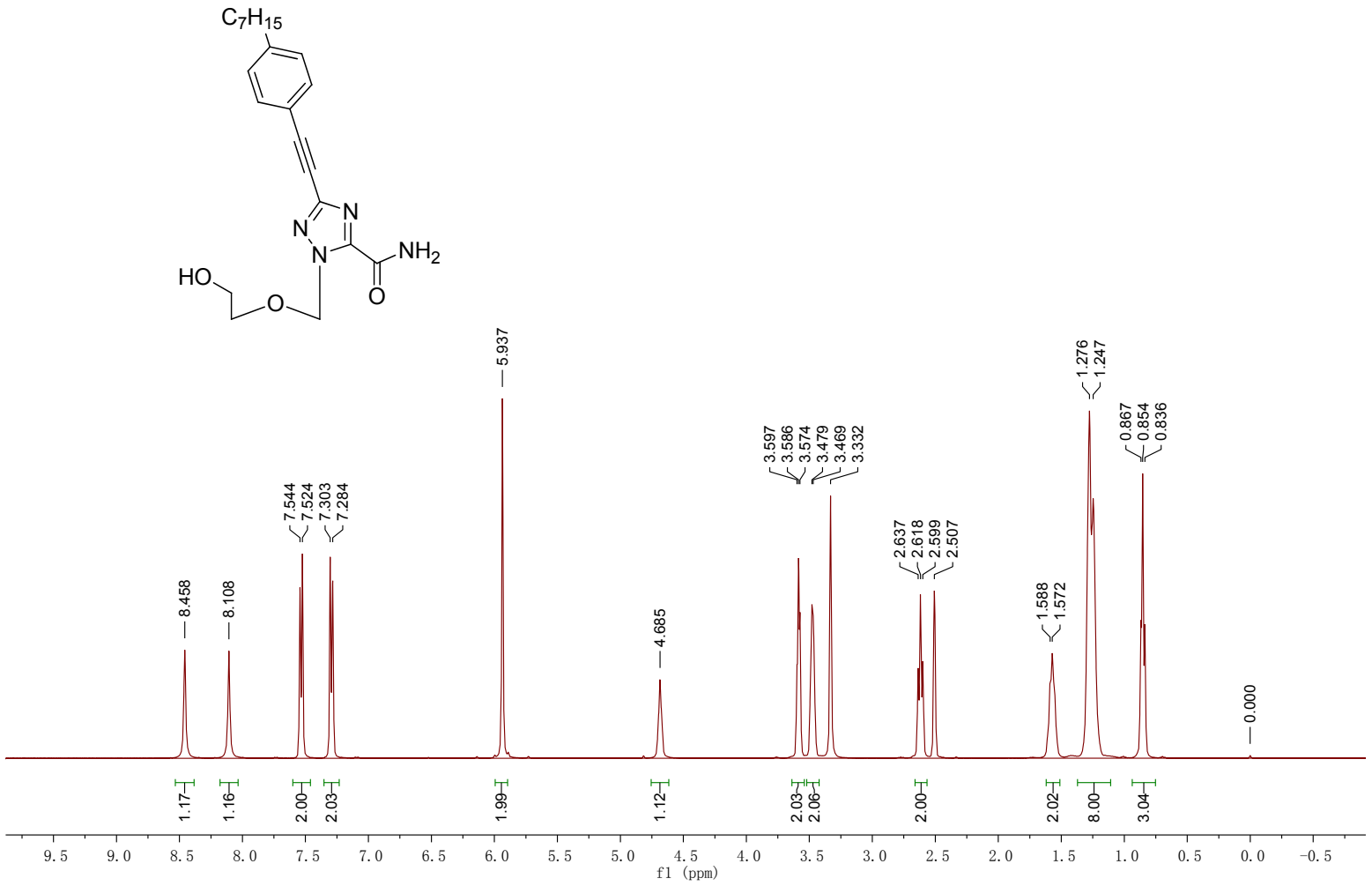
C7H15
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N
N
NH2
HO
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7.524
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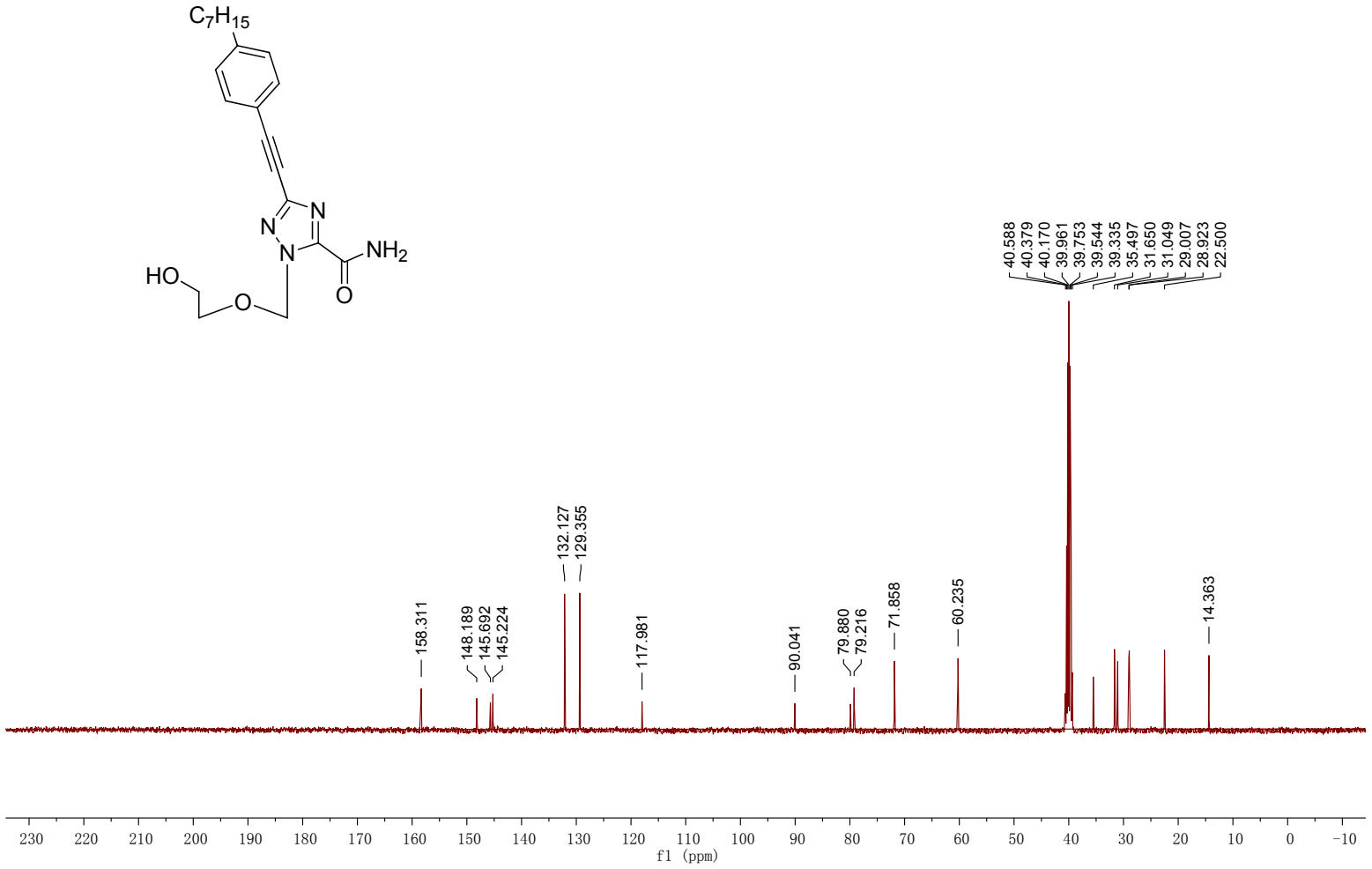
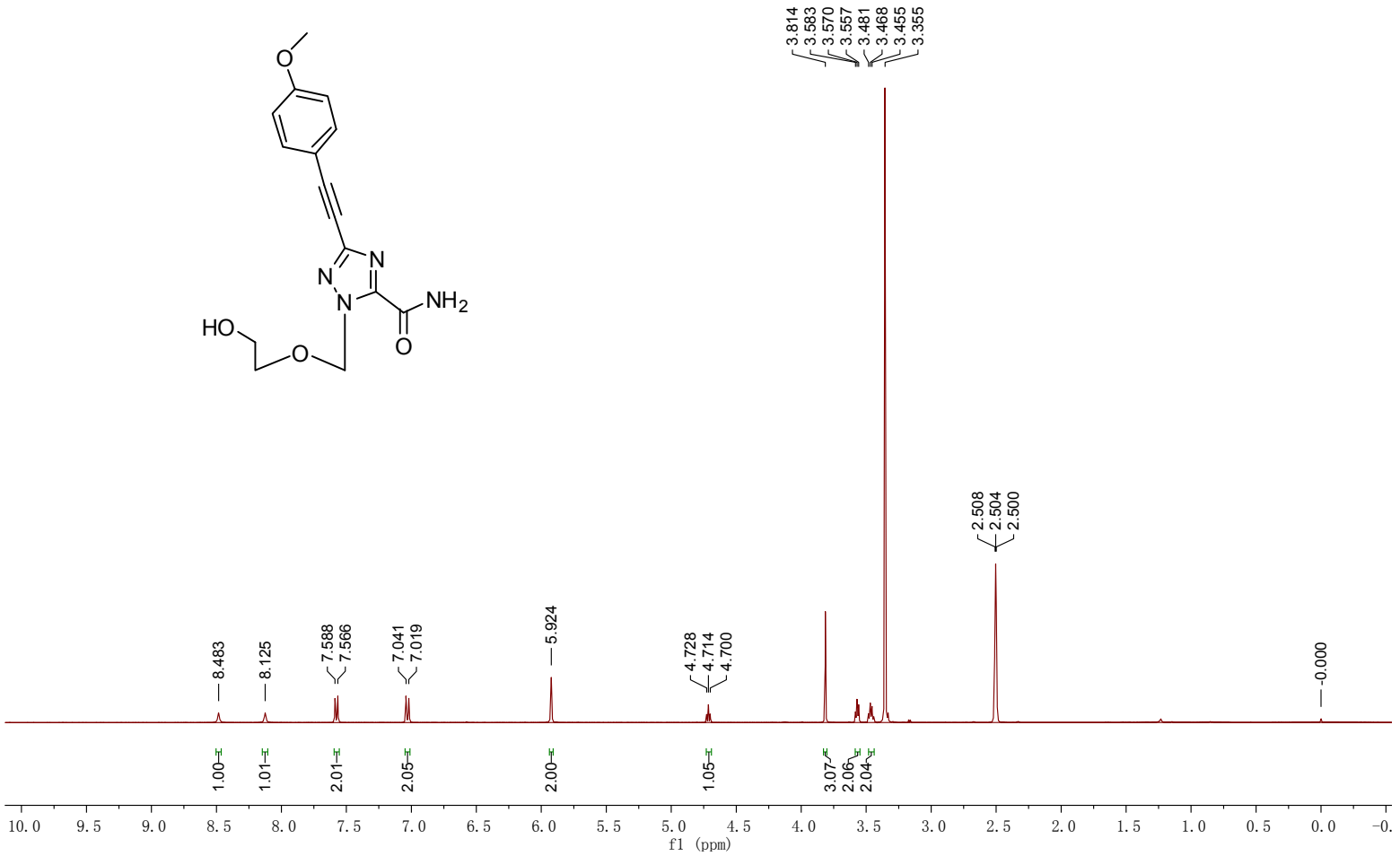
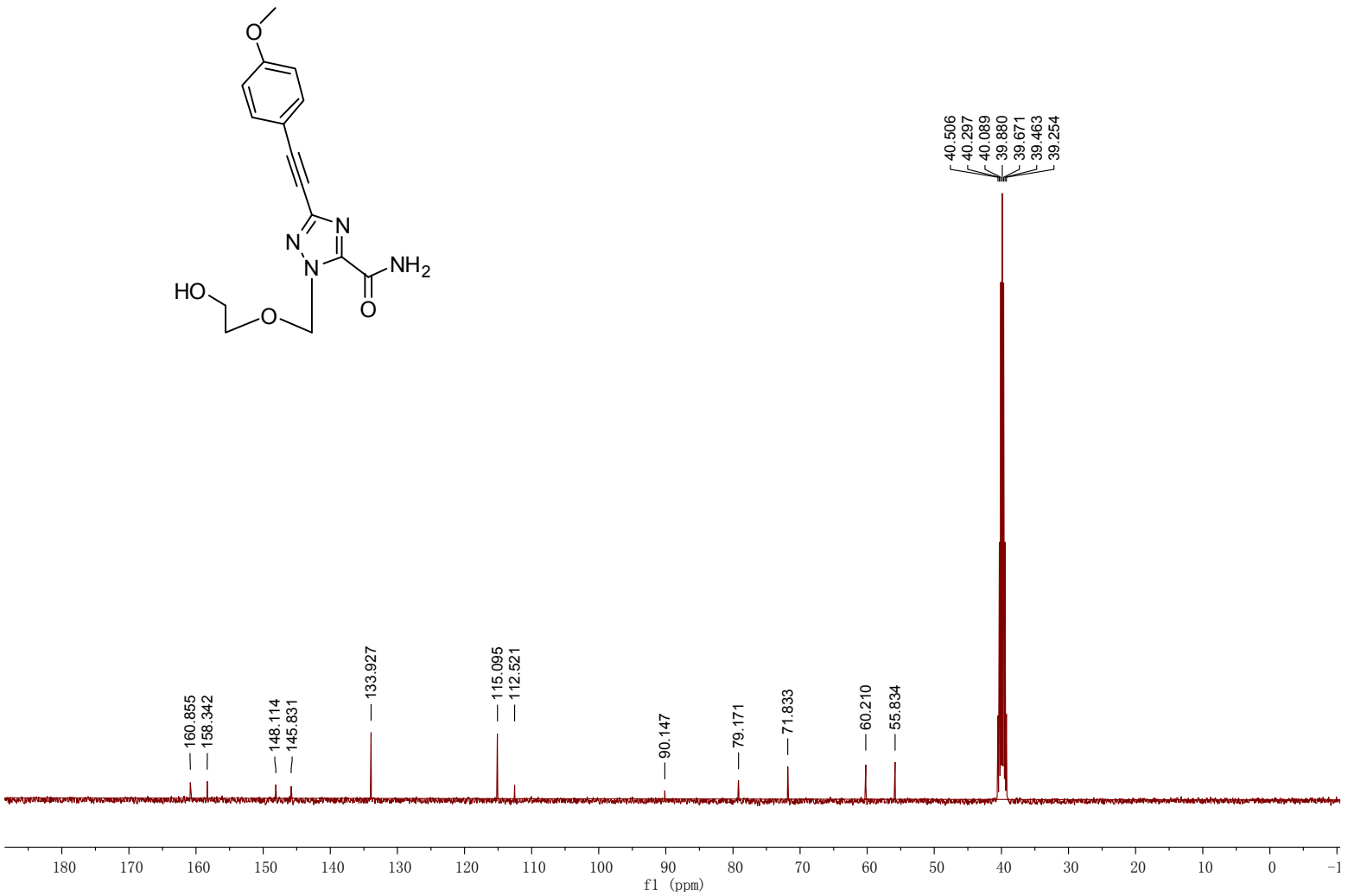
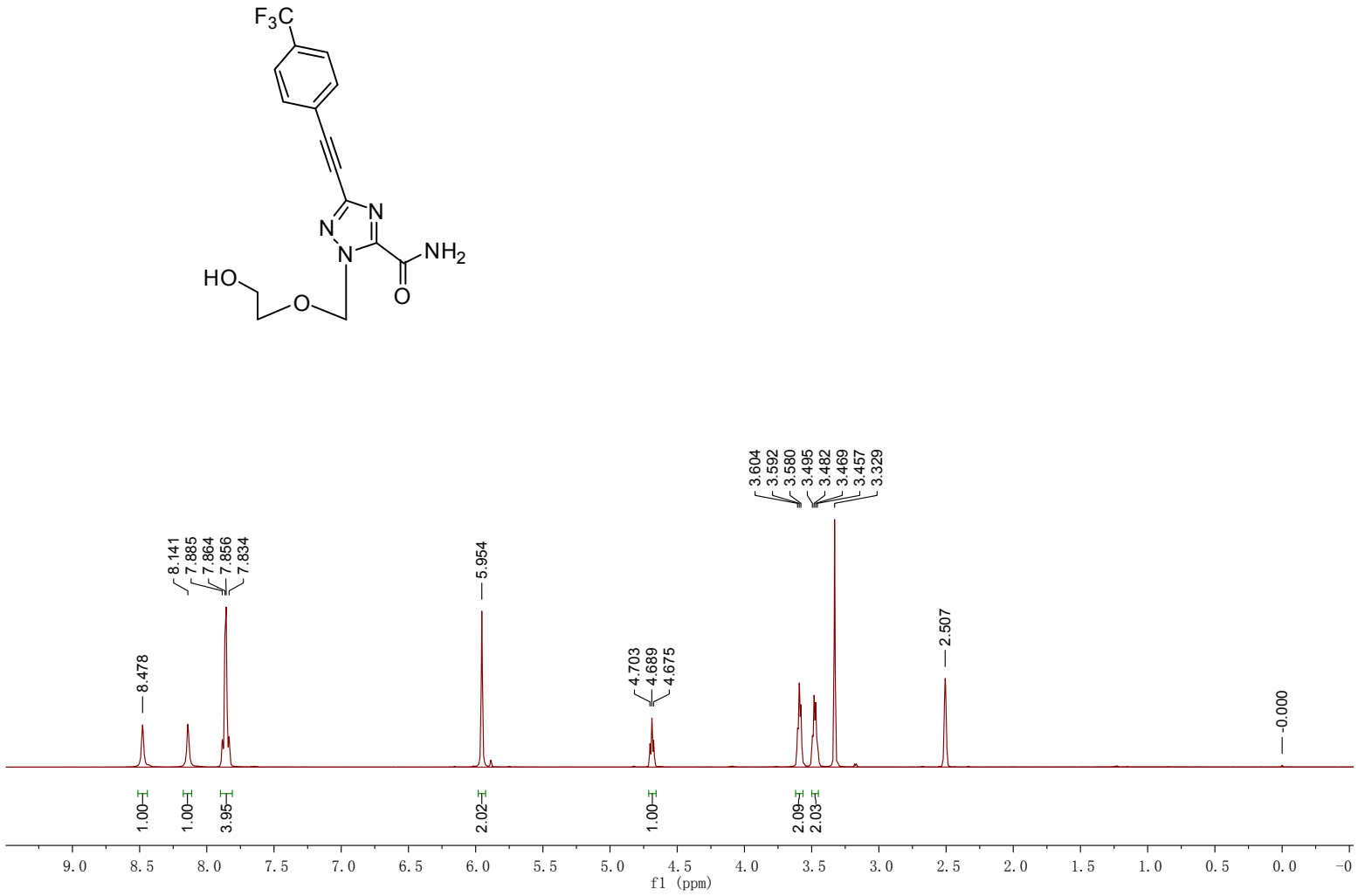
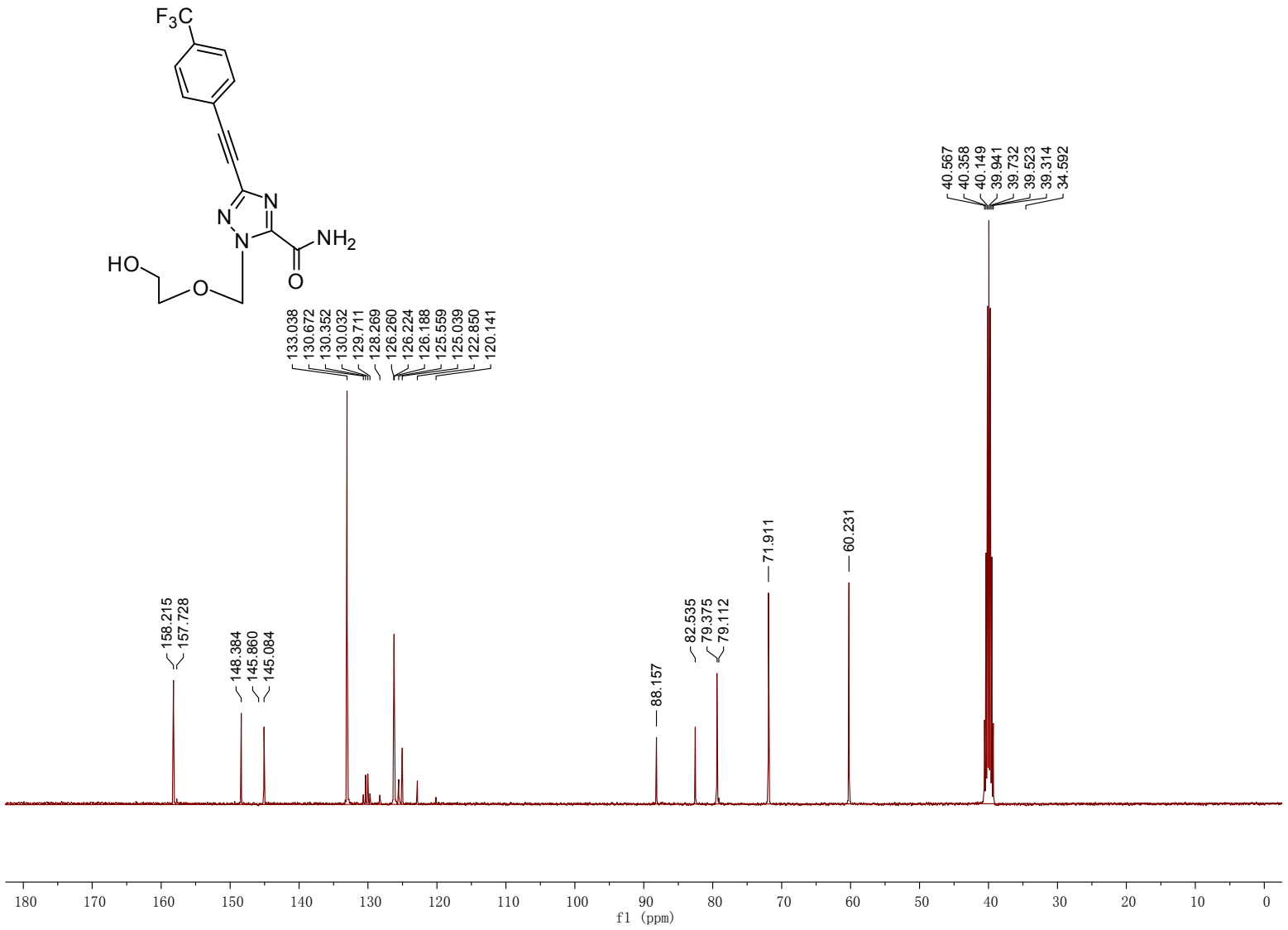
5.937
4.685
3.597
3.586
3.574
3.479
3.469
3.332
2.637
2.618
2.599
2.507
1.588
1.572
1.276
1.247
0.867
0.854
0.836
0.000
1.17
1.16
2.00
2.03
1.99
1.12
2.03
2.06
2.00
2.02
8.00
3.04
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

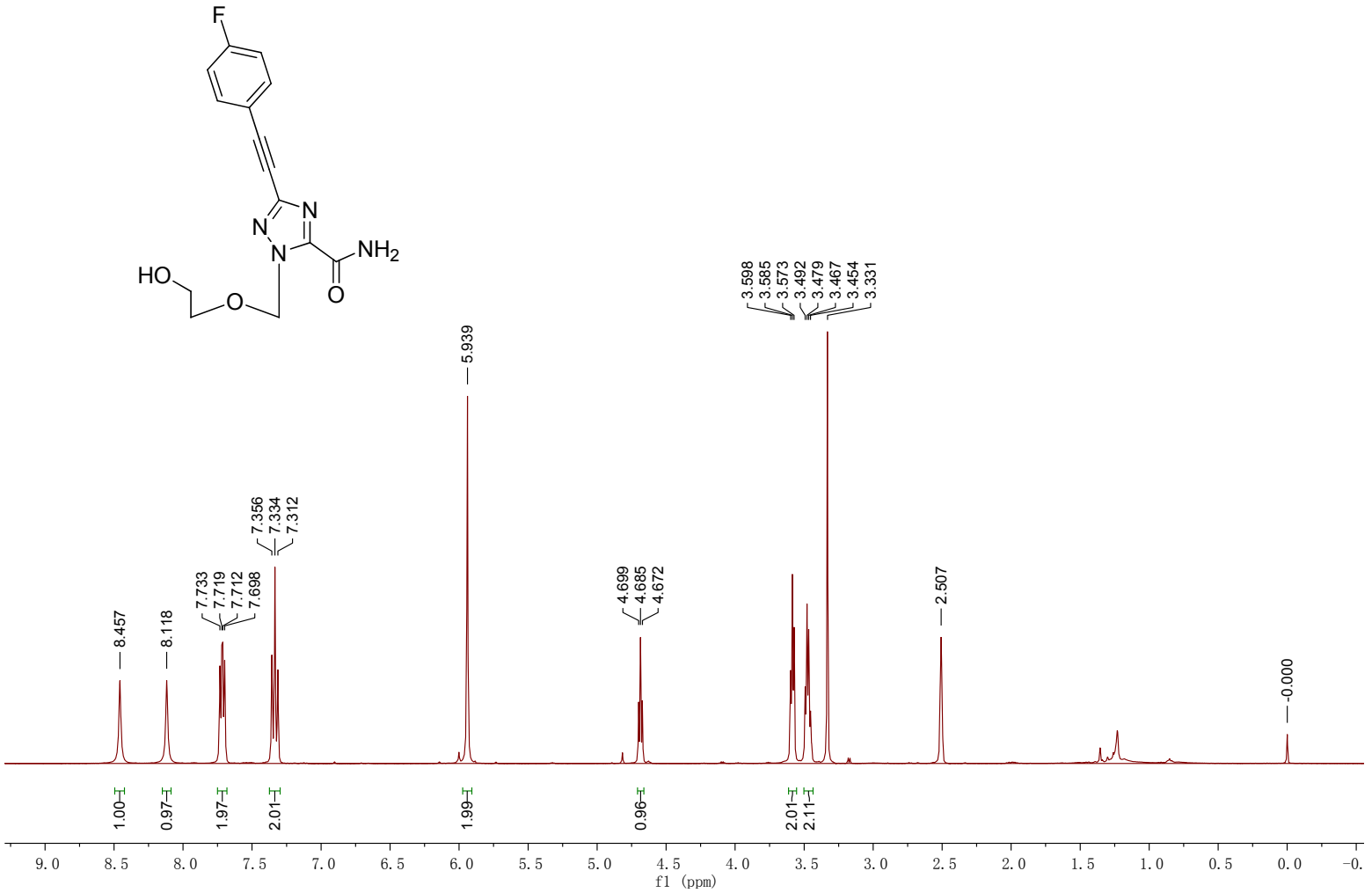

C7H15
N
N
N
NH2
O
HO
O
40.588
40.379
40.170
39.961
39.753
39.544
39.335
35.497
31.650
31.049
29.007
28.923
22.500
158.311
148.189
145.692
145.224
132.127
129.355
117.981
90.041
79.880
79.216
71.858
60.235
14.363
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

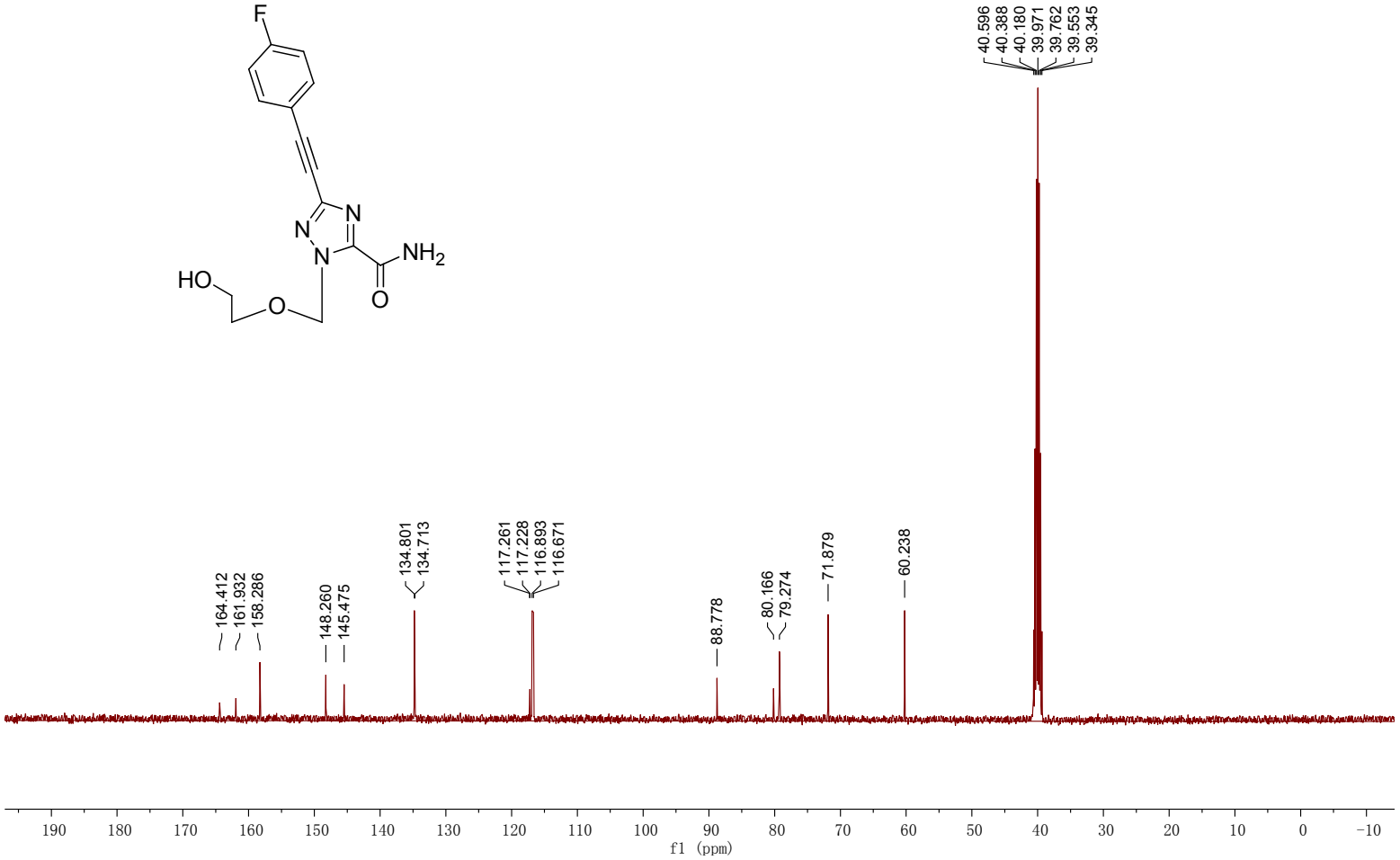

O
N
N
N
NH2
O
HO
O
3.814
3.583
3.570
3.557
3.481
3.468
3.455
3.355
2.508
2.504
2.500
8.483
8.125
7.588
7.566
7.041
7.019
5.924
4.728
4.714
4.700
-0.000
1.00
1.01
2.01
2.05
2.00
1.05
3.07
2.06
2.04
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.
f1 (ppm)

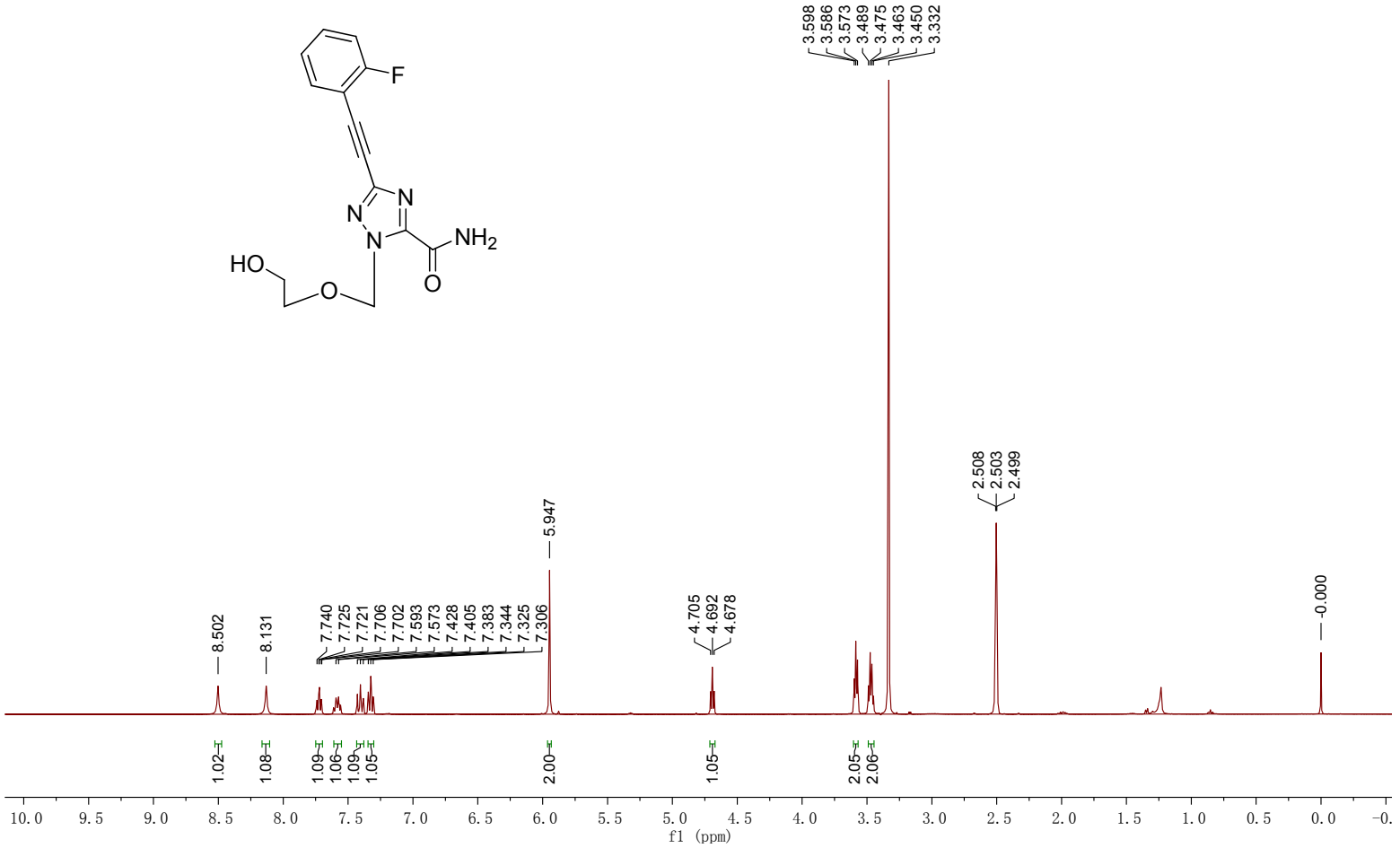

O
N
N
N
NH2
O
HO
O
40.506
40.297
40.089
39.880
39.671
39.463
39.254
160.855
158.342
148.114
145.831
133.927
115.095
112.521
90.147
79.171
71.833
60.210
55.834
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−1
f1 (ppm)

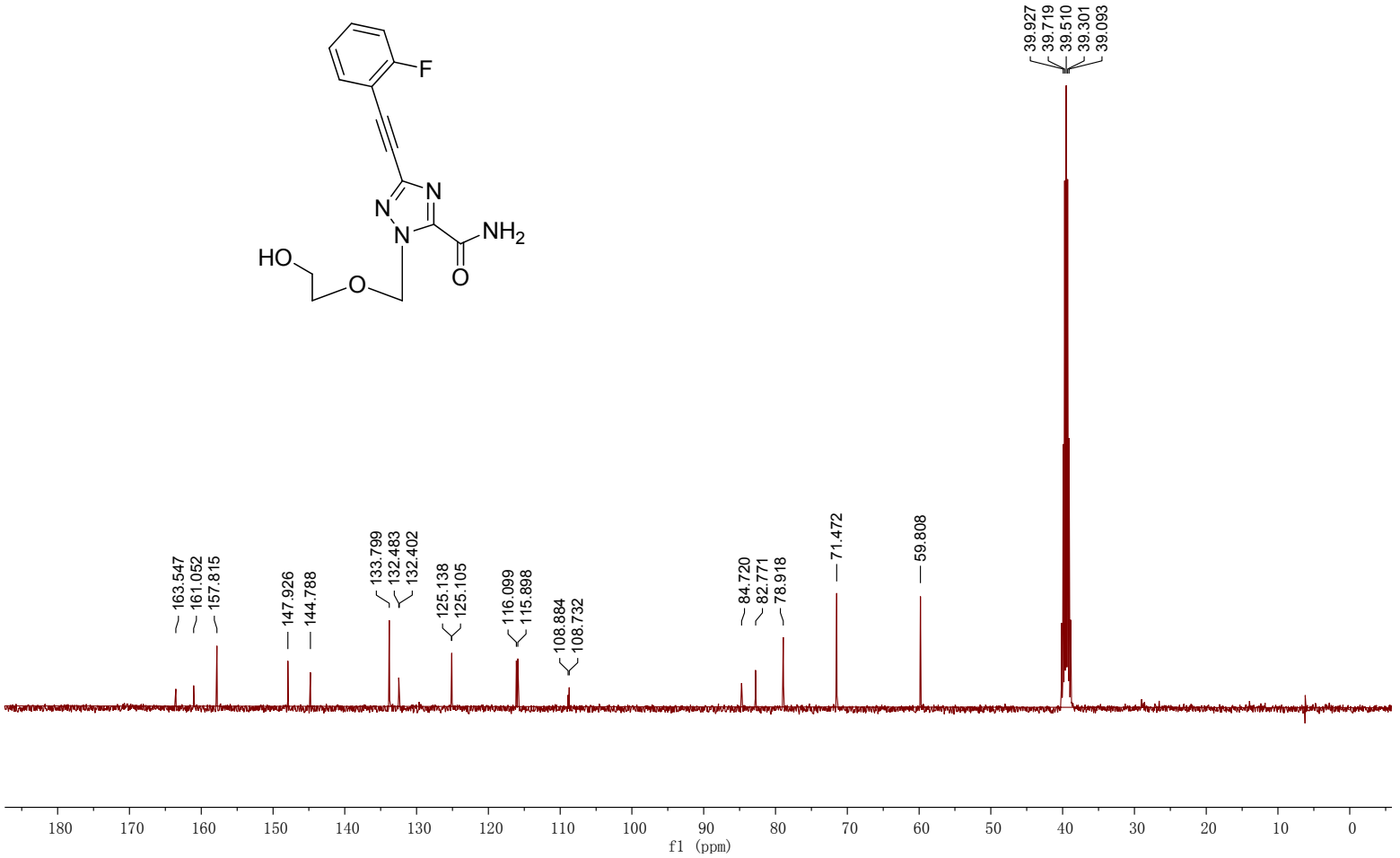

F3C
N
N
N
NH2
O
HO
O
8.478
8.141
7.885
7.864
7.856
7.834
5.954
4.703
4.689
4.675
3.604
3.592
3.580
3.495
3.482
3.469
3.457
3.329
2.507
-0.000
1.00
1.00
3.95
2.02
1.00
2.09
2.03
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

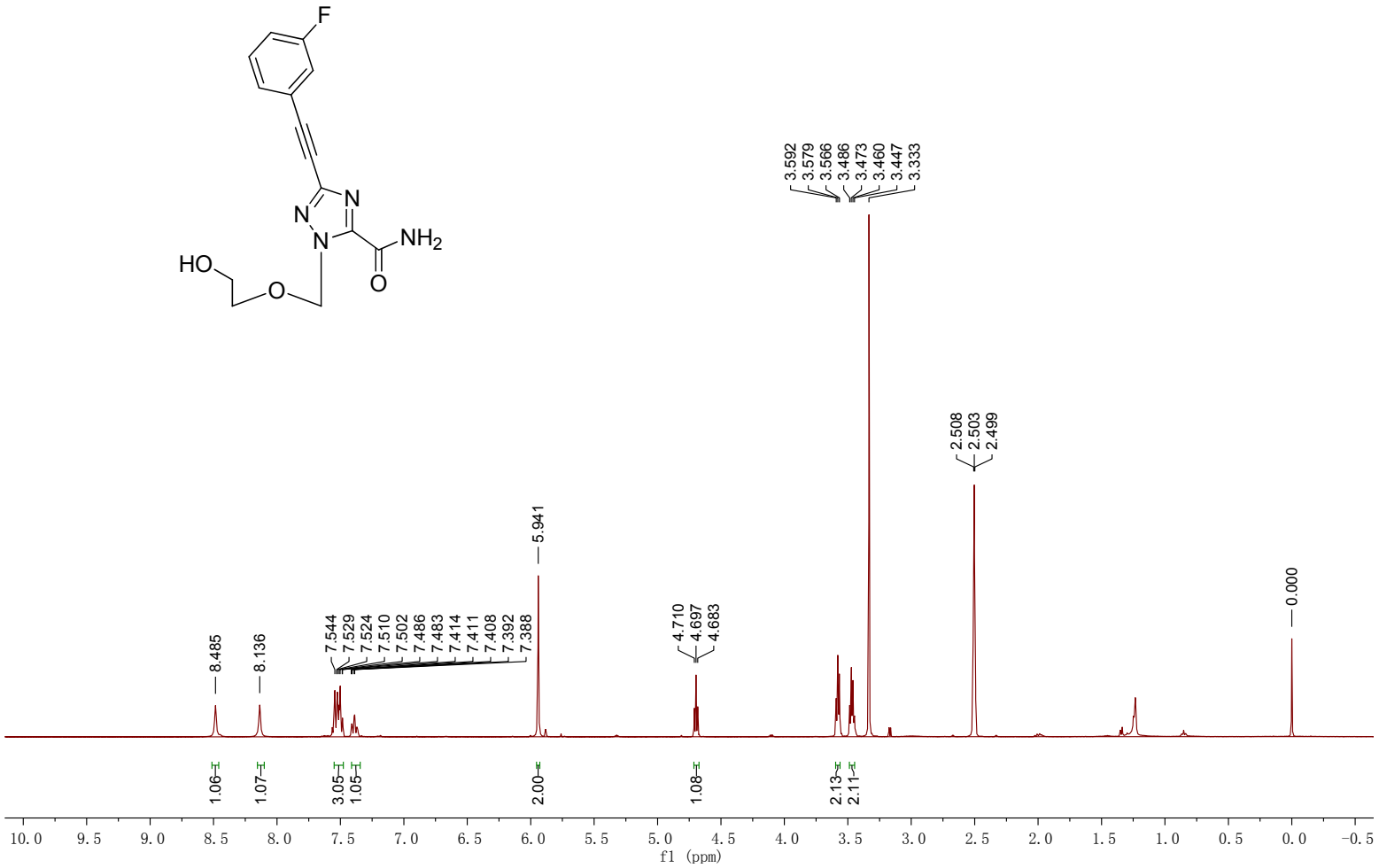

F3C
N
N
N
NH2
O
HO
O
133.038
130.672
130.352
130.032
129.711
128.269
126.260
126.224
126.188
125.559
125.039
122.850
120.141
158.215
157.728
148.384
145.860
145.084
88.157
82.535
79.375
79.112
71.911
60.231
40.567
40.358
40.149
39.941
39.732
39.523
39.314
34.592
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

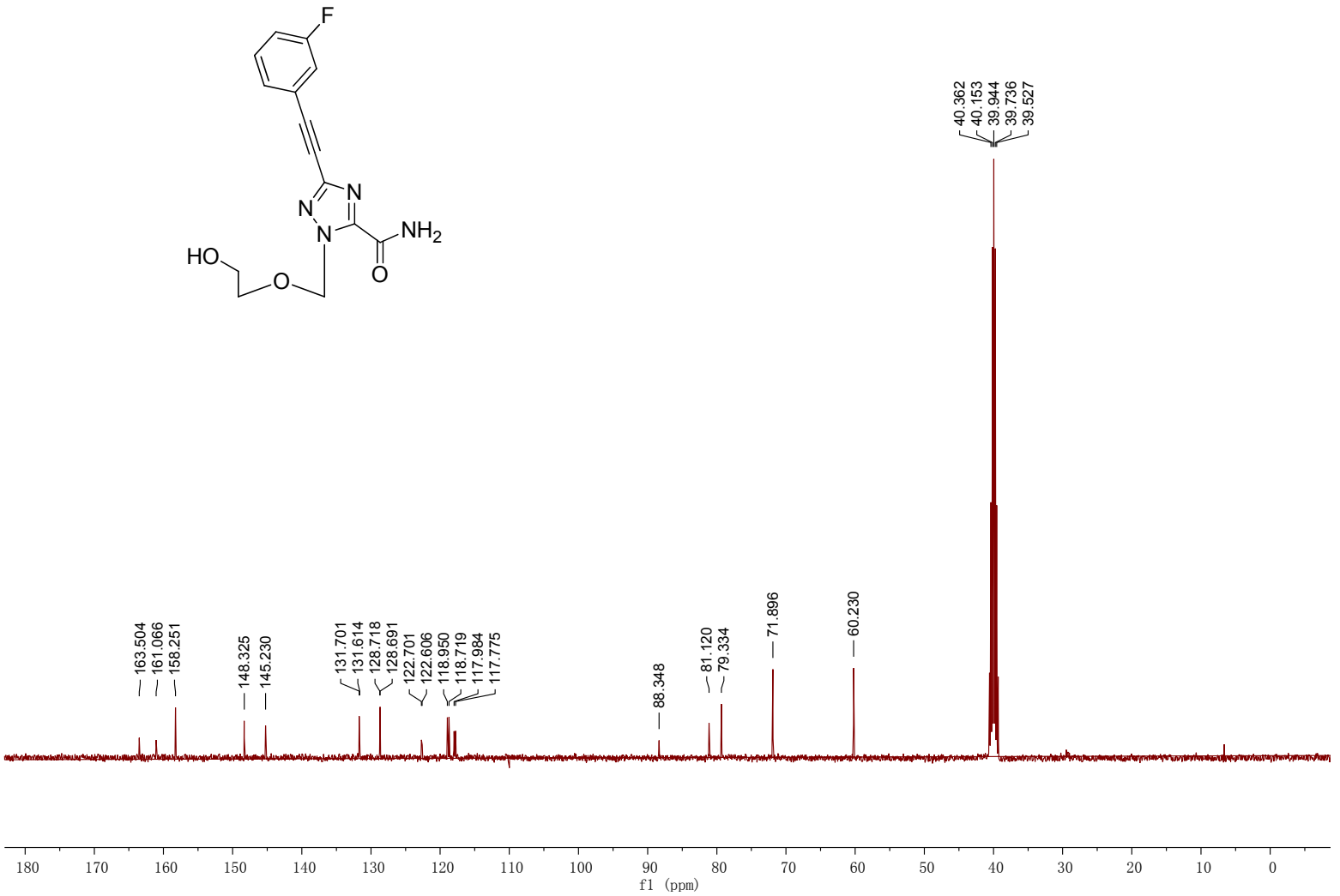

F
N
N
N
NH2
O
HO
O
8.457
8.118
7.733
7.719
7.712
7.698
7.356
7.334
7.312
5.939
4.699
4.685
4.672
3.598
3.585
3.573
3.492
3.479
3.467
3.454
3.331
2.507
-0.000
1.00
0.97
1.97
2.01
1.99
0.96
2.01
2.11
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.
f1 (ppm)

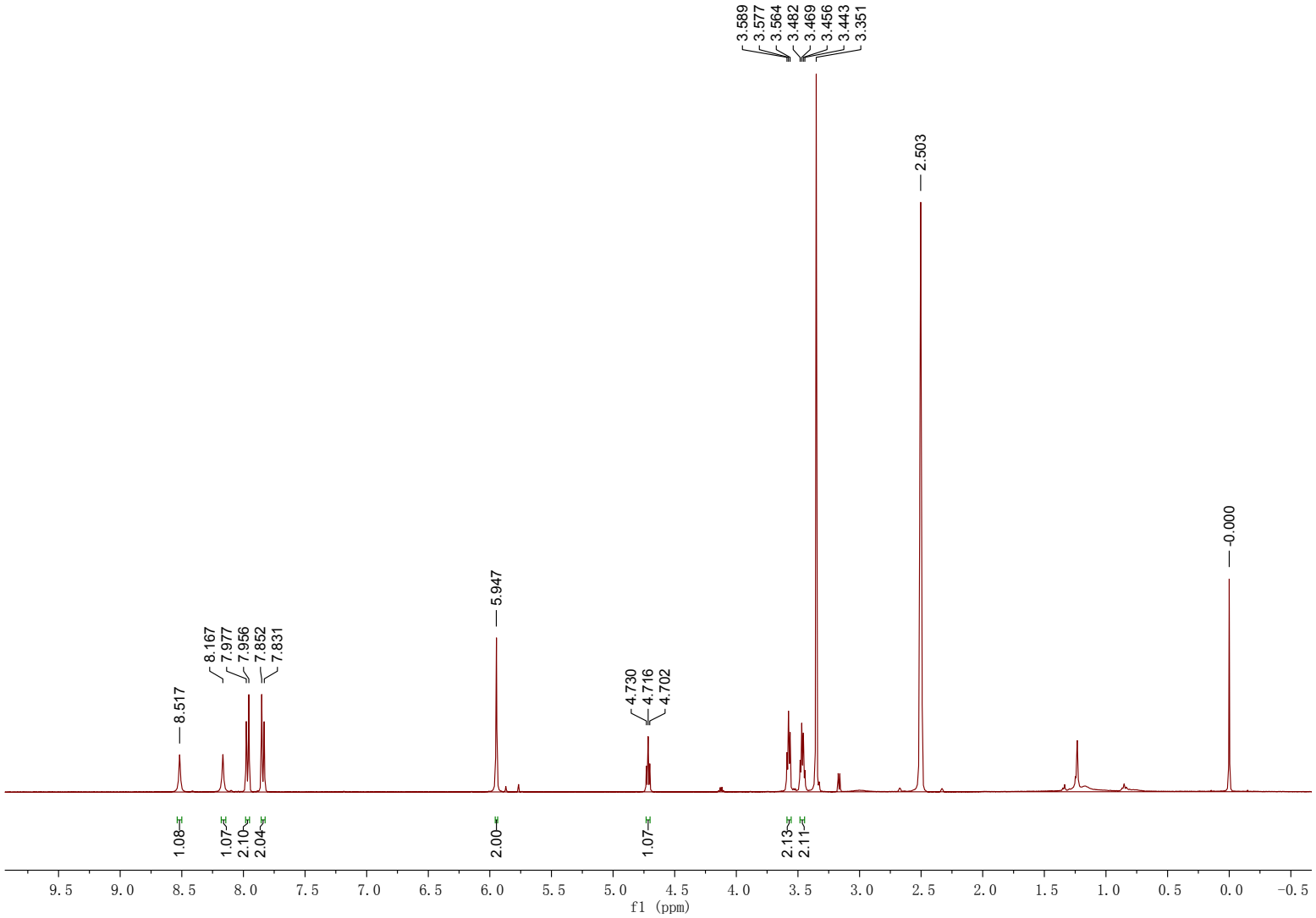

F
N
N
N
NH2
O
HO
O
40.596
40.388
40.180
39.971
39.762
39.553
39.345
164.412
161.932
158.286
148.260
145.475
134.801
134.713
117.261
117.228
116.893
116.671
88.778
80.166
79.274
71.879
60.238
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

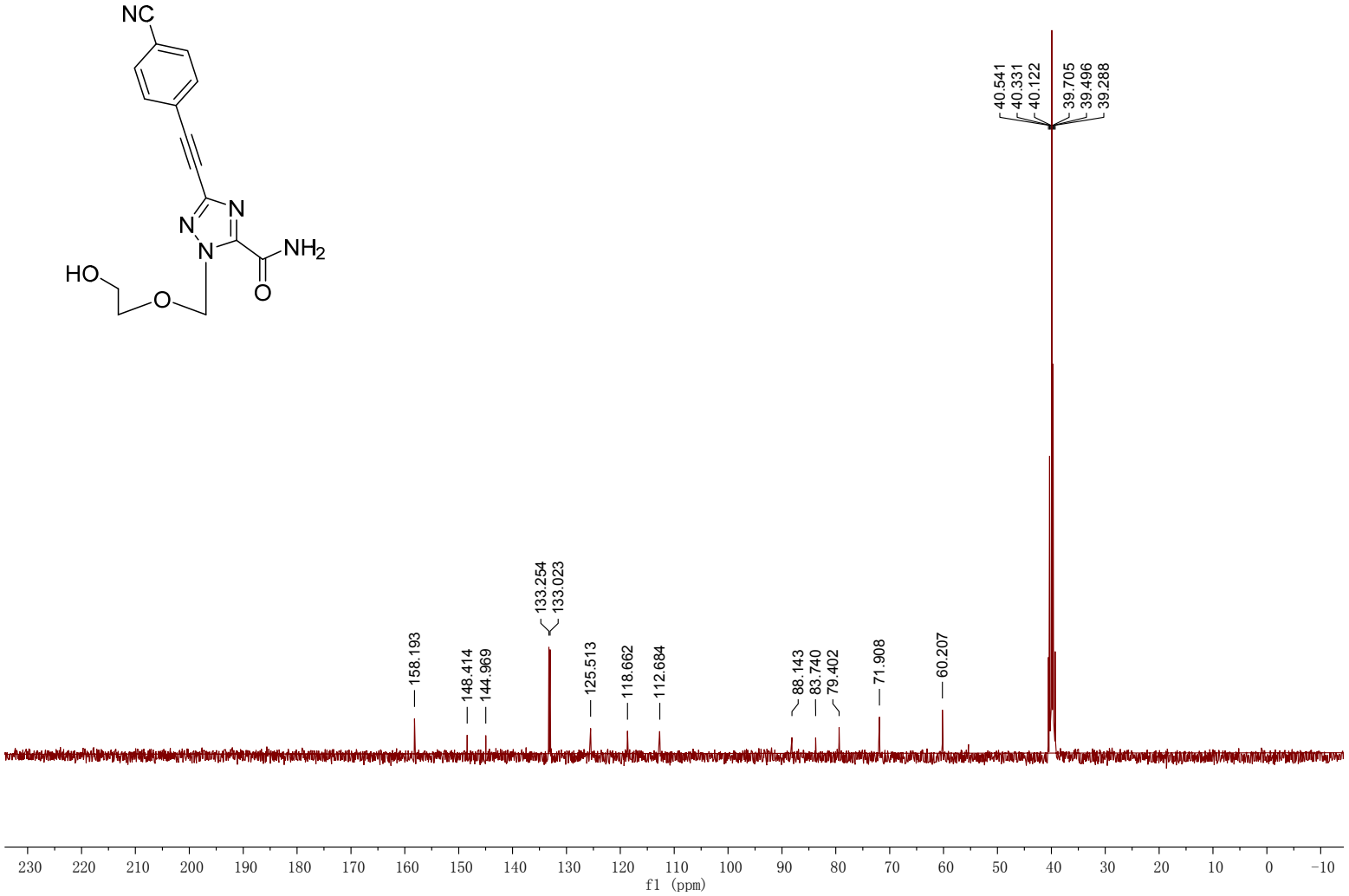

F
N
N
N
NH2
O
HO
O
3.598
3.586
3.573
3.489
3.475
3.463
3.450
3.332
2.508
2.503
2.499
5.947
8.502
8.131
7.740
7.725
7.721
7.706
7.702
7.593
7.573
7.428
7.405
7.383
7.344
7.325
7.306
4.705
4.692
4.678
-0.000
1.02
1.08
1.09
1.06
1.09
1.05
2.00
1.05
2.05
2.06
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.
f1 (ppm)

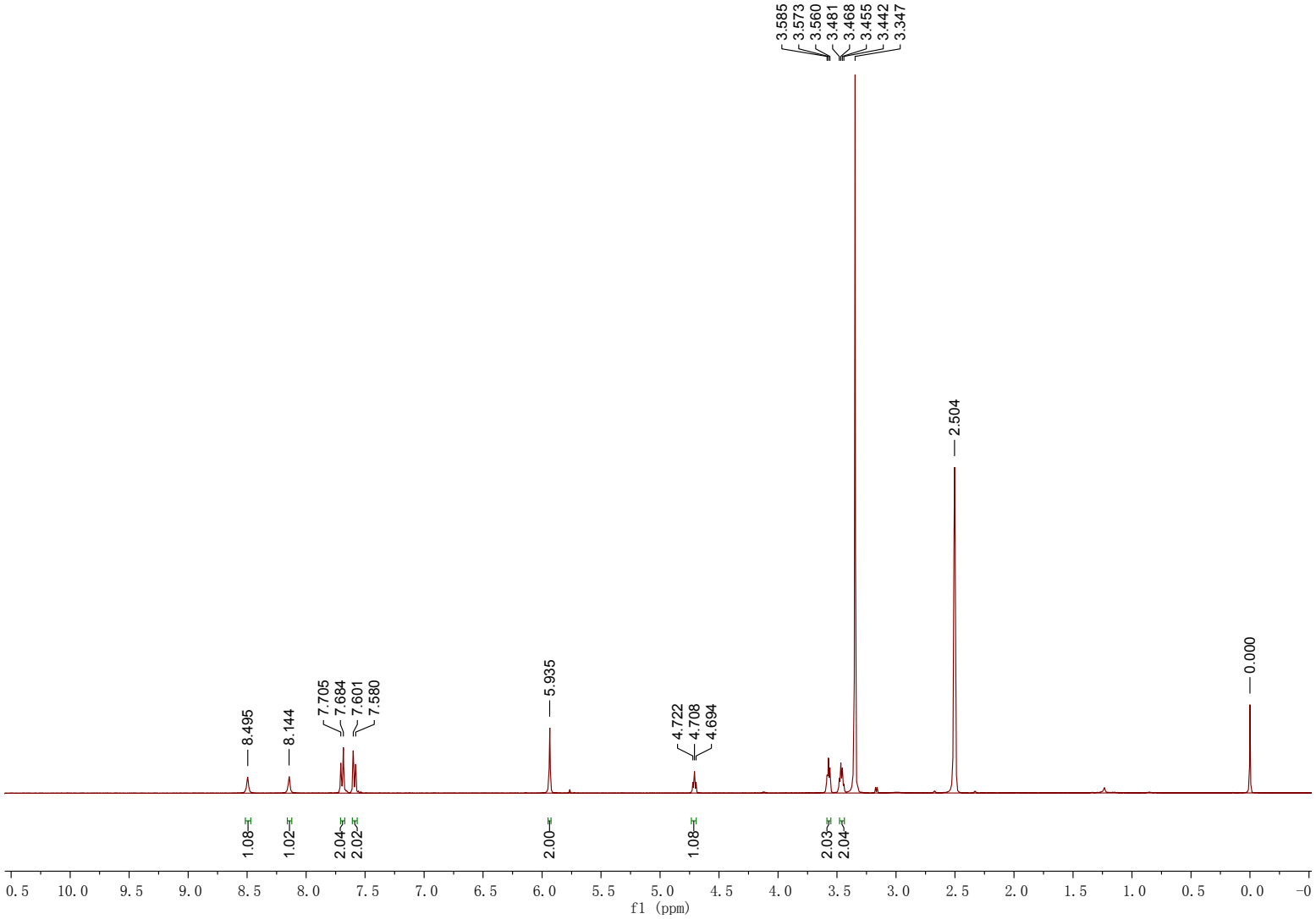

F
N
N
N
NH2
O
HO
O
39.927
39.719
39.510
39.301
39.093
163.547
161.052
157.815
147.926
144.788
133.799
132.483
132.402
125.138
125.105
116.099
115.898
108.884
108.732
84.720
82.771
78.918
71.472
59.808
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

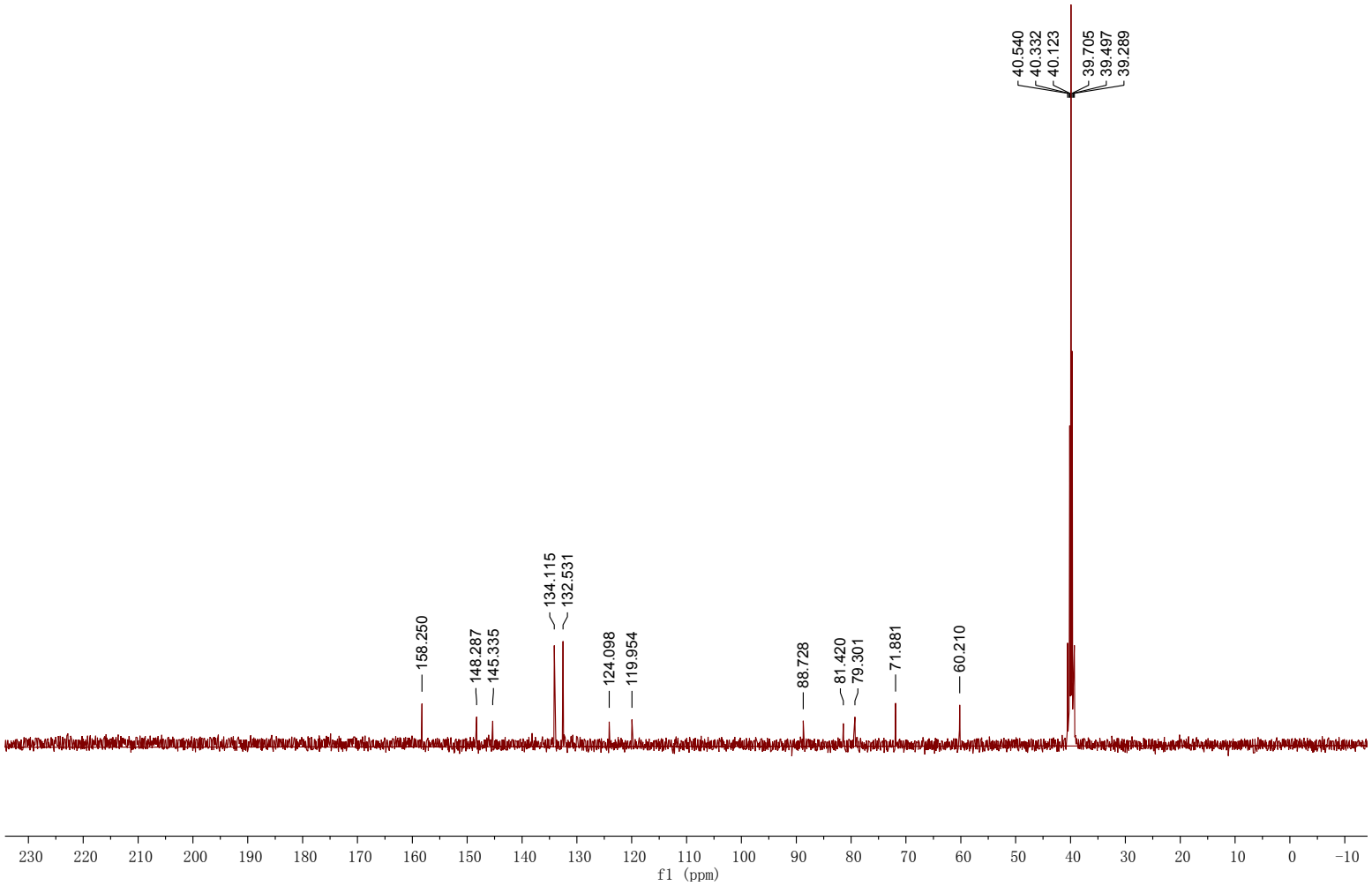

F
N
N
N
NH2
O
HO
O
3.592
3.579
3.566
3.486
3.473
3.460
3.447
3.333
2.508
2.503
2.499
8.485
8.136
7.544
7.529
7.524
7.510
7.502
7.486
7.483
7.414
7.411
7.408
7.392
7.388
5.941
4.710
4.697
4.683
0.000
1.06
1.07
3.05
1.05
2.00
1.08
2.13
2.11
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 −0.5
f1 (ppm)

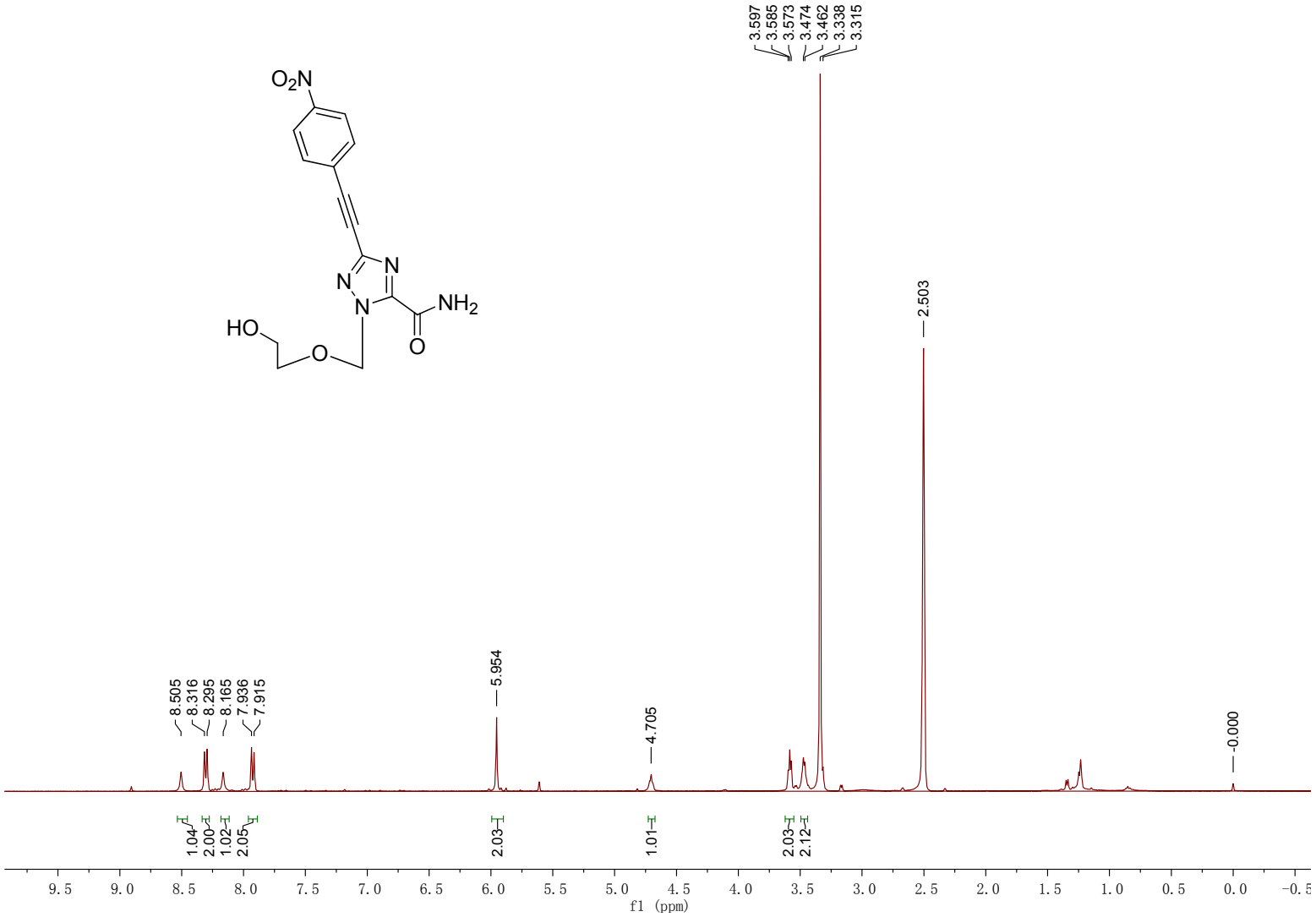

F
N
N
N
NH2
O
HO
O
40.362
40.153
39.944
39.736
39.527
163.504
161.066
158.251
148.325
145.230
131.701
131.614
128.718
128.691
122.701
122.606
118.950
118.719
117.984
117.775
88.348
81.120
79.334
71.896
60.230
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

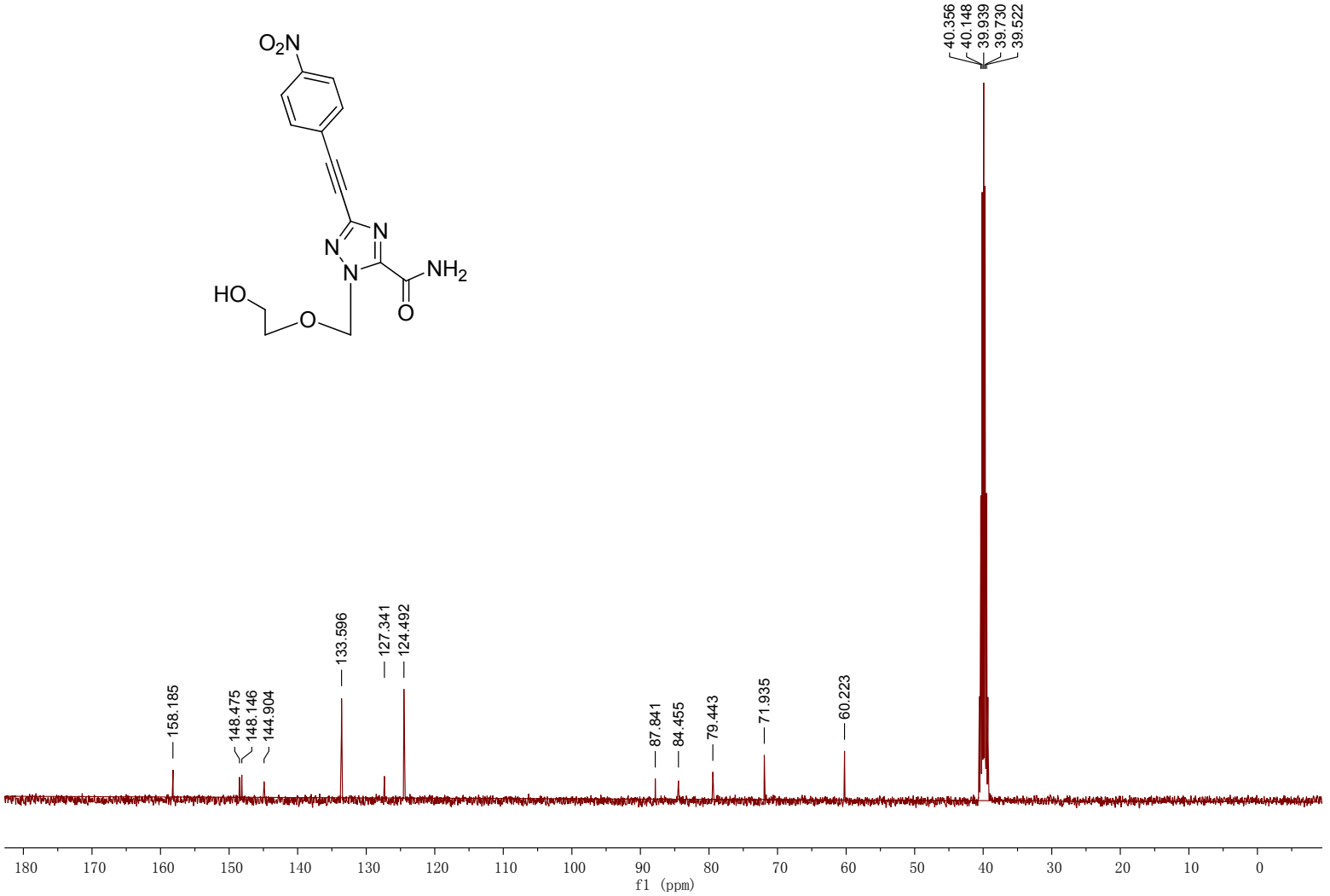

3.589
3.577
3.564
3.482
3.469
3.456
3.443
3.351
2.503
-0.000
8.517
8.167
7.977
7.956
7.852
7.831
5.947
4.730
4.716
4.702
1.08
1.07
2.10
2.04
2.00
1.07
2.13
2.11
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

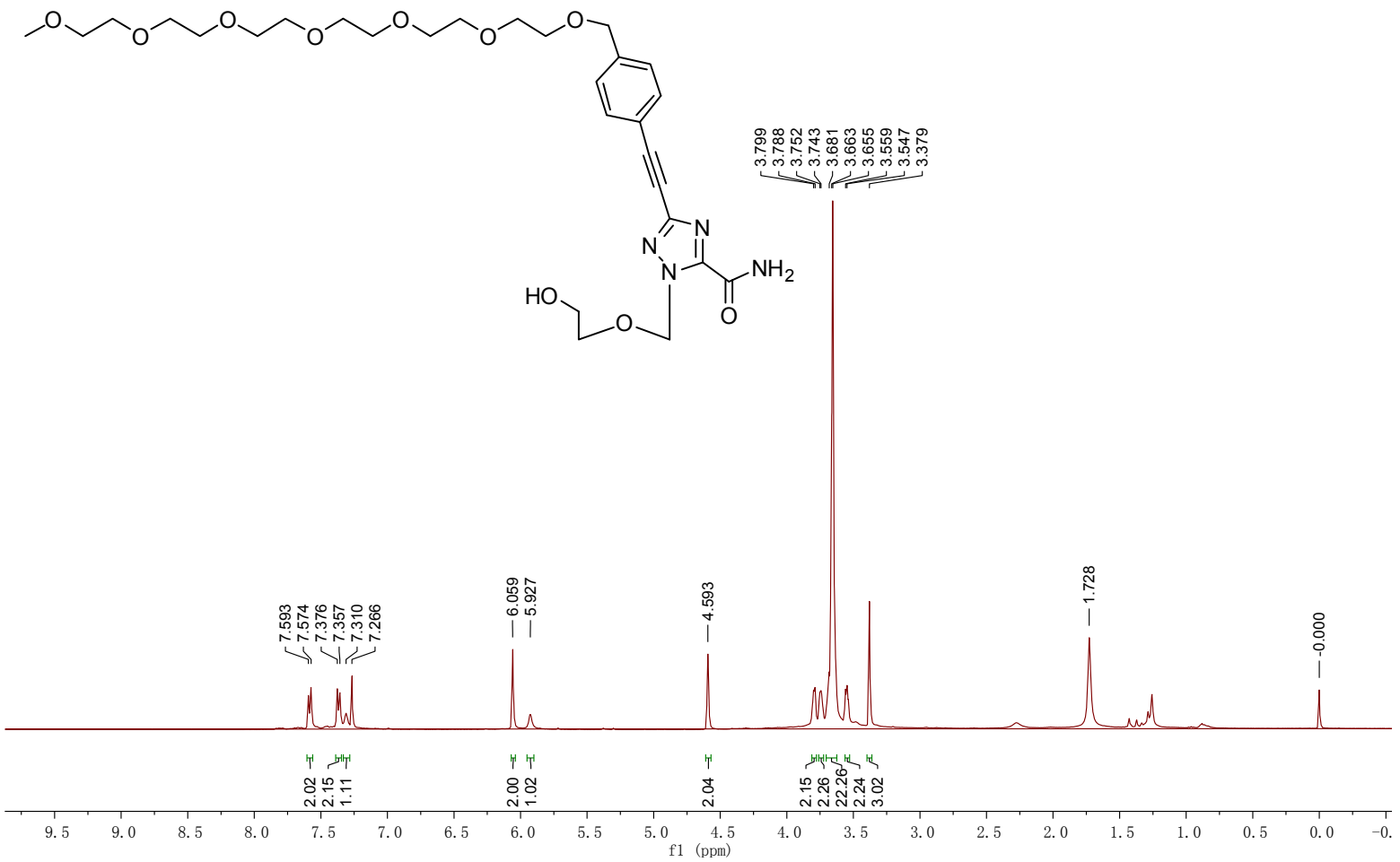

NC
N
N
N
NH2
O
HO
O
40.541
40.331
40.122
39.705
39.496
39.288
158.193
148.414
144.969
133.254
133.023
125.513
118.662
112.684
88.143
83.740
79.402
71.908
60.207
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

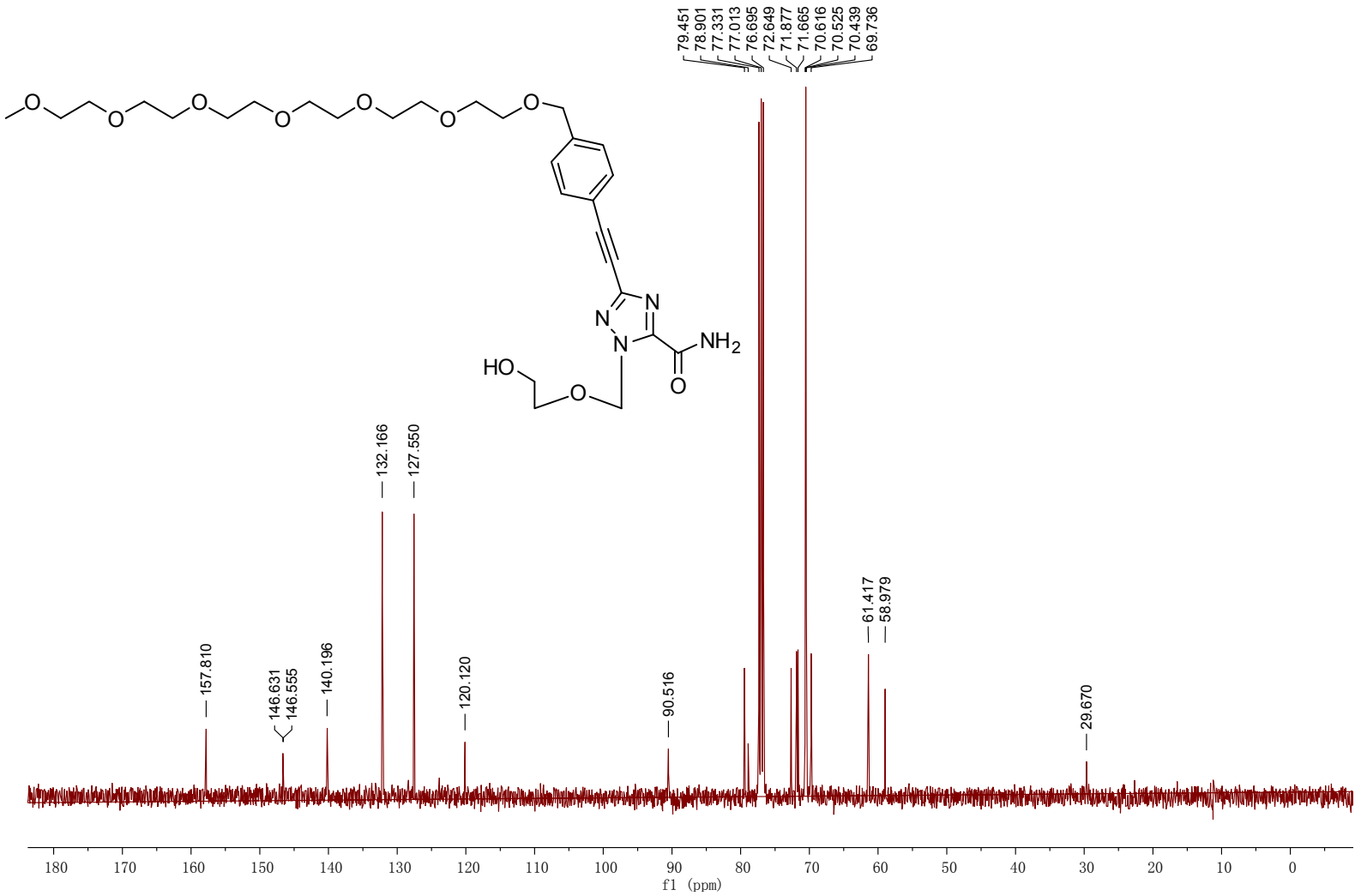

3.585
3.573
3.560
3.481
3.468
3.455
3.442
3.347
2.504
0.000
8.495
8.144
7.705
7.684
7.601
7.580
5.935
4.722
4.708
4.694
1.08
1.02
2.04
2.02
2.00
1.08
2.03
2.04
f1 (ppm)

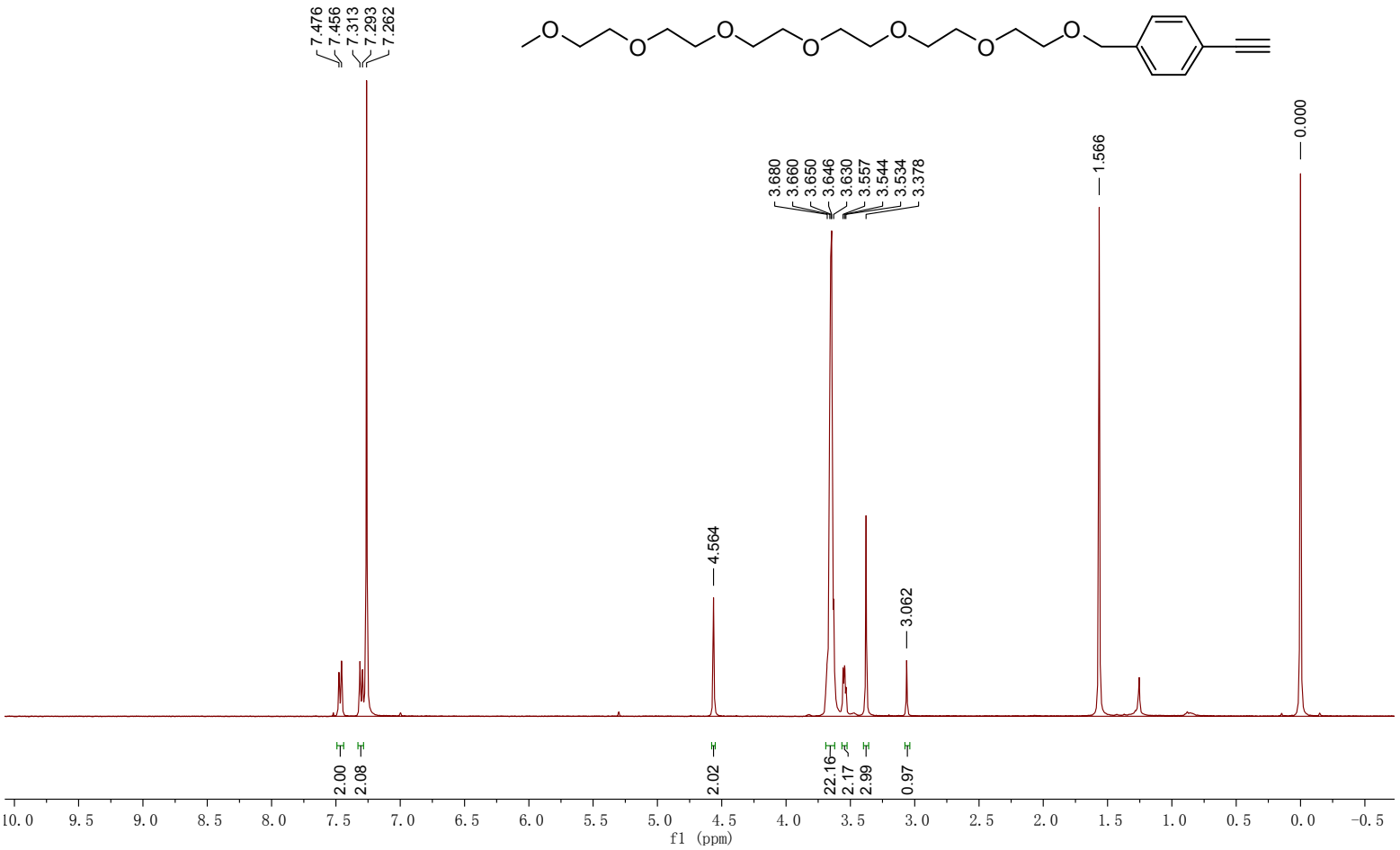

40.540
40.332
40.123
39.705
39.497
39.289
158.250
148.287
145.335
134.115
132.531
124.098
119.954
88.728
81.420
79.301
71.881
60.210
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

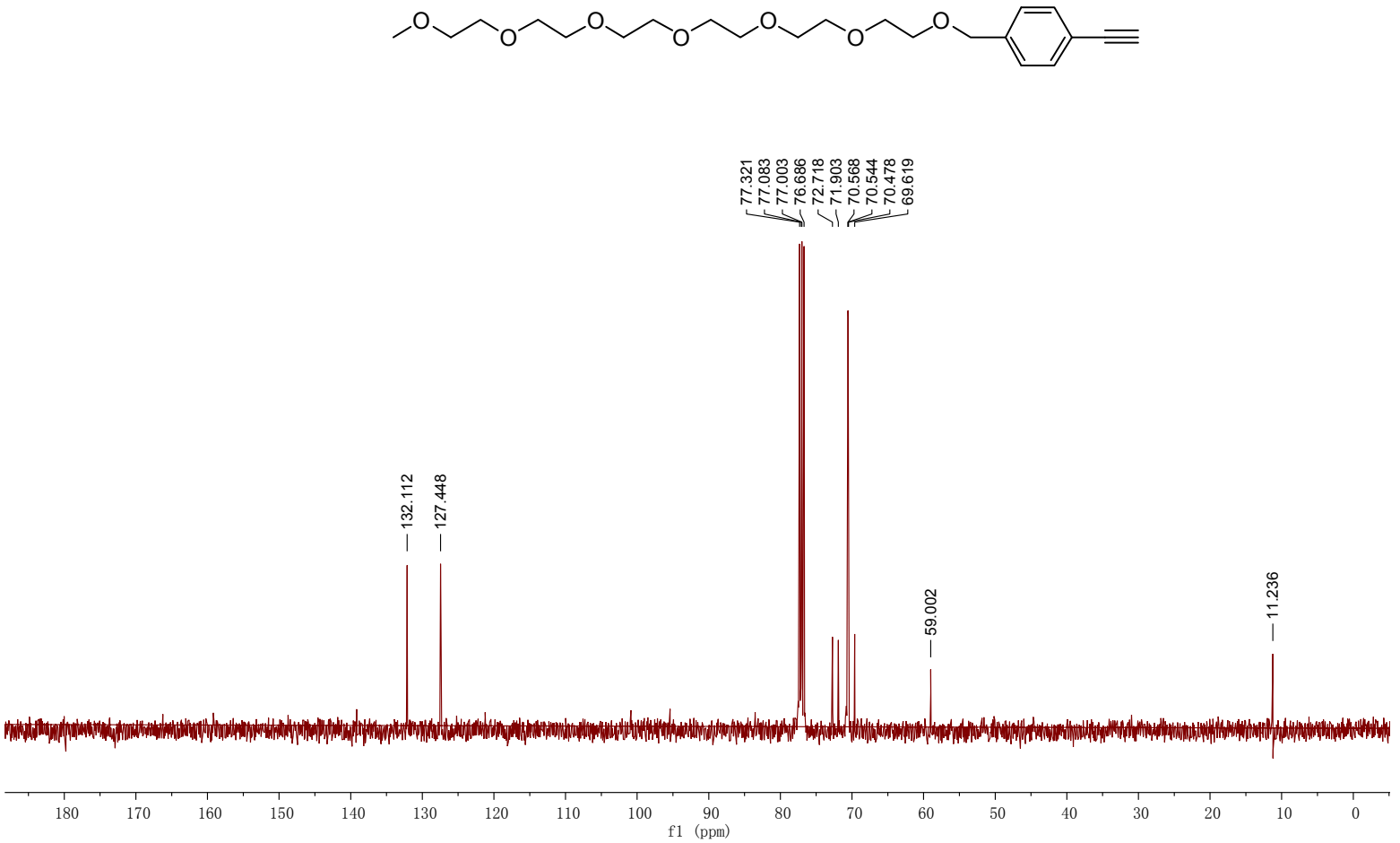

O2N
N
N
N
NH2
O
HO
O
3.597
3.585
3.573
3.474
3.462
3.338
3.315
2.503
8.505
8.316
8.295
8.165
7.936
7.915
5.954
4.705
-0.000
1.04
2.00
1.02
2.05
2.03
1.01
2.03
2.12
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


O2N
N
N
N
NH2
O
HO
O
40.356
40.148
39.939
39.730
39.522
158.185
148.475
148.146
144.904
133.596
127.341
124.492
87.841
84.455
79.443
71.935
60.223
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


O
O
O
O
O
O
O
O
N
N
N
NH2
O
HO
O
3.799
3.788
3.752
3.743
3.681
3.663
3.655
3.559
3.547
3.379
7.593
7.574
7.376
7.357
7.310
7.266
6.059
5.927
4.593
1.728
-0.000
2.02
2.15
1.11
2.00
1.02
2.04
2.15
2.26
22.26
2.24
3.02
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
-0.
f1 (ppm)


79.451
78.901
77.331
77.013
76.695
72.649
71.877
71.665
70.616
70.525
70.439
69.736
157.810
146.631
146.555
140.196
132.166
127.550
120.120
90.516
61.417
58.979
29.670
f1 (ppm)


7.476
7.456
7.313
7.293
7.262
3.680
3.660
3.650
3.646
3.630
3.557
3.544
3.534
3.378
4.564
3.062
1.566
0.000
2.00
2.08
2.02
22.16
2.17
2.99
0.97
f1 (ppm)


77.321
77.083
77.003
76.686
72.718
71.903
70.568
70.544
70.478
69.619
132.112
127.448
59.002
11.236
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)