

Supporting Information

DESIGN, SYNTHESIS AND BIOLOGICAL EVALUATION OF NOVEL INDOLE-CONTAINING SORAFENIB DERIVATIVES

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Content

1. ¹H NMR, ¹³C NMR, and HRMS spectra of target compounds **1-30**
2. Inhibition rate of all compounds at 10 μM against four cancer cells
3. Plate clone formation experiment of compound **6** and sorafenib

^1H NMR, ^{13}C NMR, and HRMS spectra of target compounds 1-30

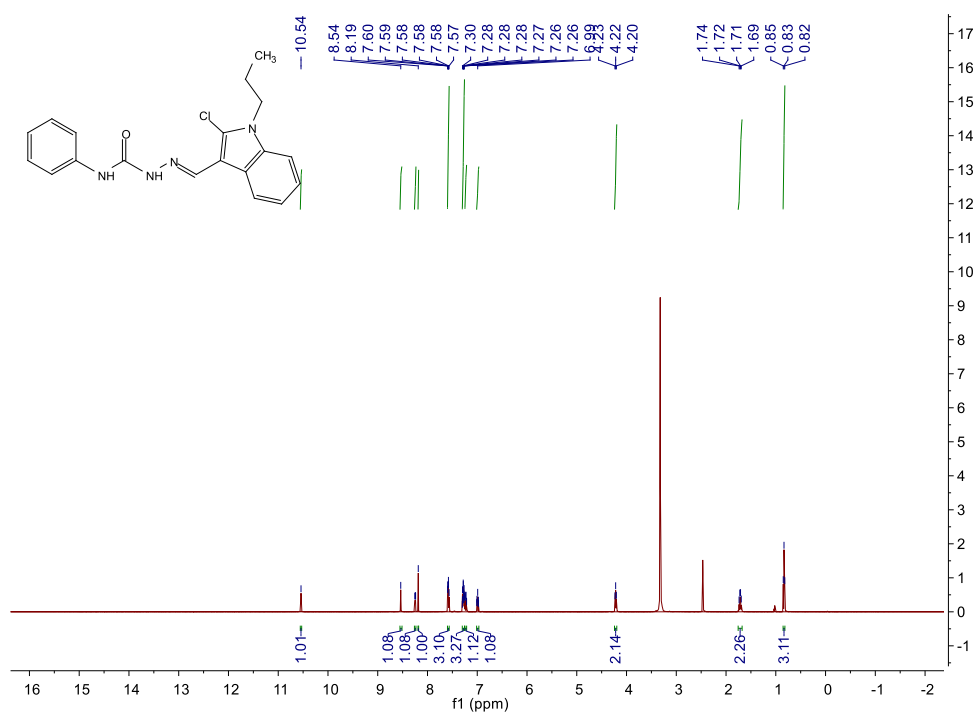


Fig. S1 ^1H NMR spectrum of target compound 1

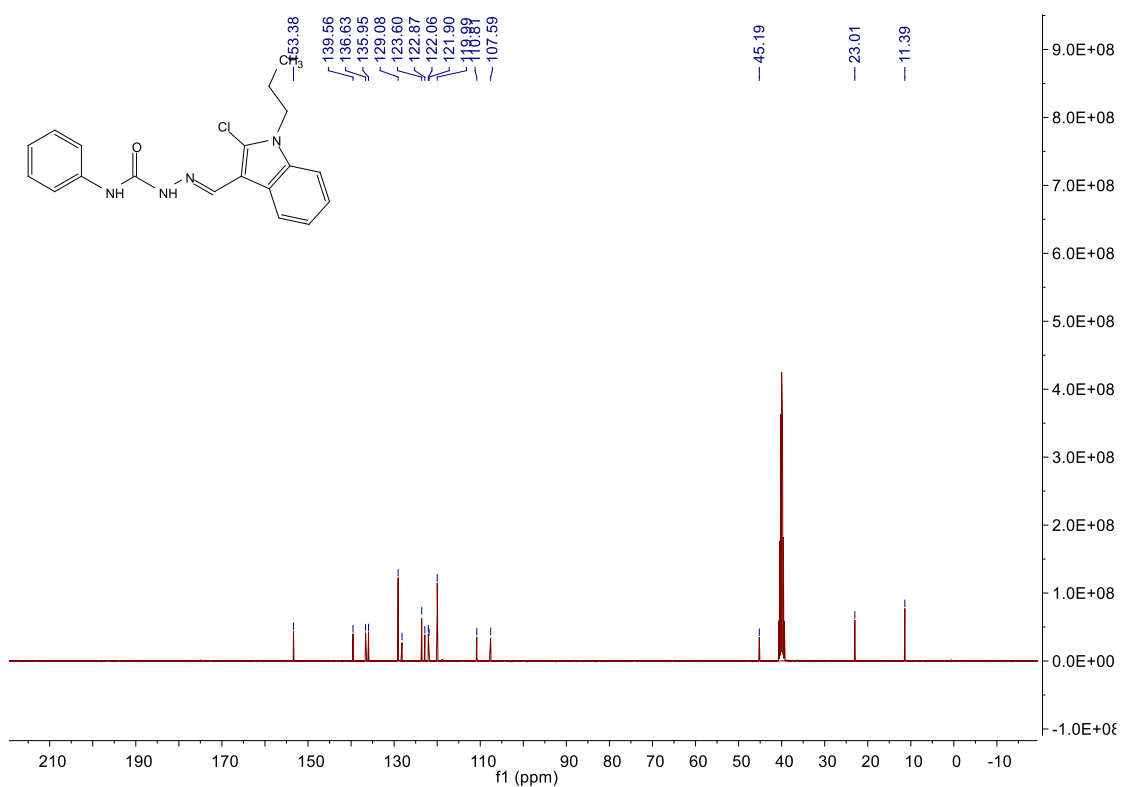


Fig. S2 ^{13}C NMR spectrum of target compound 1

20191224-1-81 #65 RT: 0.63 AV: 1 NL: 1.20E8
T: FTMS + p ESIFull.ms [100.0000-1000.0000]

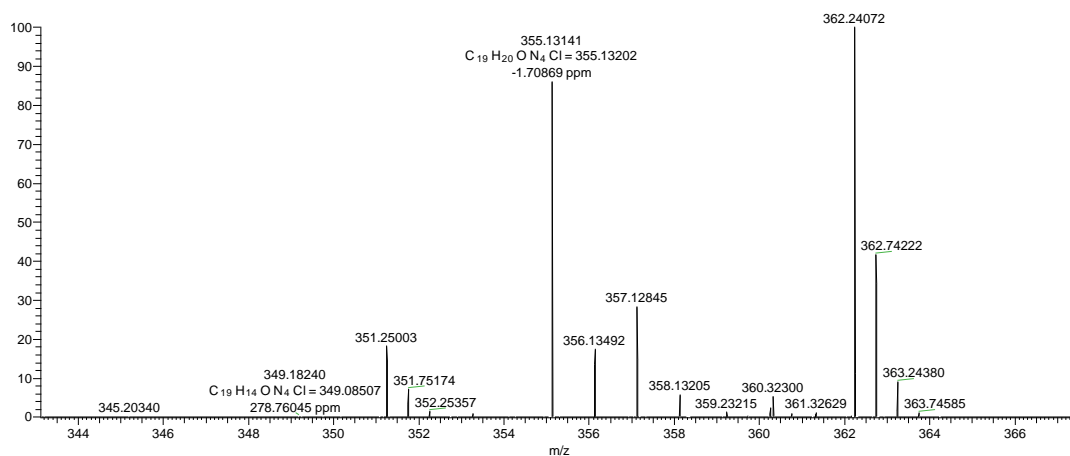


Fig. S3 HRMS spectrum of target compound 1

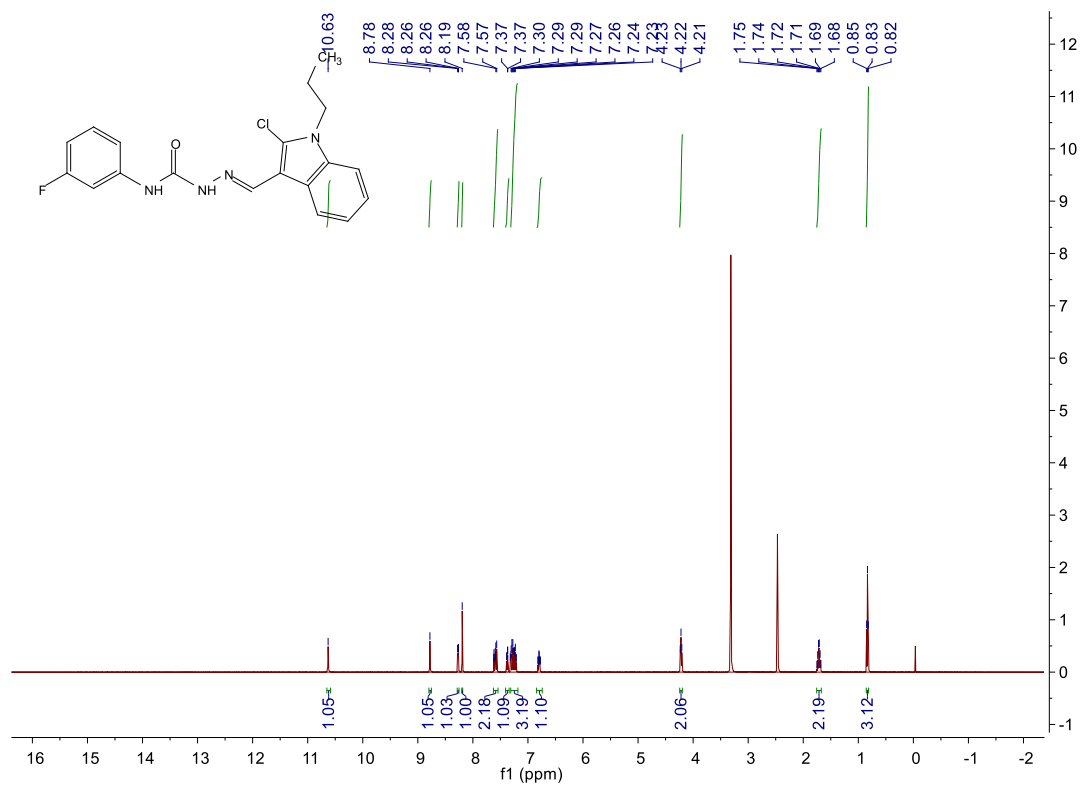


Fig. S4 ¹H NMR spectrum of target compound 2

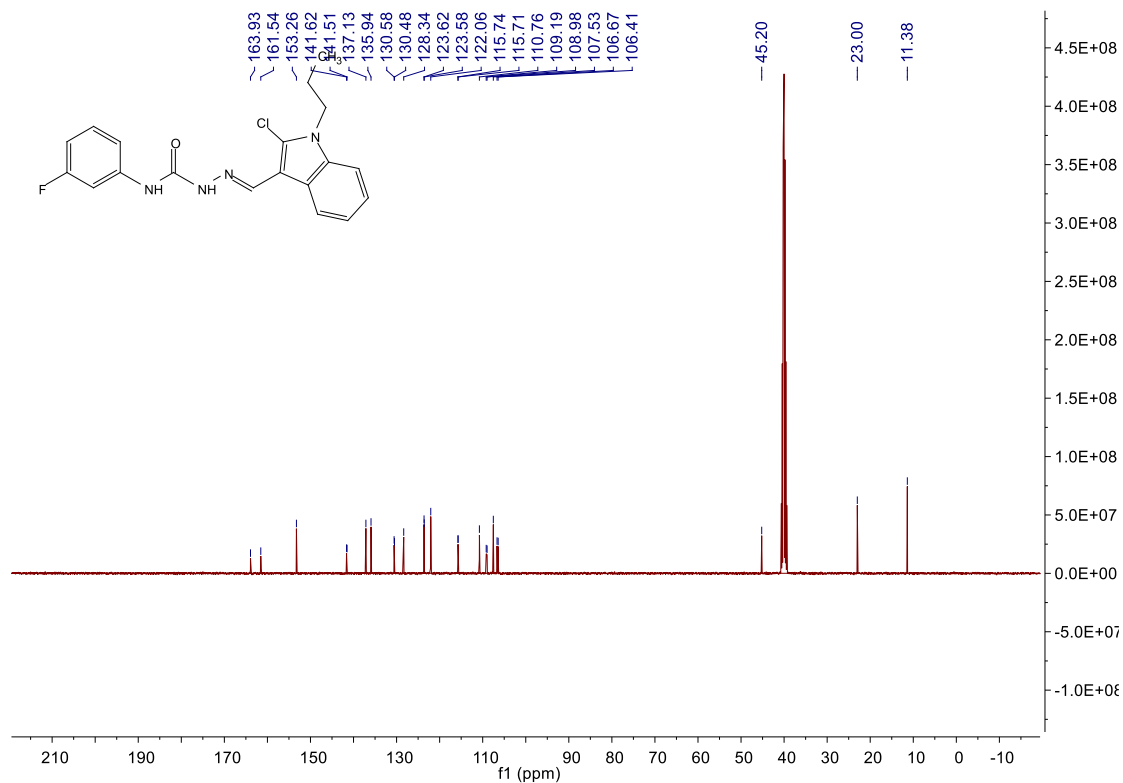


Fig. S5 ^{13}C NMR spectrum of target compound 2

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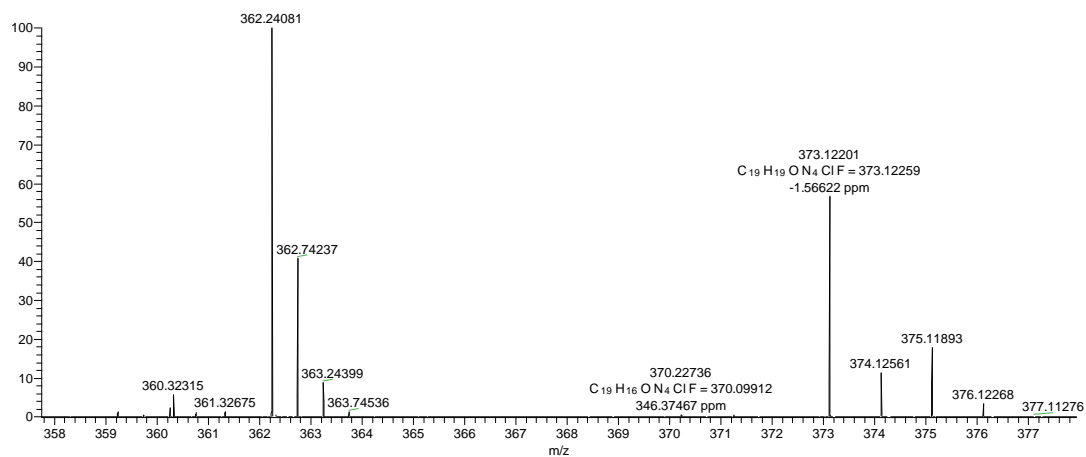


Fig. S6 HRMS spectrum of target compound 2

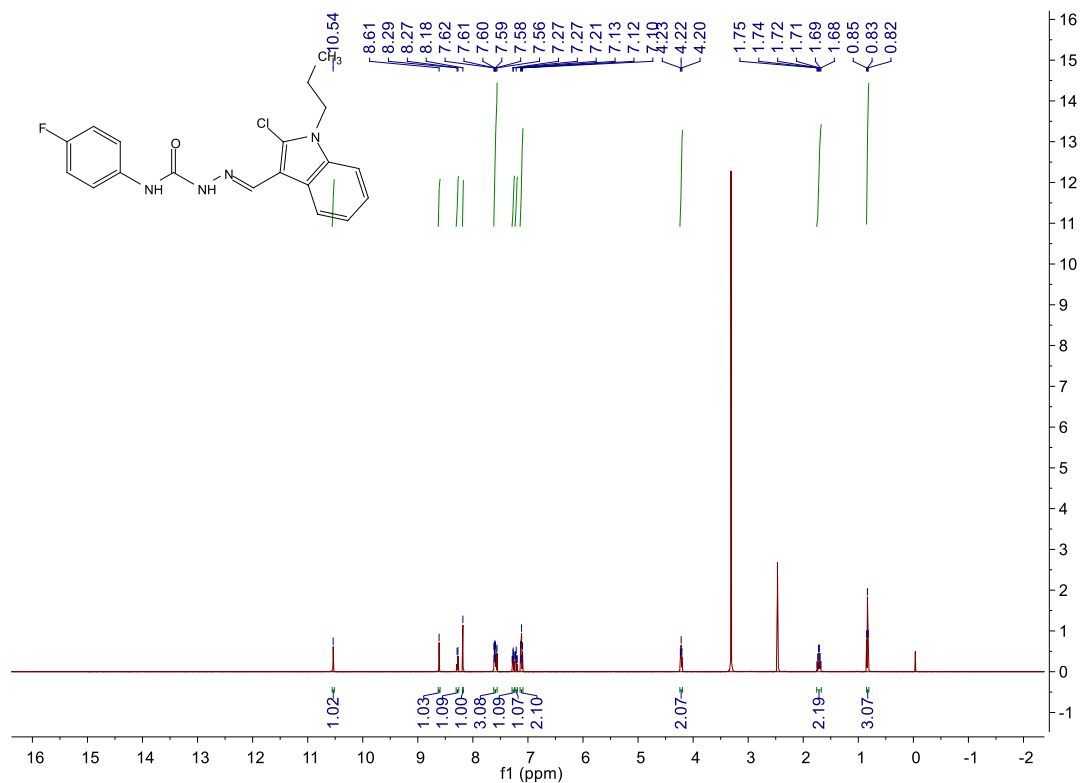


Fig. S7 ¹H NMR spectrum of target compound 3

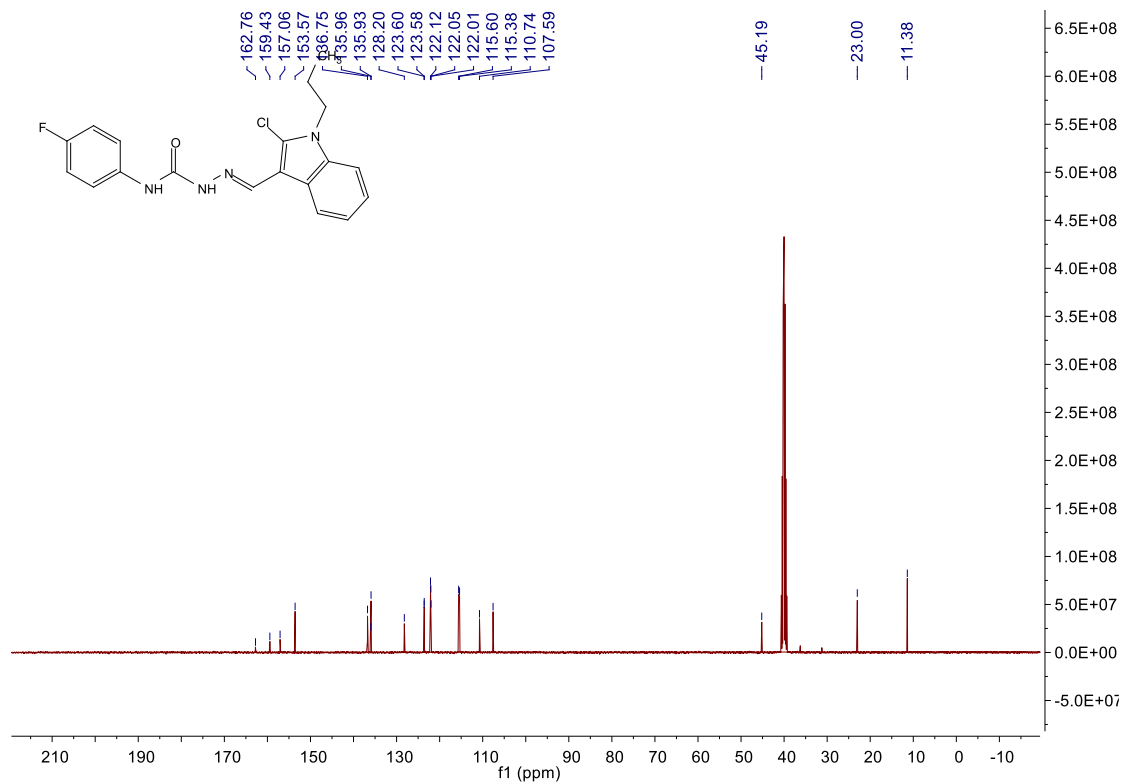


Fig. S8 ¹³C NMR spectrum of target compound 3

20191224-1-92 #60 RT: 0.58 AV: 1 NL: 4.74E7
T: FTMS - p ESI Full ms [100.0000-1000.0000]

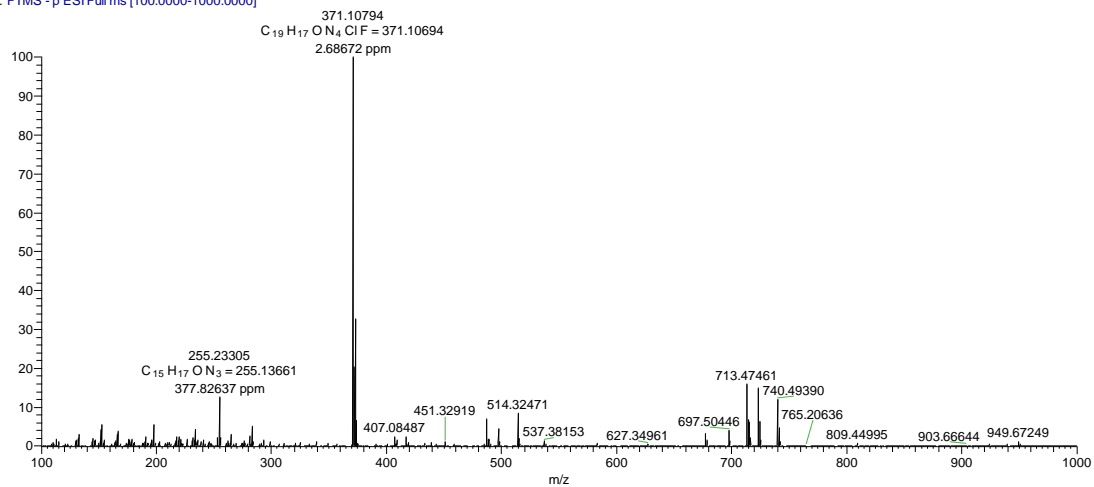


Fig. S9 HRMS spectrum of target compound 3

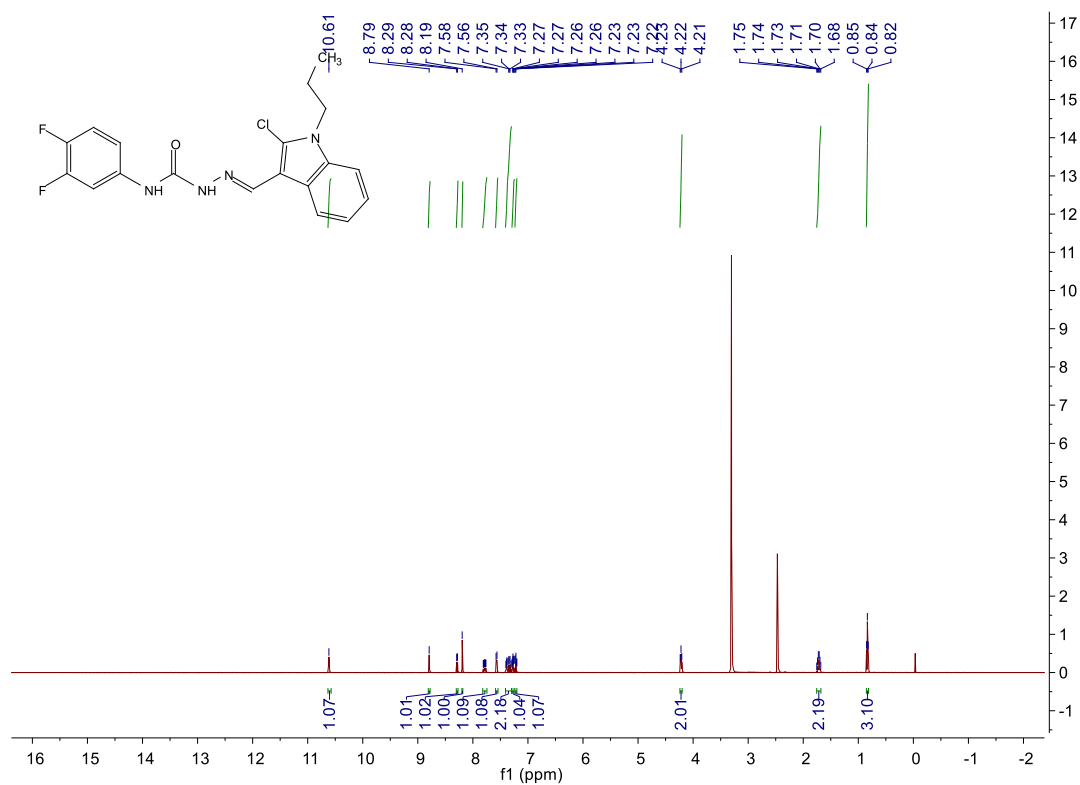


Fig. S10 ¹H NMR spectrum of target compound 4

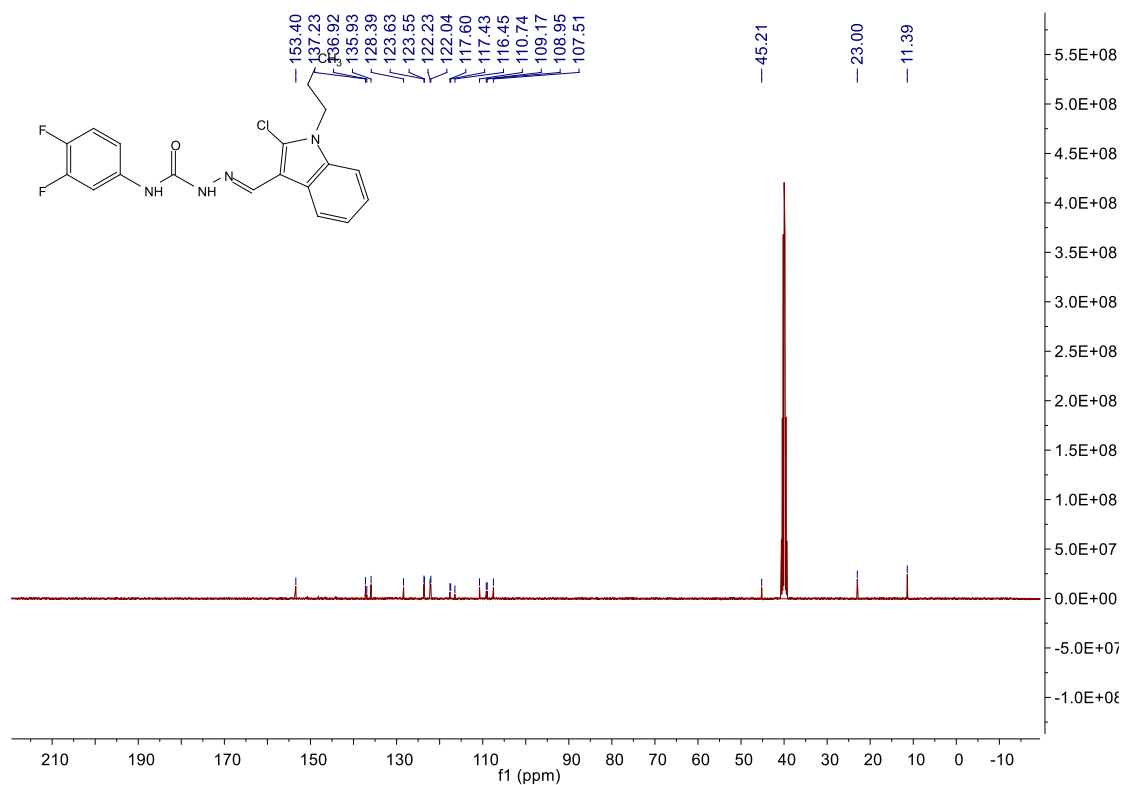


Fig. S11 ^{13}C NMR spectrum of target compound 4

20191224-1-82 #57 RT: 0.55 AV: 1 NL: 4.57E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

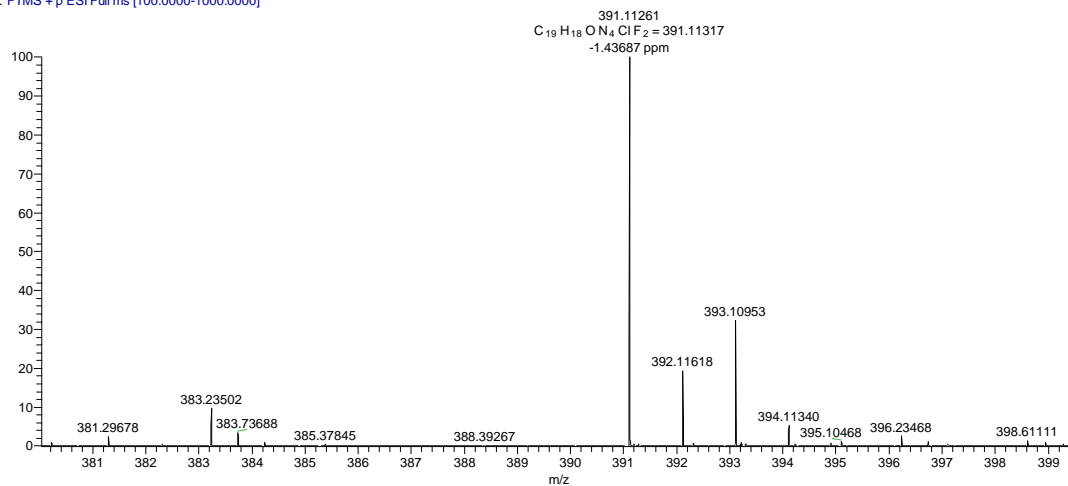


Fig. S12 HRMS spectrum of target compound 4

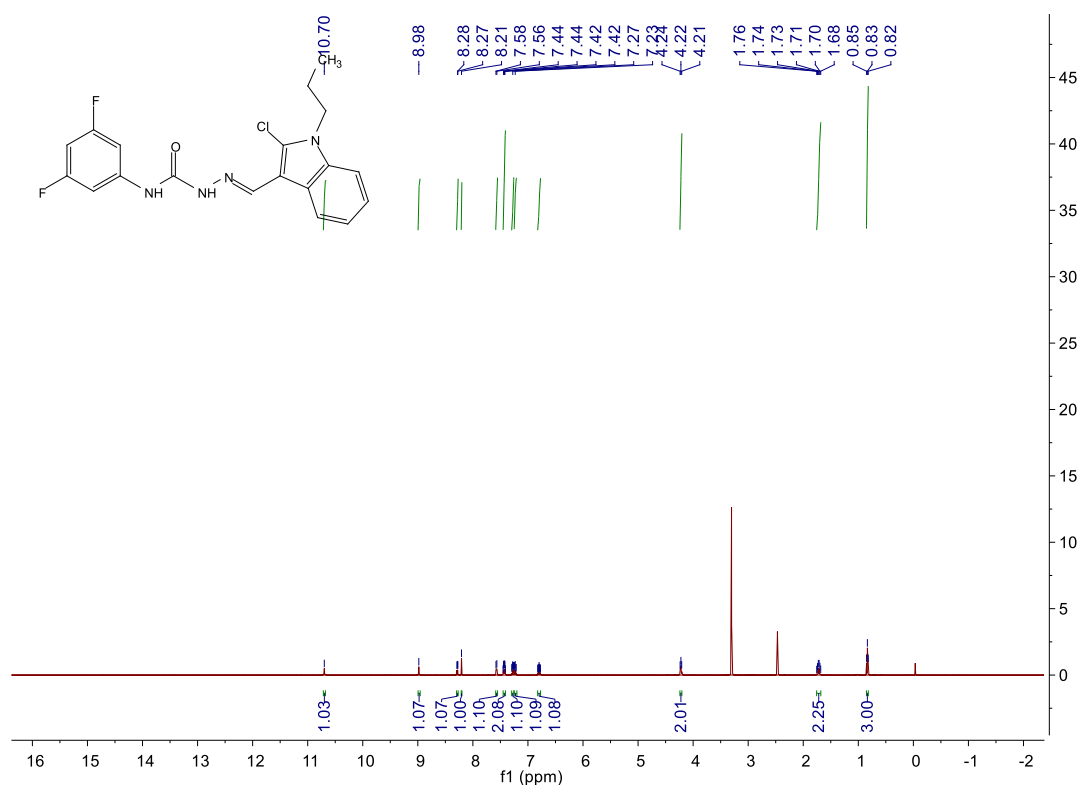


Fig. S13 1H NMR spectrum of target compound 5

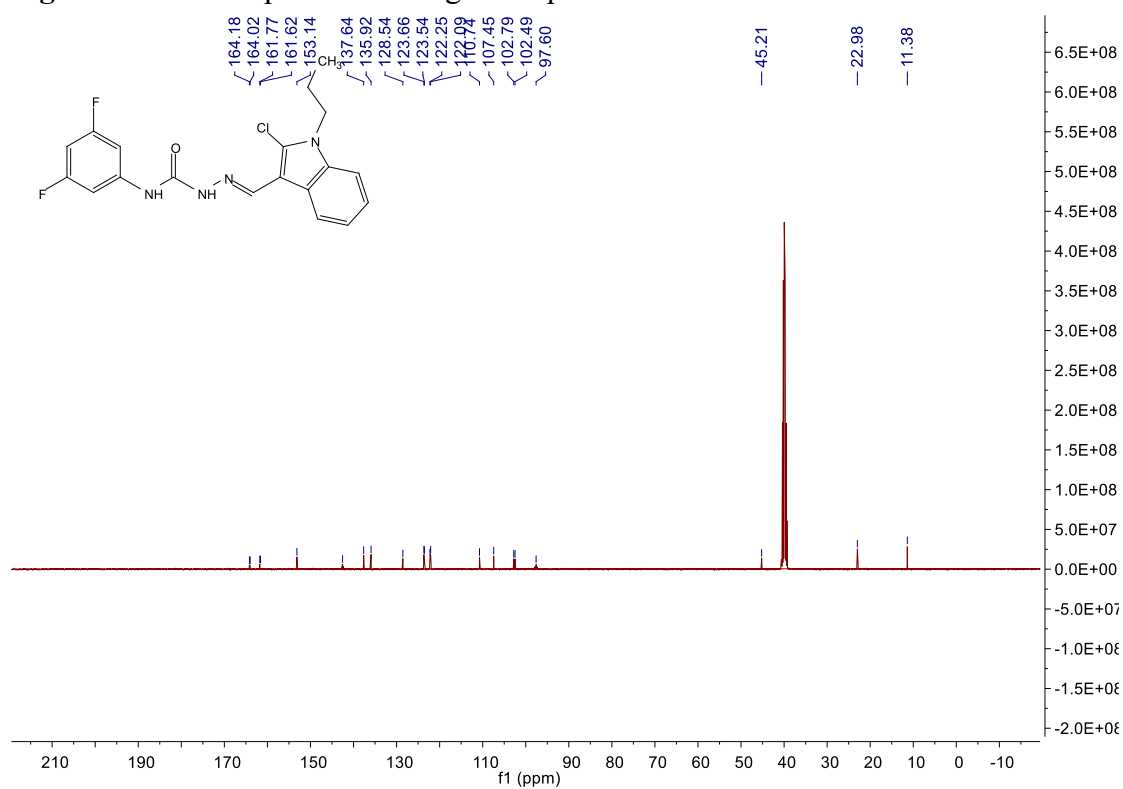


Fig. S14 ^{13}C NMR spectrum of target compound 5

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T: FTMS + p ESI Full ms [100.0000-1000.0000]

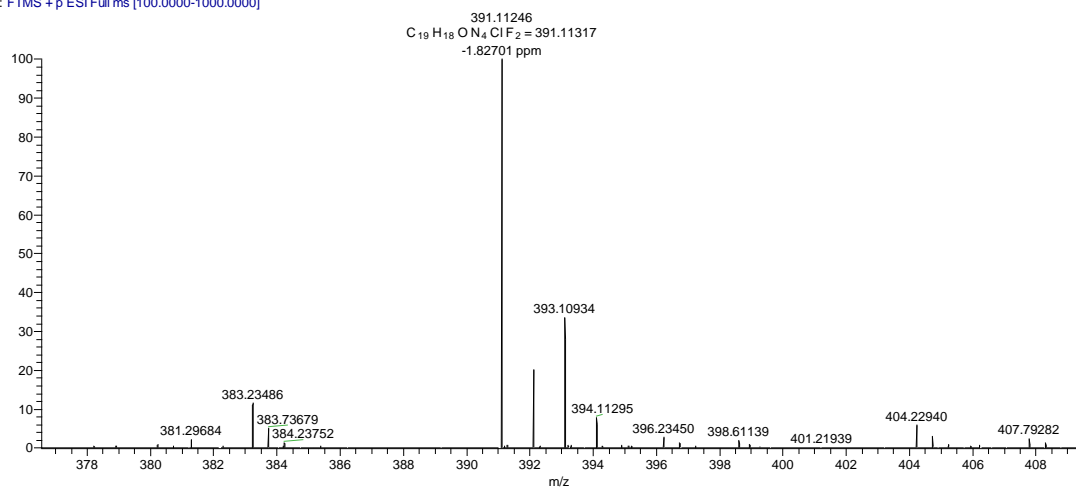


Fig. S15 HRMS spectrum of target compound 5

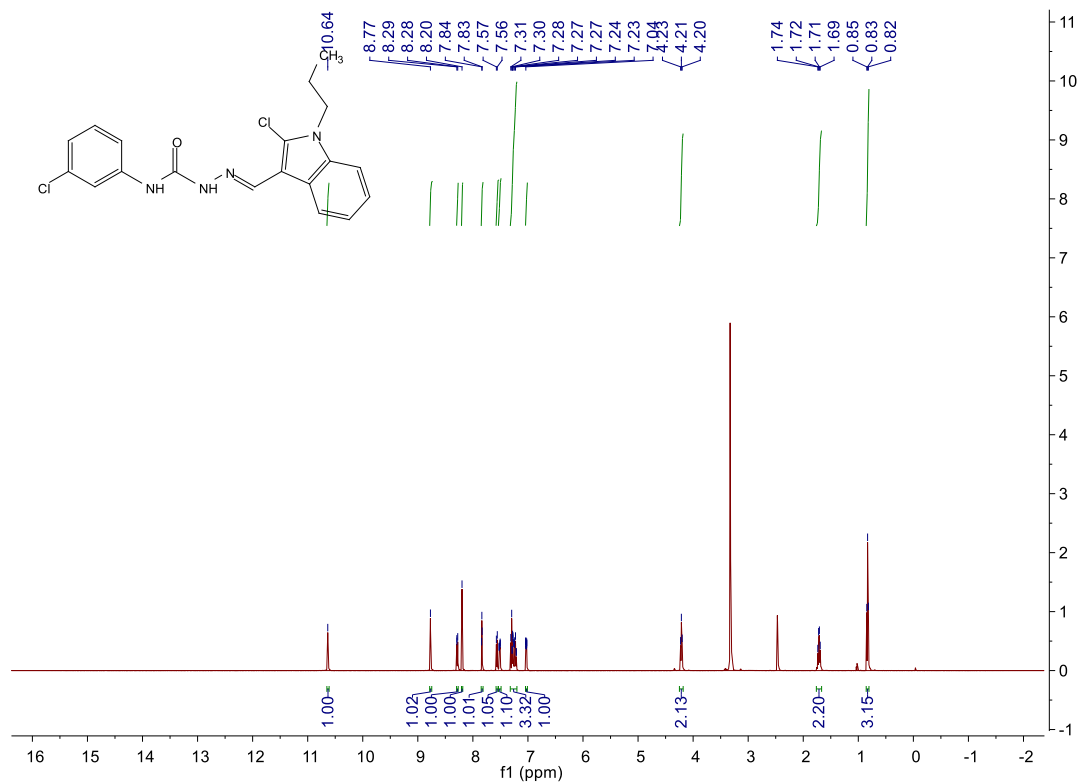


Fig. S16 ¹H NMR spectrum of target compound 6

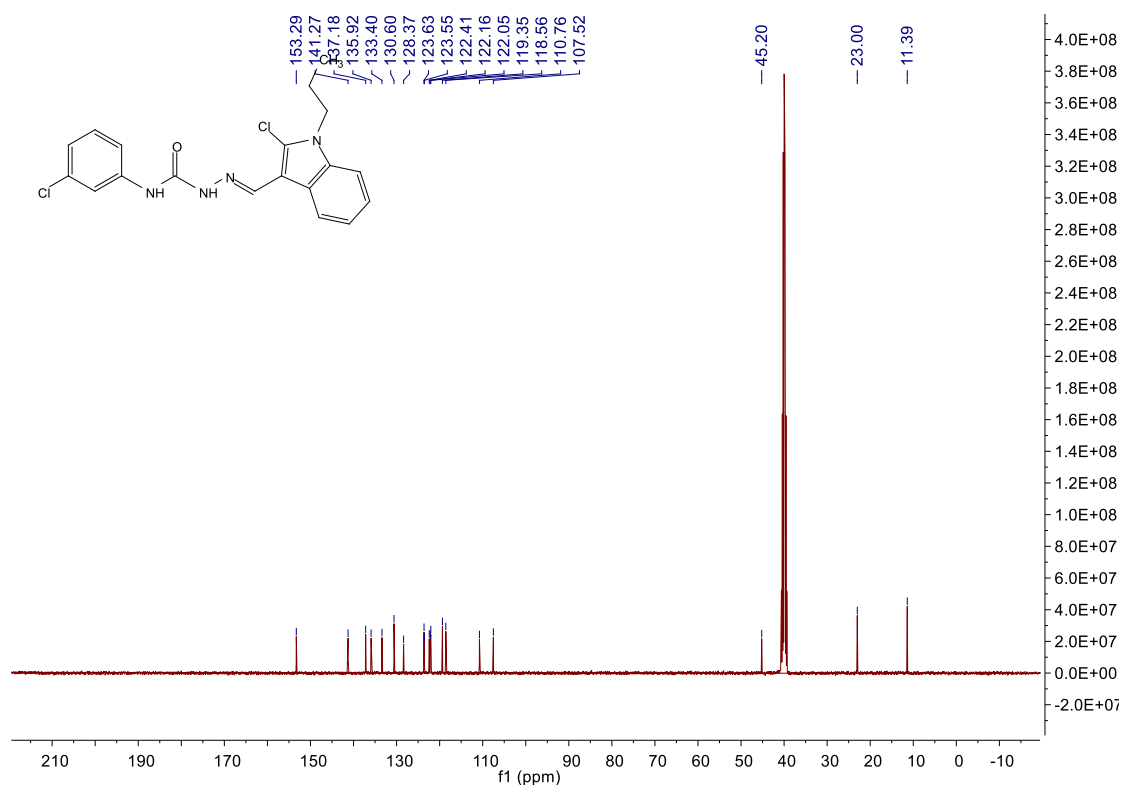


Fig. S17 ^{13}C NMR spectrum of target compound 6

20191224-1-62 #72 RT: 0.70 AV: 1 NL: 2.10E7
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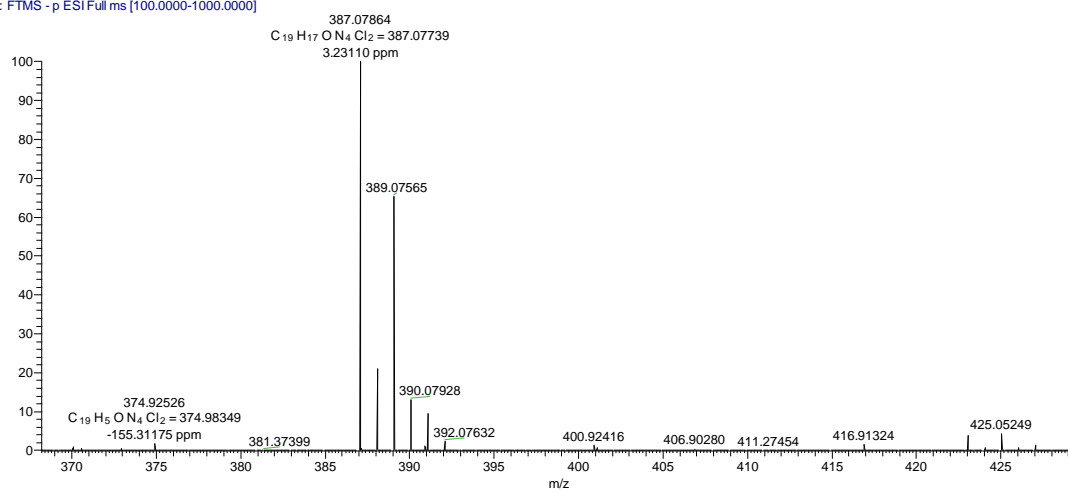


Fig. S18 HRMS spectrum of target compound 6

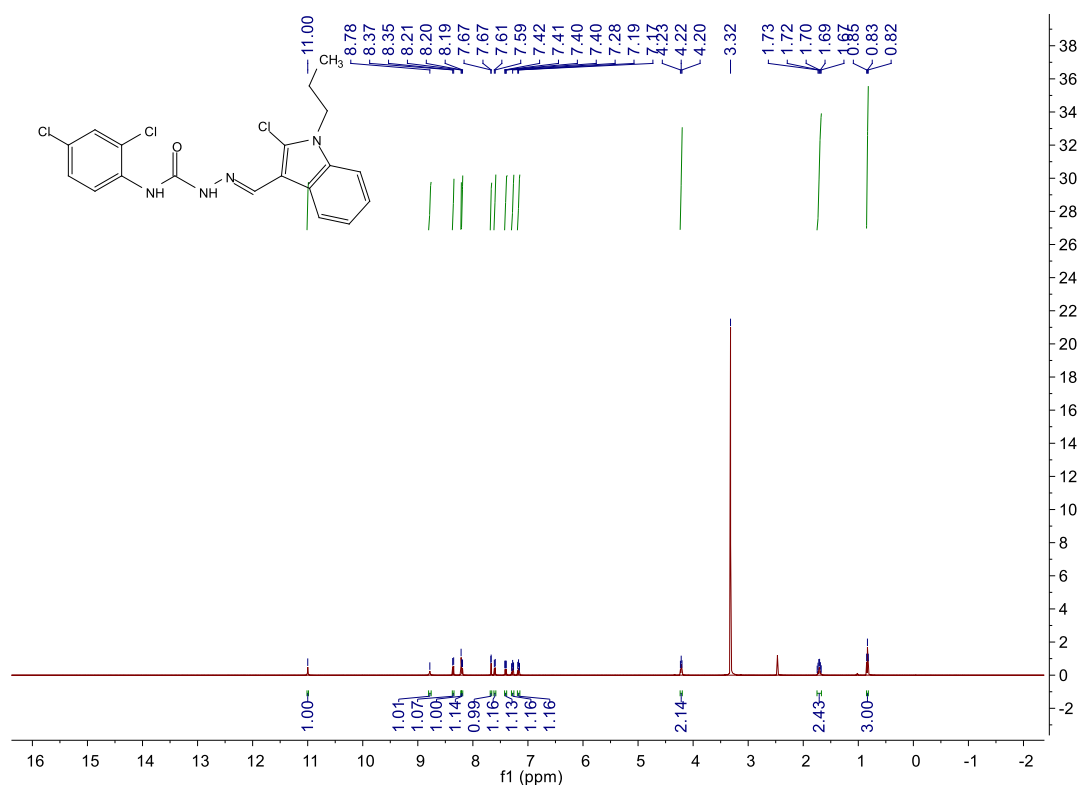


Fig. S19 ^1H NMR spectrum of target compound 7

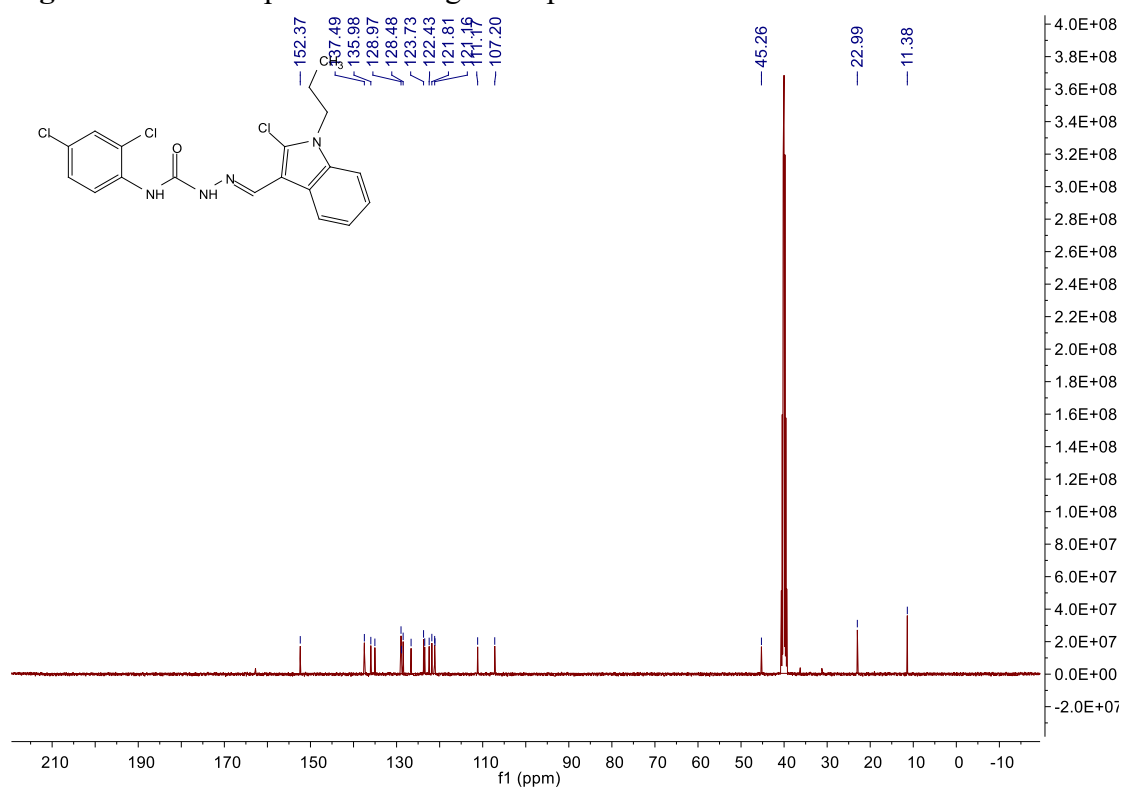


Fig. S20 ^{13}C NMR spectrum of target compound 7

20191224-1-91 #117 RT: 1.14 AV: 1 NL: 2.93E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

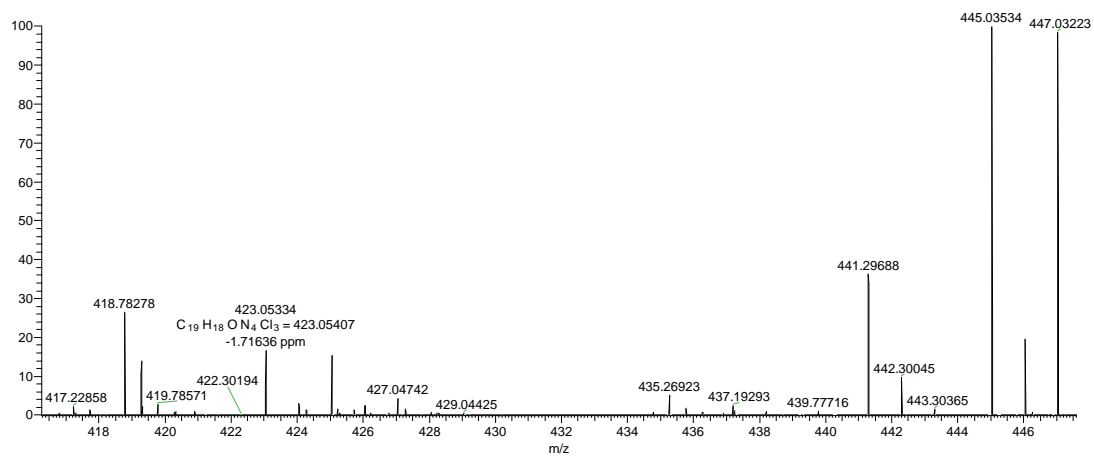


Fig. S21 HRMS spectrum of target compound 7

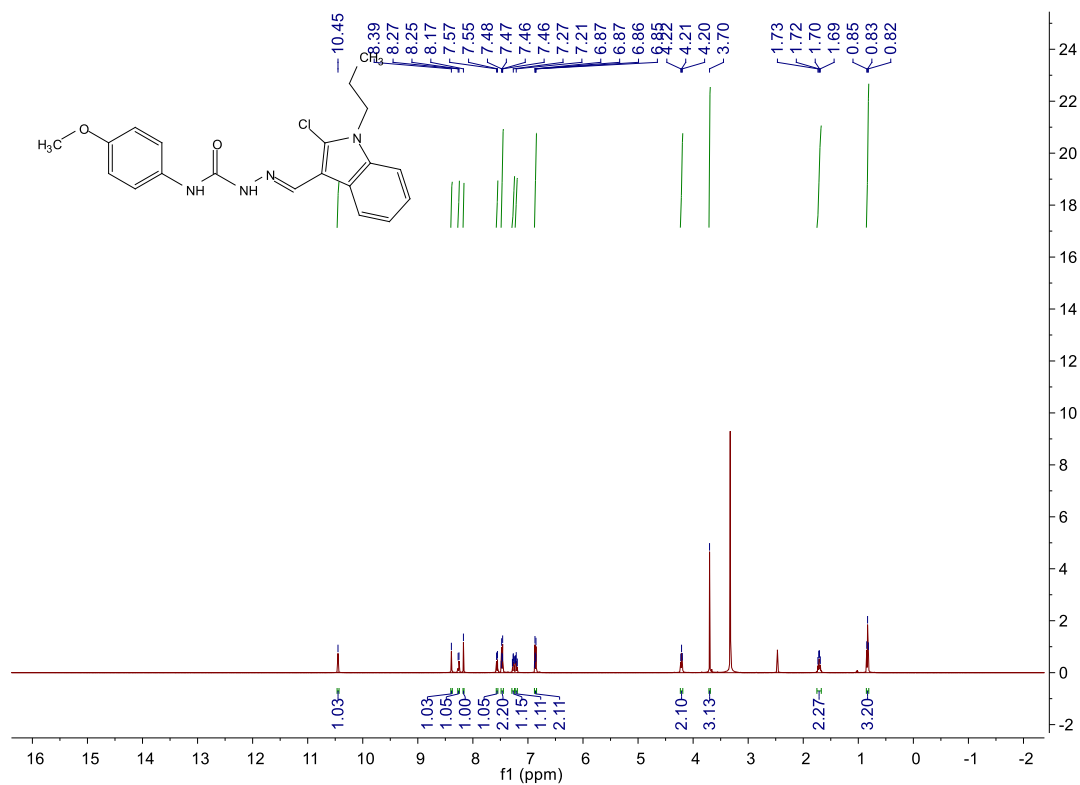


Fig. S22 ¹H NMR spectrum of target compound 8

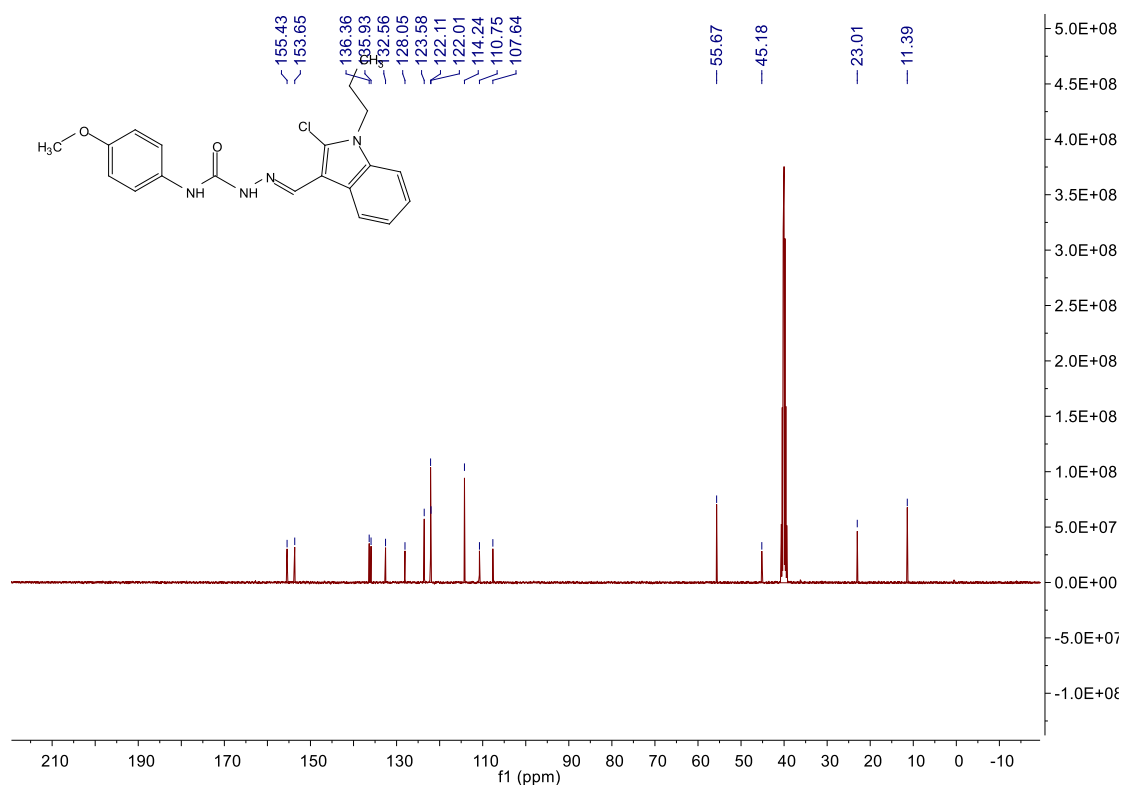


Fig. S23 ¹³C NMR spectrum of target compound **8**

20191224-1-64 #49 RT: 0.47 AV: 1 NL: 6.17E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

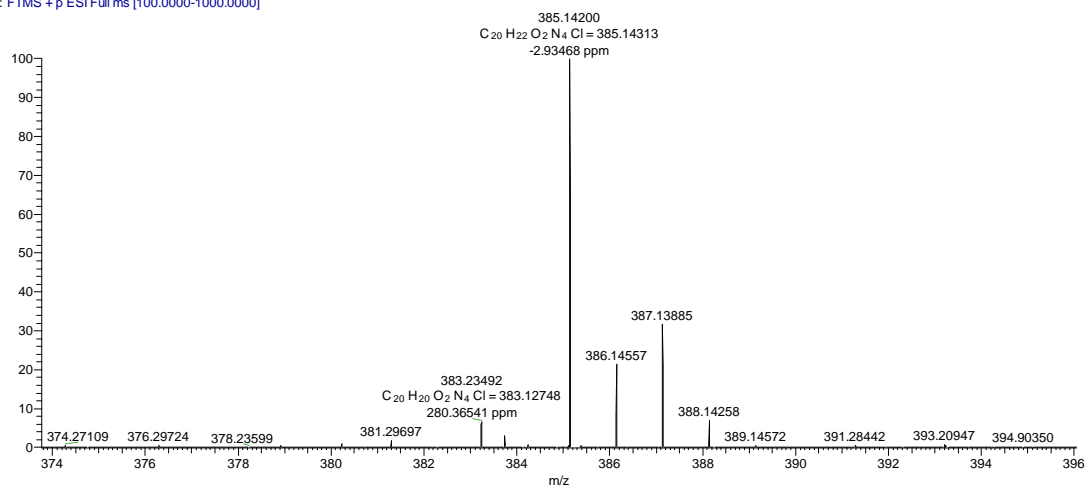


Fig. S24 HRMS spectrum of target compound **8**

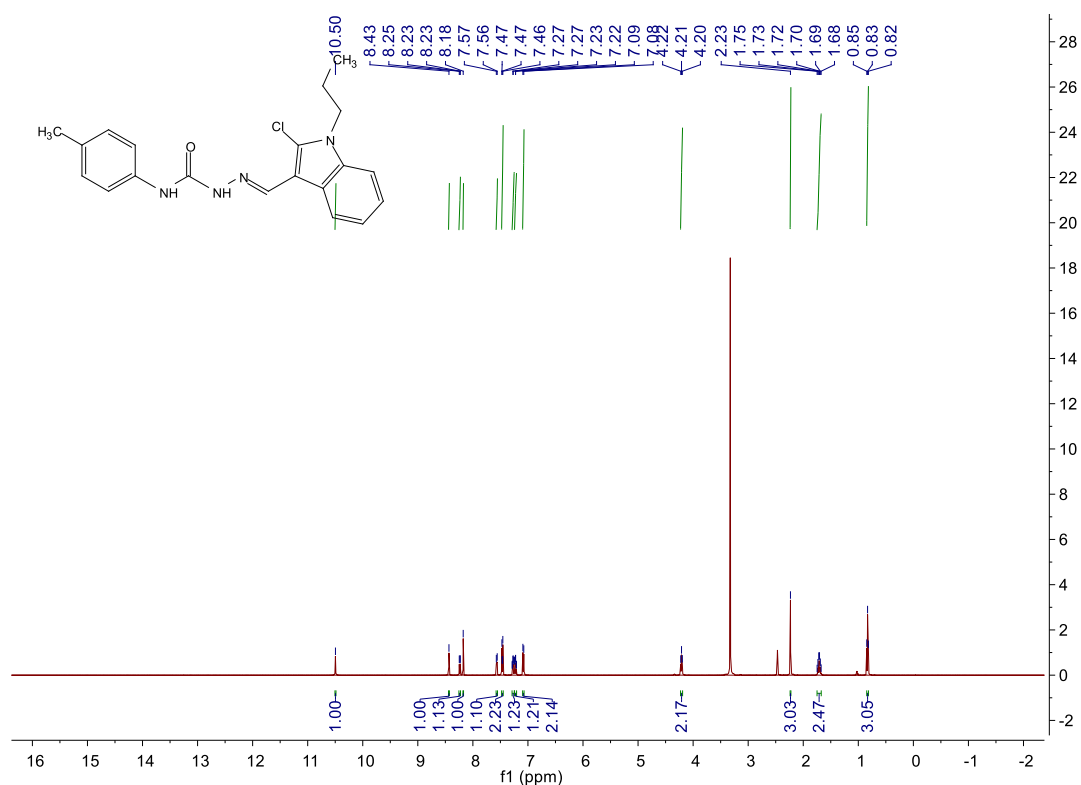


Fig. S25 ¹H NMR spectrum of target compound **9**

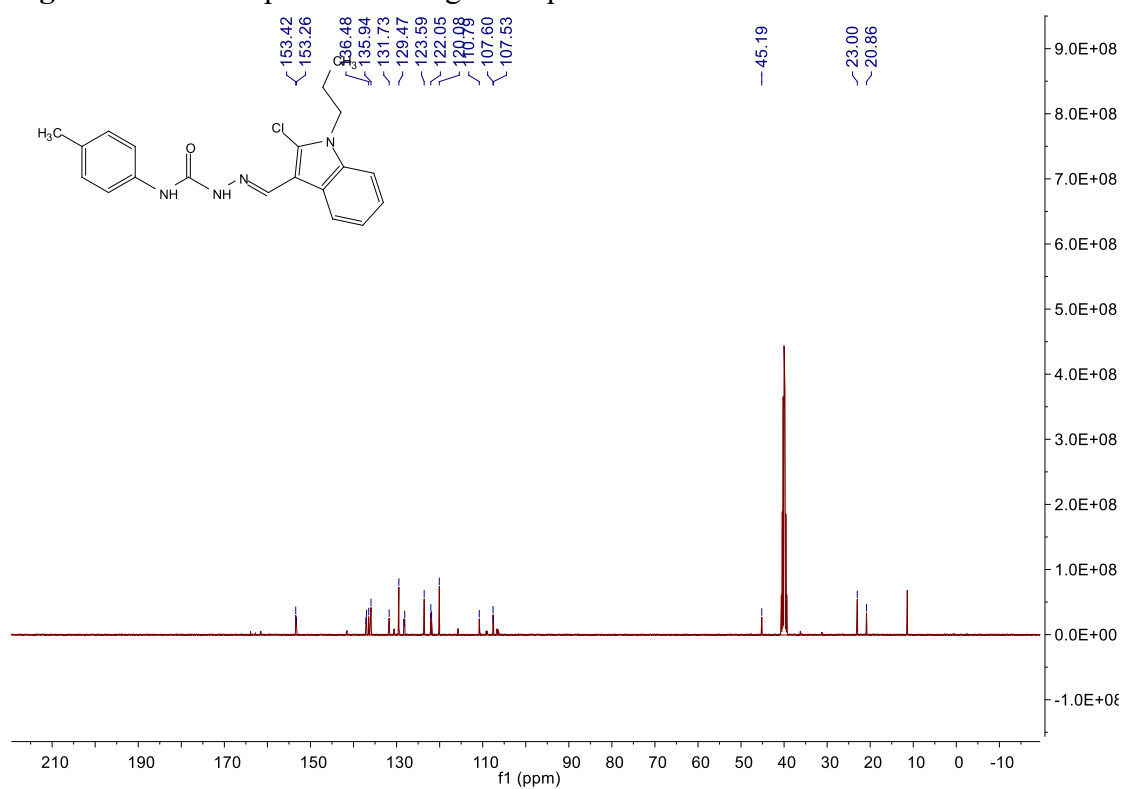


Fig. S26 ¹³C NMR spectrum of target compound **9**

20191224-1-71 #68 RT: 0.66 AV: 1 NL: 6.14E6
T: FTMS - p ESI Full ms [100.0000-1000.0000]

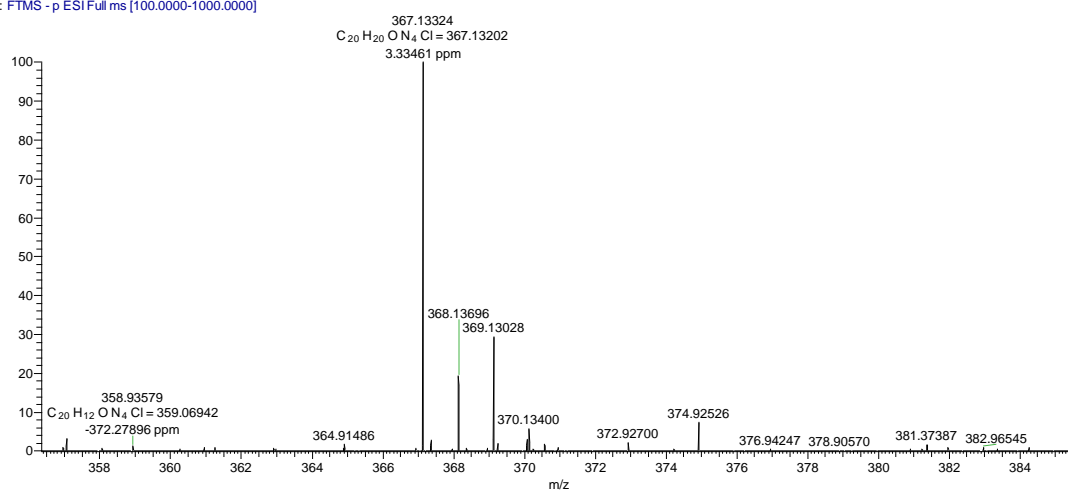


Fig. S27 HRMS spectrum of target compound 9

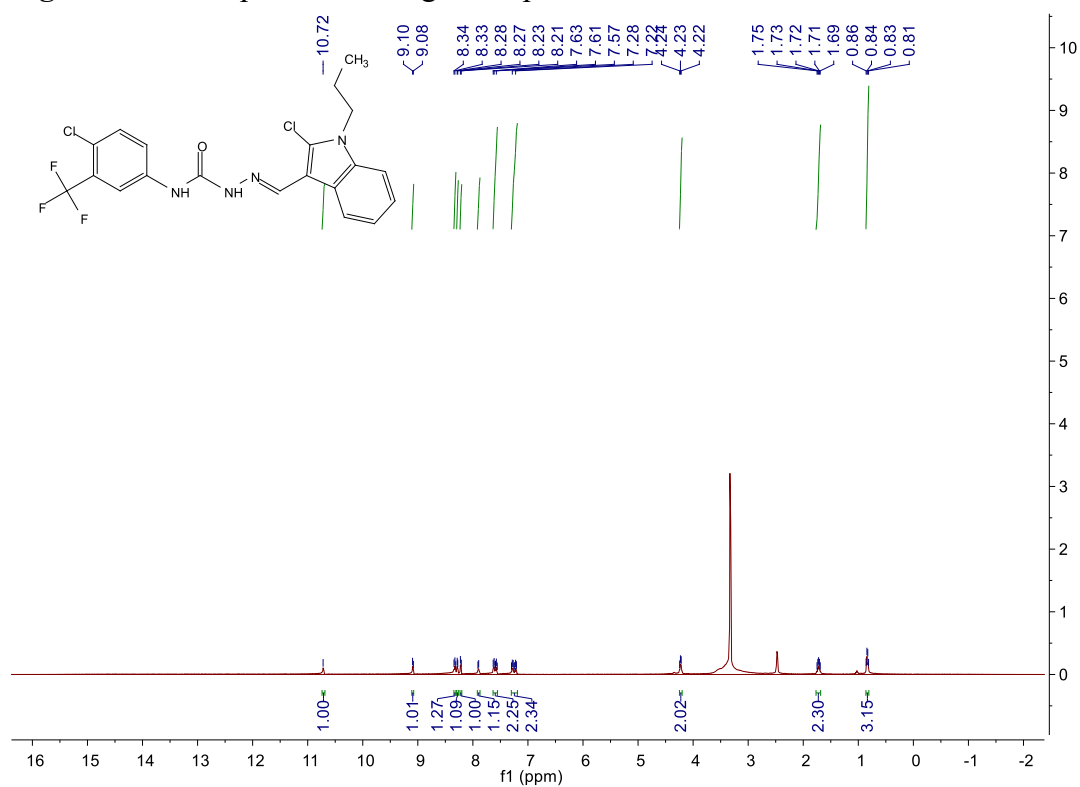


Fig. S28 ¹H NMR spectrum of target compound 10

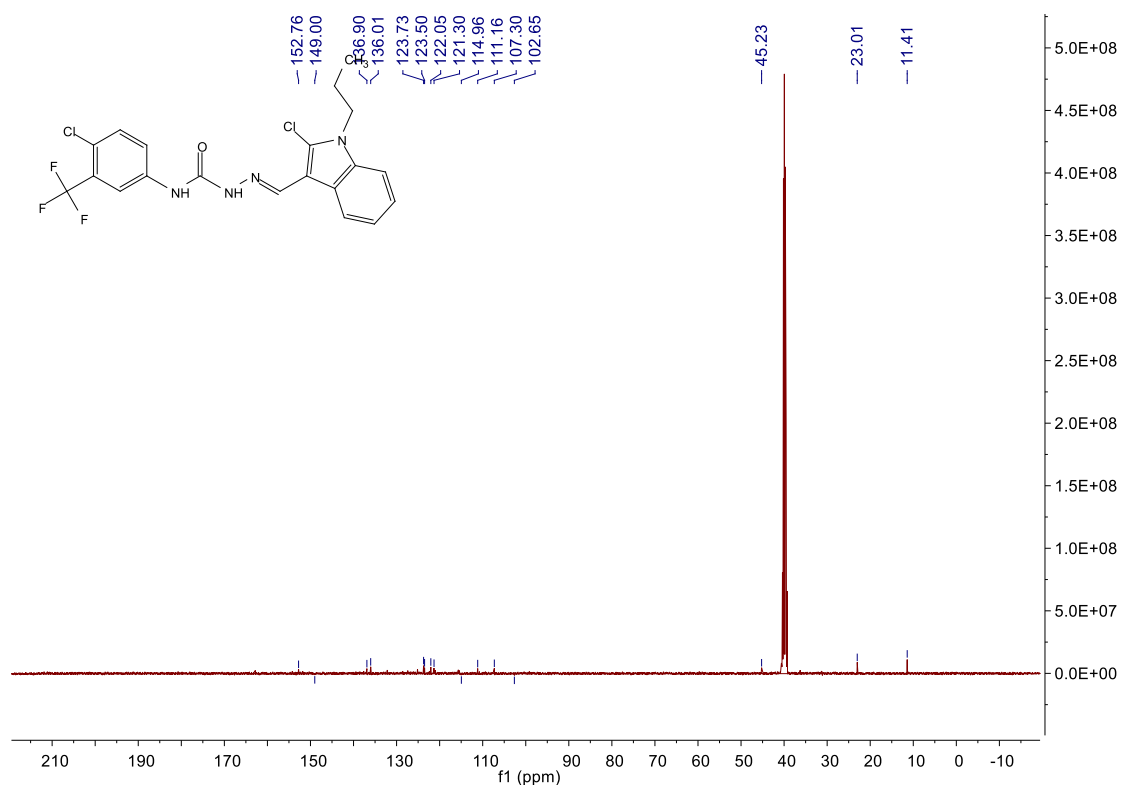


Fig. S29 ^{13}C NMR spectrum of target compound **10**

20191224-1-68 #63 RT: 0.61 AV: 1 NL: 8.47E6
T: FTMS + p ESI Full ms [100.0000-1000.0000]

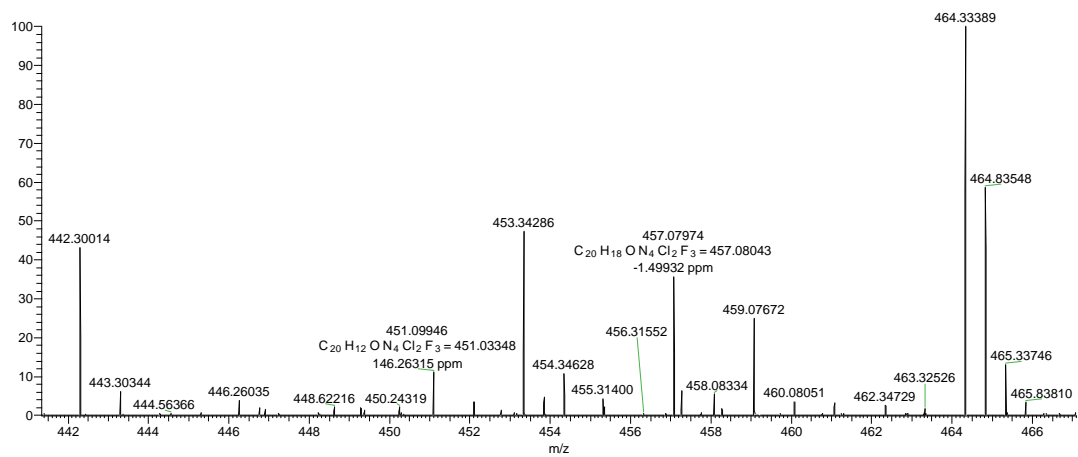


Fig. S30 HRMS spectrum of target compound **10**

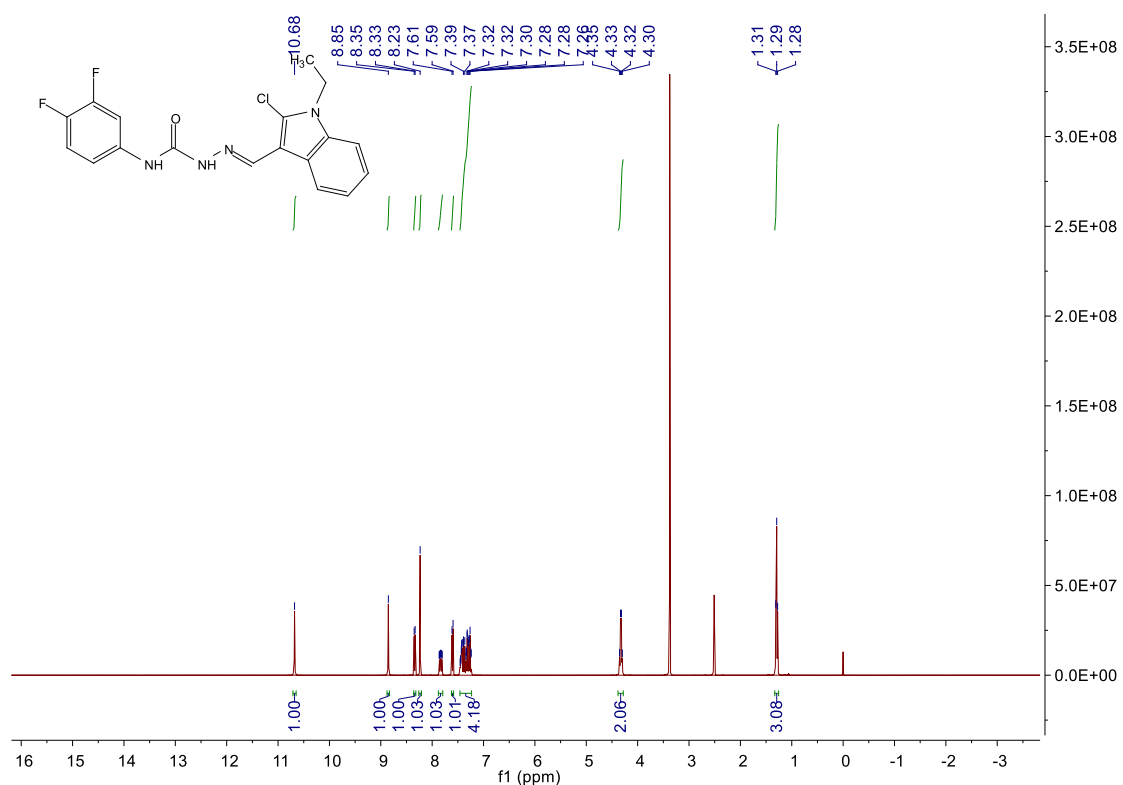


Fig. S31 ^1H NMR spectrum of target compound 11

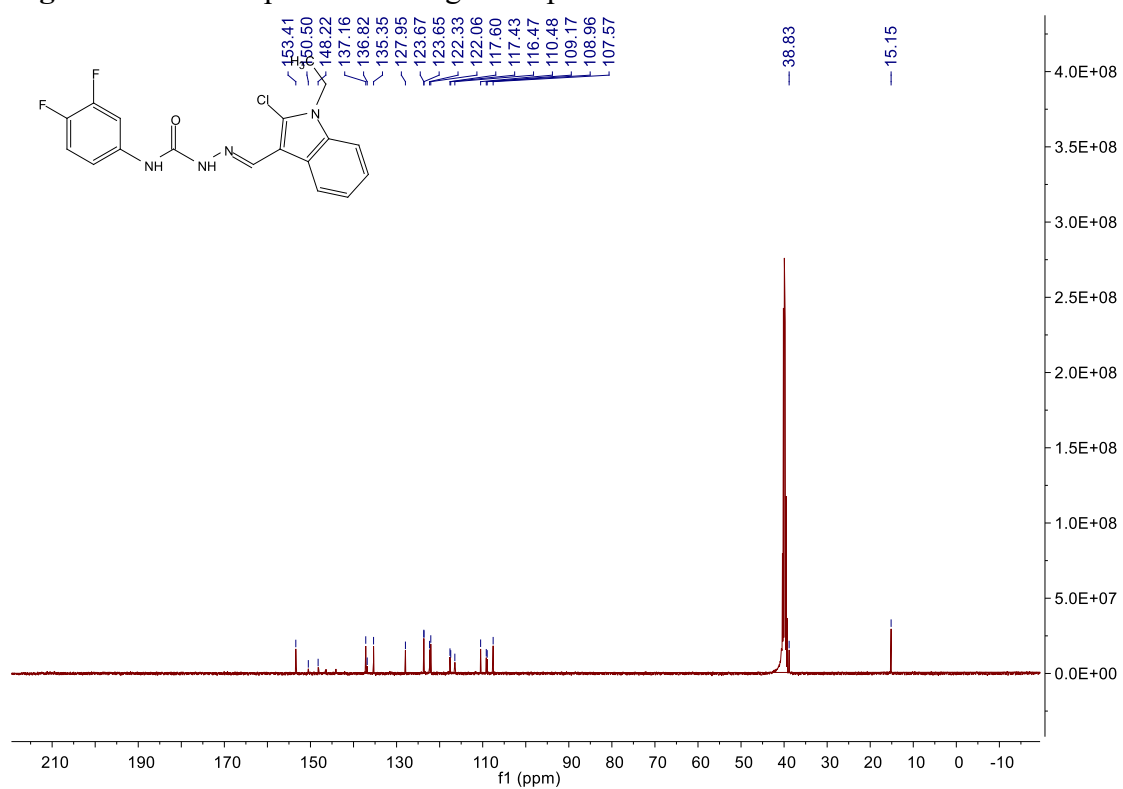


Fig. S32 ^{13}C NMR spectrum of target compound 11

20191224-1-93 #53 RT: 0.51 AV: 1 NL: 1.32E8
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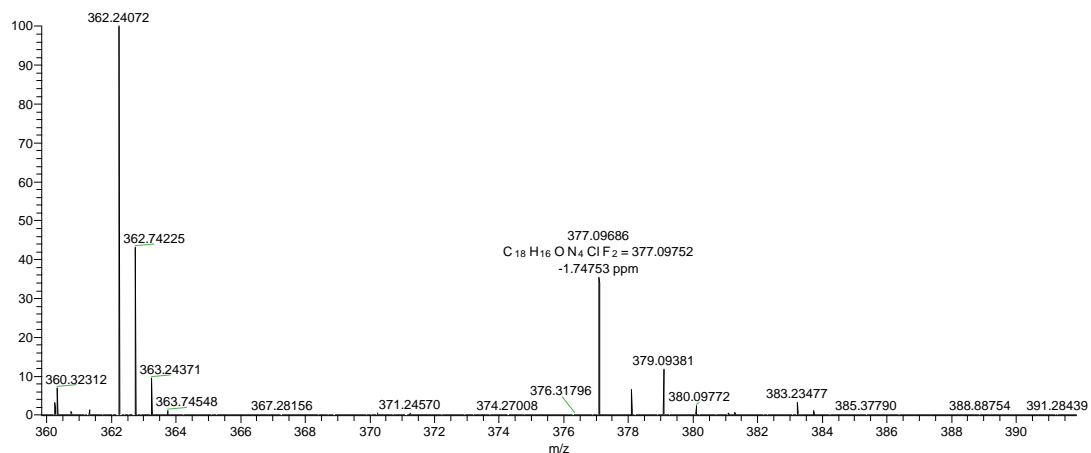


Fig. S33 HRMS spectrum of target compound 11

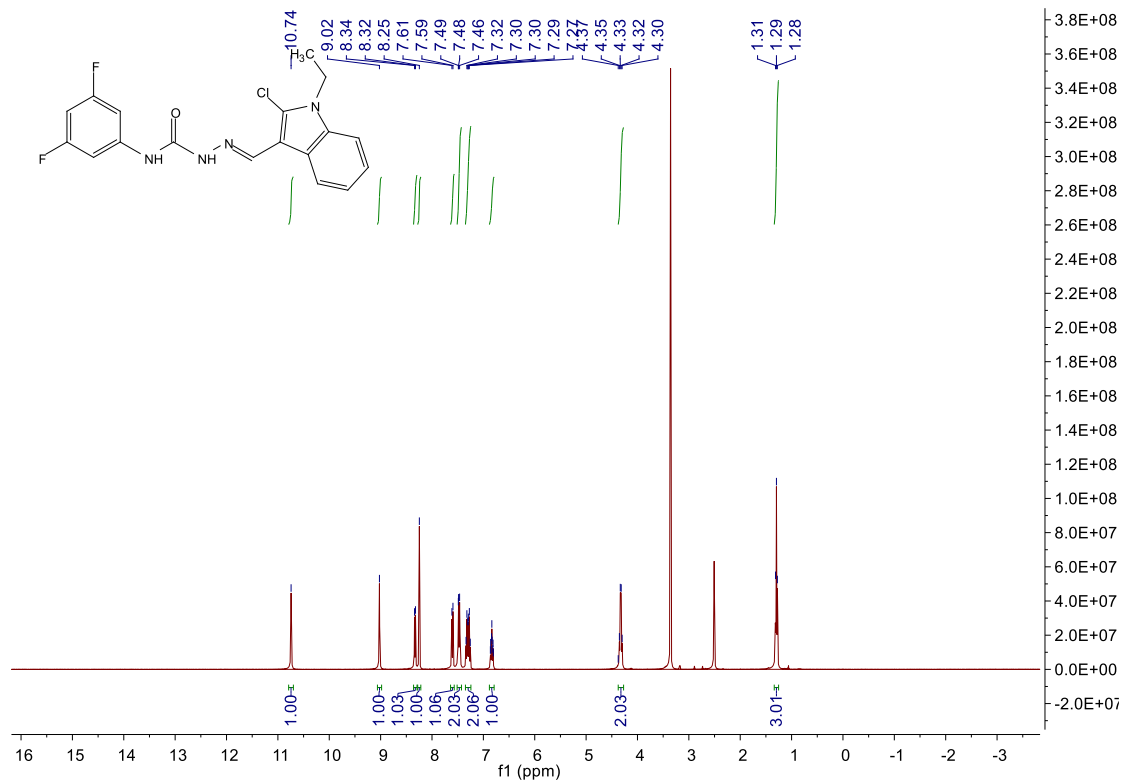


Fig. S34 ¹H NMR spectrum of target compound 12

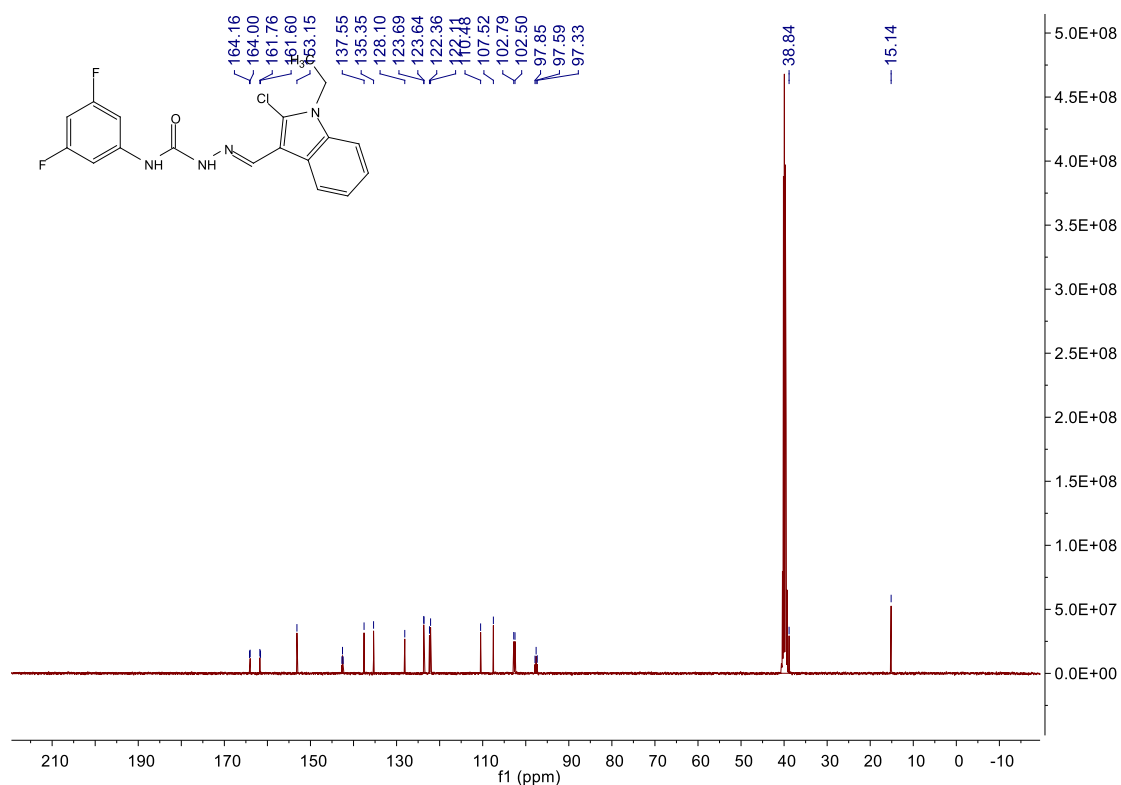


Fig. S35 ^{13}C NMR spectrum of target compound 12

20191224-1-74 #59 RT: 0.57 AV: 1 NL: 3.28E7
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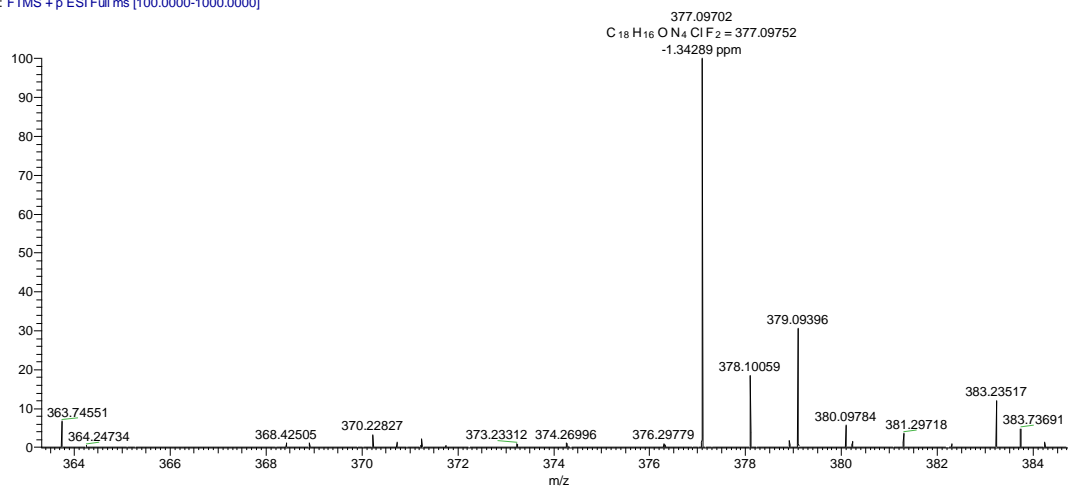


Fig. S36 HRMS spectrum of target compound 12

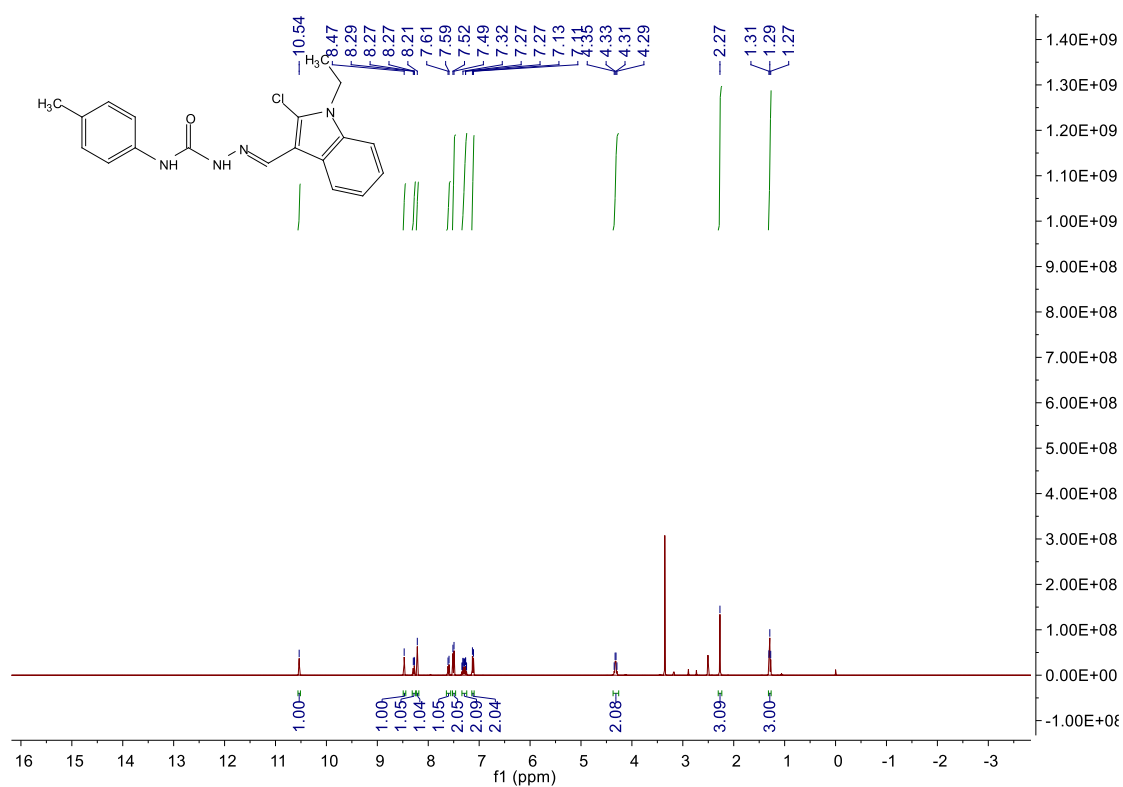


Fig. S37 ¹H NMR spectrum of target compound **13**

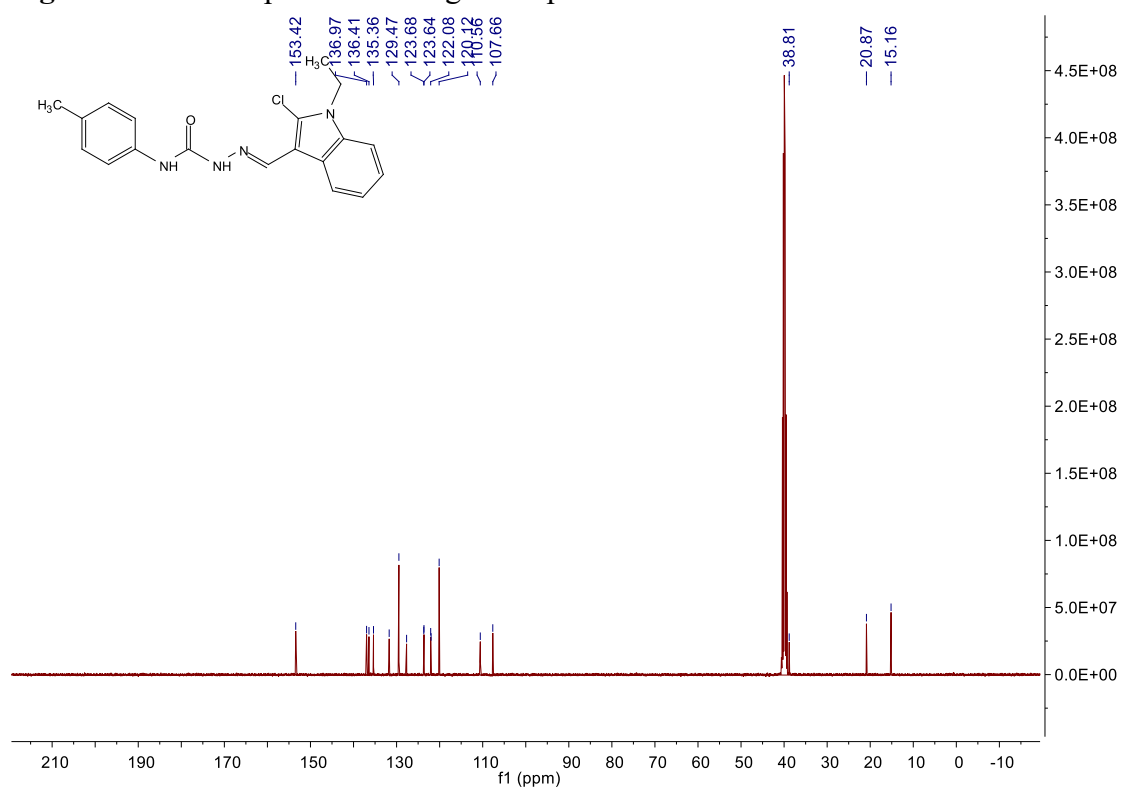


Fig. S38 ¹³C NMR spectrum of target compound **13**

20191224-1-63 #63 RT: 0.61 AV: 1 NL: 1.16E8
T: FTMS + p ESI Full ms [100.0000-1000.0000]

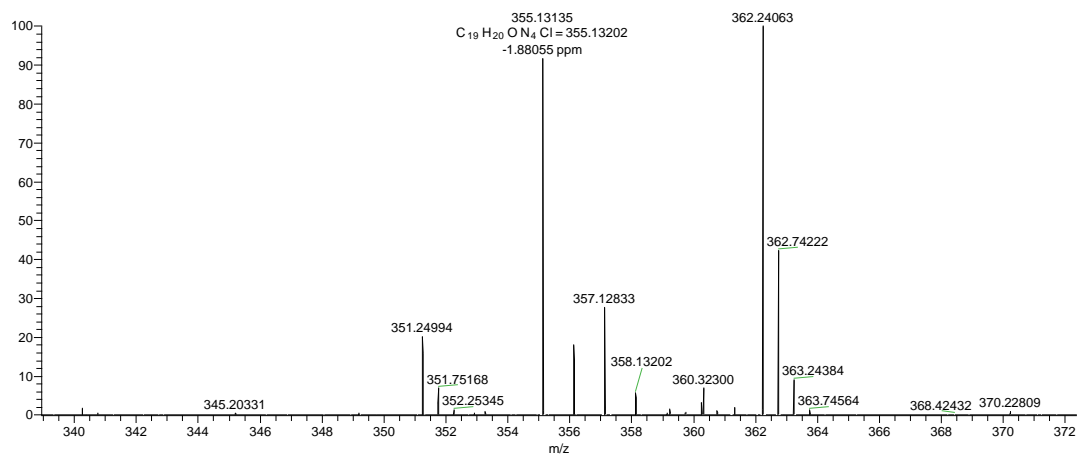


Fig. S39 HRMS spectrum of target compound 13

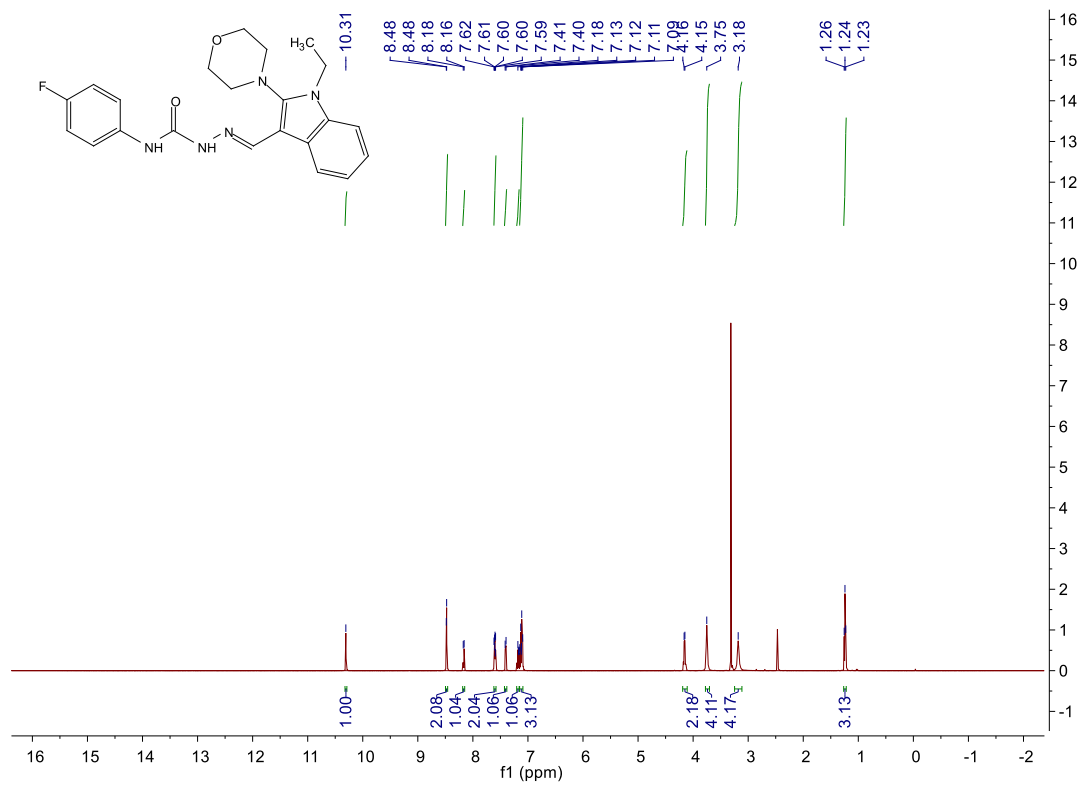


Fig. S40 ¹H NMR spectrum of target compound 14

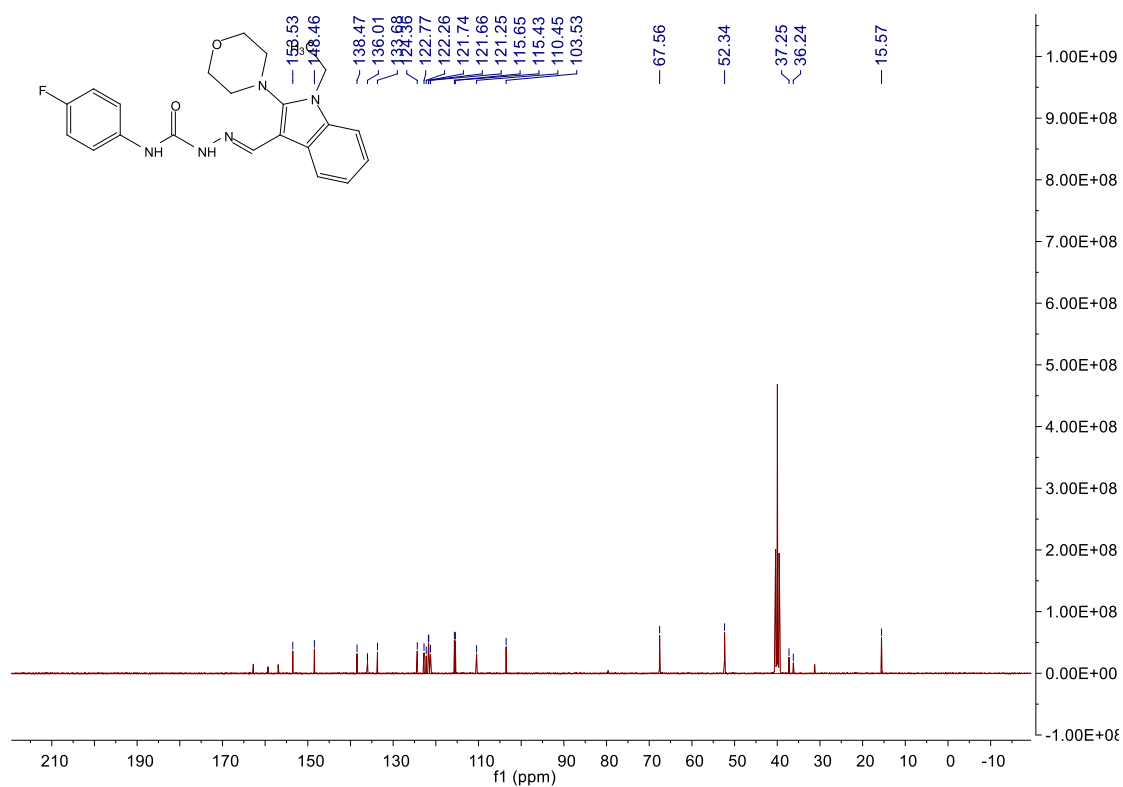


Fig. S41 ¹³C NMR spectrum of target compound 14

20191224-1-84 #43 RT: 0.41 AV: 1 NL: 3.06E7
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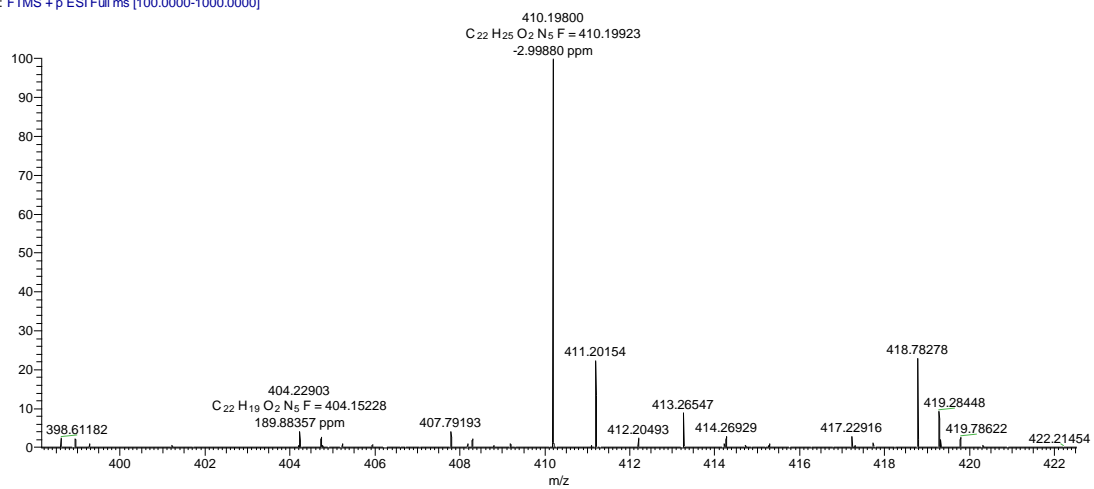


Fig. S42 HRMS spectrum of target compound 14

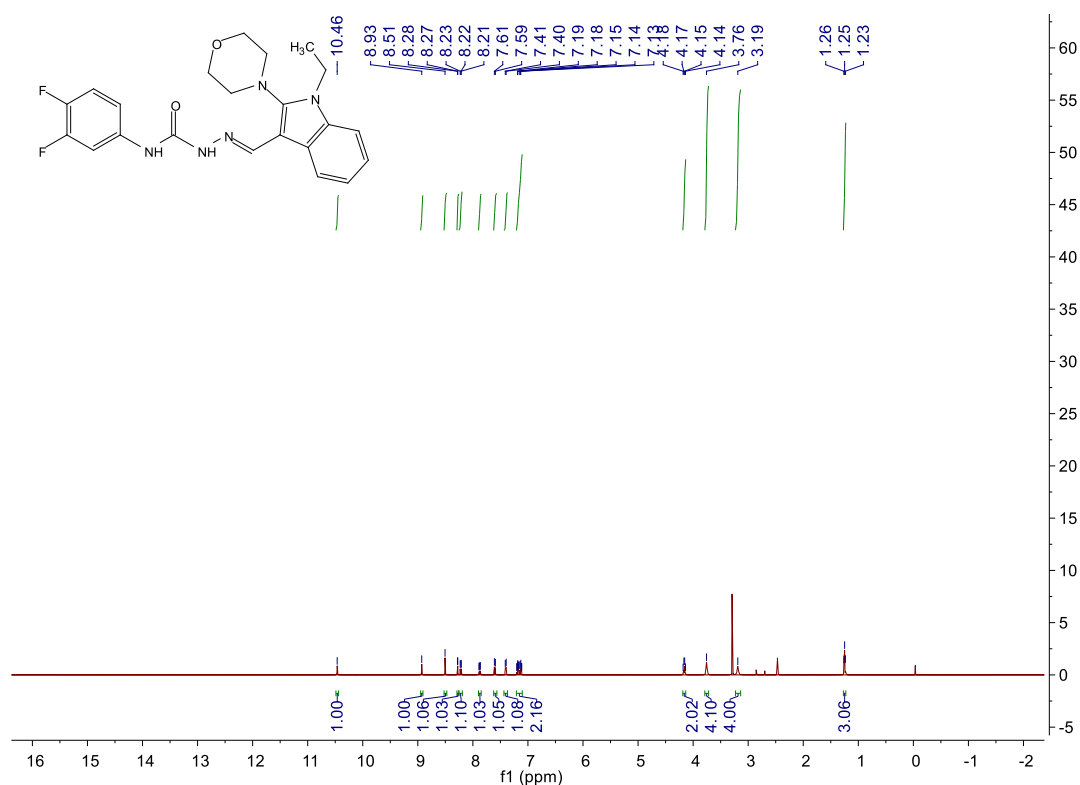


Fig. S43 ¹H NMR spectrum of target compound **15**

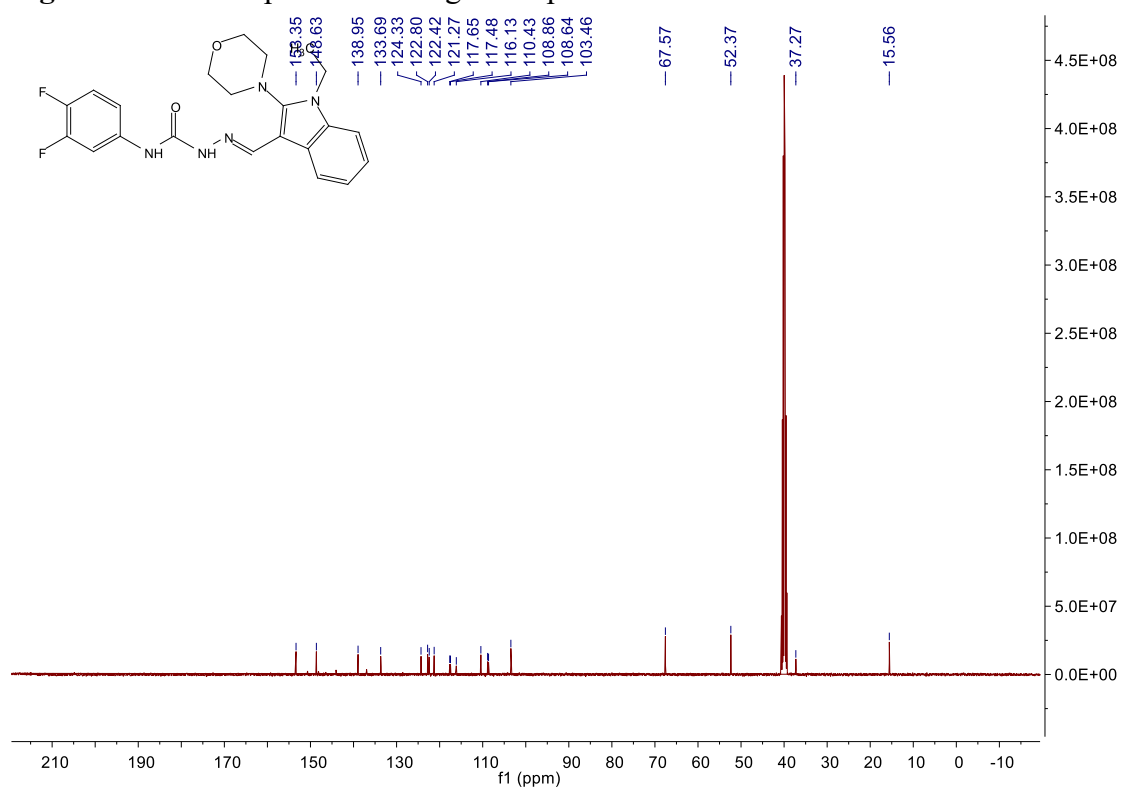


Fig. S44 ¹³C NMR spectrum of target compound **15**

20191224-1-78 #57 RT: 0.55 AV: 1 NL: 1.57E7
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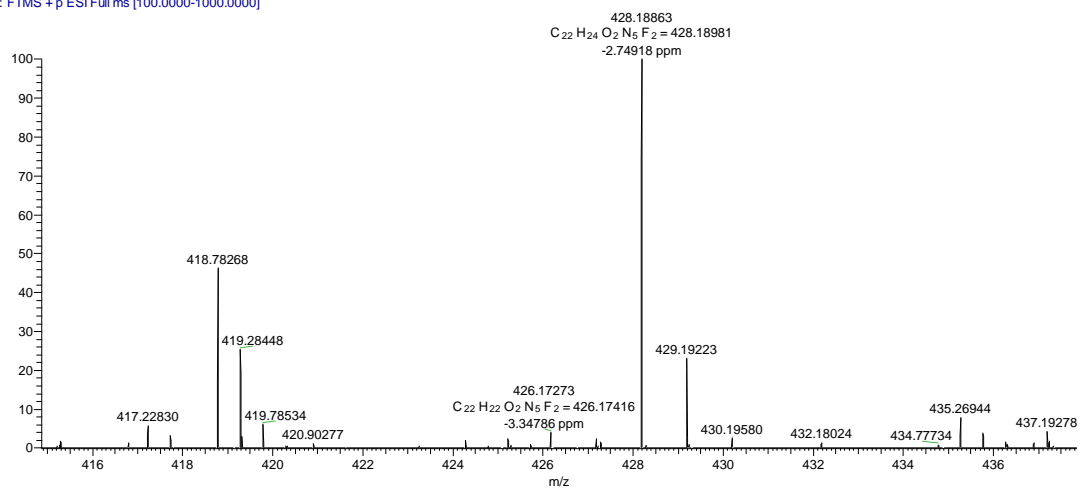


Fig. S45 HRMS spectrum of target compound 15

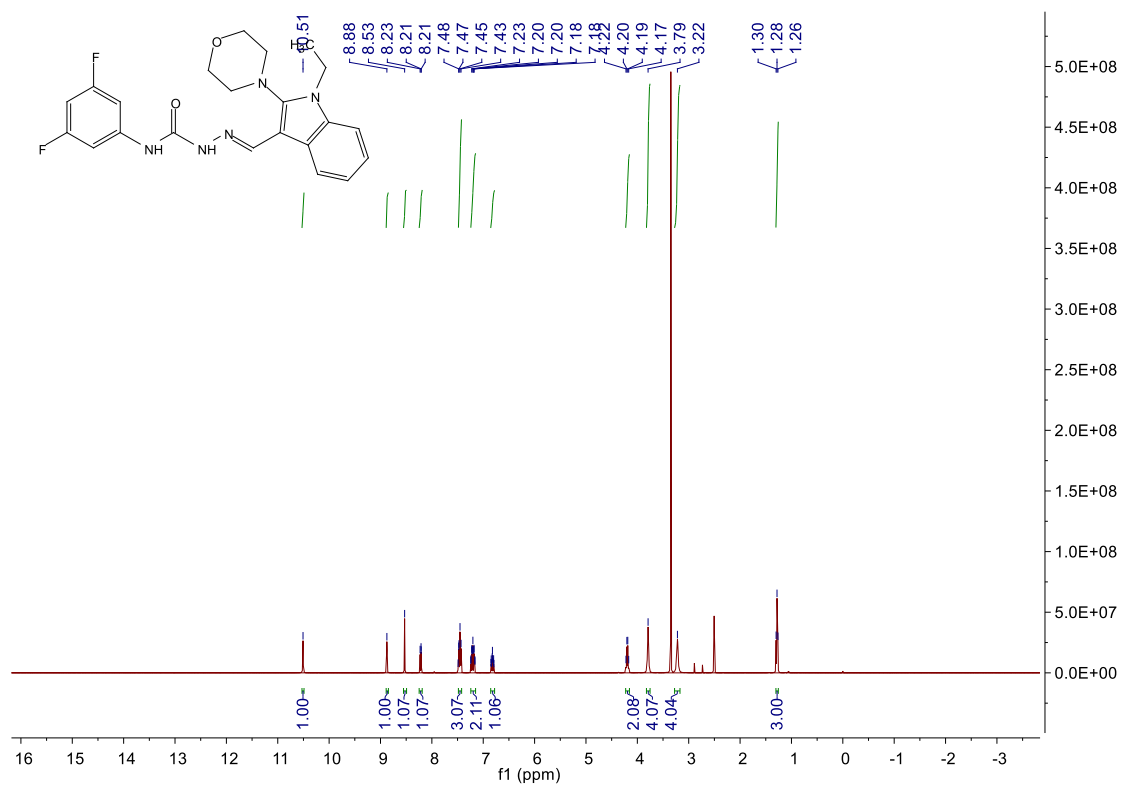


Fig. S46 ¹H NMR spectrum of target compound 16

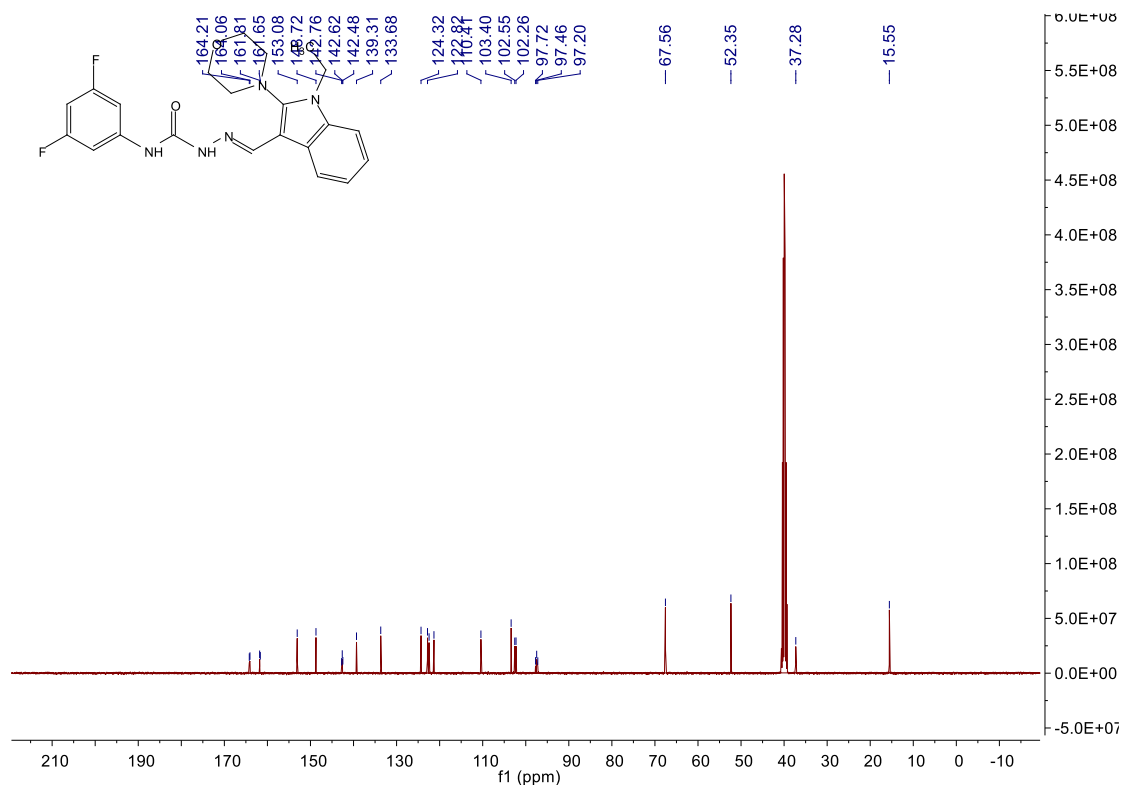


Fig. S47 ^{13}C NMR spectrum of target compound **16**

20191224-1-70 #41 RT: 0.39 AV: 1 NL: 3.98E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

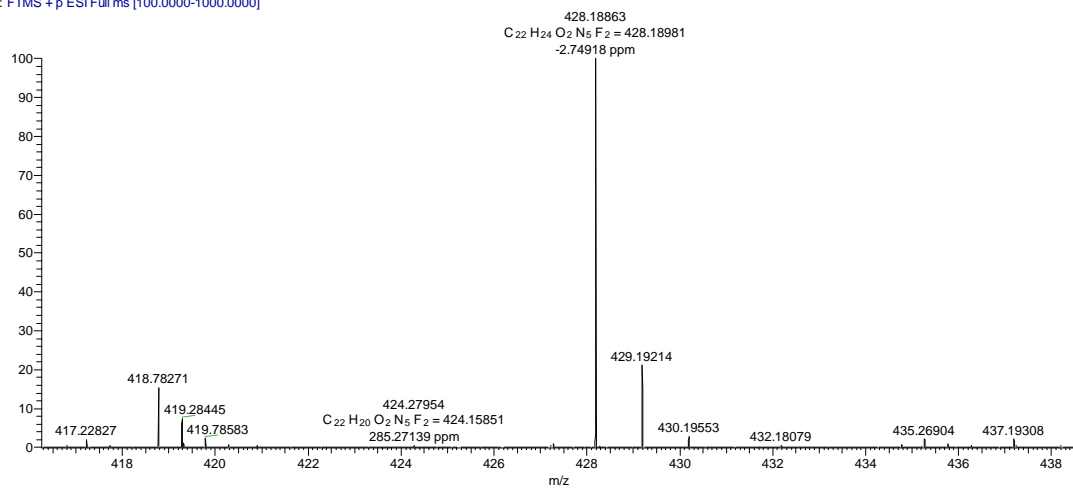


Fig. S48 HRMS spectrum of target compound **16**

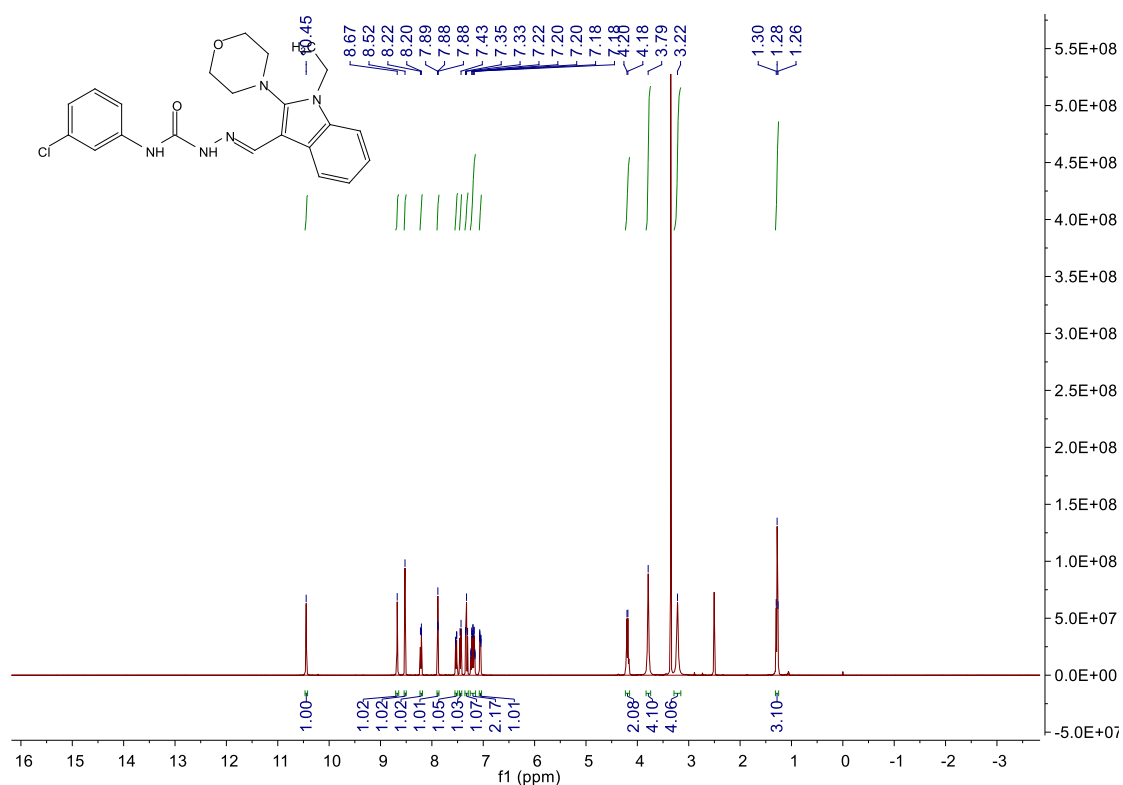


Fig. S49 ^1H NMR spectrum of target compound **17**

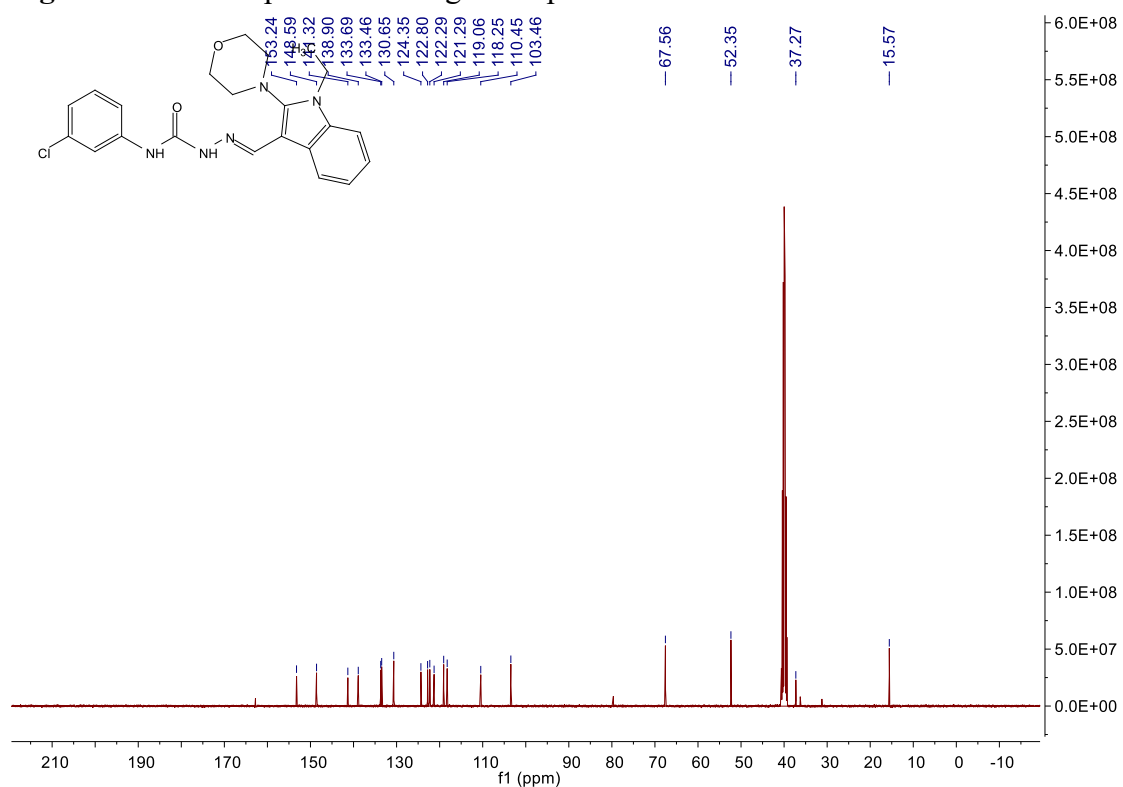


Fig. S50 ^{13}C NMR spectrum of target compound **17**

20191224-1-89 #63 RT: 0.61 AV: 1 NL: 2.11E7
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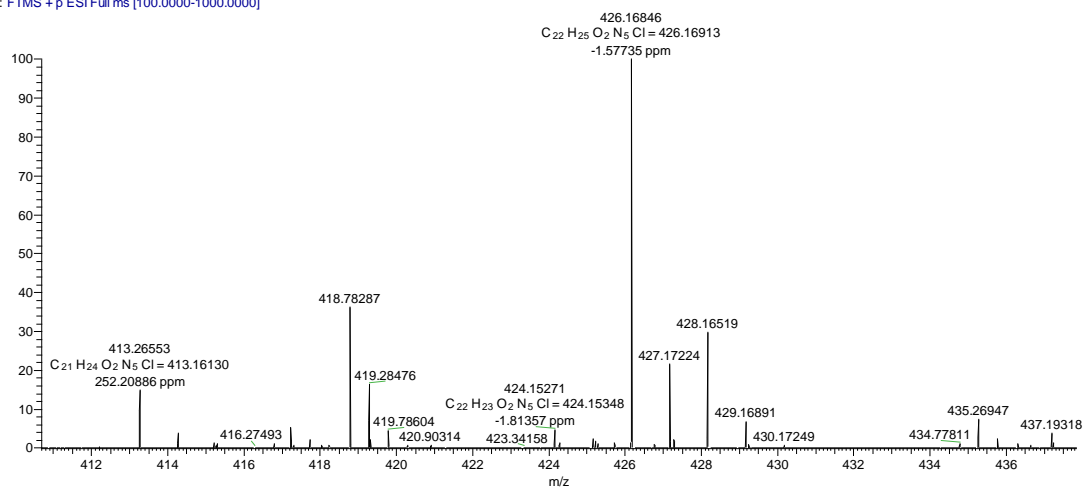


Fig. S51 HRMS spectrum of target compound 17

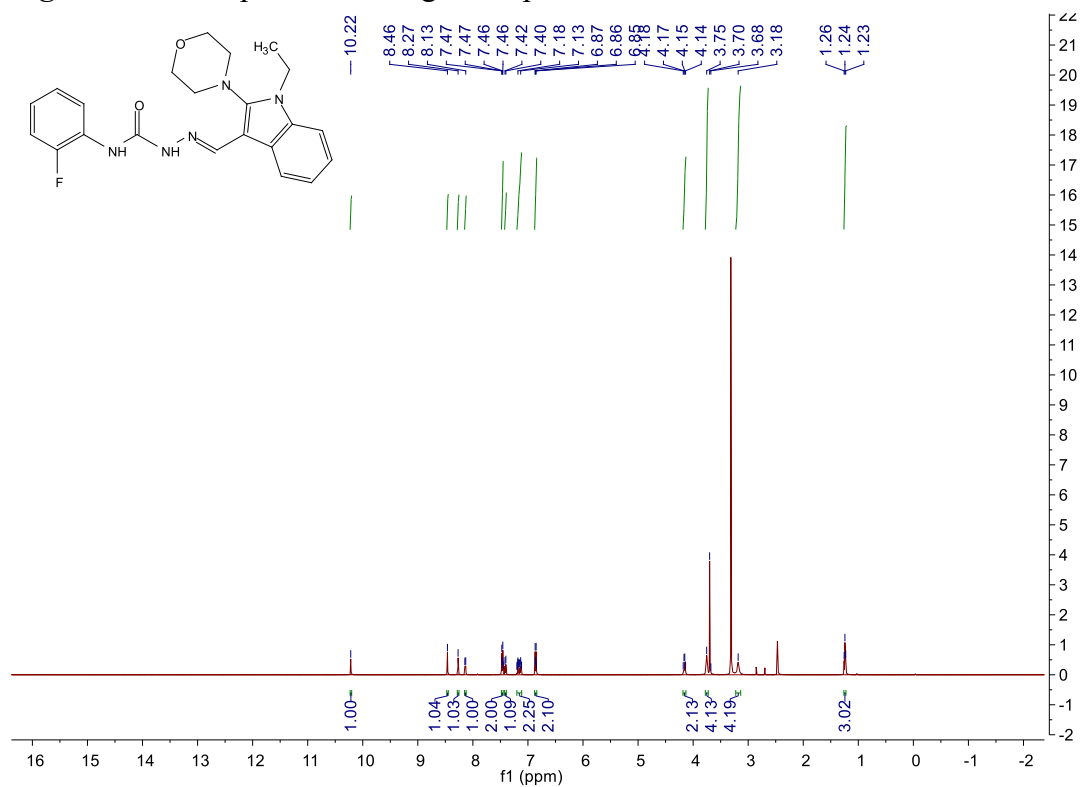
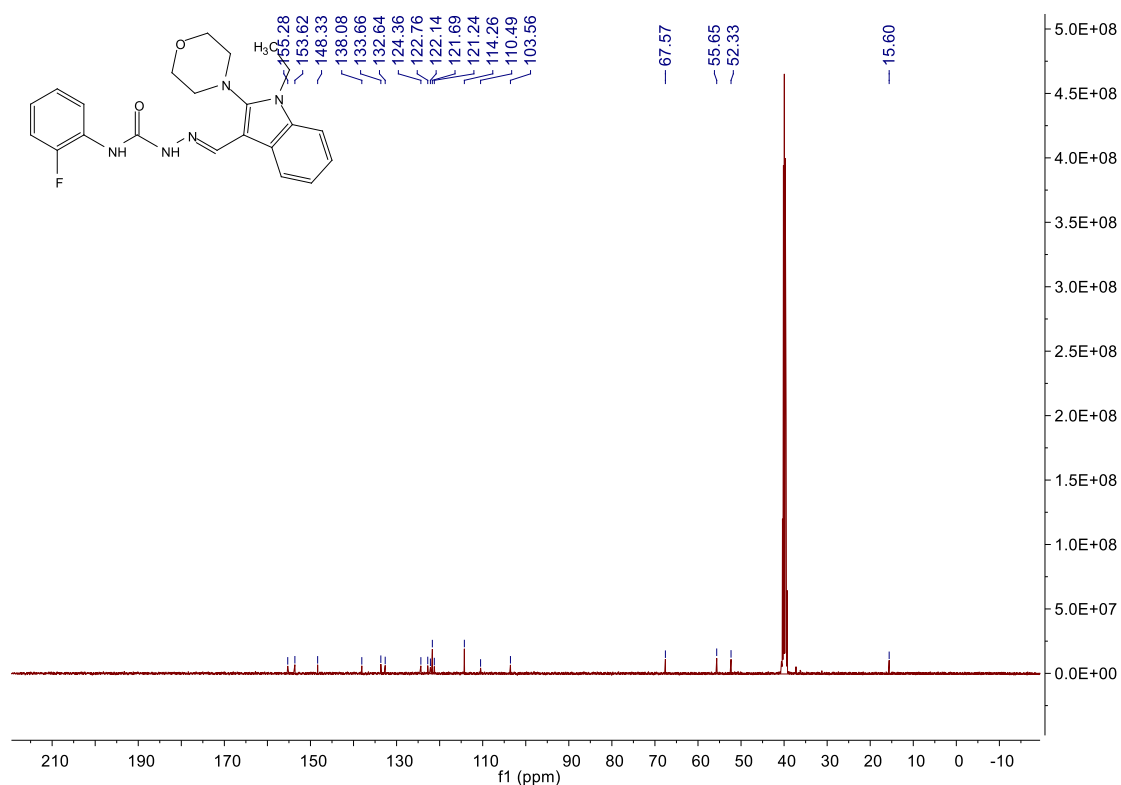
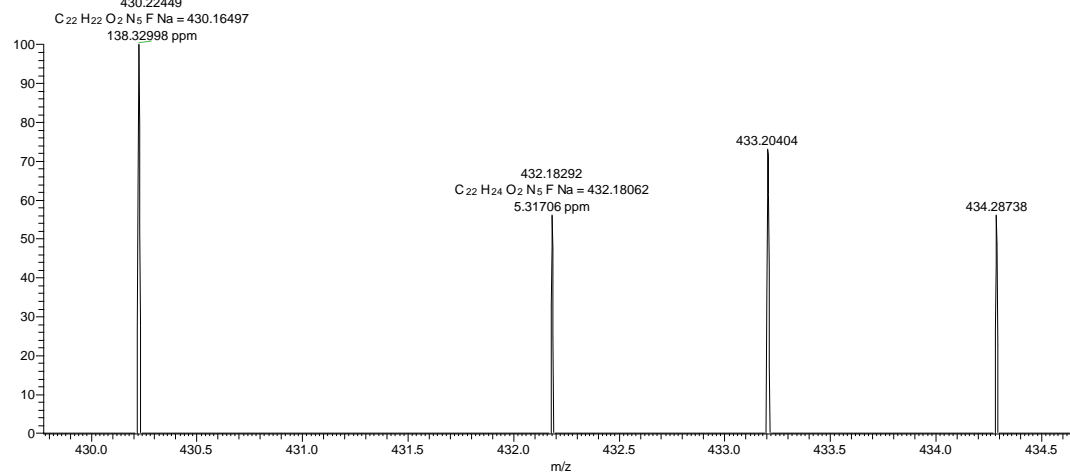


Fig. S52 ¹H NMR spectrum of target compound 18



20191224-1-76 #49 RT: 0.47 AV: 1 NL: 7.04E4
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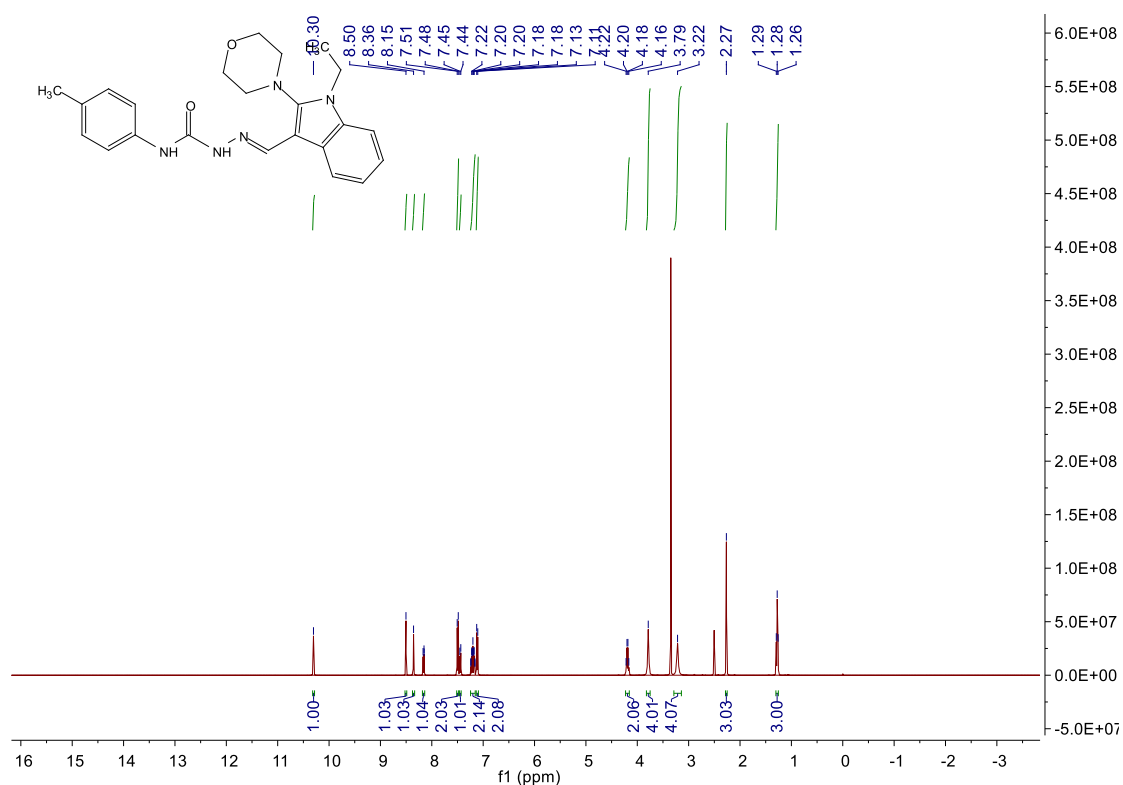


Fig. S55 ¹H NMR spectrum of target compound **19**

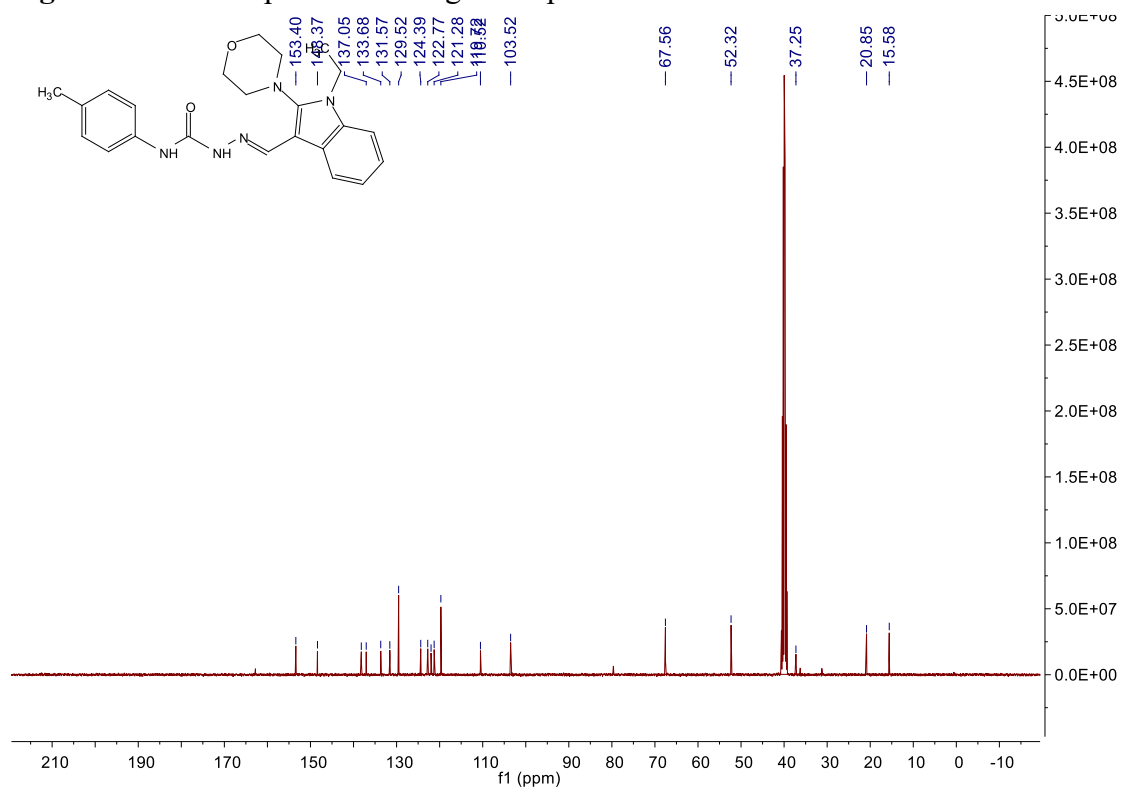


Fig. S56 ¹³C NMR spectrum of target compound **19**

20191224-1-79 #57 RT: 0.55 AV: 1 NL: 4.32E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

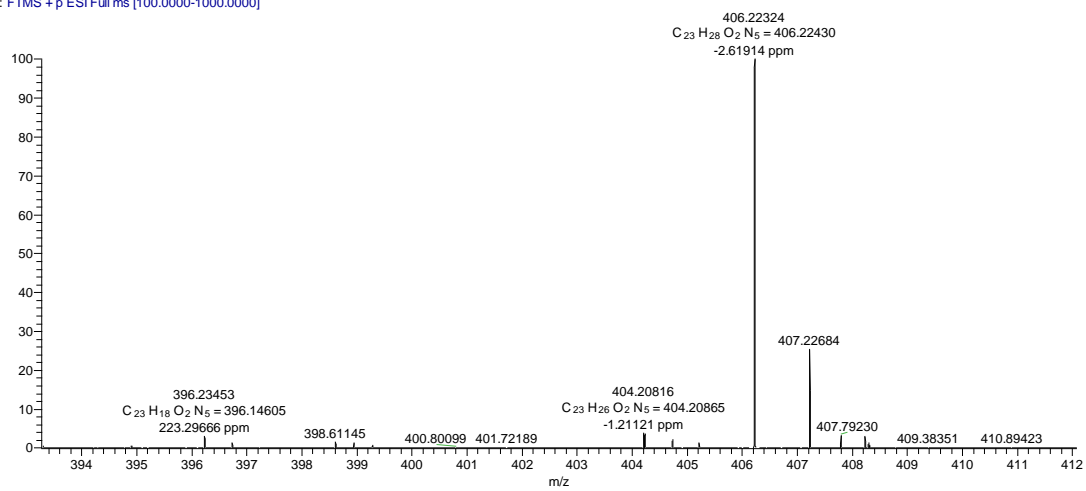


Fig. S57 HRMS spectrum of target compound 19

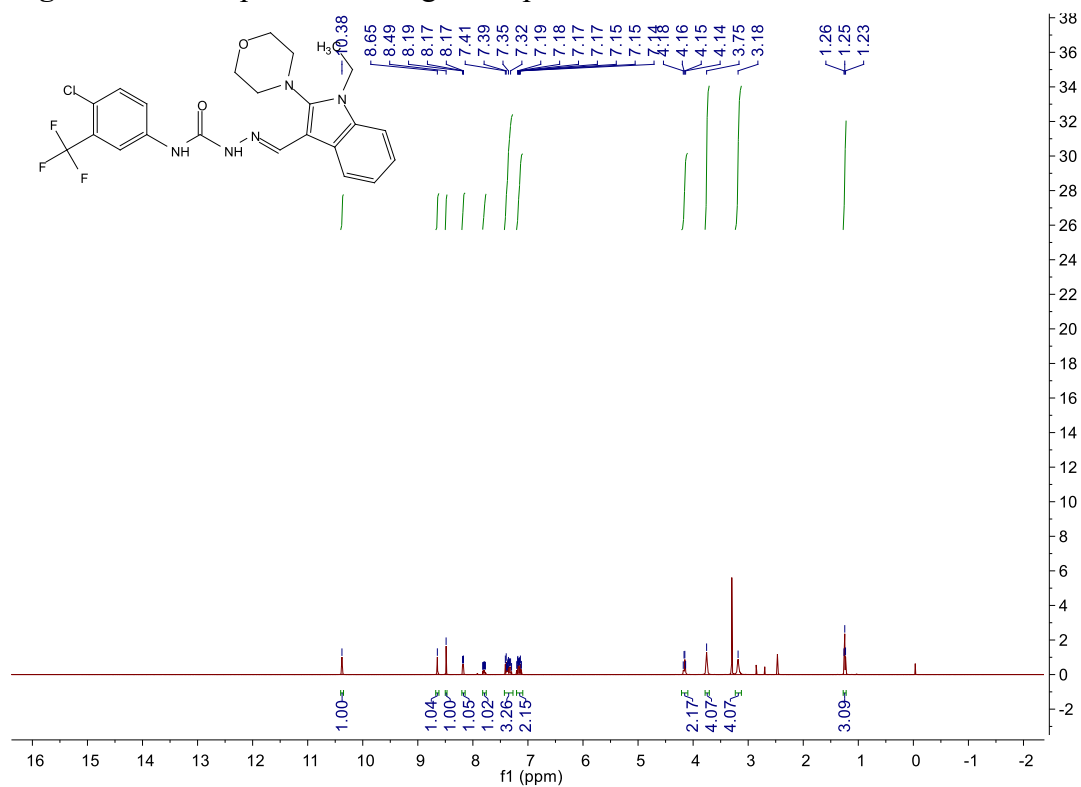


Fig. S58 ¹H NMR spectrum of target compound 20

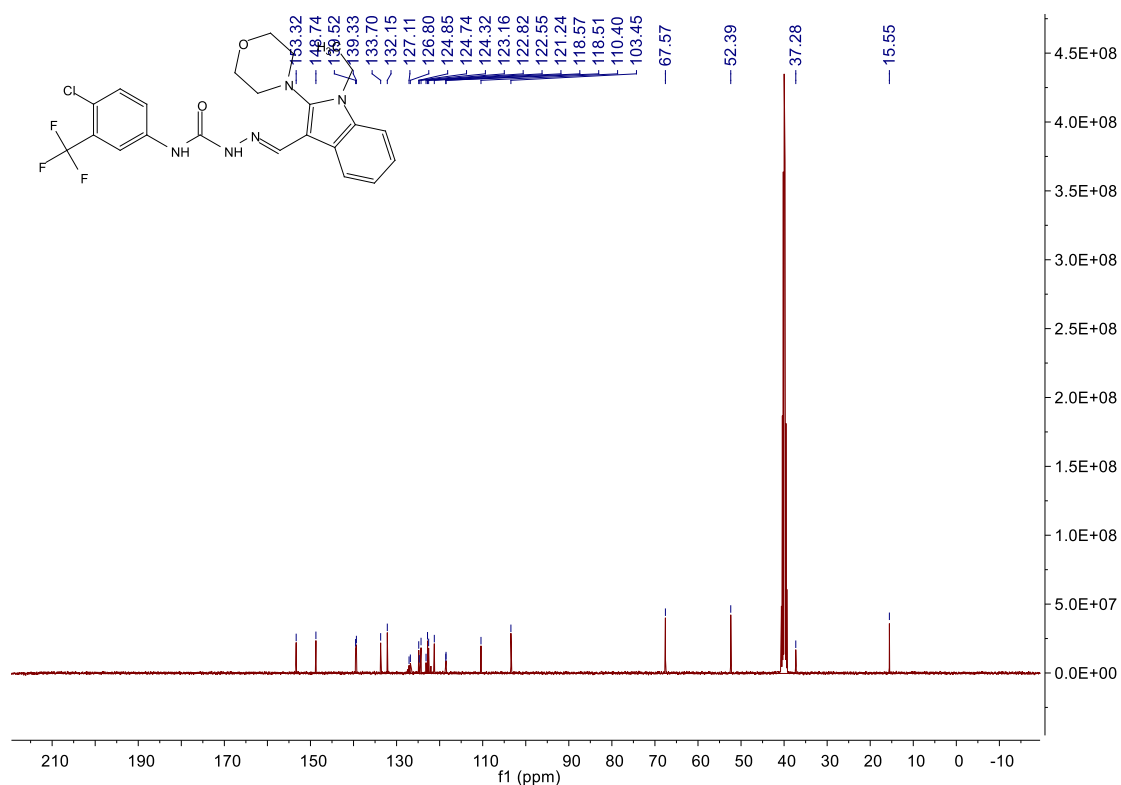


Fig. S59 ¹³C NMR spectrum of target compound **20**

20191224-1-61 #68 RT: 0.65 AV: 1 NL: 1.70E8
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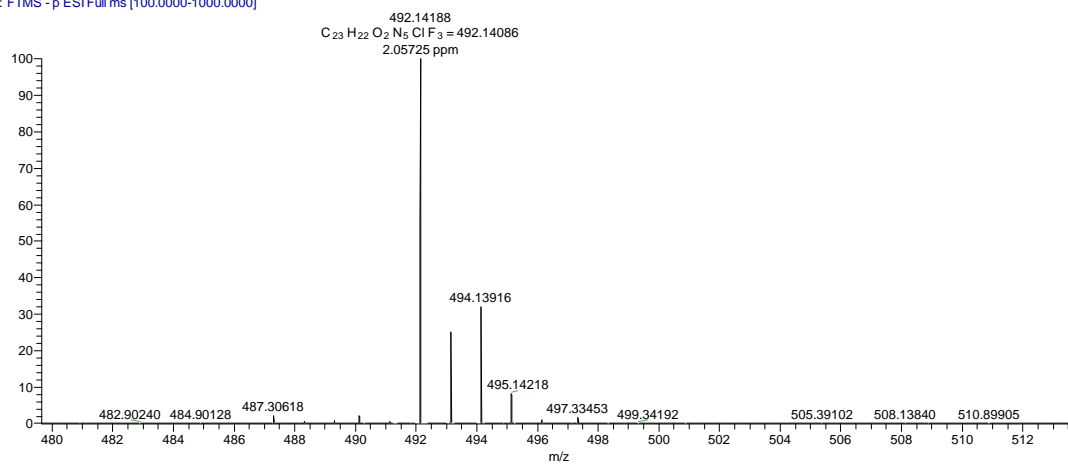


Fig. S60 HRMS spectrum of target compound **20**

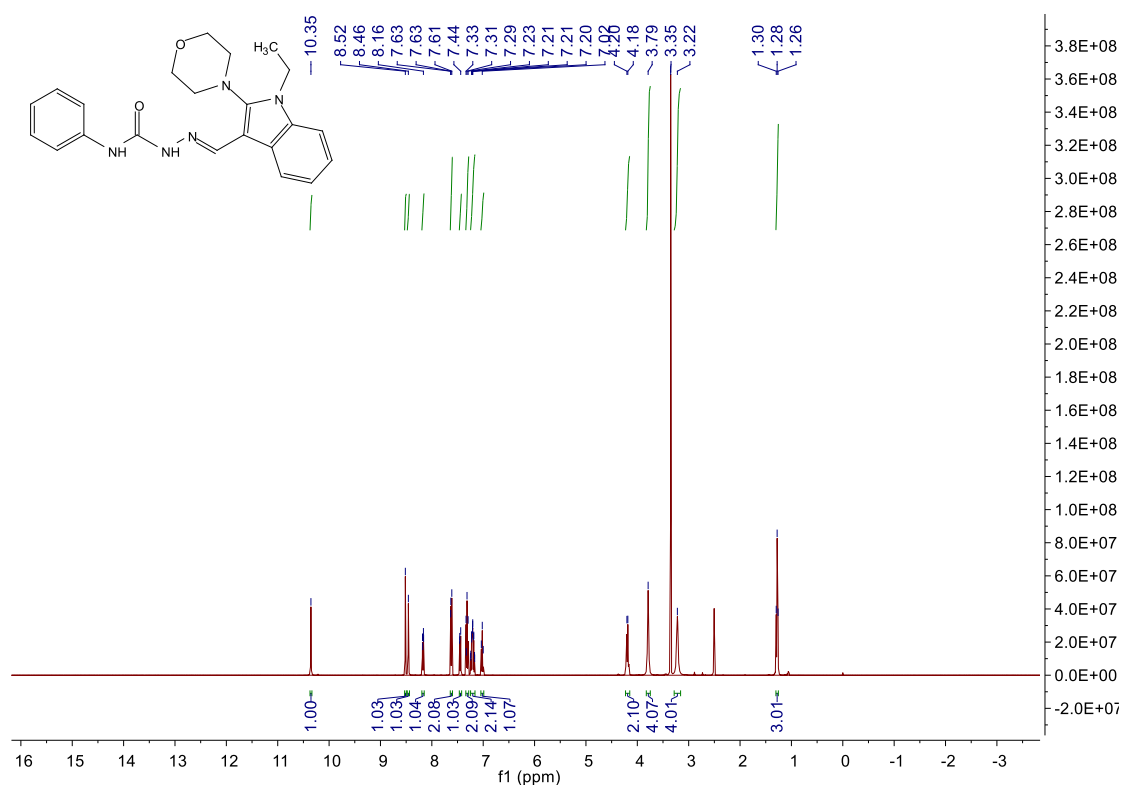


Fig. S61 ^1H NMR spectrum of target compound **21**

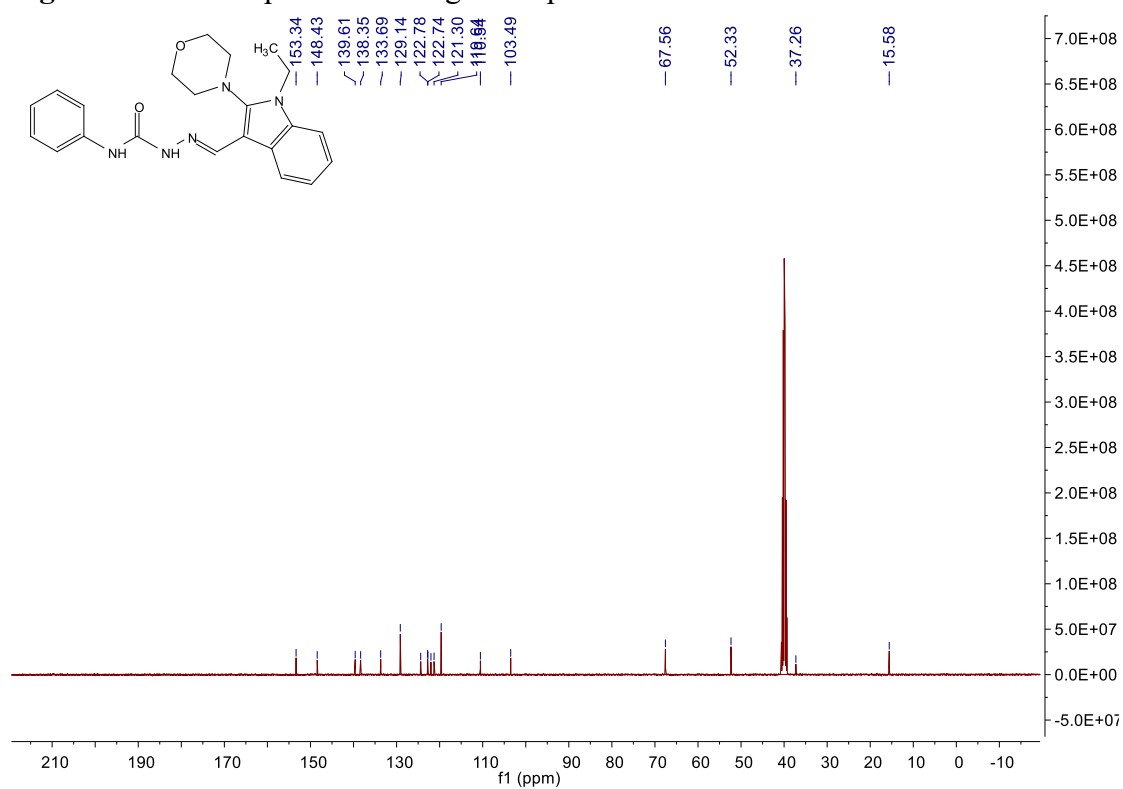


Fig. S62 ^{13}C NMR spectrum of target compound **21**

20191224-1-66 #55 RT: 0.53 AV: 1 NL: 3.84E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

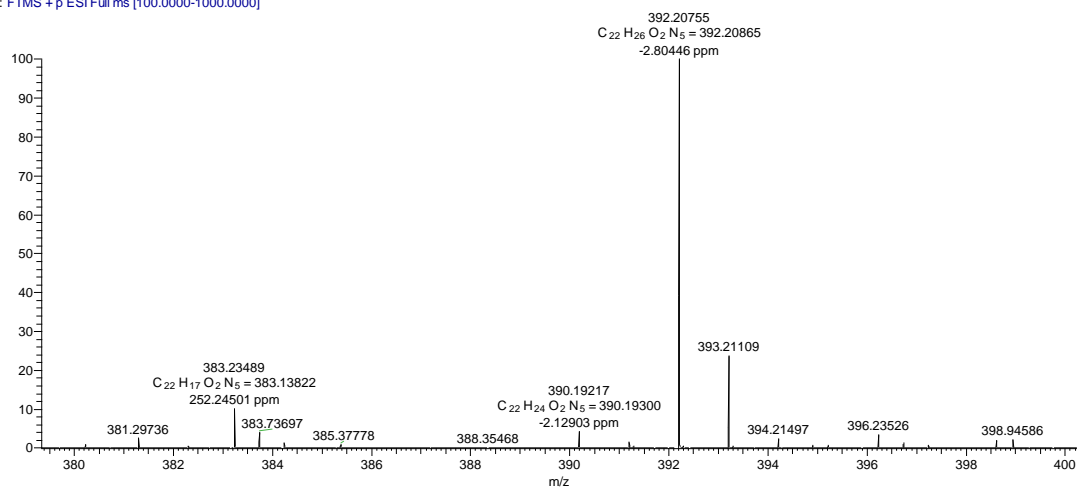


Fig. S63 HRMS spectrum of target compound 21

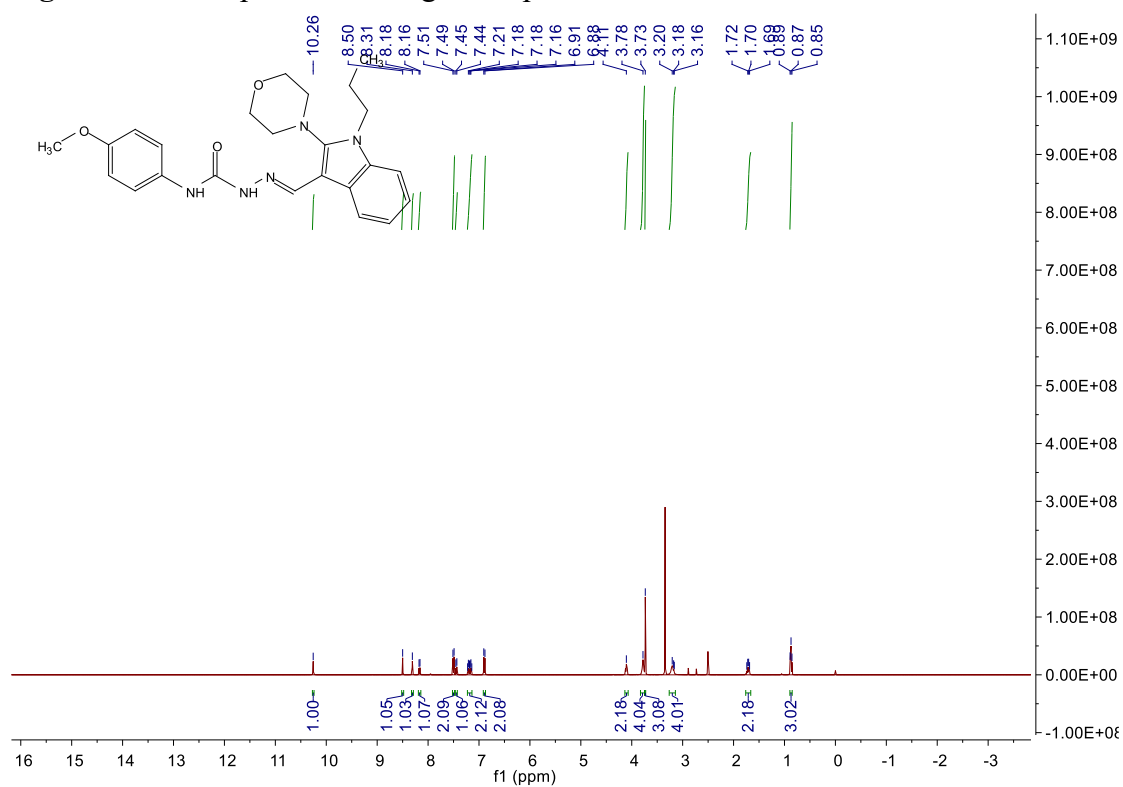


Fig. S64 ¹H NMR spectrum of target compound 22

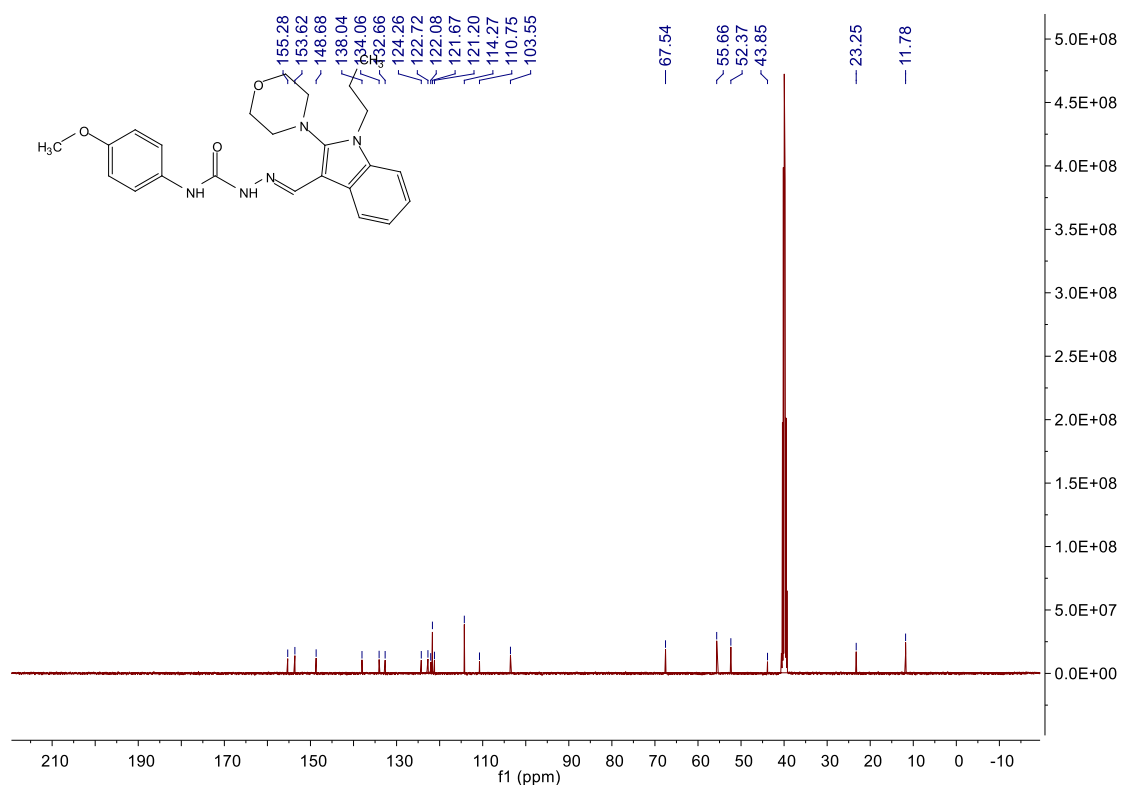


Fig. S65 ^{13}C NMR spectrum of target compound **22**

20191224-1-72 #59 RT: 0.57 AV: 1 NL: 1.58E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

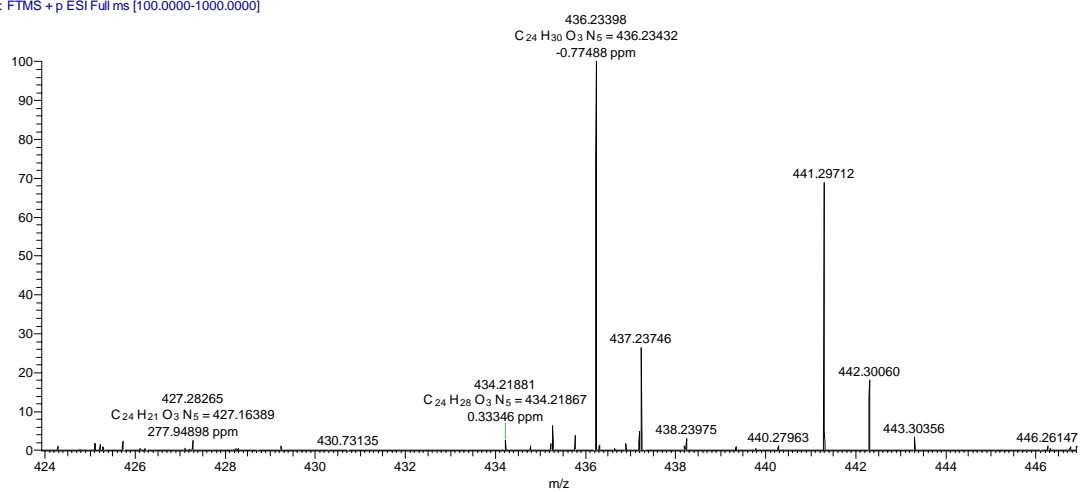


Fig. S66 HRMS spectrum of target compound **22**

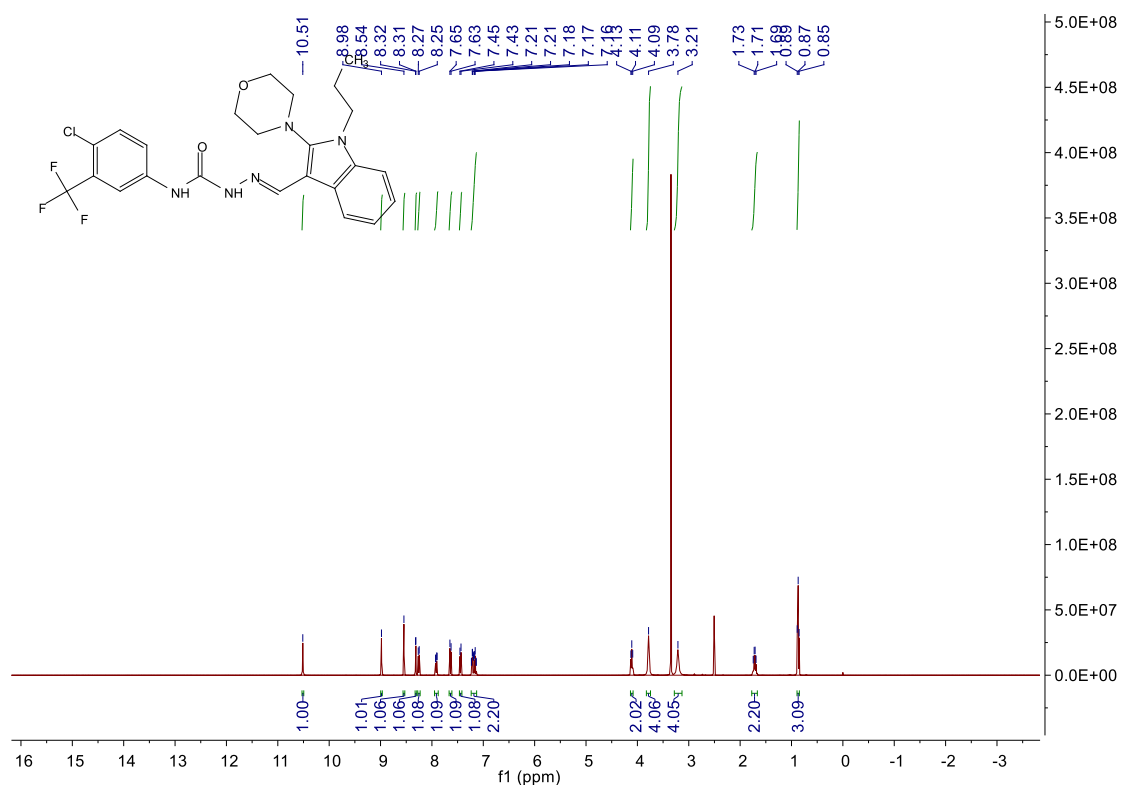


Fig. S67 ^1H NMR spectrum of target compound **23**

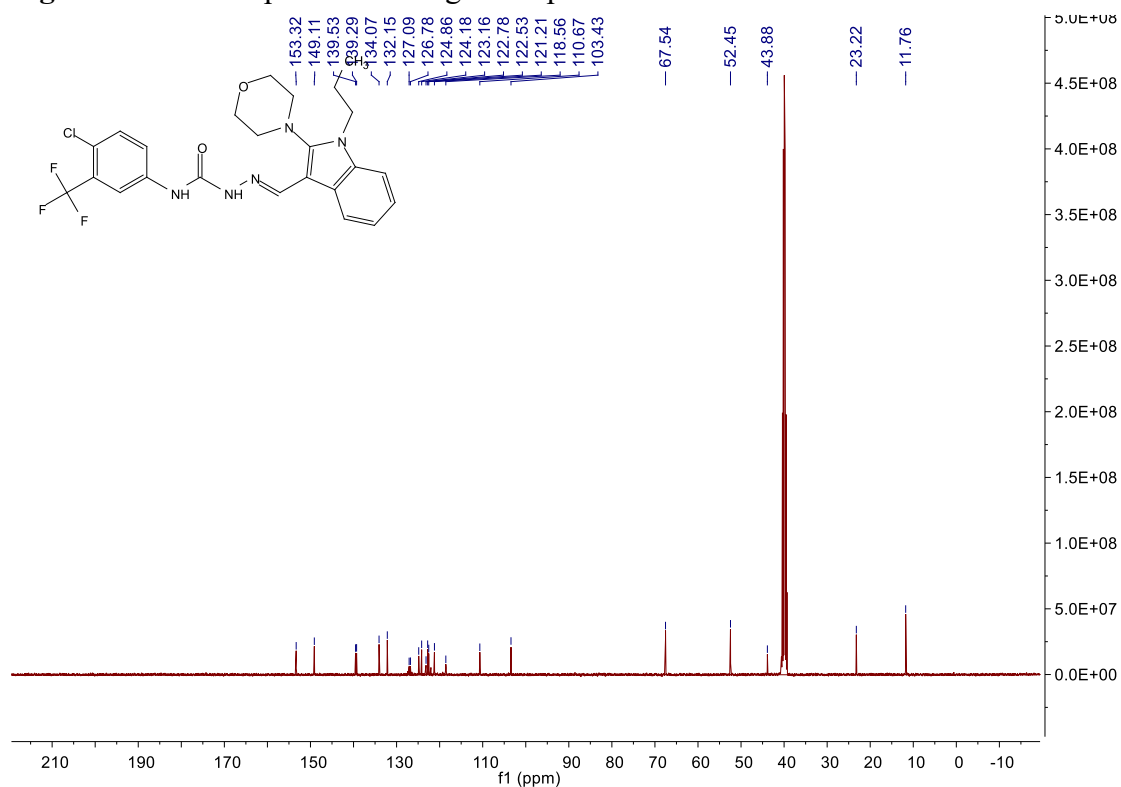


Fig. S68 ^{13}C NMR spectrum of target compound **23**

20191224-1-88 #87 RT: 0.84 AV: 1 NL: 8.28E6
T: FTMS + p ESI Full ms [100.0000-1000.0000]

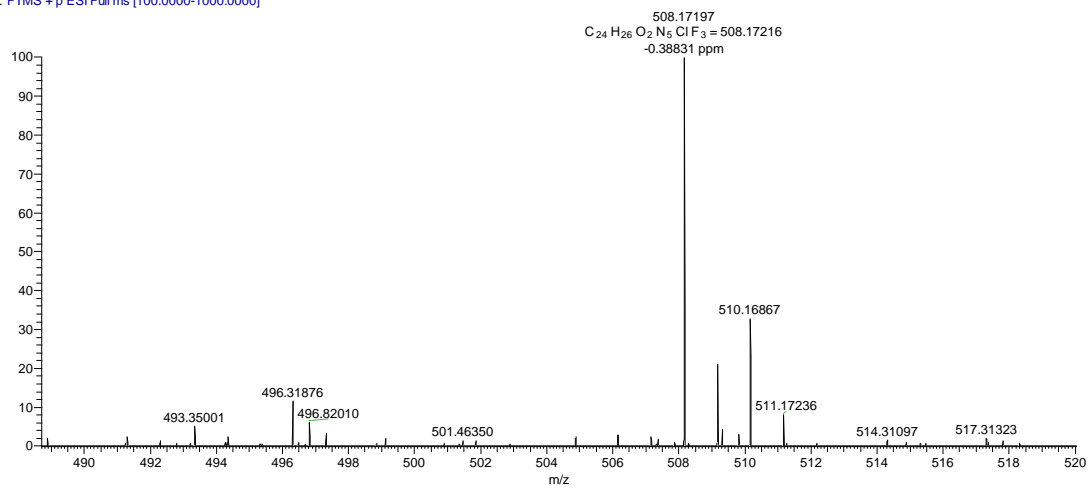


Fig. S69 HRMS spectrum of target compound 23

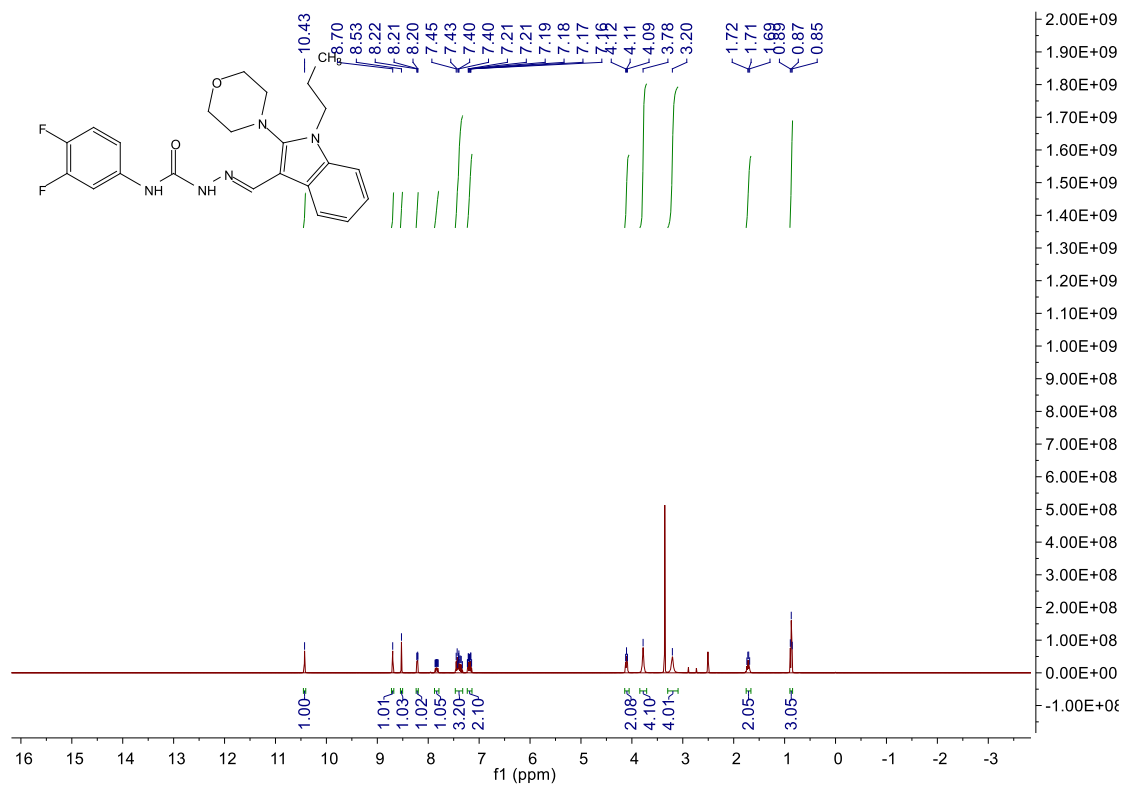


Fig. S70 ¹H NMR spectrum of target compound 24

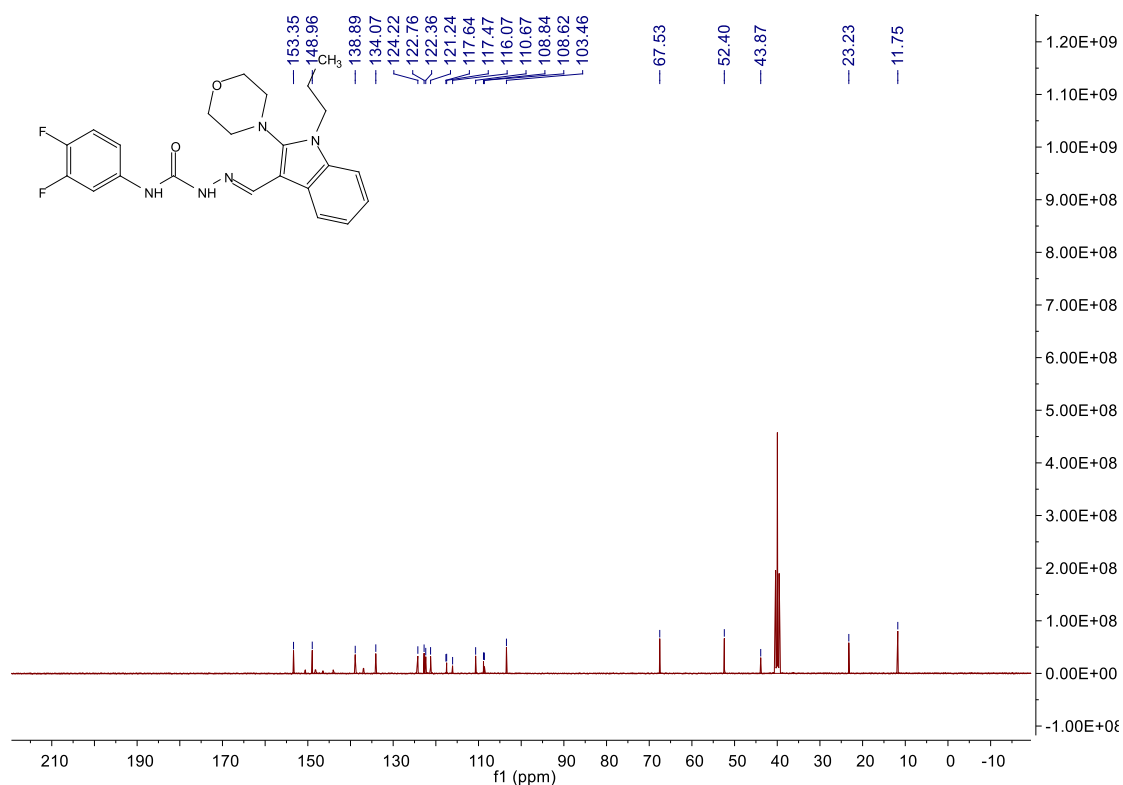


Fig. S71 ^{13}C NMR spectrum of target compound 24

20191224-1-75 #51 RT: 0.49 AV: 1 NL: 2.73E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

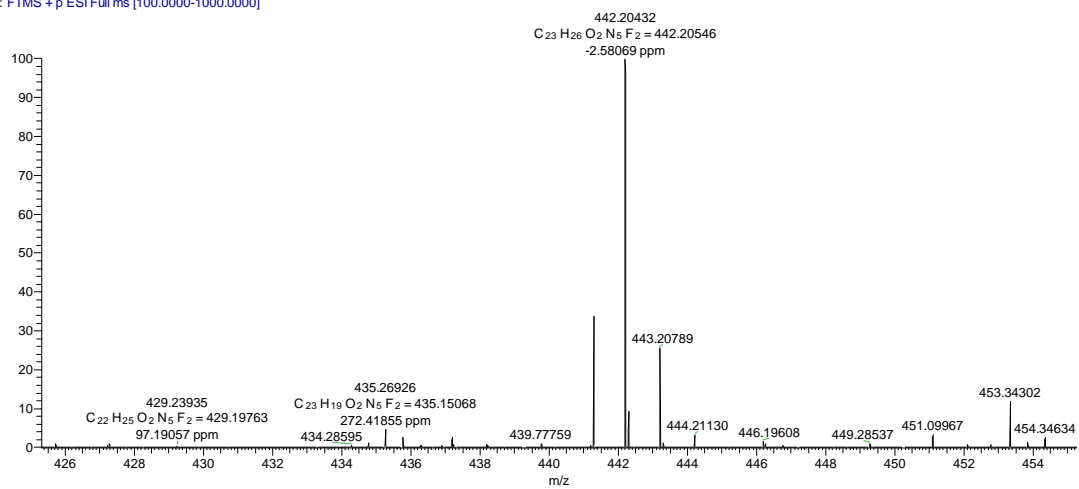
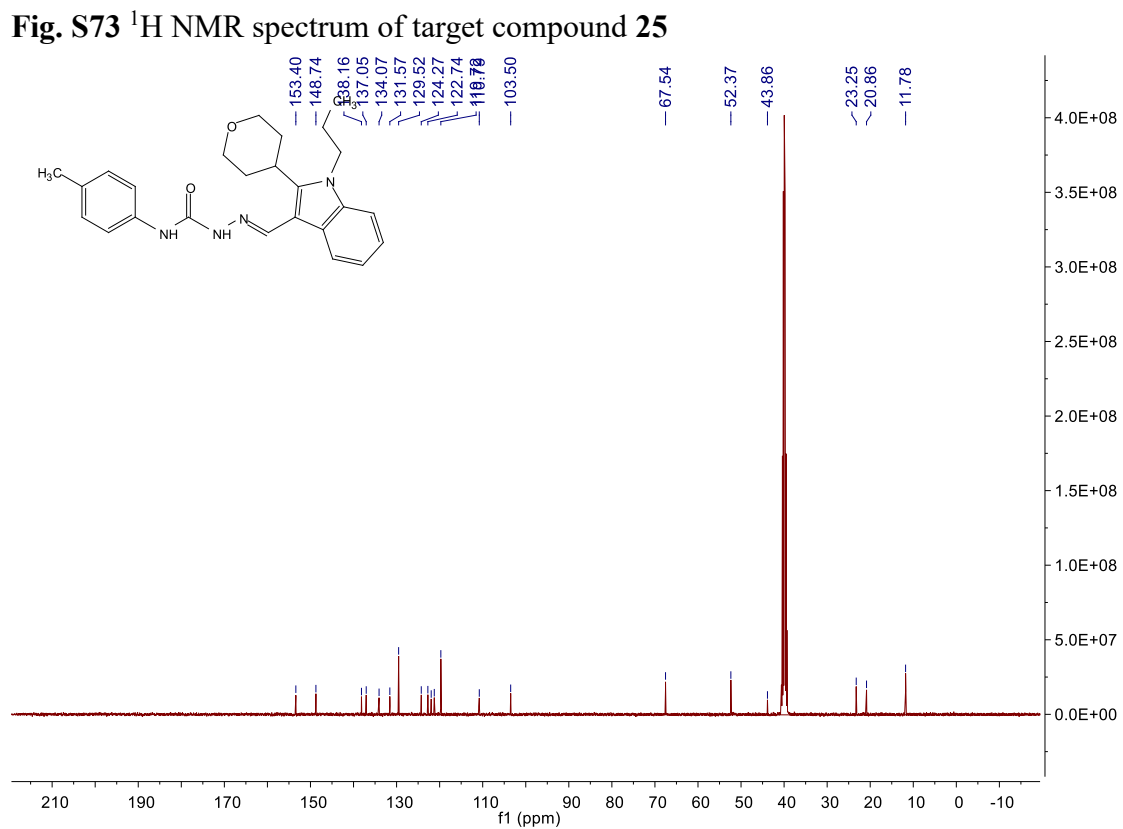
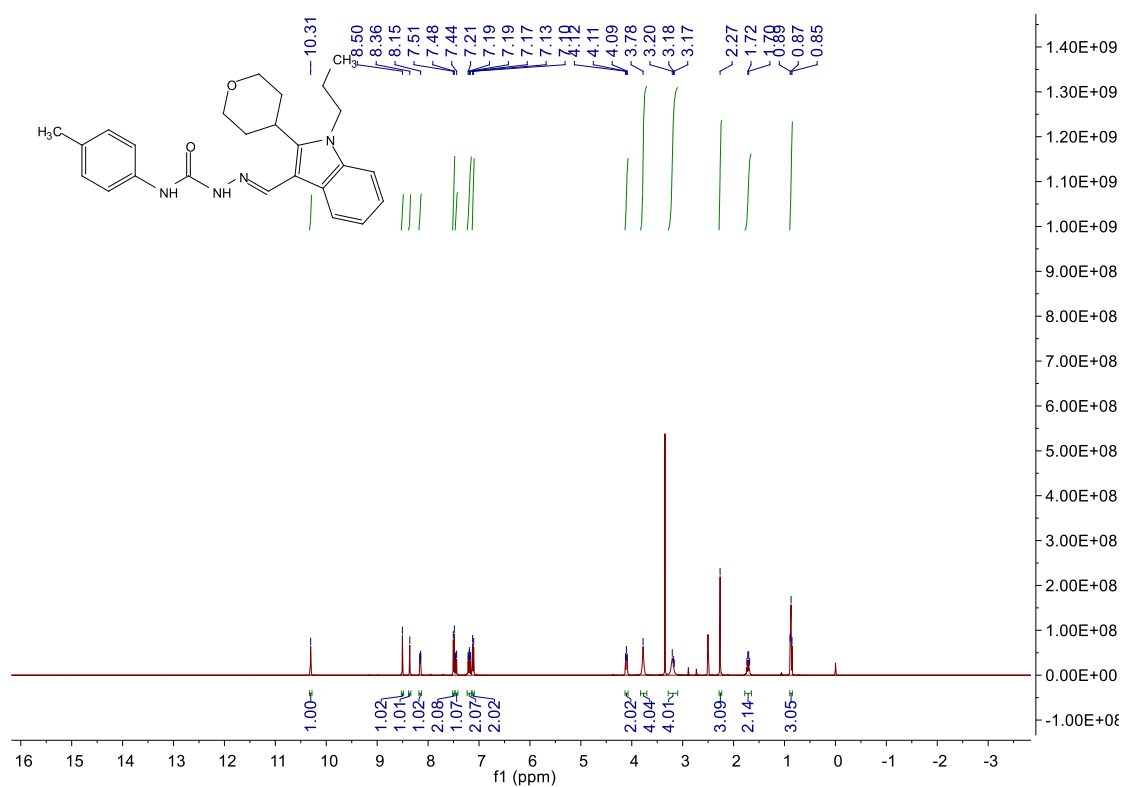


Fig. S72 HRMS spectrum of target compound 24



20191224-1-86 #69 RT: 0.67 AV: 1 NL: 3.48E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

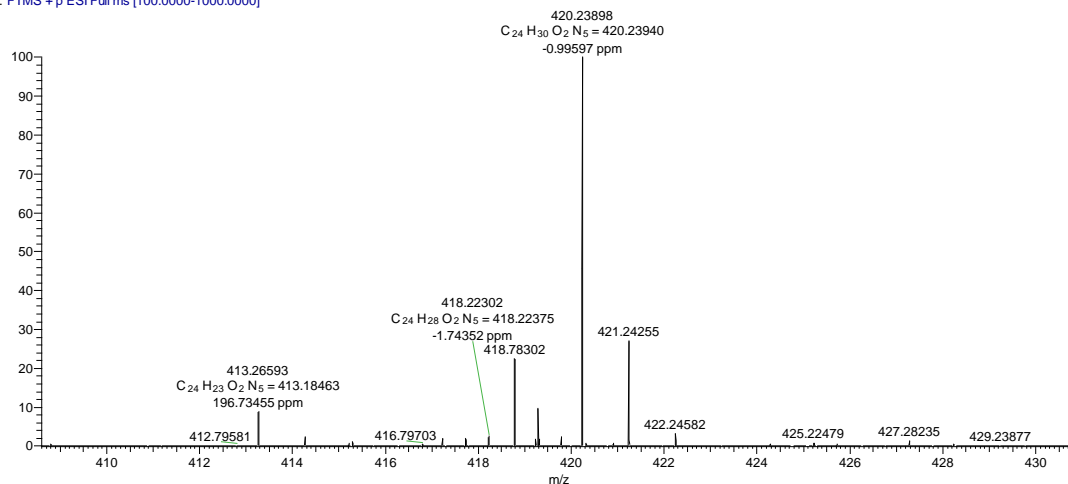


Fig. S75 HRMS spectrum of target compound 25

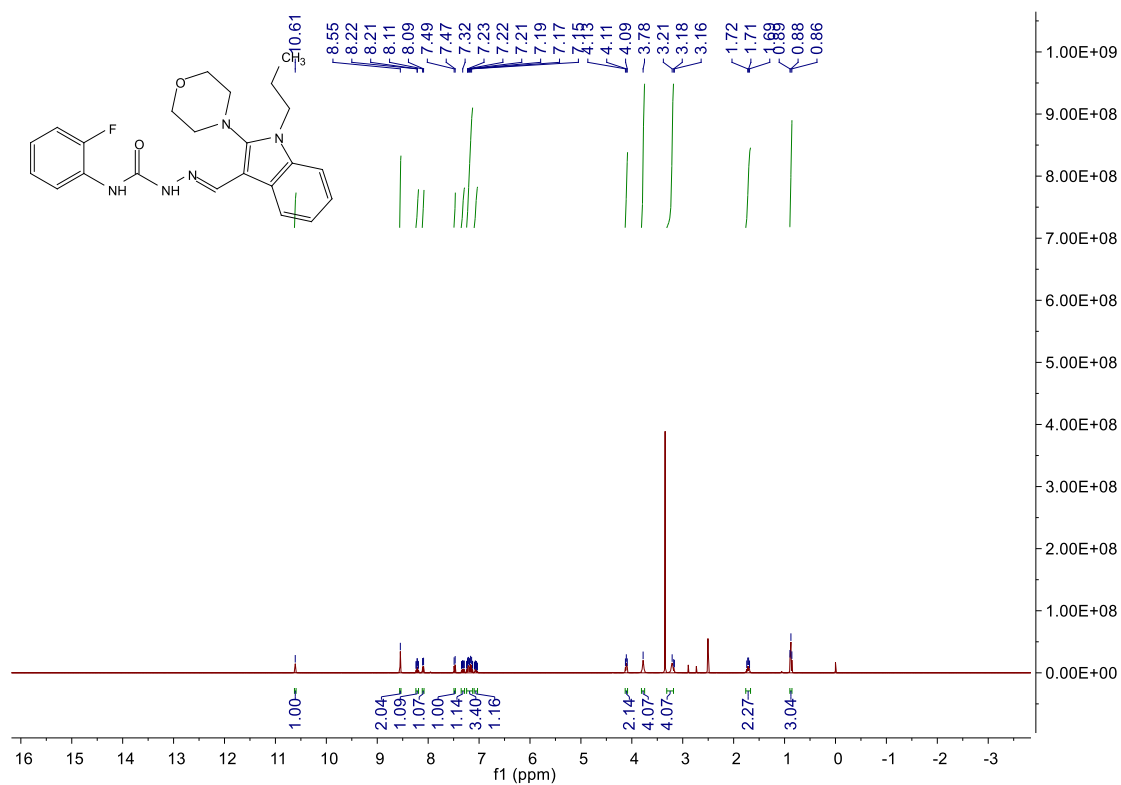


Fig. S76 ¹H NMR spectrum of target compound 26

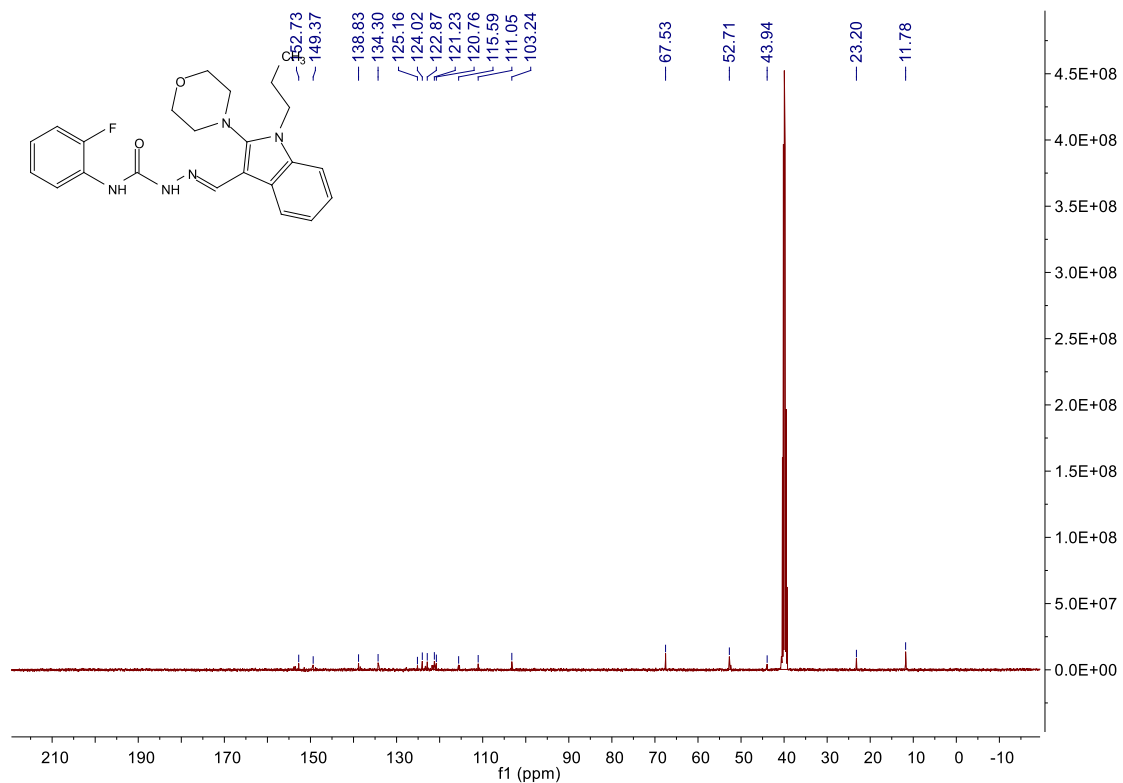


Fig. S77 ^{13}C NMR spectrum of target compound 26

20191224-1-94 #61 RT: 0.59 AV: 1 NL: 1.09E7
T: FTMS +p ESI Full ms [100.0000-1000.0000]

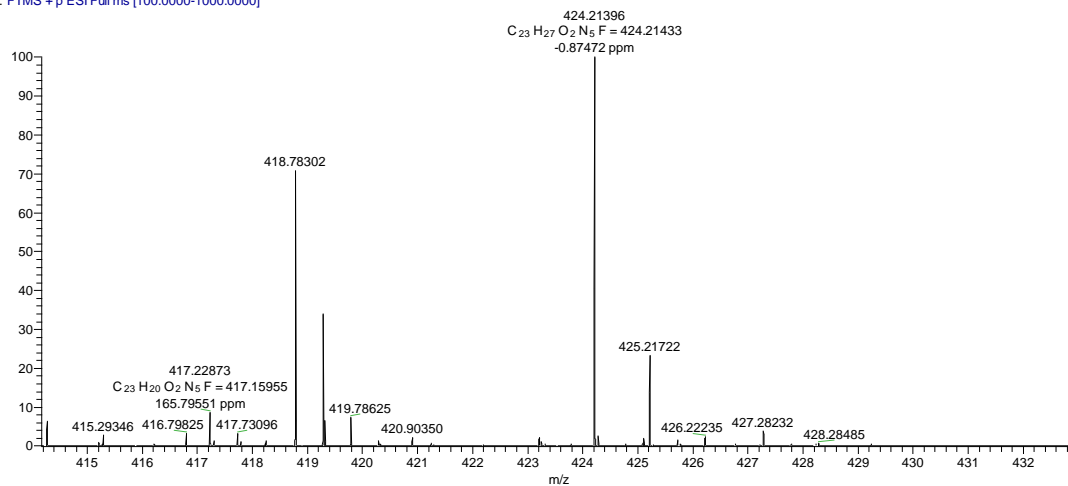


Fig. S78 HRMS spectrum of target compound 26

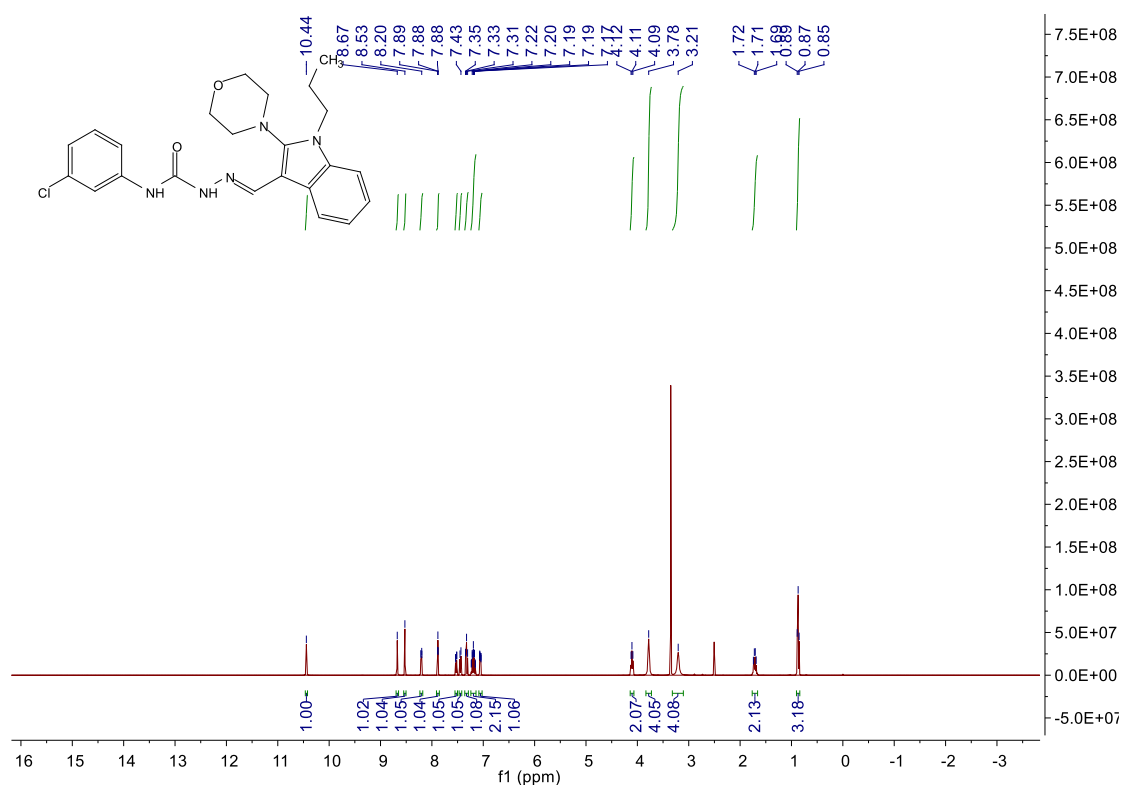


Fig. S79 ¹H NMR spectrum of target compound **27**

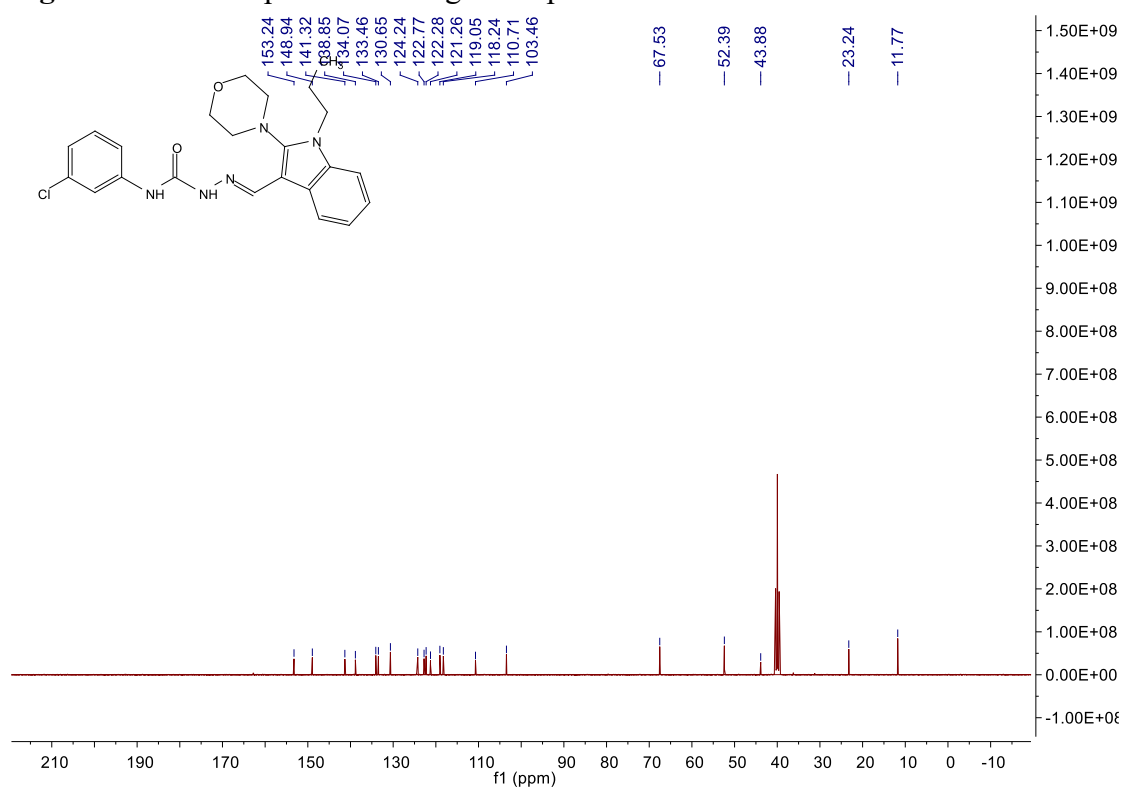


Fig. S80 ¹³C NMR spectrum of target compound **27**

20191224-1-83 #71 RT: 0.69 AV: 1 NL: 2.52E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

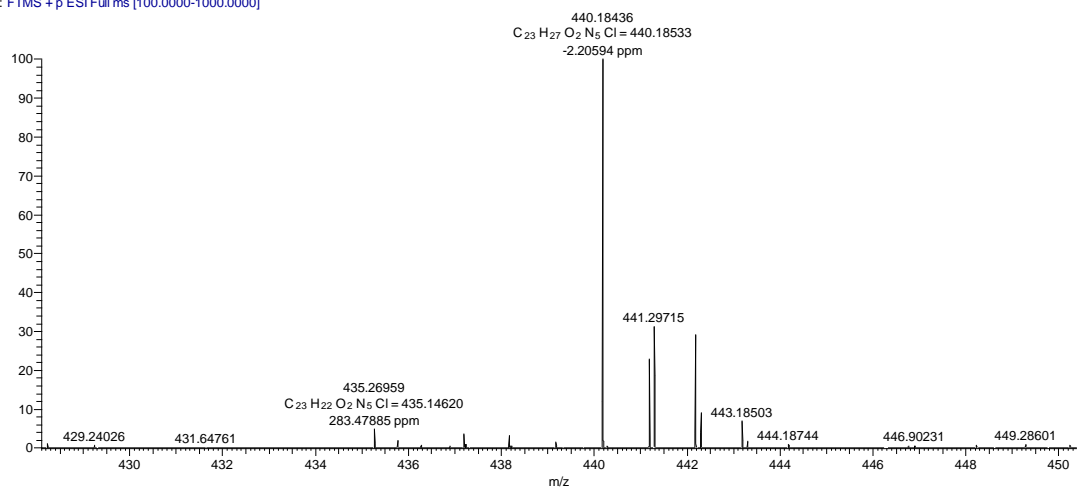


Fig. S81 HRMS spectrum of target compound 27

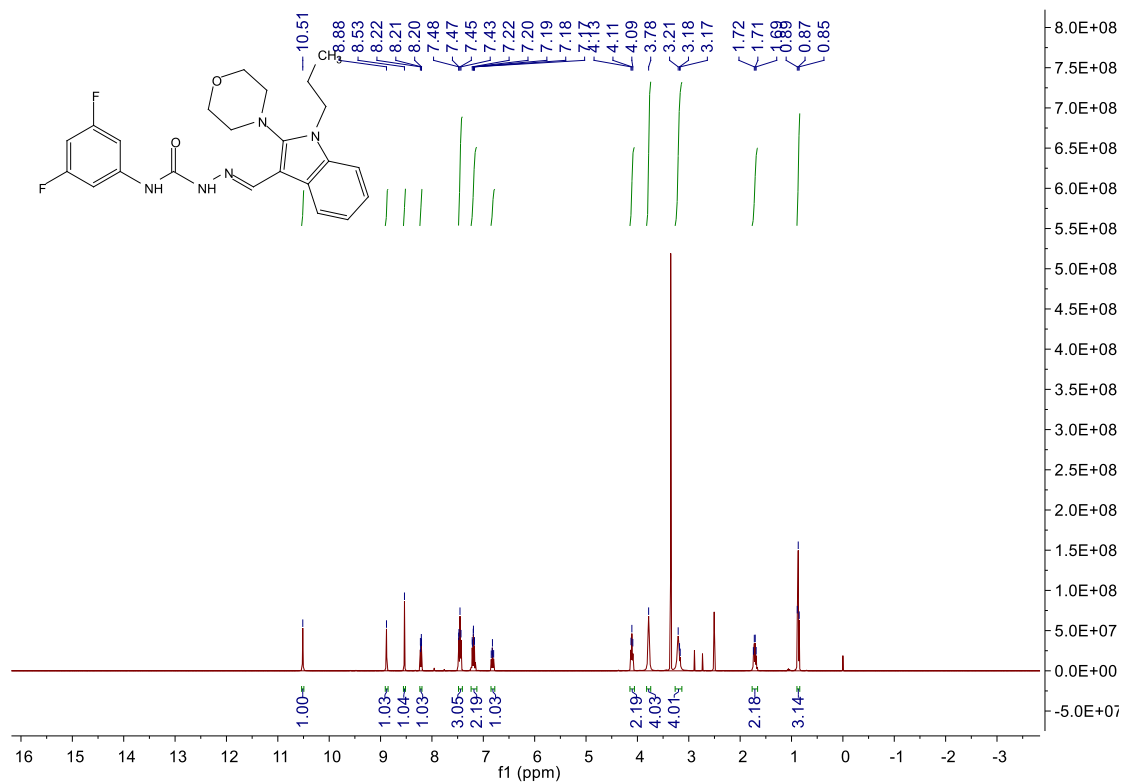


Fig. S82 ¹H NMR spectrum of target compound 28

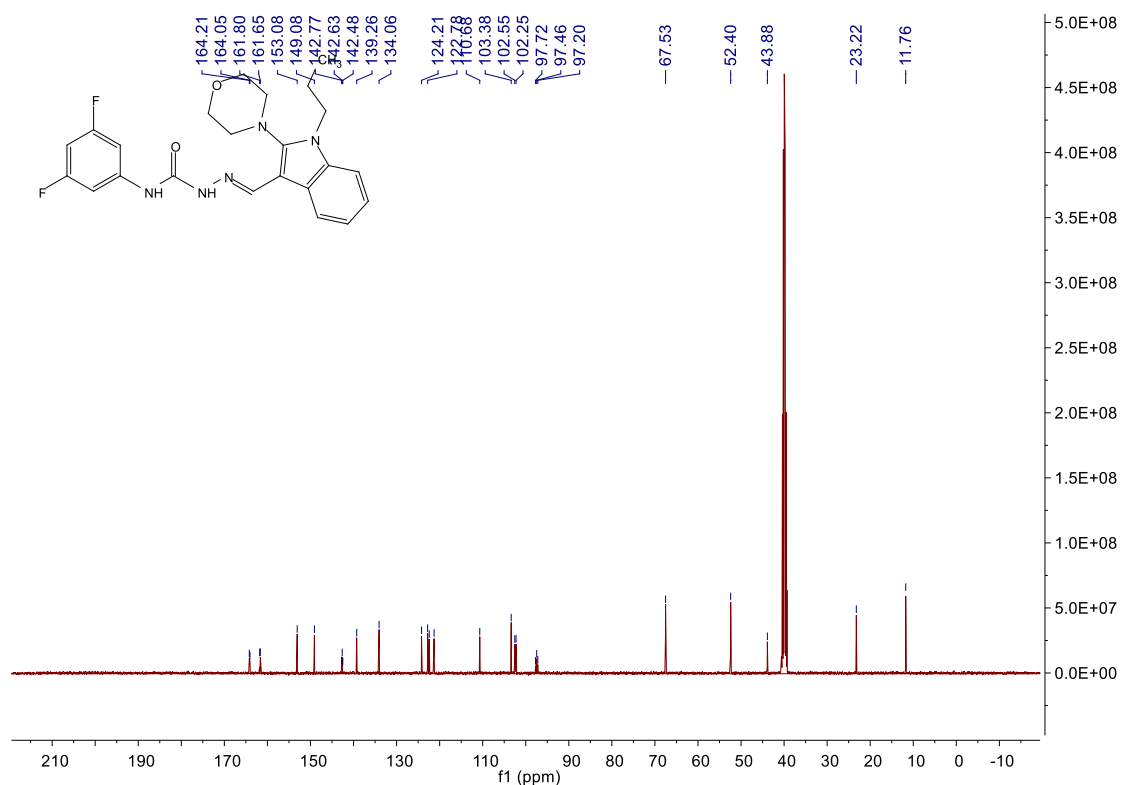


Fig. S83 ^{13}C NMR spectrum of target compound **28**

20191224-1-77 #69 RT: 0.66 AV: 1 NL: 4.05E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

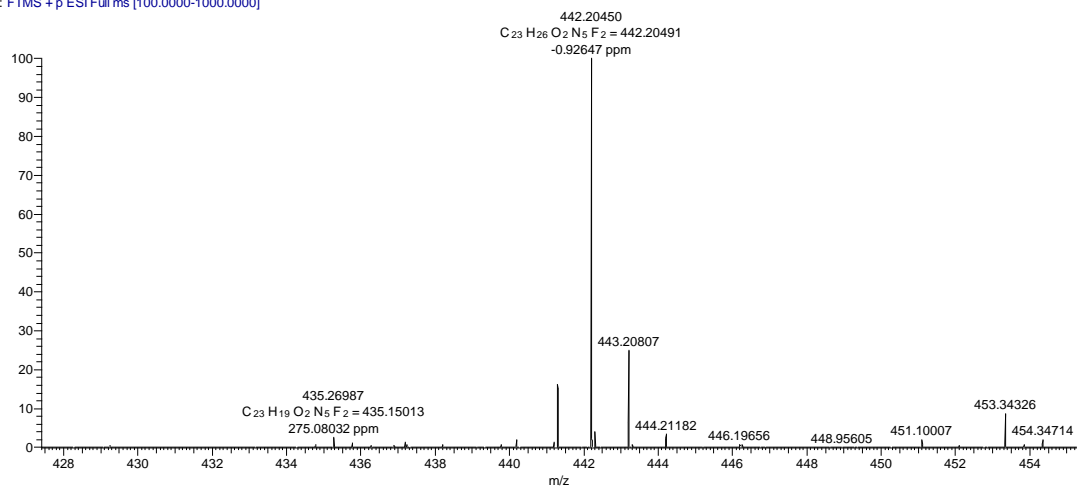


Fig. S84 HRMS spectrum of target compound **28**

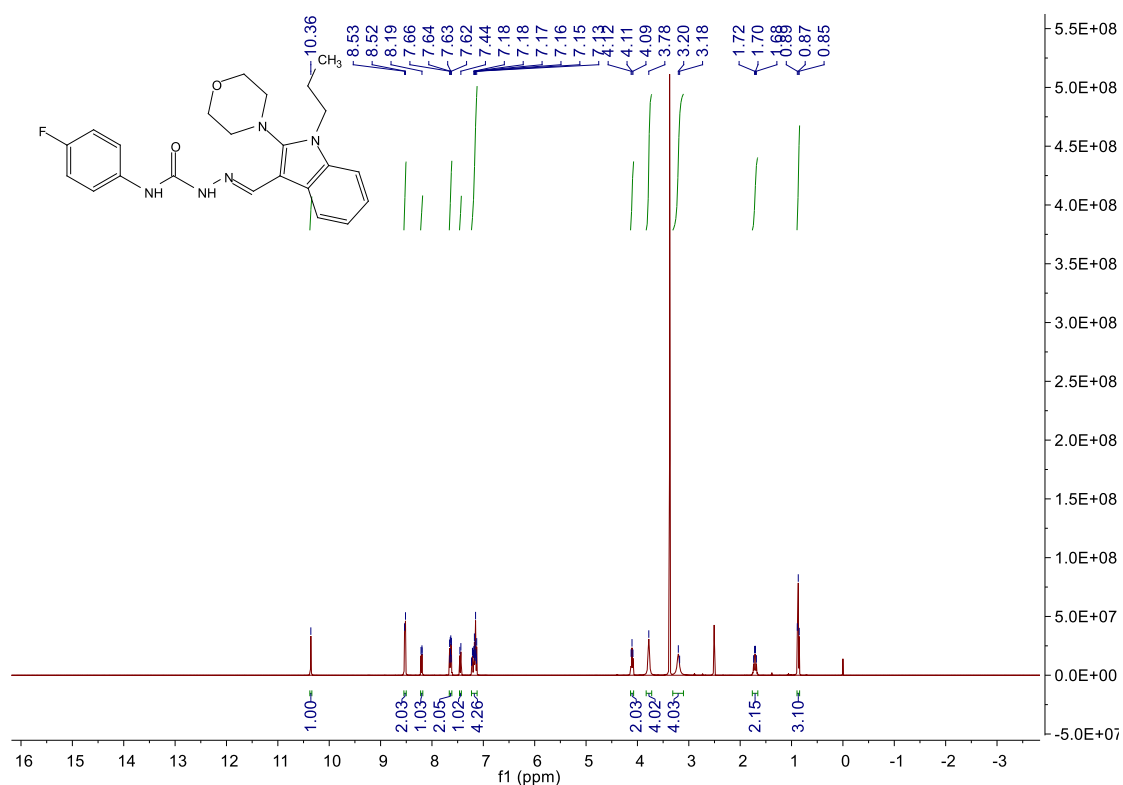


Fig. S85 ^1H NMR spectrum of target compound **29**

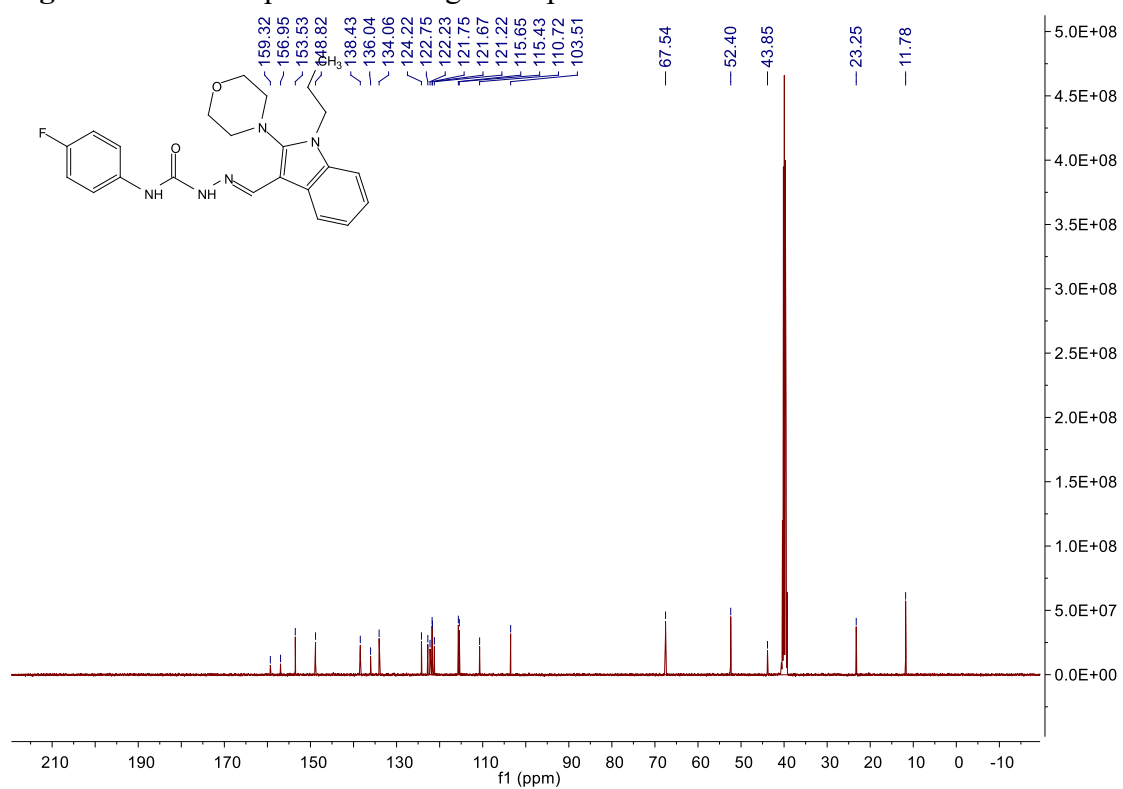


Fig. S86 ^{13}C NMR spectrum of target compound **29**

20191224-1-80 #51 RT: 0.49 AV: 1 NL: 2.90E7
T: FTMS + p ESI Full ms [100.0000-1000.0000]

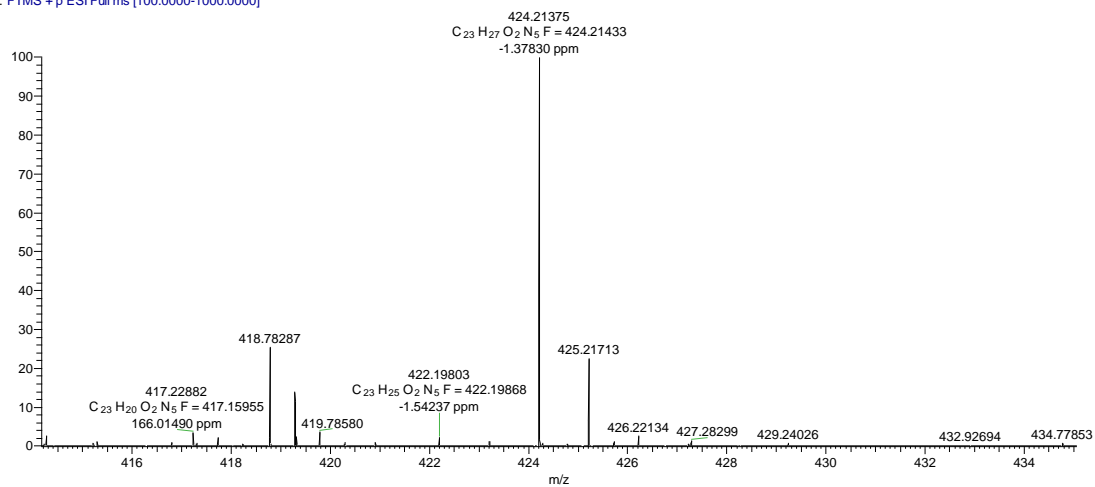


Fig. S87 HRMS spectrum of target compound 29

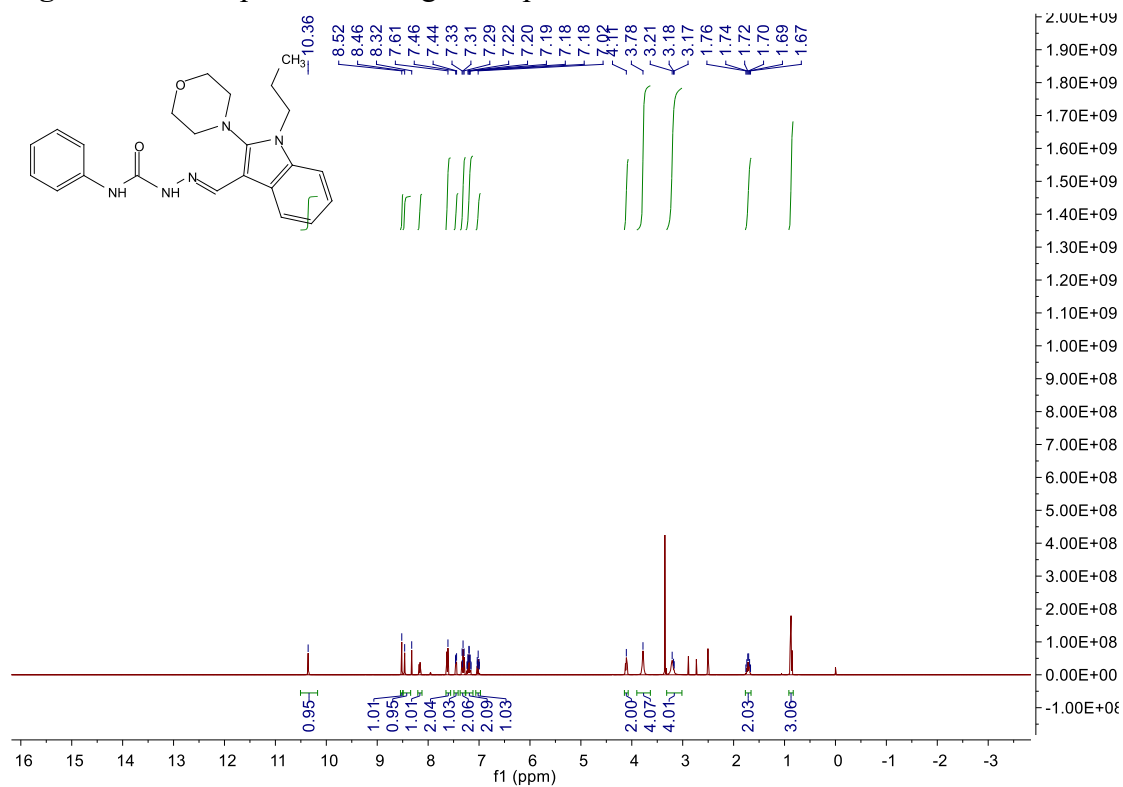


Fig. S88 ¹H NMR spectrum of target compound 30

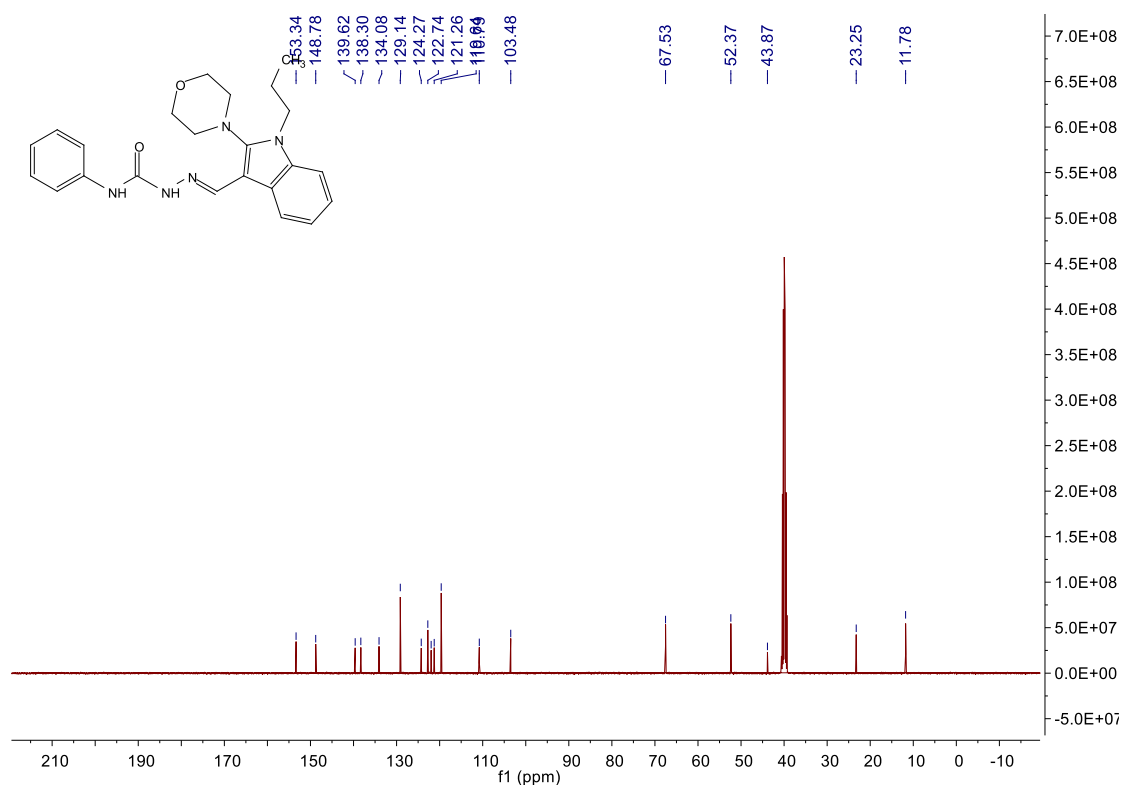


Fig. S89 ^{13}C NMR spectrum of target compound **30**

20191224-1-95 #73 RT: 0.71 AV: 1 NL: 3.41E6
T: FTMS + p ESI Full ms [100.0000-1000.0000]

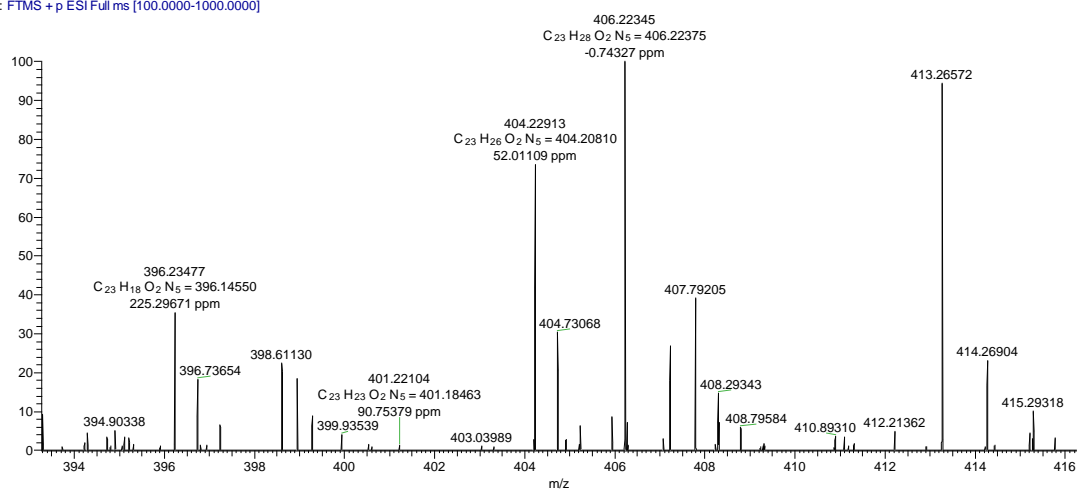


Fig. S90 HRMS spectrum of target compound **30**

Inhibition rate of all compounds at 10 μ M against four cancer cells

Table S1 Inhibition rate of all compounds at 10 μ M against four cancer cells

Comp.	Inhibition rate(%) ^a \pm SD			
	A549	PC-3	K562	HepG2
1	13.87 \pm 5.59	29.90 \pm 10.57	14.78 \pm 2.95	21.67 \pm 4.01
2	34.83 \pm 5.42	30.18 \pm 7.56	17.92 \pm 3.19	12.07 \pm 3.66
3	22.28 \pm 5.52	27.31 \pm 6.61	7.05 \pm 1.56	34.93 \pm 1.10
4	35.33 \pm 3.14	45.27 \pm 0.35	19.22 \pm 4.67	34.30 \pm 4.27
5	10.79 \pm 6.83	28.53 \pm 6.12	16.05 \pm 4.76	28.56 \pm 3.78
6	24.48 \pm 2.68	44.77 \pm 5.87	19.75 \pm 5.77	30.65 \pm 1.17
7	27.89 \pm 6.42	35.23 \pm 1.13	25.70 \pm 4.76	28.59 \pm 3.89
8	15.80 \pm 3.09	36.45 \pm 5.62	30.39 \pm 9.22	31.78 \pm 3.56
9	25.86 \pm 2.26	44.56 \pm 7.29	13.68 \pm 4.78	32.21 \pm 1.51
10	36.91 \pm 3.20	38.74 \pm 1.05	13.21 \pm 3.59	54.63 \pm 3.92
11	35.01 \pm 9.62	33.38 \pm 8.78	26.95 \pm 2.59	48.92 \pm 5.30
12	27.58 \pm 5.63	29.81 \pm 8.43	22.75 \pm 3.10	34.71 \pm 2.30
13	27.83 \pm 8.22	35.68 \pm 6.23	22.09 \pm 4.30	30.40 \pm 3.77
14	25.12 \pm 11.64	34.60 \pm 2.82	20.36 \pm 3.65	22.13 \pm 5.98
15	16.39 \pm 9.41	35.65 \pm 8.13	12.70 \pm 4.21	45.67 \pm 0.45
16	17.71 \pm 4.01	23.83 \pm 3.54	21.30 \pm 7.49	45.22 \pm 3.54
17	25.24 \pm 2.50	23.64 \pm 9.18	21.45 \pm 6.62	23.44 \pm 4.67
18	25.28 \pm 4.30	32.91 \pm 8.97	22.80 \pm 0.46	43.12 \pm 5.29
19	21.46 \pm 6.23	21.91 \pm 13.68	11.88 \pm 1.48	18.39 \pm 4.29
20	33.70 \pm 3.88	33.89 \pm 11.74	8.39 \pm 3.45	42.84 \pm 0.75
21	29.30 \pm 6.38	30.27 \pm 9.17	37.24 \pm 3.72	22.28 \pm 0.95
22	22.87 \pm 5.76	18.32 \pm 8.11	12.47 \pm 0.20	21.47 \pm 6.28
23	44.45 \pm 4.03	31.32 \pm 5.37	23.28 \pm 3.30	50.97 \pm 2.77
24	33.71 \pm 2.99	29.96 \pm 11.84	23.09 \pm 5.87	48.43 \pm 1.30
25	41.28 \pm 10.79	29.44 \pm 17.53	20.41 \pm 3.33	33.61 \pm 4.60
26	42.52 \pm 7.72	38.35 \pm 5.85	20.81 \pm 3.46	36.14 \pm 1.84
27	26.52 \pm 1.79	33.88 \pm 13.26	27.06 \pm 0.64	19.68 \pm 4.27
28	37.58 \pm 3.53	32.04 \pm 3.31	26.67 \pm 2.64	35.13 \pm 1.95
29	22.29 \pm 7.53	25.70 \pm 4.36	12.09 \pm 1.81	46.23 \pm 0.17
30	5.29 \pm 2.08	35.00 \pm 8.11	14.16 \pm 1.44	32.95 \pm 2.42
Sorafenib ^b	32.97 \pm 5.27	31.79 \pm 8.24	28.51 \pm 5.81	50.81 \pm 1.92

^a Average of the three trials. ^b Commercial sorafenib was used as positive control.

Plate clone formation experiment

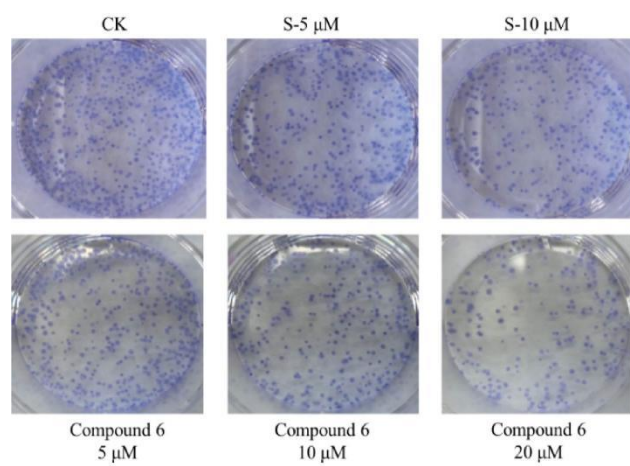


Fig. S91 Plate clone formation experiment of compound **6** and sorafenib