Supporting Information

Identification of Racemic and Chiral Carbazole Derivatives Containing an Isopropanolamine Linker as Prospective Surrogates against Plant Pathogenic Bacteria: *In Vitro* and *In Vivo* Assays, and Quantitative Proteomics

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Contents

1. Experimental procedures for parallel reaction monitoring (PRM)

1.1 Protein Extraction

The sample was grinded by liquid nitrogen into cell powder and then transferred to a 5-mL centrifuge tube. After that, four volumes of lysis buffer (8 M urea, 1% Triton-100, 10 mM dithiothreitol, and 1% Protease Inhibitor Cocktail) was added to the cell powder, followed by sonication three times on ice using a high intensity ultrasonic processor (Scientz). The remaining debris was removed by centrifugation at 20,000 g at 4 °C for 10 min. Finally, the protein was precipitated with cold 20% TCA for 2 h at -20 °C. After centrifugation at 12,000 g 4 °C for 10 min, the supernatant was discarded. The remaining precipitate was washed with cold acetone for three times. The protein was redissolved in 8 M urea and the protein concentration was determined with BCA kit according to the manufacturer's instructions.

1.2 Trypsin Digestion

For digestion, the protein solution was reduced with 5 mM dithiothreitol for 30 min at 56 °C and alkylated with 11 mM iodoacetamide for 15 min at room temperature in darkness. The protein sample was then diluted to urea concentration less than 2M. Finally, trypsin was added at 1:50 trypsin-to-protein mass ratio for the first digestion overnight and 1:100 trypsin-to-protein mass ratio for a second 4 h-digestion.

1.3 LC-MS/MS Analysis

The tryptic peptides were dissolved in 0.1% formic acid (solvent A), directly loaded onto a home-made reversed-phase analytical column. The gradient was comprised of an increase from 6% to 23% solvent B (0.1% formic acid in 98% acetonitrile) over 38 min, 23% to 35% in 14 min and climbing to 80% in 4 min then holding at 80% for the last 4 min, all at a constant flow rate of 700 nL/min on an EASY-nLC 1000 UPLC system.

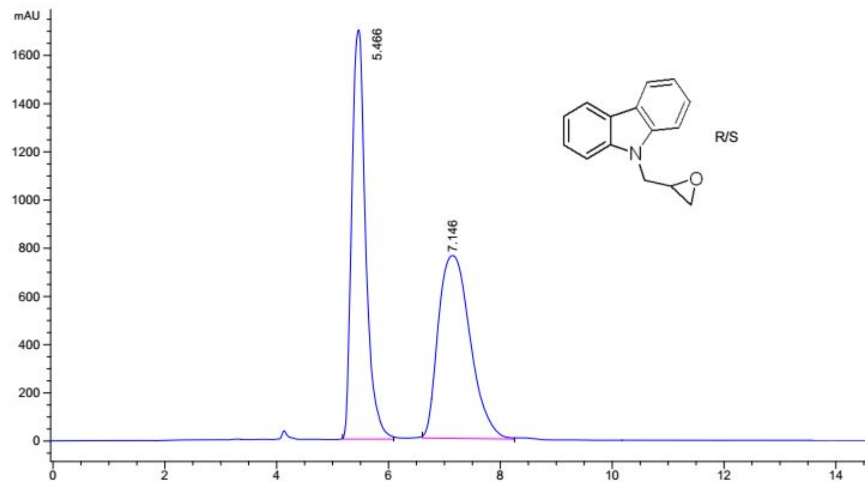
The peptides were subjected to NSI source followed by tandem mass spectrometry (MS/MS) in Q Exactive^{TM} Plus (Thermo) coupled online to the UPLC. The electrospray voltage applied was 2.0 kV. The m/z scan range was 350 to 1000 for full scan, and intact peptides were detected in the Orbitrap at a resolution of 35,000.

Peptides were then selected for MS/MS using NCE setting as 27 and the fragments were detected in the Orbitrap at a resolution of 17,500. A data-independent procedure that alternated between one MS scan followed by 20 MS/MS scans. Automatic gain control (AGC) was set at 3E6 for full MS and 1E5 for MS/MS. The maxumum IT was set at 20 ms for full MS and auto for MS/MS. The isolation window for MS/MS was set at 2.0 m/z.

1.4 Data Analysis

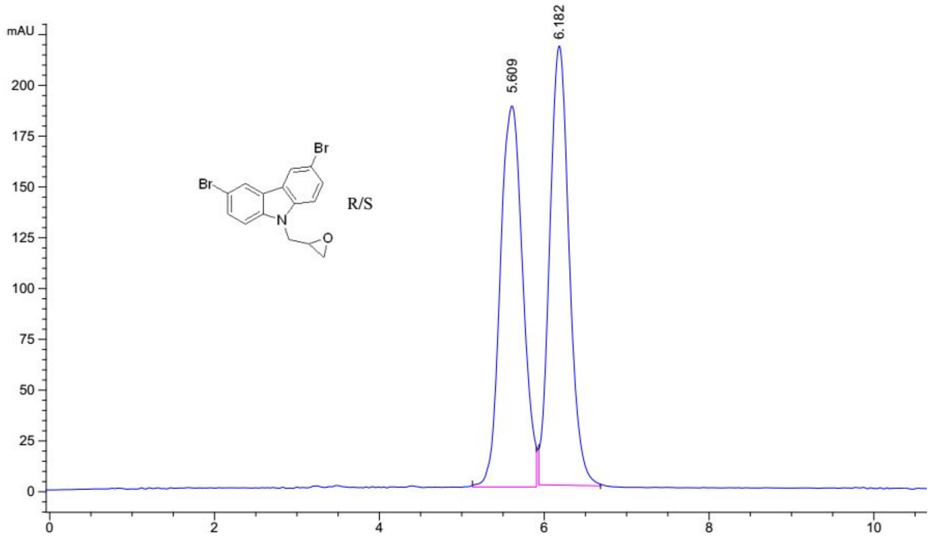
The resulting MS data were processed using Skyline (v.3.6). Peptide settings: enzyme was set as Trypsin [KR/P], Max missed cleavage set as 2. The peptide length was set as 8-25, Variable modification was set as Carbamidomethyl on Cys and oxidation on Met, and max variable modifications was set as 3. Transition settings: precursor charges were set as 2, 3, ion charges were set as 1, 2, ion types were set as b, y, p. The product ions were set as from ion 3 to last ion, the ion match tolerance was set as 0.02 Da. Three replicates were included for each sample in the PRM-MS analysis.

2. Partial racemic or chiral intermediates and target compounds were analyzed by HPLC (Figures S1-S10)



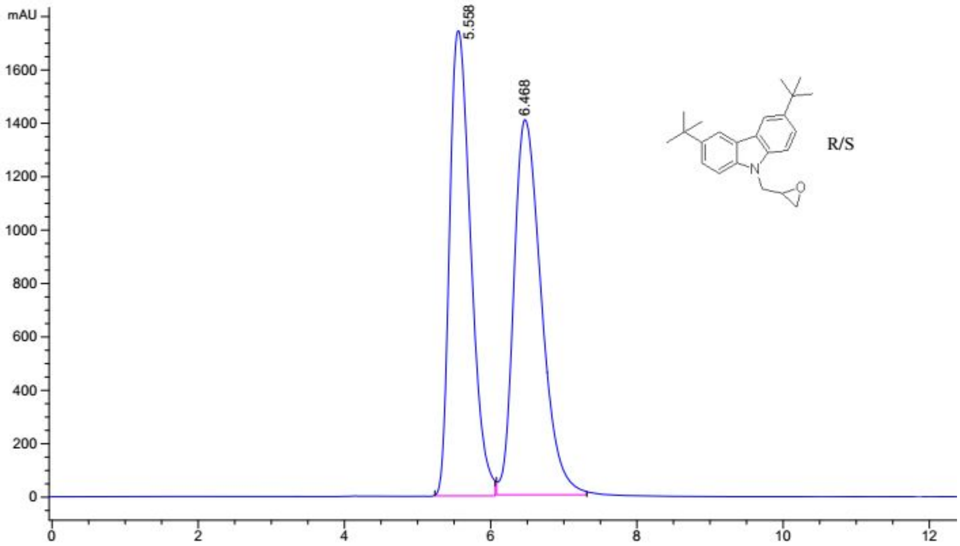
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.466	2.92141e4	1697.91724	49.2437
2	7.146	3.01115e4	758.50378	50.7563

Figure S1. HPLC analysis of **1** (Chiralcel IC; 25 ℃, IPA/Hexane = 20/80, 1 mL/min, 254 nm, Rt_1 = 5.466 min, Rt_2 = 7.146 min; er = 49.24:50.76).



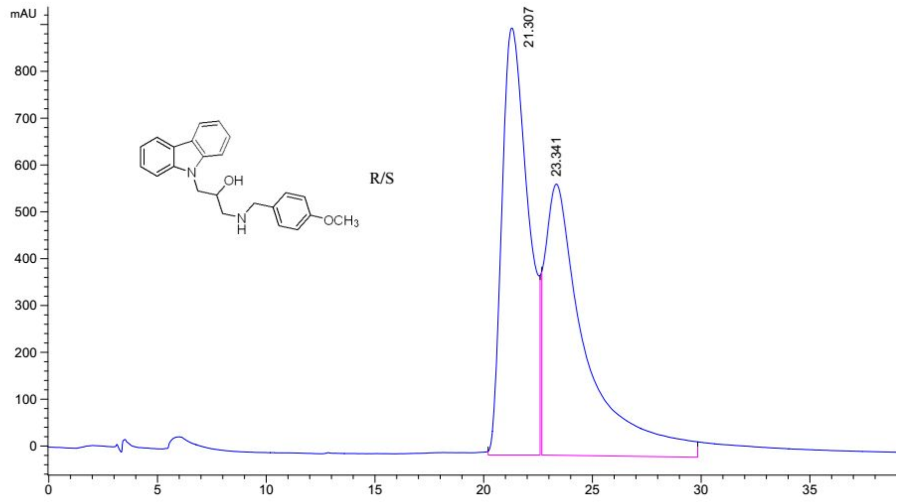
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.609	3548.59448	187.52649	50.0303
2	6.182	3544.30127	216.20840	49.9697

Figure S2. HPLC analysis of **3** bearing diBr groups (Chiralcel IC; 25 ℃, IPA/Hexane = 20/80, 1 mL/min, 254 nm, Rt_1 = 5.609 min, Rt_2 = 6.182 min; er = 50.03:49.97).



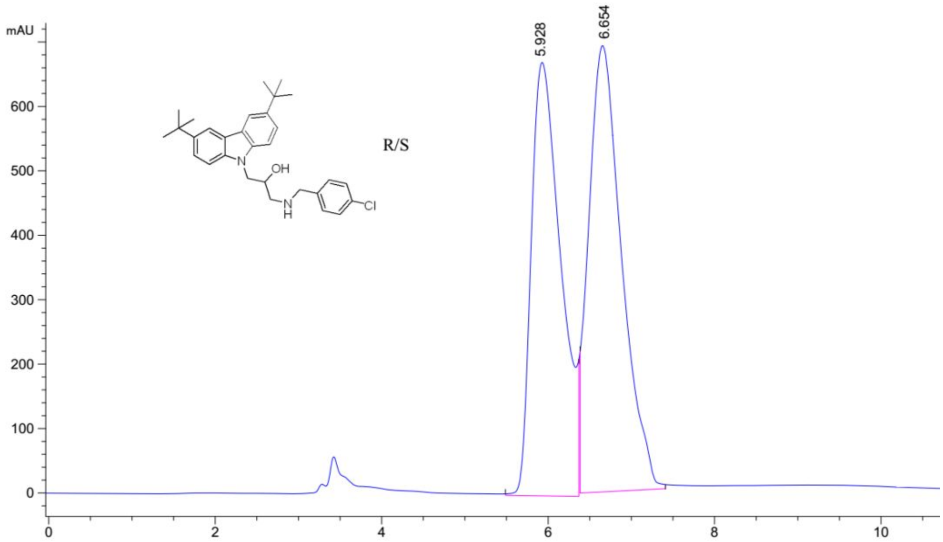
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.558	3.49879e4	1741.93567	48.8916
2	6.468	3.65742e4	1404.84485	51.1084

Figure S3. HPLC analysis of **3** bearing di-tert-butyl groups (Chiralcel AS-H; 25 ℃, IPA/Hexane = 1/99, 1 mL/min, 254 nm, Rt_1 = 5.558 min, Rt_2 = 6.468 min; er = 48.89:51.11).



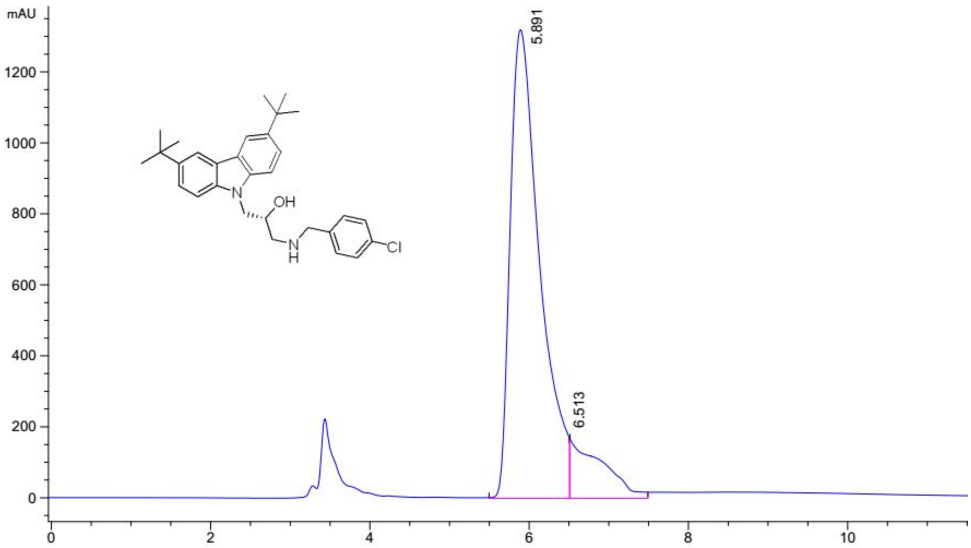
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	21.307	7.64326e4	911.39453	50.2335
2	23.341	7.57221e4	579.02661	49.7665

Figure S4. HPLC analysis of **2a** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 10/90, 1 mL/min, 254 nm, Rt_1 = 21.307 min, Rt_2 = 23.341 min; er = 50.23:49.77).



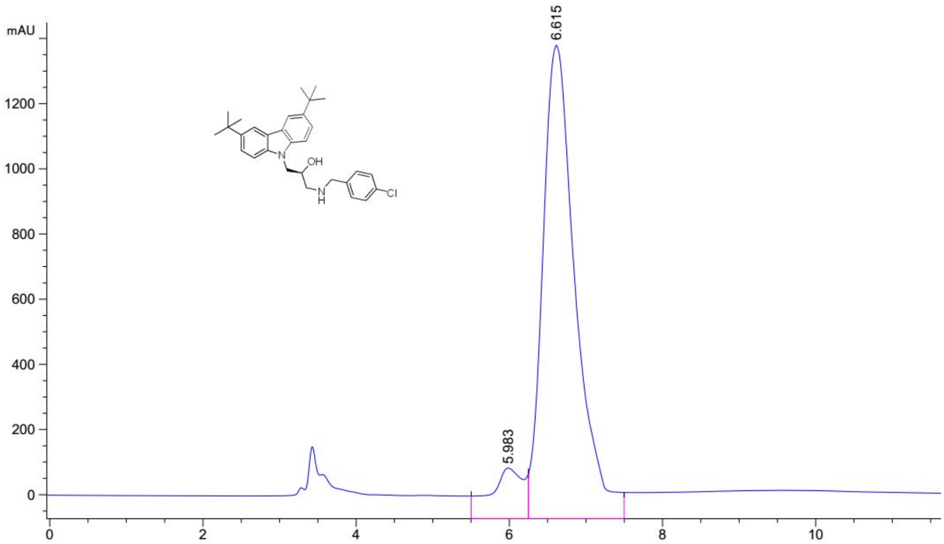
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.928	1.66358e4	672.84326	46.6641
2	6.654	1.90144e4	692.91278	53.3359

Figure S5. HPLC analysis of **4d** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 7/93, 1 mL/min, 254 nm, Rt_1 = 5.928 min, Rt_2 = 6.654 min; er = 46.66:53.34).



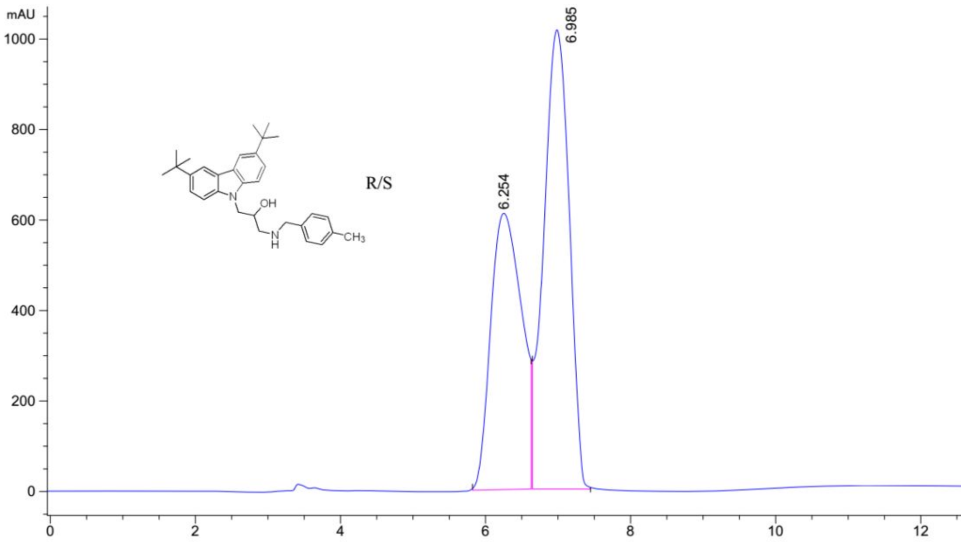
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.891	3.42151e4	1320.70715	87.9504
2	6.513	4687.64160	167.18990	12.0496

Figure S6. HPLC analysis of **6a** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 7/93, 1 mL/min, 254 nm, Rt_1 = 5.891 min, Rt_2 = 6.513 min; er = 87.95:12.05).



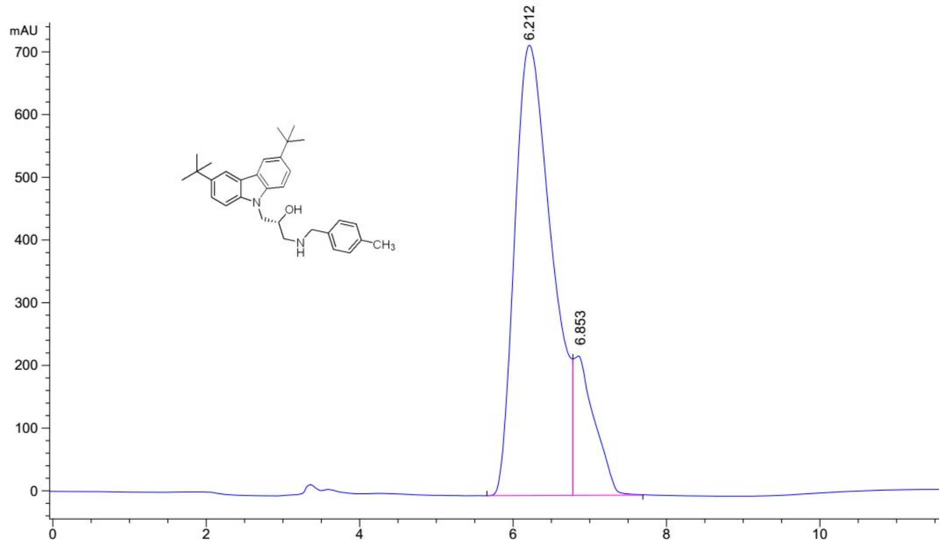
	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.983	4770.28906	155.28040	9.9869
2	6.615	4.29954e4	1452.66138	90.0131

Figure S7. HPLC analysis of **6b** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 7/93, 1 mL/min, 254 nm, Rt_1 = 5.983 min, Rt_2 = 6.615 min; er = 9.99:90.01).



	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.254	1.80664e4	610.87610	42.2025
2	6.985	2.47425e4	1014.87115	57.7975

Figure S8. HPLC analysis of **4f** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 5/95, 1 mL/min, 254 nm, Rt_1 = 6.254 min, Rt_2 = 6.985 min; er = 42.20:57.80).



	RT [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.212	2.42149e4	718.07953	85.1226
2	6.853	4232.19043	222.24248	14.8774

Figure S9. HPLC analysis of **6c** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 5/95, 1 mL/min, 254 nm, Rt_1 = 6.212 min, Rt_2 = 6.853 min; er = 85.12:14.88).

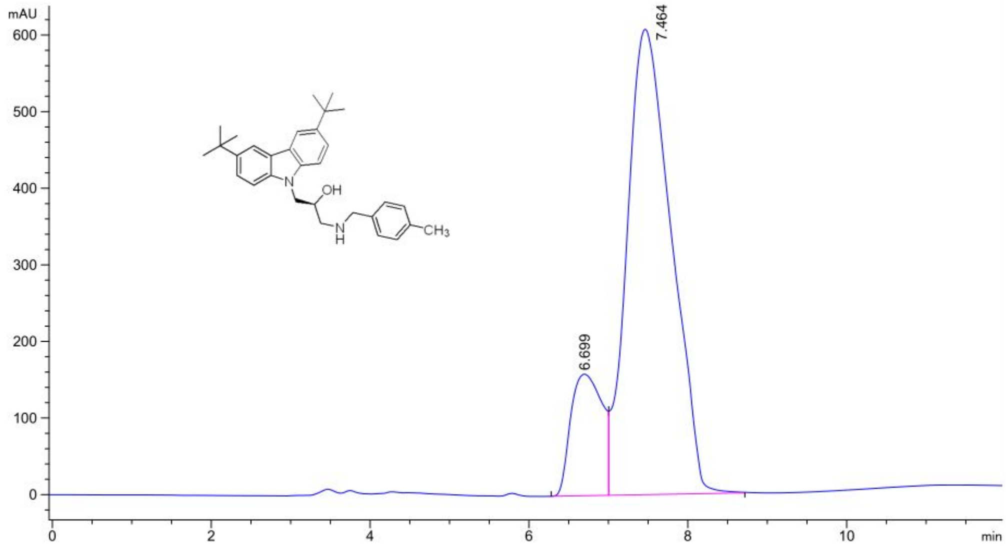


Figure S10. HPLC analysis of **6d** (Chiralcel AS-H; 25 ℃, IPA/Hexane = 5/95, 1 mL/min, 254 nm, Rt_1 = 6.699 min, Rt_2 = 7.464 min; er = 15.71:84.29).

3. Figures Sa-Sc

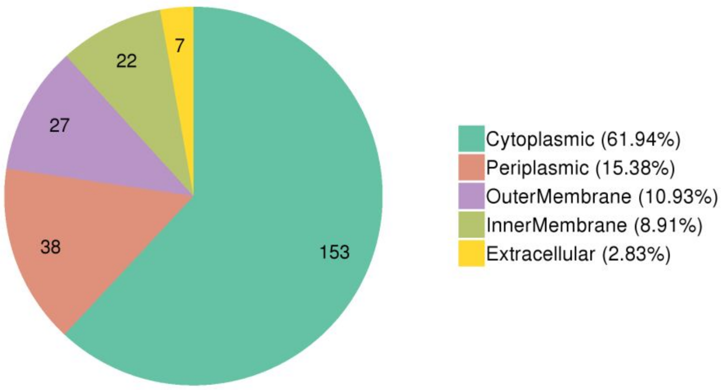


Figure Sa. Subcellular localization chart for these differentially expressed proteins.

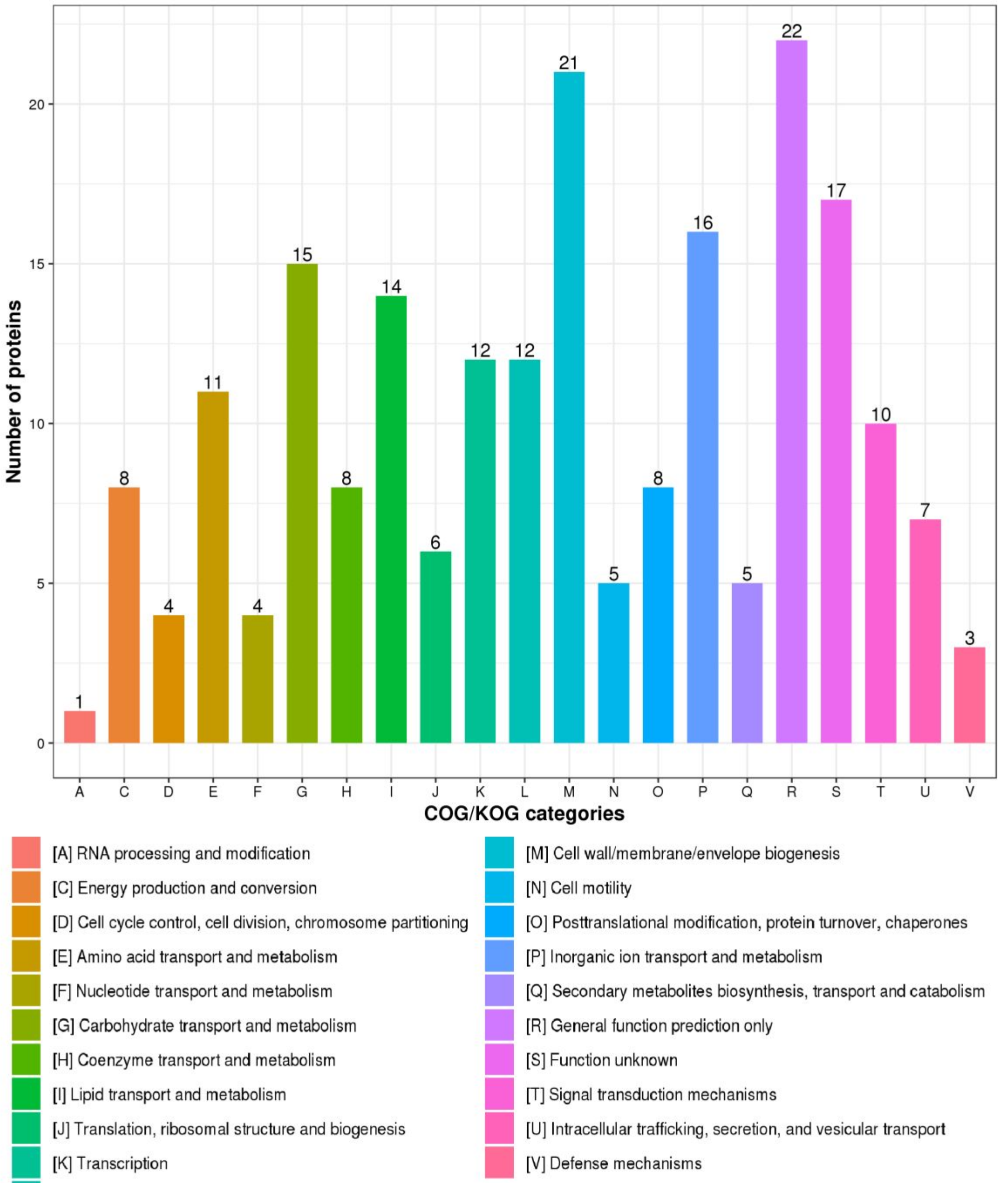


Figure Sb. COG functional classification chart for the differentially expressed proteins.

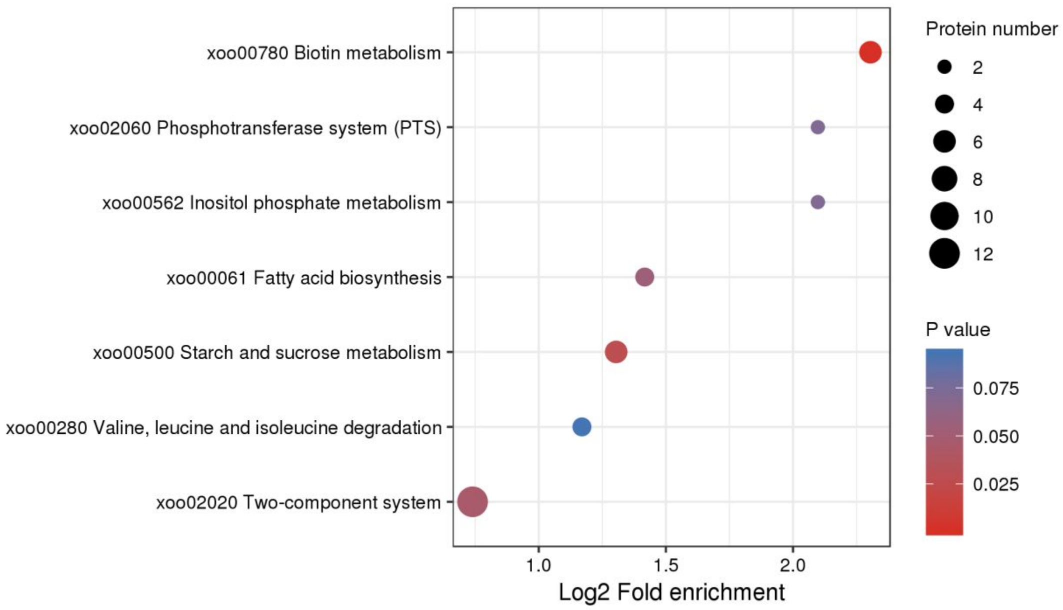


Figure Sc. KEGG pathway enrichment bubble plot of differentially expressed proteins. The vertical axis is the KEGG classification enriched according to fold >1.5, p<0.05, and the horizontal axis is the value of the fold enrichment converted by Log2. The size of the circular area in the figure represents the number of differential proteins, and the circular color represents the enrichment p-value of the differential protein under the KEGG classification.

4. Tables S1-S5

Tabel S1. Basic statistical table of MS results.

Total spectrum	Matched spectrum	Peptides	Unique peptides	Identified proteins	Quantifiable proteins
990280	308291	30927	29951	2337	2095

Table S2. Overview the detailed information of 247 differential expression proteins triggered by compound **2f**.

No	Uinport accession	Description	Regulated Type	iBAQ			2f/CK Ratio	2f/CK P value
				2f-1	2f-2	2f-3		
1	A0A0J9WWI0	ISXo1 transposase	Down	2.85E+08	3.07E+08	3.81E+08	0.333	0.00412
2	A0A0J9WWU4	Transcriptional regulator TetR family	Down	1.26E+08	1.70E+08	1.19E+08	0.636	0.0194
3	A0A0J9WX14	Flagellar motor switch protein FliM	Down	4.85E+08	7.22E+08	7.48E+08	0.491	0.00408
4	A0A0J9WX53	Transcriptional regulator	Down	1.88E+09	2.32E+09	2.58E+09	0.636	0.00502
5	A0A0J9WX74	"Hydrolase, carbon-nitrogen family"	Down	6.04E+08	5.59E+08	4.35E+08	0.582	0.0493
6	A0A0J9WXB9	Uncharacterized protein	Down	4.67E+08	5.10E+08	5.83E+08	0.422	0.000159
7	A0A0J9WXH3	Transcriptional regulator	Down	1.01E+08	1.04E+08	6.53E+07	0.461	0.0138
8	A0A0J9WXN7	TonB protein	Up	3.26E+08	3.40E+08	5.02E+08	1.915	0.0387

9	A0A0K0GF56	"Type III secretion apparatus protein, YscQ/HrcQ family"	Up	2.86E+08	1.82E+08	1.96E+08	6.277	0.029
10	A0A0K0GF95	XopF1 effector	Up	6.52E+08	5.93E+08	7.36E+08	2.115	0.00246
11	A0A0K0GF99	HrpF/NolX/HrpK	Up	3.89E+08	4.11E+08	3.60E+08	2.603	0.000135
12	A0A0K0GFB4	"Type III secretion apparatus protein, HrpE/YscL family"	Up	2.04E+08	1.83E+08	1.94E+08	3.410	0.0000384
13	A0A0K0GFF7	ISXoo7 transposase	Down	1.59E+08	1.57E+08	2.01E+08	0.231	0.0000249
14	A0A0K0GFG3	Transcriptional regulator LacI family	Down	4.15E+08	4.52E+08	5.13E+08	0.481	0.000277
15	A0A0K0GFH4	Lipoprotein	Up	8.74E+07	1.02E+08	9.21E+07	2.650	0.00196
16	A0A0K0GFI5	Uncharacterized protein	Up	7.85E+08	9.59E+08	8.82E+08	1.801	0.00358
17	A0A0K0GFJ4	Type III secretion protein HrpB1/HrpK	Up	3.93E+09	2.82E+09	4.10E+09	2.841	0.0045
18	A0A0K0GFJ5	Alpha-amylase family protein	Up	2.51E+09	2.60E+09	2.35E+09	1.898	0.0000999
19	A0A0K0GFM3	Nitrogen regulatory protein P-II	Down	4.59E+08	3.12E+08	3.77E+08	0.542	0.00614
20	A0A0K0GFM5	Malonyl-[acyl-carrier protein] O-methyltransferase	Down	2.92E+08	3.04E+08	2.83E+08	0.627	0.0029
21	A0A0K0GFN8	Uncharacterized protein	Up	1.84E+08	2.45E+08	2.51E+08	2.453	0.00714
22	A0A0K0GFN9	Tryptophan halogenase	Down	1.46E+09	1.43E+09	1.33E+09	0.581	0.000204
23	A0A0K0GFS2	Acetyltransferase	Down	6.09E+08	7.12E+08	6.91E+08	0.572	0.00892
24	A0A0K0GFT4	ComM	Down	1.17E+08	1.59E+08	1.92E+08	0.601	0.0353
25	A0A0K0GFT8	Uncharacterized protein	Up	1.26E+09	1.34E+09	1.30E+09	1.755	0.0000241
26	A0A0K0GFU8	tRNA uridine 5-carboxymethylaminomethyl modification enzyme MnmG	Down	9.28E+08	8.32E+08	9.74E+08	0.383	0.000257
27	A0A0K0GFV0	DNA-binding transcriptional regulator NtrC	Down	2.91E+08	3.16E+08	4.36E+08	0.657	0.0209
28	A0A0K0GFW8	Acyl-CoA carboxyltransferase beta chain	Down	3.40E+08	4.39E+08	4.00E+08	0.399	0.000477
29	A0A0K0GG05	Uncharacterized protein	Up	3.86E+08	2.96E+08	4.78E+08	1.811	0.0353
30	A0A0K0GG07	D-mannonate oxidoreductase	Down	1.63E+07	1.23E+07	1.58E+07	0.497	0.0111
31	A0A0K0GG31	XopQ effector	Up	2.19E+08	2.14E+08	1.69E+08	2.281	0.012
32	A0A0K0GG46	"Transcriptional regulator, TetR family"	Down	8.49E+07	9.86E+07	1.14E+08	0.656	0.0061
33	A0A0K0GG50	DesA3_2	Down	4.47E+07	3.24E+07	2.47E+07	0.334	0.00248
34	A0A0K0GG54	XopX effector protein	Up	1.18E+10	1.31E+10	1.37E+10	9.658	0.0024
35	A0A0K0GG65	Uncharacterized protein	Up	4.05E+08	3.70E+08	4.49E+08	2.507	0.00364
36	A0A0K0GG81	Methylenetetrahydrofolate reductase	Down	2.51E+08	2.65E+08	2.07E+08	0.580	0.00198
37	A0A0K0GG84	TAL effector AvrBs3/PthA family protein	Up	2.74E+09	3.34E+09	2.38E+09	1.909	0.0116
38	A0A0K0GG85	Glycosyl hydrolase family 10	Up	3.81E+08	3.66E+08	3.71E+08	2.922	0.000604
39	A0A0K0GGA6	Biotin carboxylase	Down	5.43E+08	5.50E+08	4.90E+08	0.365	0.000018
40	A0A0K0GGD2	Acyl-CoA dehydrogenase	Down	1.07E+09	1.33E+09	8.74E+08	0.380	0.00112
41	A0A0K0GGF3	Xanthomonadin biosynthesis acyltransferase	Down	2.76E+08	2.48E+08	3.62E+08	0.558	0.00802
42	A0A0K0GGI7	Ferredoxin	Down	1.55E+08	2.07E+08	1.59E+08	0.477	0.0221
43	A0A0K0GGI9	Anti-sigma F factor antagonist	Down	2.81E+08	2.20E+08	2.84E+08	0.558	0.00394
44	A0A0K0GGL2	Uncharacterized protein	Down	0.00E+00	7.37E+07	7.29E+07	0.407	0.0245
45	A0A0K0GGN0	ISXoo3 transposase ORF A	Down	6.20E+08	6.58E+08	4.90E+08	0.520	0.0052
46	A0A0K0GGR5	O-Antigen Polymerase family	Down	1.69E+08	1.80E+08	2.72E+08	0.510	0.0405
47	A0A0K0GGT0	Nitrilotriacetate monooxygenase component B	Down	2.67E+08	3.30E+08	2.78E+08	0.566	0.000504
48	A0A0K0GGT5	4-hydroxyphenylpyruvate dioxygenase	Down	3.06E+08	2.18E+08	2.04E+08	0.498	0.018
49	A0A0K0GGU7	ABC transporter ATP-binding protein	Down	2.66E+07	3.16E+07	0.00E+00	0.213	0.000325
50	A0A0K0GGX2	Glycosyltransferase	Down	8.64E+07	1.97E+08	1.25E+08	0.521	0.0412
51	A0A0K0GGX7	Uncharacterized protein	Up	2.91E+09	4.42E+09	3.20E+09	3.868	0.0304
52	A0A0K0GH45	"Putative signal protein with GAF,PAS(PAC) and GGDEF domains"	Down	2.42E+07	2.79E+07	0.00E+00	0.483	0.0058
53	A0A0K0GH51	Endoglucanase	Up	6.32E+09	6.06E+09	6.29E+09	2.160	0.000435
54	A0A0K0GH68	Lipoyl synthase	Down	1.03E+09	9.94E+08	1.22E+09	0.627	0.0146
55	A0A0K0GH72	Sulfate permease	Down	2.03E+08	1.76E+08	2.14E+08	0.581	0.0242
56	A0A0K0GHC9	6-phosphogluconate dehydrogenase (Decarboxylating)	Up	4.34E+09	5.55E+09	5.32E+09	1.669	0.00998

57	A0A0K0GHI0	Two-component system sensor protein	Down	2.35E+07	1.90E+07	3.29E+07	0.294	0.0445
58	A0A0K0GHJ3	Conserved mebrane associated protein	Up	8.85E+08	9.88E+08	7.23E+08	1.550	0.0172
59	A0A0K0GHK4	"Glycosyl transferase, group 1 family protein"	Down	1.65E+08	2.11E+08	2.10E+08	0.665	0.0398
60	A0A0K0GHP1	Putative phospholipid-binding domain family	Up	2.76E+09	2.64E+09	2.50E+09	1.749	0.000596
61	A0A0K0GHR3	Phosphoanhydride phosphohydrolase	Up	9.54E+08	8.28E+08	9.21E+08	1.507	0.0112
62	A0A0K0GHU0	"Peptidoglycan D,D-transpeptidase FtsI"	Down	8.10E+07	8.14E+07	1.01E+08	0.430	0.000115
63	A0A0K0GI35	Putative membrane protein	Down	2.46E+09	1.82E+09	2.04E+09	0.638	0.00502
64	A0A0K0GI83	Cysteine protease	Up	7.86E+08	8.20E+08	9.09E+08	5.392	0.0000822
65	A0A0K0GI84	Uncharacterized protein	Down	2.25E+08	2.64E+08	2.70E+08	0.396	0.000022
66	A0A0K0GIC3	Exodeoxyribonuclease IX	Down	5.43E+07	7.02E+07	7.33E+07	0.635	0.0289
67	A0A0K0GIC6	Uncharacterized protein	Down	1.89E+07	1.57E+07	0.00E+00	0.337	0.000516
68	A0A0K0GIH8	TonB-dependent receptor	Down	1.37E+07	3.40E+07	2.02E+07	0.478	0.0225
69	A0A0K0GIJ0	Trehalose 6-phosphate phosphatase	Up	8.16E+08	5.69E+08	8.24E+08	1.868	0.0178
70	A0A0K0GIJ7	Uncharacterized protein	Down	2.93E+09	2.85E+09	3.40E+09	0.298	0.000262
71	A0A0K0GIM1	Acyl-CoA dehydrogenase 1	Down	7.51E+07	1.08E+08	1.01E+08	0.661	0.0374
72	A0A0K0GIN1	Type IV-A pilus assembly ATPase PilB	Down	4.82E+09	5.31E+09	4.69E+09	0.635	0.000437
73	A0A0K0GIR9	Peptidoglycan-associated outer membrane lipoprotein	Up	9.67E+09	9.53E+09	1.28E+10	1.935	0.0156
74	A0A0K0GIS2	Outer membrane protein V	Up	3.44E+08	6.76E+08	6.23E+08	10.61 0	0.0411
75	A0A0K0GIS4	Outer membrane protein	Up	2.30E+08	3.17E+08	4.15E+08	2.303	0.0366
76	A0A0K0GIU0	Trehalose-6-phosphate synthase	Up	2.20E+09	1.95E+09	1.50E+09	1.931	0.0133
77	A0A0K0GIV0	EF hand domain protein	Down	7.12E+07	6.52E+07	1.04E+08	0.232	0.0253
78	A0A0K0GIW7	"CytOchrome o ubiquinol oxidase, subunit I"	Up	3.93E+09	2.79E+09	2.74E+09	2.002	0.0204
79	A0A0K0GJ06	Polyphenol oxidase	Down	1.26E+08	1.22E+08	1.05E+08	0.519	0.0175
80	A0A0K0GJ16	Uncharacterized protein	Up	9.66E+07	0.00E+00	8.54E+07	1.674	0.0157
81	A0A0K0GJ21	Early chlorosis factor protein	Up	1.80E+09	2.20E+09	2.17E+09	2.747	0.000965
82	A0A0K0GJ37	Uncharacterized protein	Up	1.81E+08	1.78E+08	1.39E+08	4.539	0.000981
83	A0A0K0GJ65	Hemolysin	Up	1.51E+09	1.38E+09	1.60E+09	1.588	0.00196
84	A0A0K0GJ84	Beta-ketoadipate enol-lactone hydrolase	Up	1.38E+09	1.45E+09	1.22E+09	1.926	0.00112
85	A0A0K0GJB3	"Tal3b, TAL effector AvrBs3/PthA family"	Up	6.59E+08	4.44E+08	5.94E+08	2.971	0.0256
86	A0A0K0GJC0	Porin	Up	3.49E+09	2.79E+09	3.31E+09	1.821	0.0061
87	A0A0K0GJI4	Ferrous iron transport protein B	Down	1.70E+08	2.18E+08	2.24E+08	0.535	0.0278
88	A0A0K0GJI5	"Tal3a, TAL effector AvrBs3/PthA family"	Up	7.46E+08	1.07E+09	1.05E+09	2.687	0.00538
89	A0A0K0GJI8	Major cold shock protein	Down	1.29E+10	1.35E+10	1.30E+10	0.411	0.0366
90	A0A0K0GJJ0	Mosc domain protein	Down	2.26E+08	3.28E+08	1.38E+08	0.581	0.0408
91	A0A0K0GJL0	Uncharacterized protein	Down	0.00E+00	5.52E+07	7.30E+07	0.245	0.0154
92	A0A0K0GJN0	Pts system fructose-specific eiibc component (Eiibc-fru) (Eii-fru)	Up	2.28E+09	2.74E+09	3.92E+09	1.921	0.0463
93	A0A0K0GJN3	Multiphosphoryl transfer protein (MTP)	Up	5.88E+09	6.58E+09	6.51E+09	1.695	0.000344
94	A0A0K0GJP1	Ubiquinol-cytochrome c reductase iron-sulfur subunit	Down	1.33E+08	1.25E+08	1.68E+08	0.525	0.00852
95	A0A0K0GJR9	Polar amino acid transporter	Up	2.55E+09	1.85E+09	2.09E+09	1.556	0.0242
96	A0A0K0GJT3	Stringent starvation protein B	Up	9.41E+08	1.05E+09	9.30E+08	1.625	0.00134
97	A0A0K0GJV1	Virulence protein	Down	5.64E+08	4.57E+08	5.92E+08	0.624	0.00958
98	A0A0K0GJV6	N-acetylmuramoyl-L-alanine amidase	Down	3.06E+08	3.43E+08	3.49E+08	0.355	0.0000995
99	A0A0K0GJV9	Transcriptional regulator LacI family	Up	2.31E+08	1.90E+08	2.02E+08	2.210	0.00218
100	A0A0K0GJZ6	Poly(Hydroxyalcanoate) granule associated protein	Up	3.48E+09	4.01E+09	3.23E+09	1.988	0.00188
101	A0A0K0GK11	Cation efflux system protein	Up	5.99E+08	5.80E+08	7.03E+08	3.262	0.000823
102	A0A0K0GK30	"Putative signal protein with GAF, GGDEF and EAL domains"	Down	2.68E+07	2.72E+07	1.69E+07	0.348	0.0116
103	A0A0K0GK37	Transposase	Down	1.43E+08	1.74E+08	1.44E+08	0.635	0.00436

104	A0A0K0GK43	Ribosomal RNA small subunit methyltransferase D	Down	0.00E+00	3.70E+07	6.84E+07	0.533	0.0377
105	A0A0K0GK47	Polyphosphate-selective porin O	Up	1.65E+09	1.52E+09	1.52E+09	1.710	0.00186
106	A0A0K0GK94	Mosc	Down	7.62E+07	7.65E+07	8.37E+07	0.573	0.00106
107	A0A0K0GKB9	"Tal4, TAL effector AvrBs3/PthA family"	Up	1.40E+10	1.42E+10	1.68E+10	1.871	0.0044
108	A0A0K0GKD9	Histidine ammonia-lyase	Down	4.23E+08	3.22E+08	3.54E+08	0.628	0.00248
109	A0A0K0GKF9	Cation efflux system protein	Up	4.50E+08	5.39E+08	4.10E+08	2.922	0.0152
110	A0A0K0GKH0	Beta-glucosidase	Down	6.20E+09	6.75E+09	5.48E+09	0.596	0.000444
111	A0A0K0GKM0	Cation efflux system protein	Up	1.84E+08	1.91E+08	1.39E+08	2.847	0.0143
112	A0A0K0GKW4	S1 RNA binding domain protein	Down	2.40E+09	2.54E+09	2.70E+09	0.471	0.0000565
113	A0A0K0GKZ6	Oligoribonuclease	Down	1.25E+09	8.00E+08	9.15E+08	0.554	0.024
114	A0A0K0GL38	Protein YciI	Up	4.56E+08	5.64E+08	7.83E+08	2.324	0.0447
115	A0A0K0GL73	ABC transporter ATP-binding protein	Down	8.43E+08	6.36E+08	7.41E+08	0.659	0.0116
116	A0A0K0GL76	Outer membrane efflux protein	Up	2.16E+09	2.26E+09	2.63E+09	1.556	0.0278
117	A0A0K0GL77	Uncharacterized protein	Up	8.40E+09	6.44E+09	8.83E+09	2.207	0.00524
118	A0A0K0GL79	"FAD dependent oxidoreductase, putative"	Down	1.29E+08	2.02E+08	1.56E+08	0.654	0.0187
119	A0A0K0GLB5	Multidrug resistance efflux pump	Up	1.23E+09	1.45E+09	1.44E+09	1.505	0.00378
120	A0A0K0GLC8	MazG family protein	Down	3.30E+08	2.70E+08	2.37E+08	0.629	0.0299
121	A0A0K0GLF0	"Outer membrane receptor protein, mostly Fe transport"	Up	1.53E+10	1.43E+10	1.68E+10	1.621	0.00132
122	A0A0K0GLF1	Endoribonuclease L-PSP family	Up	3.01E+09	3.34E+09	2.88E+09	1.578	0.0049
123	A0A0K0GLF2	Fructokinase	Down	1.71E+09	1.79E+09	2.07E+09	0.642	0.0373
124	A0A0K0GLG4	Uncharacterized protein	Down	7.34E+07	1.24E+08	1.16E+08	0.595	0.0224
125	A0A0K0GLH5	Uncharacterized protein	Down	7.78E+08	9.89E+08	1.16E+09	0.572	0.0156
126	A0A0K0GLI5	Dehydrogenase	Down	8.91E+07	9.95E+07	9.79E+07	0.627	0.0103
127	A0A0K0GLJ2	Cyclopropane-fatty-acyl-phospholipid synthase	Down	5.00E+08	5.11E+08	5.34E+08	0.665	0.000019
128	A0A0K0GLL0	Acetyltransferase	Down	3.70E+07	0.00E+00	2.70E+07	0.598	0.0171
129	A0A0K0GLL2	Heat shock protein	Down	5.15E+08	5.16E+08	6.45E+08	0.505	0.00368
130	A0A0K0GLL4	Cobalt-zinc-cadmium resistance protein	Up	2.58E+08	2.21E+08	2.51E+08	1.718	0.00986
131	A0A0K0GLP9	Uncharacterized protein	Up	5.95E+08	6.79E+08	5.37E+08	1.545	0.00938
132	A0A0K0GLQ6	Enoyl-CoA hydratase	Down	2.56E+09	1.97E+09	2.16E+09	0.595	0.00154
133	A0A0K0GLQ7	Methylmalonate-semialdehyde dehydrogenase	Down	1.23E+09	1.20E+09	1.44E+09	0.660	0.00234
134	A0A0K0GLT6	Uncharacterized protein	Up	3.87E+08	3.87E+08	4.01E+08	2.484	0.0000426
135	A0A0K0GLU2	Uncharacterized protein	Up	1.01E+10	1.02E+10	1.11E+10	6.745	0.0000376
136	A0A0K0GLV0	Acyl-coenzyme A dehydrogenase	Up	6.49E+09	7.76E+09	7.28E+09	1.507	0.0229
137	A0A0K0GLV1	PilH	Down	1.02E+09	1.29E+09	7.87E+08	0.574	0.0349
138	A0A0K0GLY9	Uncharacterized protein	Down	4.02E+08	4.26E+08	4.32E+08	0.369	0.0303
139	A0A0K0GLZ2	Pilus biogenesis protein	Down	2.49E+08	2.45E+08	5.16E+08	0.285	0.00106
140	A0A0K0GLZ3	PilL protein	Down	3.56E+09	3.61E+09	3.61E+09	0.564	0.0086
141	A0A0K0GM24	Uncharacterized protein	Down	4.39E+07	4.76E+07	3.79E+07	0.089	0.00274
142	A0A0K0GM35	Phage capsid scaffolding protein (GPO)	Up	7.01E+08	7.40E+08	1.00E+09	3.185	0.0275
143	A0A0K0GM36	Uncharacterized protein	Up	6.91E+08	8.43E+08	8.55E+08	1.573	0.00582
144	A0A0K0GM49	"Putative tail fiber assembly protein, putative"	Up	1.30E+08	1.60E+08	1.30E+08	2.265	0.0137
145	A0A0K0GM62	Phage-related protein	Up	1.15E+08	1.55E+08	1.45E+08	2.651	0.00282
146	A0A0K0GM94	Ketoglutarate semialdehyde dehydrogenase	Down	1.64E+09	2.27E+09	1.95E+09	0.645	0.022
147	A0A0K0GM98	Proline racemase	Down	9.26E+08	1.32E+09	1.06E+09	0.517	0.00306
148	A0A0K0GMD3	D-amino acid oxidase	Down	5.22E+08	4.28E+08	5.54E+08	0.546	0.0023
149	A0A0K0GMF2	Phage-related terminase	Up	1.63E+08	1.37E+08	1.93E+08	1.717	0.0287
150	A0A0K0GMJ6	TonB-dependent receptor	Up	3.74E+09	3.59E+09	4.00E+09	1.533	0.00186
151	A0A0K0GMK9	NADH-ubiquinone oxidoreductase Nqo10 subunit	Up	8.22E+08	9.36E+08	5.89E+08	1.617	0.0455
152	A0A0K0GMM0	Phage tail sheath protein	Up	4.70E+08	3.97E+08	5.10E+08	2.235	0.0018
153	A0A0K0GMN5	Oxidoreductase	Down	1.62E+08	1.83E+08	1.52E+08	0.581	0.0194
154	A0A0K0GMQ5	Uncharacterized protein	Down	6.98E+08	6.62E+08	4.86E+08	0.598	0.00424
155	A0A0K0GMV5	Lipase esterase	Down	3.72E+09	4.34E+09	4.55E+09	0.622	0.00338
156	A0A0K0GMW2	Phage-related protein	Up	1.65E+08	1.35E+08	1.46E+08	2.699	0.000805
157	A0A0K0GMW4	Outer membrane protein	Up	1.25E+09	1.19E+09	1.17E+09	1.617	0.00688

158	A0A0K0GMW7	Phage major tail tube protein	Up	4.56E+08	3.42E+08	5.65E+08	2.333	0.0188
159	A0A0K0GMZ8	Nicotinate-nucleotide pyrophosphorylase	Down	7.32E+08	7.99E+08	7.46E+08	0.659	0.001
160	A0A0K0GN43	Uncharacterized protein	Down	1.33E+08	4.82E+07	7.34E+07	0.345	0.0326
161	A0A0K0GN56	Catalase	Up	9.43E+08	1.09E+09	1.07E+09	2.699	0.00016
162	A0A0K0GND4	Uncharacterized protein	Up	1.94E+08	1.95E+08	1.93E+08	5.041	0.000000503
163	A0A0K0GNE4	UDP-N-acetylmuramoylalanine--D-glutamate ligase	Down	2.33E+08	3.19E+08	3.81E+08	0.640	0.0293
164	A0A0K0GNE9	Surface antigen protein	Up	2.78E+09	3.16E+09	3.25E+09	1.569	0.0023
165	A0A0K0GNG2	Bacterial DNA-binding protein	Down	1.64E+10	1.92E+10	2.08E+10	0.550	0.0238
166	A0A0K0GNG5	Glutamine synthetase family protein	Down	8.70E+07	9.37E+07	1.06E+08	0.588	0.00378
167	A0A0K0GNJ1	TPR repeat protein	Up	3.17E+09	2.62E+09	1.95E+09	1.692	0.0462
168	A0A0K0GNL5	Vibrioferrin biosynthesis protein PvsB	Down	9.60E+07	9.07E+07	1.51E+08	0.356	0.0321
169	A0A0K0GNL7	Putative heat shock protein 15-like protein	Down	1.95E+07	2.35E+07	2.33E+07	0.541	0.0039
170	A0A0K0GNN6	DNA transport competence protein	Down	4.30E+07	7.41E+07	0.00E+00	0.480	0.0243
171	A0A0K0GNQ1	Porin O	Up	9.49E+08	9.72E+08	8.91E+08	2.385	0.000279
172	A0A0K0GNQ5	TonB-dependent receptor	Down	5.63E+09	5.79E+09	6.51E+09	0.632	0.000658
173	A0A0K0GNR1	"Cytochrome D ubiquinol oxidase, subunit II"	Up	2.51E+08	3.22E+08	0.00E+00	3.583	0.0396
174	A0A0K0GNT0	"HIT domain, putative"	Up	9.40E+08	7.63E+08	8.47E+08	1.570	0.00698
175	A0A0K0GNU4	SapC superfamily	Down	1.22E+08	1.57E+08	1.12E+08	0.317	0.000163
176	A0A0K0GNX0	"Lipoprotein, putative"	Up	5.82E+08	7.05E+08	8.46E+08	2.723	0.0281
177	A0A0K0GP03	50S ribosomal protein L31	Down	1.13E+10	1.64E+10	1.32E+10	0.591	0.0127
178	A0A0K0GP06	DNA-directed RNA polymerase subunit omega	Down	3.31E+08	3.41E+08	2.56E+08	0.602	0.00656
179	A0A0K0GP15	Putative membrane protein	Up	4.16E+08	5.16E+08	5.17E+08	1.605	0.00622
180	A0A0K0GP16	Glutathione S-transferase GST-4.5	Down	7.00E+08	9.60E+08	7.21E+08	0.664	0.0124
181	A0A0K0GP38	dITP/XTP pyrophosphatase	Down	1.44E+08	1.39E+08	1.23E+08	0.645	0.00494
182	A0A0K0GP45	Tryptophan halogenase	Down	2.02E+08	1.52E+08	1.41E+08	0.500	0.0053
183	A0A0K0GP90	Low molecular weight heat shock protein	Up	5.71E+08	8.04E+08	1.07E+09	4.977	0.0403
184	A0A0K0GP96	DNA polymerase III subunit epsilon	Down	5.29E+08	4.10E+08	5.25E+08	0.642	0.0401
185	A0A0K0GPF0	OmpA family outer membrane protein	Up	1.81E+11	1.94E+11	1.95E+11	1.857	0.000197
186	A0A0K0GPF1	Type IV pilus assembly protein PilZ	Down	3.56E+08	2.16E+08	4.81E+08	0.601	0.0404
187	A0A0K0GPG5	Glutaredoxin	Down	6.03E+07	8.39E+07	7.18E+07	0.179	0.00106
188	A0A0K0GPK6	TonB-dependent receptor	Up	4.10E+10	4.09E+10	4.69E+10	1.628	0.0036
189	A0A0K0GPK8	Outer membrane protein Slp	Up	1.36E+10	1.16E+10	1.34E+10	1.853	0.00402
190	A0A0K0GPL6	ISXo8 transposase	Down	4.68E+09	4.57E+09	5.85E+09	0.617	0.0107
191	A0A0K0GPM3	Transcriptional regulator	Up	3.92E+08	3.93E+08	3.89E+08	1.632	0.034
192	A0A0K0GPP0	Acetolactate synthase	Down	1.65E+09	1.26E+09	1.47E+09	0.650	0.0174
193	A0A0K0GPP3	"Membrane protein, putative"	Down	1.65E+08	0.00E+00	2.19E+08	0.339	0.00114
194	A0A0K0GPP6	Glycerophosphodiester phosphodiesterase	Up	8.07E+08	7.75E+08	1.02E+09	1.524	0.0414
195	A0A0K0GPR7	3-oxoacyl-(Acyl-carrier-protein) reductase	Down	1.10E+09	1.12E+09	1.07E+09	0.543	0.0141
196	A0A0K0GPT4	Putative transposase	Down	3.26E+09	2.40E+09	2.69E+09	0.591	0.00386
197	A0A0K0GPT7	TonB-dependent outer membrane receptor	Up	2.80E+09	2.60E+09	2.70E+09	1.639	0.000282
198	A0A0K0GPV0	General secretion pathway protein G	Up	3.98E+09	3.46E+09	3.85E+09	2.723	0.00012
199	A0A0K0GPW5	Malonyl CoA-acyl carrier protein transacylase	Down	1.75E+09	1.70E+09	1.49E+09	0.613	0.00452
200	A0A0K0GPX2	Maf-like protein PXO_02703	Down	3.81E+08	3.01E+08	3.40E+08	0.635	0.00282
201	A0A0K0GPY6	Uncharacterized protein	Down	2.75E+07	3.25E+07	3.26E+07	0.628	0.0232
202	A0A0K0GPZ5	Uncharacterized protein	Up	4.13E+08	3.08E+08	2.87E+08	2.192	0.0106
203	A0A0K0GQ08	Transport permease protein	Up	4.36E+08	3.09E+08	1.94E+08	3.015	0.0434
204	A0A0K0GQ31	dTDP-4-dehydrorhamnose reductase	Down	9.19E+08	7.35E+08	8.79E+08	0.611	0.0439
205	A0A0K0GQ60	Uncharacterized protein	Down	1.18E+08	1.15E+08	1.07E+08	0.565	0.00034
206	A0A0K0GQ64	3-hydroxydecanoyl-[acyl-carrier-protein] dehydratase	Down	5.19E+09	4.34E+09	4.02E+09	0.596	0.00456
207	A0A0K0GQ70	"6-carboxy-5,6,7,8-tetrahydropterin synthase"	Up	6.04E+08	7.24E+08	6.01E+08	1.613	0.0392

208	A0A0K0GQ90	Outer membrane protein	Up	2.49E+10	2.55E+10	2.47E+10	1.603	0.0307
209	A0A0K0GQA3	Beta-ketoacyl-synthase I	Down	3.23E+09	3.16E+09	2.75E+09	0.535	0.0148
210	A0A0K0GQB6	Transposase	Down	7.39E+08	5.92E+08	7.04E+08	0.549	0.00927
211	A0A0K0GQH0	Transcriptional regulator PbsX family	Down	2.44E+08	2.72E+08	1.73E+08	0.649	0.0197
212	A0A0K0GQJ7	Tryptophan halogenase	Down	1.77E+08	2.26E+08	1.82E+08	0.427	0.00898
213	A0A0K0GQN0	Chromosome partitioning protein	Down	3.99E+08	4.50E+08	5.23E+08	0.392	0.00192
214	A0A0K0GQN3	XopN effector	Up	5.27E+09	6.68E+09	5.84E+09	3.964	0.00848
215	A0A0K0GQR0	Ribonucleoside-diphosphate reductase	Down	1.02E+10	1.08E+10	1.11E+10	0.662	0.000142
216	A0A0K0GQT1	Uncharacterized protein	Down	1.08E+09	1.22E+09	1.30E+09	0.612	0.00762
217	A0A0K0GQV5	Magnesium transporter MgtE	Up	1.18E+09	1.41E+09	1.24E+09	1.652	0.00368
218	A0A0K0GQZ8	TonB-dependent receptor	Down	1.85E+09	2.06E+09	1.98E+09	0.472	0.00162
219	A0A0K0GR24	Thioredoxin	Down	8.84E+07	3.32E+07	4.90E+07	0.097	0.00398
220	A0A0K0GR33	SapC	Down	2.38E+08	2.76E+08	2.99E+08	0.570	0.0117
221	A0A0K0GR36	Uncharacterized protein	Down	6.68E+07	5.22E+07	5.62E+07	0.322	0.00332
222	A0A0K0GR69	Uncharacterized protein	Down	1.63E+08	1.13E+08	1.05E+08	0.527	0.0273
223	A0A0K0GR87	ATP-dependent DNA helicase DinG	Down	1.25E+08	1.69E+08	1.97E+08	0.580	0.00728
224	A0A0K0GRA2	Pass1 domain protein	Down	1.15E+08	1.22E+08	1.62E+08	0.537	0.00288
225	A0A0K0GRC1	D-alanine--D-alanine ligase	Down	1.14E+08	1.28E+08	1.74E+08	0.499	0.0098
226	A0A0K0GRE1	Uncharacterized protein	Down	7.96E+09	8.60E+09	6.79E+09	0.650	0.0035
227	A0A0K0GRE2	Alkaline phosphatase D	Up	9.61E+07	8.97E+07	8.07E+07	1.825	0.0017
228	A0A0K0GRG9	Endoglucanase	Up	5.46E+09	6.63E+09	6.68E+09	1.861	0.00226
229	A0A0K0GRI4	Uncharacterized protein	Down	2.67E+08	2.14E+08	2.42E+08	0.549	0.011
230	A0A0K0GRN4	Antigen	Down	2.84E+09	2.74E+09	2.73E+09	0.608	0.0194
231	B2SK75	Oxygen-dependent coproporphyrinogen-III oxidase	Up	4.39E+09	6.28E+09	6.24E+09	1.749	0.0238
232	B2SKN4	1-(5-phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino] imidazole-4-carboxamide isomerase	Down	2.24E+08	2.17E+08	3.34E+08	0.666	0.0332
233	B2SL50	Protein Smg homolog	Down	1.07E+08	0.00E+00	9.71E+07	0.386	0.0257
234	B2SM33	Phosphoribosylaminoimidazole-succinocarboxamide synthase	Down	3.13E+09	3.24E+09	3.75E+09	0.613	0.00402
235	B2SMI4	Trigger factor	Down	2.86E+10	2.89E+10	3.45E+10	0.599	0.00884
236	B2SNZ9	UDP-3-O-acyl-N-acetylglucosamine deacetylase	Down	3.30E+08	3.98E+08	5.53E+08	0.451	0.00308
237	B2SQ77	ATP-dependent dethiobiotin synthetase BioD	Down	3.72E+08	3.71E+08	4.52E+08	0.597	0.00472
238	B2SQM8	UPF0761 membrane protein PXO_04555	Up	1.77E+08	1.69E+08	1.48E+08	1.515	0.00706
239	B2SQP2	Peptidyl-tRNA hydrolase	Down	3.51E+08	4.01E+08	2.89E+08	0.542	0.00362
240	B2SQR4	30S ribosomal protein S19	Down	3.37E+09	4.16E+09	7.68E+09	0.473	0.0268
241	B2SS66	8-amino-7-oxononanoate synthase	Down	5.72E+08	6.30E+08	6.63E+08	0.546	0.000636
242	B2SS67	Biotin synthase	Down	2.18E+09	2.50E+09	2.63E+09	0.606	0.000803
243	B2SSQ1	Aminomethyltransferase	Down	2.02E+09	2.24E+09	2.24E+09	0.557	0.000617
244	B2STC6	4-hydroxy-3-methylbut-2-enyl diphosphate reductase	Down	1.56E+09	1.32E+09	1.66E+09	0.646	0.00522
245	B2SUD1	Translational regulator CsrA	Up	9.40E+09	7.75E+09	1.05E+10	1.551	0.0372
246	B2SW86	tRNA-2-methylthio-N(6)-dimethylallyladenosine synthase	Down	4.51E+08	4.83E+08	5.21E+08	0.512	0.000316
247	B2SWL6	Large-conductance mechanosensitive channel	Up	9.15E+08	1.10E+09	1.11E+09	1.544	0.0048

Table S3. The comparison of parallel reaction monitoring (PRM) analysis with the label free quantitative proteomics result triggered by compound **2f**.

No.	Uinport accession	Description	Regulated Type	Label free		PRM	
				2f/CK Ratio	2f/CK P value	2f/CK Ratio	2f/CK P value
1	A0A0K0GLZ2	Biotin carboxylase	Down	0.285	1.06E-02	0.23	5.13E-04
2	A0A0K0GIJ7	Acyl-CoA dehydrogenase	Down	0.298	2.62E-04	0.31	3.83E-06
3	A0A0K0GGA6	Acyl-CoA carboxyltransferase beta chain	Down	0.365	1.80E-05	0.36	1.02E-04
4	A0A0K0GGD2	Major cold shock protein	Down	0.380	1.12E-03	0.30	4.68E-05

5	A0A0K0GFW8	Tryptophan halogenase	Down	0.399	4.77E-04	0.31	1.46E-05
6	A0A0K0GJI8	TonB-dependent receptor	Down	0.411	3.66E-02	0.25	4.90E-05
7	A0A0K0GQJ7	Heat shock protein	Down	0.427	8.98E-03	0.29	6.73E-05
8	A0A0K0GQZ8	Proline racemase	Down	0.472	1.62E-03	0.43	1.91E-04
9	A0A0K0GLL2	Beta-ketoacyl-synthase I	Down	0.505	3.68E-03	0.40	7.93E-04
10	A0A0K0GM98	3-oxoacyl-(Acyl-carrier-protein) reductase	Down	0.517	3.06E-03	0.30	3.45E-05
11	A0A0K0GQA3	8-amino-7-oxononanoate synthase	Down	0.535	1.48E-02	0.55	7.57E-05
12	A0A0K0GPR7	Biotin synthase	Down	0.543	1.41E-02	0.47	7.38E-05
13	B2SS66	Malonyl-[acyl-carrier protein] O-methyltransferase	Down	0.546	6.36E-04	0.42	2.12E-02
14	B2SS67	Fructokinase	Down	0.606	8.03E-04	0.69	1.92E-02
15	A0A0K0GFM5	Trehalose 6-phosphate phosphatase	Down	0.627	2.90E-03	0.62	1.57E-03
16	A0A0K0GLF2	Trehalose-6-phosphate synthase	Down	0.652	3.73E-02	0.60	2.58E-03
17	A0A0K0GIJ0	CytOchrome o ubiquinol oxidase, subunit I	Up	1.868	1.78E-02	1.30	3.40E-02
18	A0A0K0GIU0	Type III secretion protein HrpB1/HrpK	Up	1.931	1.33E-02	1.60	7.38E-04
19	A0A0K0GIW7	Biotin carboxylase	Up	2.002	2.04E-02	1.17	8.30E-02
20	A0A0K0GFJ4	Acyl-CoA dehydrogenase	Up	2.841	4.50E-03	2.42	2.42E-03

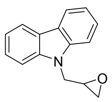
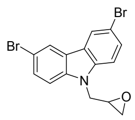
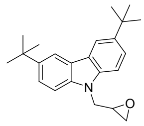
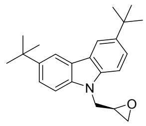
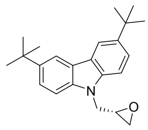
Table S4. Comparision of relative abundance of 20 selected proteins in the PRM experiment.

Comparision of relative abundance of 20 selected proteins in the PRM experiment. Two unique peptides were chosen for each protein except B2SS66 and A0A0K0GIJ0. Normalized peptide peak area was calculated by dividing the raw peptide peak area by the labeled reference peptide peak area. Relative protein abundance was expressed as the average of two normalized peptide peak area.

Protein Accession	Peptide	Raw peptide peak area						Normalized peptide peak area						Average relative peptide aboudance		Fold change
		CK1 Area	CK2 Area	CK3 Area	2f-1 Area	2f-2 Area	2f-3 Area	CK1 Normalized Area	CK2 Normalized Area	CK3 Normalized Area	2f-1 Normalized Area	2f-2 Normalized Area	2f-3 Normalized Area	CK mean	2f mean	2f/CK
A0A0K0GLZ2	SLAHATPLPER	2.95E+07	3.82E+07	4.31E+07	5.80E+06	7.72E+06	7.55E+06	1.34	1.74	1.96	0.26	0.35	0.34	1.68	0.32	0.19
	SFEQVQAVEPGELAQGR	6.30E+07	6.60E+07	7.18E+07	1.53E+07	2.00E+07	1.77E+07	1.49	1.56	1.70	0.36	0.47	0.42	1.58	0.42	0.26
A0A0K0GIJ7	GFGFISR	1.10E+09	1.28E+09	1.26E+09	3.51E+08	4.11E+08	2.83E+08	1.41	1.64	1.61	0.45	0.53	0.36	1.55	0.45	0.29
	VSFTVVQGQK	1.50E+09	1.35E+09	1.42E+09	5.27E+08	4.63E+08	4.72E+08	1.57	1.41	1.49	0.55	0.48	0.49	1.49	0.51	0.34
A0A0K0GGA6	LADEAVHIGASPAQQSYLR	5.87E+07	6.06E+07	6.52E+07	2.30E+07	2.61E+07	2.43E+07	1.37	1.41	1.52	0.53	0.61	0.57	1.43	0.57	0.40
	AQADAIGYPVLIK	3.32E+07	4.17E+07	3.60E+07	1.20E+07	1.30E+07	1.12E+07	1.35	1.70	1.47	0.49	0.53	0.46	1.51	0.49	0.33
A0A0K0GGD2	AGGAIGLSYGAHSNLCLNQLR	4.50E+07	4.66E+07	4.66E+07	1.19E+07	1.53E+07	1.42E+07	1.50	1.56	1.56	0.40	0.51	0.47	1.54	0.46	0.30
	AYVYAVAR	1.22E+08	1.33E+08	1.11E+08	2.88E+07	4.16E+07	3.84E+07	1.54	1.68	1.41	0.36	0.53	0.49	1.54	0.46	0.30
A0A0K0GFW8	VSGVECVIVANDATVK	1.48E+07	1.46E+07	1.42E+07	4.52E+06	5.13E+06	5.70E+06	1.50	1.49	1.45	0.46	0.52	0.58	1.48	0.52	0.35
	LWDDGIIDPADTR	2.15E+07	2.32E+07	2.24E+07	4.72E+06	6.63E+06	6.55E+06	1.52	1.64	1.58	0.33	0.47	0.46	1.58	0.42	0.27
A0A0K0GJI8	GFGFITPESGPDLFVHFR	1.47E+10	1.57E+10	1.31E+10	3.19E+09	3.97E+09	3.72E+09	1.62	1.74	1.45	0.35	0.44	0.41	1.60	0.40	0.25
	VTFVAVQGQK	6.00E+09	6.15E+09	5.93E+09	1.25E+09	1.96E+09	1.45E+09	1.58	1.62	1.56	0.33	0.52	0.38	1.59	0.41	0.26
A0A0K0GQJ7	LGIAFEHWR	8.44E+06	9.01E+06	8.57E+06	2.23E+06	3.21E+06	2.94E+06	1.47	1.57	1.50	0.39	0.56	0.51	1.51	0.49	0.32
	YCPAPPPPEPAAR	1.93E+07	2.07E+07	1.82E+07	3.99E+06	5.28E+06	6.05E+06	1.57	1.69	1.49	0.33	0.43	0.49	1.58	0.42	0.26
A0A0K0GQZ8	AFDFANLASESISGIEVFK	2.05E+07	2.27E+07	2.19E+07	7.61E+06	9.25E+06	1.03E+07	1.33	1.47	1.43	0.49	0.60	0.67	1.41	0.59	0.42
	NIDNYVGVTTR	7.73E+07	8.59E+07	9.44E+07	3.78E+07	4.13E+07	3.32E+07	1.25	1.39	1.53	0.61	0.67	0.54	1.39	0.61	0.44

A0A0K0GLL2	**FGQALQFR**	**3.07E+07**	**3.78E+07**	**3.43E+07**	**1.28E+07**	**1.53E+07**	**1.40E+07**	**1.27**	**1.57**	**1.42**	**0.53**	**0.63**	**0.58**	**1.42**	**0.58**	**0.41**
	DTVAAAFPESR	**6.00E+07**	**7.55E+07**	**7.18E+07**	**2.50E+07**	**2.86E+07**	**2.59E+07**	**1.26**	**1.58**	**1.50**	**0.52**	**0.60**	**0.54**	**1.45**	**0.55**	**0.38**
A0A0K0GM98	**FASGVEVEVPGHGR**	**1.23E+08**	**1.35E+08**	**1.44E+08**	**4.72E+07**	**5.90E+07**	**3.22E+07**	**1.37**	**1.49**	**1.60**	**0.52**	**0.66**	**0.36**	**1.49**	**0.51**	**0.34**
	NFVLCPGLAYDR	**1.47E+08**	**1.53E+08**	**1.34E+08**	**3.31E+07**	**4.00E+07**	**3.94E+07**	**1.61**	**1.68**	**1.47**	**0.36**	**0.44**	**0.43**	**1.59**	**0.41**	**0.26**
A0A0K0GQA3	**TGVIAGSGGGSSQWQVETADLLR**	**7.43E+07**	**7.95E+07**	**8.26E+07**	**4.30E+07**	**4.87E+07**	**4.68E+07**	**1.19**	**1.27**	**1.32**	**0.69**	**0.78**	**0.75**	**1.26**	**0.74**	**0.59**
	AEGFPILR	**4.35E+08**	**4.37E+08**	**4.20E+08**	**1.97E+08**	**2.39E+08**	**2.23E+08**	**1.34**	**1.34**	**1.29**	**0.61**	**0.73**	**0.69**	**1.32**	**0.68**	**0.51**
A0A0K0GPR7	**ELNVTDAAAVDGLIDAIGK**	**1.20E+08**	**9.52E+07**	**9.78E+07**	**4.91E+07**	**5.45E+07**	**4.87E+07**	**1.55**	**1.23**	**1.26**	**0.63**	**0.70**	**0.63**	**1.35**	**0.65**	**0.49**
	AGIIAFSK	**4.44E+07**	**5.35E+07**	**4.62E+07**	**2.31E+07**	**2.27E+07**	**1.94E+07**	**1.27**	**1.53**	**1.33**	**0.66**	**0.65**	**0.56**	**1.38**	**0.62**	**0.45**
B2SS66	**VTLSALHTPQQVQALIDAIVQAR**	**6.86E+07**	**6.72E+07**	**6.29E+07**	**2.57E+07**	**3.08E+07**	**2.75E+07**	**1.45**	**1.43**	**1.33**	**0.55**	**0.65**	**0.58**	**1.41**	**0.59**	**0.42**
B2SS67	**TGGCPEDCAYCPQAQR**	**4.73E+07**	**4.13E+07**	**4.75E+07**	**1.70E+07**	**2.17E+07**	**2.43E+07**	**1.43**	**1.25**	**1.43**	**0.51**	**0.65**	**0.73**	**1.37**	**0.63**	**0.46**
	YDTGVTAQK	**6.10E+06**	**7.76E+06**	**7.35E+06**	**5.66E+06**	**7.19E+06**	**8.59E+06**	**0.86**	**1.09**	**1.03**	**0.80**	**1.01**	**1.21**	**0.99**	**1.01**	**1.01**
A0A0K0GFM5	**LLESLDYLGAQVPK**	**1.62E+07**	**1.66E+07**	**1.76E+07**	**1.03E+07**	**1.29E+07**	**1.17E+07**	**1.14**	**1.17**	**1.24**	**0.73**	**0.91**	**0.82**	**1.18**	**0.82**	**0.69**
	DAFAQTDPAPHVSR	**1.97E+07**	**1.99E+07**	**2.09E+07**	**1.06E+07**	**1.32E+07**	**9.48E+06**	**1.26**	**1.27**	**1.33**	**0.68**	**0.85**	**0.61**	**1.29**	**0.71**	**0.55**
A0A0K0GLF2	**TFAQYAGGAPANVAVAVAR**	**1.96E+08**	**2.38E+08**	**2.31E+08**	**1.11E+08**	**1.19E+08**	**1.55E+08**	**1.12**	**1.36**	**1.32**	**0.63**	**0.68**	**0.89**	**1.27**	**0.73**	**0.58**
	ASSLEQLCGDPAAINEVIR	**1.41E+08**	**1.52E+08**	**1.44E+08**	**8.06E+07**	**9.88E+07**	**9.60E+07**	**1.19**	**1.28**	**1.21**	**0.68**	**0.83**	**0.81**	**1.23**	**0.77**	**0.63**
A0A0K0GIJ0	**AQPQAGPEVLAFAQQEIAQLSGYR**	**2.23E+07**	**1.99E+07**	**2.23E+07**	**2.42E+07**	**2.96E+07**	**2.99E+07**	**0.90**	**0.81**	**0.90**	**0.98**	**1.20**	**1.21**	**0.87**	**1.13**	**1.30**
A0A0K0GIU0	**ILQGDLVEGPGGR**	**1.16E+08**	**1.13E+08**	**1.10E+08**	**1.64E+08**	**1.72E+08**	**1.72E+08**	**0.82**	**0.80**	**0.78**	**1.16**	**1.22**	**1.22**	**0.80**	**1.20**	**1.50**
	YVNQNFSHATLTGFYR	**6.86E+07**	**5.83E+07**	**5.55E+07**	**1.03E+08**	**1.15E+08**	**9.40E+07**	**0.83**	**0.71**	**0.67**	**1.25**	**1.39**	**1.14**	**0.74**	**1.26**	**1.71**
A0A0K0GIW7	**TFDDDIDYWVPADEVER**	**5.55E+08**	**5.80E+08**	**5.82E+08**	**6.01E+08**	**6.32E+08**	**6.12E+08**	**0.94**	**0.98**	**0.98**	**1.01**	**1.06**	**1.03**	**0.96**	**1.04**	**1.07**
	FALLEQQQAAQAAK	**8.32E+08**	**9.36E+08**	**9.39E+08**	**9.79E+08**	**1.35E+09**	**1.09E+09**	**0.81**	**0.92**	**0.92**	**0.96**	**1.32**	**1.07**	**0.88**	**1.12**	**1.26**
A0A0K0GFJ4	**IQDAAAVLAAVR**	**2.95E+08**	**3.17E+08**	**2.66E+08**	**5.91E+08**	**8.05E+08**	**7.42E+08**	**0.59**	**0.63**	**0.53**	**1.18**	**1.60**	**1.48**	**0.58**	**1.42**	**2.43**
	ALDTFDAWISIK	**1.57E+07**	**1.28E+07**	**1.42E+07**	**2.85E+07**	**3.58E+07**	**3.87E+07**	**0.65**	**0.53**	**0.58**	**1.17**	**1.47**	**1.59**	**0.59**	**1.41**	**2.41**

Table S5. Antibacterial activities of epoxy intermediates against plant pathogens *Xoo*, *Xac*, and *Psa in vitro*.

Intermediates	*Xoo*		*Xac*		*Psa*	
	Inhibition (%)		Inhibition (%)		Inhibition (%)	
	100 μg/mL	50 μg/mL	100 μg/mL	50 μg/mL	100 μg/mL	50 μg/mL
	99.5 ± 1.5	90.5 ± 2.3	70.2 ± 4.9	44.0 ± 1.2	41.7 ± 4.0	35.2 ± 2.6
	35.7 ± 2.6	17.0 ± 1.2	41.8 ± 1.2	21.0 ± 1.1	22.3 ± 0.5	0
	0	0	26.0 ± 3.6	0	0	0
	7.01 ± 1.27	0	9.34 ± 3.26	0	14.7 ± 1.9	0
	0	0	11.1 ± 3.8	0	0	0
BT	53.7 ± 1.2	38.4 ± 3.1			46.4 ± 1.8	10.4 ± 1.8
TC	43.1 ± 3.2	30.2 ± 1.5	61.2 ± 2.6	36.4 ± 2.3	57.3 ± 2.2	22.1 ± 1.1

5. Synthetic procedures for the intermediates and target compounds

Sythesis of the intermediate 9-(oxiran-2-ylmethyl)-9*H*-carbazole

Carbazole (6.0 mmol) and KOH (9.0 mmol) in 10 mL dry DMF were stirred on the ice bath for 30 min, then 2-(chloromethyl)oxirane (6.0 mmol) was added, and the mixture was stirred for 5 h. After that, 20 mL NH_4Cl and 100 mL ethyl acetate was added into the mixture. The organic layer was washed by NH_4Cl, dried with sodium sulfate, filtered, and followed by the removal of the solvent under vacuum. The pure intermediate could be obtained by column chromatography using (PE:EA, V:V = 30:1) as the eluent. A white solid, yield 76.9%, m. p. 105-106 ^oC; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (d, J = 7.7 Hz, 2H, carbazol-H), 7.66 (d, J = 8.3 Hz, 2H, carbazol-H), 7.49–7.40 (m, 2H, carbazol-H), 7.22 (t, J = 7.4 Hz, 2H, carbazol-H), 4.79 (dd, J = 15.7, 3.2 Hz, 1H), 4.43 (dd, J = 15.7, 5.6 Hz, 1H), 3.31 (dt, J = 6.8, 2.9 Hz, 1H), 2.79–2.73 (m, 1H), 2.58 (dd, J = 5.1, 2.6 Hz, 1H); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 140.3, 125.7, 122.1, 120.1, 119.0, 109.6, 50.3, 44.6, 44.2; HRMS (ESI): m/z calcd for $C_{15}H_{14}NO^+$: 224.1070; found: 224.1066.

The synthesis of other intermediates was carried our following the above synthetic protocols.

3,6-dibromo-9-(oxiran-2-ylmethyl)-9*H*-carbazole

A white solid, yield 76.7%; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.48 (d, J=1.8 Hz, 2H, carbazol-H), 7.67 (d, J=8.8 Hz, 2H, carbazol-H), 7.61 (dd, J=8.7, 1.9 Hz, 2H, carbazol-H), 4.83 (dd, J=15.8, 2.9 Hz, 1H, N-$\underline{CH_2}$), 4.42 (dd, J=15.8, 5.8 Hz, 1H, N-$\underline{CH_2}$), 3.32–3.26 (m, 1H, O-$\underline{CH_2}$), 2.79–2.70 (m, 1H, O-$\underline{CH}$), 2.53 (dd, J=5.0, 2.6 Hz, 1H, O-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 139.5, 128.9, 123.4, 123.0, 112.1, 111.6, 50.2, 44.6, 44.4.

3,6-di-tert-butyl-9-(oxiran-2-ylmethyl)-9*H*-carbazole

A white solid, yield 63.1%; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.18 (d, J=1.2 Hz, 2H, carbazol-H), 7.52 (d, J=8.5 Hz, 2H, carbazol-H), 7.48 (dd, J=8.6, 1.8 Hz, 2H, carbazol-H), 4.69 (dd, J=15.7, 3.3 Hz, 1H, N-$\underline{CH_2}$), 4.36 (dd, J=15.7, 5.5 Hz, 1H, N-$\underline{CH_2}$), 3.29–3.23 (m, 1H, O-$\underline{CH_2}$), 2.77–2.72 (m, 1H, O-$\underline{CH}$), 2.56 (dd, J=5.1, 2.6 Hz, 1H, O-$\underline{CH_2}$), 1.41 (s, 18H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.8, 139.3, 123.7, 122.6, 116.7, 109.4, 50.8, 45.2, 44.7, 34.9, 32.4.

1,1'-(9-(oxiran-2-ylmethyl)-9*H*-carbazole-3,6-diyl)bis(ethan-1-one)

A white solid, yield 22.5%; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 9.05 (d, J=1.4 Hz, 2H, carbazol-H), 8.12 (dd, J=8.7, 1.7 Hz, 2H, carbazol-H), 7.81 (d, J=8.7 Hz, 2H, carbazol-H), 4.94 (dd, J=15.7, 2.8 Hz, 1H, N-$\underline{CH_2}$), 4.54 (dd, J=15.7, 5.8 Hz, 1H, N-$\underline{CH_2}$), 3.40–3.35 (m, 1H, O-$\underline{CH_2}$), 2.80–2.75 (m, 1H, O-$\underline{CH}$), 2.71 (s, 6H, CO-$\underline{CH_3}$), 2.56 (dd, J=5.0, 2.6 Hz, 1H, O-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 197.1, 143.8, 129.6, 126.5, 122.5, 122.3, 110.2, 50.2, 44.6, 44.5, 26.7.

General synthetic procedures for the target compounds

To a 25 mL round-bottomed flask, compound **1** (0.90 mmol), and K_2CO_3 (0.90 mmol) were dissolved in 5 mL dry isopropanol, then R-NH_2 (1.8 mmol) was added and heated to 60 °C for 6 hours. After that, the removal of the solvent under vacuum. Finally, The crude residue was further purified by column chromatography on a silica gel using CH_2Cl_2 and CH_3OH (200:1,V/V) as the eluent to afford the desired product. The synthesis of the left target compounds was carried our as this synthetic protocol.

1-(9*H*-carbazol-9-yl)-3-((4-methoxybenzyl)amino)propan-2-ol (2a). A white solid, yield 85.6%; m. p. 97-99 °C; ^{1}H NMR (400 MHz, DMSO-*d*$_6$, ppm) δ 8.13 (d, *J* = 7.6 Hz, 2H, carbazol-H), 7.62 (d, *J* = 8.3 Hz, 2H, benzyl-H), 7.51–7.32 (m, 2H, carbazol-H), 7.23 (d, *J* = 8.6 Hz, 2H, benzyl-H), 7.21–7.16 (m, 2H, carbazol-H), 6.97–6.76 (m, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.03 (s, 1H, OH), 4.48 (dd, *J* = 14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J* = 14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.94 (m, 1H, CH), 3.73 (s, 3H, CH_3), 3.68–3.56 (m, 2H, benzene-$\underline{CH_2}$), 2.62–2.52 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-*d*$_6$, ppm) δ 158.5, 141.1, 133.2, 129.7, 125.9, 122.5, 120.5, 119.1, 114.0, 110.2, 69.3, 55.5, 55.4, 53.1, 47.7; HRMS (ESI): m/z calcd for $C_{23}H_{25}N_2O_2^+$: 361.1911; found: 361.1904.

1-(9*H*-carbazol-9-yl)-3-((4-methylbenzyl)amino)propan-2-ol (2b)

A white solid, yield 57.8%; m. p. 113-115 °C; ^{1}H NMR (400 MHz, DMSO-*d*$_6$, ppm) δ 8.13 (d, *J*=7.6 Hz, 2H, carbazol-H), 7.61 (d, *J*=8.2 Hz, 2H, benzyl-H), 7.45–7.36 (m, 2H, carbazol-H), 7.19 (td, *J*=7.8, 2.8 Hz, 4H, carbazol-H, benzyl-H), 7.15–7.07 (m, 2H, carbazol-H), 5.03 (s, 1H, OH), 4.47 (dd, *J*=14.7, 4.8 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, *J*=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.11–3.90 (m, 1H, CH), 3.76–3.51 (m, 2H, benzene-$\underline{CH_2}$), 2.64–2.52 (m, 2H, CH-$\underline{CH_2}$), 2.27 (s, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-*d*$_6$, ppm) δ 141.1, 138.2, 136.0, 129.2, 128.4, 125.9, 122.5, 120.5, 119.1, 110.23, 69.4, 53.5, 53.2, 47.7, 21.2; HRMS (ESI): m/z calcd for $C_{23}H_{25}N_2O^+$: 345.1961; found: 345.1958.

1-(benzylamino)-3-(9*H*-carbazol-9-yl)propan-2-ol (2c)

A white solid, yield 53.7%; m. p. 129-130 °C; ^{1}H NMR (400 MHz, DMSO-*d*$_6$, ppm) δ 8.13 (d, *J*=7.6 Hz, 2H, carbazol-H), 7.62 (d, *J*=8.2 Hz, 2H, benzyl-H), 7.46–7.39 (m, 2H, carbazol-H), 7.37–7.28 (m, 4H, carbazol-H, benzyl-H), 7.26–7.21 (m, 1H, benzyl-H), 7.21–7.15 (m, 2H, carbazol-H), 5.05 (s, 1H, OH), 4.48 (dd, *J* = 14.7, 4.8 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, *J*=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.11–3.96 (m, 1H, CH), 3.79–3.60 (m, 2H, benzene-$\underline{CH_2}$), 2.67–2.55 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.2, 141.1, 128.6, 128.5, 127.1, 126.0, 122.5, 120.5, 119.1, 110.2, 69.3, 53.7, 53.2, 47.7; HRMS (ESI): m/z calcd for $C_{22}H_{23}N_2O^+$: 331.1805; found: 331.1798.

1-(9*H*-carbazol-9-yl)-3-((2-chlorobenzyl)amino)propan-2-ol (2d)

A white solid, yield 74.7%; m. p. 94-96 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.5 Hz, 2H, carbazol-H), 7.62 (d, *J*=8.2 Hz, 2H, carbazol-H), 7.51 (dd, *J*=7.4, 1.8 Hz, 1H, benzyl-H), 7.46–7.38 (m, 3H, carbazol-H, benzyl-H), 7.36–7.24 (m, 2H, benzyl-H), 7.18 (t, *J*=7.4 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.09 (d, *J*=5.2 Hz, 1H, OH), 4.48 (dd, *J*=14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, *J*=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.09–3.96 (m, 1H, CH), 3.79 (s, 2H, benzene-$\underline{CH_2}$), 2.70–2.54 (m, 2H, CH-$\underline{CH_2}$) ; ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.1, 138.4, 133.1, 130.5, 129.6, 128.9, 127.6, 126.0, 122.5, 120.5, 119.1, 110.2, 69.4, 53.2, 50.9, 47.6; HRMS (ESI): m/z calcd for $C_{22}H_{20}ClN_2O^-$: 363.1259; found: 363.1270.

1-(9*H*-carbazol-9-yl)-3-((3-chlorobenzyl)amino)propan-2-ol (2e)

A white solid, yield 83.7%; m. p. 87-89 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.62 (d, *J*=8.2 Hz, 2H, benzyl-H), 7.42 (t, *J*=7.6 Hz, 3H, carbazol-H, benzyl-H), 7.37–7.25 (m, 3H, carbazol-H, benzyl-H), 7.18 (t, *J*=7.4 Hz, 2H, carbazol-H), 5.04 (d, *J*=4.9 Hz, 1H, OH), 4.48 (dd, *J*=14.7, 4.7 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J*=14.7, 7.1 Hz, 1H, N-$\underline{CH_2}$), 4.12–3.94 (m, 1H, CH), 3.85–3.51 (m, 2H, benzene-$\underline{CH_2}$), 2.68–2.52 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 143.7, 140.6, 132.9, 130.0, 127.8, 126.7, 126.5, 125.5, 122.0, 120.1, 118.6, 109.8, 69.0, 52.7, 52.5, 47.2; HRMS (ESI): m/z calcd for $C_{22}H_{22}ClN_2O^+$: 365.1415; found: 365.1404.

1-(9*H*-carbazol-9-yl)-3-((4-chlorobenzyl)amino)propan-2-ol (2f)

A white solid, yield 53.2% ; m. p. 89-91 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.61 (d, *J*=8.3 Hz, 2H, benzyl-H), 7.46–

7.39 (m, 2H, carbazol-H), 7.38–7.31 (m, 4H, carbazol-H, benzyl-H), 7.19 (t, J=7.4 Hz, 2H, carbazol-H), 5.06 (s, 1H, OH), 4.48 (dd, J=14.7, 4.8 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, J=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.96 (m, 1H, CH), 3.75–3.61 (m, 2H, benzene-$\underline{CH_2}$), 2.65–2.52 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.1, 140.4, 131.5, 130.3, 128.5, 126.0, 122.5, 120.5, 119.1, 69.4, 53.2, 52.9, 47.7; HRMS (ESI): m/z calcd for $C_{22}H_{20}ClN_2O^-$: 363.1259; found: 363.1269.

1-(9*H*-carbazol-9-yl)-3-((2,4-dichlorobenzyl)amino)propan-2-ol (2g)

A white solid, yield 36.3% ; m. p. 91-92 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.6 Hz, 2H, carbazol-H), 7.61 (d, J=8.3 Hz, 2H, carbazol-H), 7.59–7.52 (m, 2H, benzyl-H), 7.45–7.37 (m, 3H, carbazol-H, benzyl-H), 7.21–7.16 (m, 2H, carbazol-H), 5.09 (d, J=5.0 Hz, 1H, OH), 4.47 (dd, J=14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, J=14.6, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.10–3.95 (m, 1H, NH), 3.76 (d, J=9.9 Hz, 2H, benzene-$\underline{CH_2}$), 2.68–2.53 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.1, 137.7, 134.0, 132.3, 131.7, 128.9, 127.7, 125.9, 122.5, 120.5, 119.1, 110.2, 69.4, 53.2, 50.3, 47.6, 43.1; HRMS (ESI): m/z calcd for $C_{22}H_{21}Cl_2N_2O^+$: 399.1026; found: 399.1016.

1-(9*H*-carbazol-9-yl)-3-((2-fluorobenzyl)amino)propan-2-ol (2h)

A white solid, yield 49.1%; m. p. 109-110 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.7 Hz, 2H, carbazol-H), 7.63 (d, J=8.2 Hz, 2H, carbazol-H), 7.44 (dd, J=16.3, 8.0 Hz, 3H, carbazol-H, benzyl-H), 7.29 (tt, J=12.2, 6.1 Hz, 1H, benzyl-H), 7.24–7.10 (m, 4H, carbazol-H, benzyl-H), 5.09 (d, J=4.0 Hz, 1H, OH), 4.48 (dd, J=14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, J=14.7, 6.9 Hz, 1H, N-$\underline{CH_2}$), 4.13–3.94 (m, 1H, CH), 3.82–3.69 (m, 2H, benzene-$\underline{CH_2}$), 2.74–2.53 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 161.0 (d, $^1J_{CF}$=243.6 Hz, 2C), 141.1, 131.0 (d, $^3J_{CCCF}$=4.9 Hz, 2C), 129.1 (d, $^3J_{CCCF}$=8.1 Hz, 2C), 127.9 (d, $^2J_{CCF}$=15.1 Hz, 2C), 126.0, 124.7 (d, $^4J_{CCCCF}$=3.3 Hz, 2C), 122.5, 120.5, 119.1, 115.5 (d, $^2J_{CCF}$=21.8 Hz, 2C), 110.2, 69.3, 53.2, 47.6, 46.8 (d, $^4J_{CNCCF}$=2.7 Hz, 2C); ^{19}F NMR (376 MHz, DMSO-d_6, ppm) δ -119.44; HRMS (ESI): m/z calcd for $C_{22}H_{22}FN_2O^+$: 349.1711; found: 349.1700.

1-(9*H*-carbazol-9-yl)-3-((3-fluorobenzyl)amino)propan-2-ol (2i)

A white solid, yield 50.4%; m. p. 121-122 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.7 Hz, 2H, carbazol-H), 7.62 (d, J=8.2 Hz, 2H, carbazol-H), 7.42 (dd, J=11.3, 4.1 Hz, 2H, carbazol-H), 7.38–7.29 (m, 1H, benzyl-H), 7.17 (dd, J=13.5, 6.7 Hz, 4H, carbazol-H, benzyl-H), 7.04 (td, J=8.8, 2.3 Hz, 1H, benzyl-H), 5.05 (d, J=4.9 Hz, 1H, OH), 4.48 (dd, J=14.7, 4.7 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, J=14.7, 7.1 Hz, 1H, N-$\underline{CH_2}$), 4.10–3.93 (m, 1H, CH), 3.83–3.61 (m, 2H, benzene-$\underline{CH_2}$), 2.71–2.53 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 162.8 (d, $^1J_{CF}$=242.8 Hz, 2C), 144.6 (d, $^3J_{CCCF}$=6.8 Hz, 2C), 141.1, 130.5 (d, $^3J_{CCCF}$=8.3 Hz, 2C), 125.9, 124.4 (d, $^4J_{CCCCF}$=2.5 Hz, 2C), 122.5, 120.5, 119.1, 114.9 (d, $^2J_{CCF}$=21.0 Hz, 2C), 113.7 (d, $^2J_{CCF}$=21.0 Hz, 2C), 110.2, 69.4, 53.2, 53.0, 47.7; ^{19}F NMR (376 MHz, DMSO-d_6, ppm) δ -113.80; HRMS (ESI): m/z calcd for $C_{22}H_{20}FN_2O^-$: 347.1554; found: 347.1564.

1-(9*H*-carbazol-9-yl)-3-((4-fluorobenzyl)amino)propan-2-ol (2j)

A white solid, yield 50.4%; m. p. 125-126 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.6 Hz, 2H, carbazol-H), 7.61 (d, J=8.2 Hz, 2H, carbazol-H), 7.46–7.39 (m, 2H, carbazol-H), 7.35 (dd, J=8.5, 5.8 Hz, 2H, benzyl-H), 7.18 (t, J=7.4 Hz, 2H, carbazol-H), 7.12 (t, J=8.9 Hz, 2H, benzyl-H), 5.05 (s, 1H, OH), 4.47 (dd, J=14.7, 4.8 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, J=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.10–3.91 (m, 1H, NH), 3.75–3.58 (m, 2H, benzene-$\underline{CH_2}$), 2.64–2.53 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 161.6 (d, $^1J_{CF}$ = 241.6 Hz, 2C), 141.1, 137.4 (d, $^4J_{CCCCF}$=2.9 Hz, 2C), 130.3 (d, $^3J_{CCCF}$=8.0 Hz, 2C), 125.9, 122.5, 120.5, 119.1, 115.3 (d, $^2J_{CCF}$=21.0 Hz, 2C), 110.2, 69.3, 53.2, 52.8, 47.7; ^{19}F NMR (376 MHz, DMSO-d_6, ppm) δ -116.53; HRMS (ESI): m/z calcd for $C_{22}H_{22}FN_2O^+$: 349.1711; found: 349.1698.

1-(9*H*-carbazol-9-yl)-3-((4-(trifluoromethyl)benzyl)amino)propan-2-ol (2k)

A white solid, yield 72.6%; m. p. 72-74 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.6 Hz, 2H, carbazol-H), 7.66 (d, J=8.1 Hz, 2H, carbazol-H), 7.62 (d, J=8.2 Hz, 2H, benzyl-H), 7.58–7.52 (m, 2H, benzyl-H), 7.41 (tt, J=8.9, 4.4 Hz, 2H, carbazol-H), 7.22–7.14 (m, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.06 (d, J=5.1 Hz, 1H, OH), 4.48 (dd, J=14.7, 4.8 Hz, 1H, N-$\underline{CH_2}$), 4.29 (dd, J=14.7, 7.1 Hz, 1H, N-$\underline{CH_2}$), 4.11–3.96 (m, 1H, CH), 3.87–3.66 (m, 2H, benzene-$\underline{CH_2}$), 2.65–2.53 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 146.3 (d, $^5J_{CCCCCF}$=1.1 Hz, 2C), 141.1, 129.1, 127.7 (d, $^3J_{CCCF}$=31.6 Hz), 125.9, 125.4 (q, $^1J_{CFFF}$=3.8 Hz, 4C), 122.5, 120.5, 119.1, 110.2, 69.4, 55.4, 53.2, 53.1, 47.7; ^{19}F NMR (376 MHz, DMSO-d_6) δ -60.70; HRMS (ESI): m/z calcd for $C_{23}H_{22}F_3N_2O^+$: 399.1679; found: 399.1672.

1-(9*H*-carbazol-9-yl)-3-((furan-2-ylmethyl)amino)propan-2-ol (2l)

A white solid, yield 43.6%; m. p. 112-113 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.6 Hz, 2H, carbazol-H), 7.61 (t, *J*=7.5 Hz, 2H, carbazol-H), 7.55 (dd, *J*=1.8, 0.8 Hz, 1H, furan-H), 7.50–7.34 (m, 2H, carbazol-H), 7.24–7.11 (m, 2H, carbazol-H), 6.37 (dd, *J*=3.1, 1.9 Hz, 1H, furan-H), 6.22 (d, *J*=2.7 Hz, 1H, furan-H), 5.76 (s, 1H, NH), 5.04 (d, *J*=4.6 Hz, 1H, OH), 4.46 (dd, *J*=14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, *J*=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.13–3.88 (m, 1H, CH), 3.77–3.57 (m, 2H, furan-$\underline{CH_2}$), 2.70–2.52 (m, 2H, CH-$\underline{CH_2}$) ; ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 154.3, 141.3, 140.6, 125.5, 122.0, 120.0, 118.6, 110.3, 109.8, 106.7, 68.9, 52.5, 47.1, 45.7; HRMS (ESI): m/z calcd for $C_{20}H_{21}N_2O_2^+$: 321.1598; found: 321.1586.

1-(9*H*-carbazol-9-yl)-3-((thiophen-2-ylmethyl)amino)propan-2-ol (2m)

A white solid, yield 73.6%; m. p. 132-133 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.64 (d, *J*=8.2 Hz, 2H, carbazol-H), 7.47–7.40 (m, 2H, carbazol-H), 7.38 (dd, *J*=4.1, 2.2 Hz, 1H, thiofuran-H), 7.19 (t, *J*=7.4 Hz, 2H, carbazol-H), 6.98–6.90 (m, 2H, thiofuran-H), 5.76 (s, 1H, NH), 5.06 (d, *J*=4.7 Hz, 1H, OH), 4.49 (dd, *J*=14.7, 4.6 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J*=14.7, 7.1 Hz, 1H, N-$\underline{CH_2}$), 4.12–3.95 (m, 1H, CH), 3.95–3.82 (m, 2H, thiofuran-$\underline{CH_2}$), 2.73–2.54 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 144.8, 140.6, 126.6, 125.5, 124.7, 124.5, 122.0, 120.0, 118.6, 109.8, 68.9, 52.6, 47.9, 47.2; HRMS (ESI): m/z calcd for $C_{20}H_{21}N_2OS^+$: 337.1369; found: 337.1364.

1-(9*H*-carbazol-9-yl)-3-((pyridin-2-ylmethyl)amino)propan-2-ol (2n)

A white solid, yield 39.7%; m. p. 95-97 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.49 (ddd, *J*=18.5, 9.6, 8.8 Hz, 1H, pyridine-H), 8.14 (d, *J*=7.6 Hz, 2H, carbazol-H), 7.74 (td, *J*=7.7, 1.8 Hz, 1H, pyridine-H), 7.63 (d, *J*=8.3 Hz, 2H, carbazol-H), 7.46–7.39 (m, 3H, carbazol-H, pyridine-H), 7.24 (ddd, *J*=7.4, 4.9, 0.9 Hz, 1H, pyridine-H), 7.22–7.16 (m, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.10 (d, *J*=31.8 Hz, 1H, OH), 4.49 (dd, *J*=14.7, 5.0 Hz, 1H, N-CH2), 4.31 (dd, *J*=14.7, 7.0 Hz, 1H, N-CH2), 4.11–4.01 (m, 1H, CH), 3.87–3.76 (m, 2H, pyridine-CH2), 2.71–2.56 (m, 2H, CH-CH2); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 160.5, 149.3, 141.1, 137.0, 126.0, 122.5, 122.4 (d, *J*=1.4 Hz), 120.5, 119.1, 110.2, 69.3, 55.2, 53.3, 47.6; HRMS (ESI): m/z calcd for $C_{21}H_{22}N_3O^+$: 332.1757; found: 332.1758.

1-(9*H*-carbazol-9-yl)-3-(phenylamino)propan-2-ol (2o)

A white solid, yield 88.3%; m. p. 125-126 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.14 (d, *J*=7.6 Hz, 2H, carbazol-H), 7.61 (d, *J*=8.3 Hz, 2H, carbazol-H), 7.45–7.36 (m, 2H, carbazol-H), 7.18 (dd, *J*=11.0, 3.9 Hz, 2H, benzyl-H), 7.06 (dd, *J*=8.3, 7.4 Hz, 2H, carbazol-H), 6.59 (d, *J*=7.7 Hz, 2H, benzyl-H), 6.54 (t, *J*=7.3 Hz, 1H, benzyl-H), 5.68 (t, *J*=5.8 Hz, 1H, NH), 5.23 (d, *J*=5.3 Hz, 1H, OH), 4.51 (dd, *J*=14.8, 4.4 Hz, 1H, N-CH2), 4.37 (dd, *J*=14.8, 7.5 Hz, 1H, N-CH2), 4.23–4.06 (m, 1H, CH), 3.24–3.03 (m, 2H, CH-CH2); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 148.8, 140.6, 128.9, 125.5, 122.1, 120.1, 118.7, 115.9, 112.2, 109.8, 68.2, 47.5, 47.2; HRMS (ESI): m/z calcd for $C_{21}H_{21}N_2O^+$: 317.1648; found: 317.1635.

1-(9*H*-carbazol-9-yl)-3-((2-methoxyphenyl)amino)propan-2-ol (2p)

^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.14 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.59 (d, *J*=8.2 Hz, 2H, carbazol-H), 7.49–7.35 (m, 2H, carbazol-H), 7.19 (t, *J*=7.2 Hz, 2H, carbazol-H), 6.80 (dt, *J*=31.4, 15.7 Hz, 1H, benzyl-H), 6.71 (td, *J*=7.6, 1.0 Hz, 1H, benzyl-H), 6.56 (td, *J*=7.7, 1.4 Hz, 1H, benzyl-H), 6.42 (dd, *J*=7.8, 1.3 Hz, 1H, benzyl-H), 5.36 (d, *J*=5.4 Hz, 1H, OH), 4.95 (t, *J*=5.9 Hz, 1H, NH), 4.50 (dd, *J*=14.8, 4.9 Hz, 1H, N-CH2), 4.37 (dd, *J*=14.8, 7.1 Hz, 1H, N-CH2), 4.24–4.07 (m, 1H, NH), 3.79 (s, 3H, CH_3), 3.28–3.16 (m, 1H, CH-CH2), 3.14–3.00 (m, 1H, CH-CH2); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 146.6, 140.5, 138.0, 125.6, 122.1, 121.0, 120.1, 118.7, 116.0, 109.8, 109.6, 109.5, 68.7, 55.3, 47.2, 47.1; HRMS (ESI): m/z calcd for $C_{22}H_{21}N_2O_2^-$: 345.1598; found: 345.1603.

1-(9*H*-carbazol-9-yl)-3-(m-tolylamino)propan-2-ol (2q)

A white solid, yield 60.4%; m. p. 121-122 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.14 (d, J=7.6 Hz, 2H, carbazol-H), 7.60 (d, J=8.2 Hz, 2H, carbazol-H), 7.55–7.33 (m, 2H, carbazol-H), 7.19 (dd, J=11.0, 3.8 Hz, 2H, carbazol-H), 6.92 (t, J=7.7 Hz, 1H, benzyl-H), 6.35 (dt, J=12.4, 3.2 Hz, 2H, benzyl-H), 6.30 (s, 1H, benzyl-H), 5.59 (t, J=4.9 Hz, 1H, NH), 5.20 (d, J=5.3 Hz, 1H, OH), 4.50 (dd, J=14.8, 4.6 Hz, 1H, N-$\underline{CH_2}$), 4.35 (dd, J=14.8, 7.3 Hz, 1H, N-$\underline{CH_2}$), 4.23–4.01 (m, 1H, CH), 3.24–2.96 (m, 2H, CH-$\underline{CH_2}$), 2.10 (s, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 149.1, 141.0, 138.3, 129.2, 126.0, 122.5, 120.6, 119.1, 117.2, 113.1, 110.2, 110.2, 68.6, 47.9, 47.6, 21.8; HRMS (ESI): m/z calcd for $C_{22}H_{23}N_2O^+$: 331.1805; found: 331.1792.

1-(9*H*-carbazol-9-yl)-3-((4-chloro-2-methoxyphenyl)amino)propan-2-ol (2r)

A white solid, yield 71.1%; m. p. 107-108 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.14 (d, J=7.7 Hz, 2H, carbazol-H), 7.58 (d, J=8.3 Hz, 2H, carbazol-H), 7.45–7.35 (m, 2H, carbazol-H), 7.19 (dd, J=11.0, 3.8 Hz, 2H, carbazol-H), 7.03 (d, J=2.0 Hz, 1H, benzyl-H), 6.95 (dd, J=8.6, 2.5 Hz, 1H, benzyl-H), 6.44 (d, J=8.7 Hz, 1H, benzyl-H), 5.30 (d, J=5.3 Hz, 1H, OH), 5.00 (t, J=5.7 Hz, 1H, NH), 4.52 (dd, J=14.8, 4.5 Hz, 1H, N-$\underline{CH_2}$), 4.38 (dd, J=14.8, 7.2 Hz, 1H, N-$\underline{CH_2}$), 4.25–4.05 (m, 1H, CH), 3.30–3.08 (m, 2H, CH-$\underline{CH_2}$), 2.10 (s, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 145.3, 140.5, 129.2, 126.1, 125.5, 124.1, 122.1, 120.1, 119.1, 118.7, 110.4, 109.7, 68.0, 47.6, 47.2, 17.3; HRMS (ESI): m/z calcd for $C_{22}H_{20}ClN_2O^-$: 363.1259; found: 363.1266.

1-amino-3-(9*H*-carbazol-9-yl)propan-2-ol (2s)

A white solid, yield 18.6%; m. p. 131-133 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.7 Hz, 2H, carbazol-H), 7.63 (d, J=8.2 Hz, 2H, carbazol-H), 7.43 (t, J=7.7 Hz, 2H, carbazol-H), 7.18 (t, J=7.8 Hz, 2H, carbazol-H), 5.02 (s, 1H, OH), 4.43 (dd, J=14.7, 5.2 Hz, 1H, N-$\underline{CH_2}$), 4.26 (dd, J=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 3.98–3.67 (m, 1H, CH), 2.69–2.54 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.0, 126.0, 122.5, 120.5, 119.1, 110.2, 71.6, 47.3, 46.3; HRMS (ESI): m/z calcd for $C_{15}H_{17}N_2O^+$: 241.1335; found: 241.1328.

1-(9*H*-carbazol-9-yl)-3-(methylamino)propan-2-ol (2t)

A white solid, yield 63.8%; m. p. 144-145 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.14 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.63 (d, *J*=8.2 Hz, 2H, carbazol-H), 7.48–7.39 (m, 2H, carbazol-H), 7.19 (t, *J*=7.4 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.05 (s, 1H, OH), 4.46 (dd, *J*=14.7, 5.0 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J*=14.7, 6.8 Hz, 1H, N-$\underline{CH_2}$), 4.05–3.94 (m, 1H, CH), 2.58–2.51 (m, 2H, CH-$\underline{CH_2}$), 2.30 (s, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.1, 126.0, 122.5, 120.5, 119.1, 110.2, 69.1, 55.9, 47.6, 36.8; HRMS (ESI): m/z calcd for $C_{16}H_{19}N_2O^+$: 255.1492; found: 255.1490.

1-(9*H*-carbazol-9-yl)-3-(ethylamino)propan-2-ol [2u]

A white solid, yield 36.2%; m. p. 113-114 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.63 (d, *J*=8.2 Hz, 2H, carbazol-H), 7.49–7.39 (m, 2H, carbazol-H), 7.19 (t, *J*=7.2 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.07 (d, *J*=55.0 Hz, 1H, OH), 4.46 (dd, *J*=14.7, 5.1 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J*=14.7, 6.8 Hz, 1H, N-$\underline{CH_2}$), 4.06–3.95 (m, 1H, CH), 2.64–2.55 (m, 2H, $\underline{CH_2}CH_3$), 2.54 (d, *J*=7.1 Hz, 2H, CH-$\underline{CH_2}$), 1.03 (t, *J*=7.1 Hz, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.1, 126.0, 122.5, 120.5, 119.1, 110.2, 69.2, 53.5, 47.6, 44.1, 15.6; HRMS (ESI): m/z calcd for $C_{17}H_{21}N_2O^+$: 269.1648; found: 269.1642.

1-(9*H*-carbazol-9-yl)-3-(isopropylamino)propan-2-ol (2v)

A white solid, yield 45.2%; m. p. 93-94 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, *J*=7.7 Hz, 2H, carbazol-H), 7.64 (d, *J*=8.3 Hz, 2H, carbazol-H), 7.48–7.39 (m, 2H, carbazol-H), 7.23–7.13 (m, 2H, carbazol-H), 5.06 (s, 1H, OH), 4.47 (dd, *J*=14.7, 5.2 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, *J*=14.7, 6.8 Hz, 1H, N-$\underline{CH_2}$), 4.06–3.87 (m, 1H, CH), 2.71–2.52 (m, 3H, $\underline{H_2C}$-N-$\underline{CH}$), 1.01–0.89 (m, 6H, 2CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 140.6, 125.5, 122.0, 120.0, 118.6, 109.8, 69.0, 50.9, 48.4, 47.2, 22.9 (d, *J*=3.3 Hz); HRMS (ESI): m/z calcd for $C_{18}H_{23}N_2O^+$: 283.1805; found: 283.1794.

1-(butylamino)-3-(9*H*-carbazol-9-yl)propan-2-ol (2w)

A white solid, yield 71.3%; m. p. 103-105 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.7 Hz, 2H, carbazol-H), 7.64 (d, J=8.2 Hz, 2H, carbazol-H), 7.43 (t, J=7.2 Hz, 2H, carbazol-H), 7.19 (t, J=7.2 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 4.47 (dd, J=14.7, 5.2 Hz, 1H, N-$\underline{CH_2}$), 4.28 (dd, J=14.7, 6.7 Hz, 1H, N-$\underline{CH_2}$), 4.07–3.92 (m, 1H, CH), 2.62–2.53 (m, 2H, CH-$\underline{CH_2}$), 2.52–2.47 (m, 2H, CH_2), 1.48–1.35 (m, 2H, CH_2), 1.35–1.30 (m, 2H, CH_2), 0.87 (t, J=7.2 Hz, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 140.6, 125.5, 122.0, 120.1, 118.6, 109.8, 68.7, 53.2, 49.1, 47.1, 31.7, 20.0, 14.0; HRMS (ESI): m/z calcd for $C_{19}H_{25}N_2O^+$: 297.1961; found: 297.1954.

1-(tert-butylamino)-3-(9*H*-carbazol-9-yl)propan-2-ol (2x)

A white solid, yield 65.9%; m. p. 110-112 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.13 (d, J=7.6 Hz, 2H, carbazol-H), 7.64 (d, J=8.2 Hz, 2H, carbazol-H), 7.43 (t, J=7.7 Hz, 2H, carbazol-H), 7.18 (t, J=7.4 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 5.02 (s, 1H, OH), 4.48 (dd, J=14.7, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, J=14.7, 7.0 Hz, 1H, N-$\underline{CH_2}$), 4.04–3.77 (m, 1H, CH), 2.62–2.54 (m, 2H, CH_2), 1.01 (s, 9H, $3CH_3$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.0, 125.9, 122.5, 120.5, 119.1, 110.3, 70.1, 50.1, 47.7, 46.7, 29.3; HRMS (ESI): m/z calcd for $C_{19}H_{25}N_2O^+$: 297.1961; found: 297.1954.

1-((4-chlorobenzyl)amino)-3-(3,6-dibromo-9*H*-carbazol-9-yl)propan-2-ol (4a)

A white solid, yield 74.9%; m. p. 114-117 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.45 (d, J=1.6 Hz, 2H, carbazol-H), 7.63–7.53 (m, 4H, carbazol-H, benzyl-H), 7.39–7.31 (m, 4H, carbazol-H, benzyl-H), 5.76 (s, 1H, NH), 5.03 (d, J=5.1 Hz, 1H, OH), 4.45 (dd, J=14.8, 4.1 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, J=14.8, 7.4 Hz, 1H, N-$\underline{CH_2}$), 3.98–3.93 (m, 1H, CH), 3.74–3.60 (m, 2H, benzyl-$\underline{CH_2}$), 2.58–2.52 (m, 2H, CH-$\underline{CH_2}$) ; ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 140.4, 140.2, 131.5, 130.3, 129.1, 128.6, 123.6, 1234, 112.7, 111.6, 69.3, 53.0, 52.8, 47.9; HRMS (ESI): m/z calcd for $C_{22}H_{20}Br_2{}^{37}ClN_2O^+$: 522.9596; found: 522.9595.

1-(3,6-dibromo-9*H*-carbazol-9-yl)-3-((4-fluorobenzyl)amino)propan-2-ol (4b)

A white solid, yield 63.2%; m. p. 159-160 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.45 (d, *J*=1.7 Hz, 2H, carbazol-H), 7.66–7.50 (m, 4H, carbazol-H, benzyl-H), 7.35 (dd, *J*=8.5, 5.8 Hz, 2H, benzyl-H), 7.18–7.04 (m, 2H, carbazol-H), 5.75 (s, 1H, NH), 5.02 (d, *J*=5.0 Hz, 1H, OH), 4.46 (dd, *J*=14.8, 4.2 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, *J*=14.8, 7.3 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.86 (m, 1H, NH), 3.79–3.58 (m, 2H, benzyl-$\underline{CH_2}$), 2.62–2.52 (m, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 161.6 (d, $^{1}J_{CF}$=241.7 Hz, 2C), 140.2, 137.4, 130.3 (d, $^{3}J_{CCCF}$=8.0 Hz, 2C), 129.1, 123.6, 123.4, 115.3 (d, $^{2}J_{CCF}$=21.0 Hz, 2C), 112.7, 111.6, 69.3, 53.0, 52.8, 47.9; ^{19}F NMR (376 MHz, DMSO-d_6, ppm) δ -116.54; HRMS (ESI): m/z calcd for $C_{22}H_{20}Br_2FN_2O^+$: 504.9921; found: 504.9920.

1-(3,6-dibromo-9*H*-carbazol-9-yl)-3-((4-methylbenzyl)amino)propan-2-ol (4c)

A white solid, yield 72.4%; m. p. 145-148 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.45 (d, *J*=1.7 Hz, 2H, carbazol-H), 7.58 (dt, *J*=8.8, 5.3 Hz, 4H, carbazol-H, benzyl-H), 7.20 (d, *J*=7.9 Hz, 2H, carbazol-H), 7.11 (d, *J*=7.9 Hz, 2H, benzyl-H), 5.75 (s, 1H, NH), 5.03 (d, *J*=4.1 Hz, 1H, OH), 4.45 (dd, *J*=14.8, 4.2 Hz, 1H, N-$\underline{CH_2}$), 4.27 (dd, *J*=14.8, 7.2 Hz, 1H, N-$\underline{CH_2}$), 4.04–3.87 (m, 1H, CH), 3.72–3.59 (m, 2H, benzyl-$\underline{CH_2}$), 2.57 (dt, *J*=11.0, 6.8 Hz, 2H, CH-$\underline{CH_2}$), 2.28 (s, 3H, CH_3). ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 140.2, 138.0, 136.1, 129.2, 129.1, 128.5, 123.6, 123.4, 112.7, 111.6, 69.2, 53.4, 52.9, 47.9, 21.2; HRMS (ESI): m/z calcd for $C_{23}H_{23}Br_2N_2O^+$: 501.0172; found: 501.0172.

1-((4-chlorobenzyl)amino)-3-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)propan-2-ol (4d)

A white solid, yield 69.6%; m. p. 147-148 °C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.49–7.41 (m, 4H, carbazol-H, benzyl-H), 7.38–7.27 (m, 4H, carbazol-H, benzyl-H), 5.00 (d, *J*=4.8 Hz, 1H, OH), 4.39 (dd, *J*=14.6, 5.1 Hz, 1H, N-$\underline{CH_2}$), 4.20 (dd, *J*=14.6, 6.7 Hz, 1H, N-$\underline{CH_2}$), 4.06–3.90 (m, 1H, CH), 3.80–3.54 (m, 2H, benzyl-$\underline{CH_2}$), 2.61–2.52 (m, 2H, CH-$\underline{CH_2}$), 1.41 (s, 18H, 6CH_3); ^{13}C

NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 140.4, 139.6, 131.5, 130.3, 128.5, 123.4, 122.4, 116.5, 109.5, 69.3, 53.2, 52.8, 47.7, 34.9, 32.4; HRMS (ESI): m/z calcd for $C_{30}H_{38}ClN_2O^+$: 477.2667; found: 477.2662.

1-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)-3-((4-fluorobenzyl)amino)propan-2-ol (4e)

A white solid, yield 63.7%; m. p. 163-164 ^oC; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.52–7.41 (m, 4H, carbazol-H, benzyl-H), 7.33 (dd, J=8.5, 5.8 Hz, 2H, benzyl-H), 7.16–7.03 (m, 2H, carbazol-H), 5.75 (s, 1H, NH), 5.02 (s, 1H, OH), 4.39 (dd, J=14.6, 5.1 Hz, 1H, N-$\underline{CH_2}$), 4.21 (dd, J=14.6, 6.7 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.90 (m, 1H, CH), 3.77–3.50 (m, 2H, benzyl-$\underline{CH_2}$), 2.63–2.51 (m, 2H, CH-$\underline{CH_2}$), 1.40 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 161.5 (d, $^1J_{CF}$=241.7 Hz, 2C), 141.3, 139.6, 137.4 (d, $^4J_{CCCCF}$=2.8 Hz, 2C), 130.3 (d, $^3J_{CCCF}$=8.0 Hz, 2C), 123.4, 122.4, 116.5, 115.2 (d, $^2J_{CCF}$=21.0 Hz), 109.5, 69.3, 55.4, 53.0 (d, $^5J_{CCCCCF}$=33.4 Hz, 2C), 47.7, 34.9, 32.4; ^{19}F NMR (376 MHz, DMSO-d_6, ppm) δ -115.54; HRMS (ESI): m/z calcd for $C_{30}H_{38}FN_2O^+$: 461.2963; found: 461.2957.

1-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)-3-((4-methylbenzyl)amino)propan-2-ol (4f)

A white solid, yield 77.1%; m. p. 134-135 ^oC; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.52–7.40 (m, 4H, carbazol-H, benzyl-H), 7.19 (d, J=7.8 Hz, 2H, benzyl-H), 7.10 (d, J=7.7 Hz, 2H, carbazol-H), 5.76 (s, 1H, NH), 4.99 (s, 1H, OH), 4.39 (dd, J=14.6, 4.9 Hz, 1H, N-$\underline{CH_2}$), 4.20 (dd, J=14.7, 6.7 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.88 (m, 1H, CH), 3.80–3.50 (m, 2H, benzyl-$\underline{CH_2}$), 2.65–2.52 (m, 2H, CH-$\underline{CH_2}$), 2.27 (s, 3H, CH_3), 1.41 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 139.6, 138.2, 135.9, 129.2, 128.5, 123.4, 122.4, 116.5, 109.5, 69.3, 53.5, 53.2, 47.7, 34.9, 32.4, 21.2; HRMS (ESI): m/z calcd for $C_{31}H_{41}N_2O^+$: 457.3213; found: 457.3203.

1,1'-(9-(3-((4-chlorobenzyl)amino)-2-hydroxypropyl)-9*H*-carbazole-3,6-diyl) bis(ethan-1-one) (4g)

A white solid, yield 64.4%; m. p. 156-157 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 9.02 (d, *J*=1.4 Hz, 2H, carbazol-H), 8.09 (dd, *J*=8.7, 1.6 Hz, 2H, carbazol-H), 7.74 (d, *J*=8.7 Hz, 2H, benzyl-H), 7.36 (s, 4H, carbazol-H, benzyl-H), 5.07 (d, *J*=4.8 Hz, 1H, OH), 4.55 (dd, *J*=14.7, 4.0 Hz, 1H, N-$\underline{CH_2}$), 4.38 (dd, *J*=14.7, 7.5 Hz, 1H, N-$\underline{CH_2}$), 4.10–3.92 (m, 1H, CH), 3.76–3.63 (m, 2H, benzyl-$\underline{CH_2}$), 2.71 (s, 6H, 2CO-$\underline{CH_3}$), 2.59 (t, *J*=5.4 Hz, 2H, CH-$\underline{CH_2}$); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 197.5, 144.7, 140.4, 131.5, 130.3, 129.7, 128.5, 126.7, 122.9, 122.7, 110.8, 69.3, 53.0, 52.8, 48.1, 27.2; HRMS (ESI): m/z calcd for $C_{26}H_{26}N_2O_3Cl^+$: 449.1627; found: 449.1627.

1,1'-(9-(2-hydroxy-3-((4-methylbenzyl)amino)propyl)-9*H*-carbazole-3,6-diyl) bis(ethan-1-one) (4h)

A white solid, yield 38.7%; m. p. 167-168 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 9.03 (d, *J*=1.4 Hz, 2H, carbazol-H), 8.09 (dd, *J*=8.7, 1.7 Hz, 2H, carbazol-H), 7.75 (d, *J*=8.7 Hz, 2H, benzyl-H), 7.21 (d, *J*=7.9 Hz, 2H, carbazol-H), 7.12 (d, *J*=7.8 Hz, 2H, benzyl-H), 5.04 (d, *J*=4.8 Hz, 1H, OH), 4.56 (dd, *J*=14.7, 4.1 Hz, 1H, N-$\underline{CH_2}$), 4.38 (dd, *J*=14.7, 7.5 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.90 (m, 1H, CH), 3.75–3.57 (m, 2H, benzyl-$\underline{CH_2}$), 2.71 (s, 6H, 2CO-$\underline{CH_3}$), 2.65–2.54 (m, 2H, CH-$\underline{CH_2}$), 2.28 (s, 3H, CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 197.6, 144.7, 138.2, 136.0, 129.7, 129.2, 128.4, 126.7, 122.9, 122.7, 110.9, 69.3, 53.5, 53.1, 48.1, 27.2, 21.2; HRMS (ESI): m/z calcd for $C_{27}H_{29}N_2O_3^+$: 429.2173; found: 429.2173.

(*R*)-1-((4-chlorobenzyl)amino)-3-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)propan-2-ol (6a)

A white solid, yield 88.9%; m. p. 52-54 °C; ^1H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.54–7.39 (m, 4H, carbazol-H, benzyl-H), 7.23–7.16 (m, 2H, carbazol-H), 7.10 (d, *J*=6.3 Hz, 2H, benzyl-H), 5.00 (s, 1H, OH), 4.39 (dd, *J*=13.5, 3.2 Hz, 1H, N-$\underline{CH_2}$), 4.20 (dd, *J*=12.9, 6.6 Hz, 1H, N-$\underline{CH_2}$), 4.05–3.90 (m, 1H, CH), 3.72–3.55 (m, 2H, benzyl-$\underline{CH_2}$), 2.65–2.52 (m, 2H, CH-$\underline{CH_2}$), 1.40 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 139.6, 138.2, 135.9, 129.2, 128.5, 123.4, 122.4, 116.5, 109.5, 69.3, 53.5, 53.2, 47.7, 34.9, 32.4, 21.1; HRMS (ESI): m/z calcd for $C_{30}H_{38}ClN_2O^+$: 477.2667; found: 477.2663.

(*S*)-1-((4-chlorobenzyl)amino)-3-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)propan-2-ol (6b)

A white solid, yield 82.6%; m. p. 52-54 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.45 (d, *J*=0.7 Hz, 4H, carbazol-H, benzyl-H), 7.37–7.29 (m, 4H, carbazol-H, benzyl-H), 5.03 (d, *J*=3.5 Hz, 1H, OH), 4.39 (dd, *J*=14.6, 5.1 Hz, 1H, N-$\underline{CH_2}$), 4.20 (dd, *J*=14.6, 6.8 Hz, 1H, N-$\underline{CH_2}$), 4.08–3.91 (m, 1H, CH), 3.67 (q, *J*=13.7 Hz, 2H, benzyl-$\underline{CH_2}$), 2.54 (t, *J*=6.2 Hz, 2H, CH-$\underline{CH_2}$), 1.40 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 140.4, 139.5, 131.5, 130.3, 128.5, 123.5, 122.4, 116.5, 109.5, 69.3, 53.2, 52.8, 47.7, 34.9, 32.4; HRMS (ESI): m/z calcd for $C_{30}H_{38}ClN_2O^+$: 477.2667; found: 477.2658.

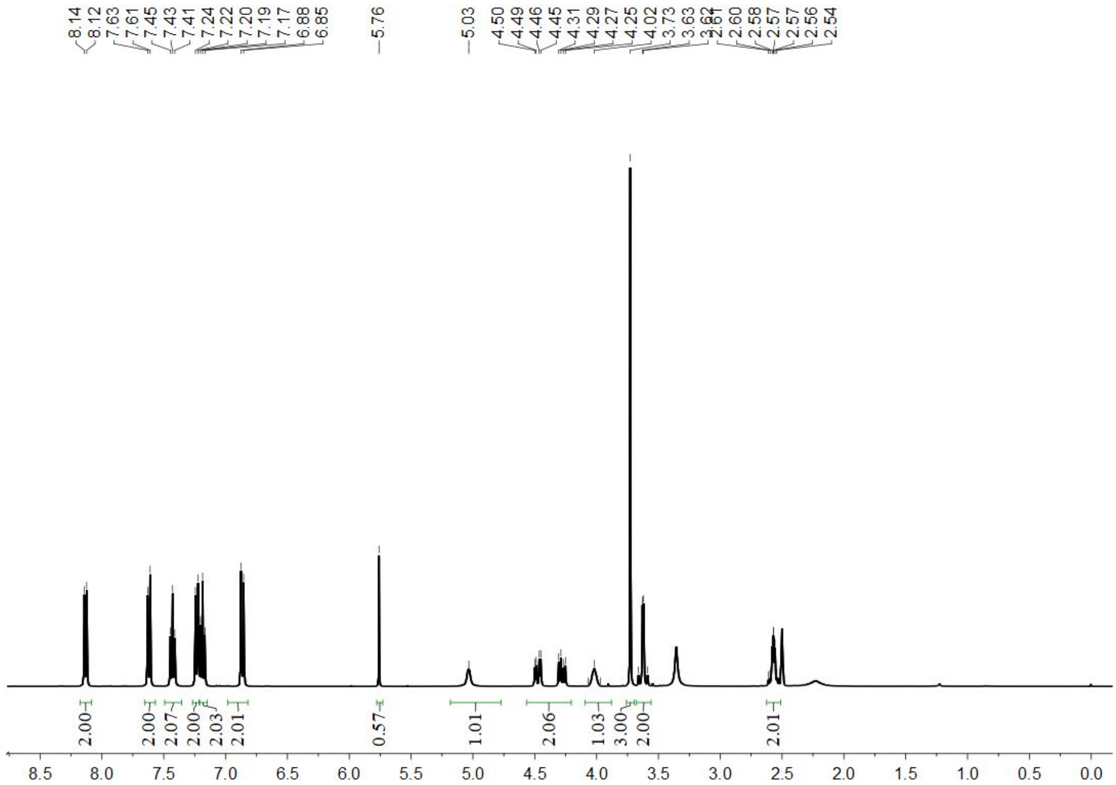
(*R*)-1-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)-3-((4-methylbenzyl)amino)propan-2-ol (6c)

A white solid, yield 62.5%; m. p. 58-61 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.54–7.39 (m, 4H, carbazol-H, benzyl-H), 7.23–7.16 (m, 2H, carbazol-H), 7.10 (d, *J*=6.3 Hz, 2H, benzyl-H), 5.00 (s, 1H, OH), 4.39 (dd, *J*=13.5, 3.2 Hz, 1H, N-$\underline{CH_2}$), 4.20 (dd, *J*=12.9, 6.6 Hz, 1H, N-$\underline{CH_2}$), 4.05–3.90 (m, 1H, CH), 3.72–3.55 (m, 2H, benzyl-$\underline{CH_2}$), 2.65–2.52 (m, 2H, CH-$\underline{CH_2}$), 2.27 (s, 3H, CH_3), 1.40 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 139.6, 138.2, 135.9, 129.2, 128.5, 123.4, 122.4, 116.5, 109.5, 69.3, 53.5, 53.2, 47.7, 34.9, 32.4, 21.2; HRMS (ESI): m/z calcd for $C_{31}H_{41}N_2O^+$: 457.3213; found: 457.3206.

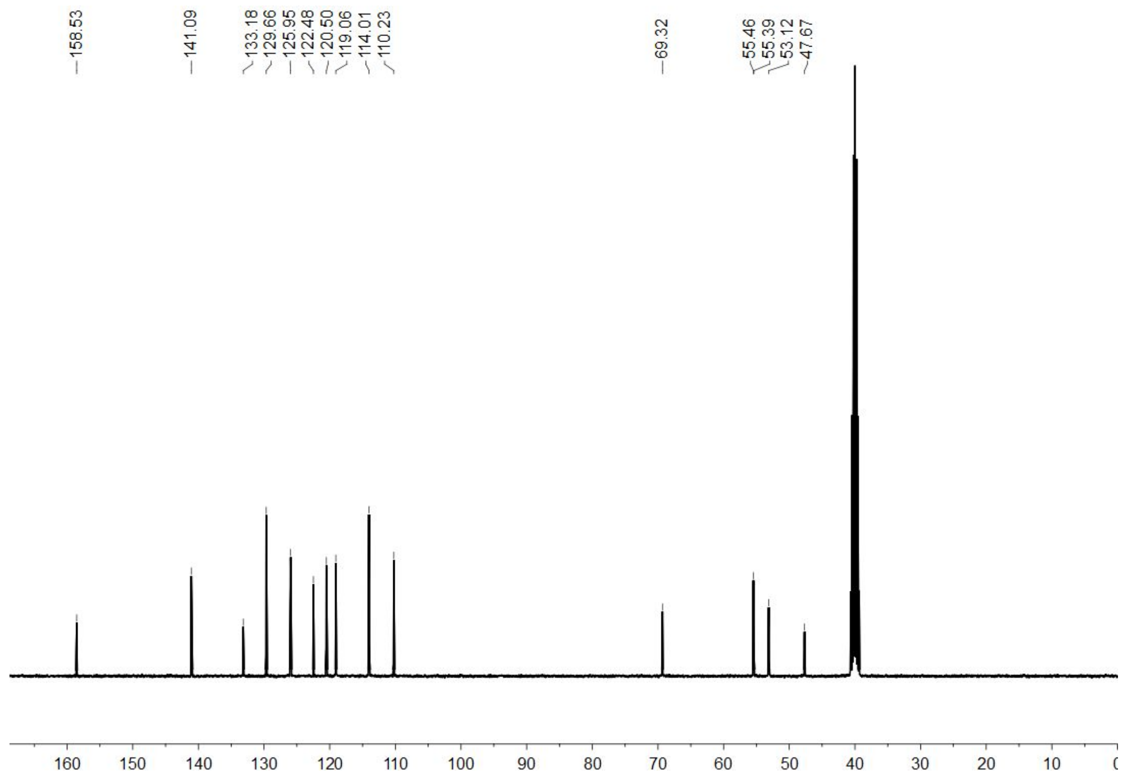
(*S*)-1-(3,6-di-tert-butyl-9*H*-carbazol-9-yl)-3-((4-methylbenzyl)amino)propan-2-ol (6d)

A white solid, yield 82.2%; m. p. 58-61 ^{o}C; ^{1}H NMR (400 MHz, DMSO-d_6, ppm) δ 8.15 (s, 2H, carbazol-H), 7.53–7.37 (m, 4H, carbazol-H, benzyl-H), 7.18 (d, *J*=7.3 Hz, 2H, carbazol-H), 7.10 (d, *J*=7.2 Hz, 2H, benzyl-H), 4.97 (d, *J*=4.2 Hz, 1H, OH), 4.39 (dd, *J*=14.4, 4.6 Hz, 1H, N-$\underline{CH_2}$), 4.19 (dd, *J*=14.7, 6.4 Hz, 1H, N-$\underline{CH_2}$), 4.05–3.92 (m, 1H, CH), 3.73–3.54 (m, 2H, benzyl-$\underline{CH_2}$), 2.55 (t, *J*=8.7 Hz, 2H, CH-$\underline{CH_2}$), 2.27 (s, 3H, CH_3), 1.40 (s, 18H, 6CH_3); ^{13}C NMR (101 MHz, DMSO-d_6, ppm) δ 141.3, 139.6, 138.2, 135.9, 129.2, 128.5, 123.4, 122.4, 116.5, 109.5, 69.3, 53.5, 53.3, 47.7, 34.9, 32.4, 21.2. HRMS (ESI): m/z calcd for $C_{31}H_{41}N_2O^+$: 457.3213; found: 457.3207.

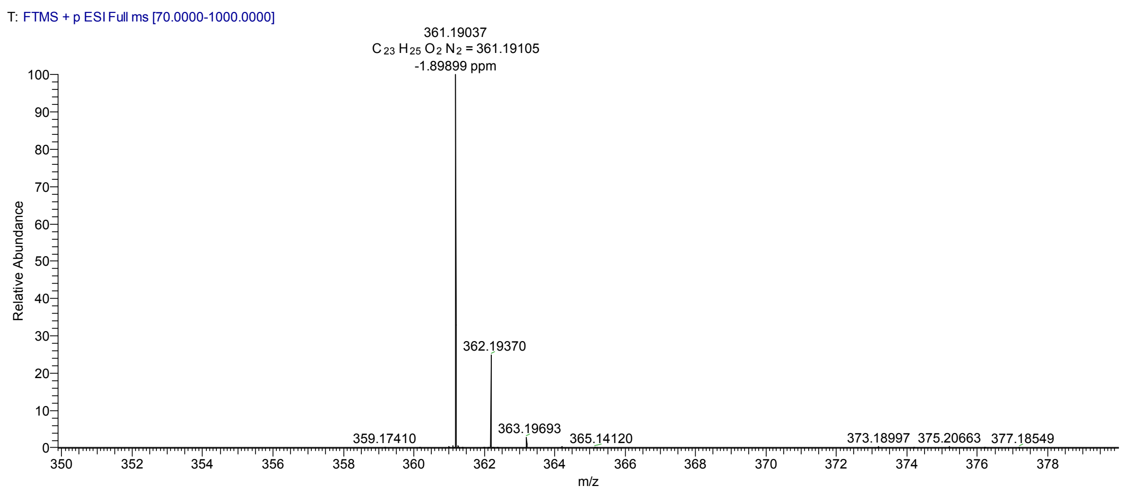
6. ^{1}H NMR, ^{13}C NMR, and HRMS spectra for the target compounds



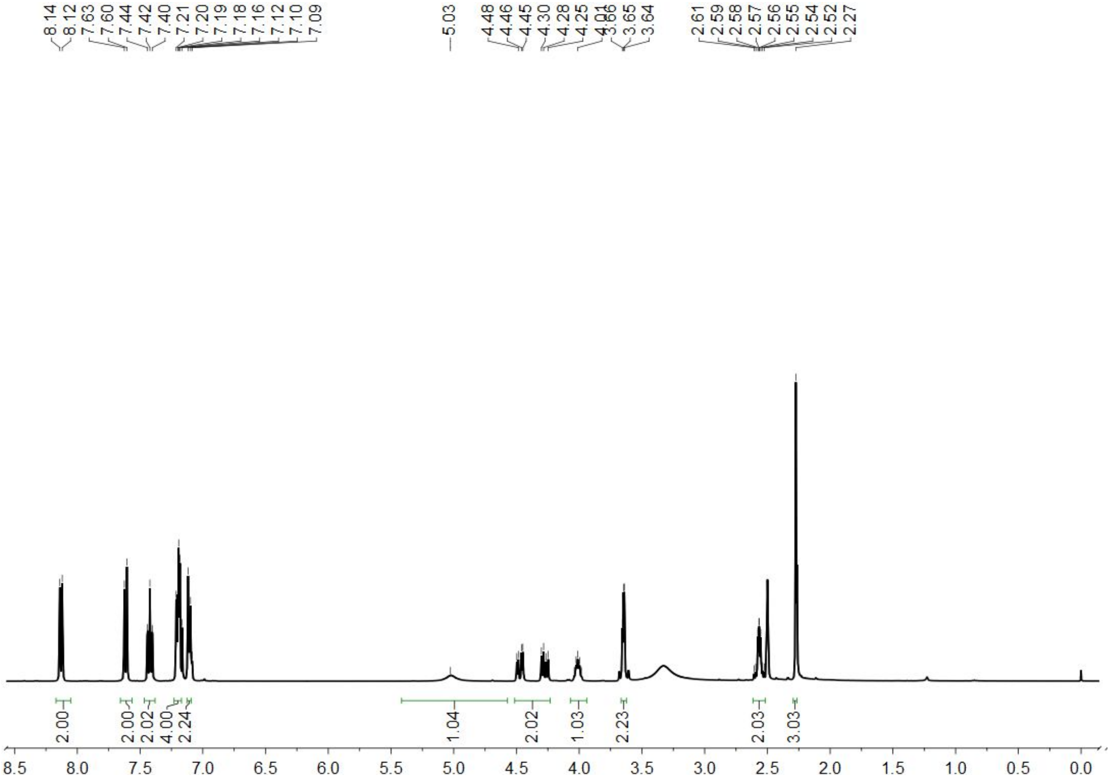
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2a**.



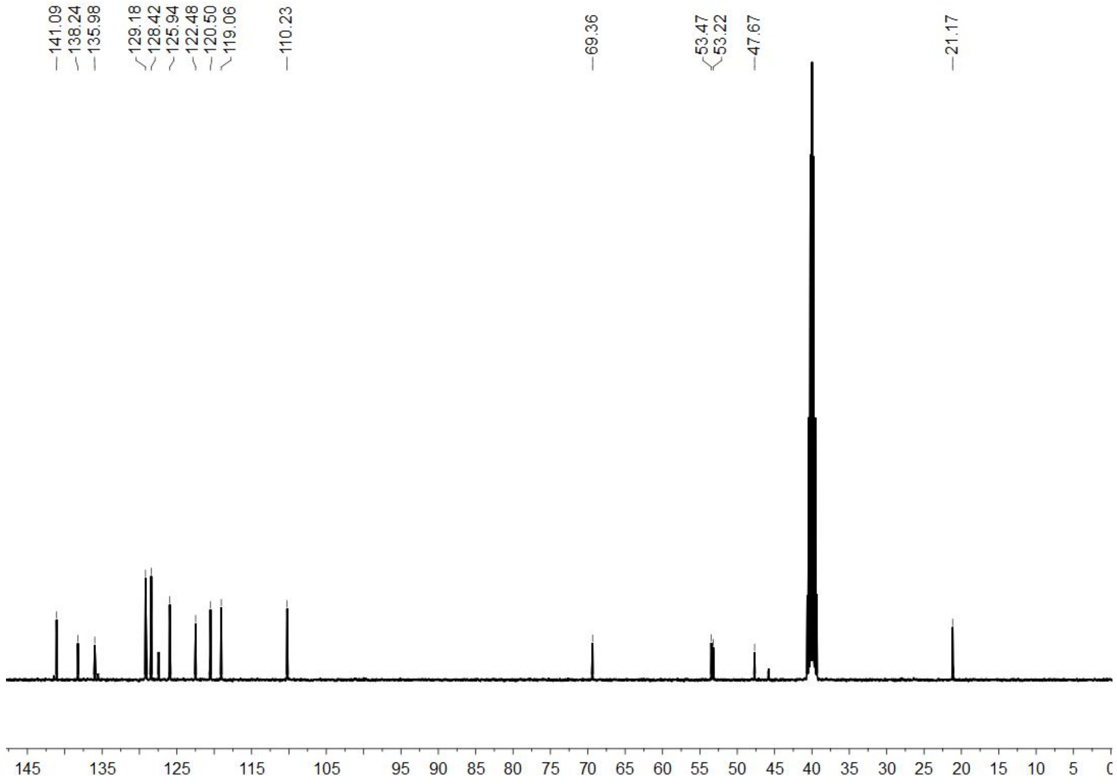
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2a**.



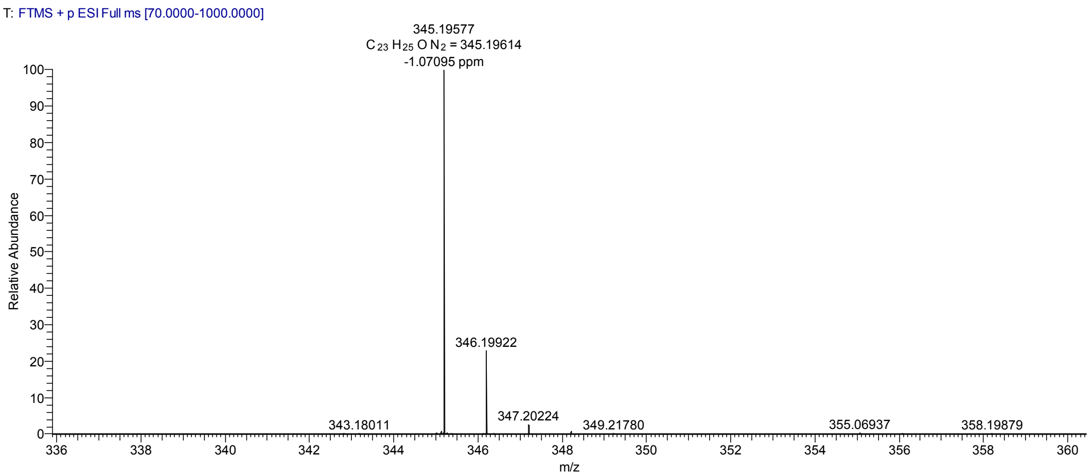
HRMS spectrum of target compound **2a**.



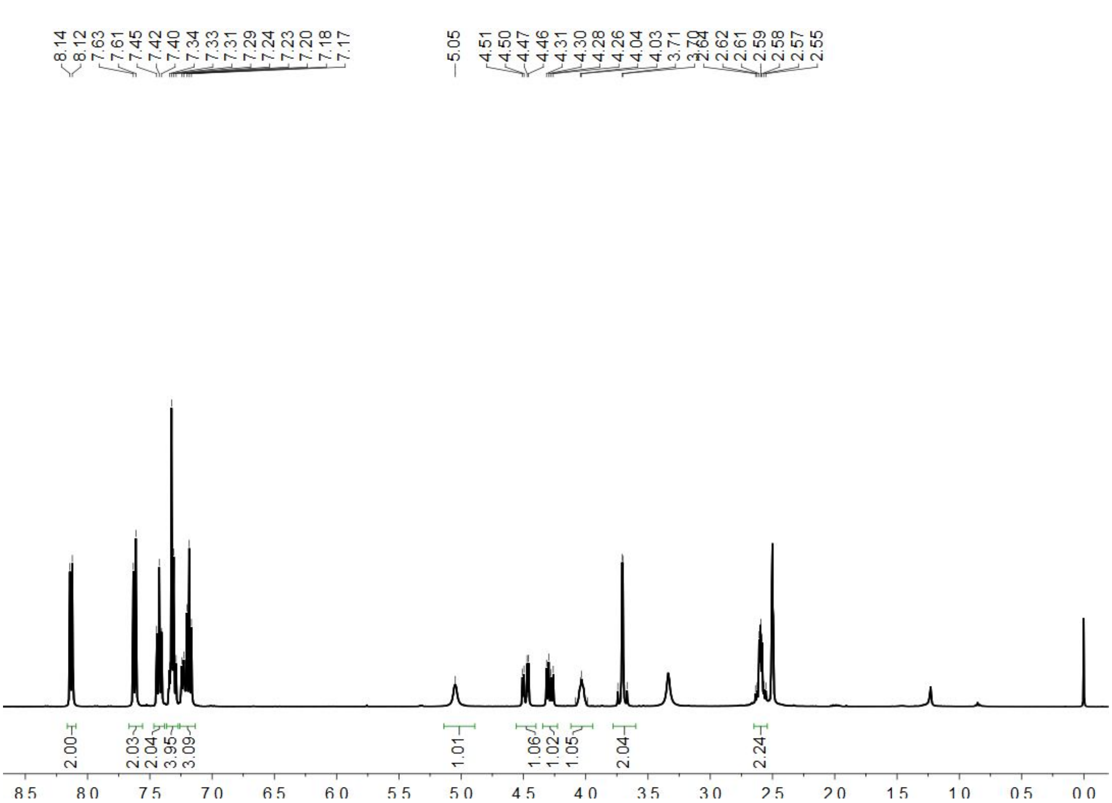
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2b**.



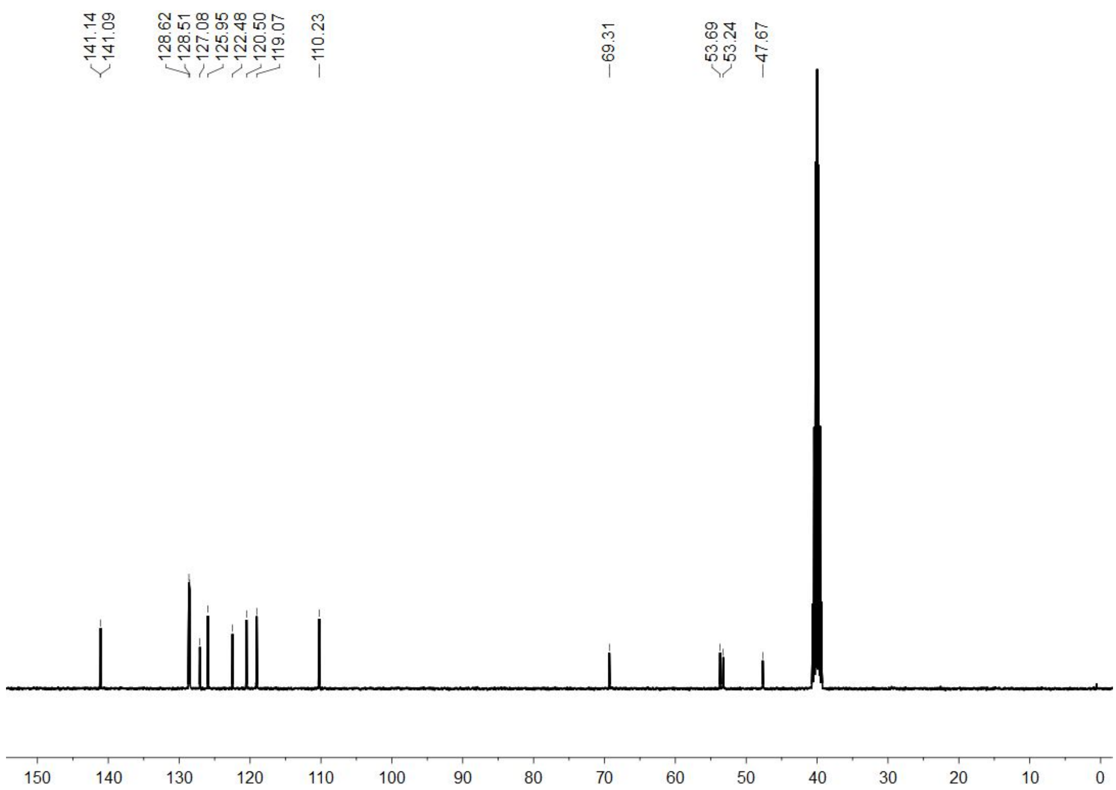
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2b**.



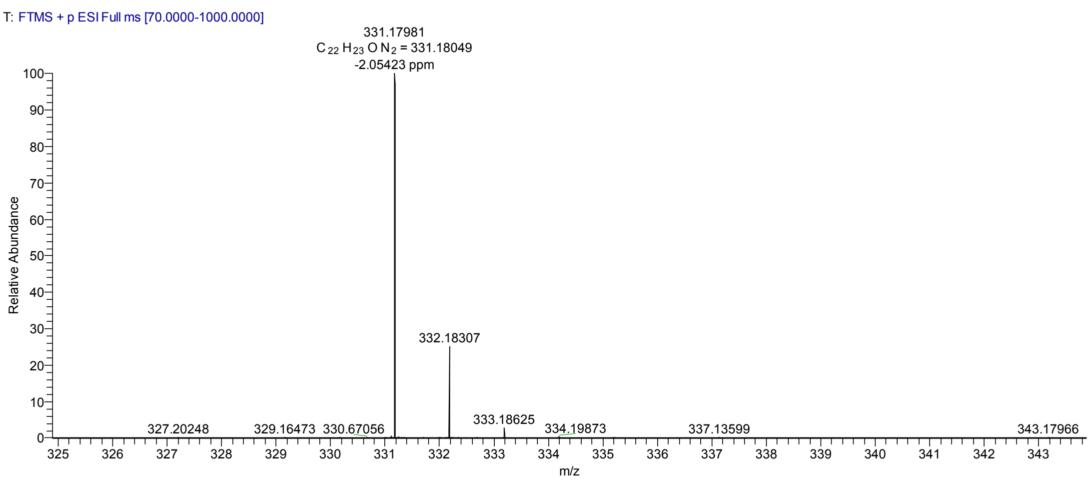
HRMS spectrum of target compound **2b**.



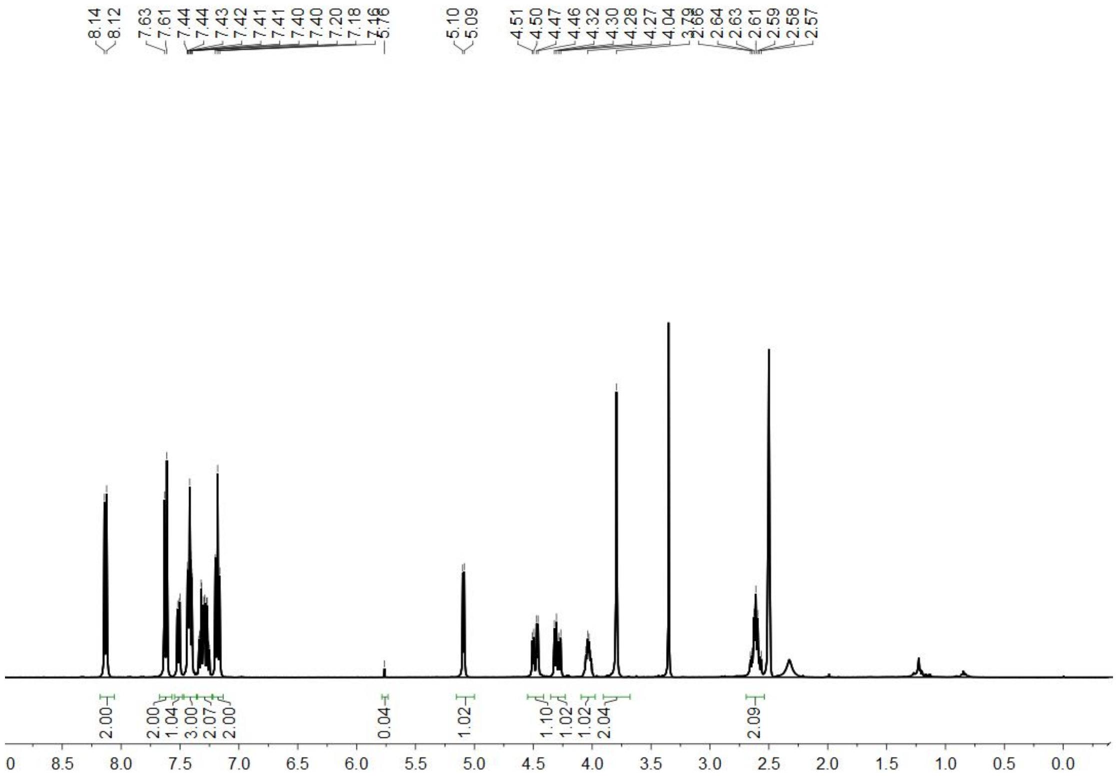
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2c**.



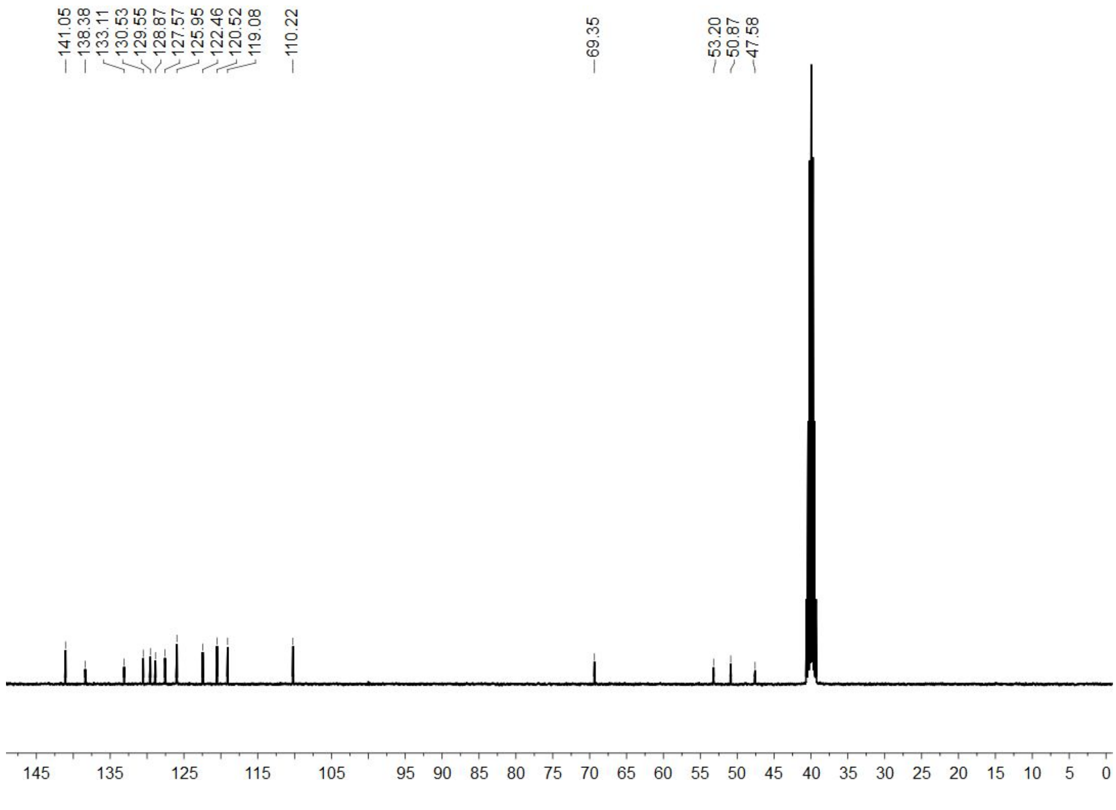
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2c**.



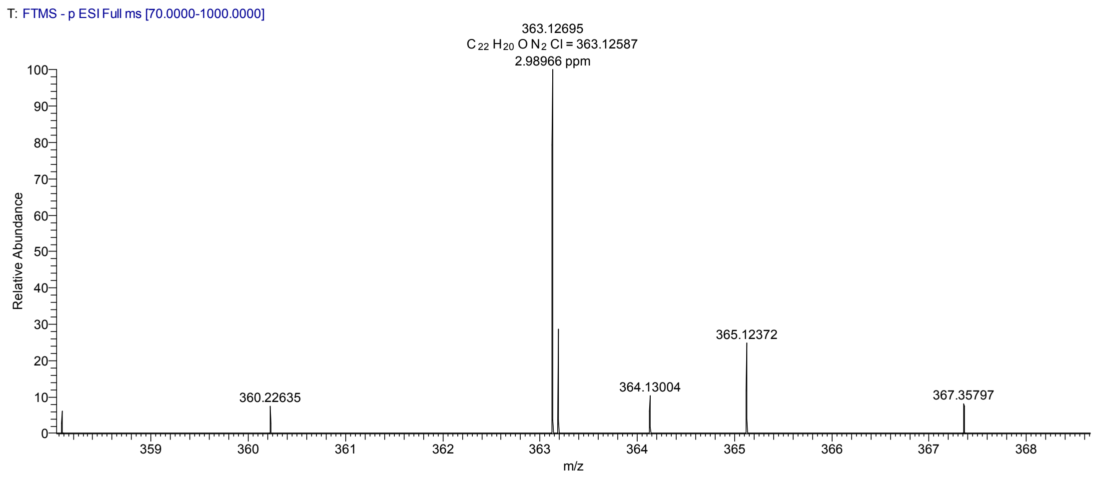
HRMS spectrum of target compound **2c**.



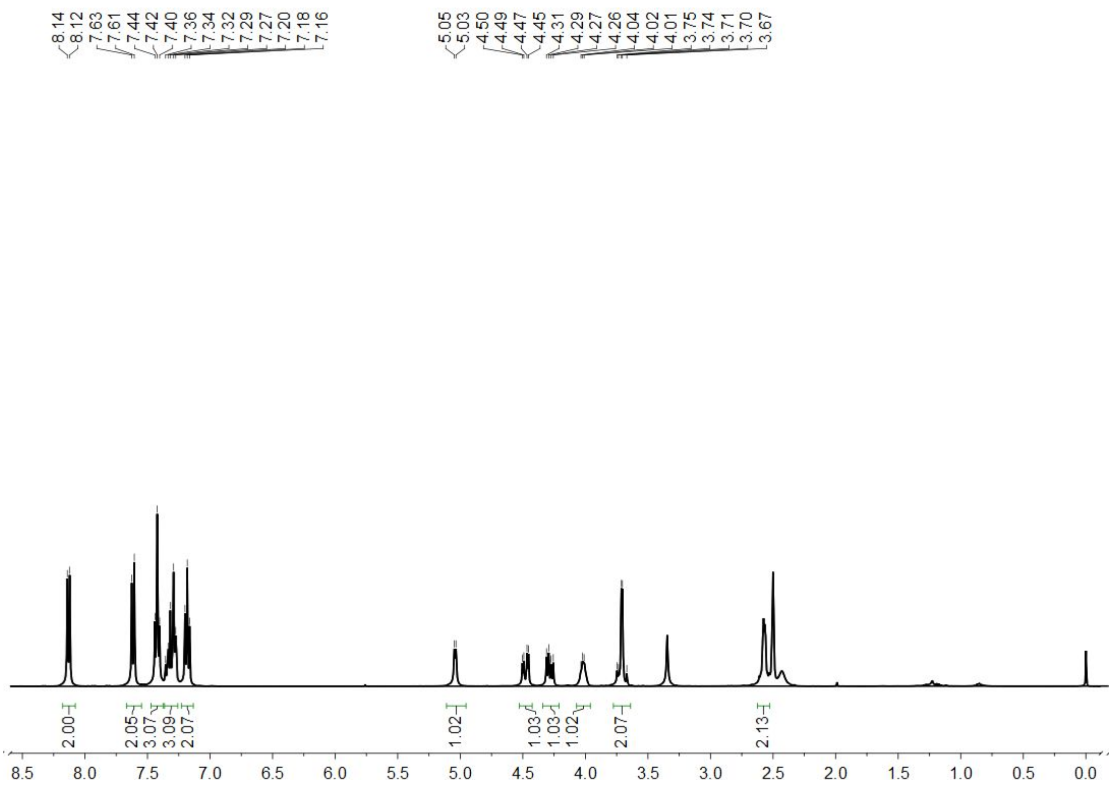
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2d**.



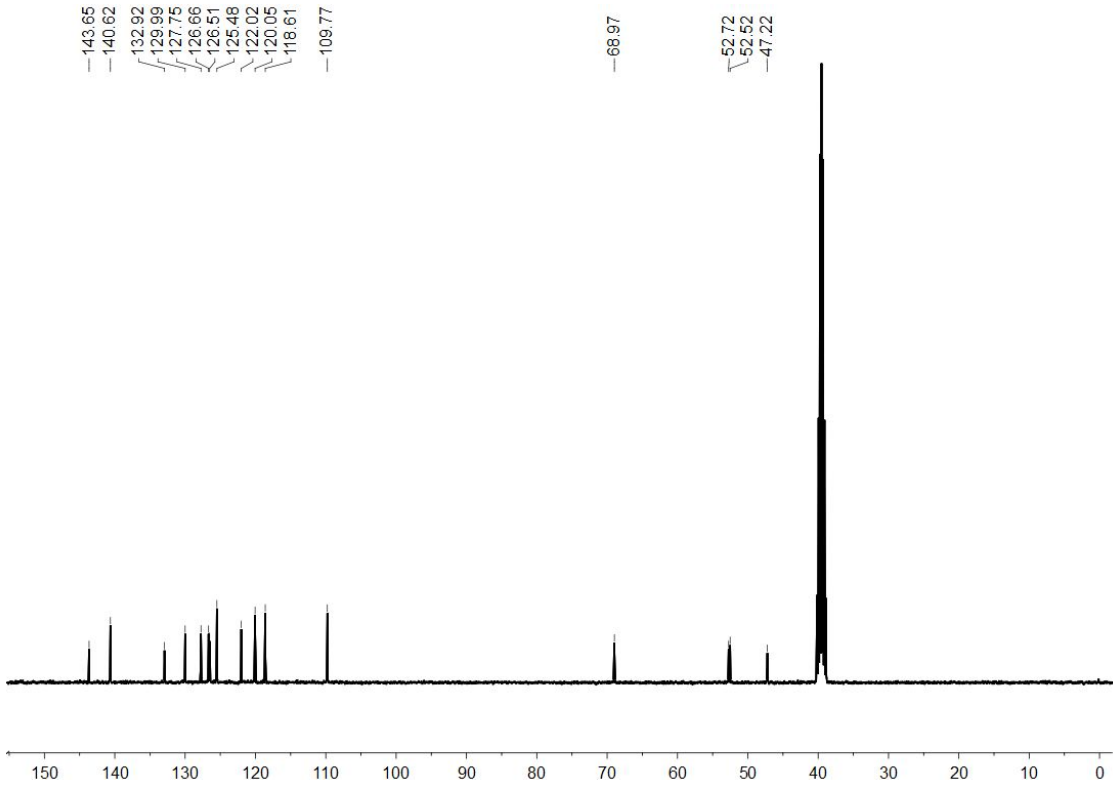
[13]C NMR Spectrum (DMSO-d_6, 101 MHz) of **2d**.



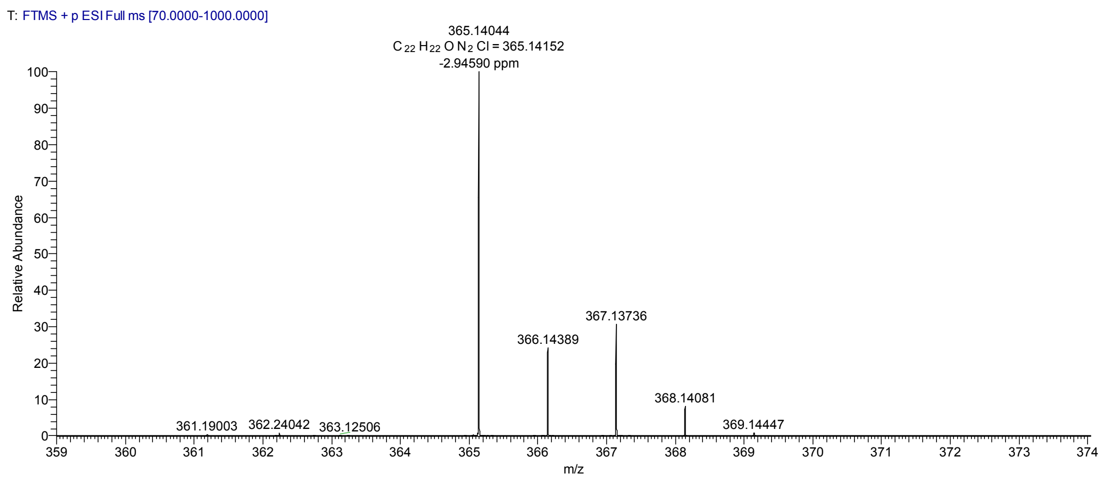
HRMS spectrum of target compound **2d**.



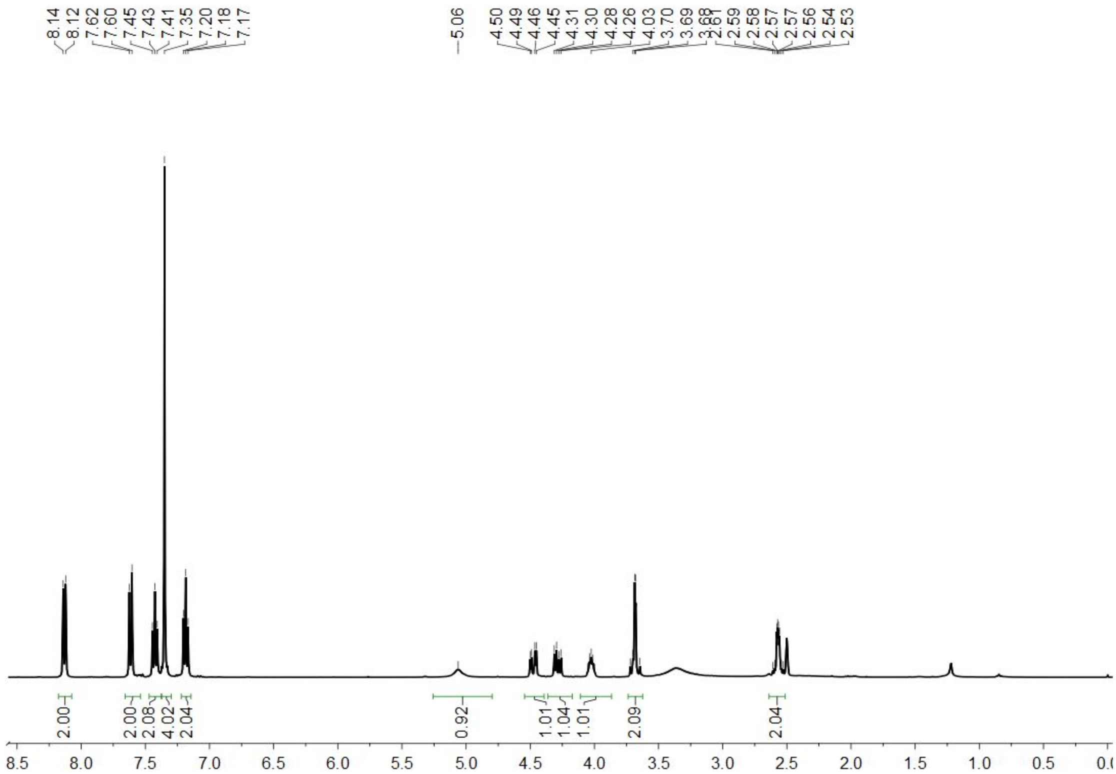
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2e**.



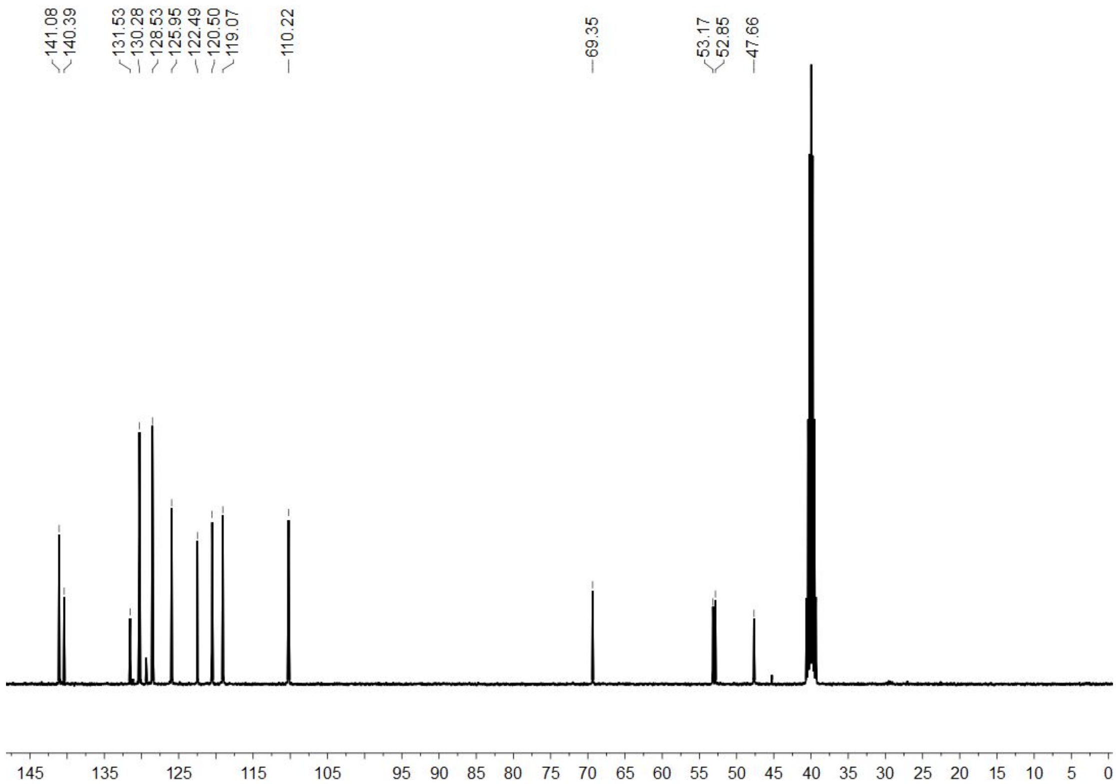
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2e**.



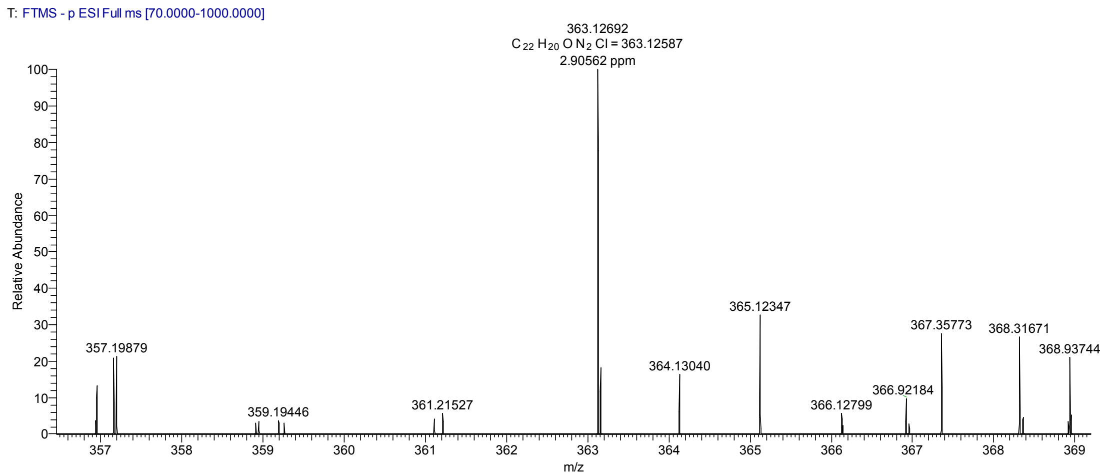
HRMS spectrum of target compound **2e**.



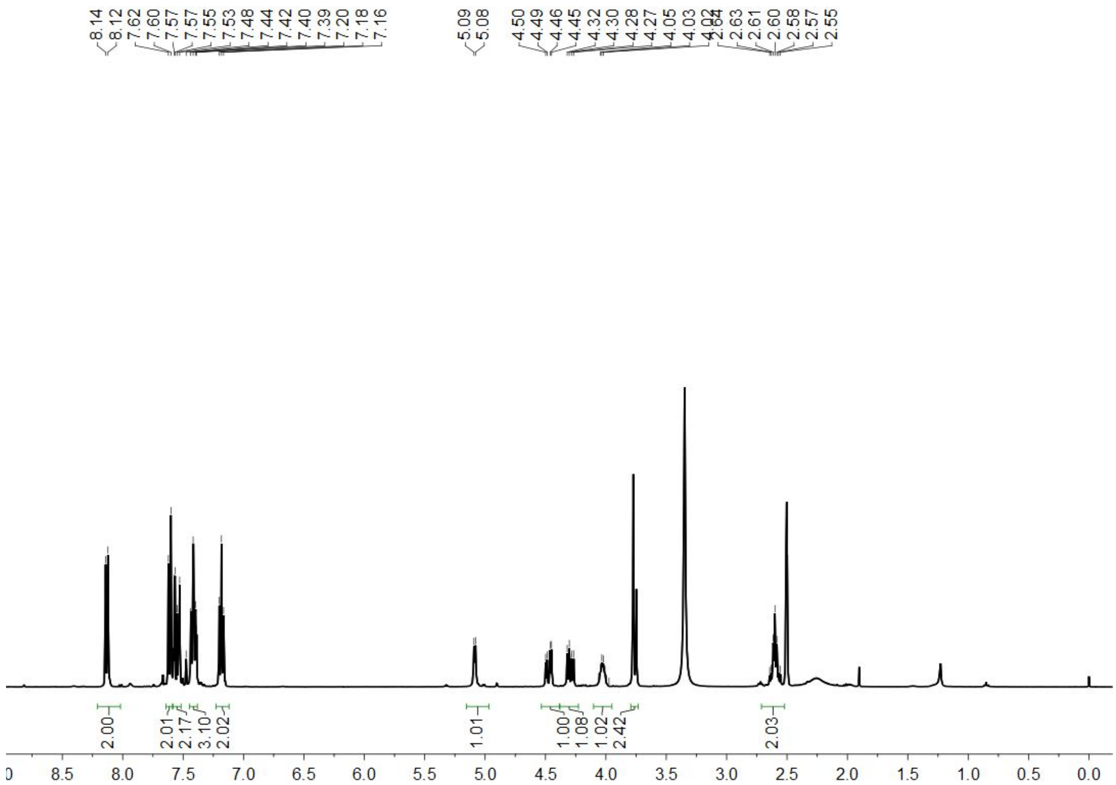
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2f**.



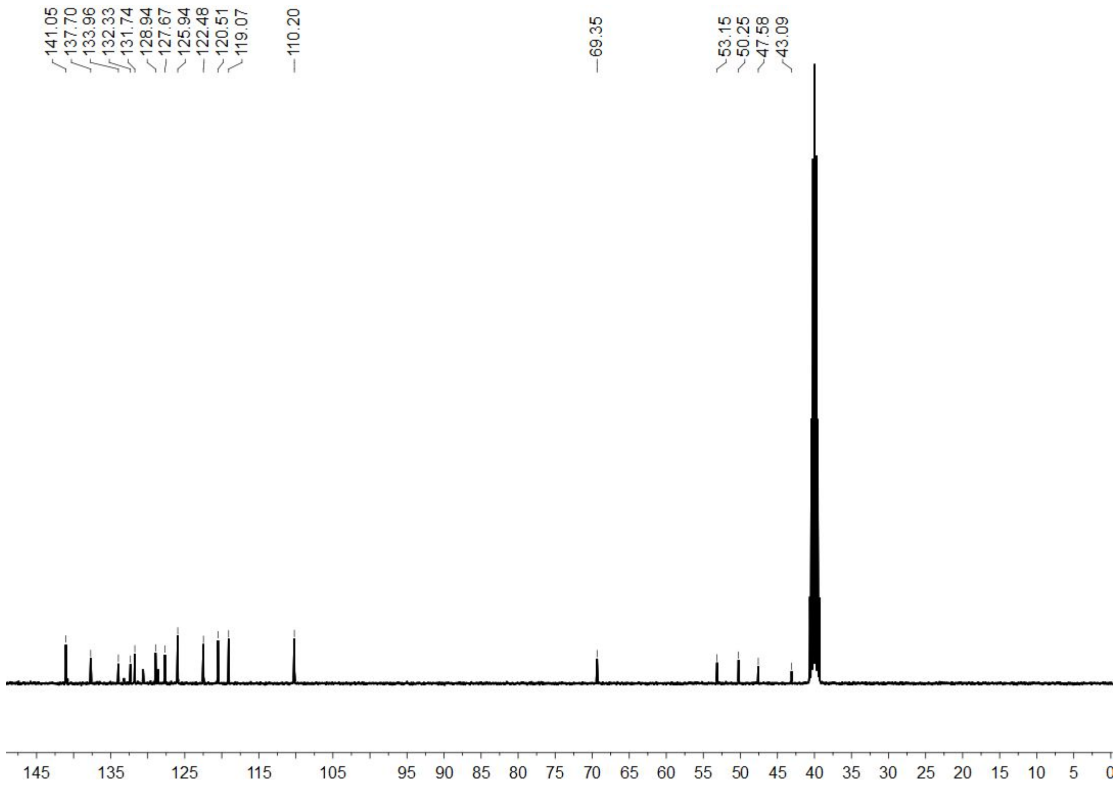
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2f**.



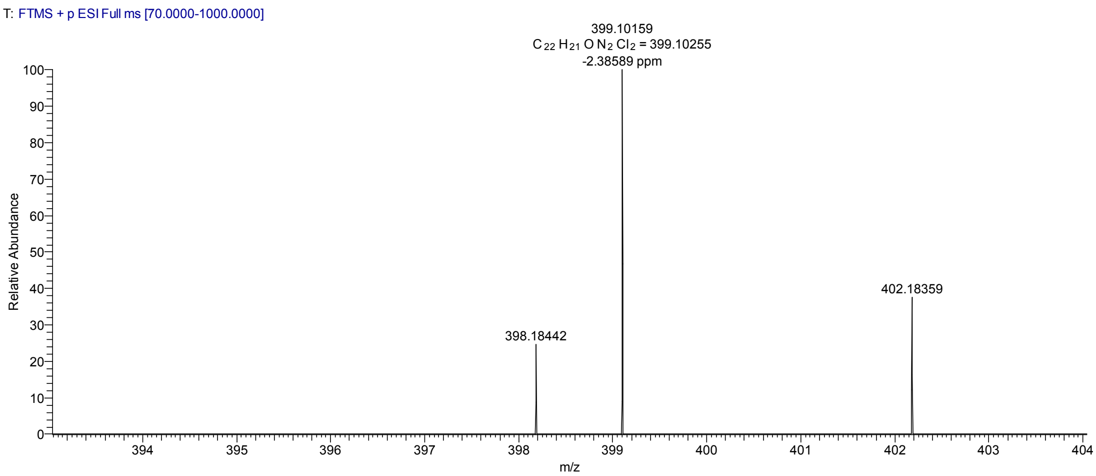
HRMS spectrum of target compound **2f**.



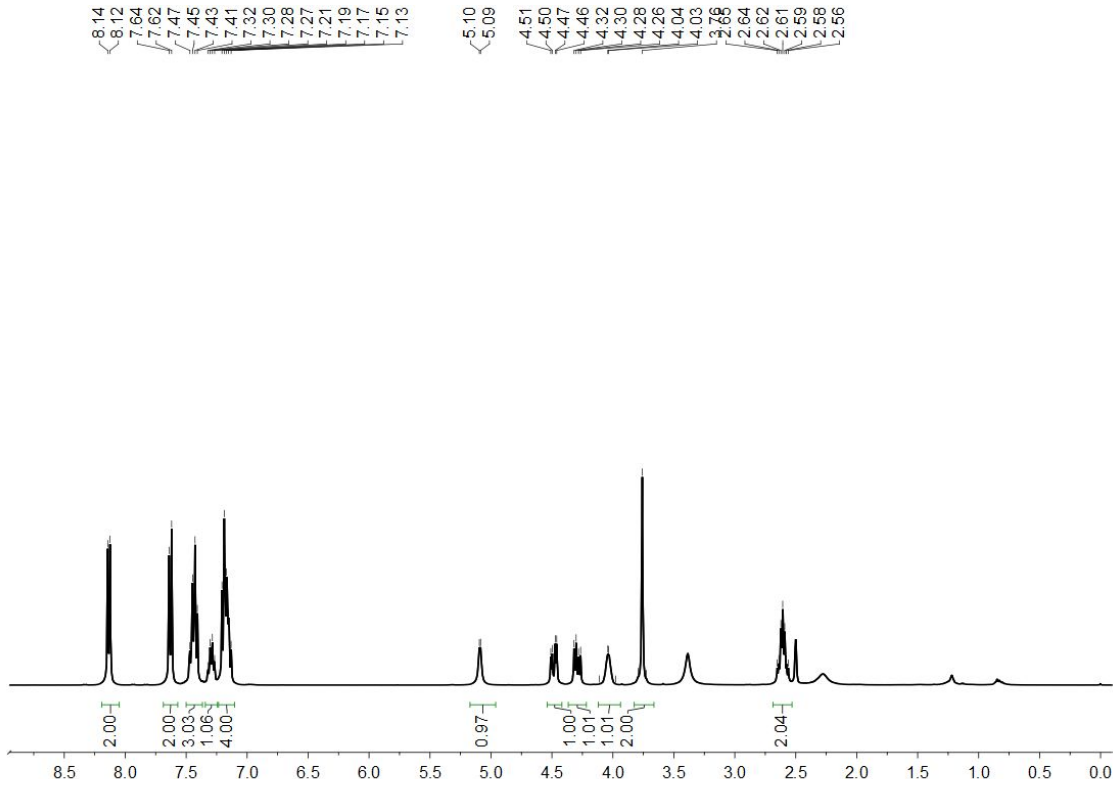
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2g**.



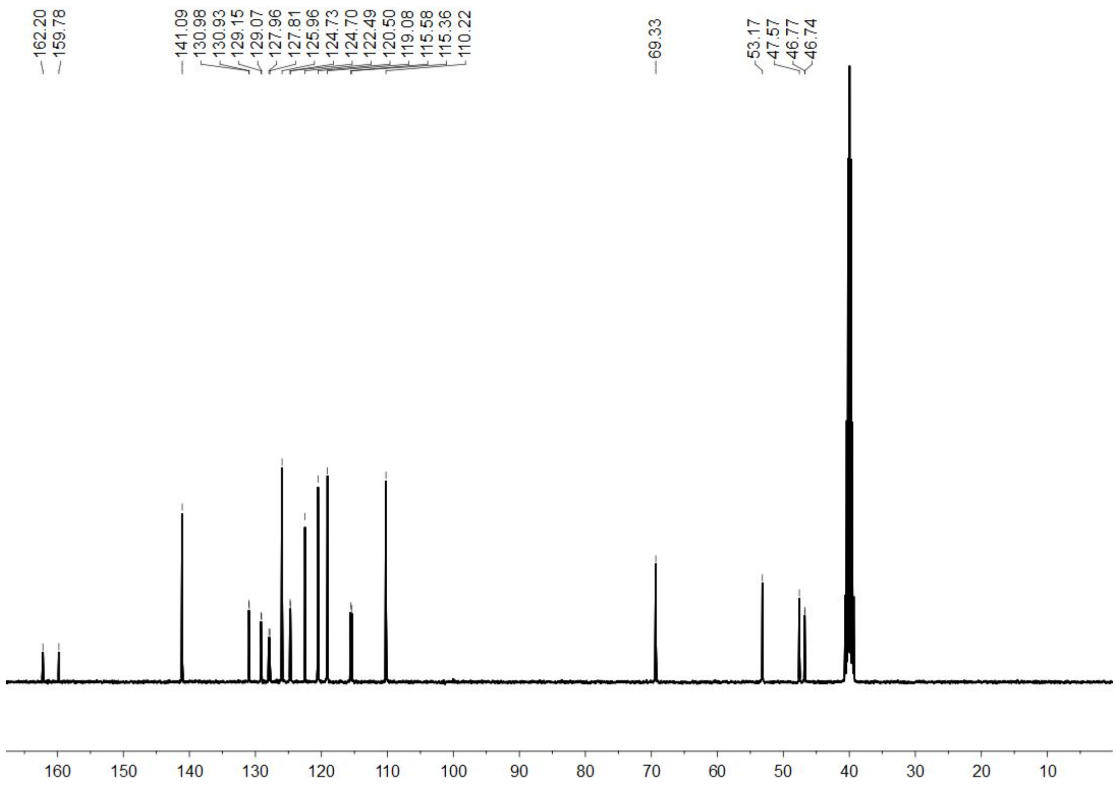
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2g**.



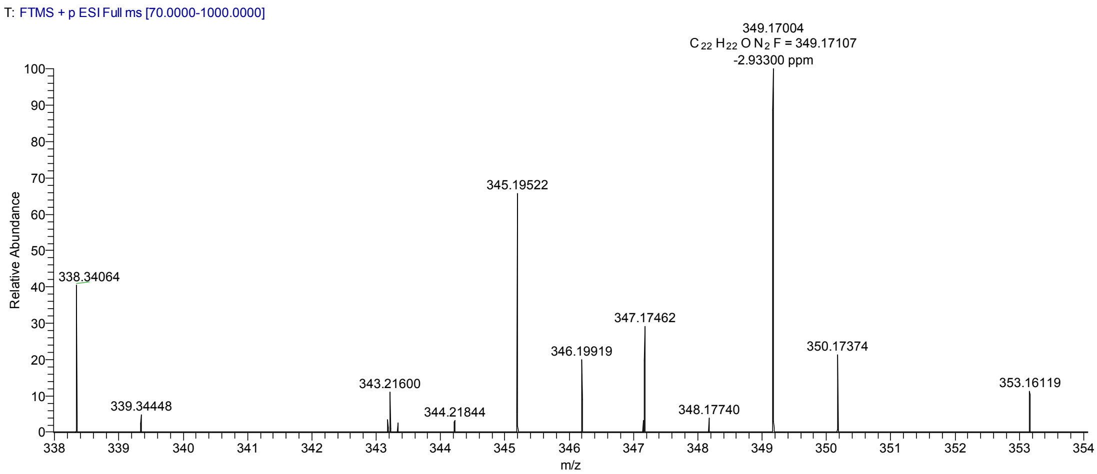
HRMS spectrum of target compound **2g**.



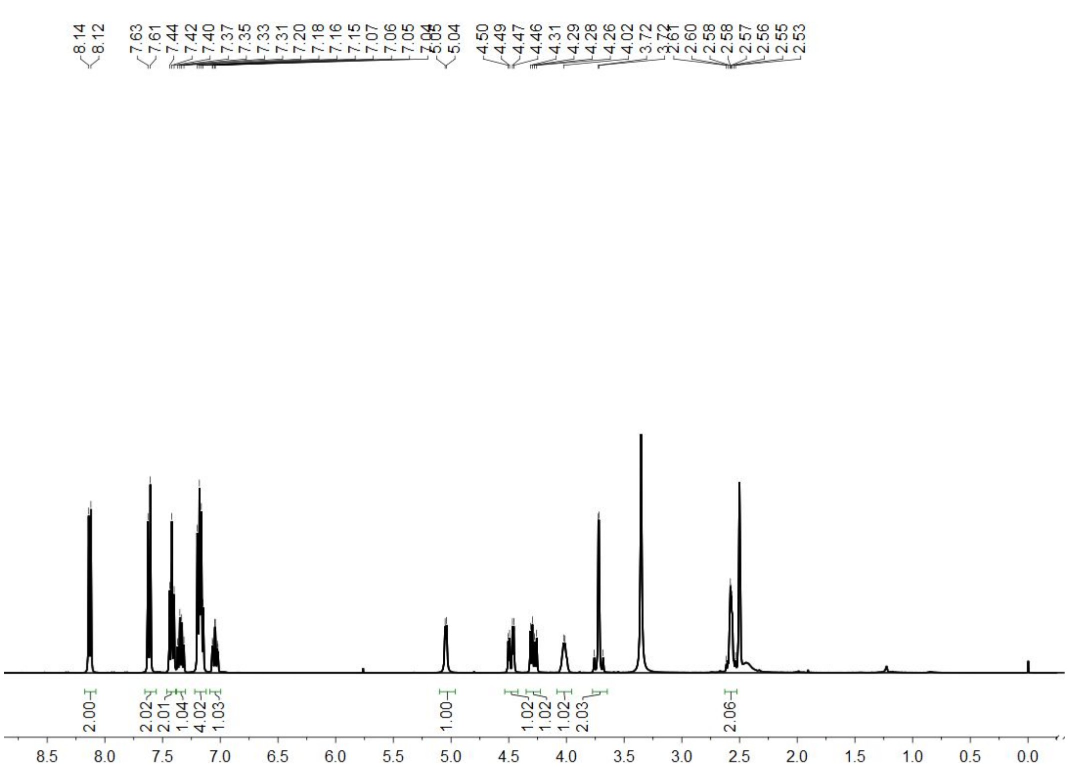
^1H NMR Spectrum (DMSO-d_6, 400 MHz) of **2h**.



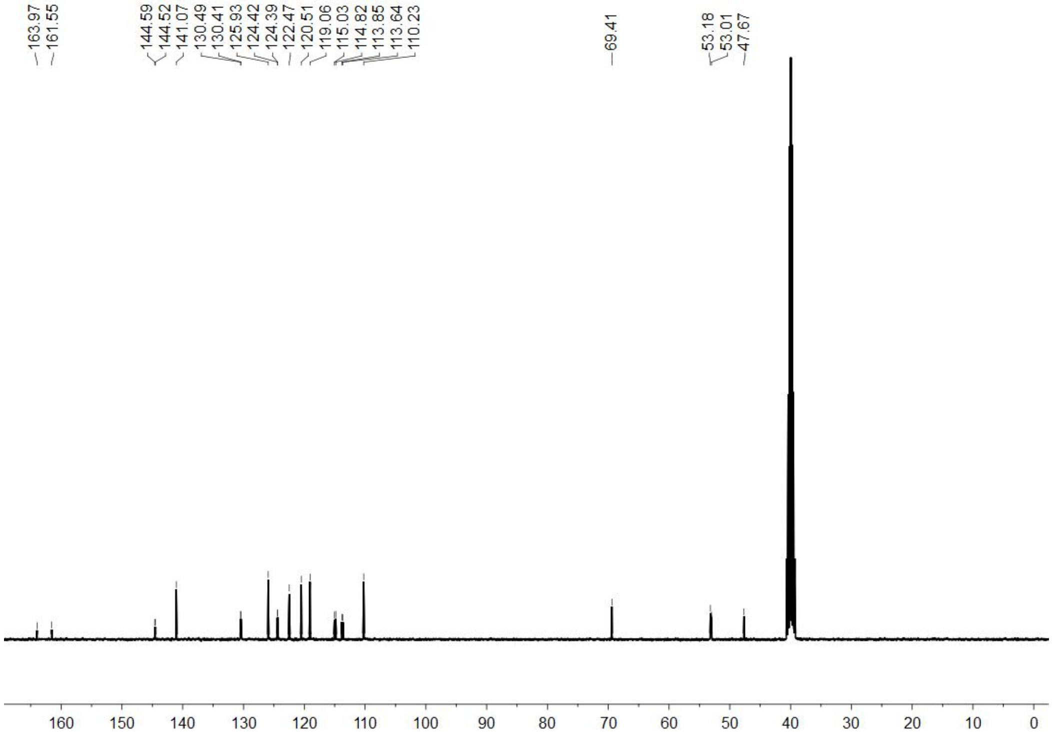
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2h**.



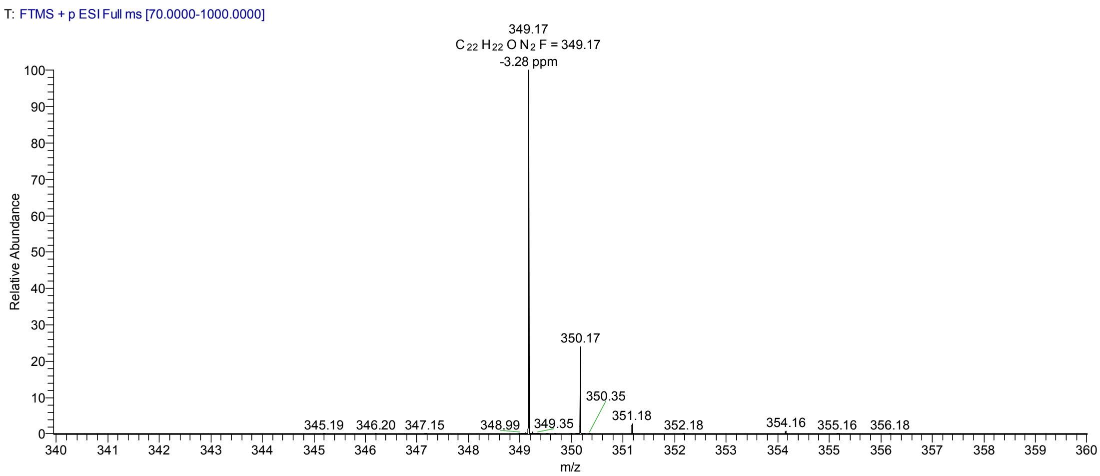
HRMS spectrum of target compound **2h**.



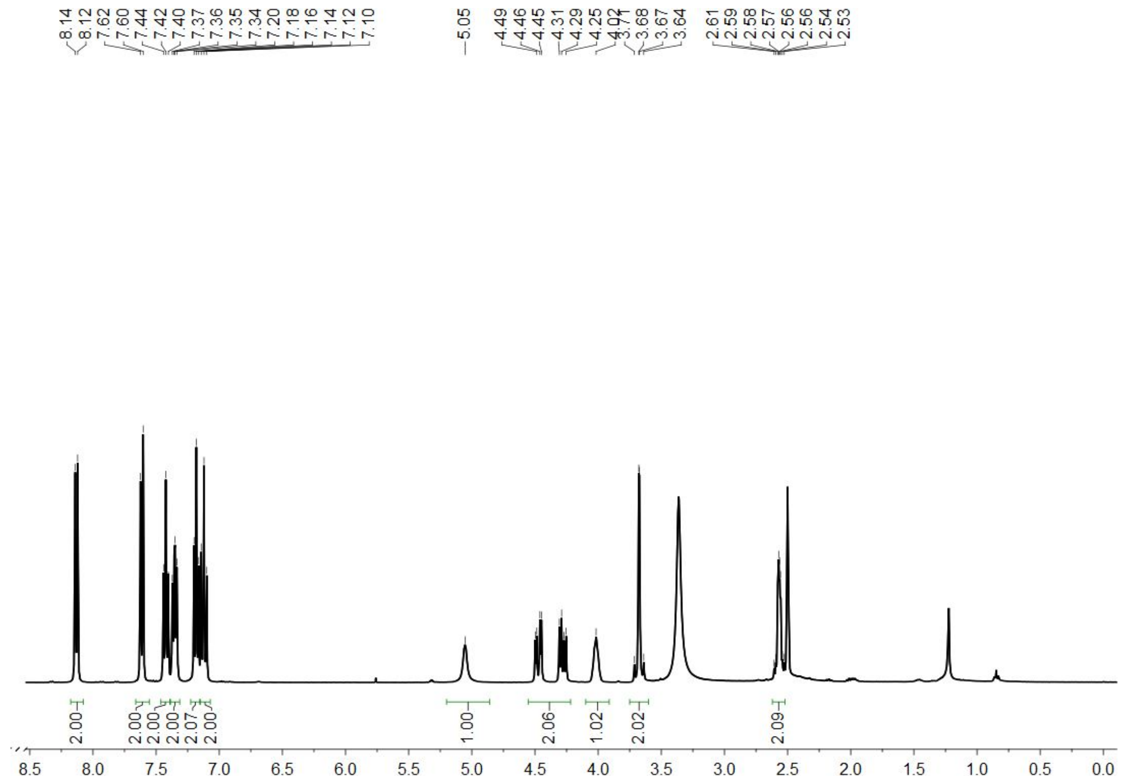
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2i**.



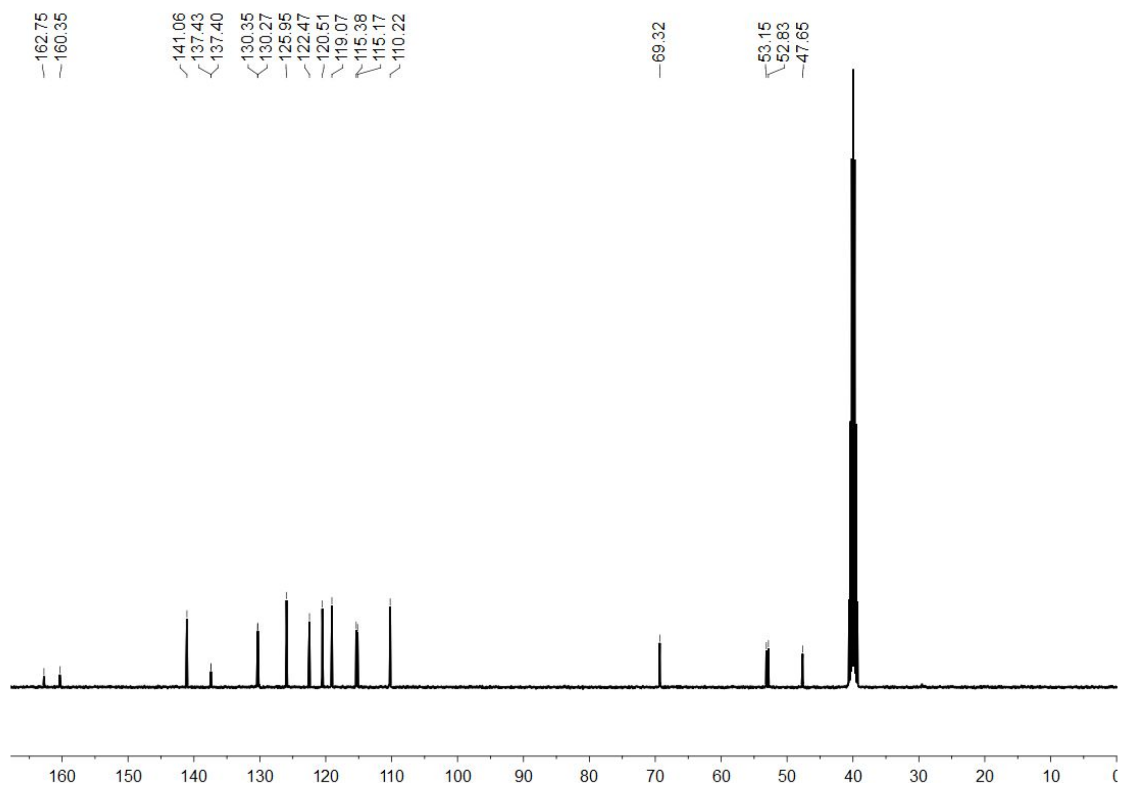
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2i**.



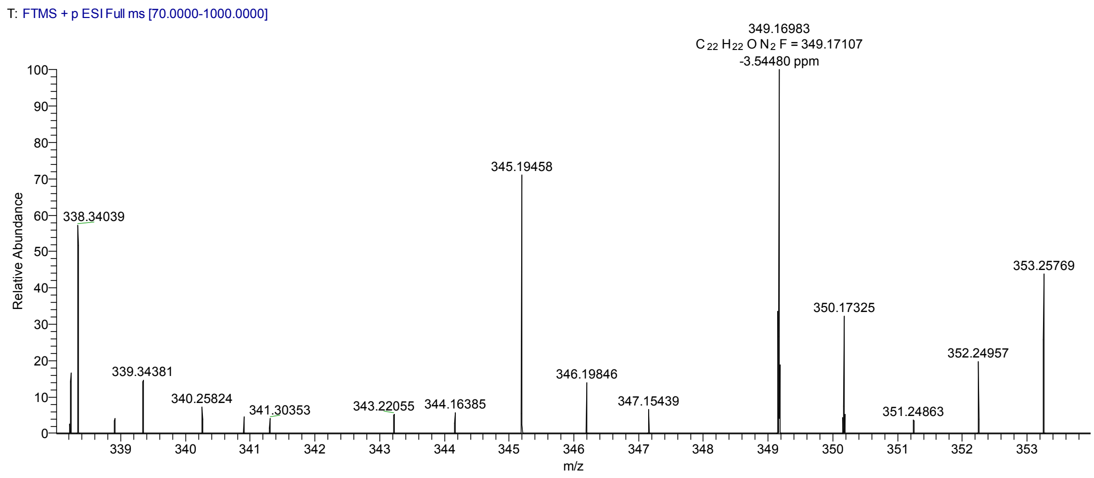
HRMS spectrum of target compound **2i**.



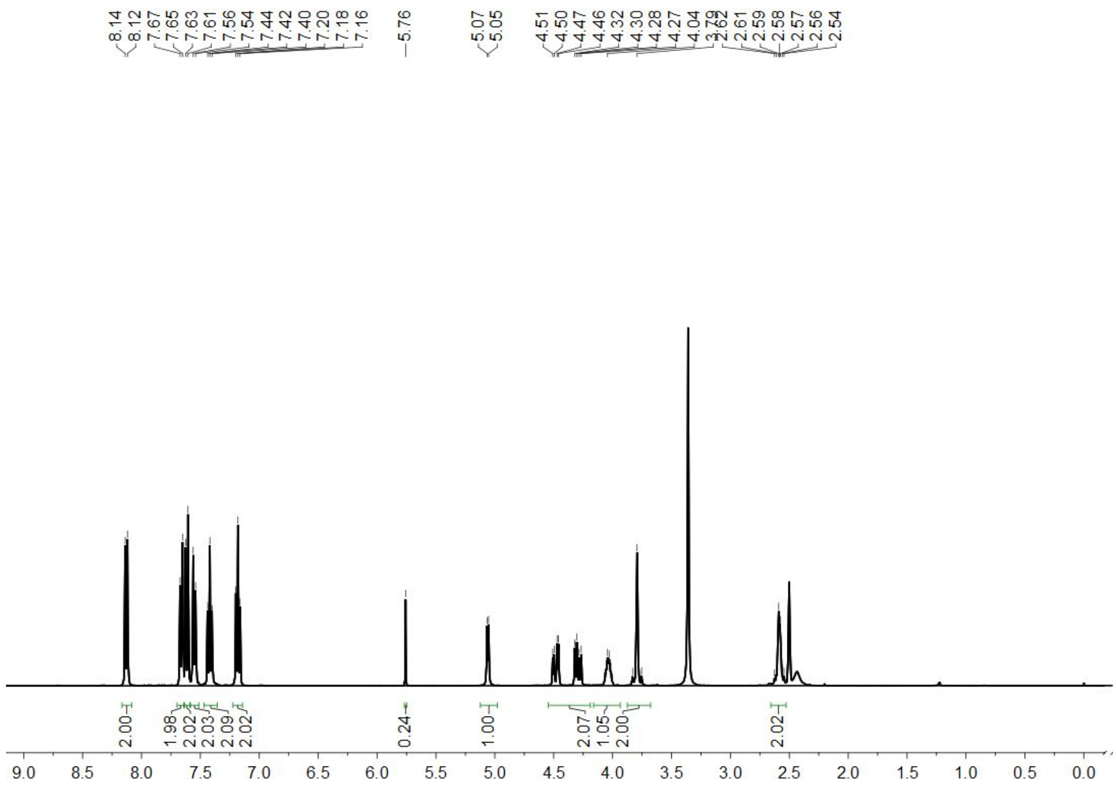
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2j**.



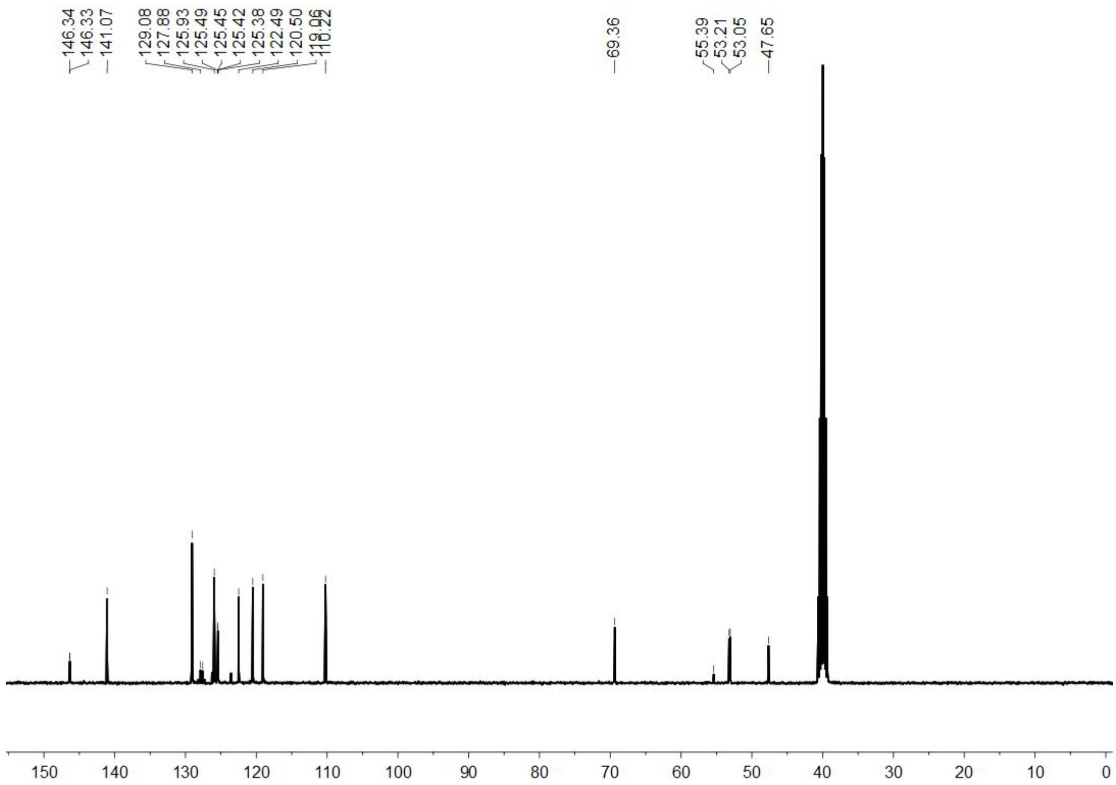
[13]C NMR Spectrum (DMSO-d_6, 101 MHz) of **2j**.



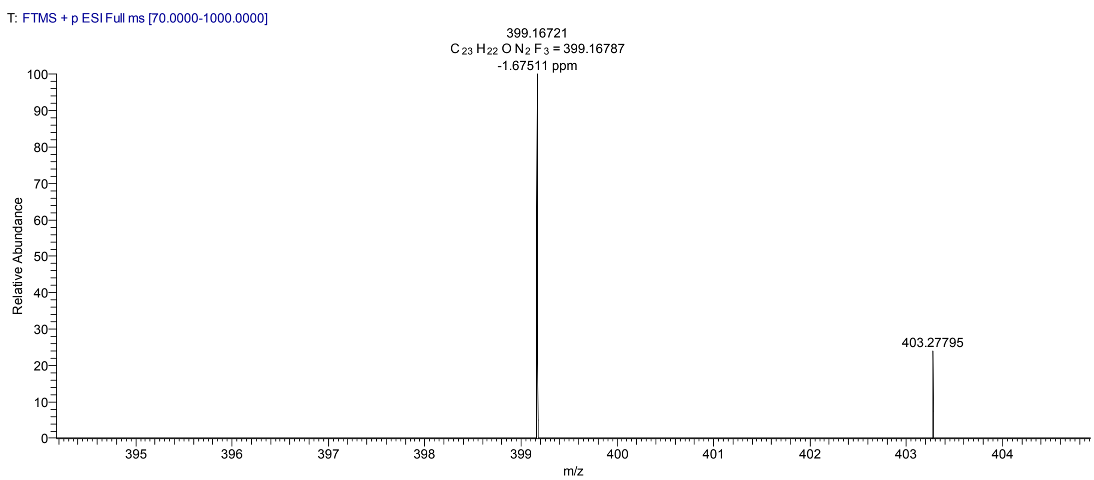
HRMS spectrum of target compound **2j**.



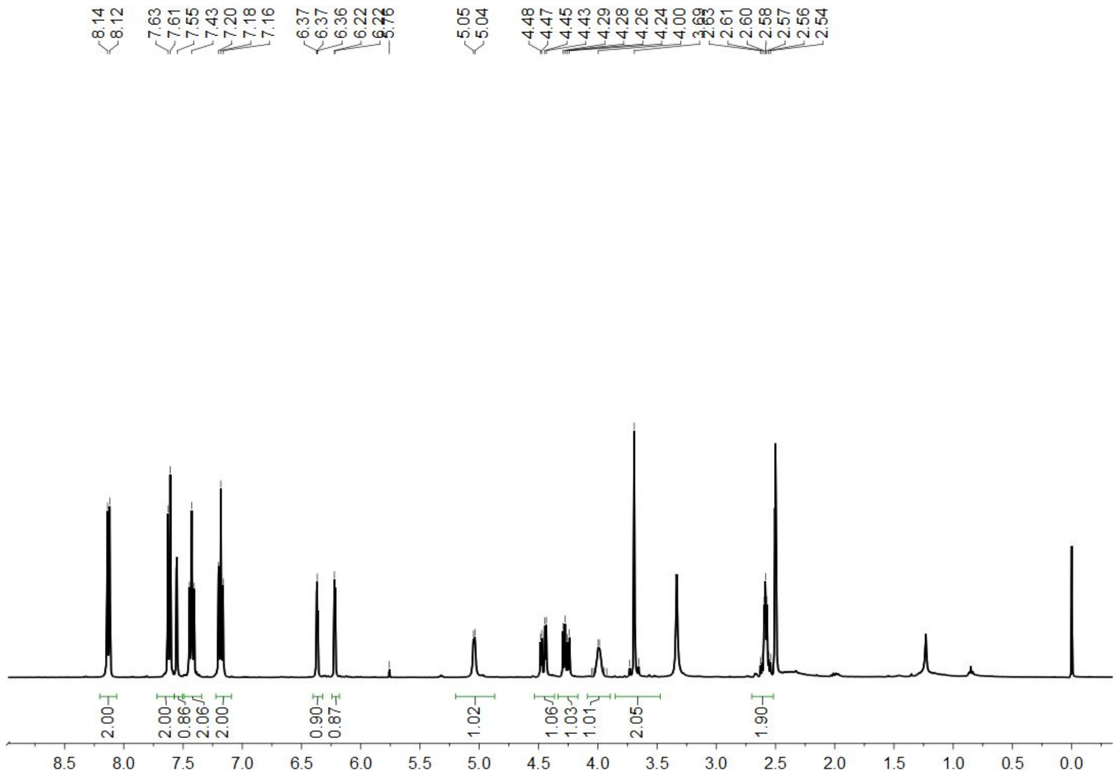
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2k**.



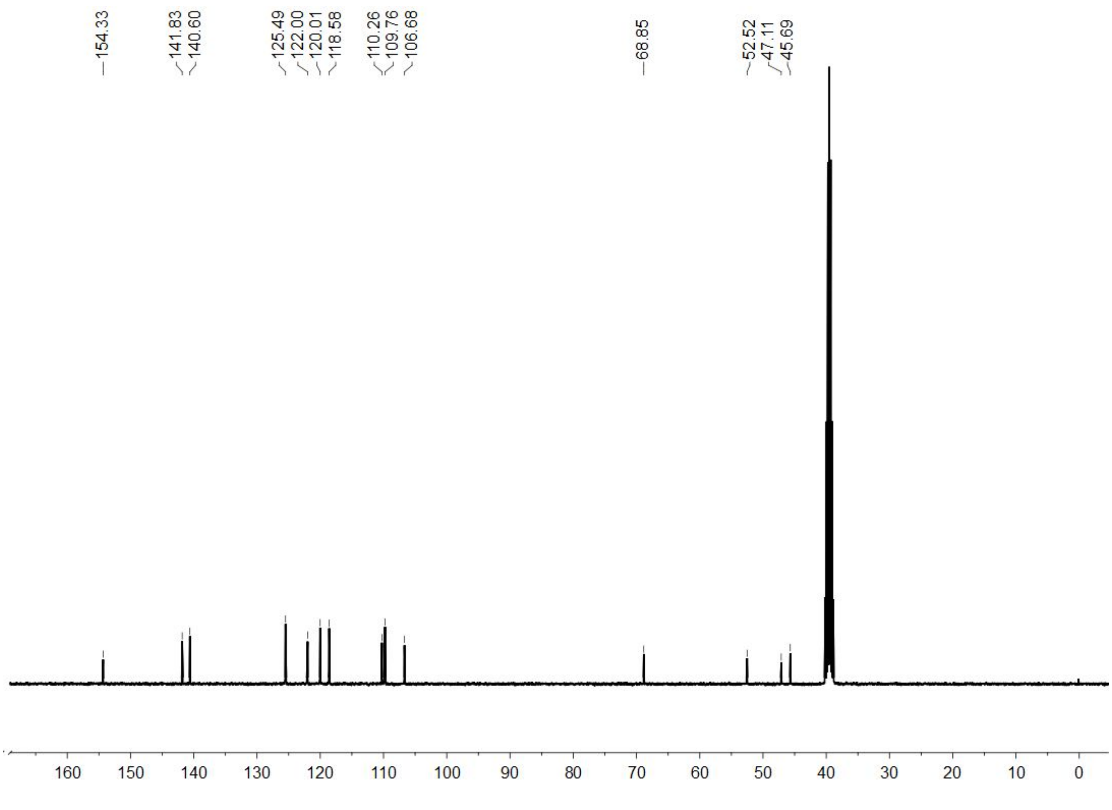
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2k**.



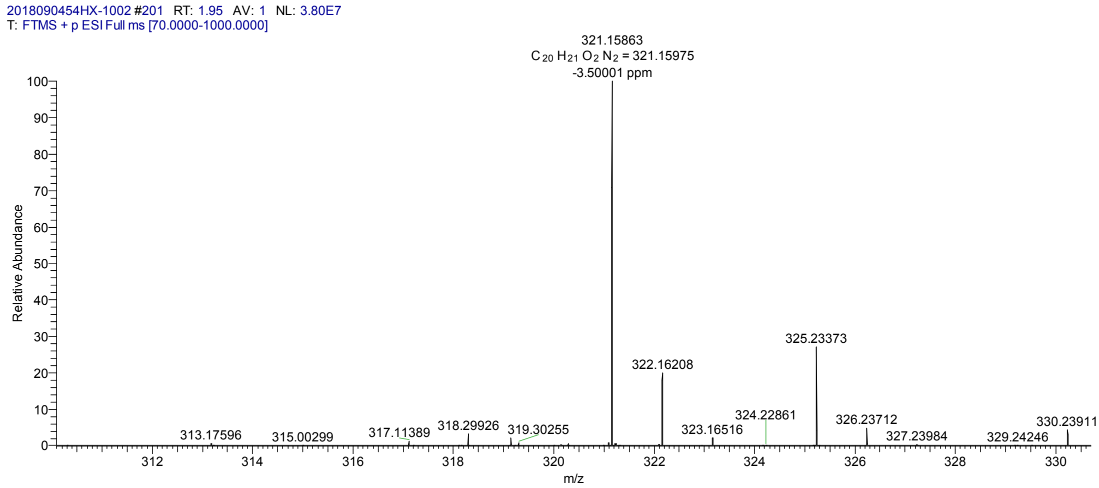
HRMS spectrum of target compound **2k**.



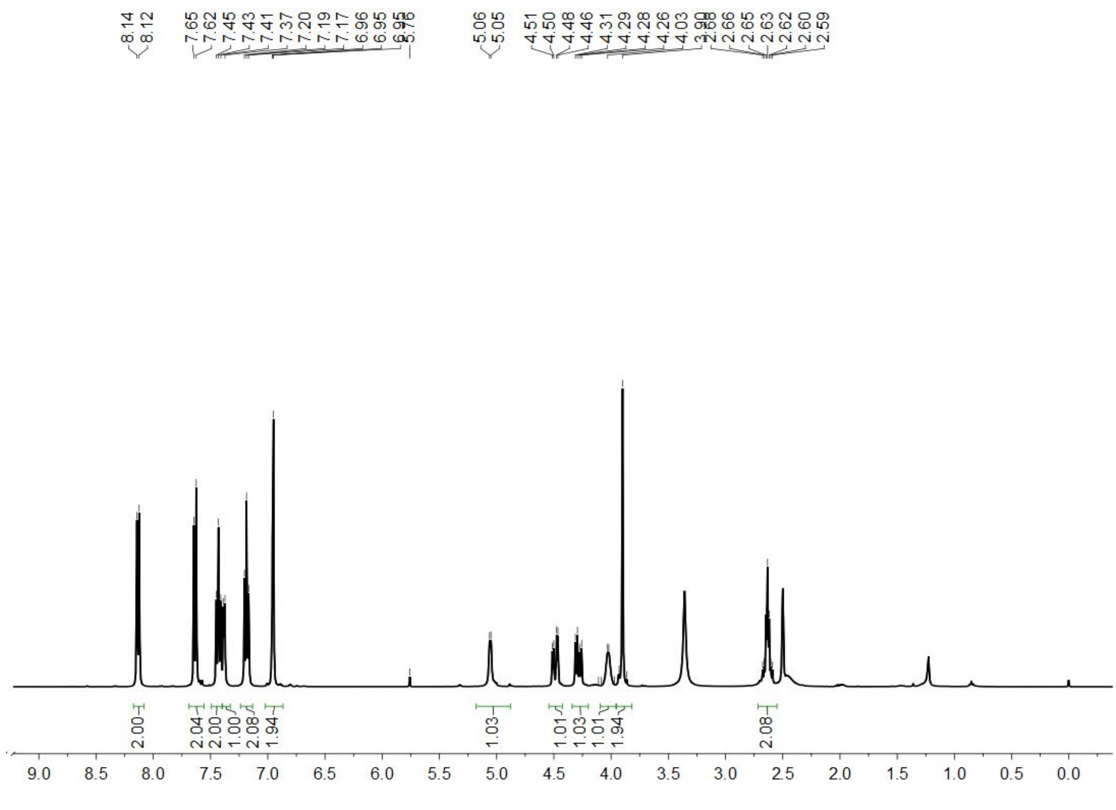
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2l**.



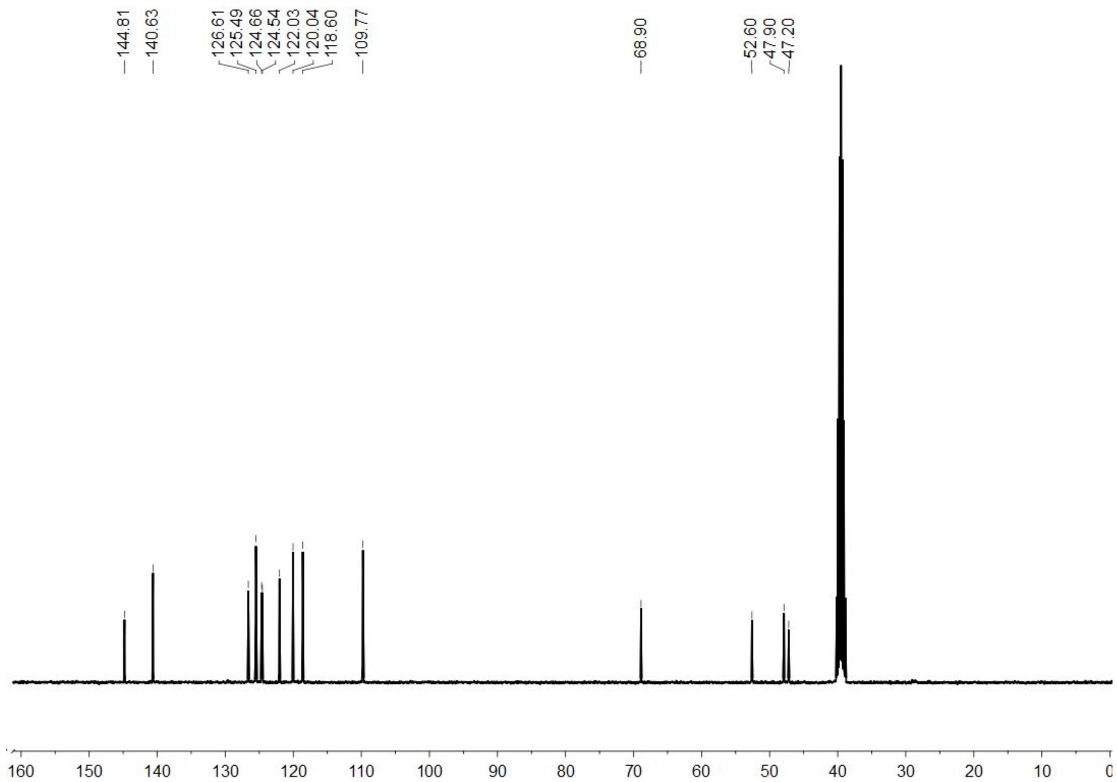
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2l**.



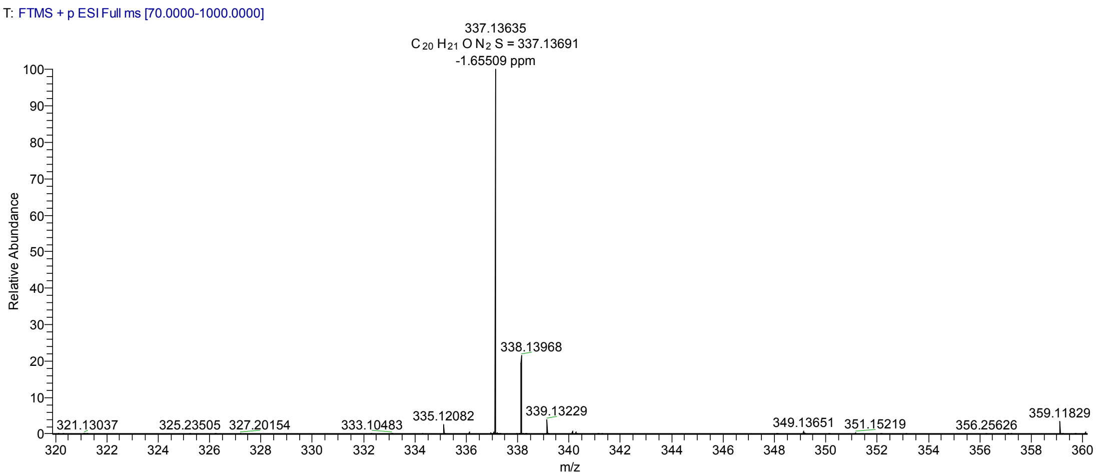
HRMS spectrum of target compound **2l**.



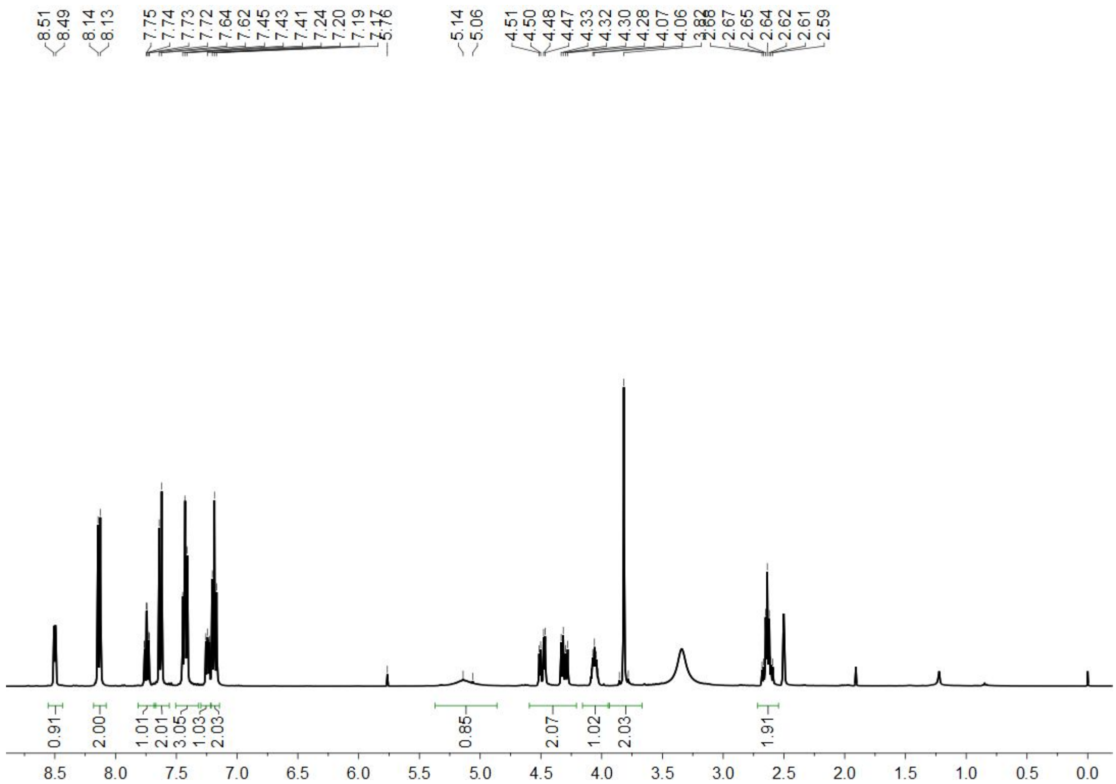
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2m**.



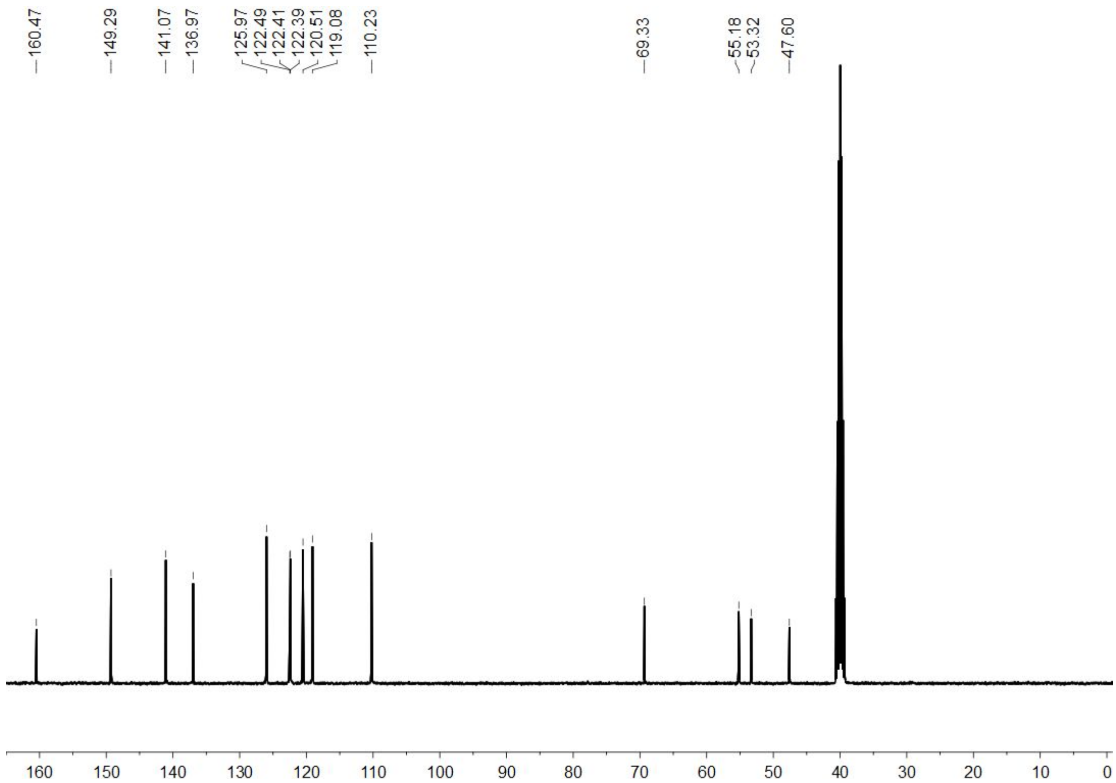
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2m**.



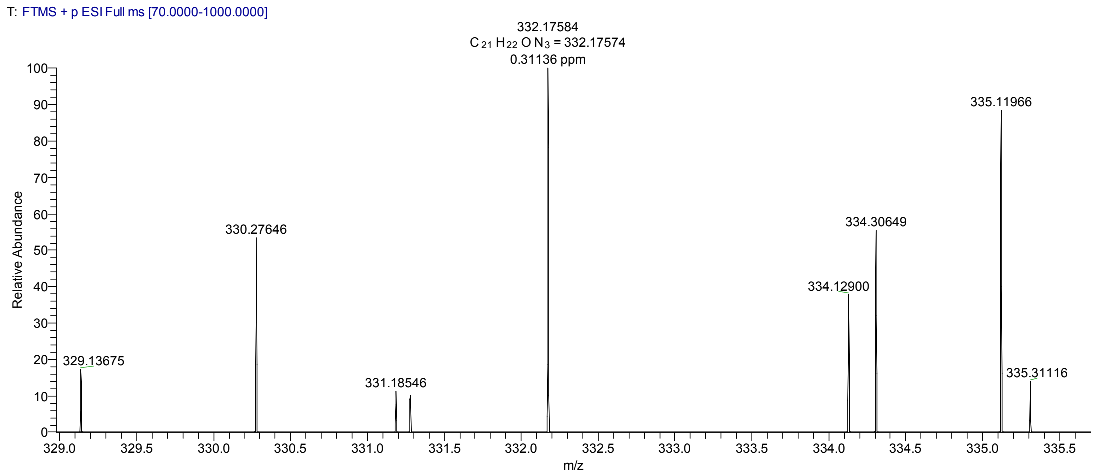
HRMS spectrum of target compound **2m**.



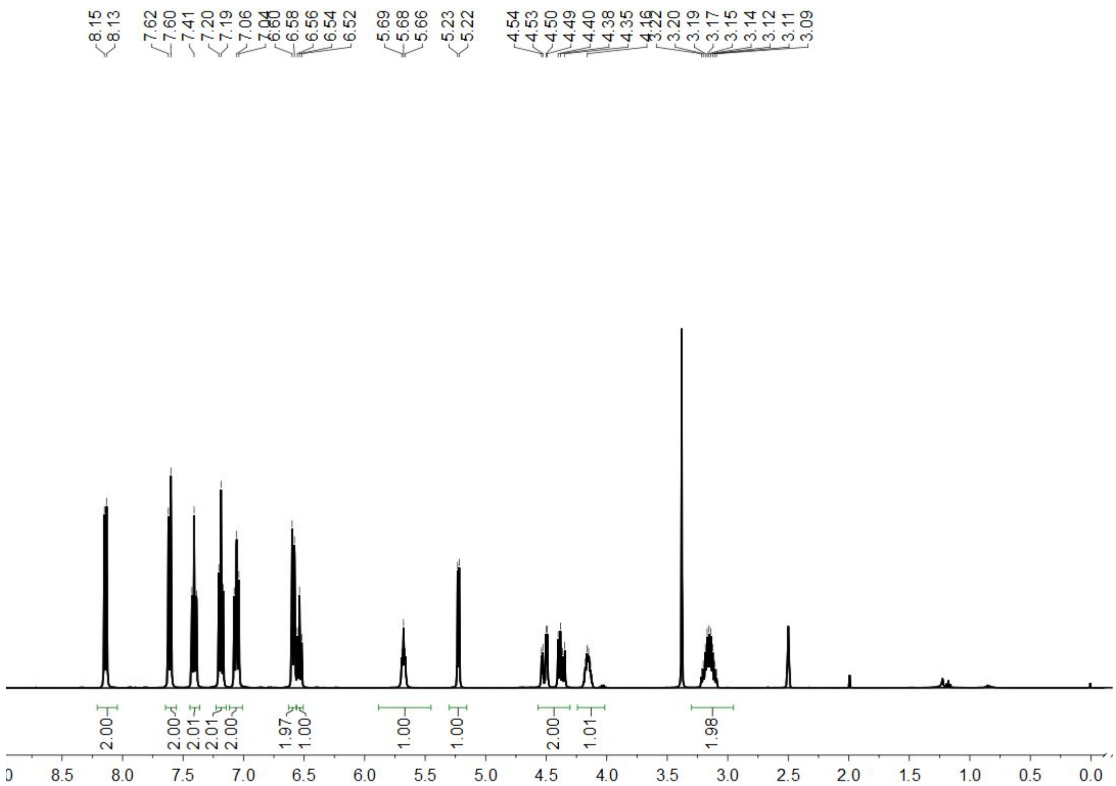
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2n**.



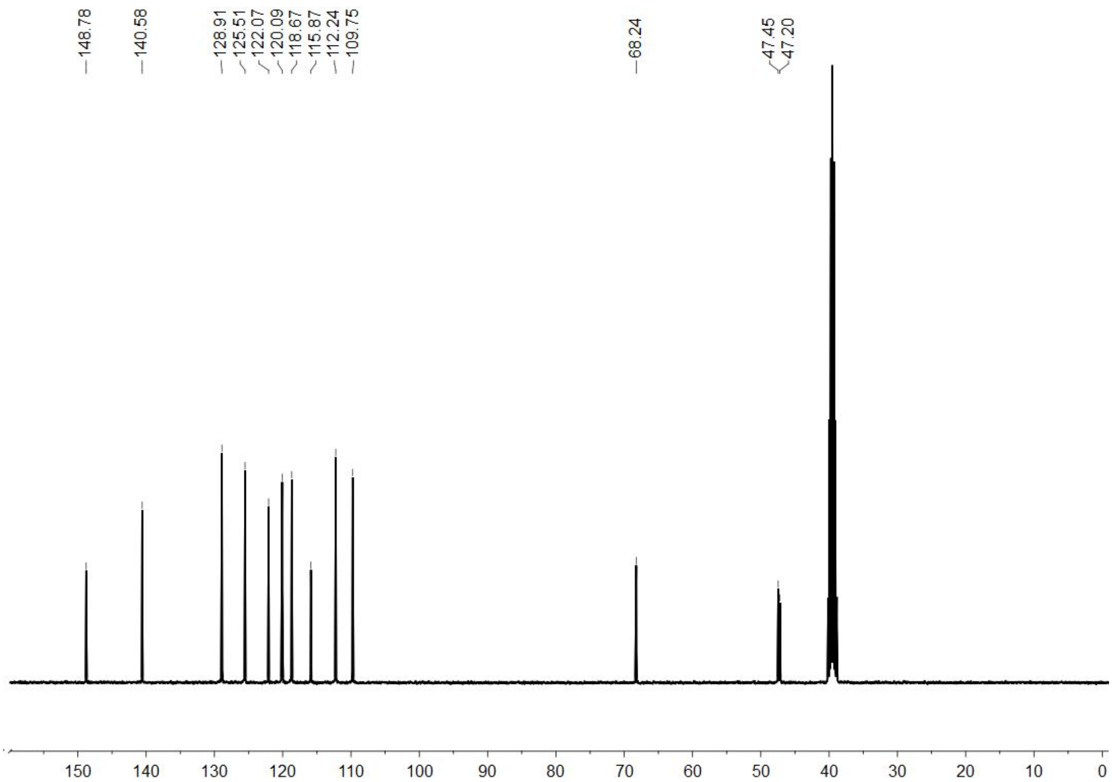
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2n**.



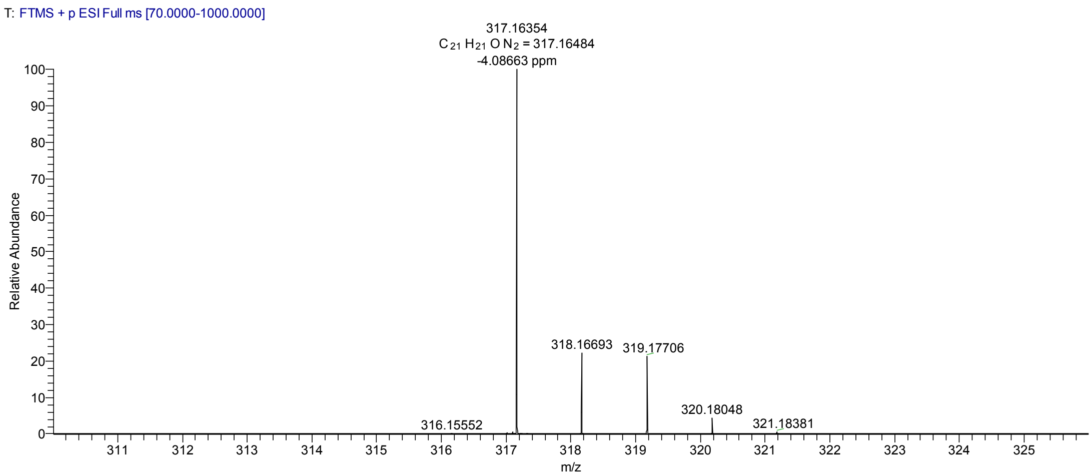
HRMS spectrum of target compound **2n**.



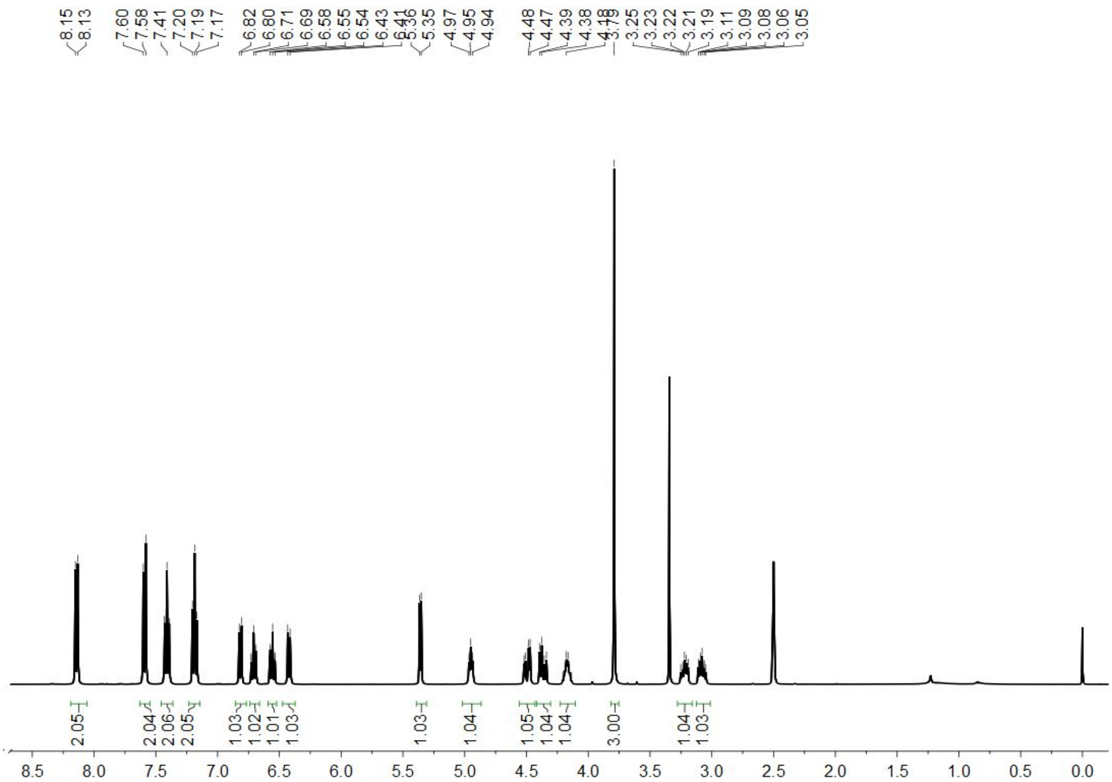
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2o**.



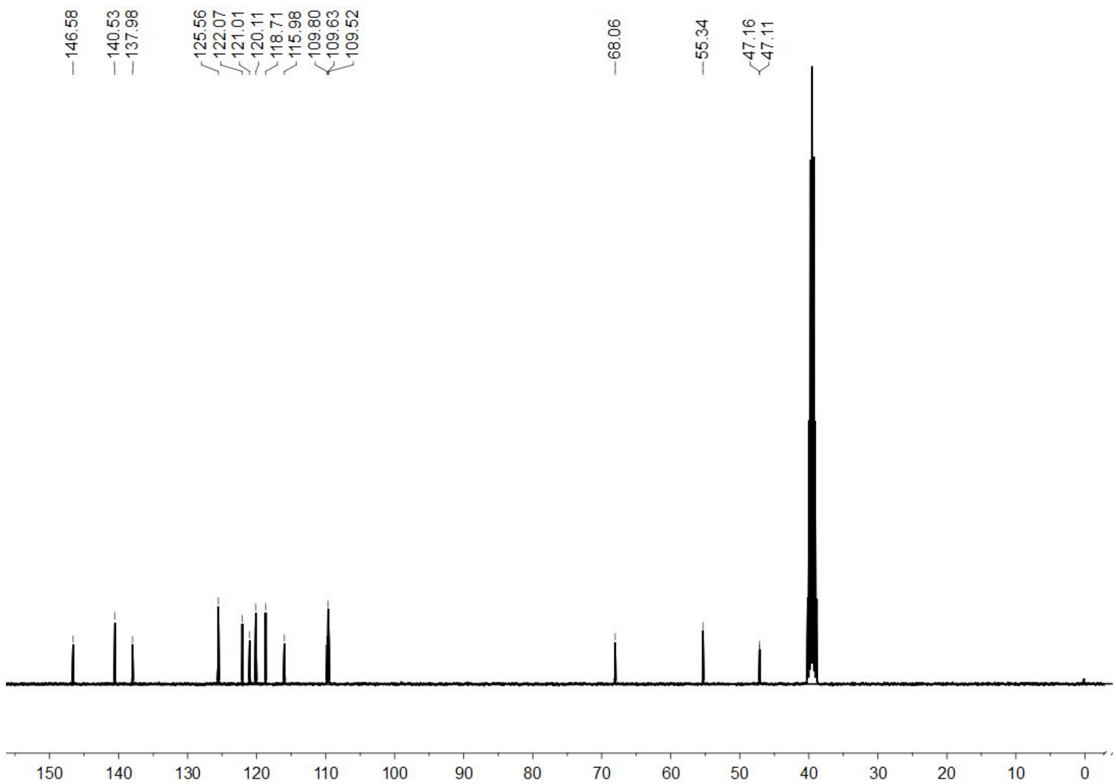
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2o**.



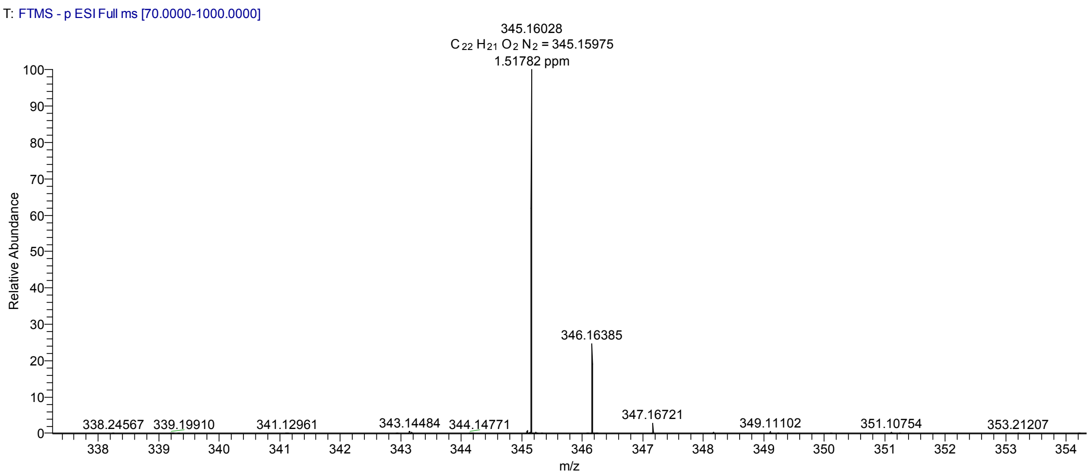
HRMS spectrum of target compound **2o**.



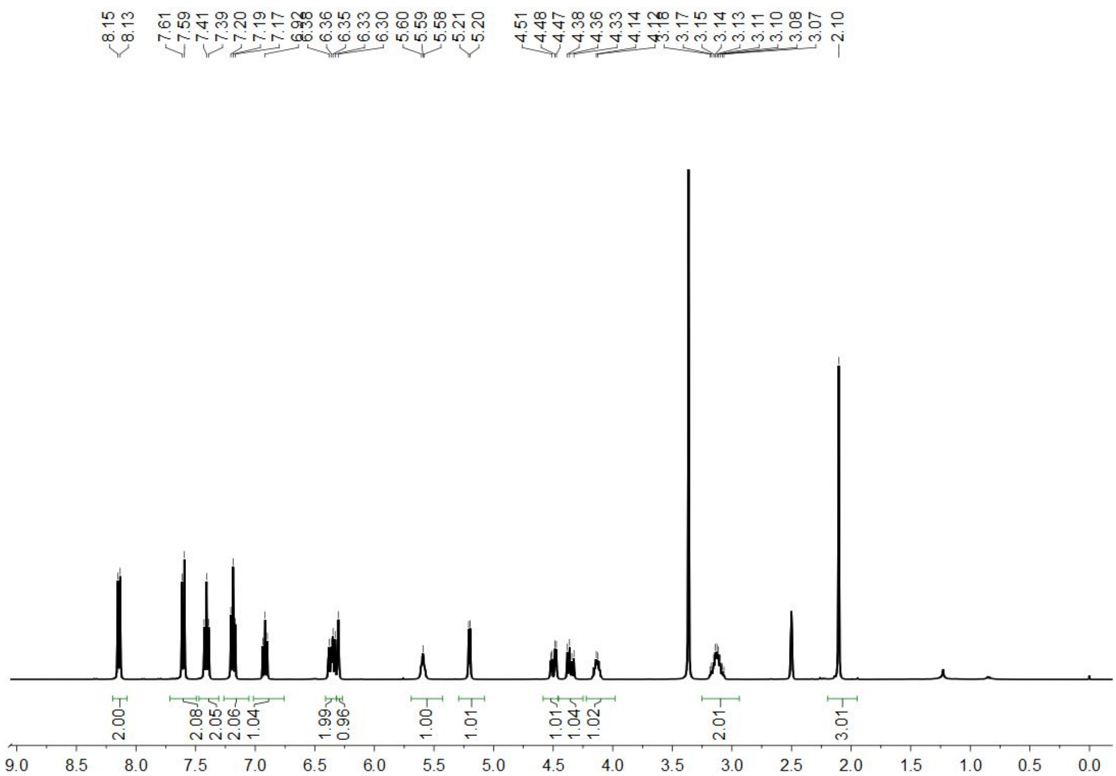
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2p**.



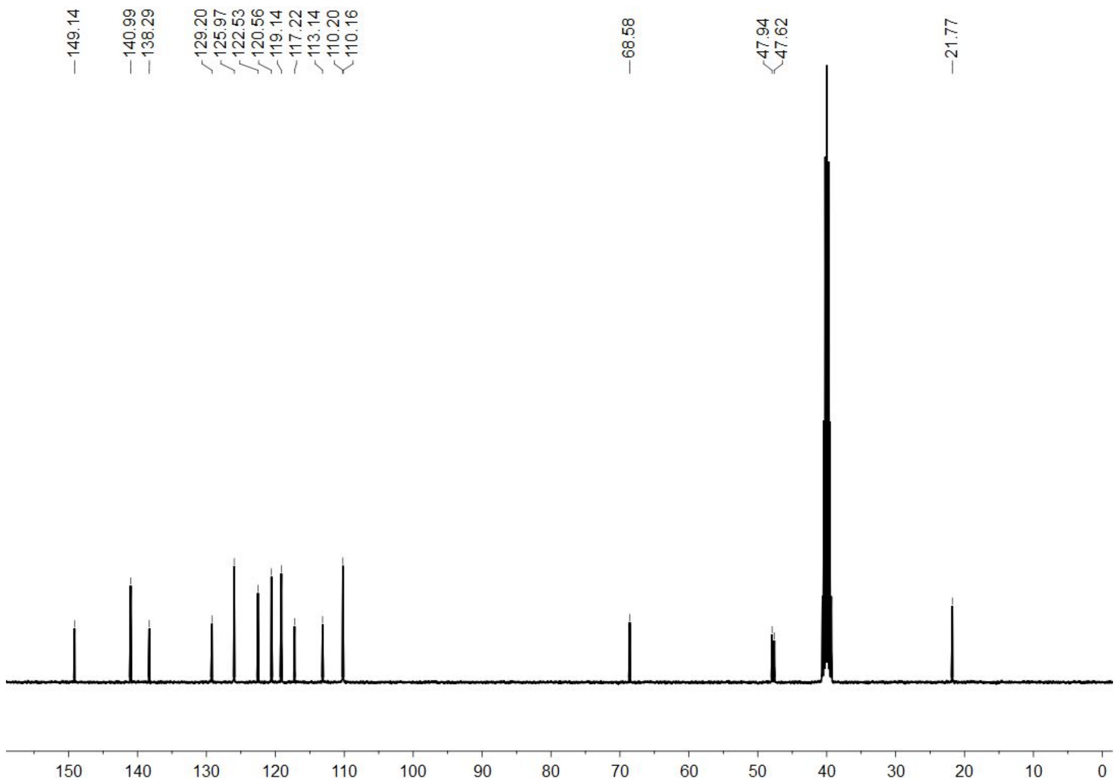
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2p**.



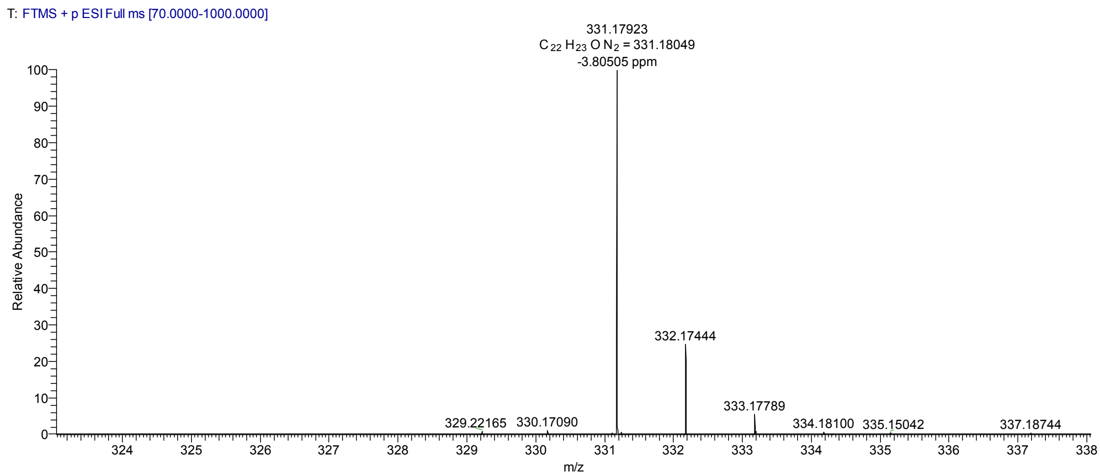
HRMS spectrum of target compound **2p**.



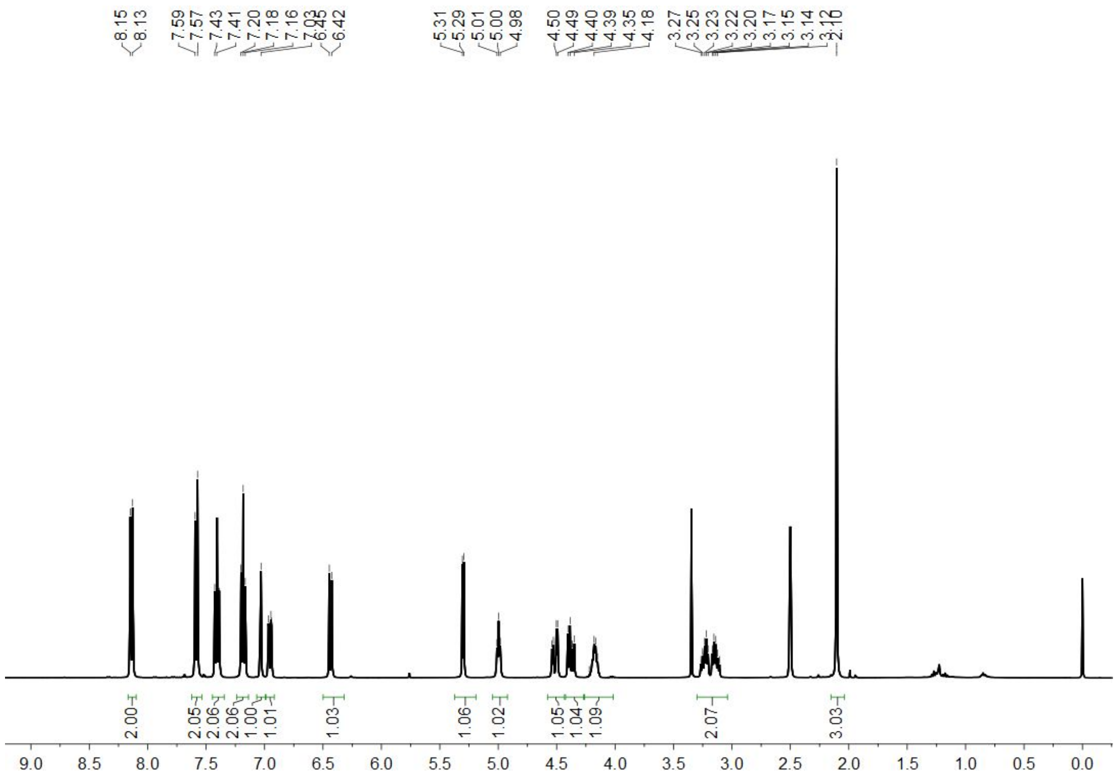
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2q**.



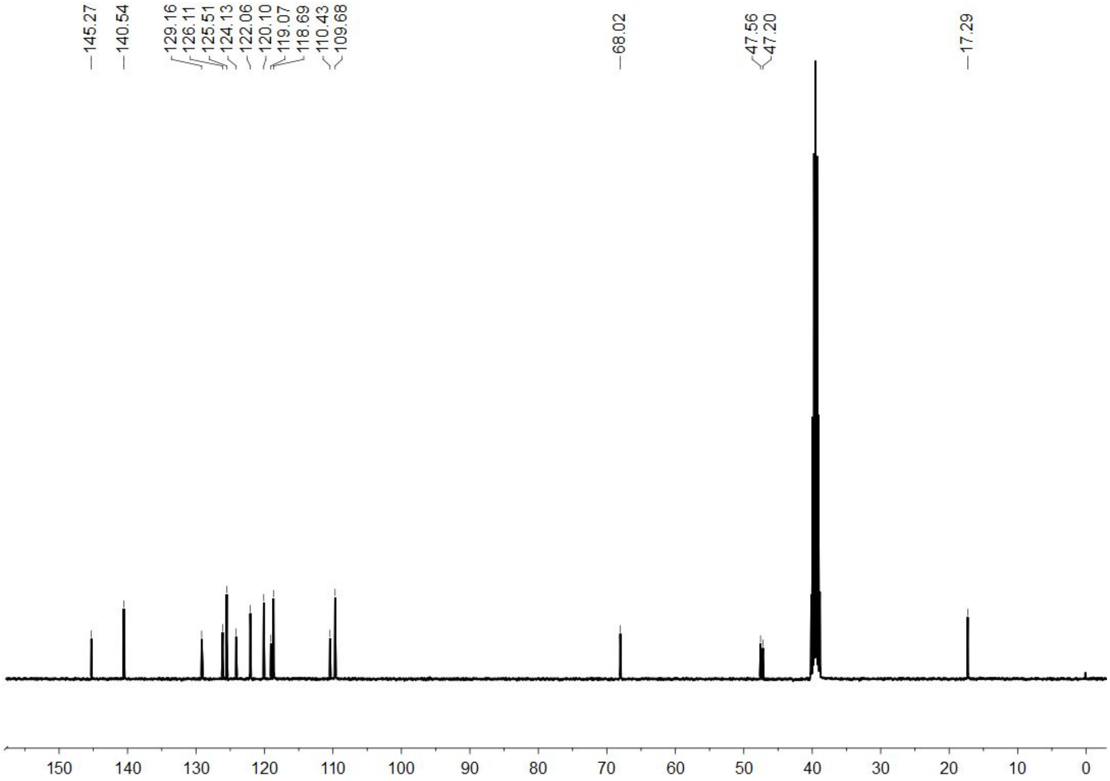
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2q**.



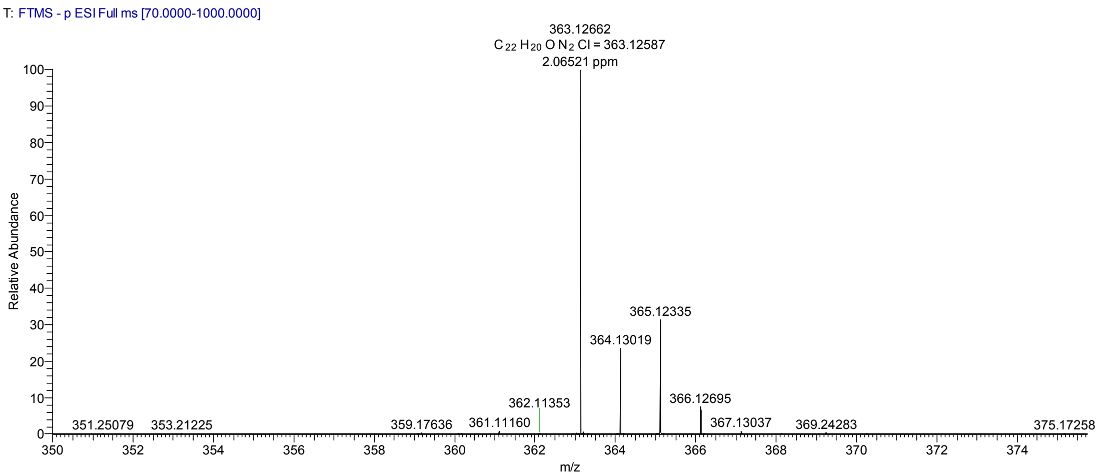
HRMS spectrum of target compound **2q**.



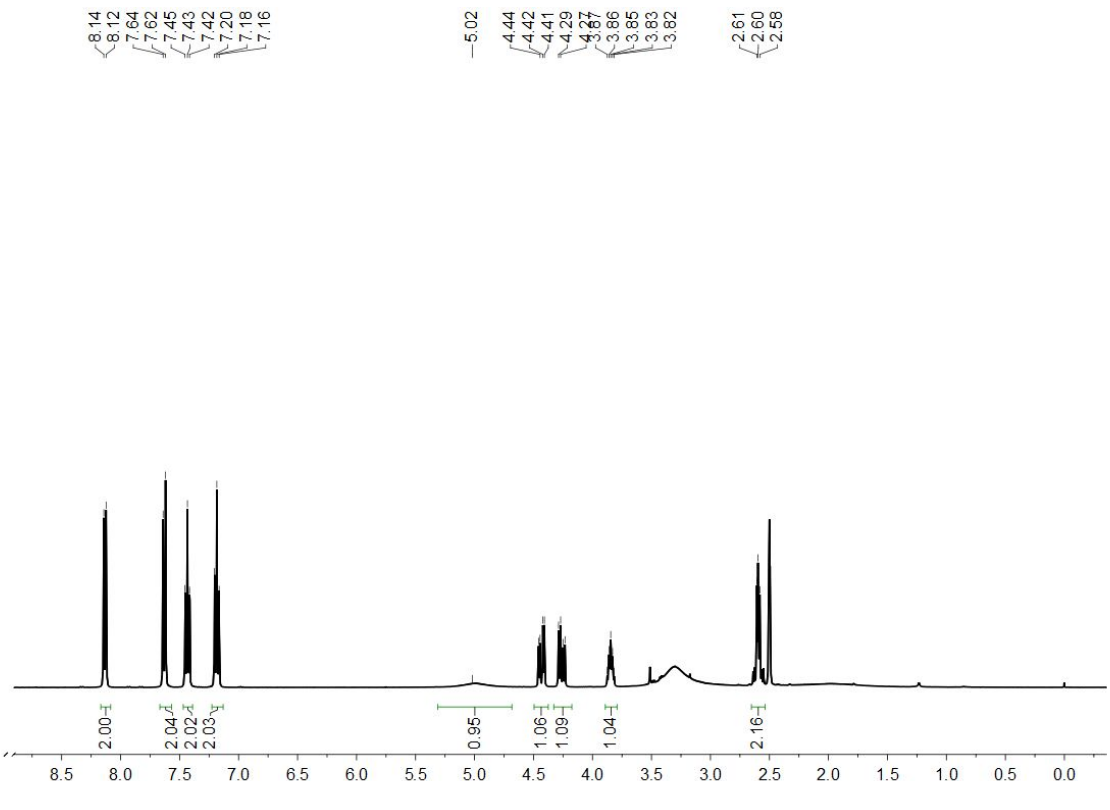
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2r**.



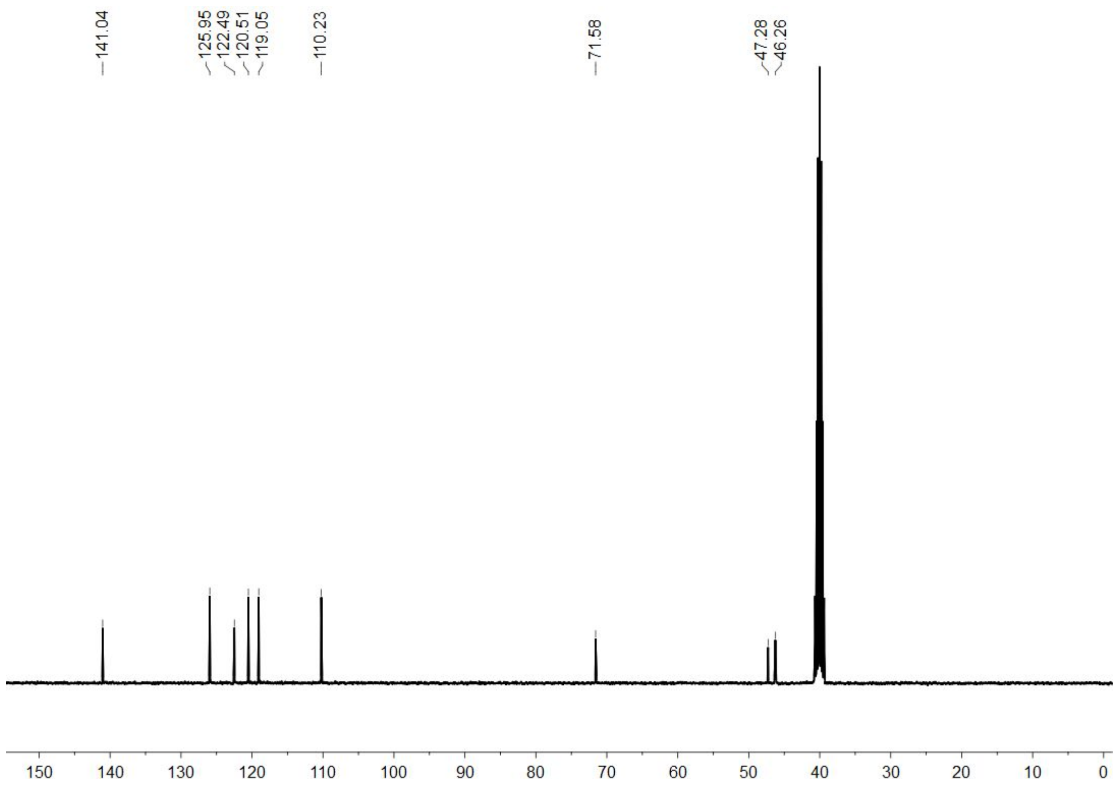
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2r**.



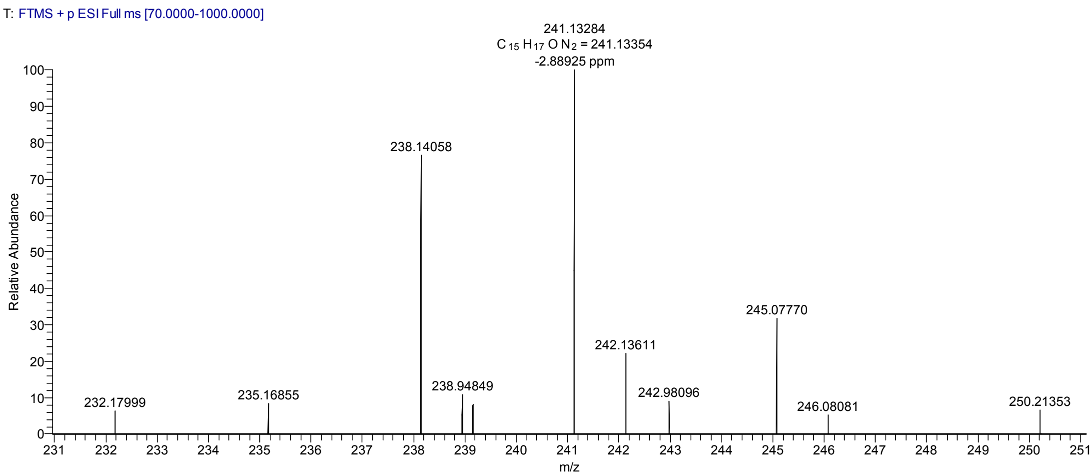
HRMS spectrum of target compound **2r**.



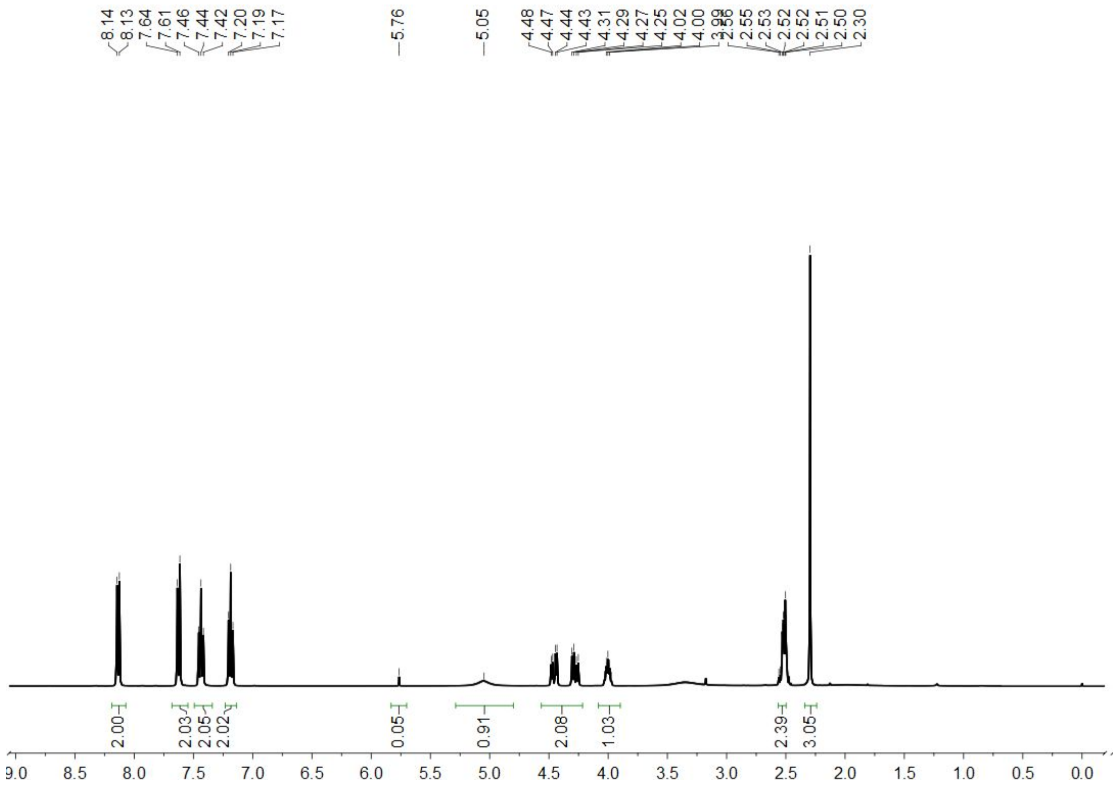
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2s**.



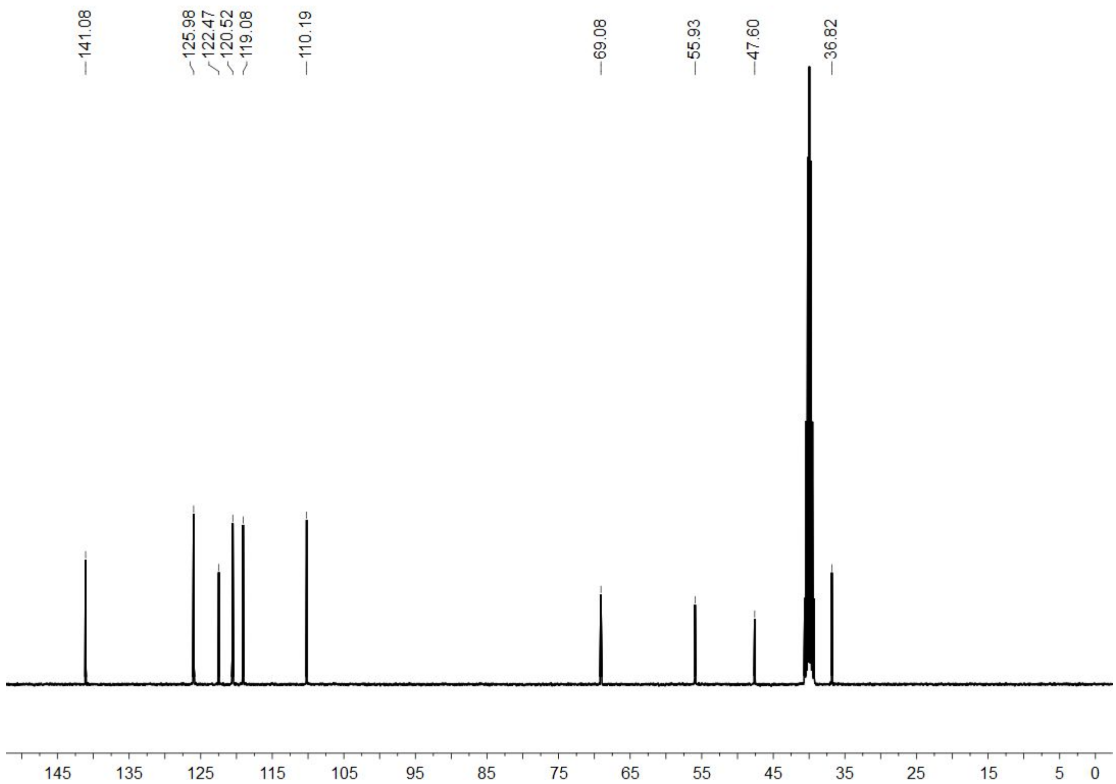
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2s**.



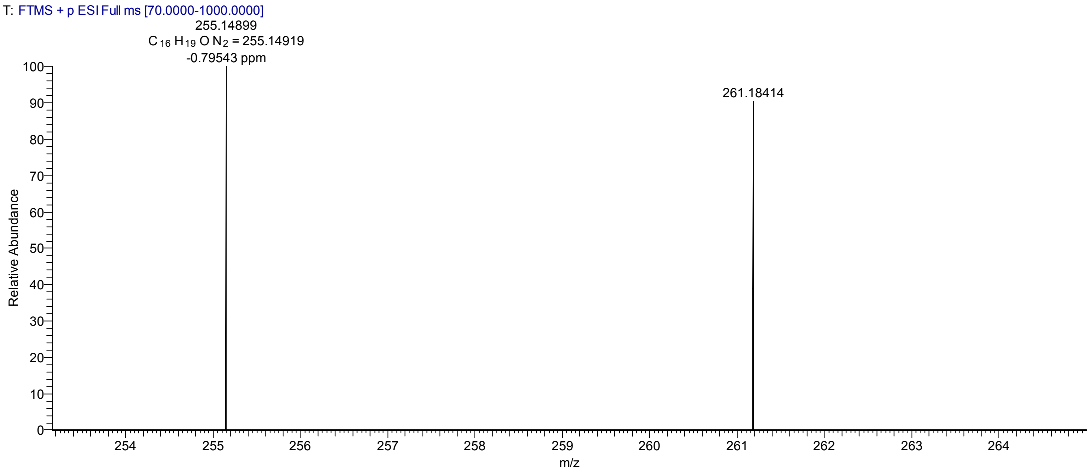
HRMS spectrum of target compound **2s**.



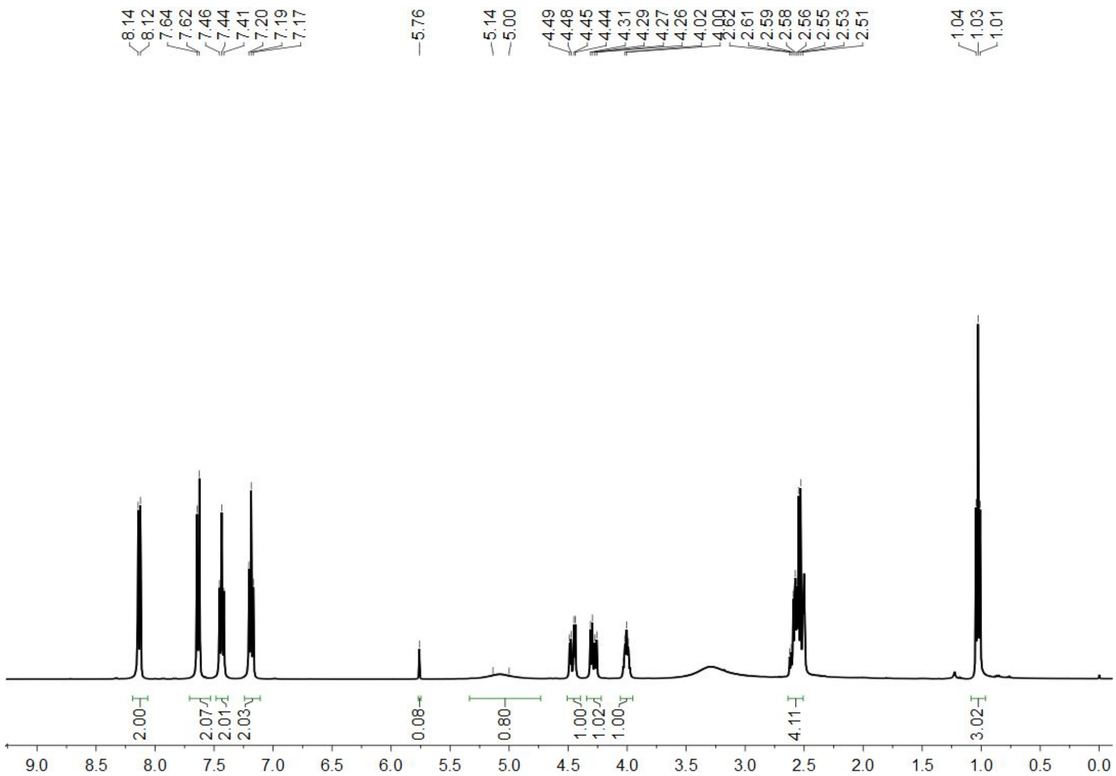
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2t**.



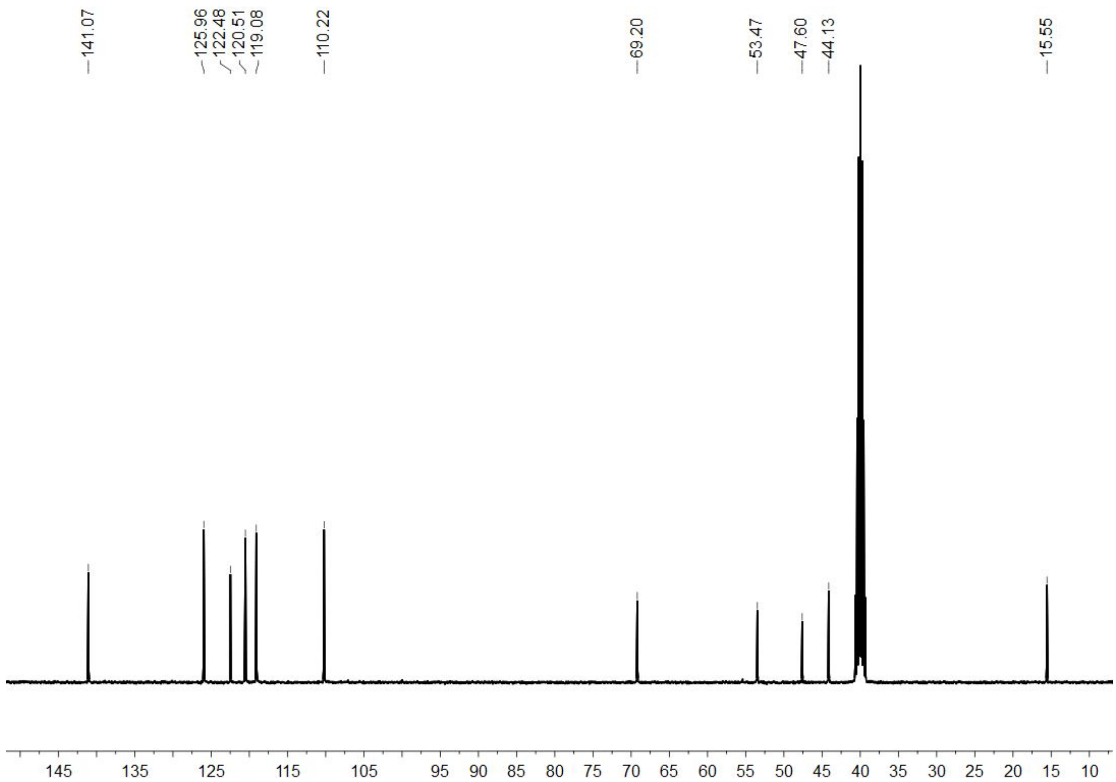
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2t**.



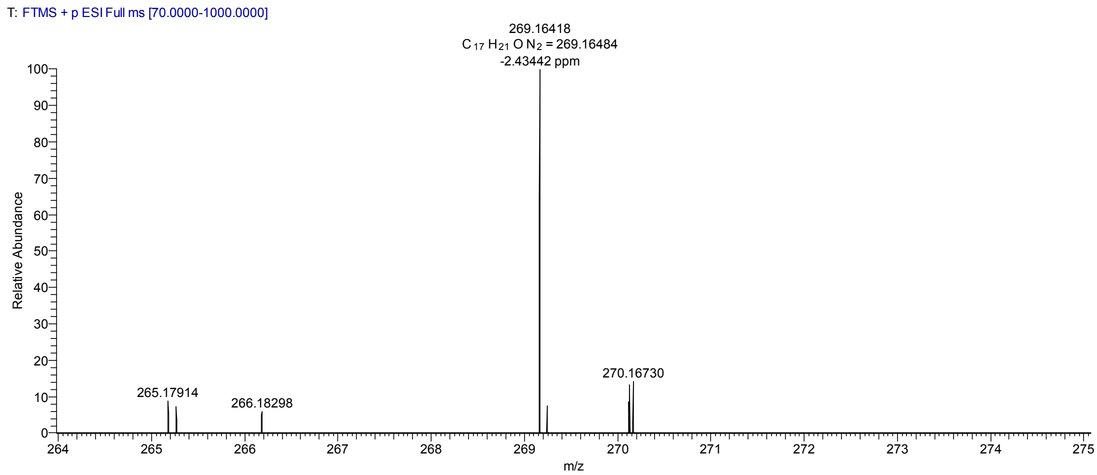
HRMS spectrum of target compound **2t**.



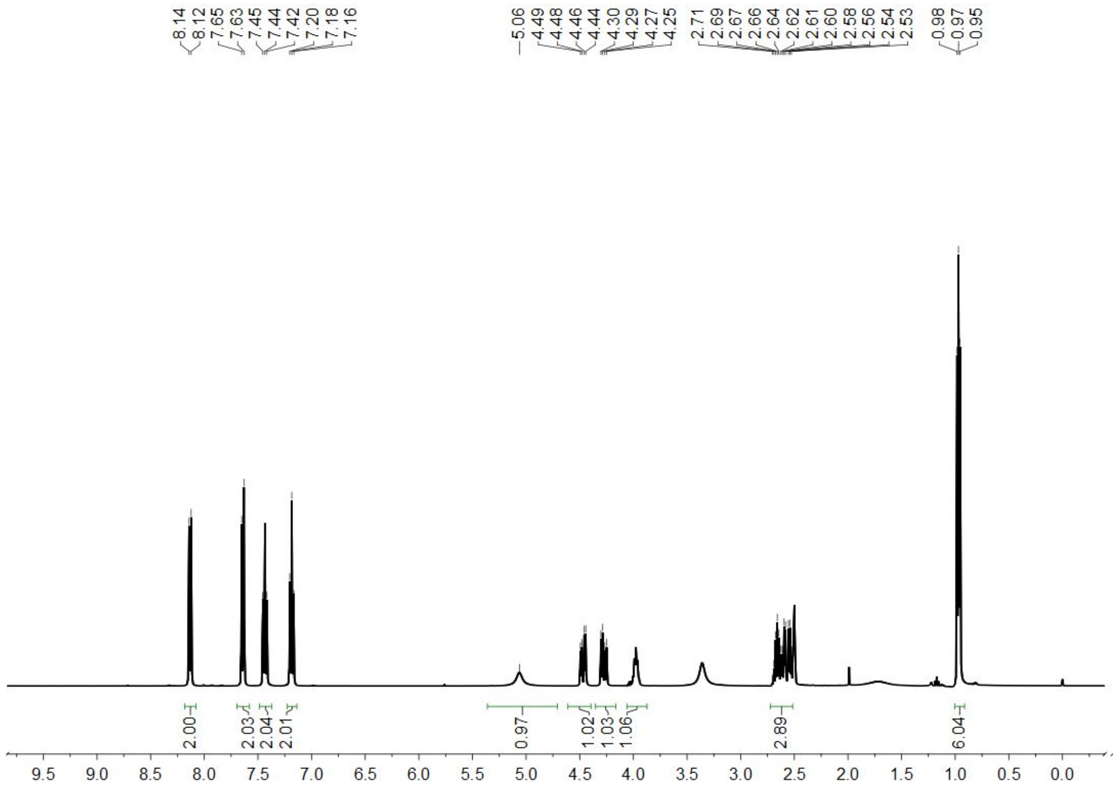
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2u**.



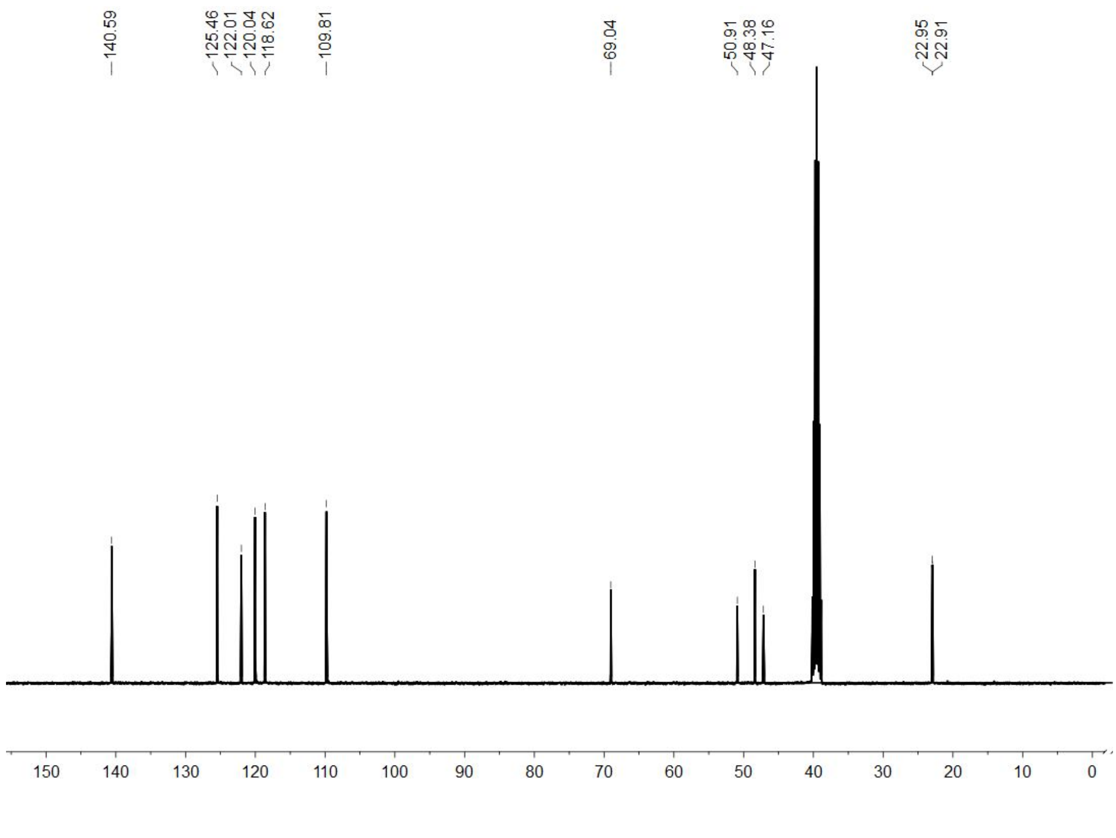
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2u**.



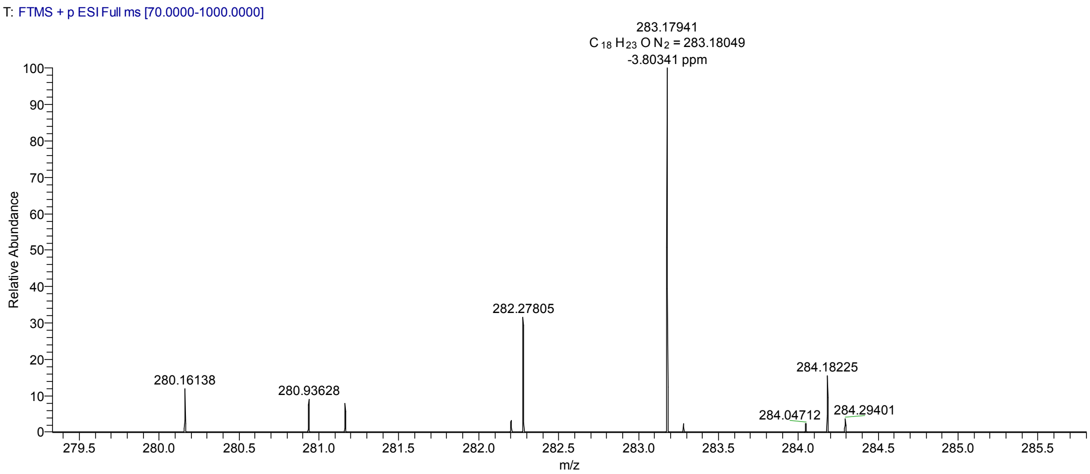
HRMS spectrum of target compound **2u**.



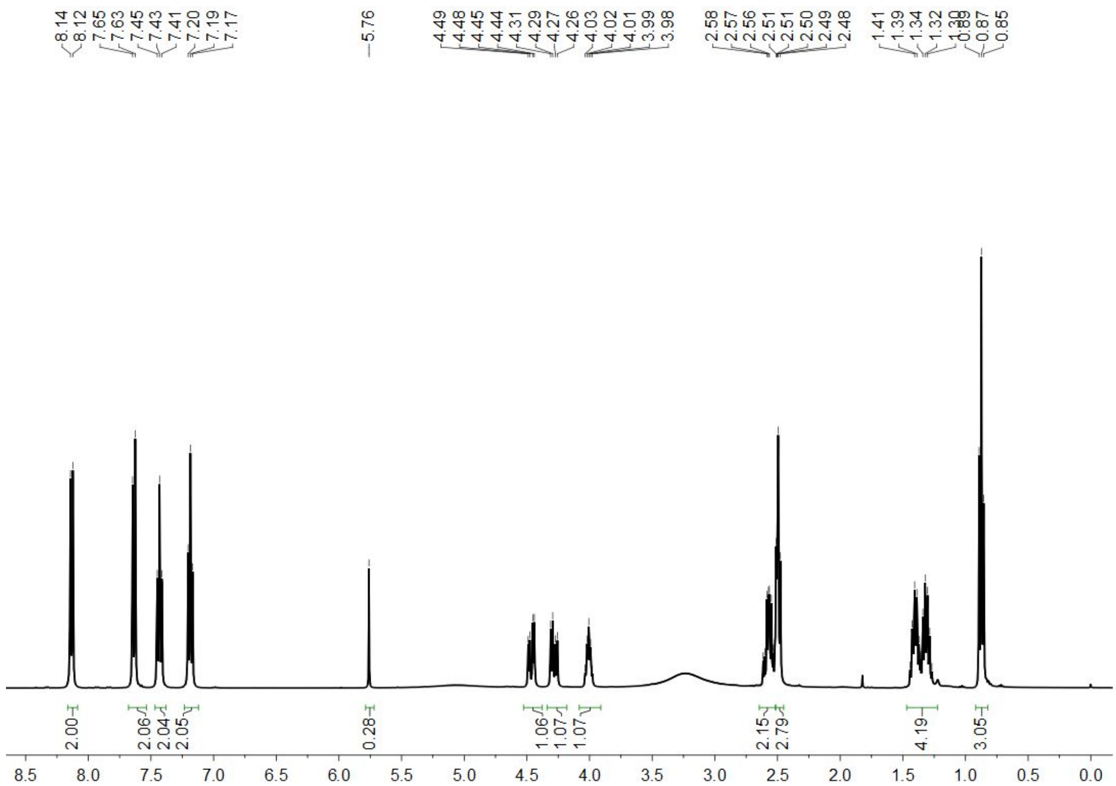
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **2v**.



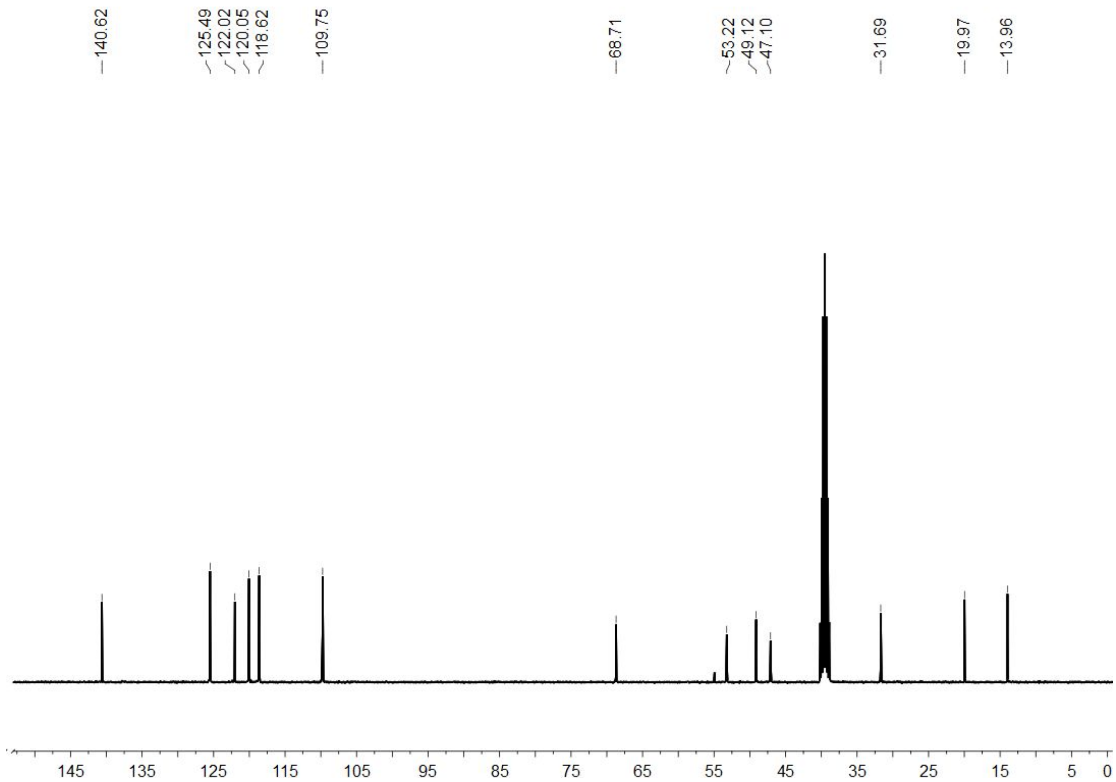
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2v**.



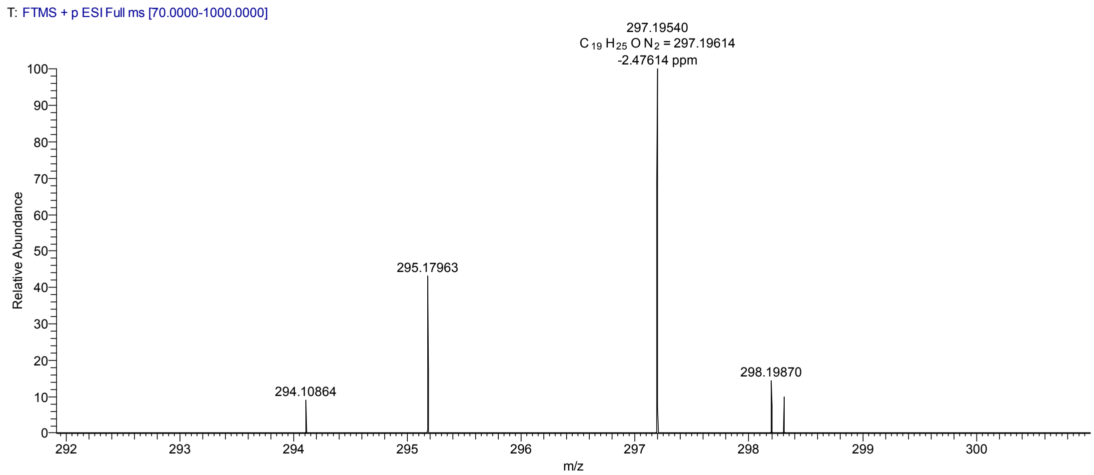
HRMS spectrum of target compound **2v**.



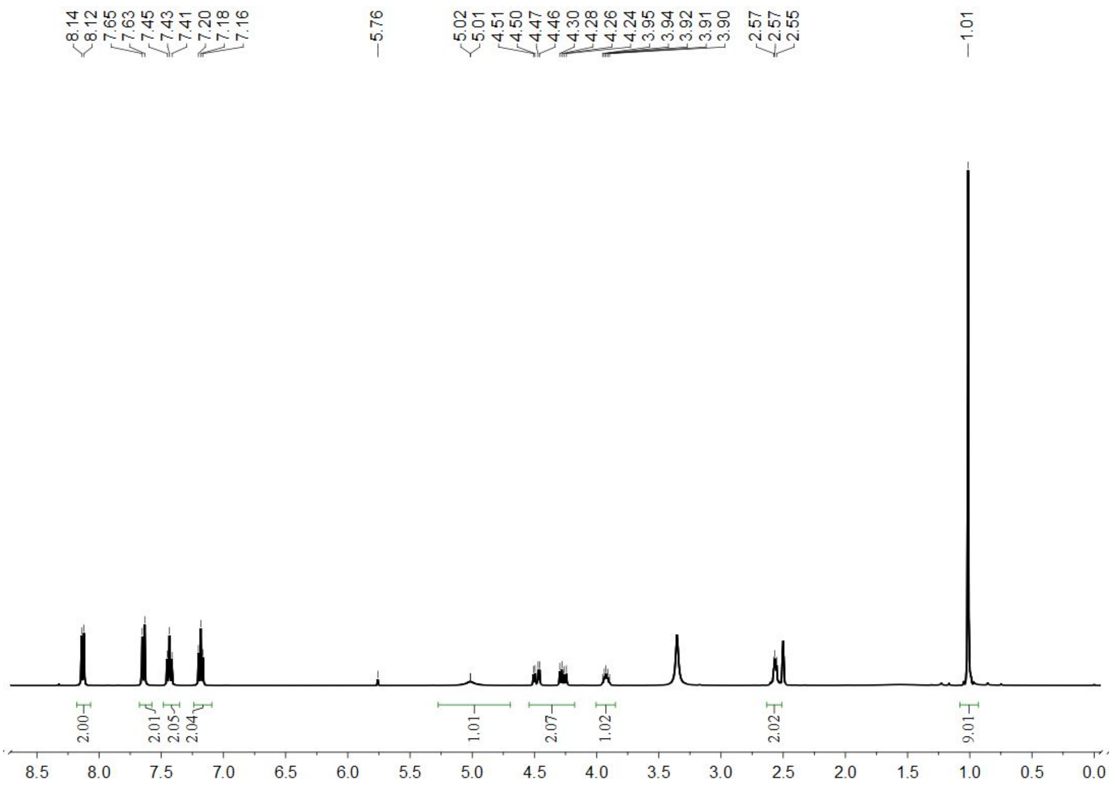
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2w**.



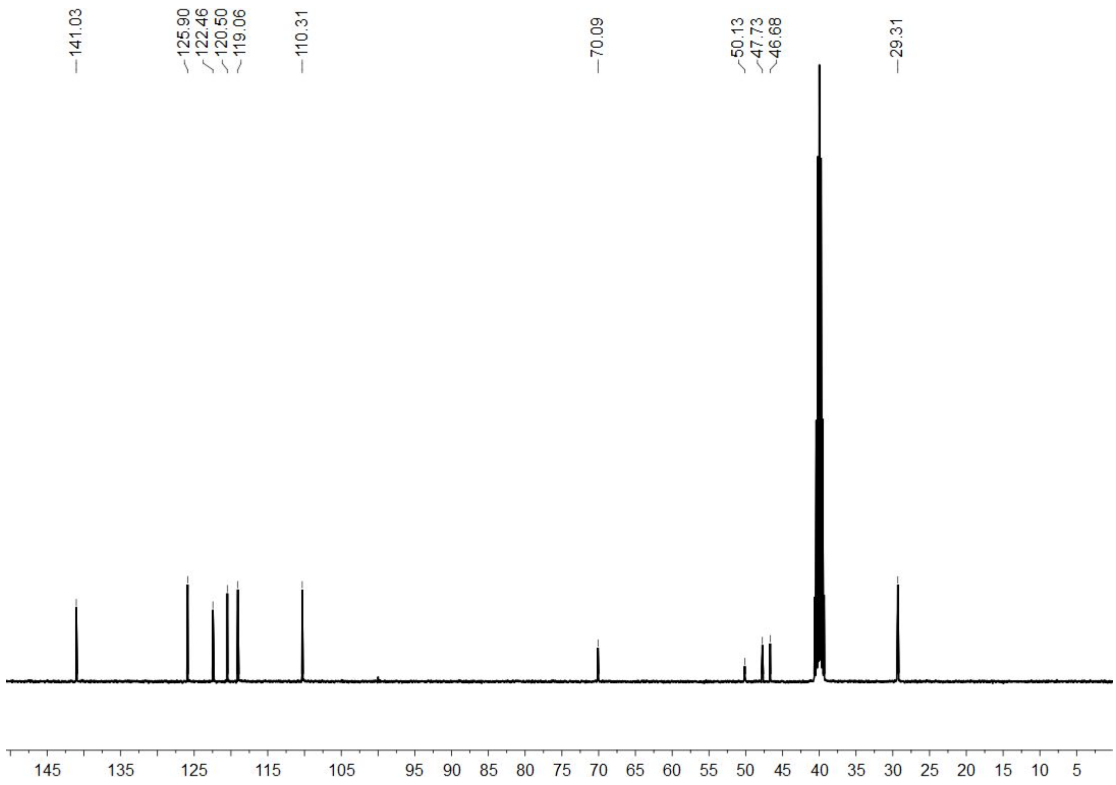
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **2w**.



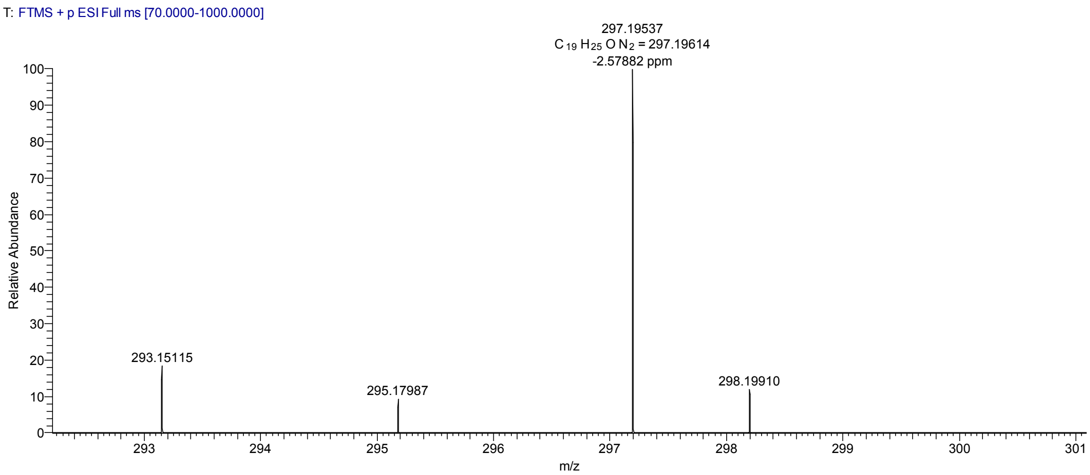
HRMS spectrum of target compound **2w**.



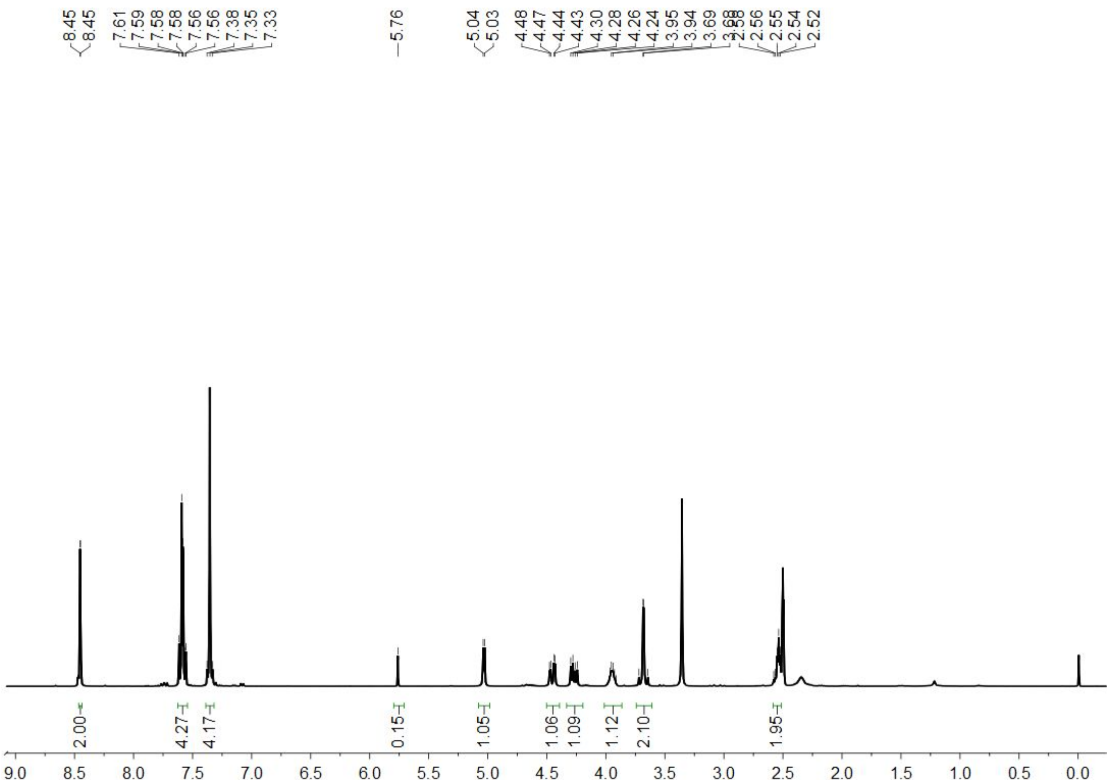
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **2x**.



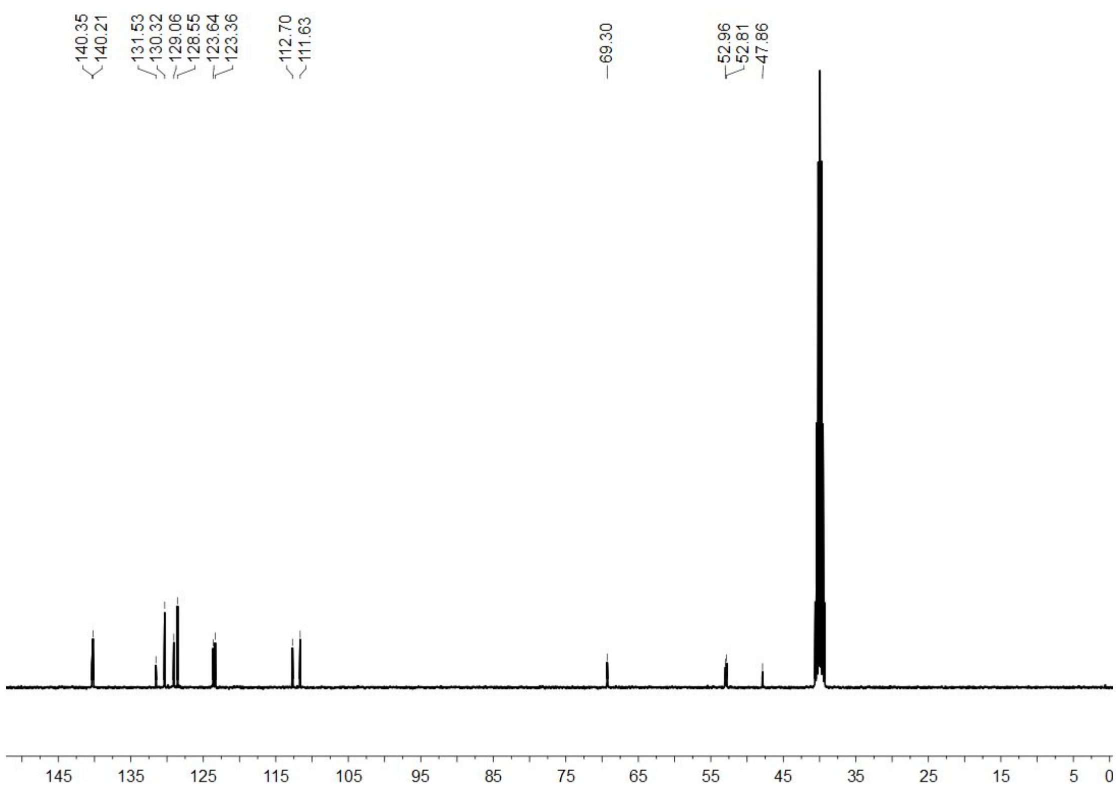
[13]C NMR Spectrum (DMSO-d_6, 101 MHz) of **2x**.



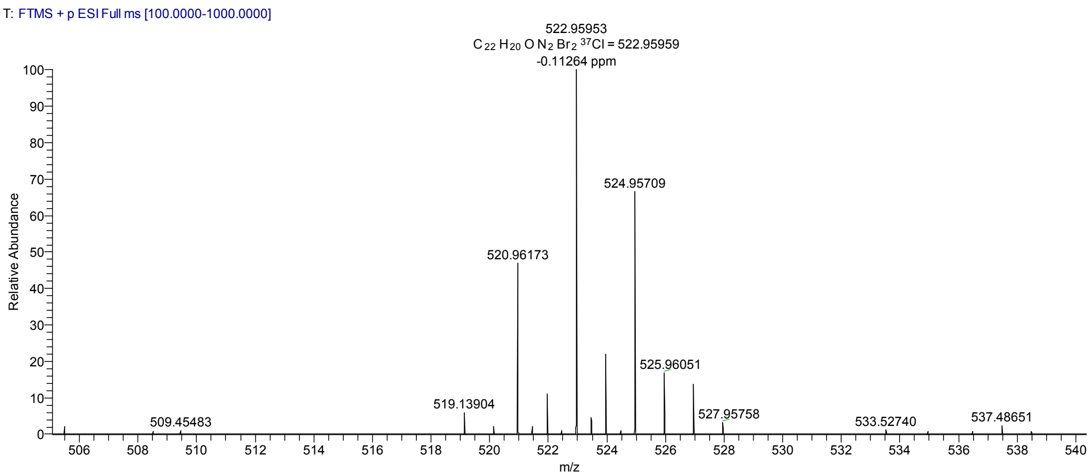
HRMS spectrum of target compound **2x**.



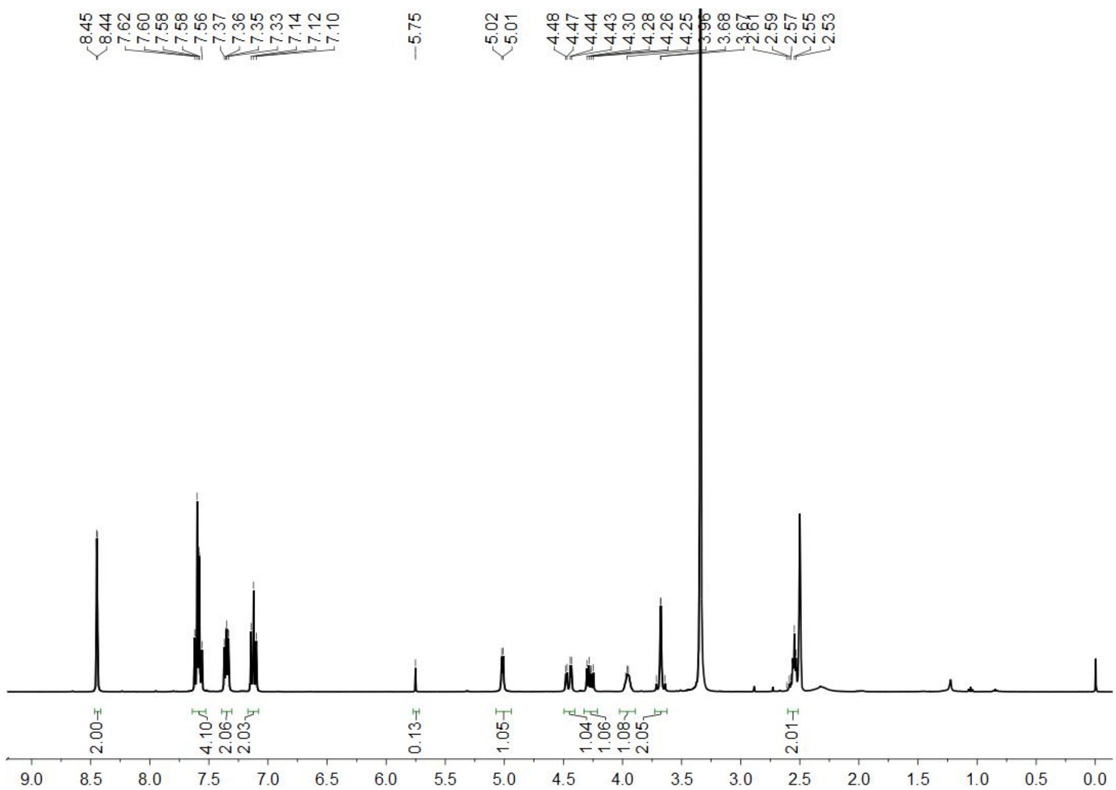
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4a**.



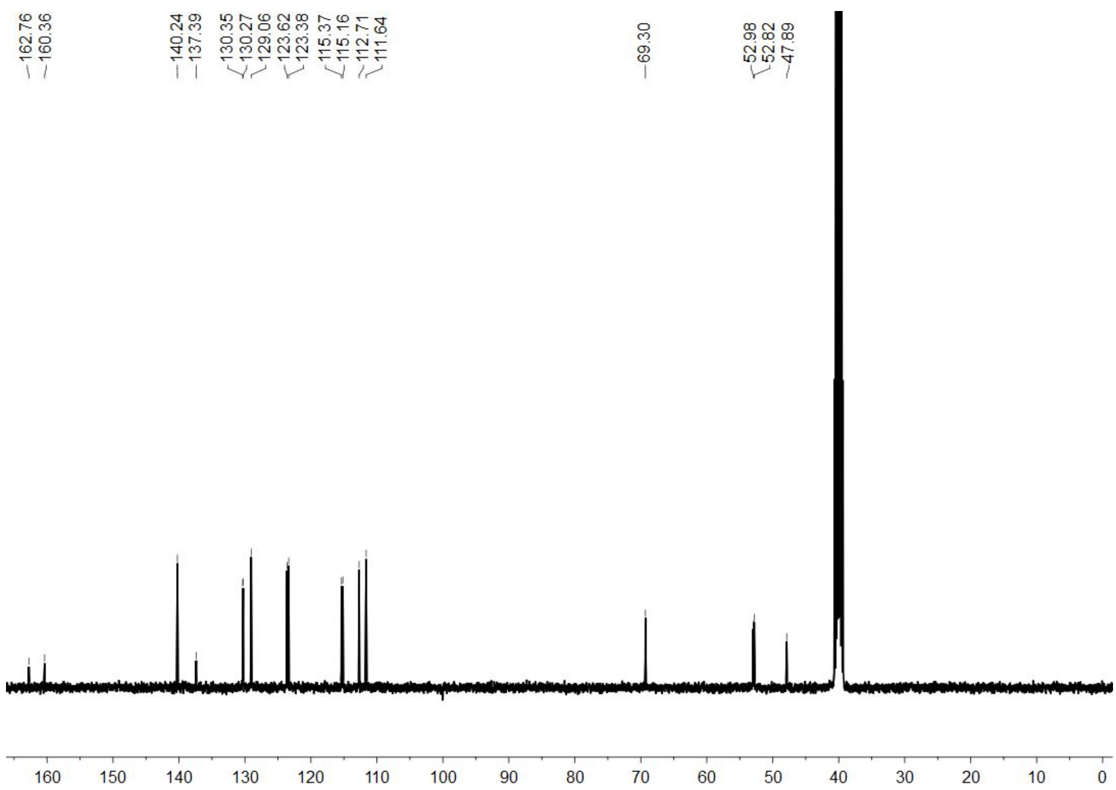
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4a**.



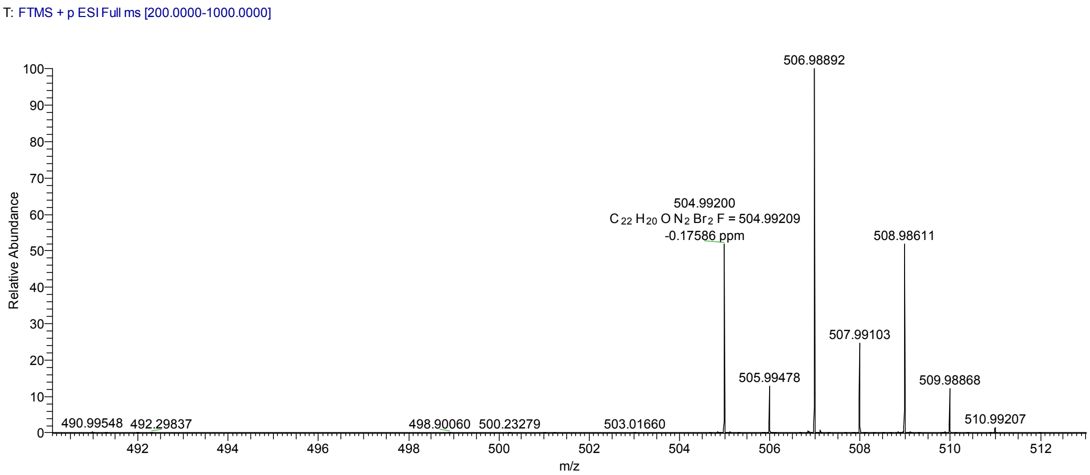
HRMS spectrum of target compound **4a**.



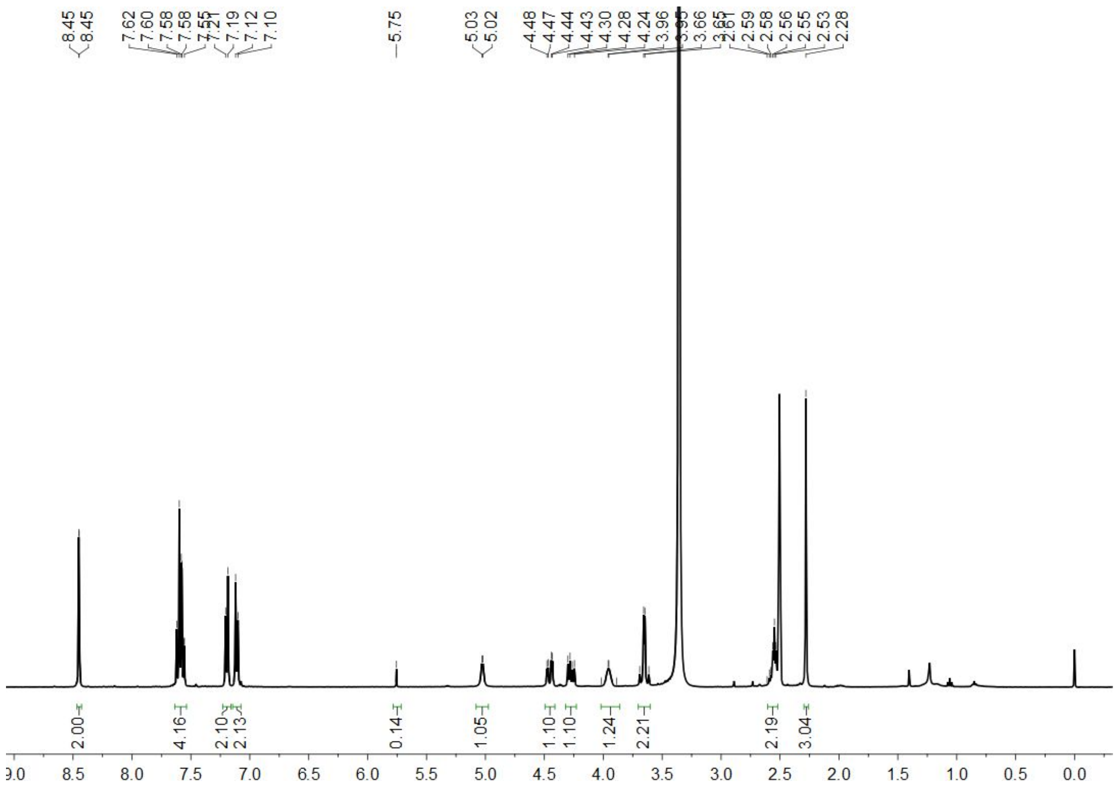
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4b**.



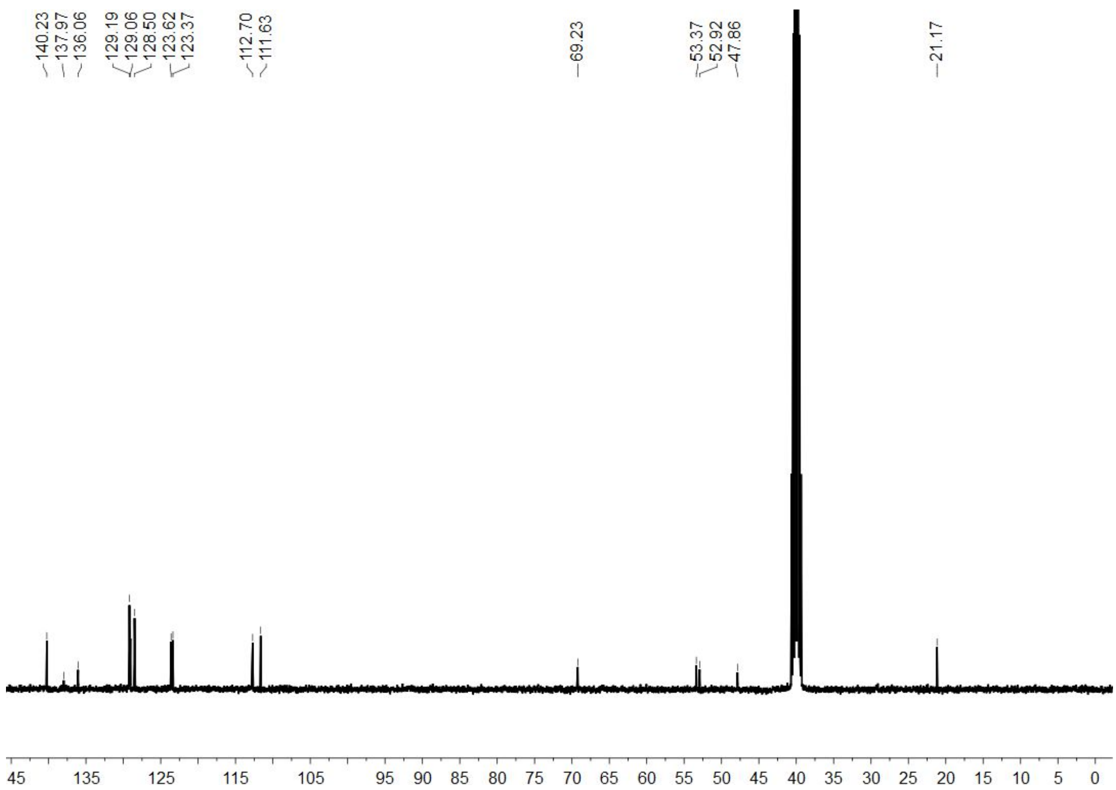
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4b**.



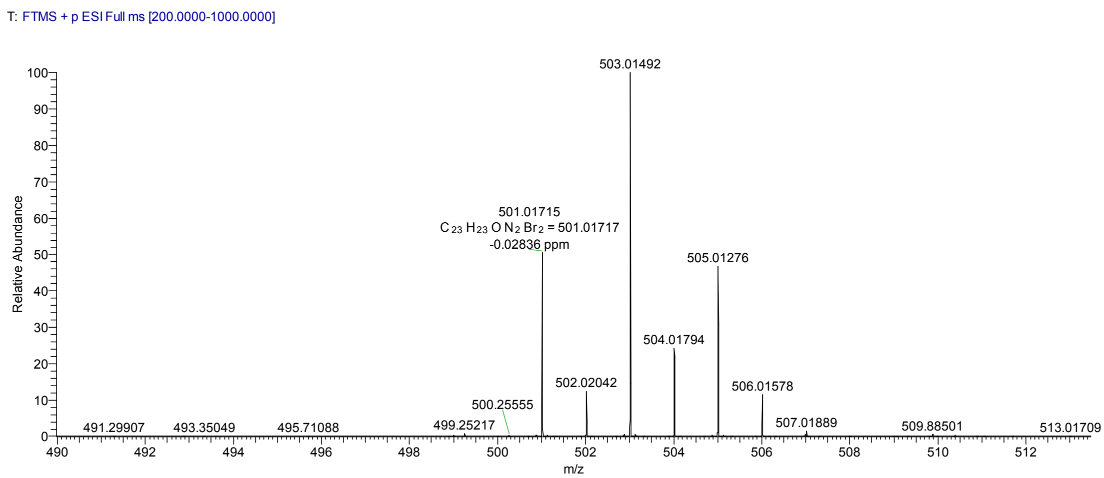
HRMS spectrum of target compound **4b**.



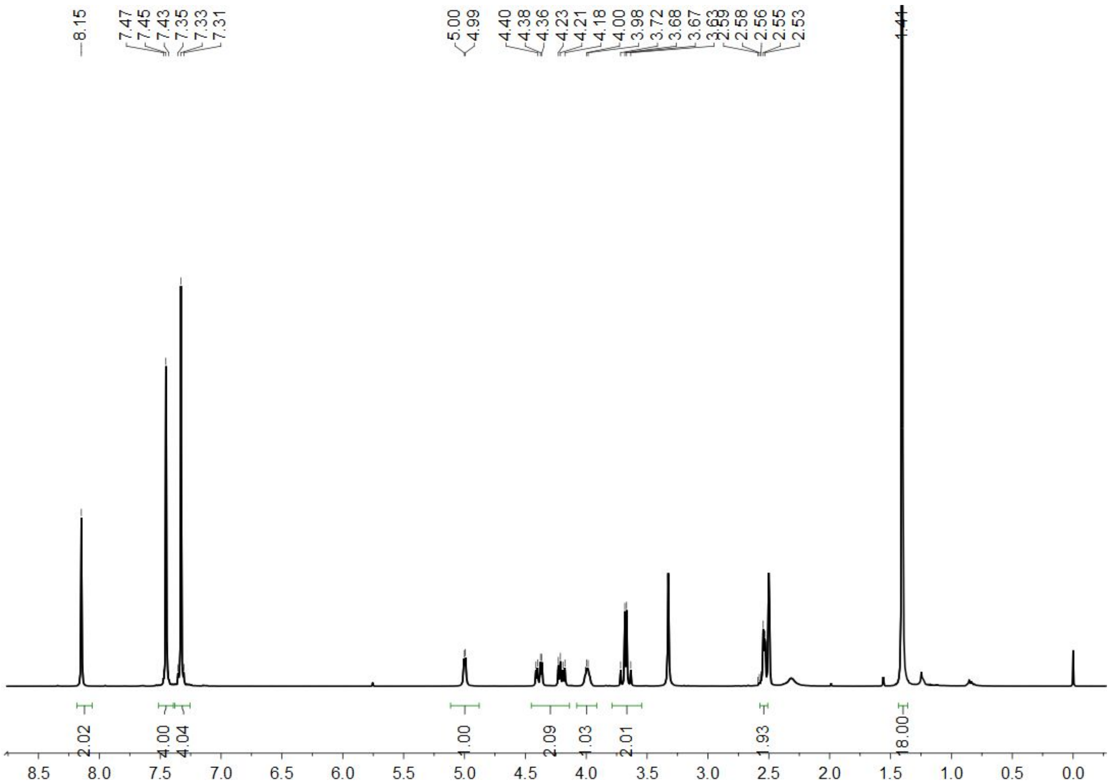
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4c**.



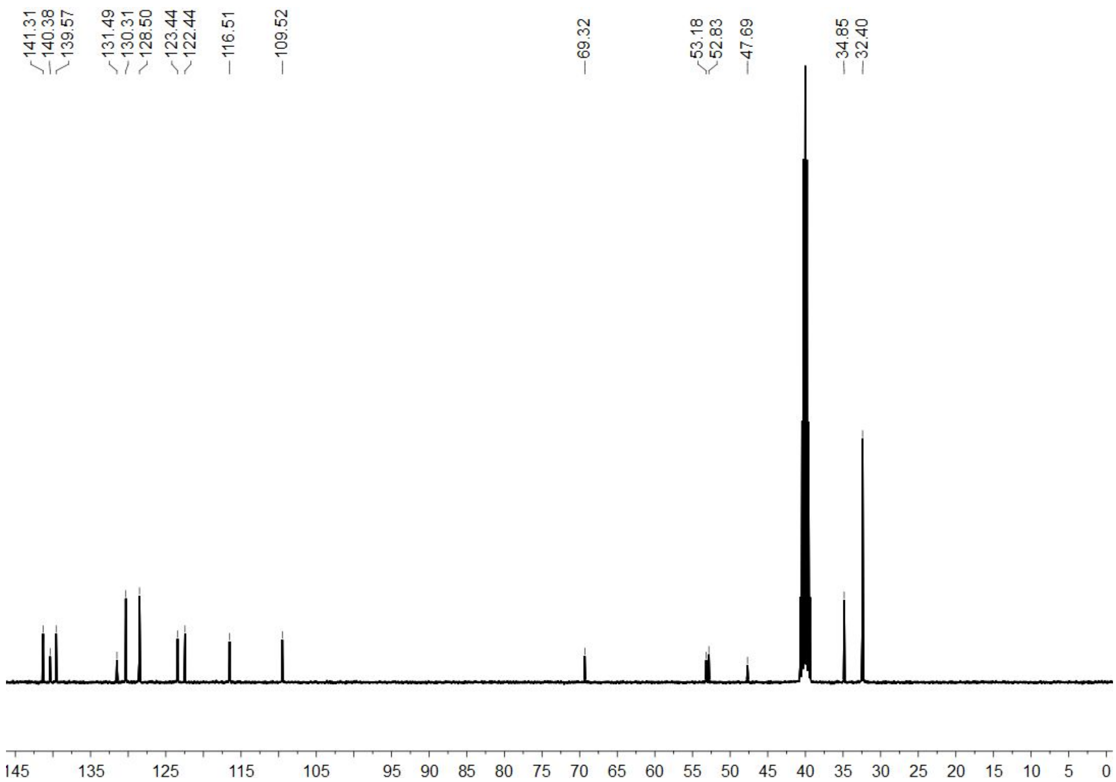
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4c**.



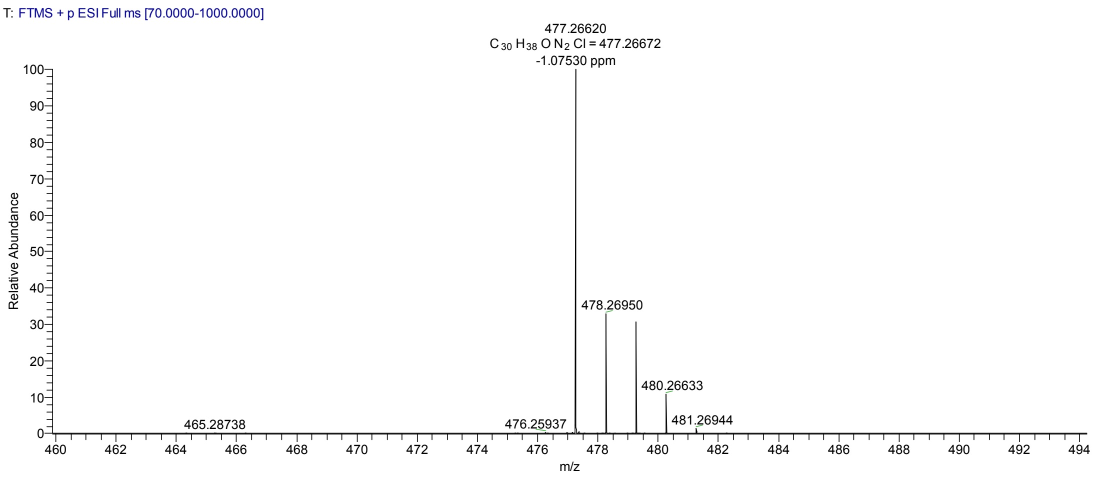
HRMS spectrum of target compound **4c**.



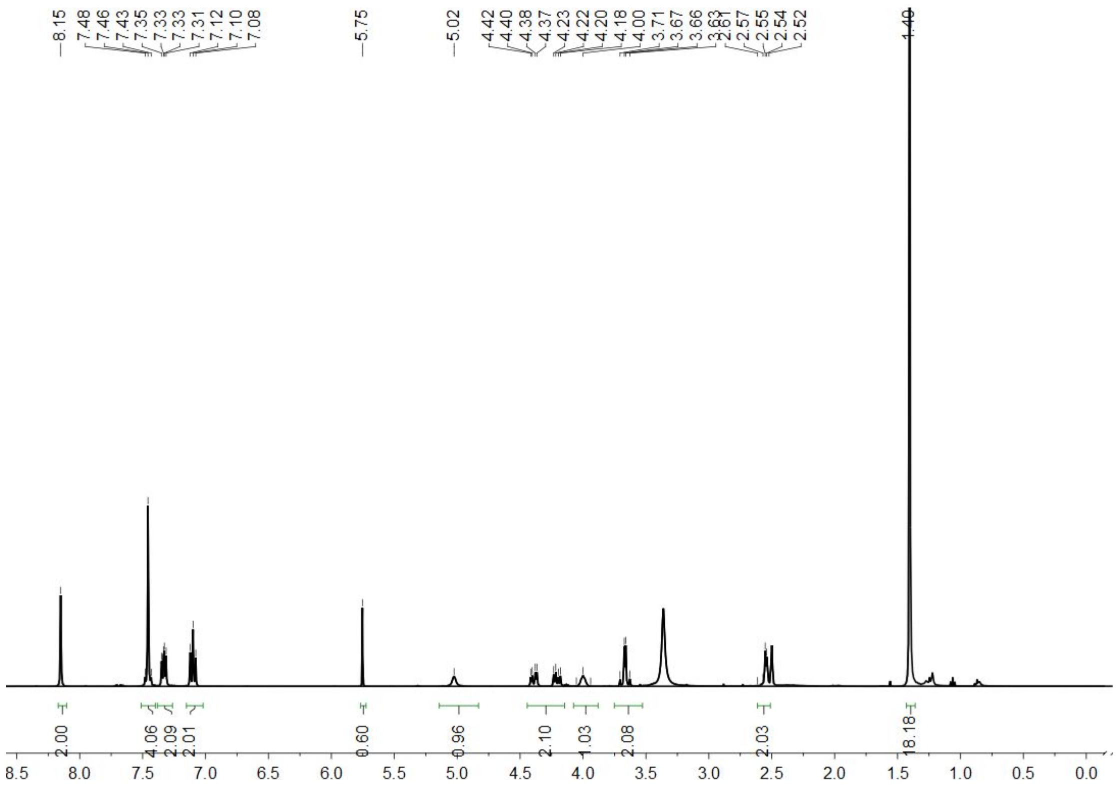
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **4d**.



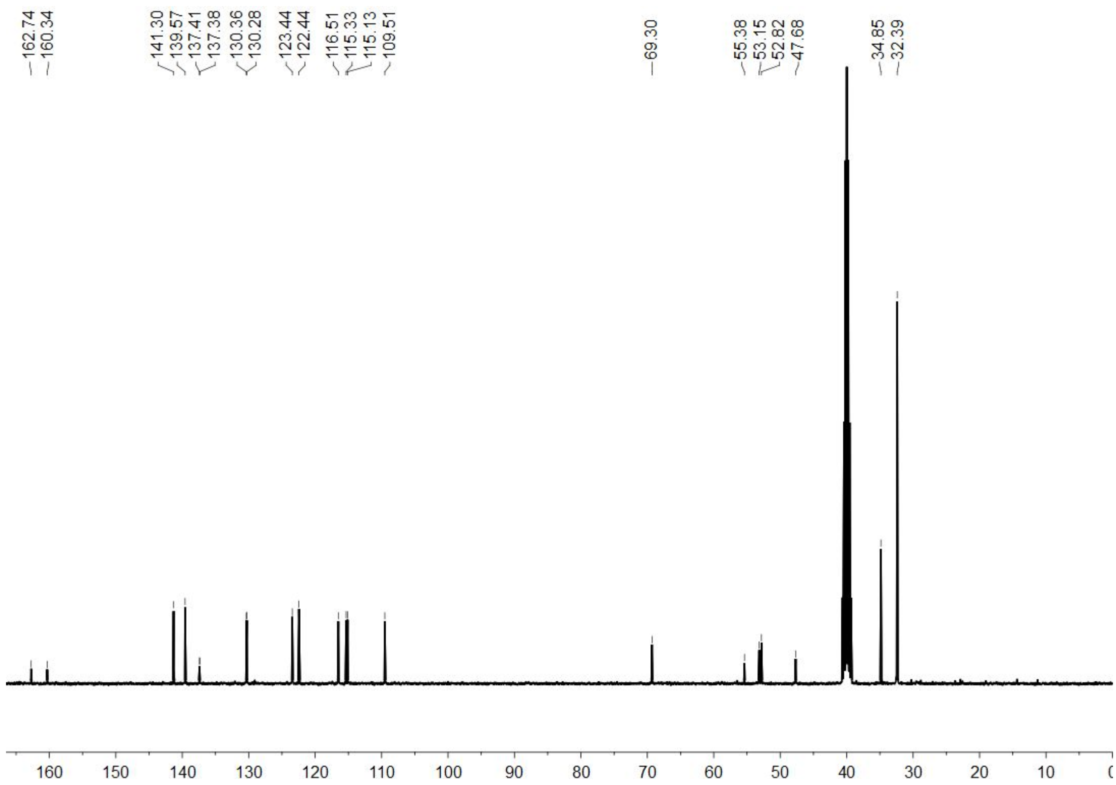
[13]C NMR Spectrum (DMSO-d_6, 101 MHz) of **4d**.



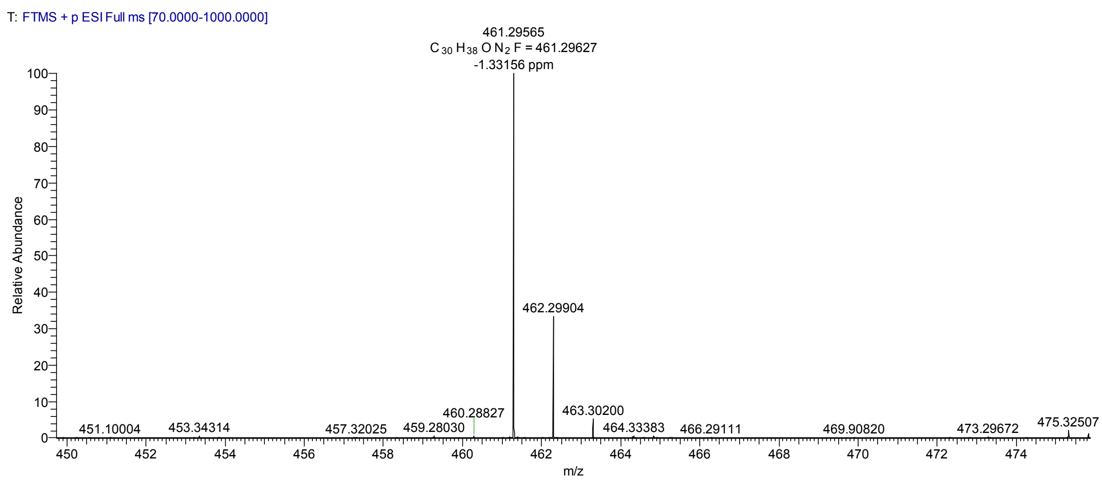
HRMS spectrum of target compound **4d**.



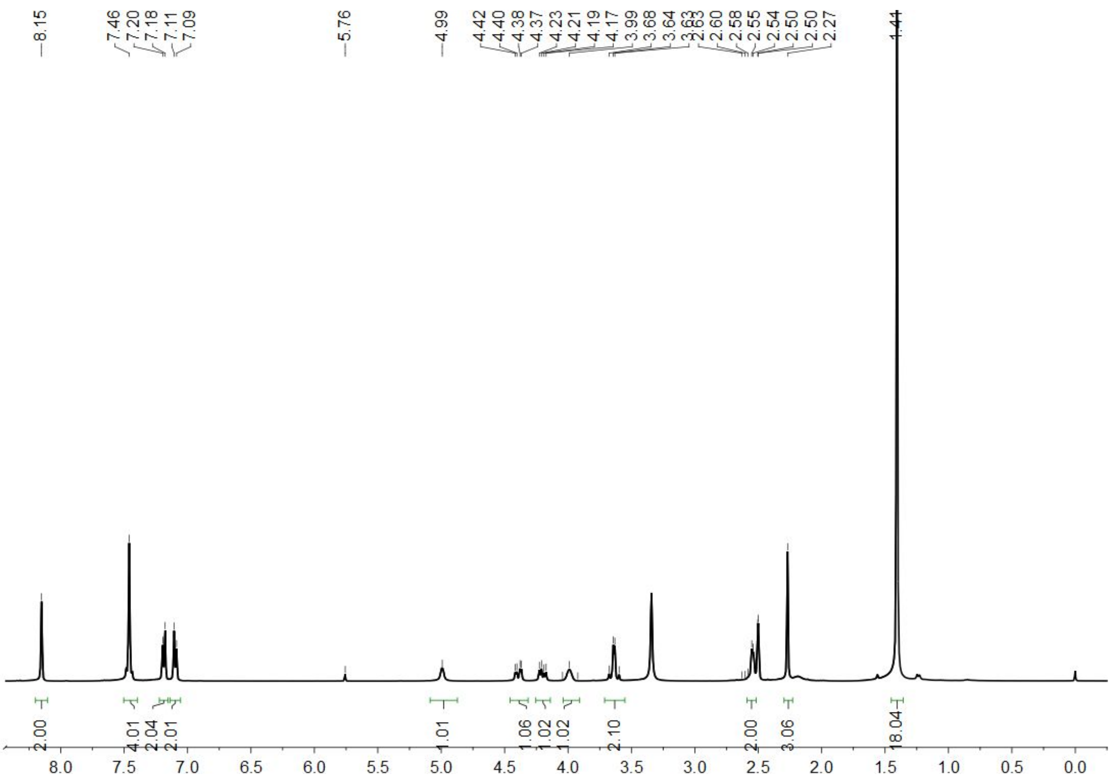
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4e**.



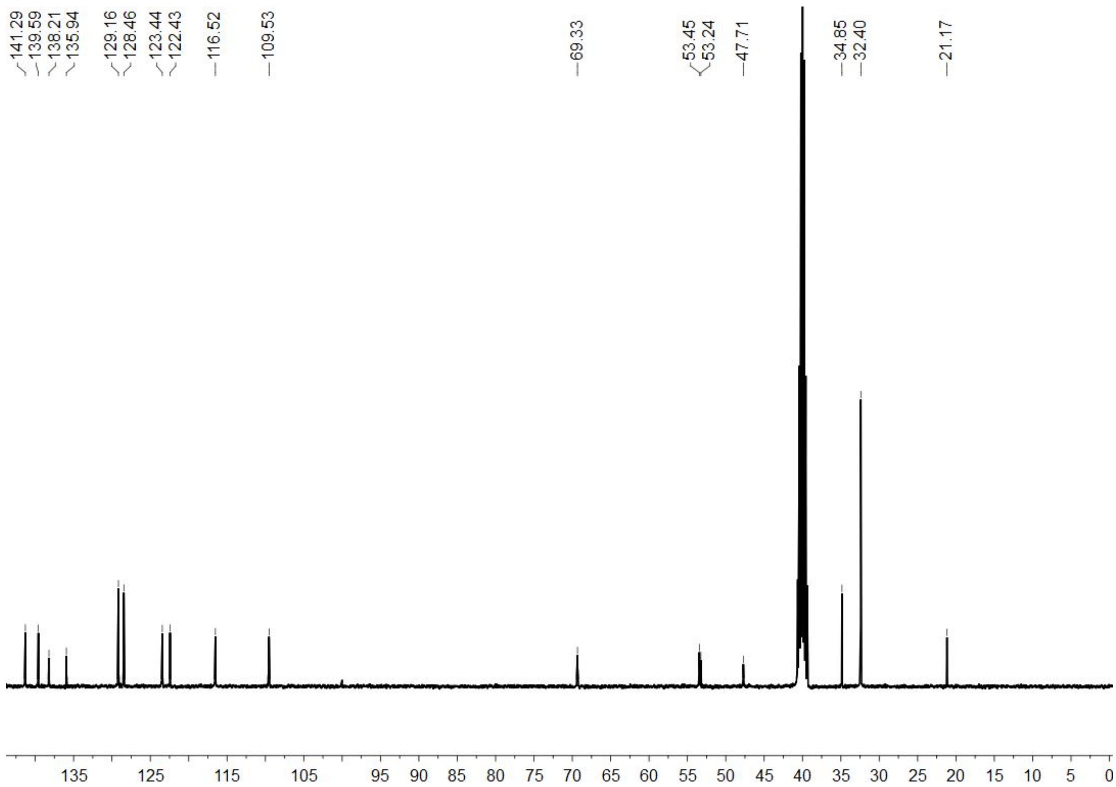
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4e**.



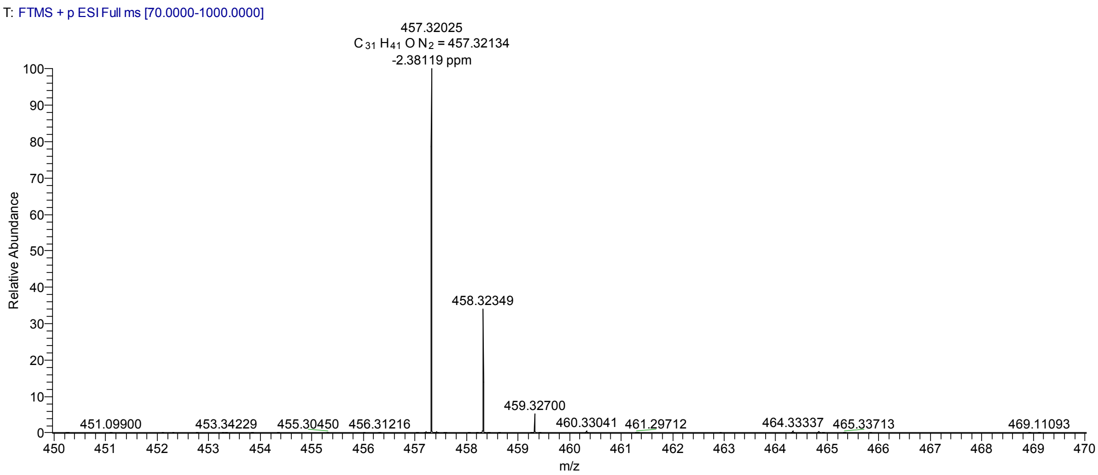
HRMS spectrum of target compound **4e**.



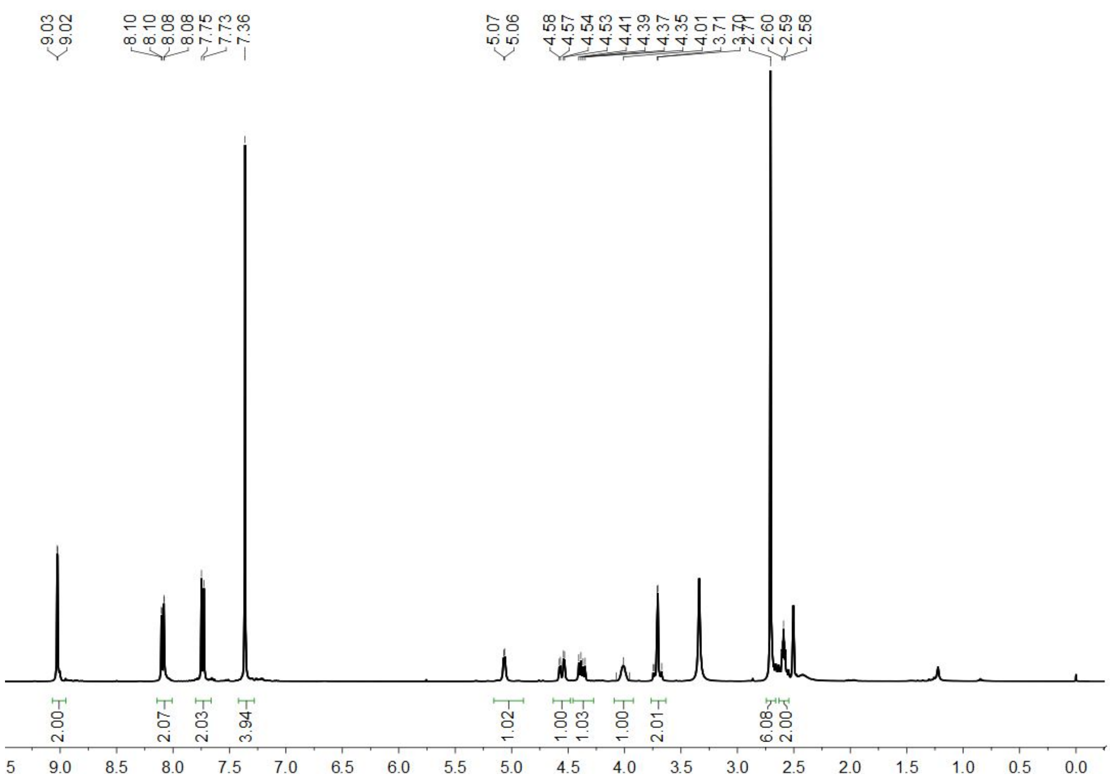
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **4f**.



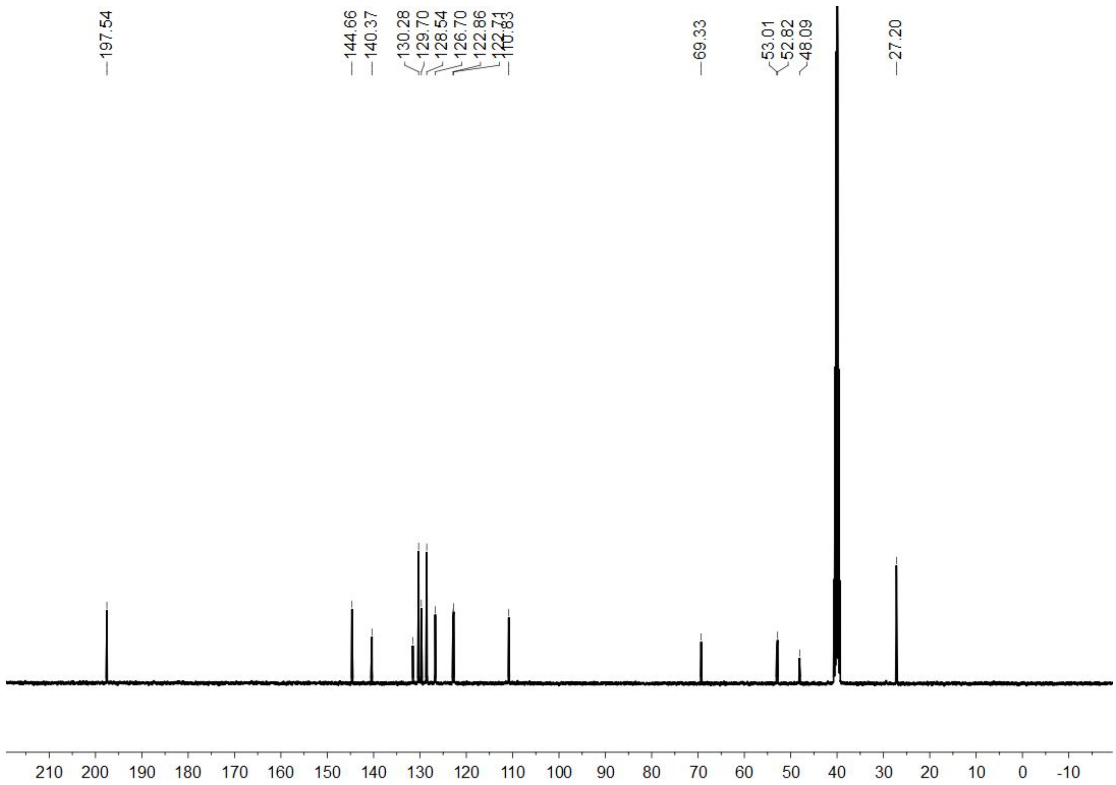
[13]C NMR Spectrum (DMSO-d_6, 101 MHz) of **4f**.



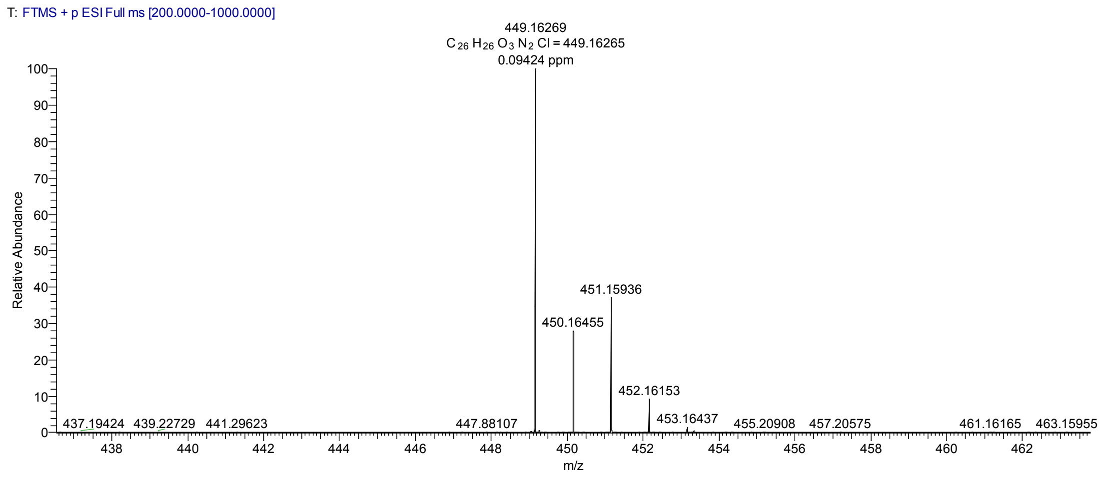
HRMS spectrum of target compound **4f**.



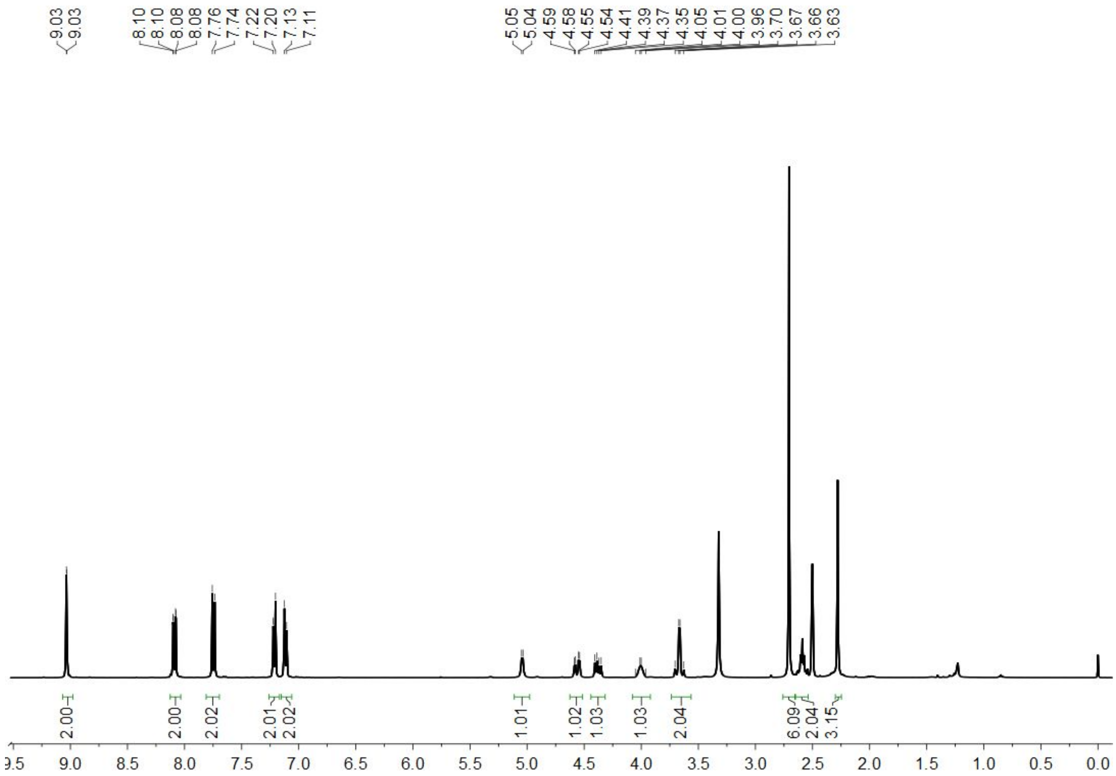
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4g**.



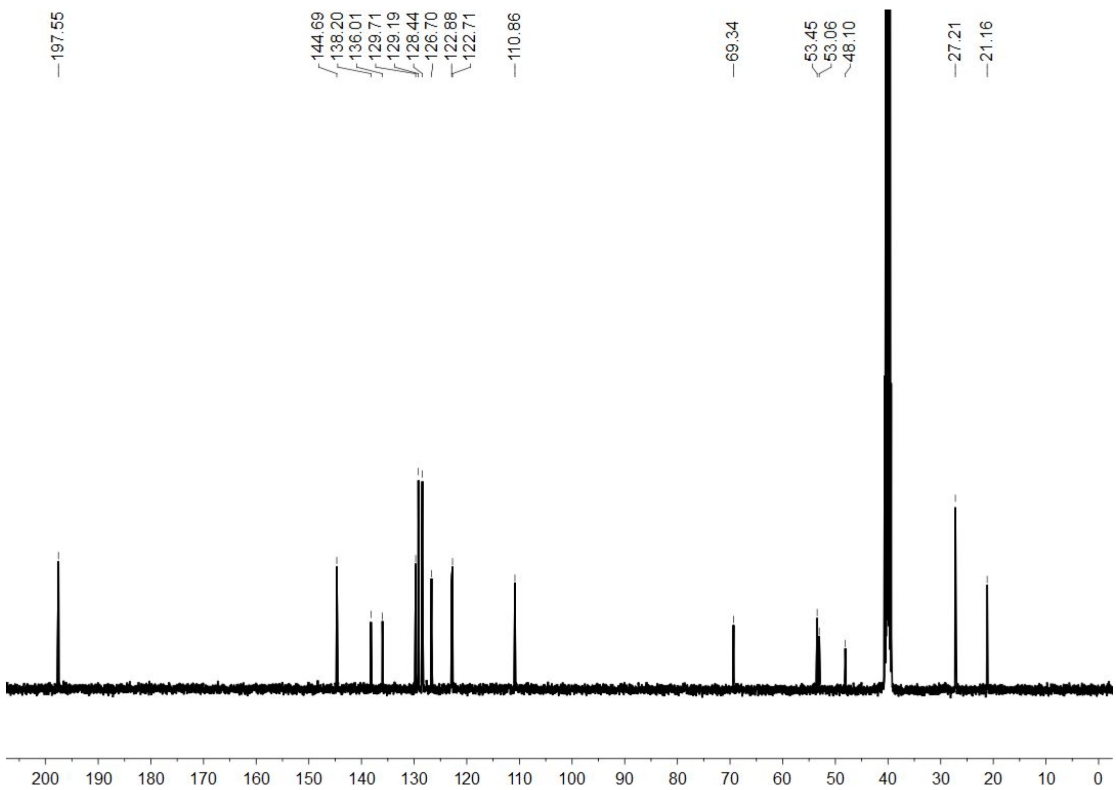
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4g**.



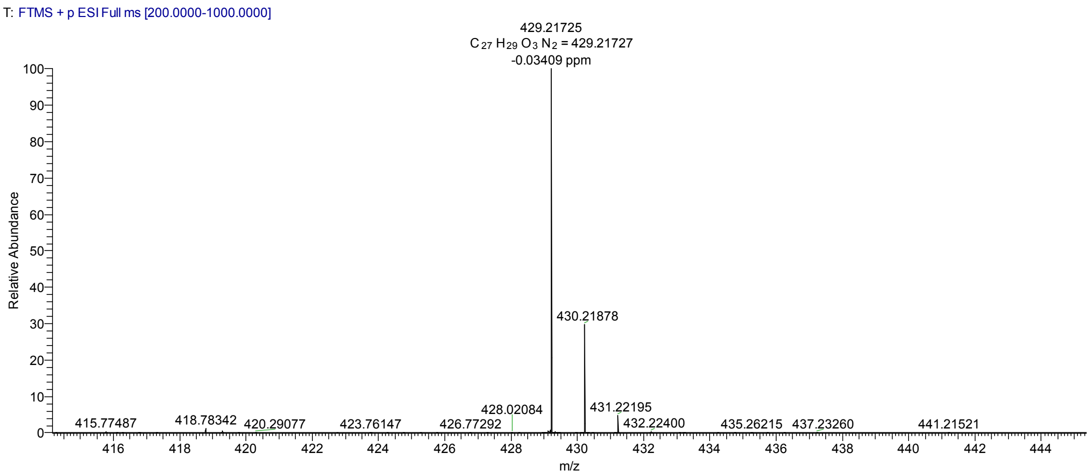
HRMS spectrum of target compound **4g**.



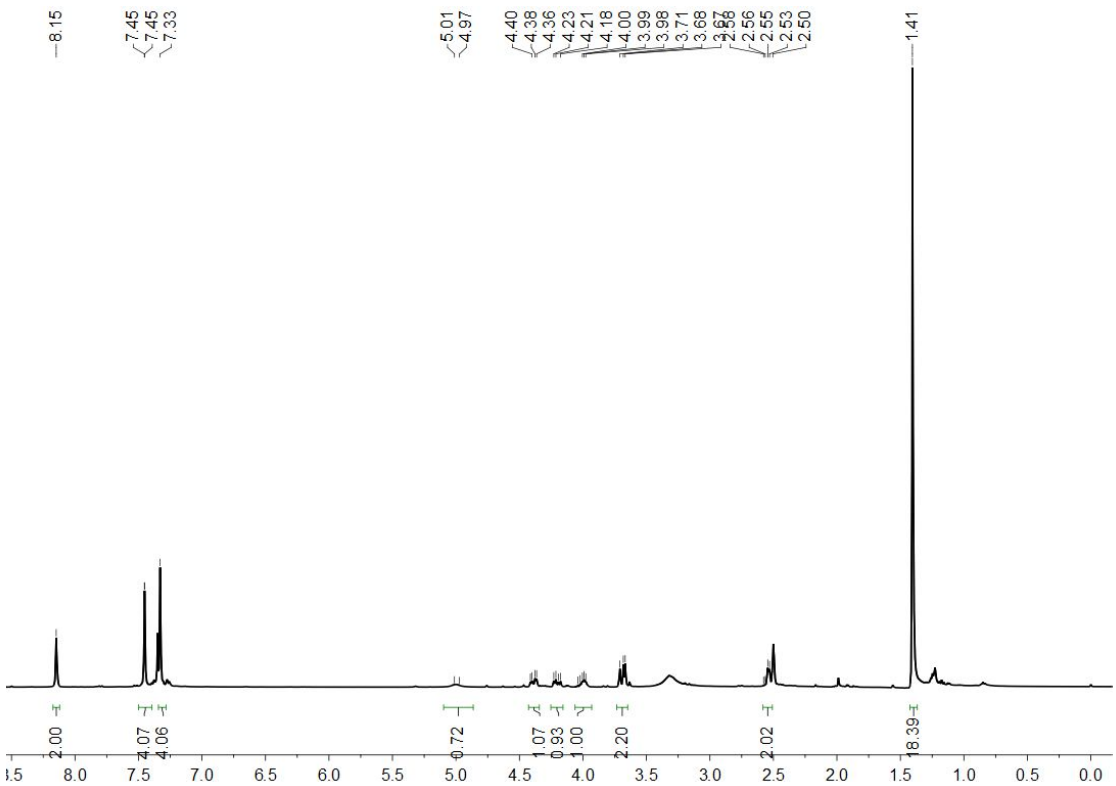
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **4h**.



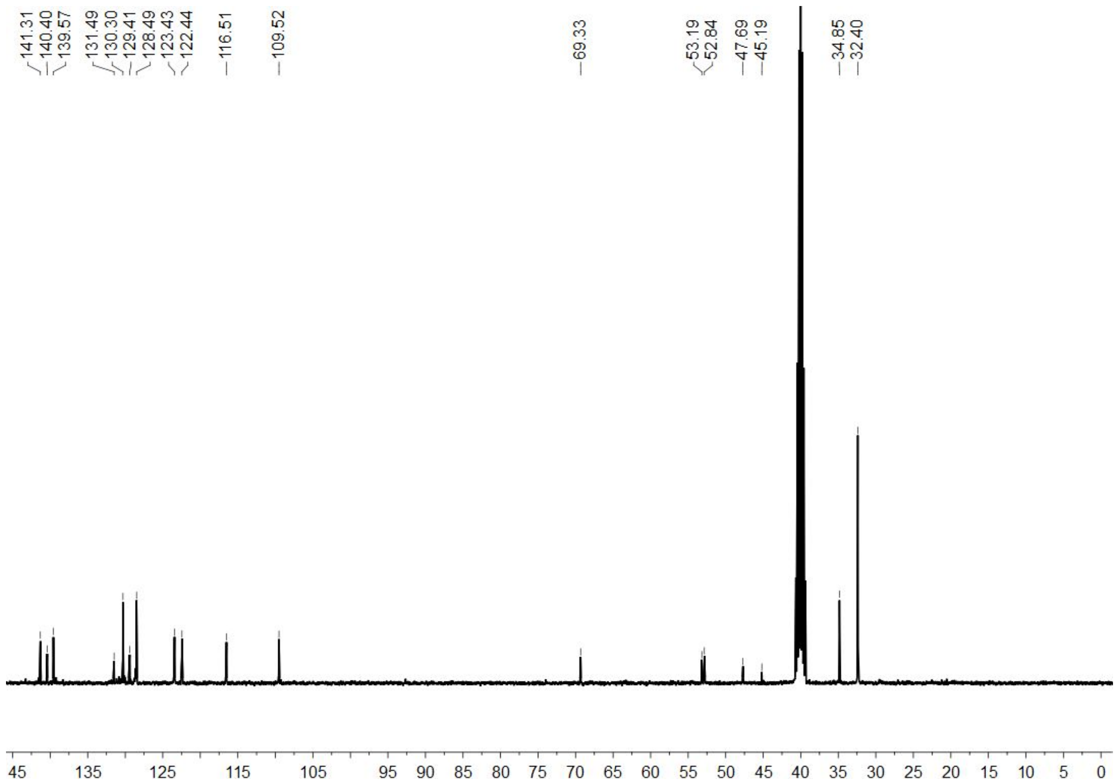
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **4h**.



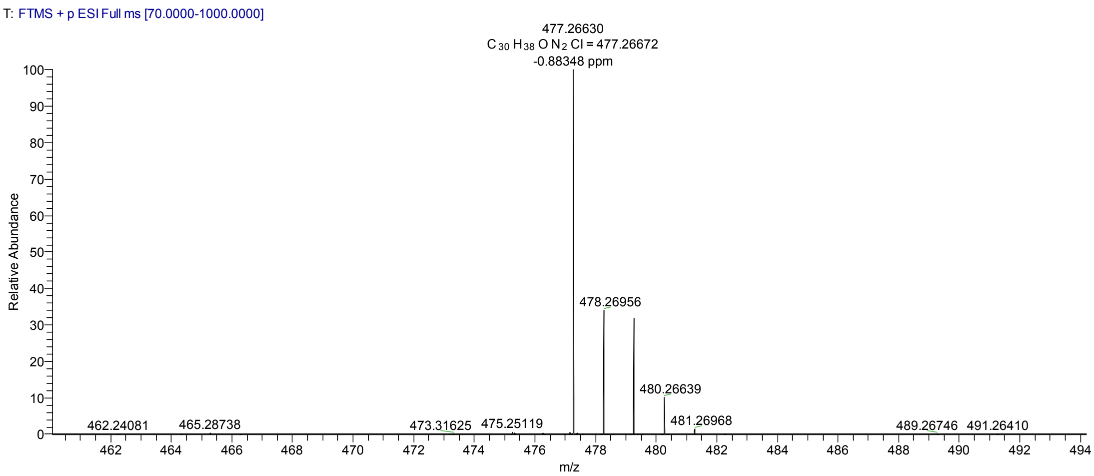
HRMS spectrum of target compound **4h**.



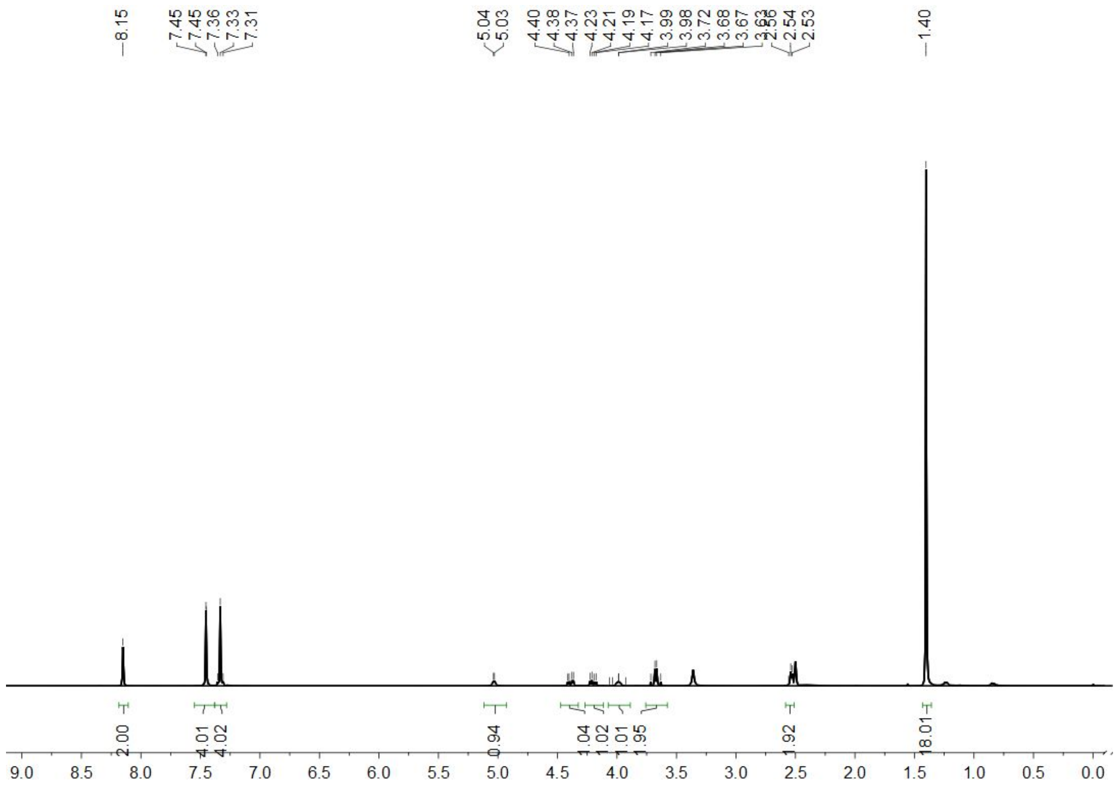
[1]H NMR Spectrum (DMSO-d_6, 400 MHz) of **6a**.



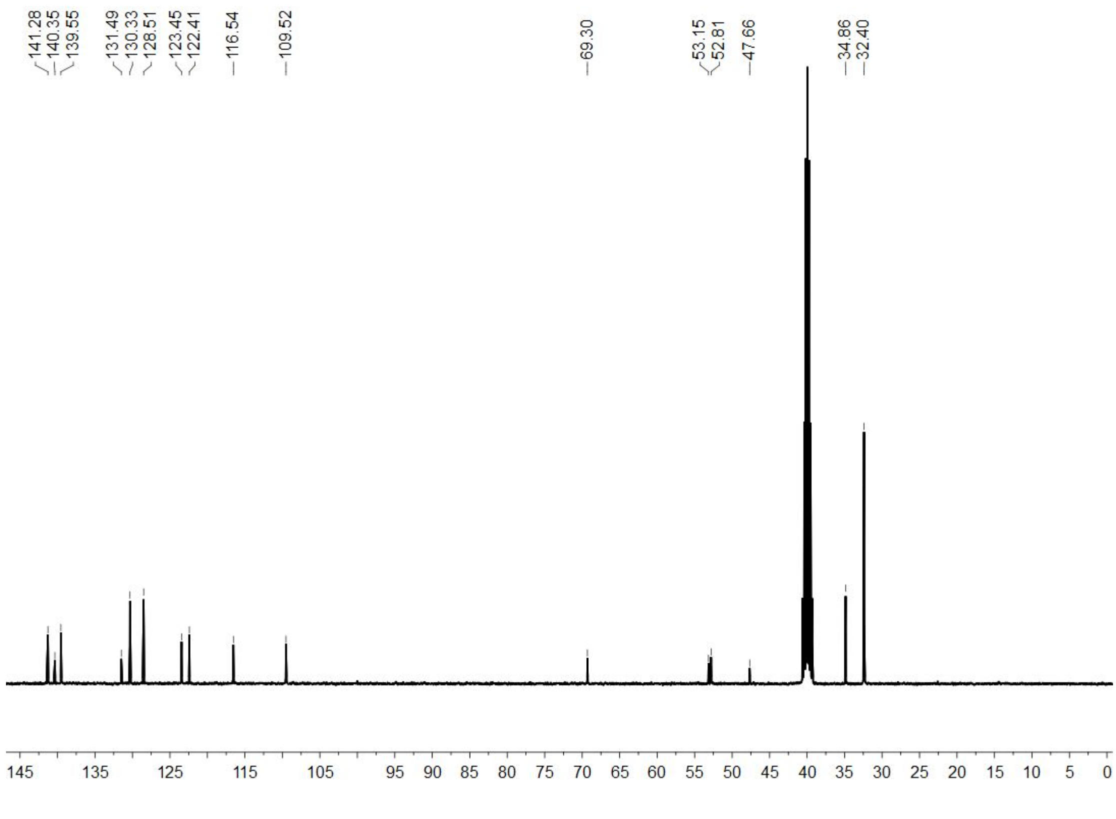
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **6a**.



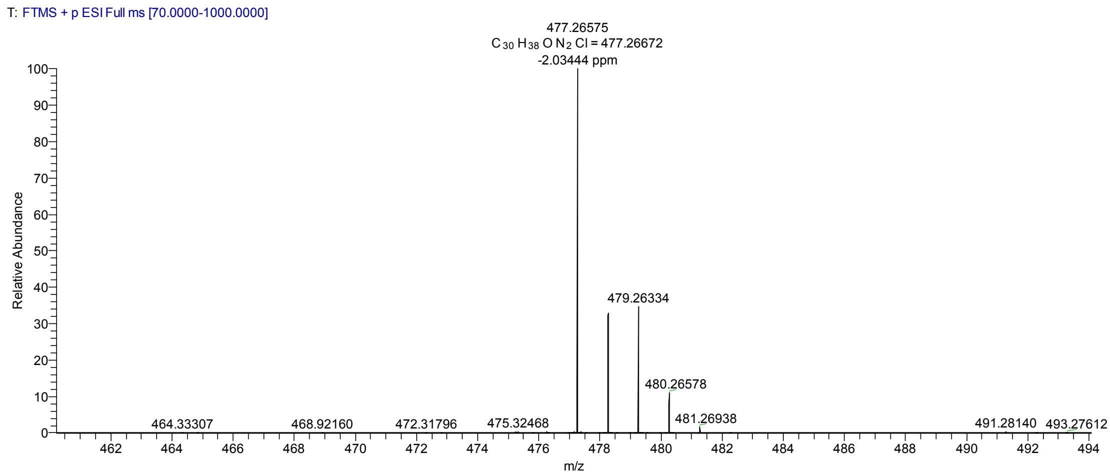
HRMS spectrum of target compound **6a**.



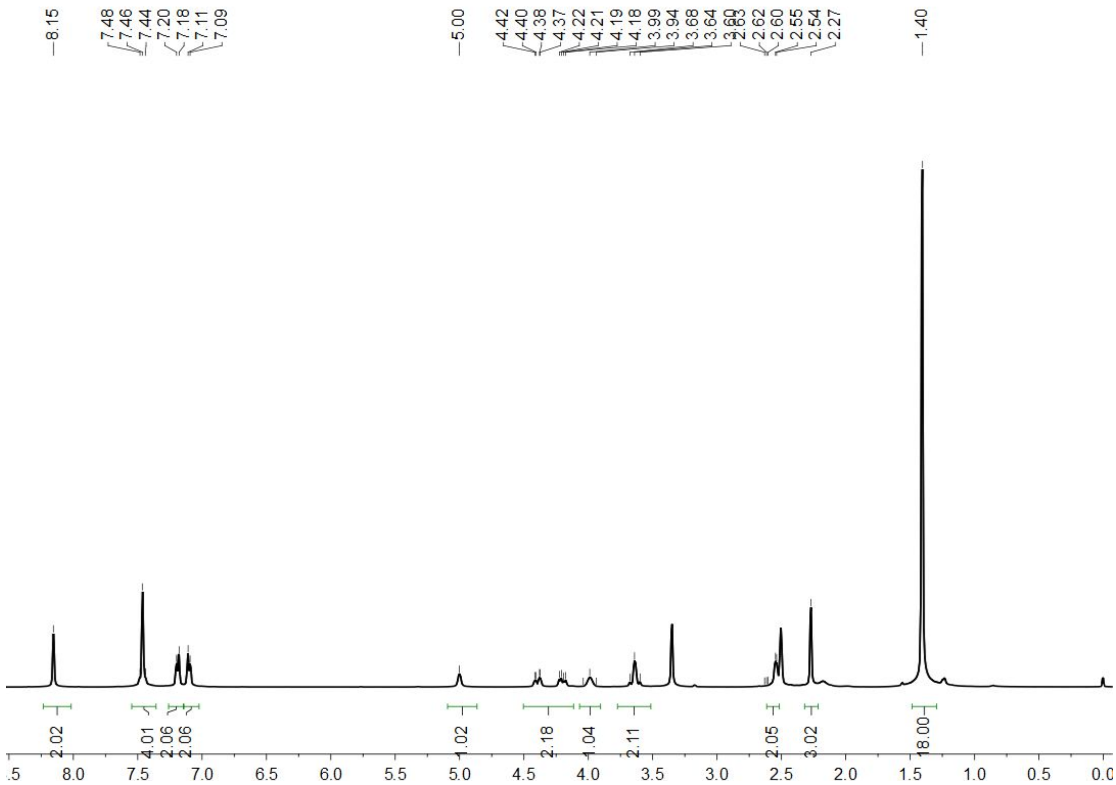
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **6b**.



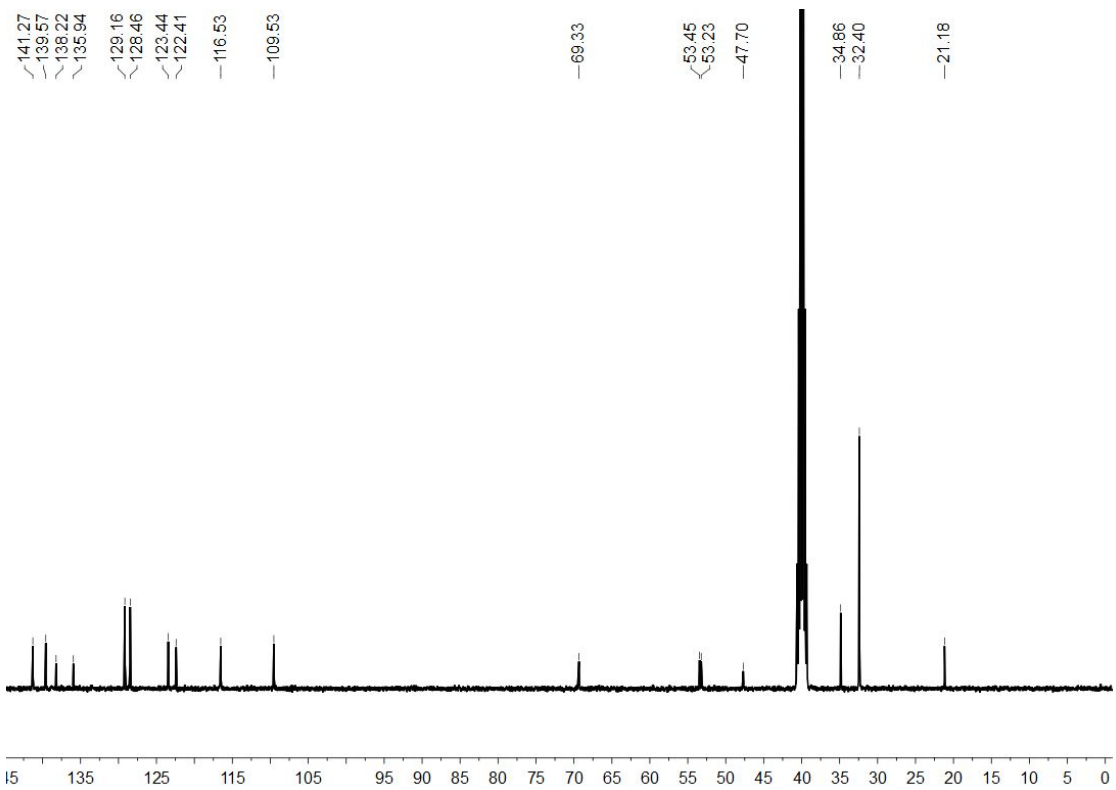
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **6b**.



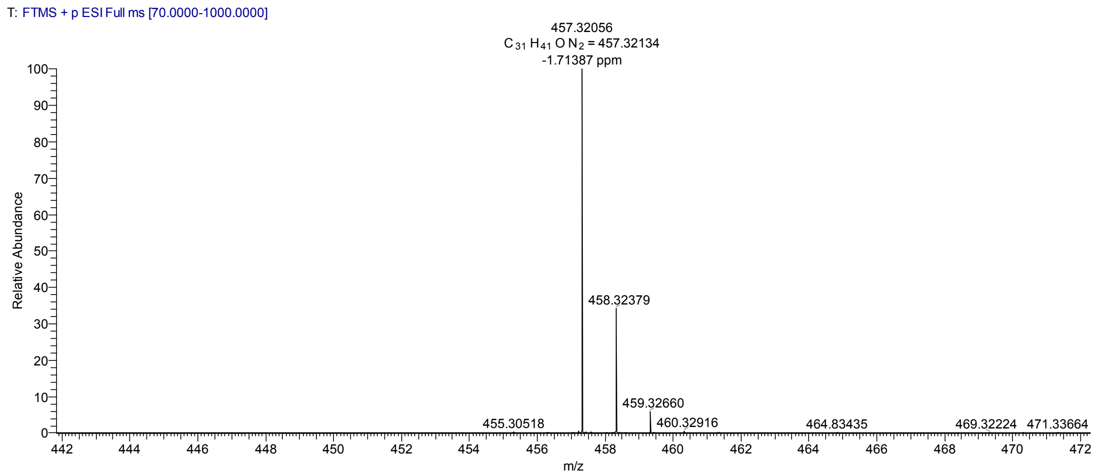
HRMS spectrum of target compound **6b**.



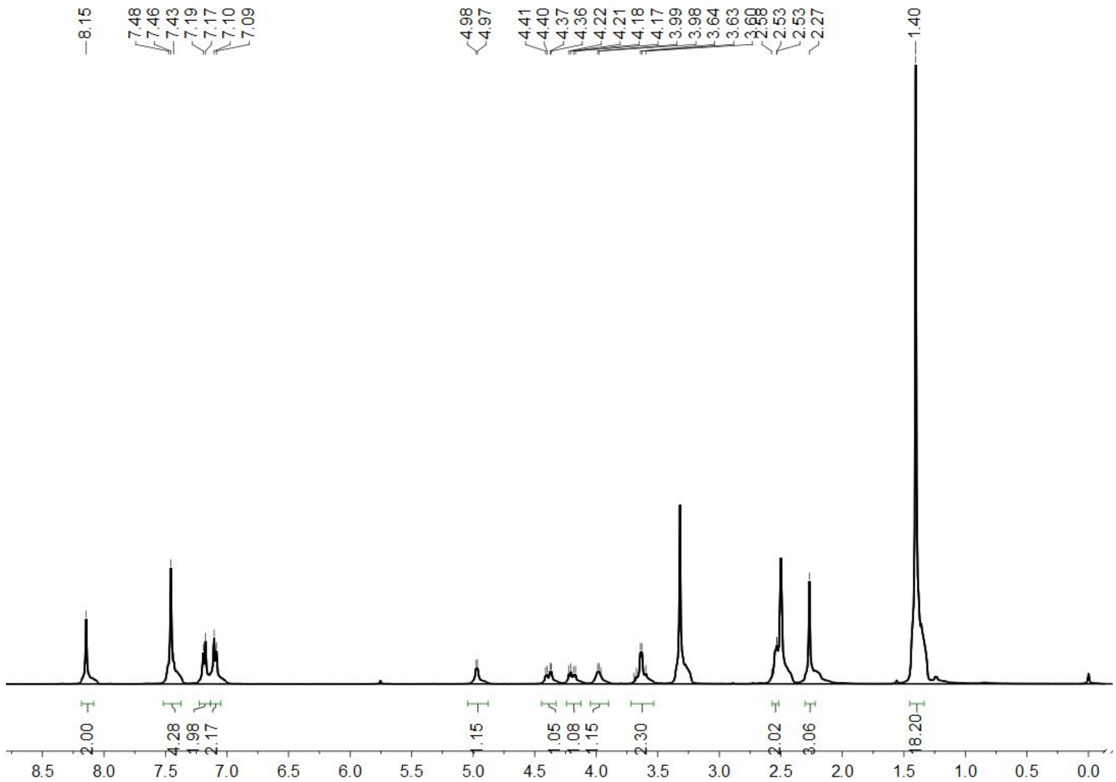
^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **6c**.



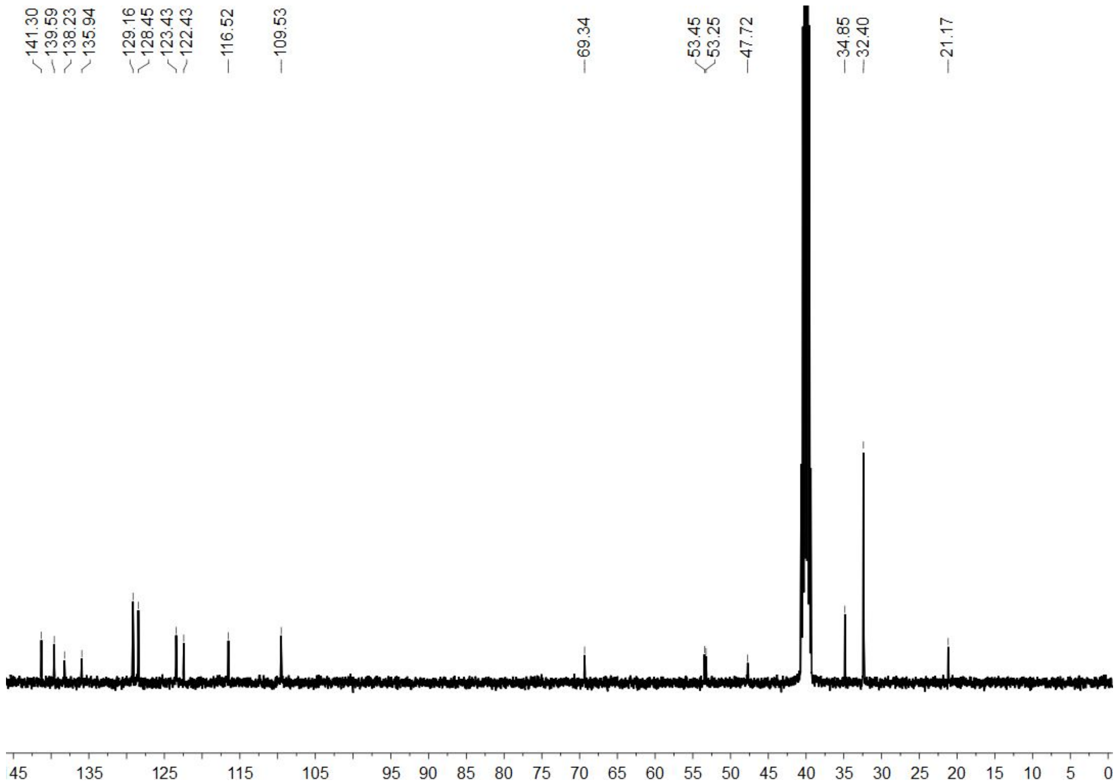
^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **6c**.



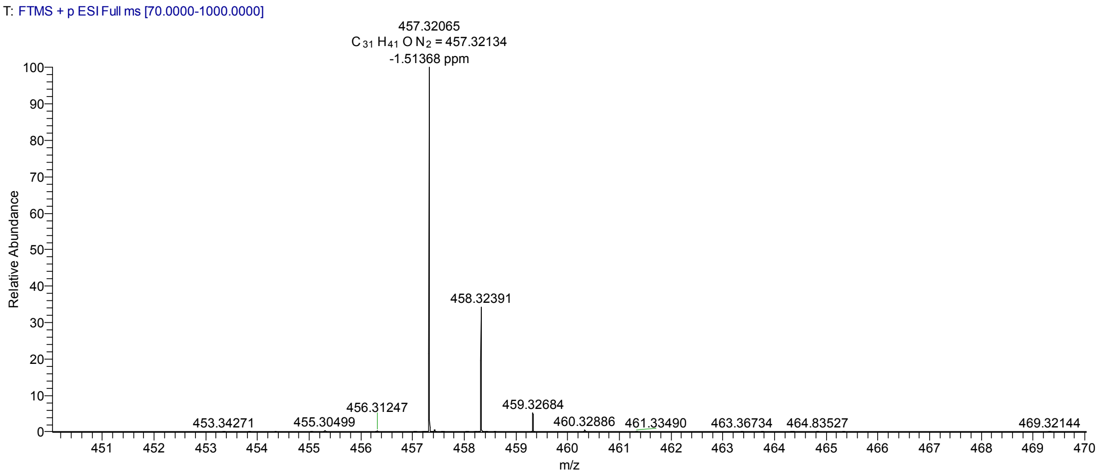
HRMS spectrum of target compound **6c**.



^{1}H NMR Spectrum (DMSO-d_6, 400 MHz) of **6d**.



^{13}C NMR Spectrum (DMSO-d_6, 101 MHz) of **6d**.



HRMS spectrum of target compound **6d**.