C_2-Symmetric 1,2-Diphenylethane-1,2-diamine-Derived Primary−Tertiary Diamine-Catalyzed Asymmetric Mannich Addition of Cyclic *N*-Sulfonyl Trifluoromethylated Ketimines

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Supporting Information

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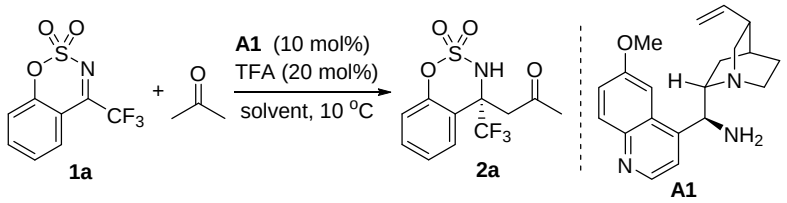
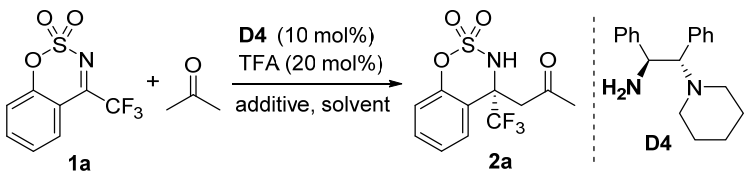
1. More results on the condition optimization of asymmetric Mannich reaction

Table S1. The Reaction Optimization Catalyzed by A1.



entry	Solvent	Time (h)	Yield (%)	*ee* (%)
1	toluene	30	73	80
2	THF	48	26	70
3	DCM	48	37	61
4	EA	48	64	70
5	$CHCl_3$	48	68	68
6	*o*-xylene	48	39	78
7	*m*-xylene	48	40	76
8	***p*-xylene**	**48**	**67**	**89**

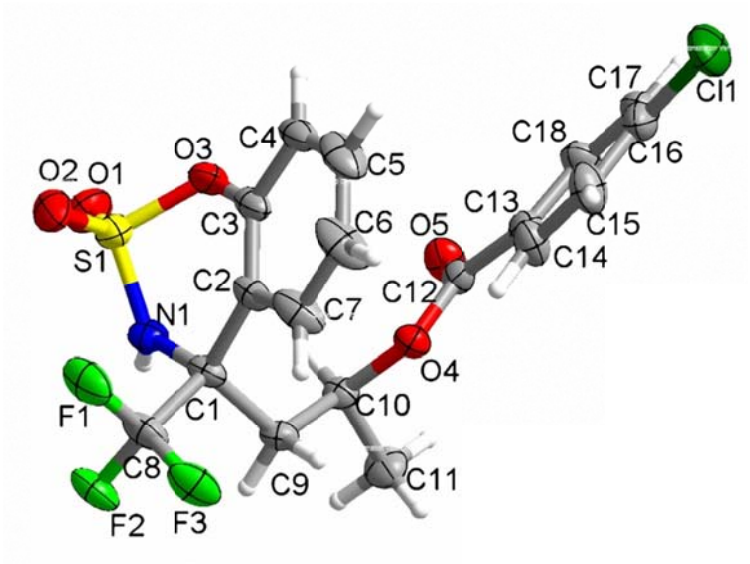
Table S2. The Reaction Optimization Catalyzed by D4.



entry	Solvent	additive	T (^{o}C)/time (h)	Yield (%)	*ee* (%)
1	toluene	--	25/10	92	93
2	**toluene**	**--**	**10/10**	**93**	**96**
3	toluene	--	0/10	86	97
4	toluene	--	-10/20	56	97
5	toluene	3 Å MS	10/10	86	96
6	toluene	4 Å MS	10/10	85	96
7	toluene	5 Å MS	10/10	93	96
8	THF	--	10/48	90	50
9	DCM	--	10/48	57	50
10	MeOH	--	10/48	0	--
11	neat (no solvent)	--	10/48	88	70

2. X-ray structure for compound 7

A single crystal of the compound **7** (CCDC 1583064) was grown from its solution in dichloromethane and petroleum ether, which is suitable for X-ray diffraction analysis. The correctness of the X-ray data and the structure had been checked by using the CheckCIF utility on the submission Web site: http://checkcif.iucr.org.



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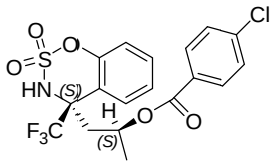


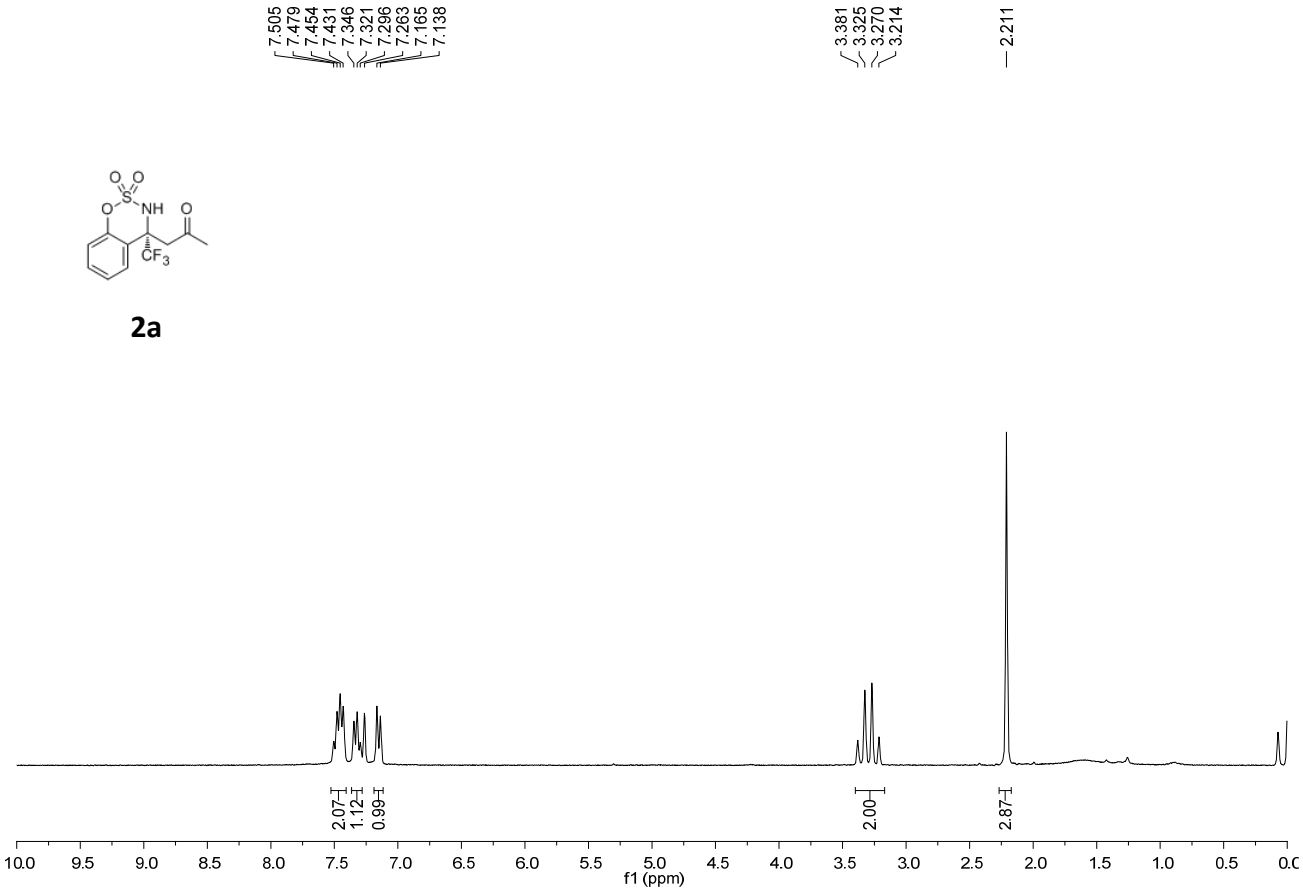
7

Table S3. Crystal Data and Structure Refinement for 7.

Identification code	**201710201**
Empirical formula	$C_{18}H_{15}ClF_3NO_5S$
Formula weight	449.82
Temperature/K	293(2)
Crystal system	orthorhombic
Space group	$P2_12_12_1$
a/Å	8.8858(4)
b/Å	9.5706(6)
c/Å	23.3142(11)

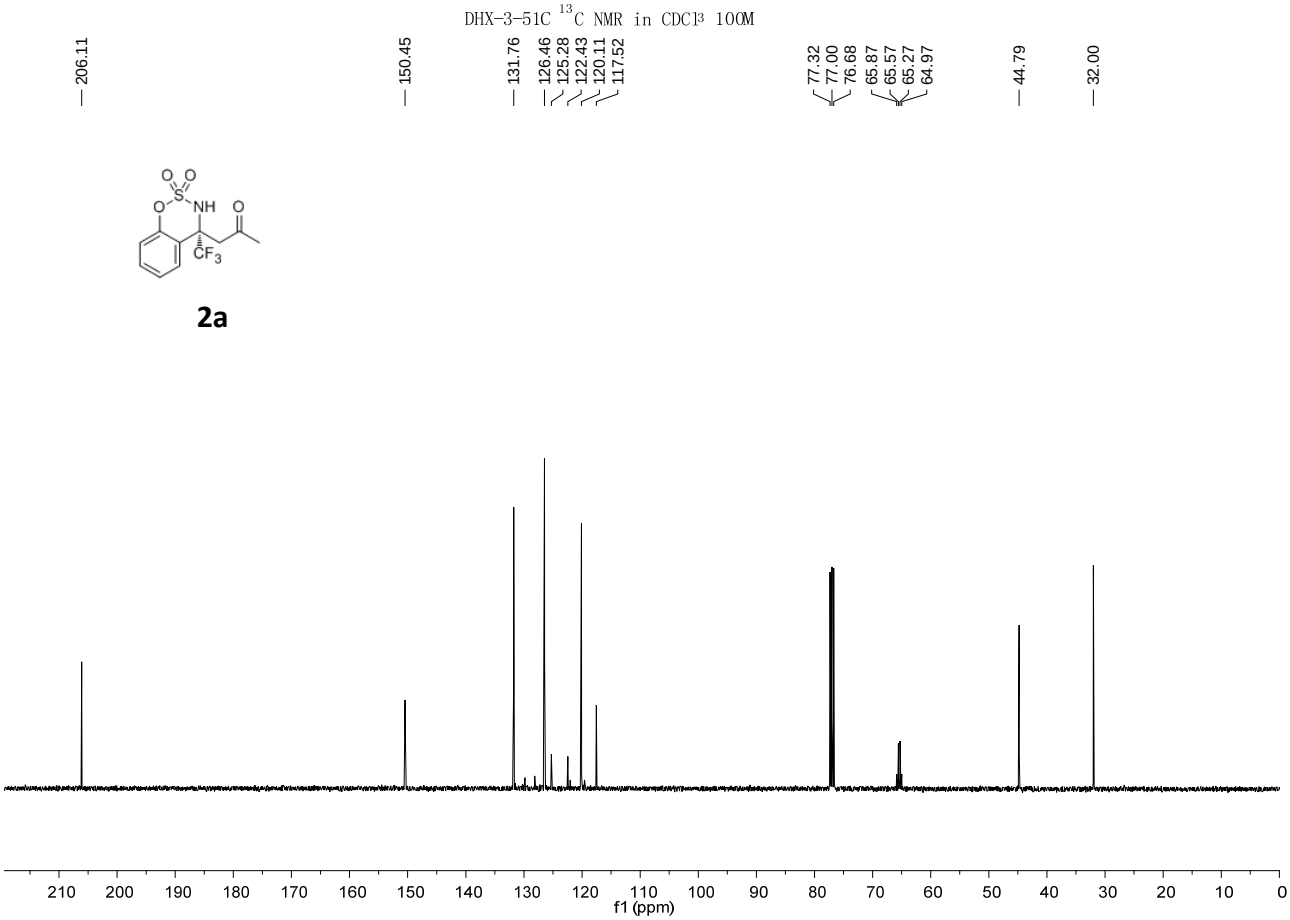
α/°	90
β/°	90
γ/°	90
Volume/Å^3	1982.68(17)
Z	4
ρ_{calc}g/cm^3	1.507
μ/mm^{-1}	3.233
F(000)	920.0
Crystal size/mm^3	0.26 × 0.2 × 0.16
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	7.584 to 134.07
Index ranges	$-9 \leq h \leq 10$, $-9 \leq k \leq 11$, $-19 \leq l \leq 27$
Reflections collected	8370
Independent reflections	3538 [R_{int} = 0.0279, R_{sigma} = 0.0338]
Data/restraints/parameters	3538/0/267
Goodness-of-fit on F^2	1.028
Final R indexes [I>=2σ (I)]	R_1 = 0.0422, wR_2 = 0.1072
Final R indexes [all data]	R_1 = 0.0524, wR_2 = 0.1156
Largest diff. peak/hole / e Å^{-3}	0.19/-0.22
Flack parameter	0.029(13)

DHX-3-51C ^{1}H NMR in CDCl$_3$ 300M

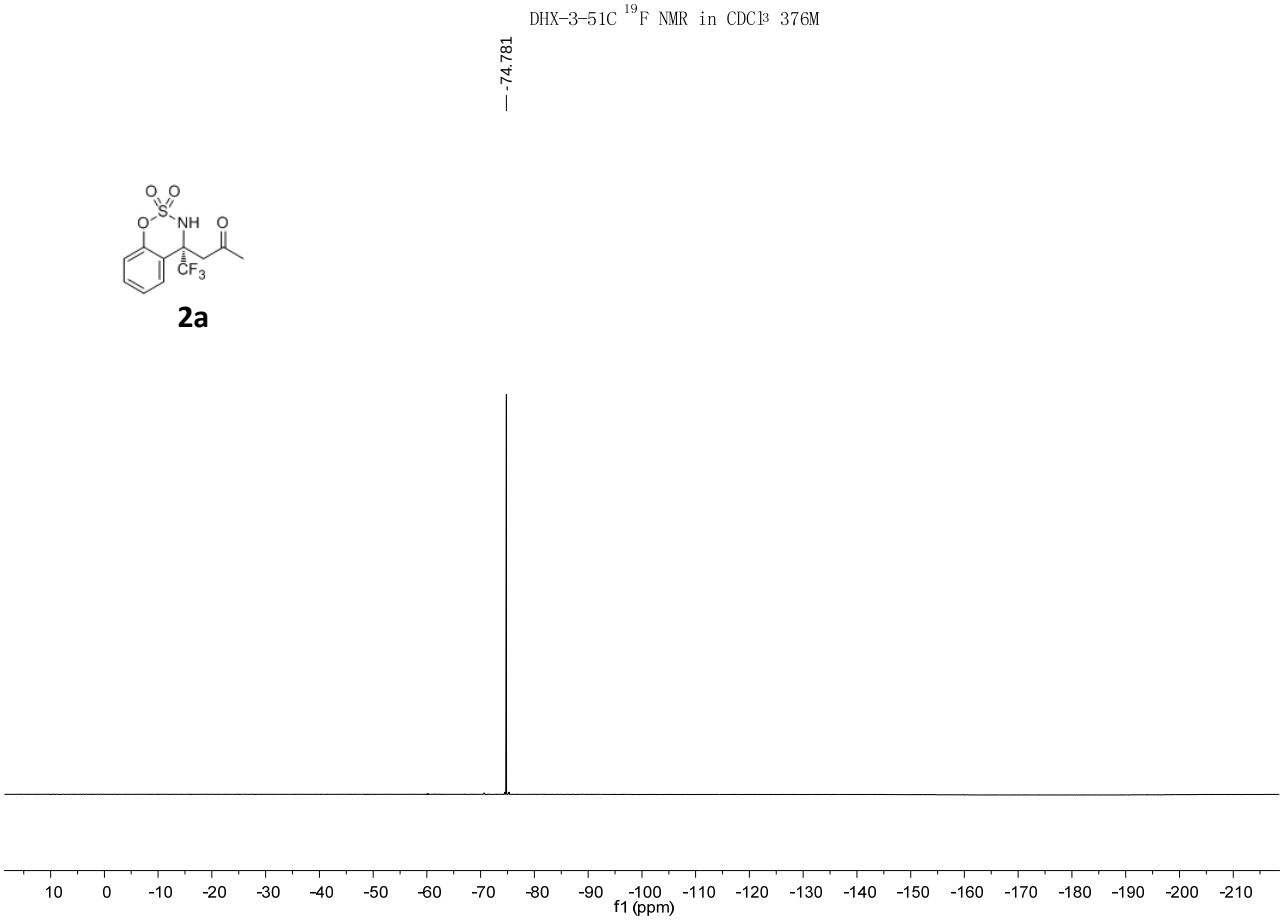


2a

DHX-3-51C ^{13}C NMR in CDCl$_3$ 100M

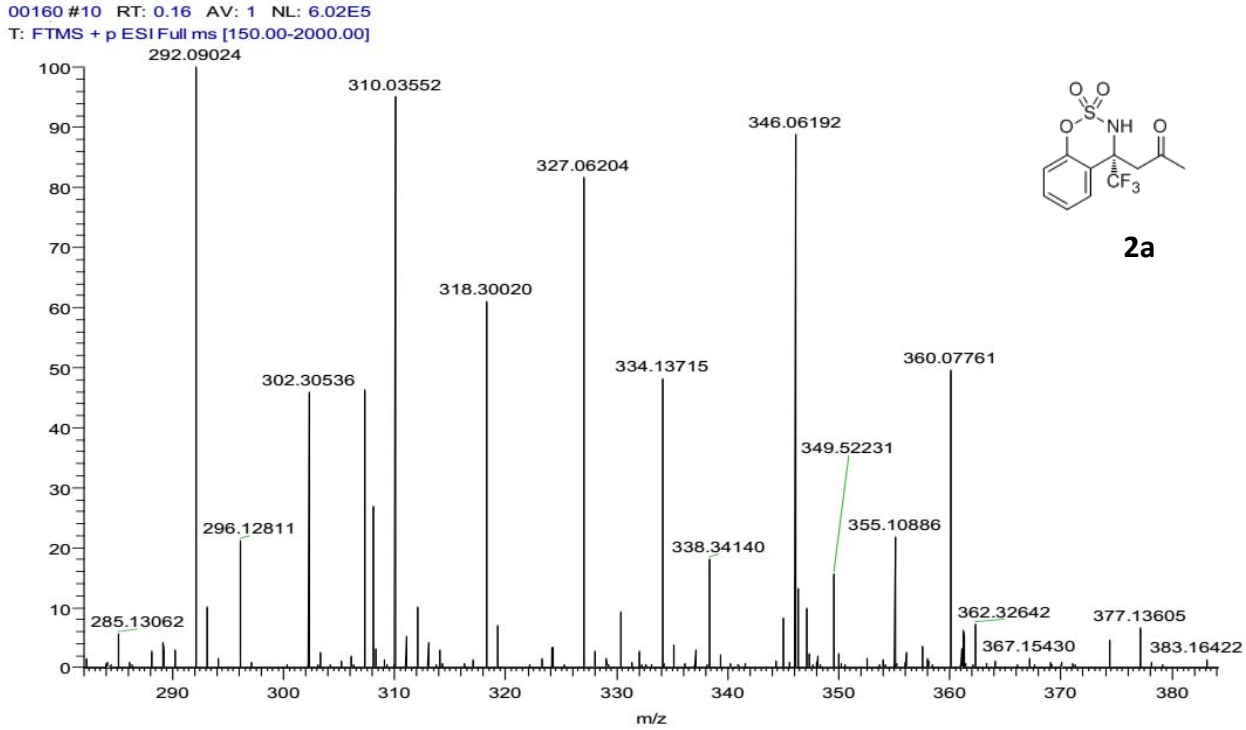


2a

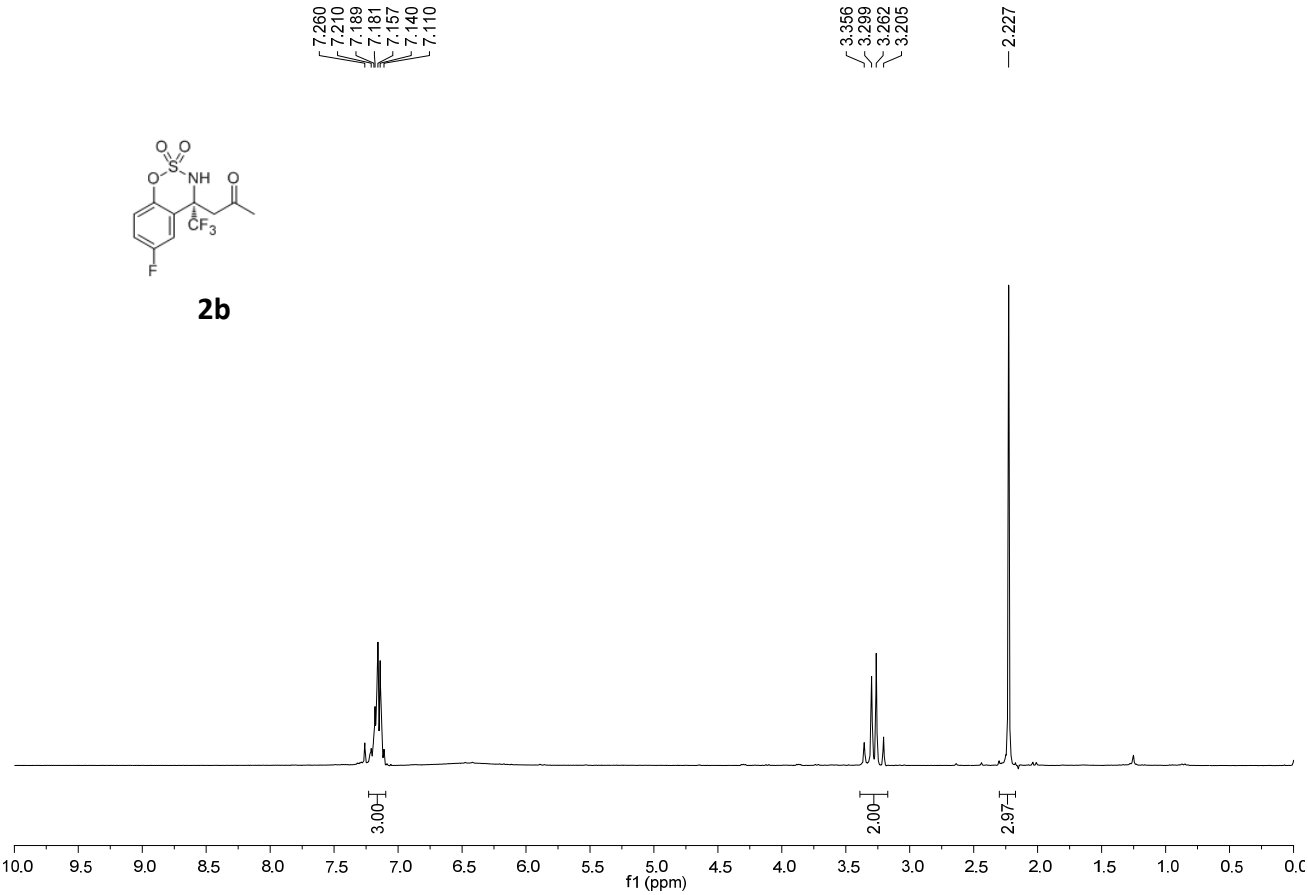


HRMS for 2a

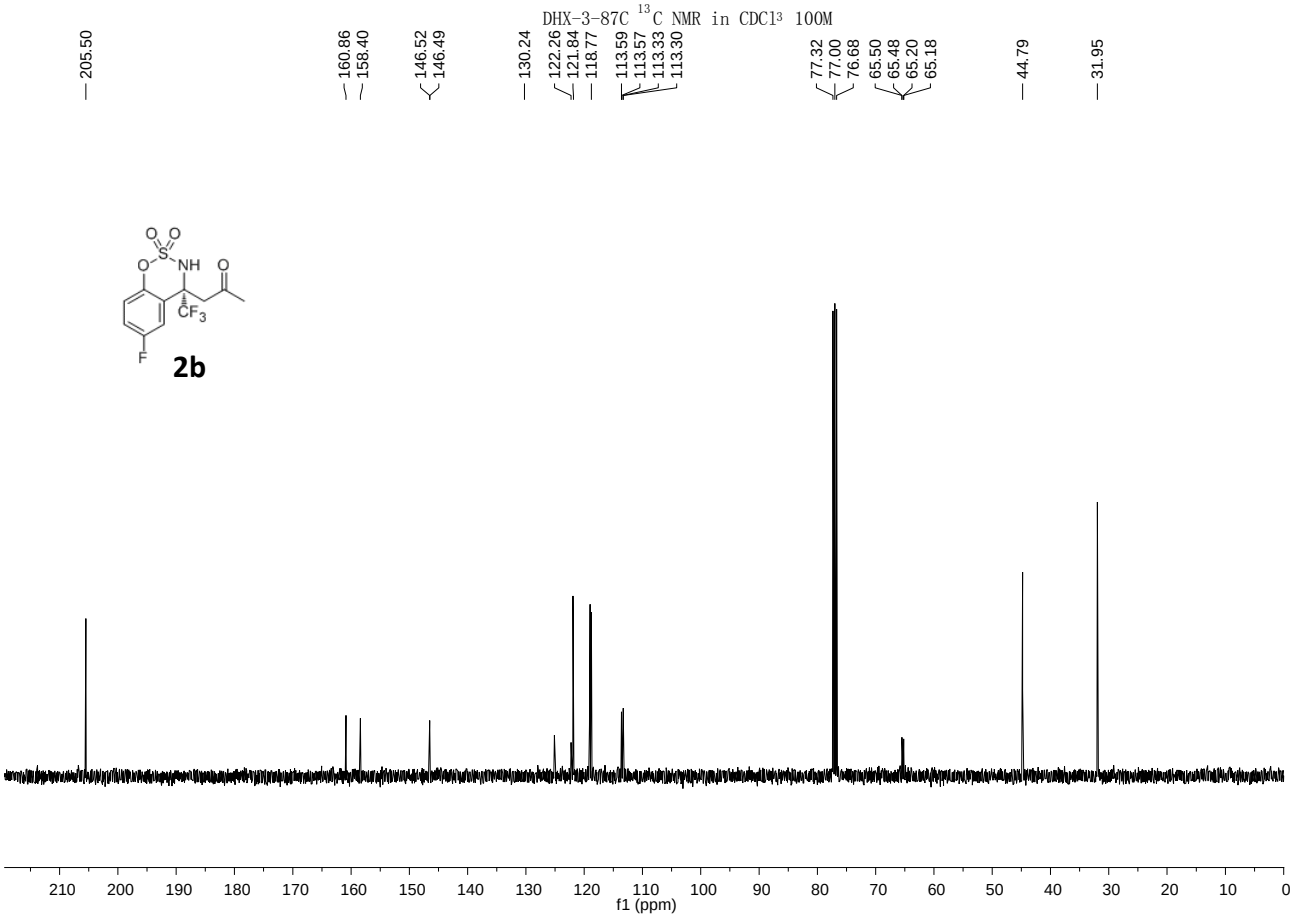
DHX-3-17-H: HRMS (ESI) m/z calcd for $C_{11}H_{11}F_3NO_4S^+$ $(M+H)^+$ 310.03554, found 310.03552.

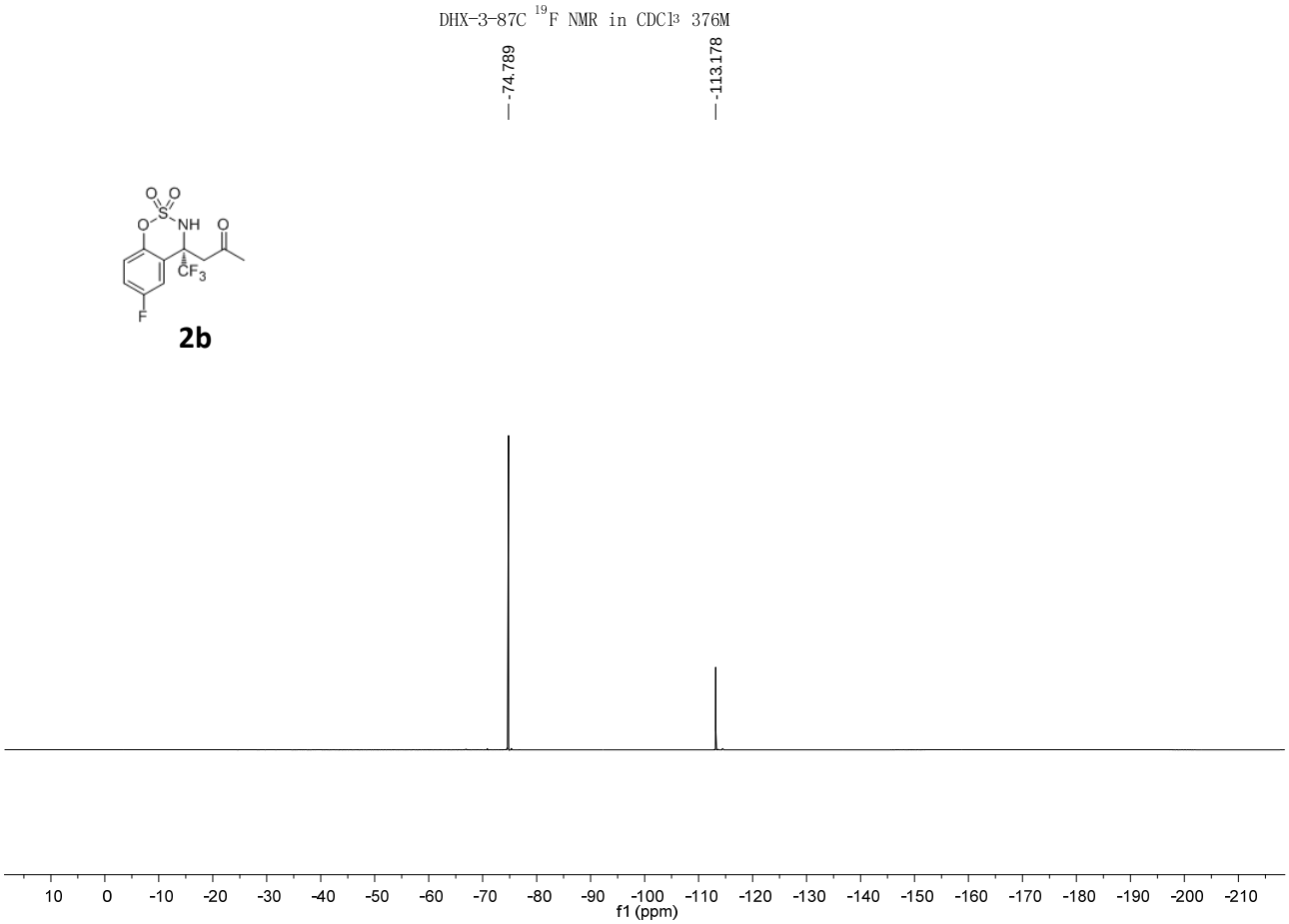


DHX-3-87C ^{1}H NMR in CDCl^{3} 300M



DHX-3-87C ^{13}C NMR in CDCl^{3} 100M

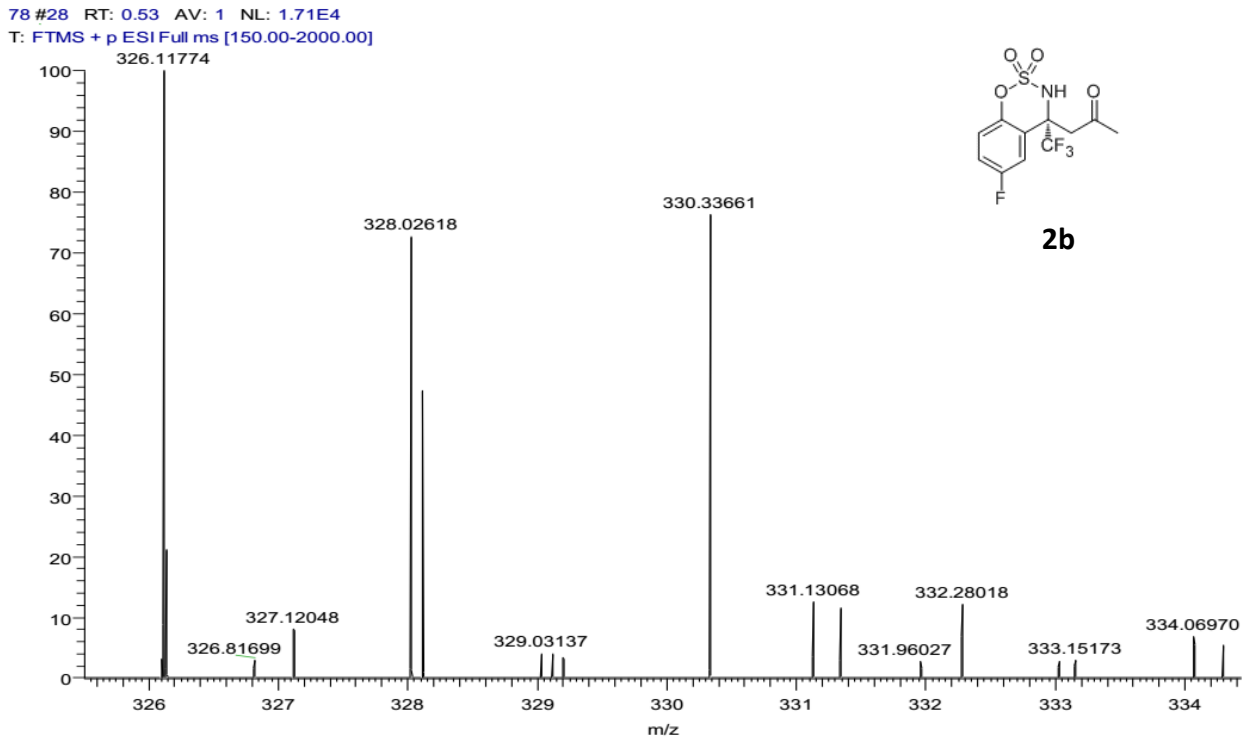




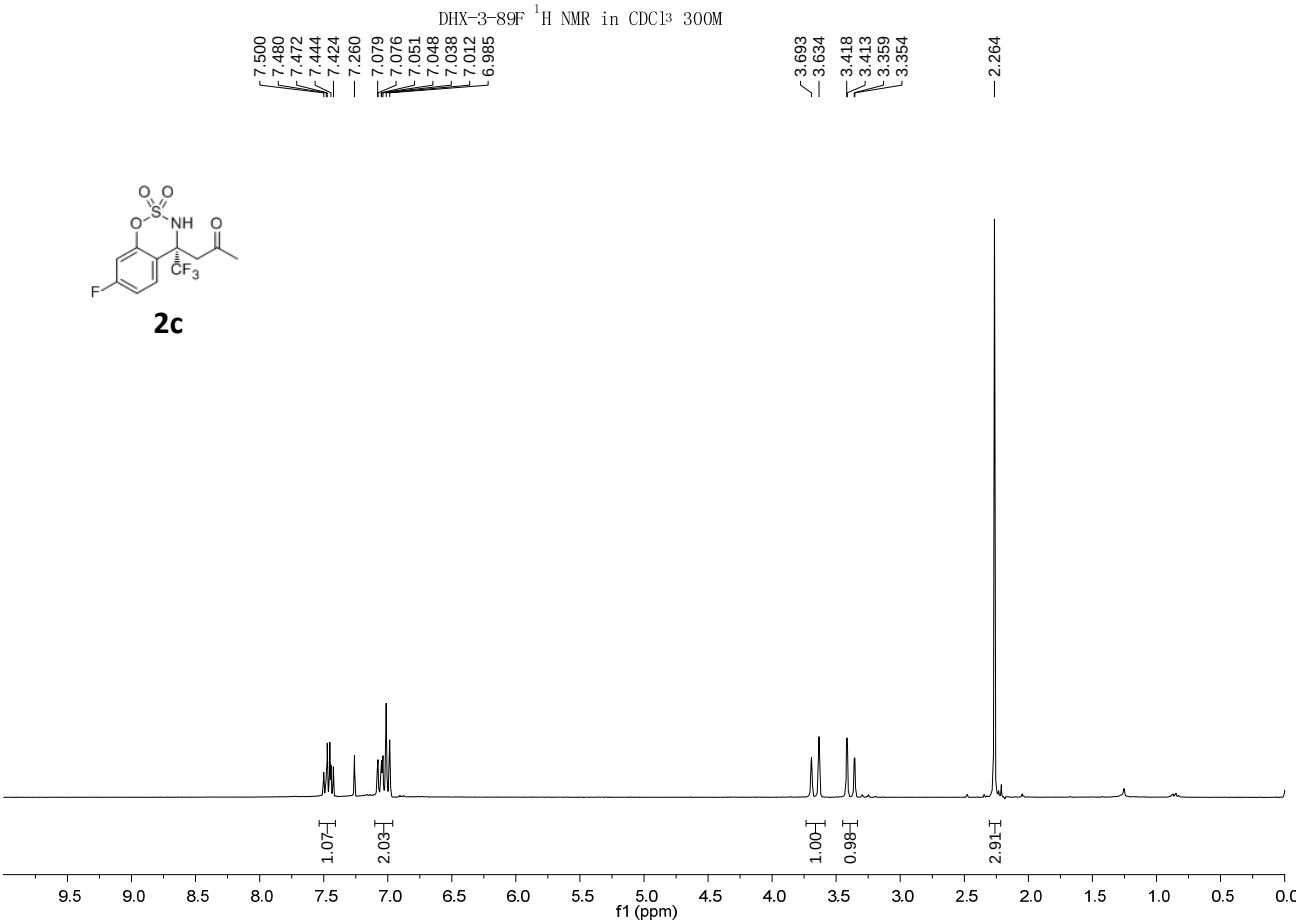
HRMS for 2b

DHX-3-87C: HRMS (ESI) m/z calcd for $C_{11}H_{10}F_4NO_4S^+$ $(M+H)^+$ 328.02612, founc

328.02618.

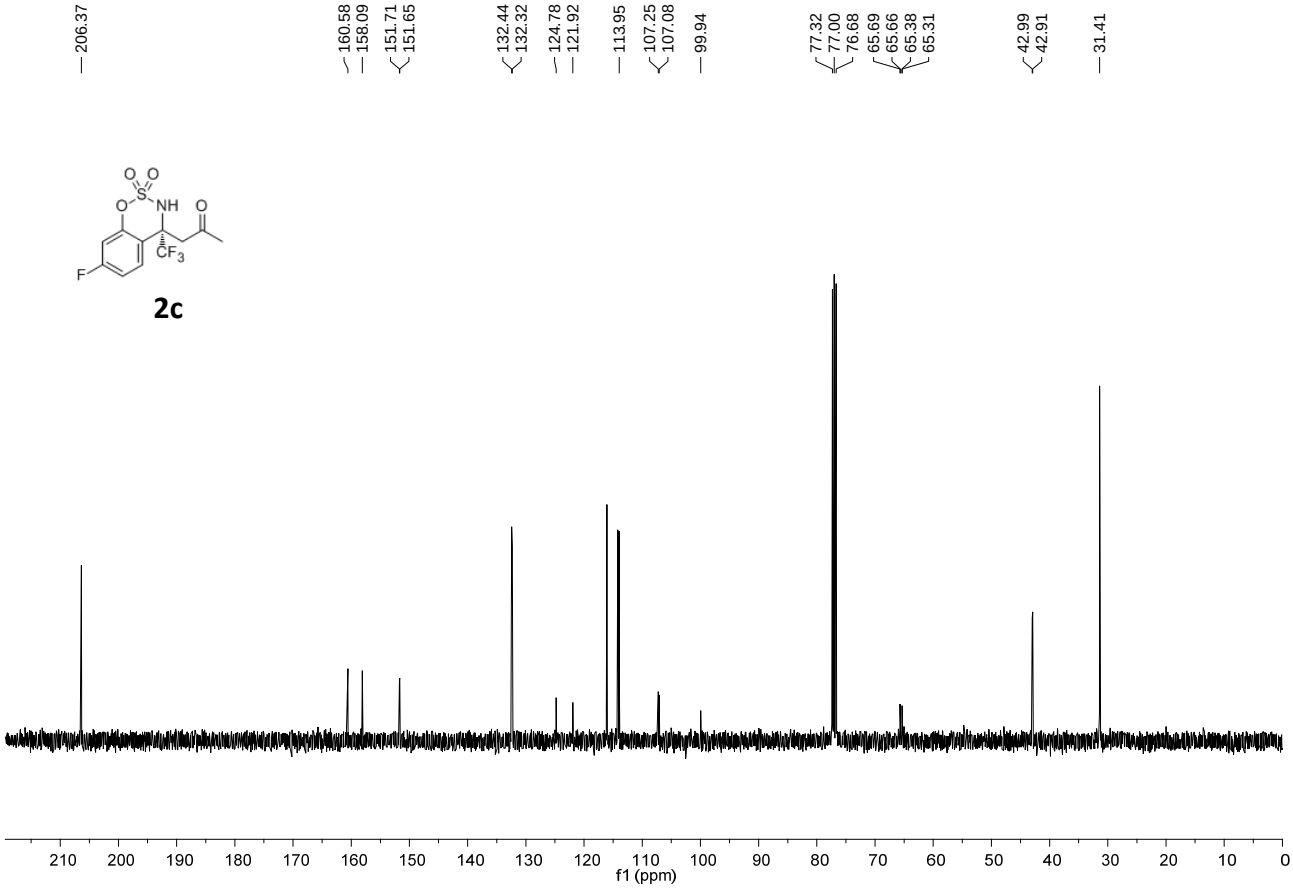


DHX-3-89F ^{1}H NMR in CDCl^{3} 300M

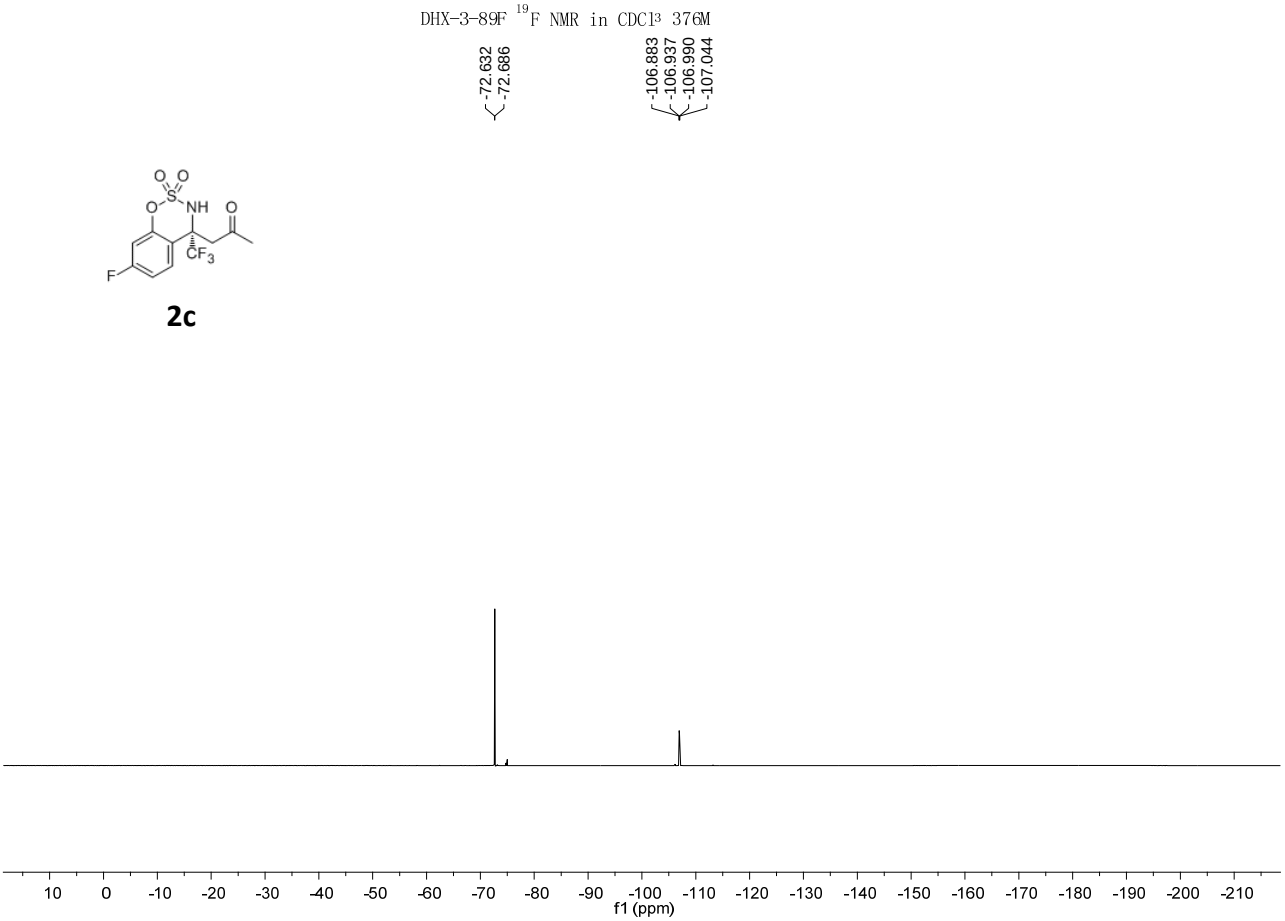


2c

DHX-3-89F ^{13}C NMR in CDCl^{3} 100M

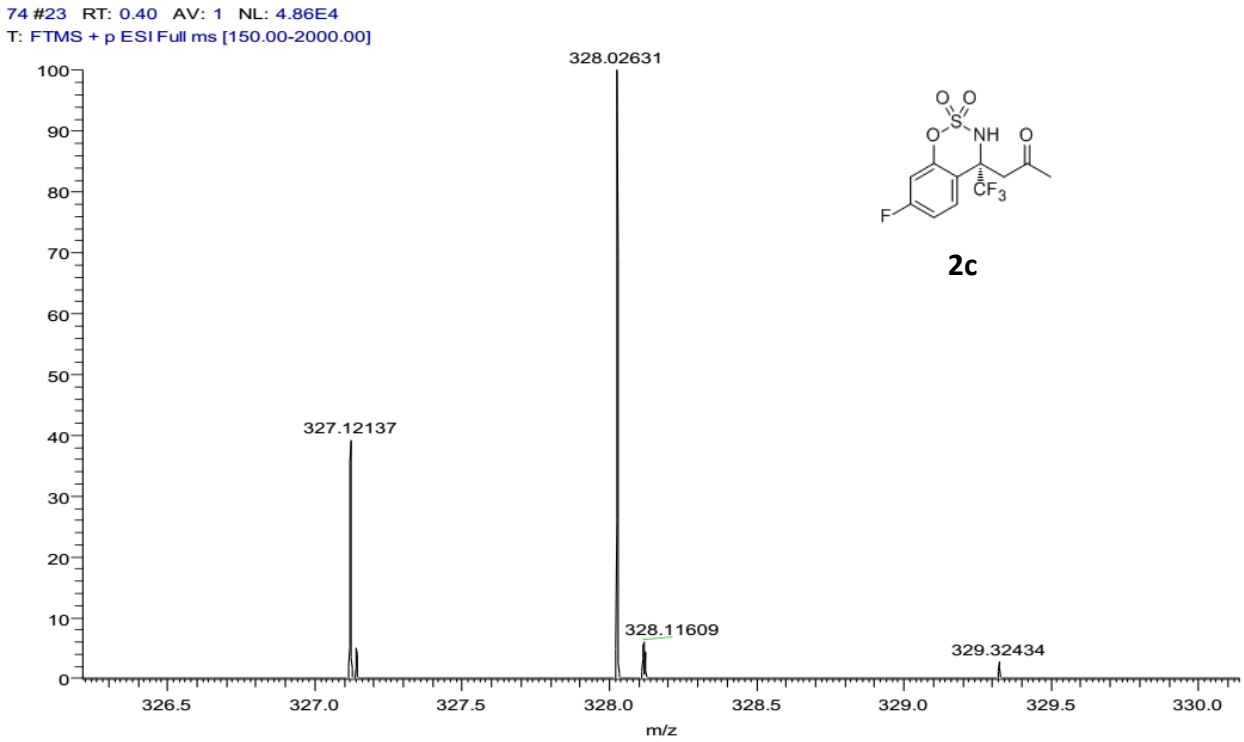


2c

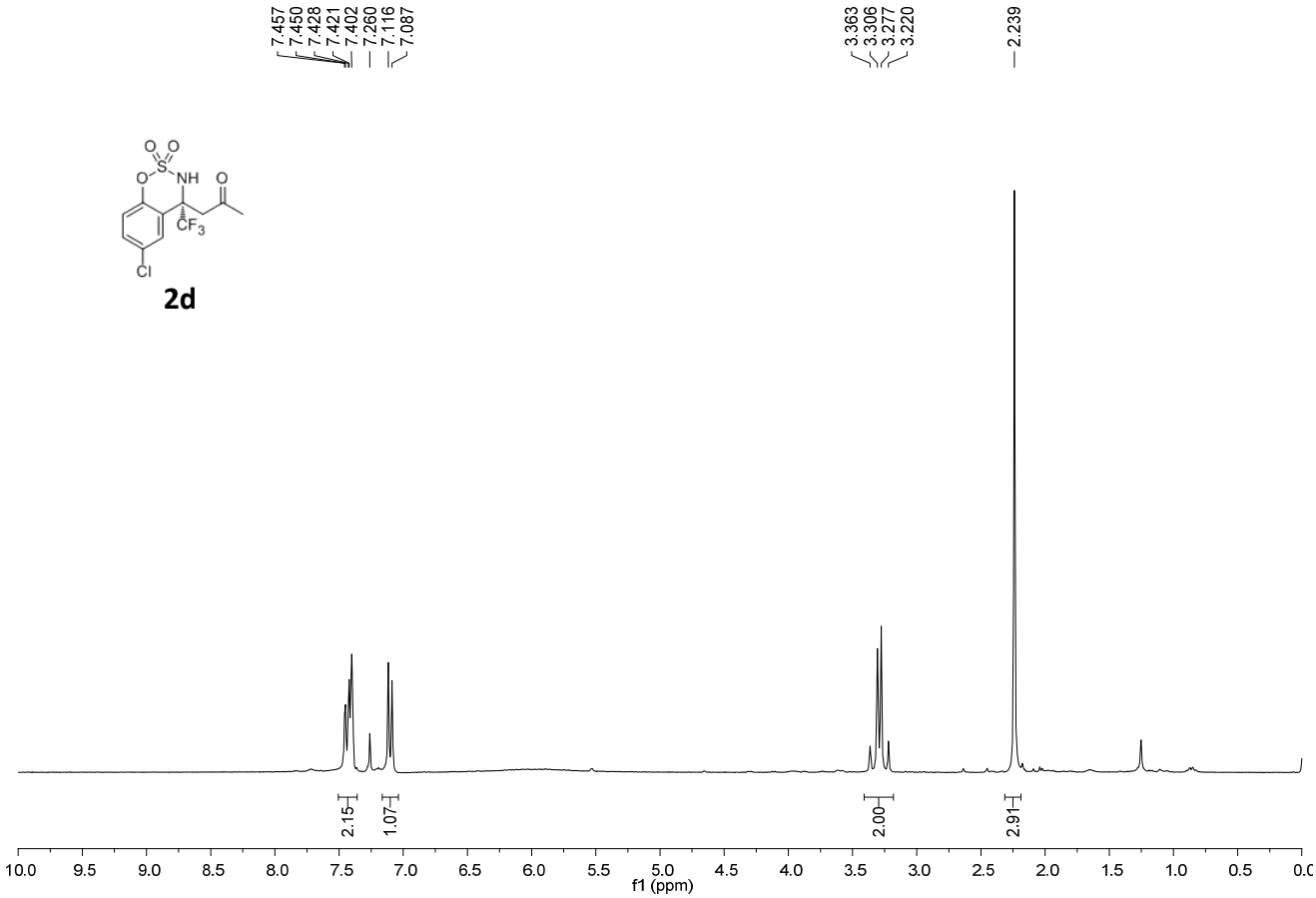


HRMS for 2c

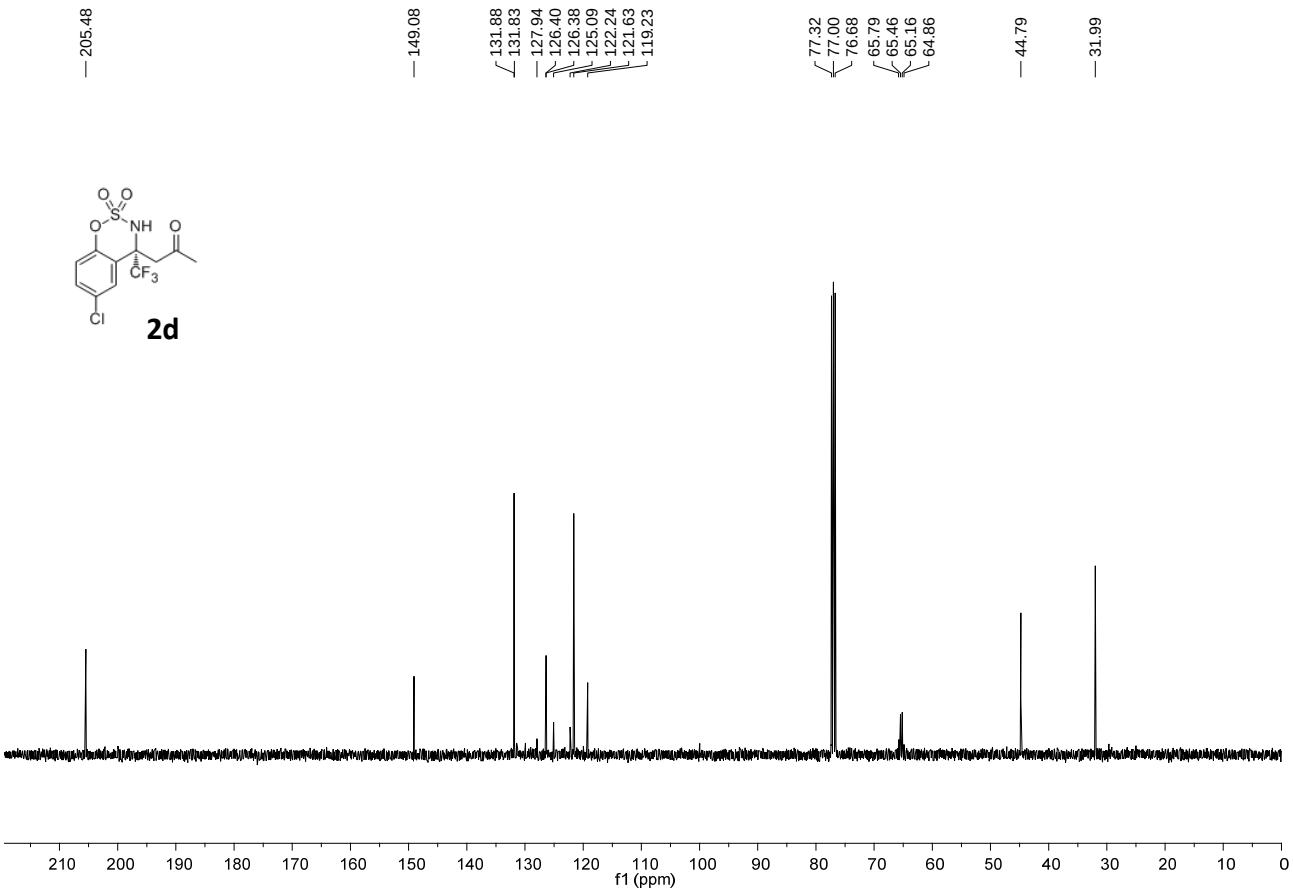
DHX-3-89F: HRMS (ESI) m/z calcd for $C_{11}H_{10}F_4NO_4S^+$ $(M+H)^+$ 328.02612, found 328.02631.

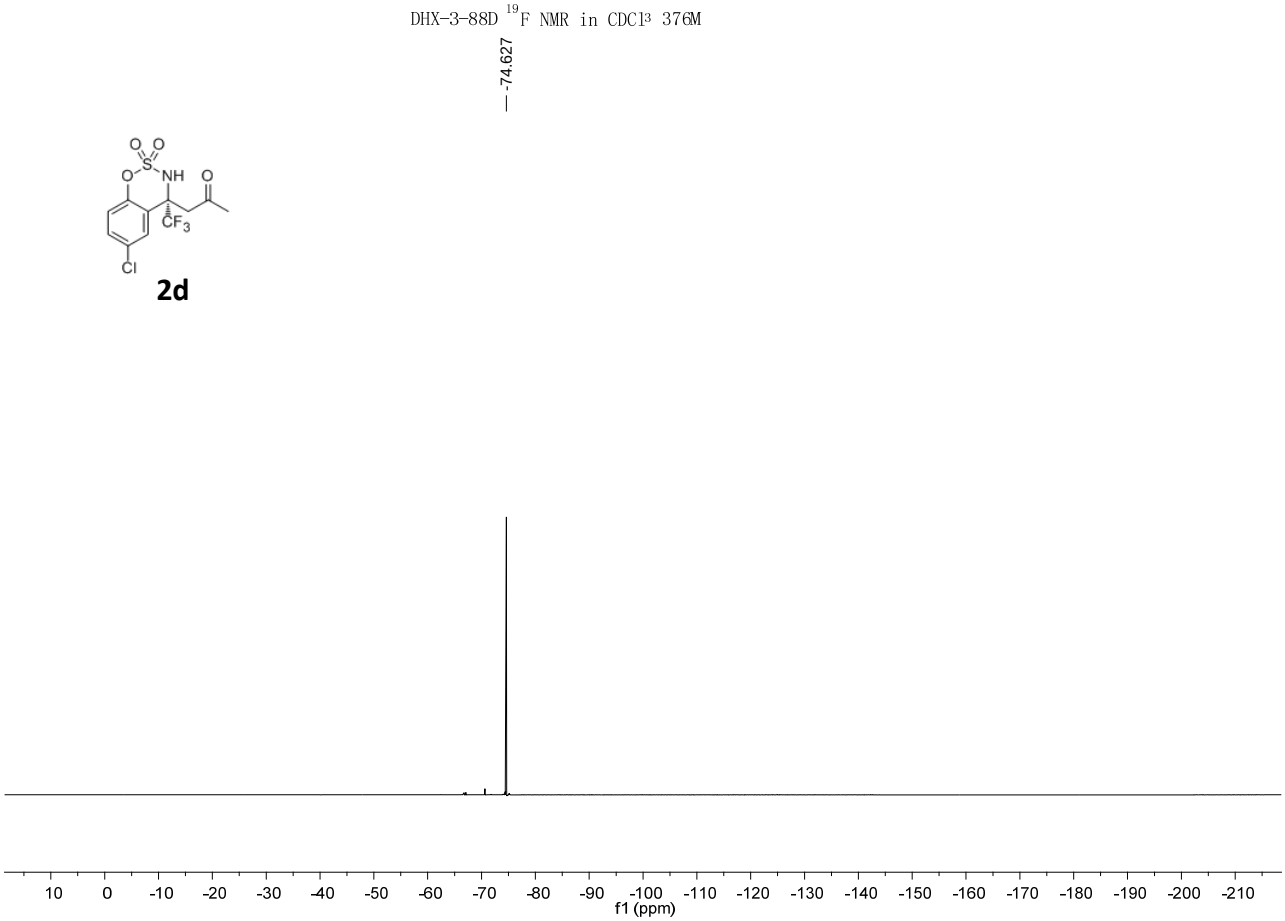


DHX-3-88D ^{1}H NMR in CDCl^{3} 300M



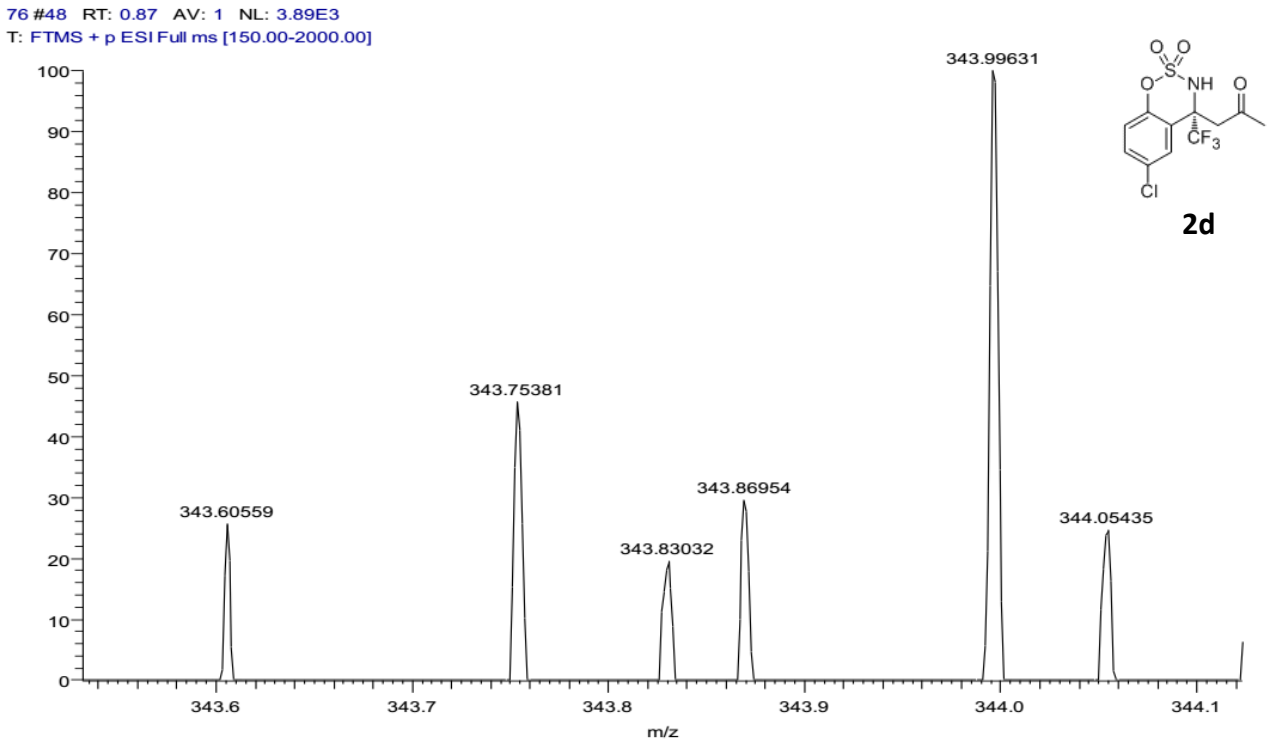
DHX-3-88D ^{13}C NMR in CDCl^{3} 100M

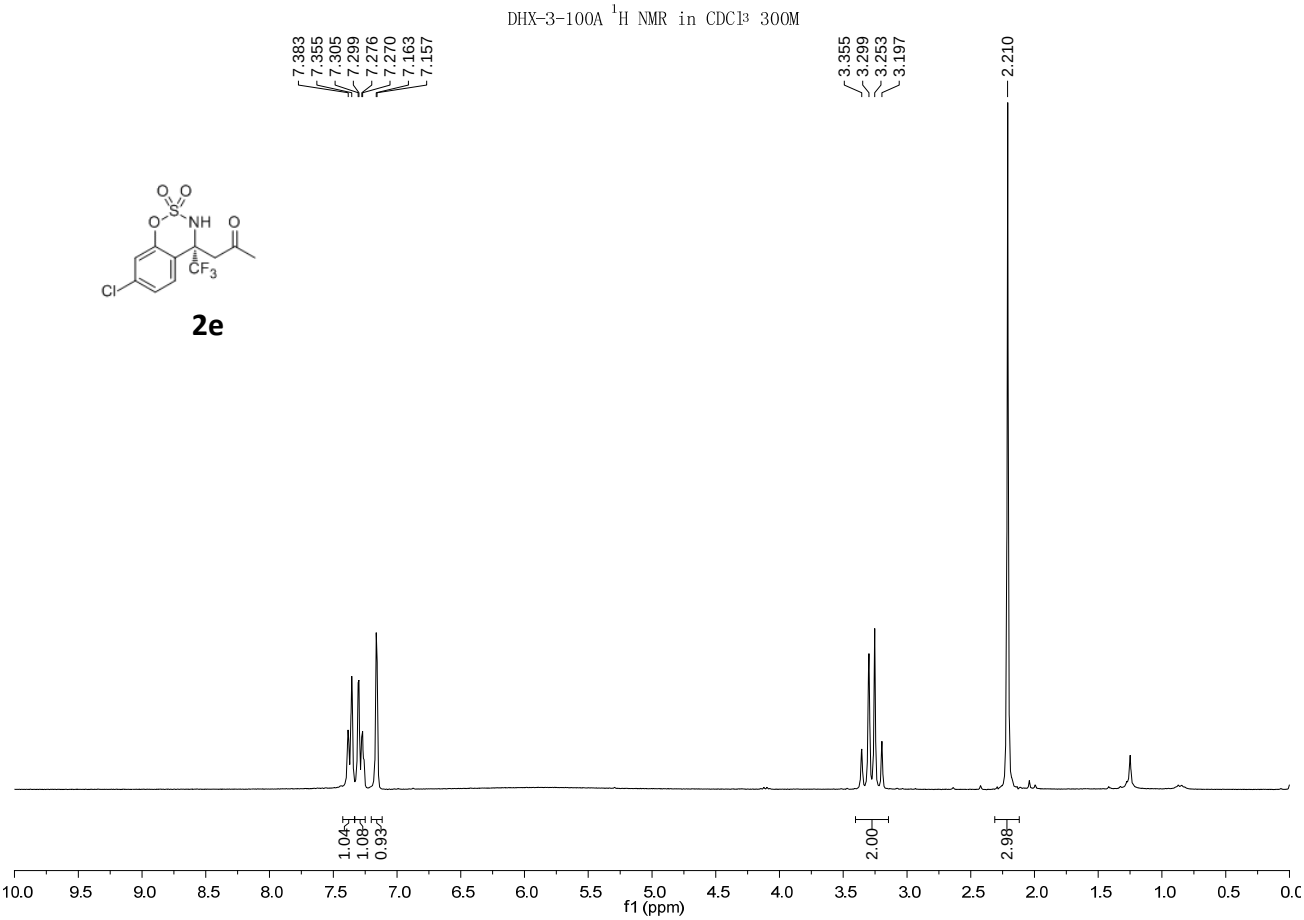




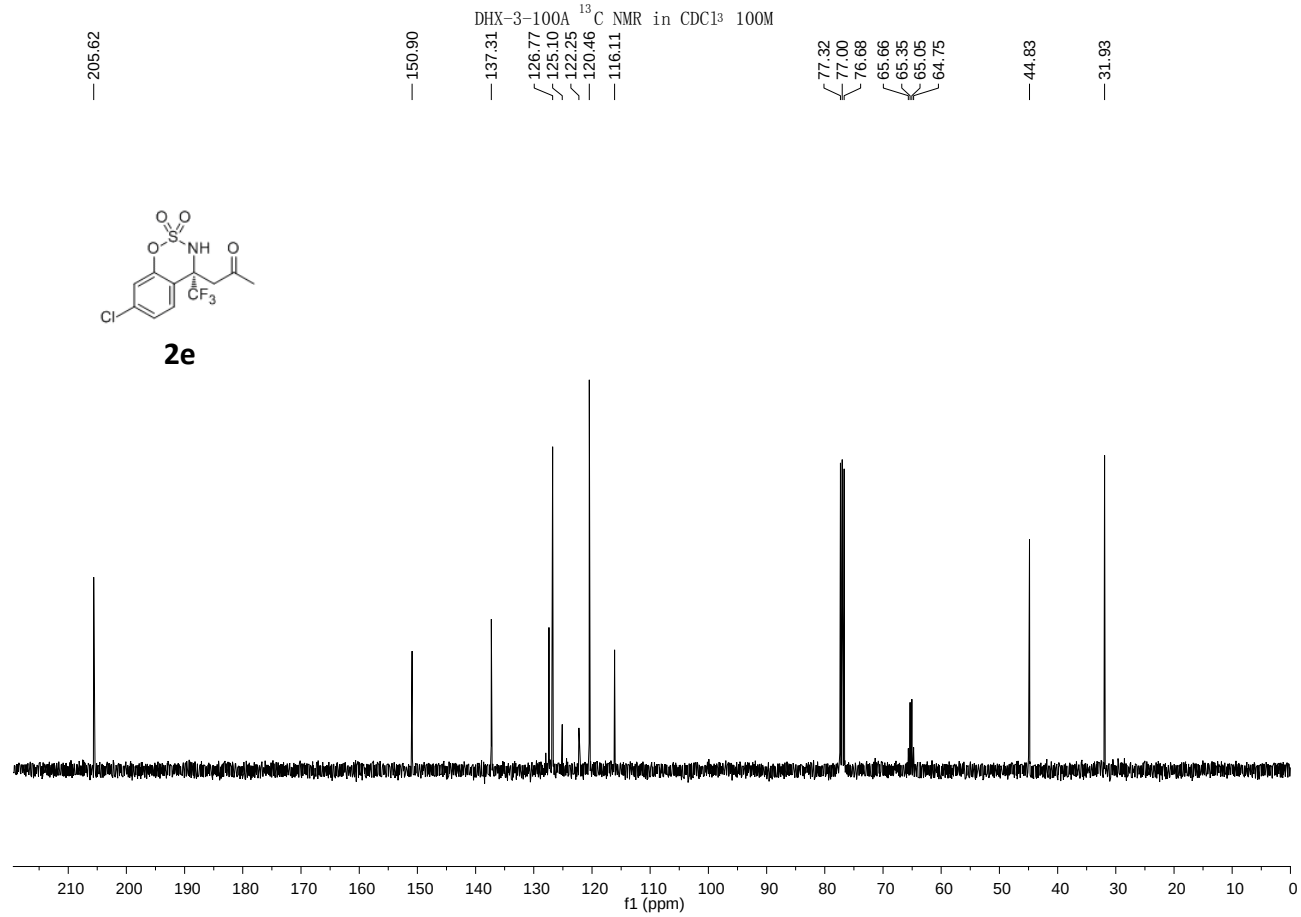
HRMS for 2d

DHX-3-88D: HRMS (ESI) m/z calcd for $C_{11}H_{10}ClF_3NO_4S^+$ $(M+H)^+$ 343.99657, found 343.99631.

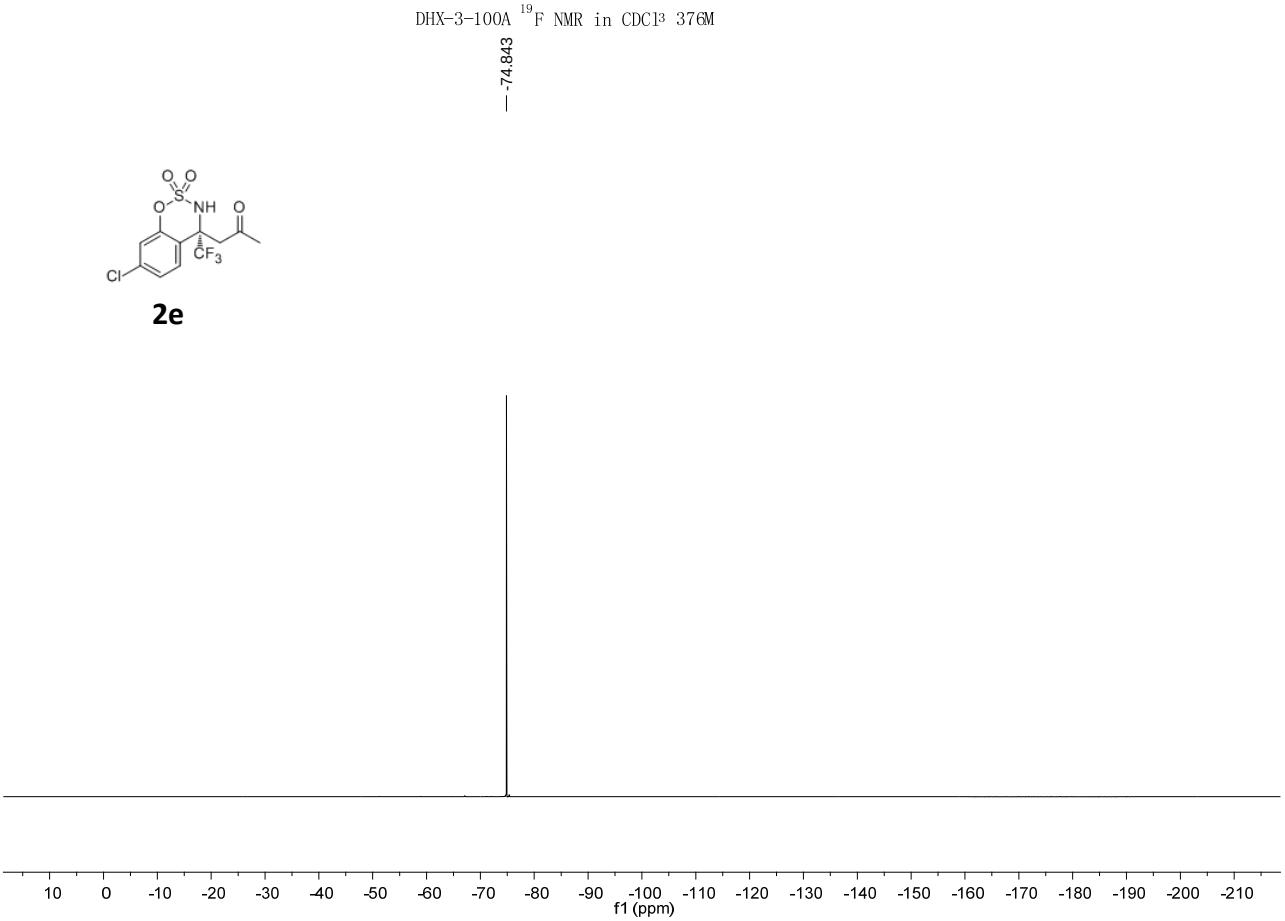



DHX-3-100A ^{1}H NMR in CDCl3 300M
7.383
7.355
7.305
7.299
7.276
7.270
7.163
7.157
3.355
3.299
3.253
3.197
2.210
1.04
1.08
0.93
2.00
2.98
f1 (ppm)

2e

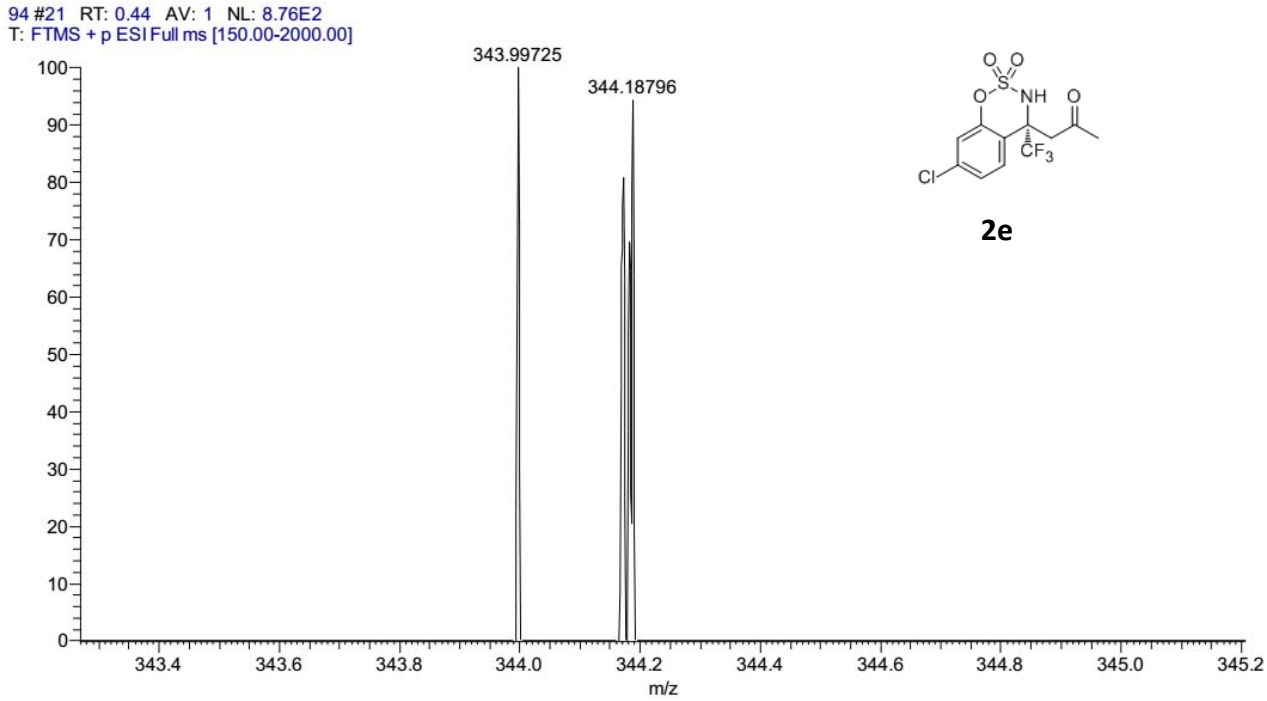

DHX-3-100A ^{13}C NMR in CDCl3 100M
205.62
150.90
137.31
126.77
125.10
122.25
120.46
116.11
77.32
77.00
76.68
65.66
65.35
65.05
64.75
44.83
31.93
f1 (ppm)

2e

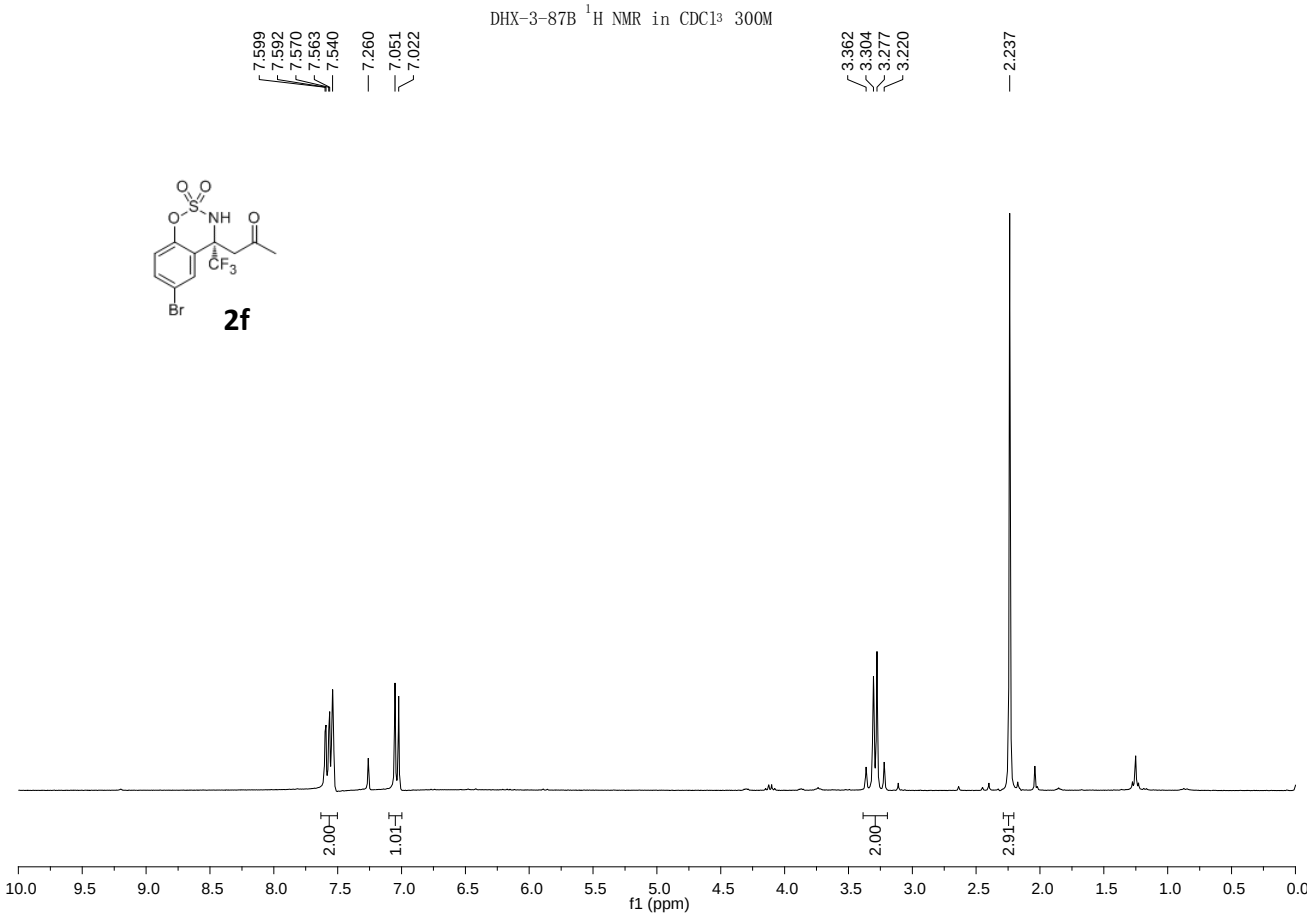


HRMS for 2e

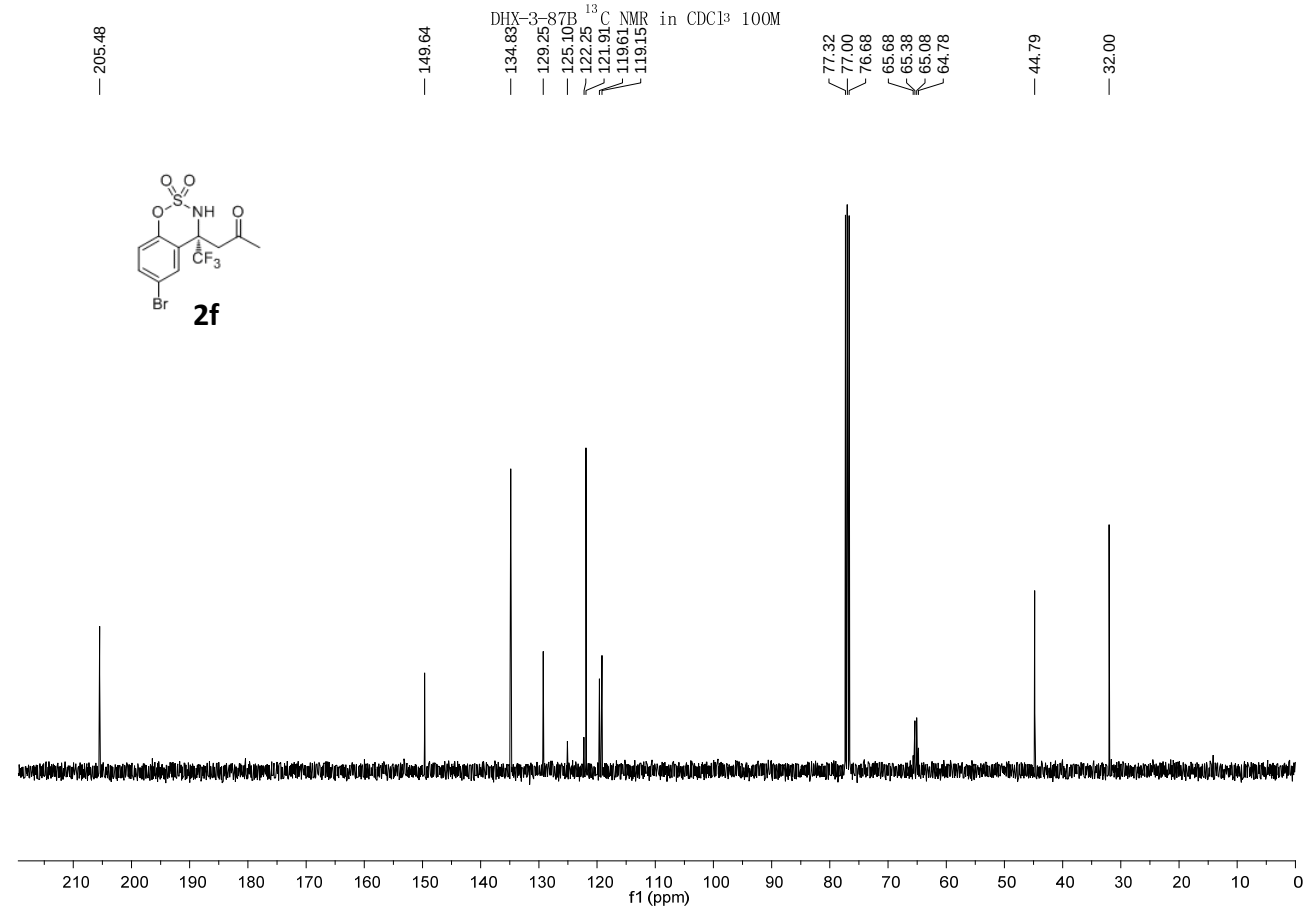
DHX-3-100A. HRMS (ESI) m/z calcd for $C_{11}H_{10}ClF_3NO_4S^+$ $(M+H)^+$ 343.99657, found 343.99725.

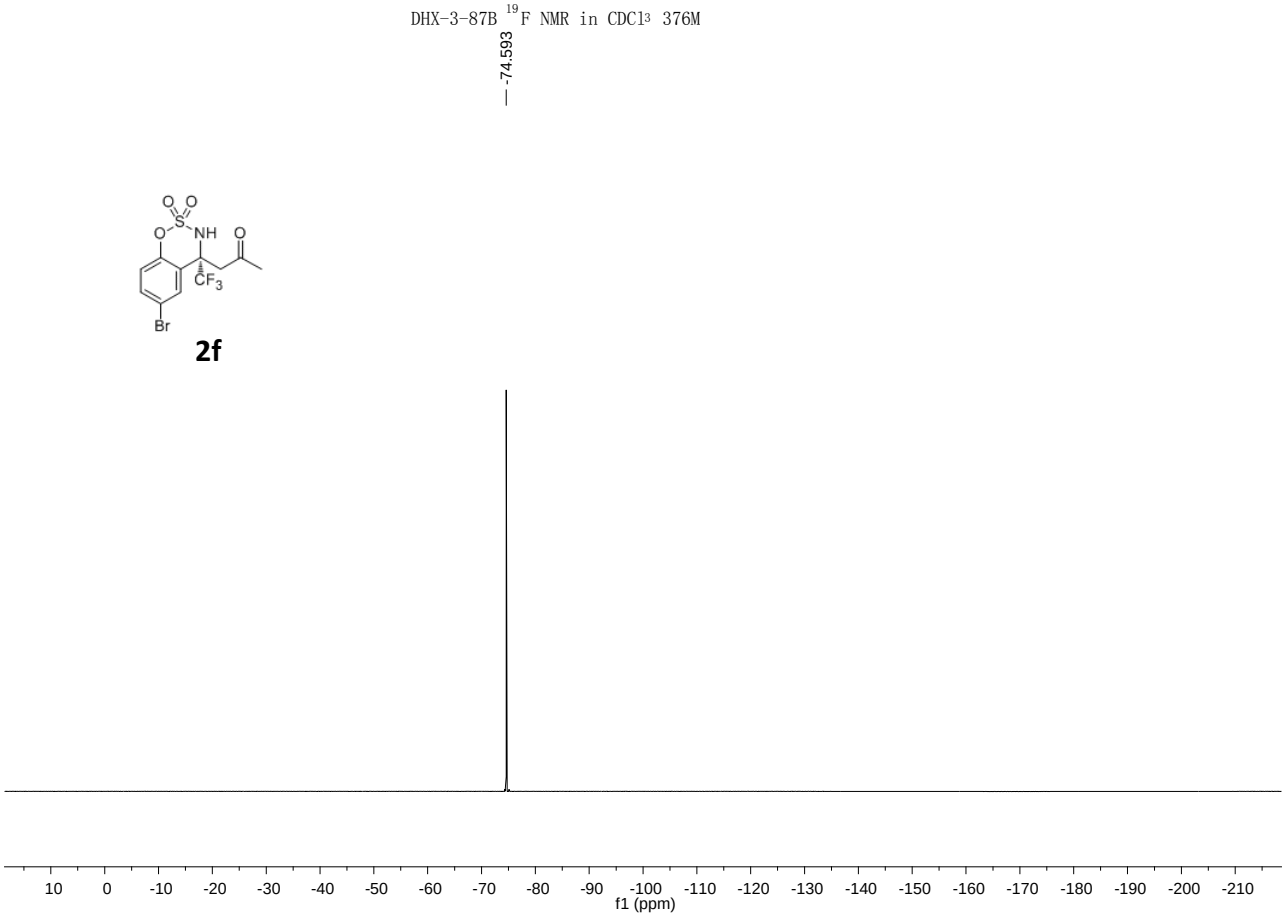


DHX-3-87B ^{1}H NMR in CDCl$_3$ 300M



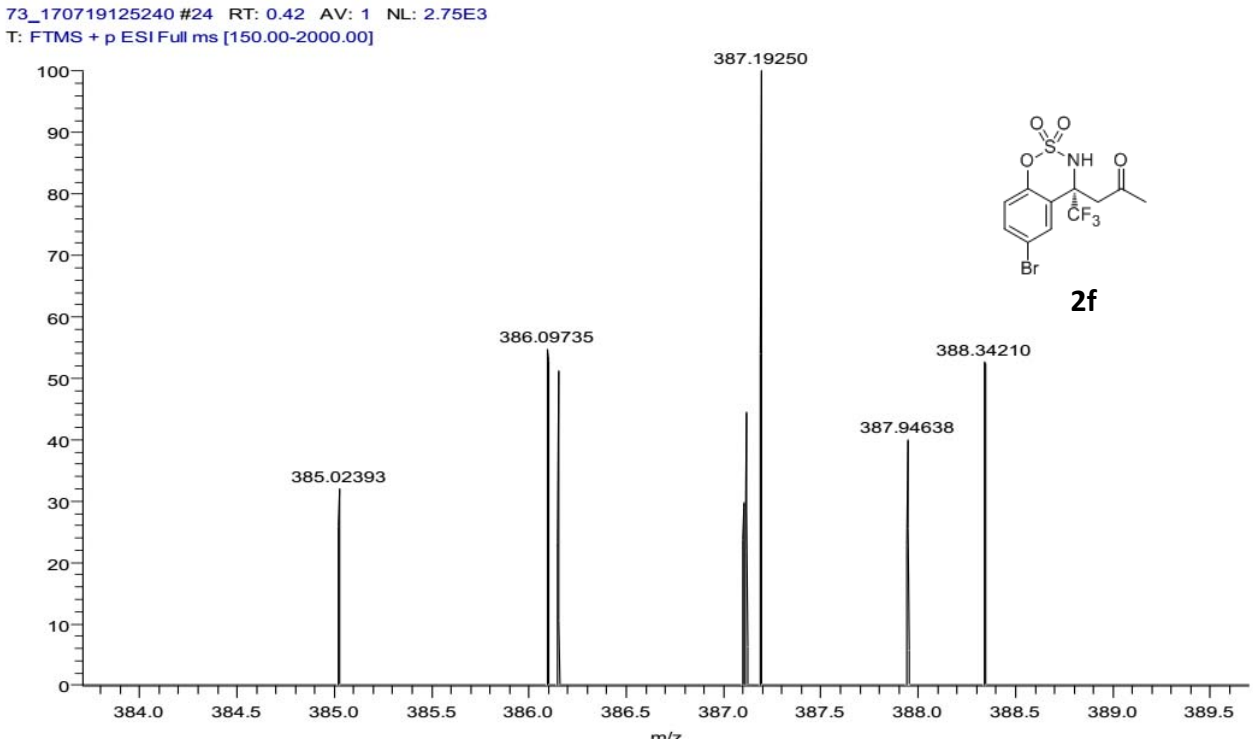
DHX-3-87B ^{13}C NMR in CDCl$_3$ 100M



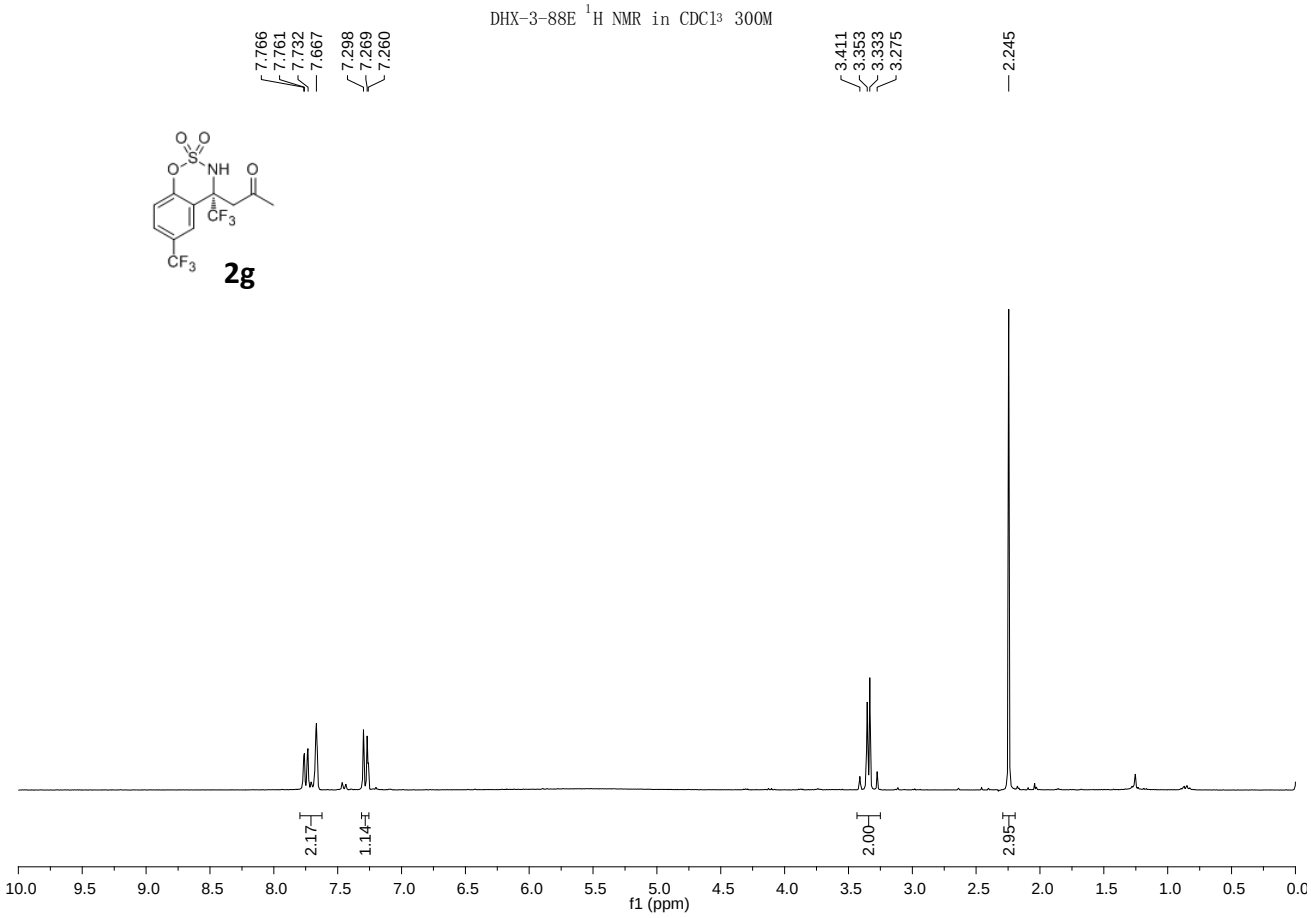


HRMS for 2f

DHX-3-87B: HRMS (ESI) m/z calcd for $C_{11}H_{10}BrF_3NO_4S^+$ $(M+H)^+$ 387.94605, found 387.94638.

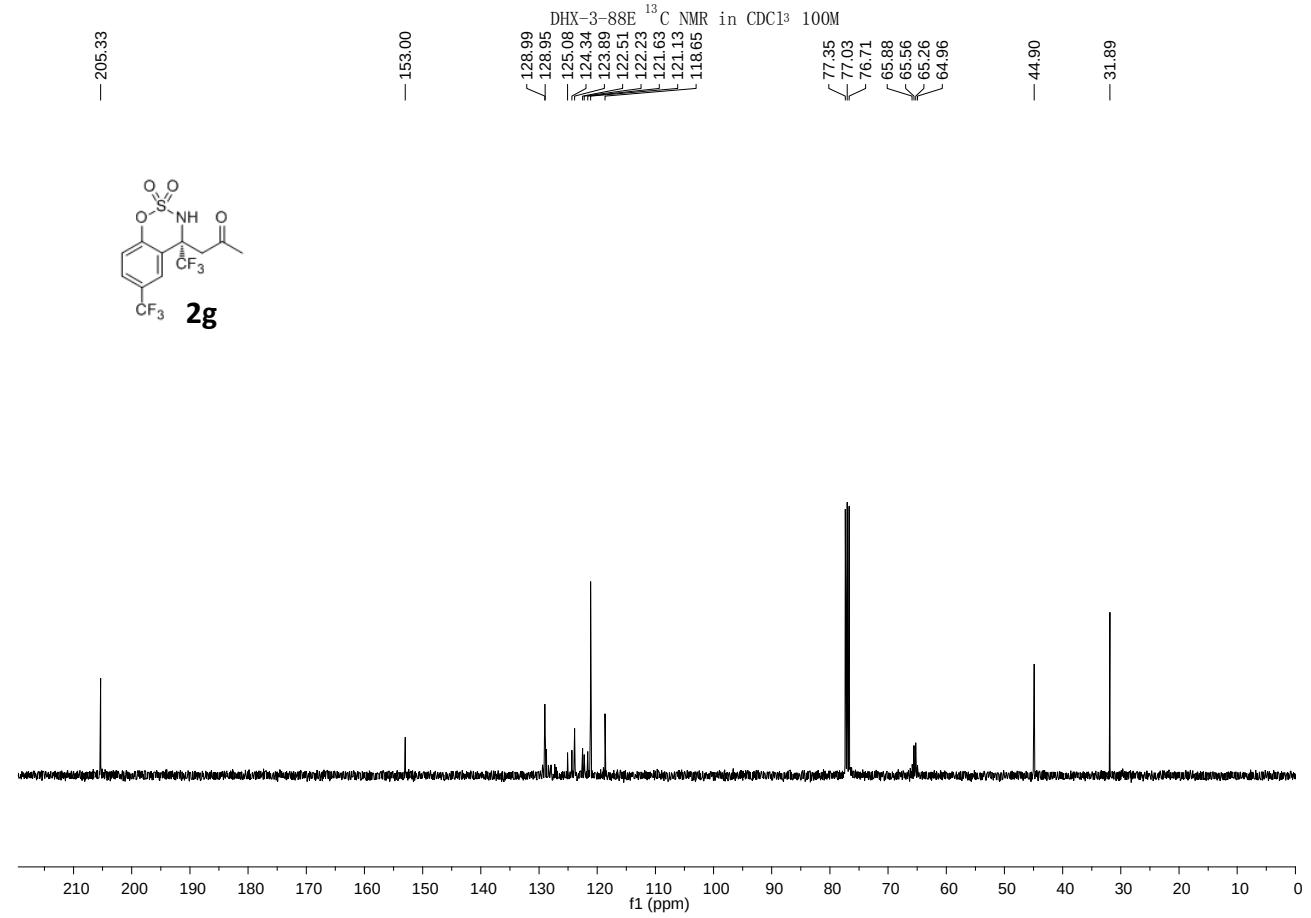


DHX-3-88E ^{1}H NMR in CDCl3 300M

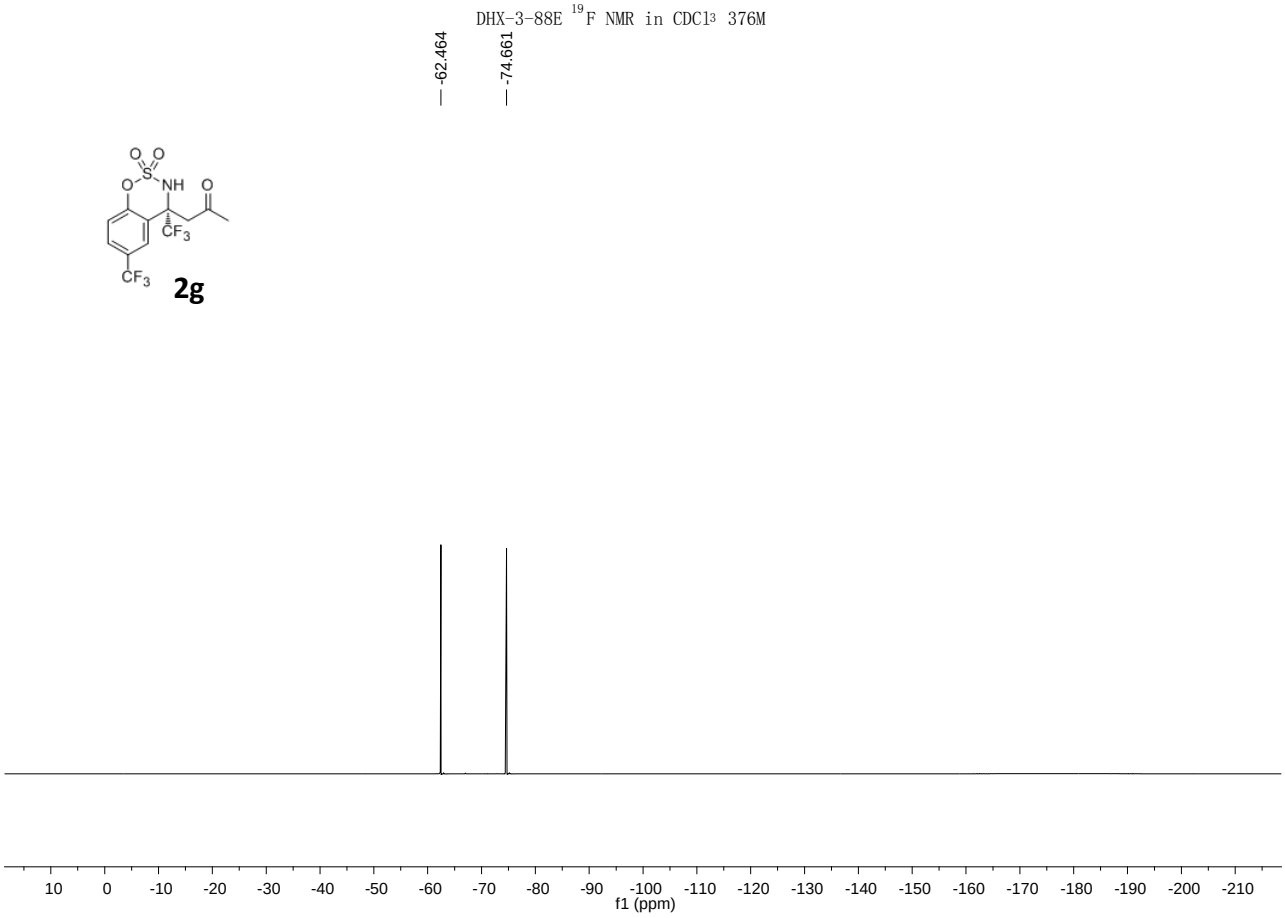


2g

DHX-3-88E ^{13}C NMR in CDCl3 100M

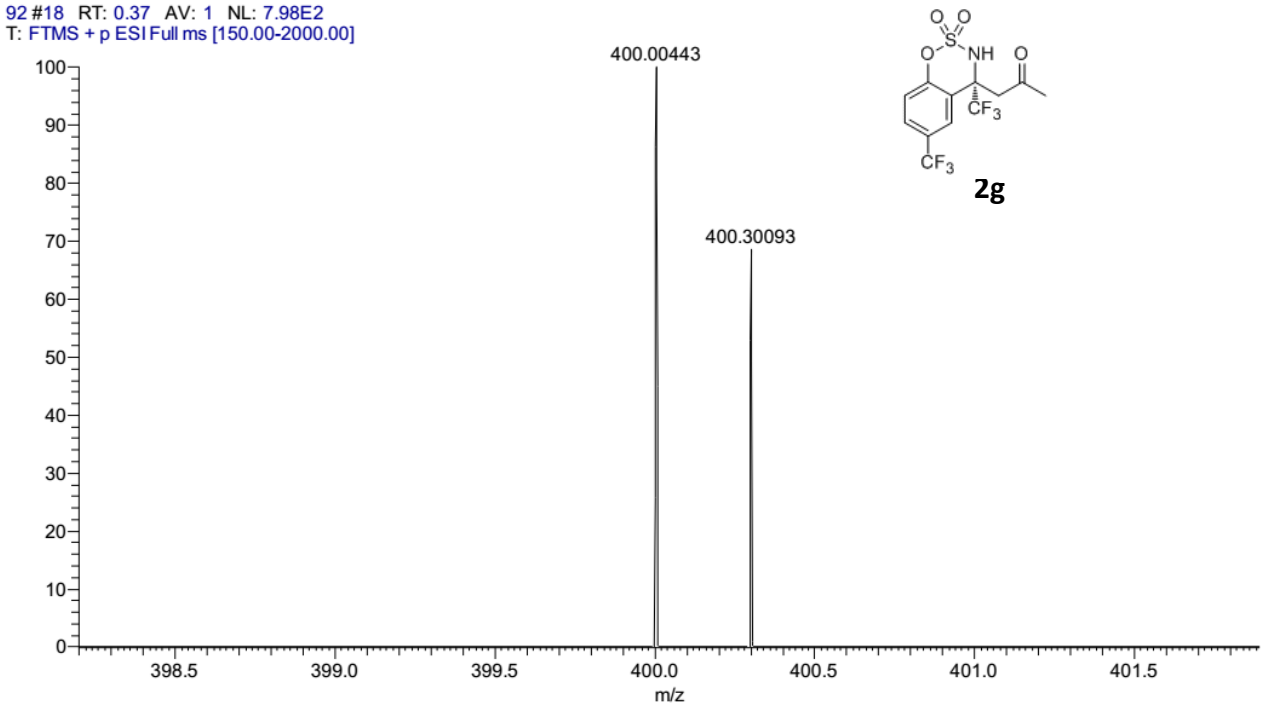


2g

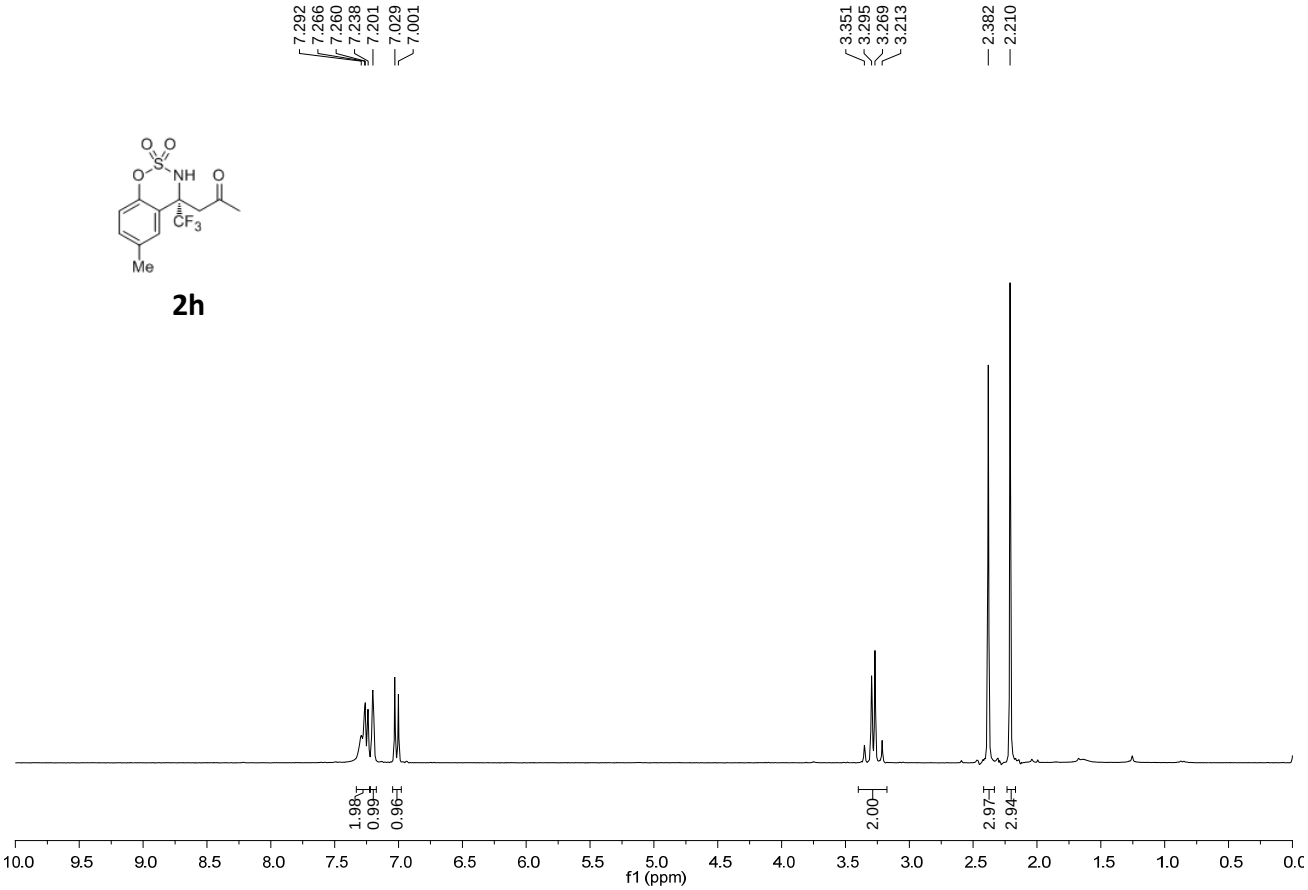


HRMS for 2g

DHX-3-88E. HRMS (ESI) m/z calcd for $C_{12}H_9F_6NO_4SNa^+$ $(M+Na)^+$ 400.00487, found 400.00443.

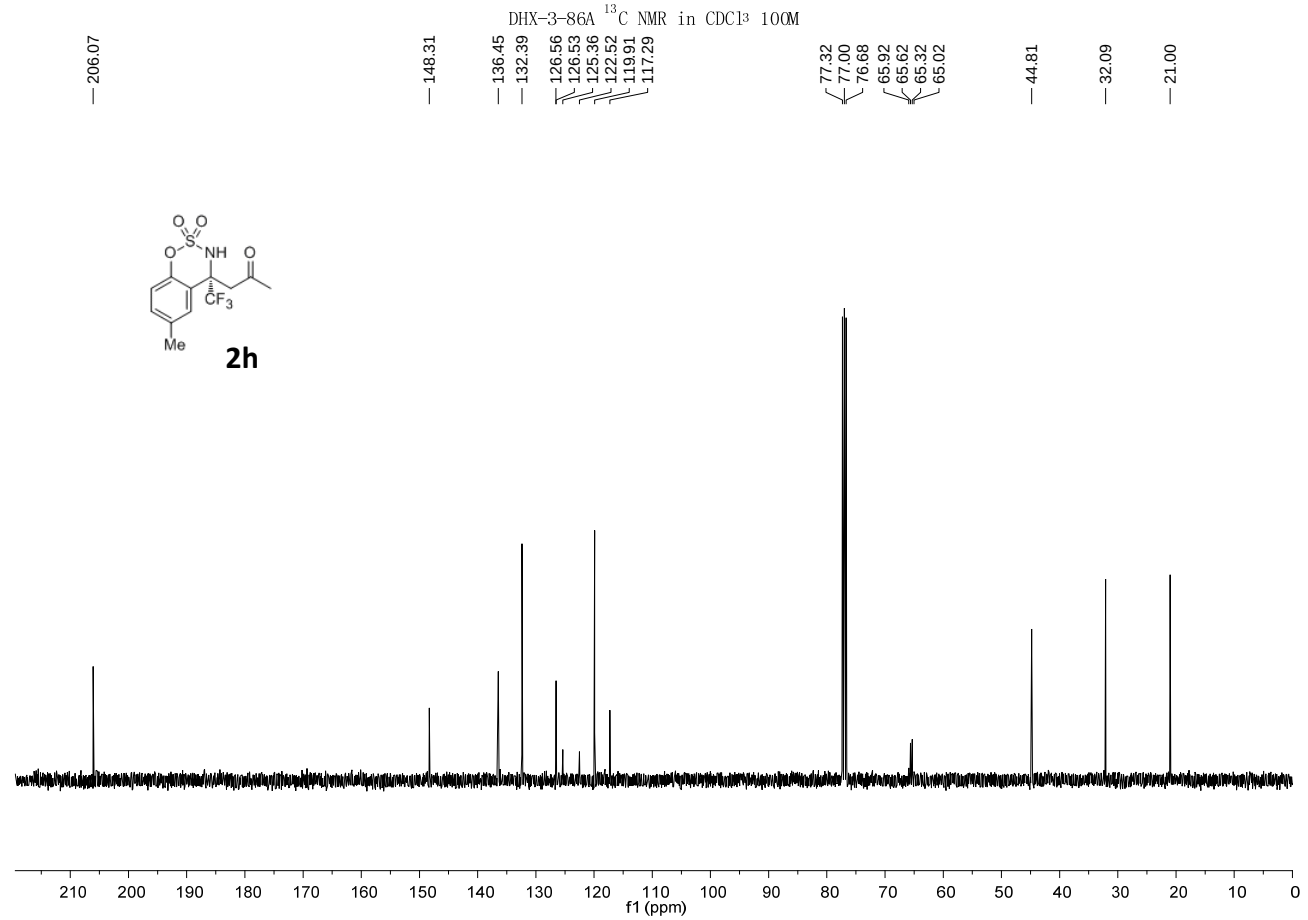


DHX-3-86A ^{1}H NMR in CDCl3 300M



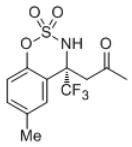
2h

DHX-3-86A ^{13}C NMR in CDCl3 100M

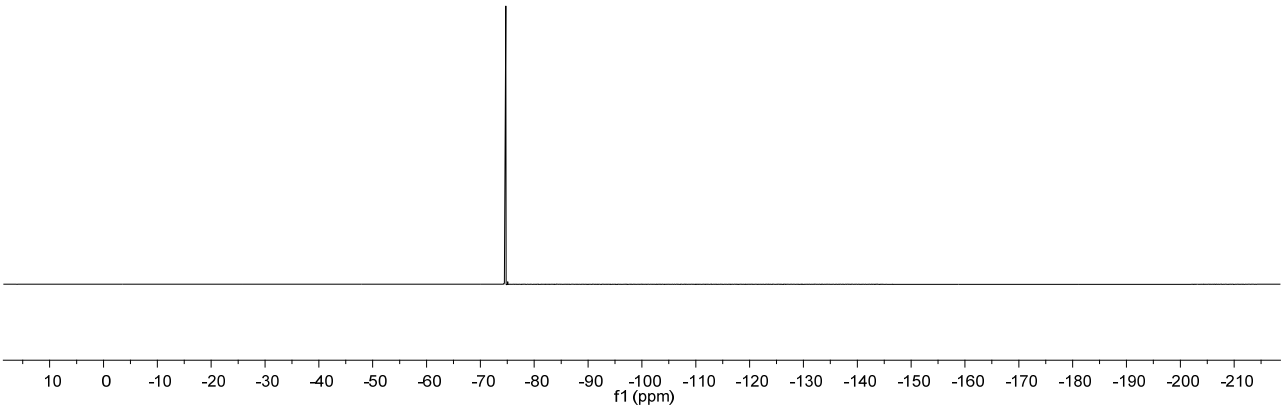


2h

DHX-3-86A ^{19}F NMR in CDCl^3 376M

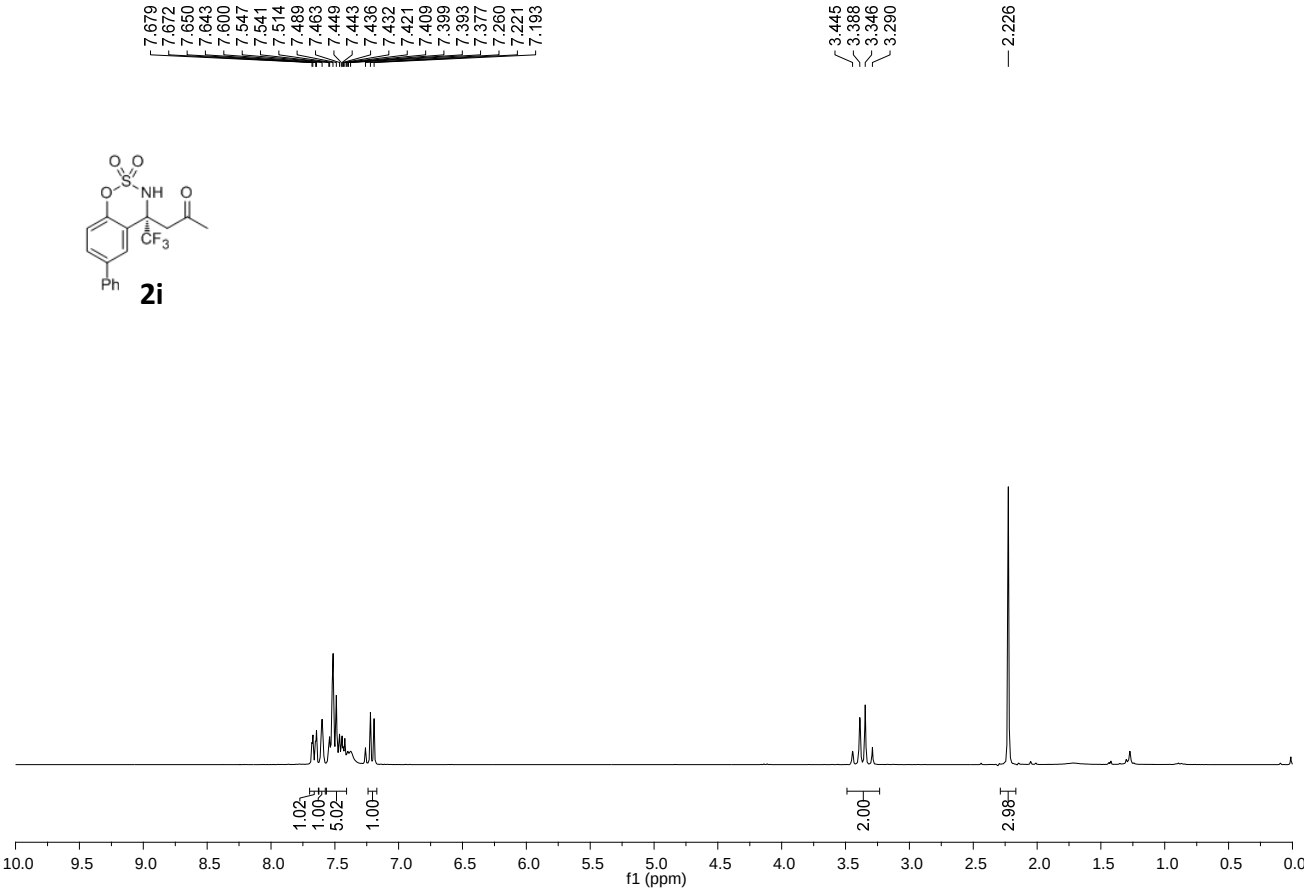


2h



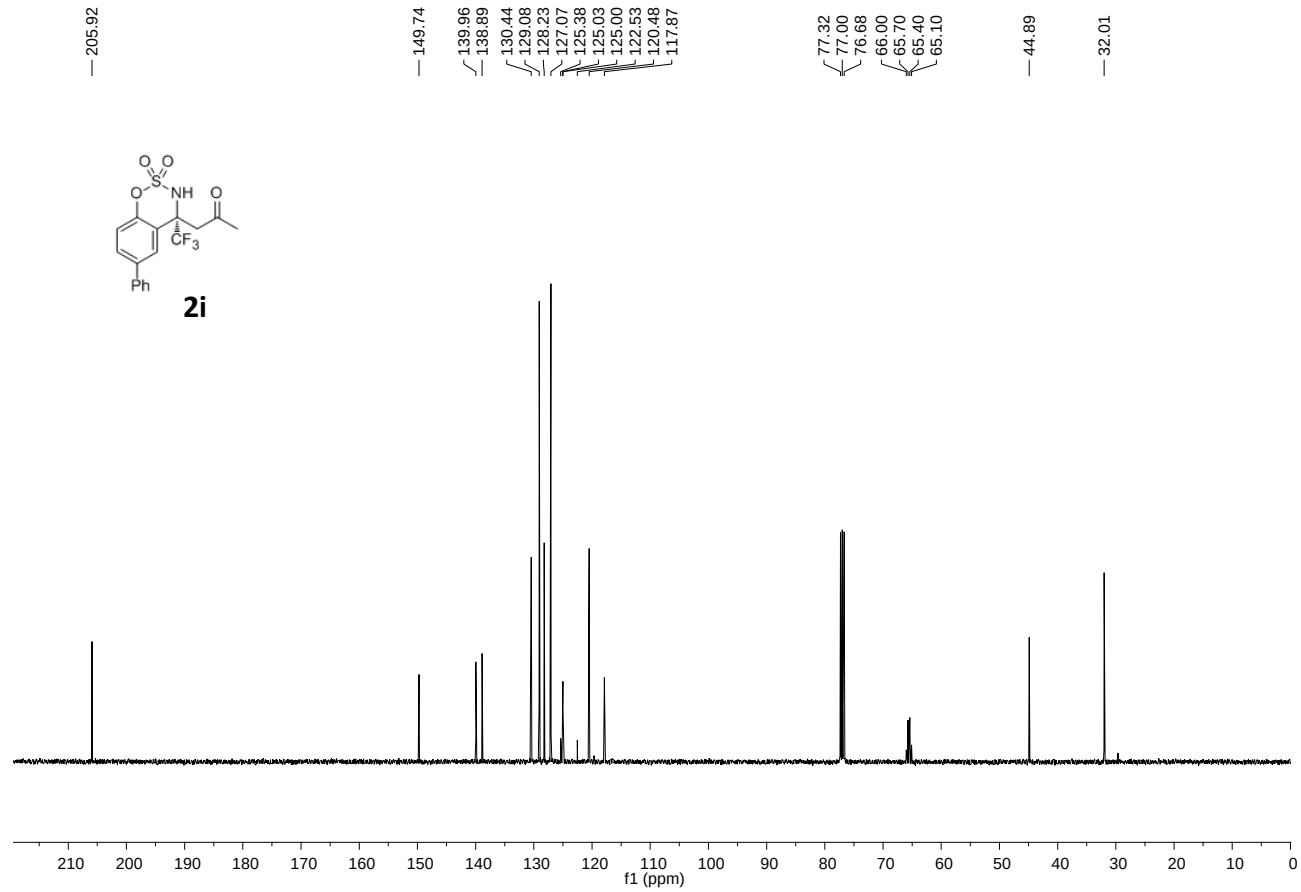
HRMS for 2h (known)

DHX-4-15 ^{1}H NMR in CDCl^{3} 300M

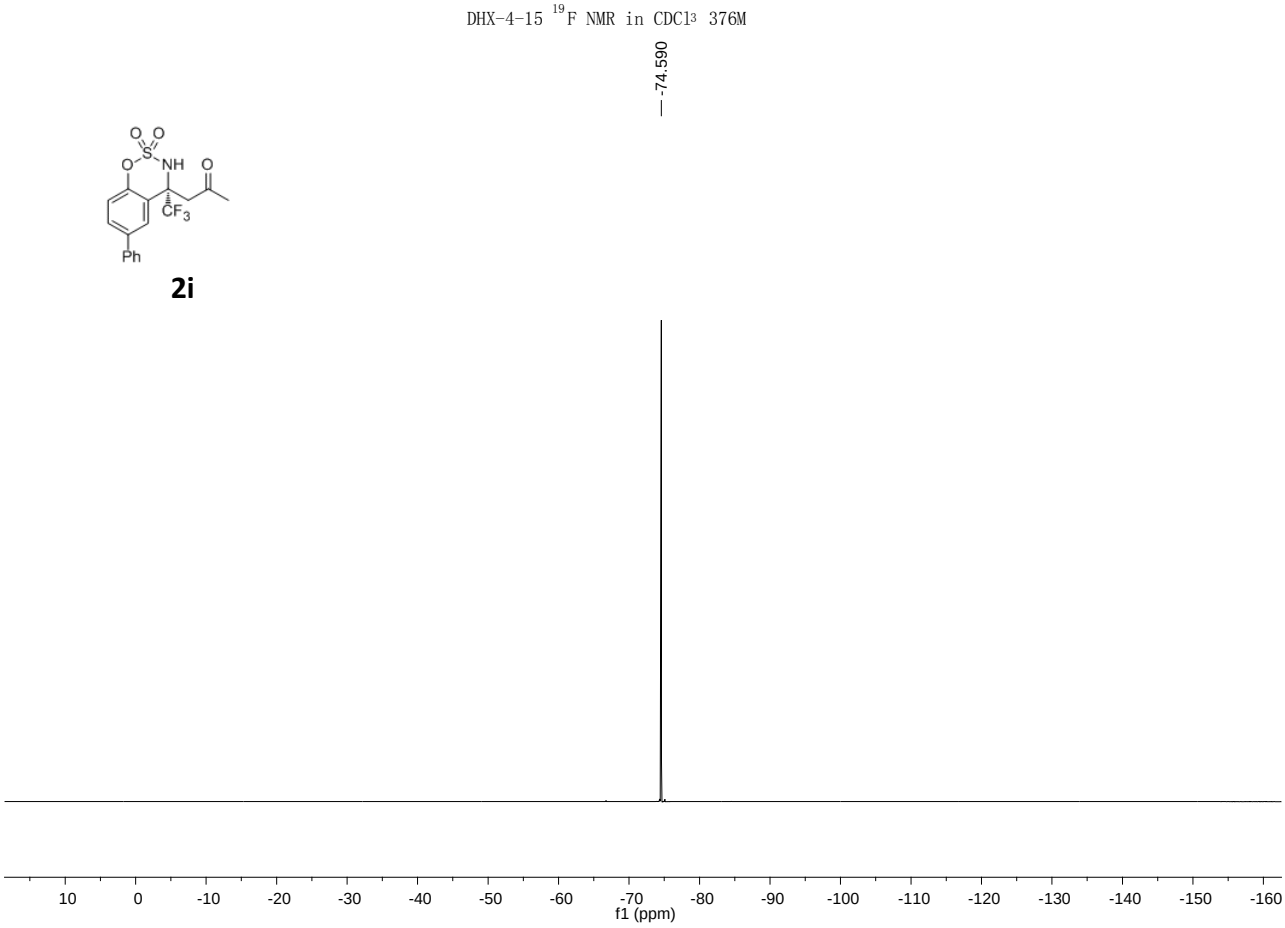


2i

DHX-4-15 ^{13}C NMR in CDCl^{3} 100M

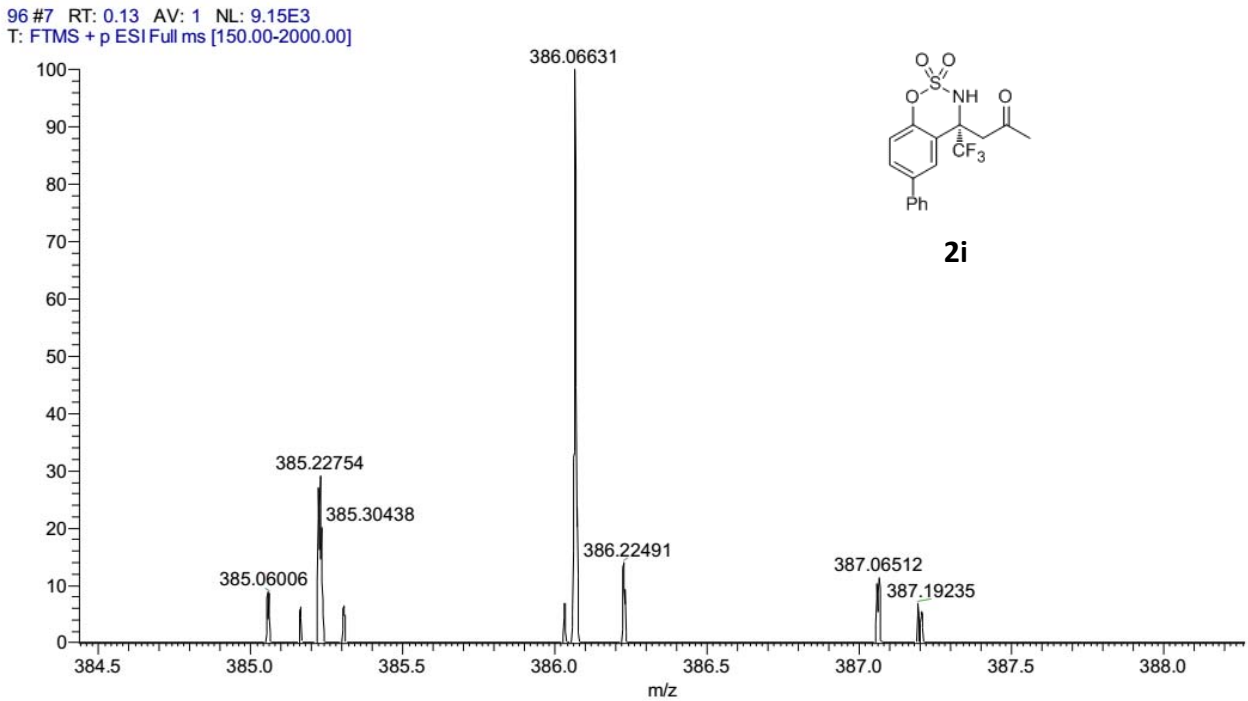


2i

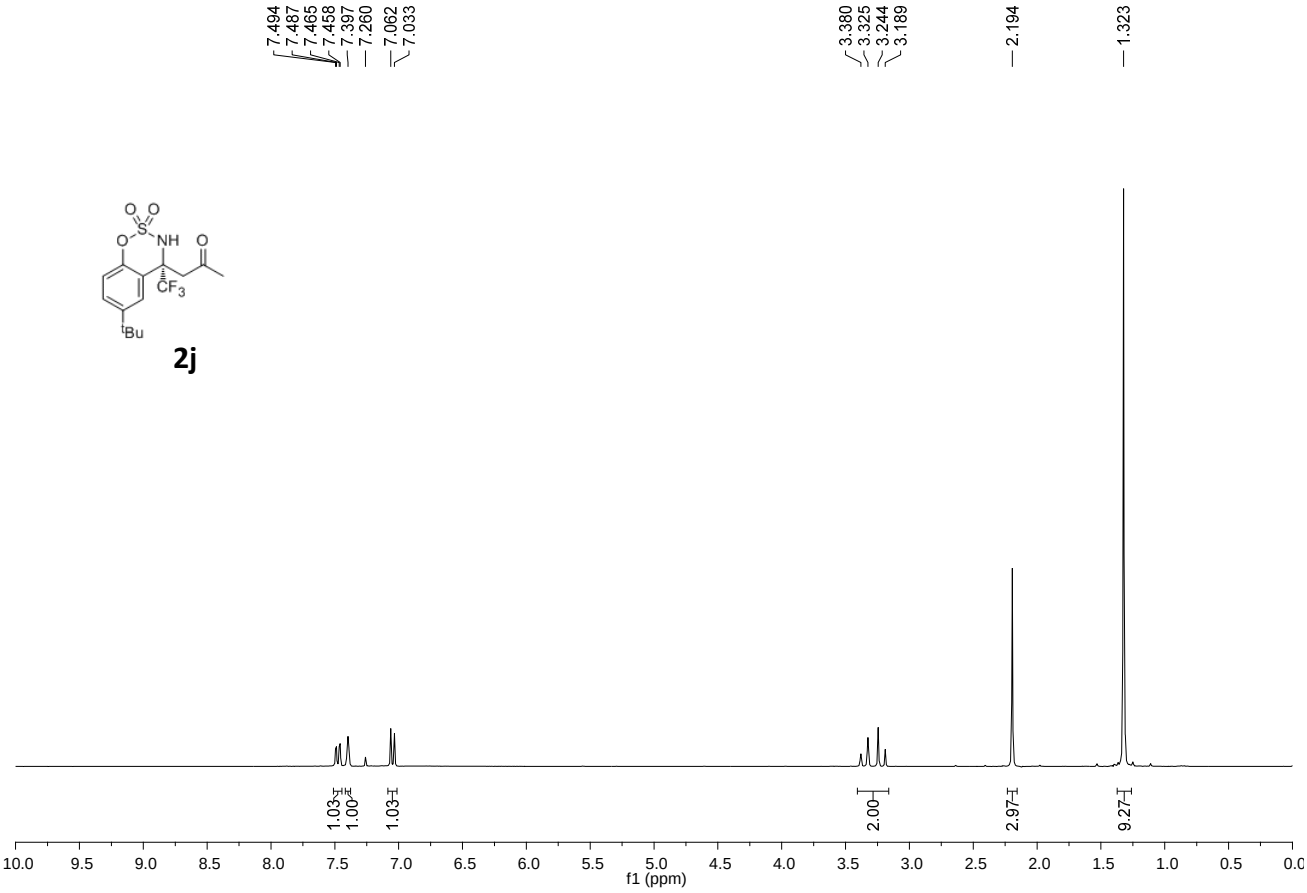


HRMS for 2i

DHX-4-15. HRMS (ESI) m/z calcd for $C_{17}H_{15}F_3NO_4S^+$ $(M+H)^+$ 386.06684, found 386.06631.

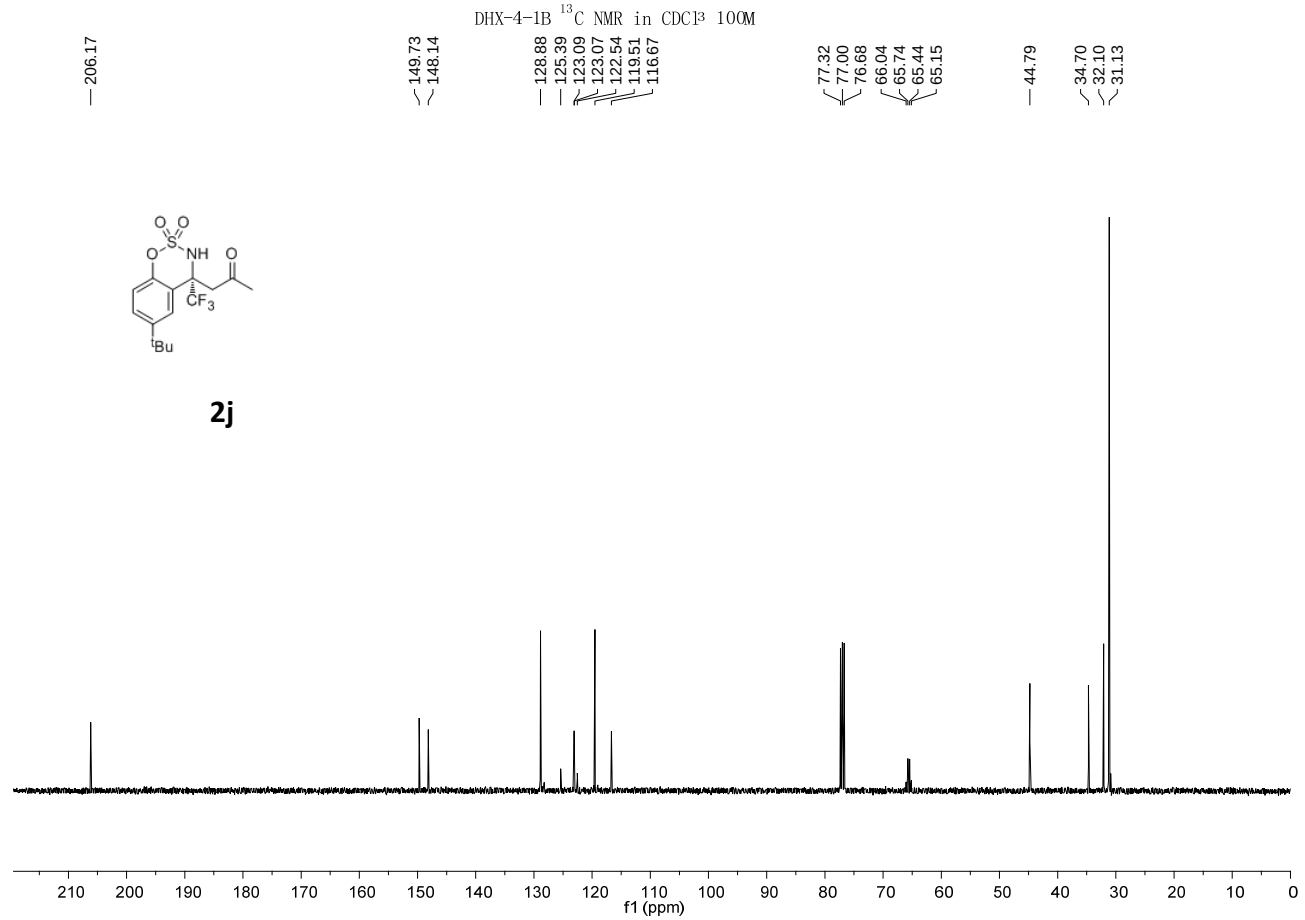


DHX-4-1B ^{1}H NMR in CDCl^{3} 300M

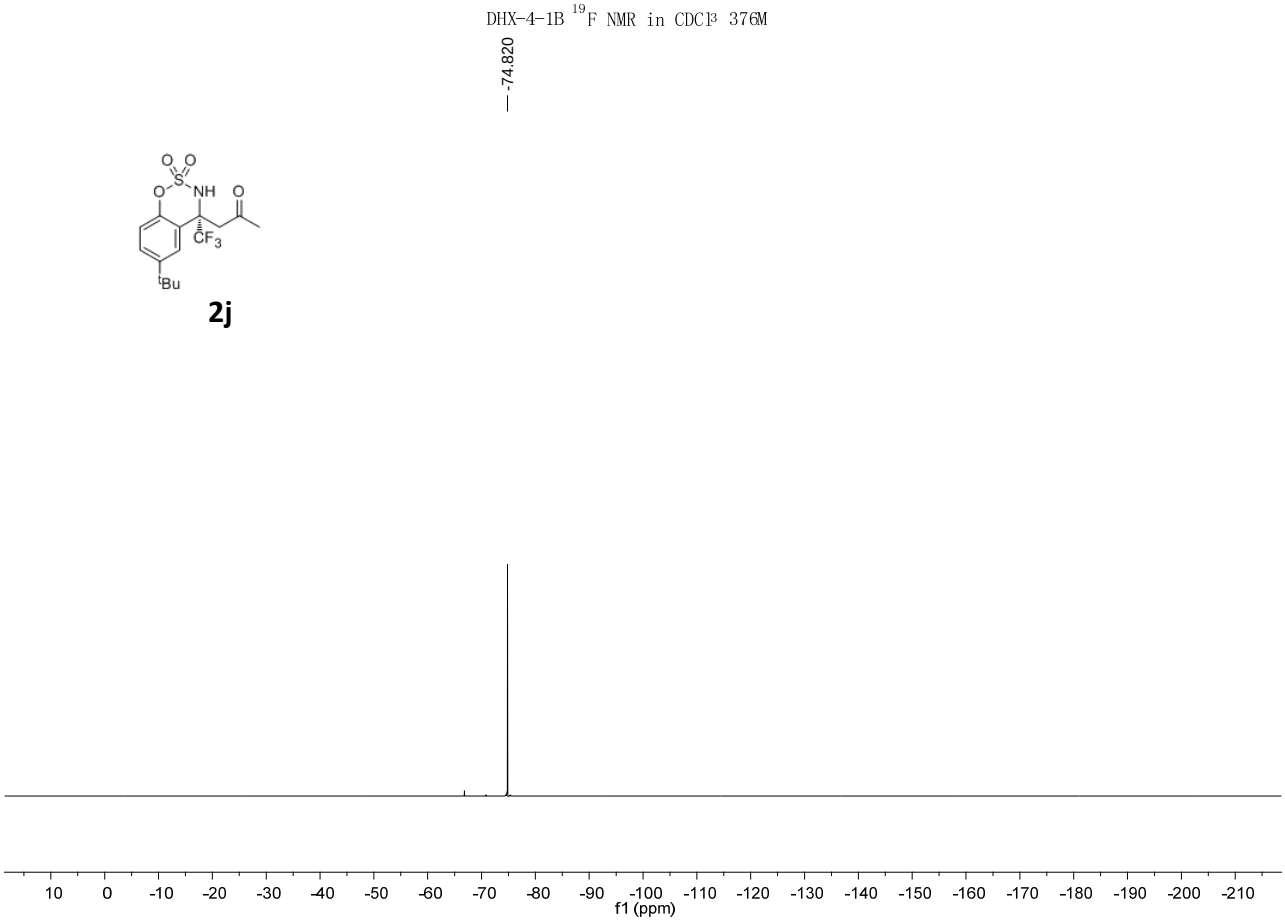


2j

DHX-4-1B ^{13}C NMR in CDCl^{3} 100M

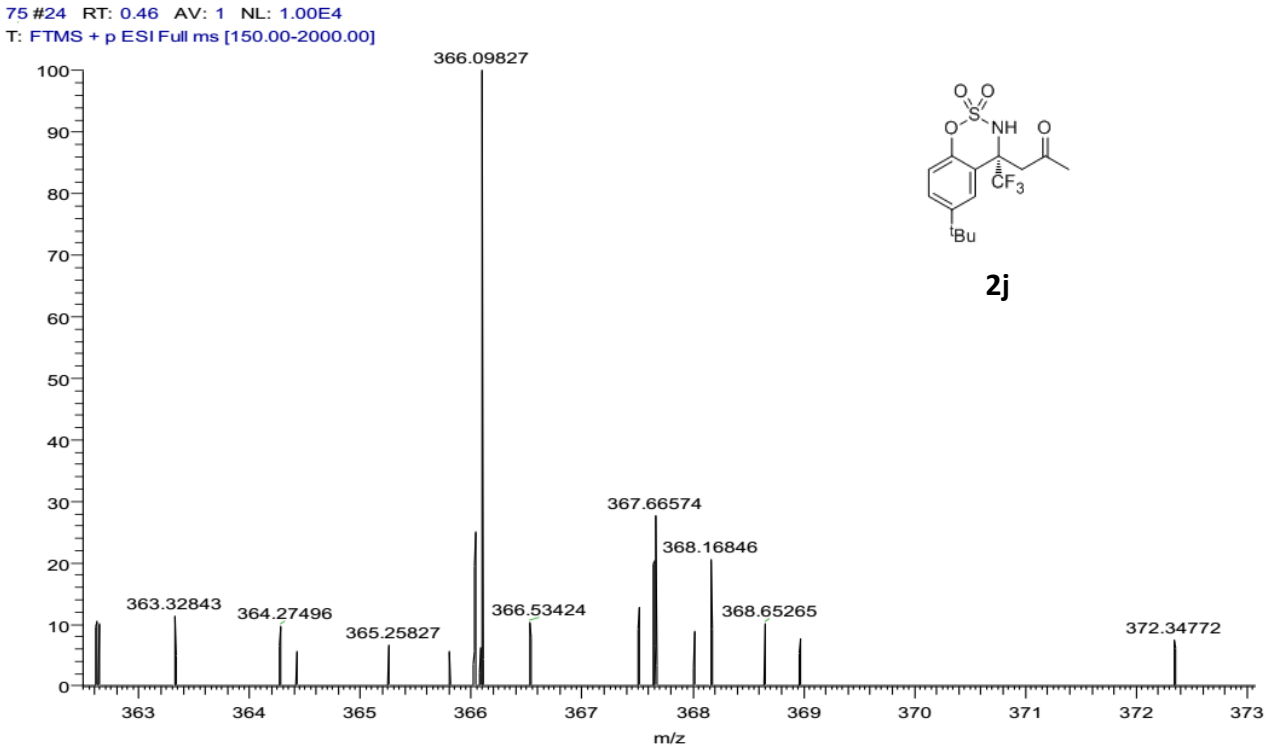


2j

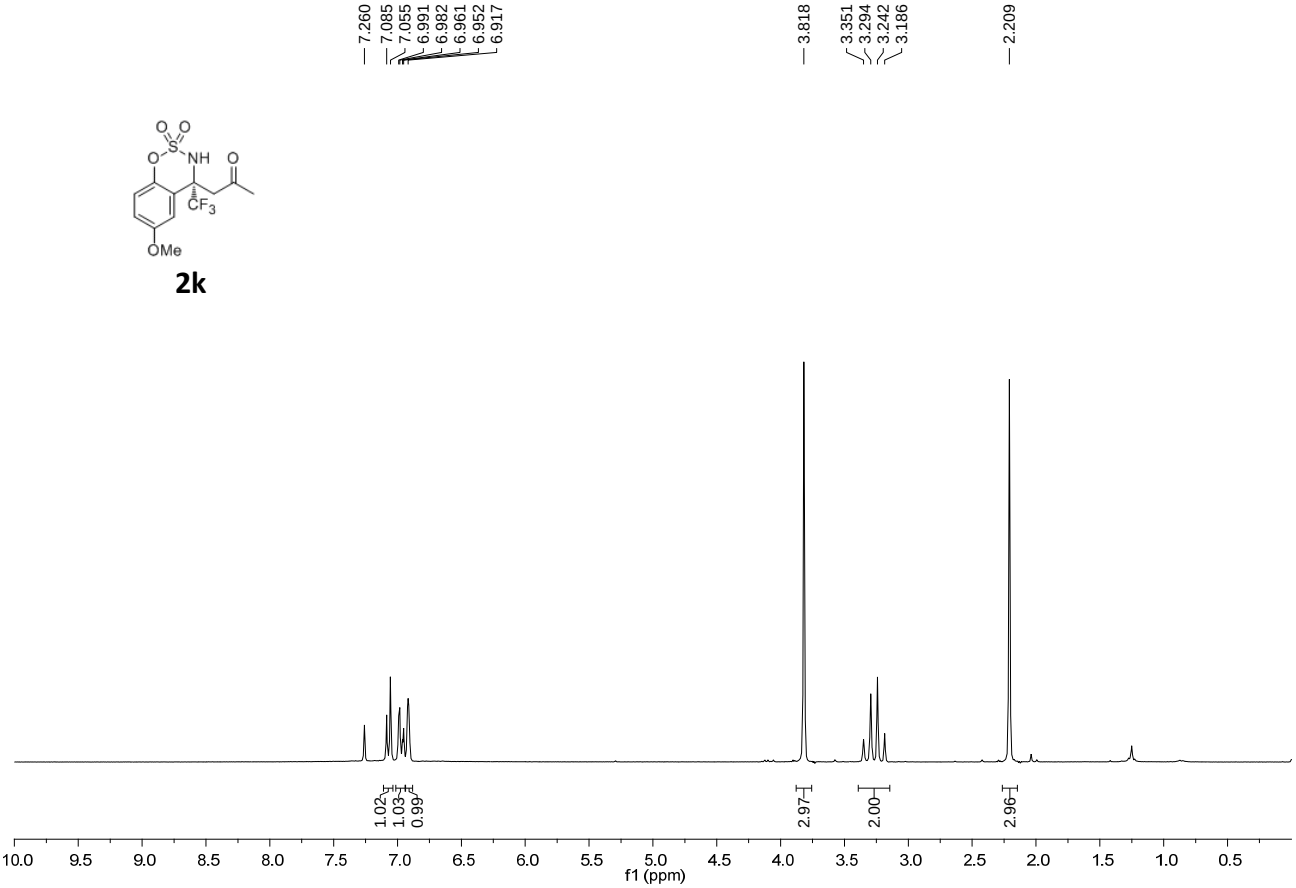


HRMS for 2j

DHX-4-1B: HRMS (ESI) m/z calcd for $C_{15}H_{19}F_3NO_4S^+$ $(M+H)^+$ 366.09814, found 366.09827.

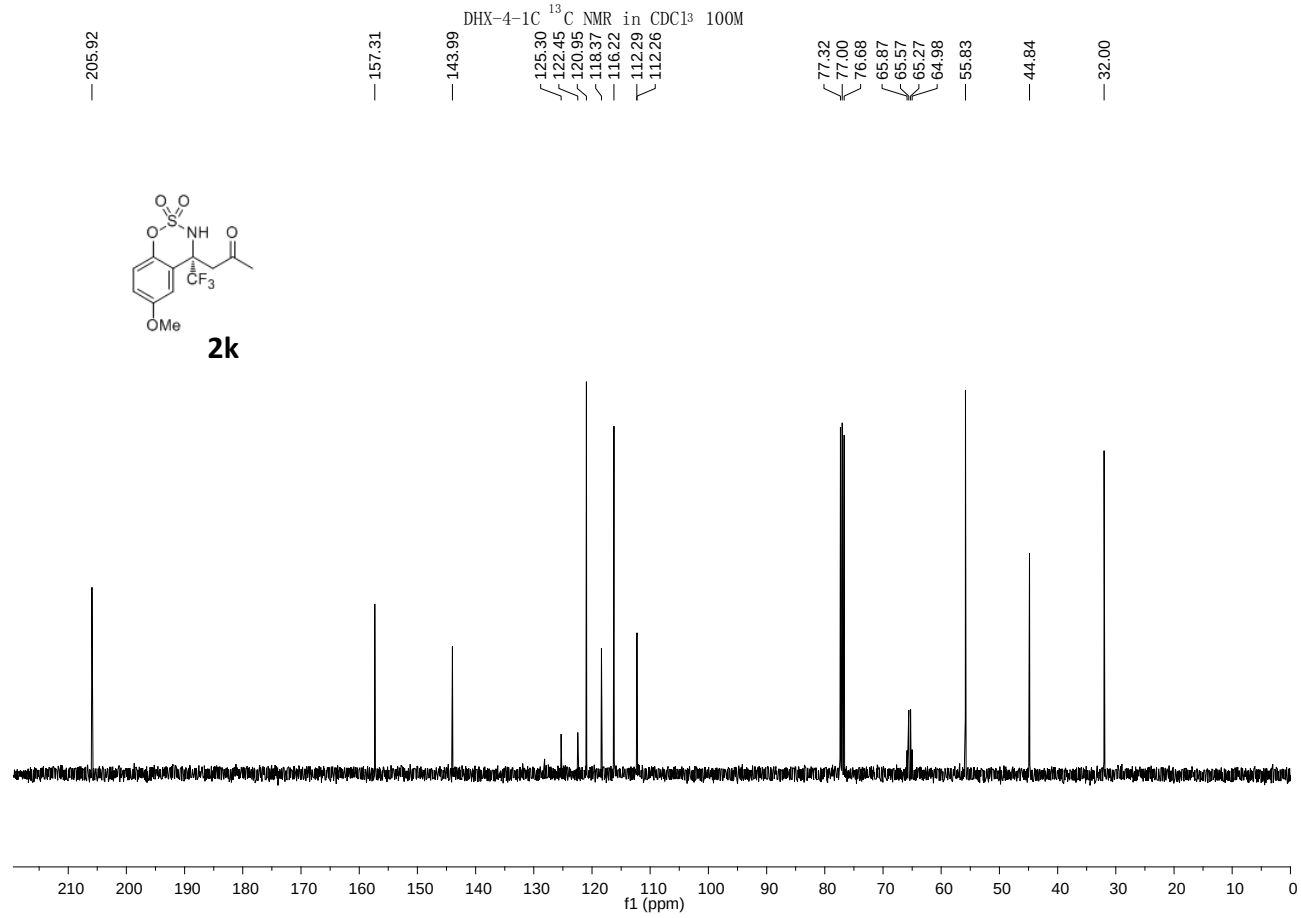


DHX-4-1C ^{1}H NMR in CDCl3 300M

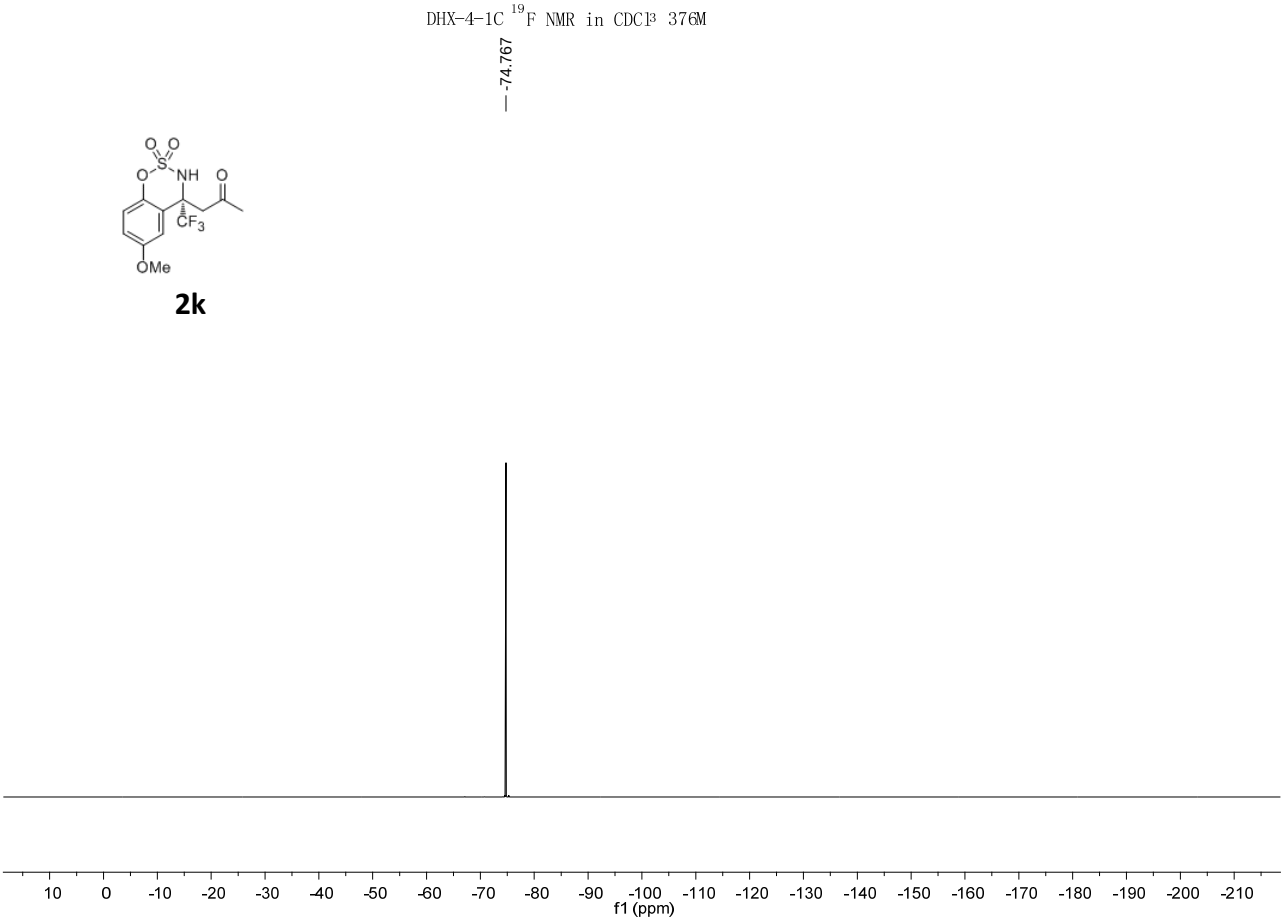


2k

DHX-4-1C ^{13}C NMR in CDCl3 100M

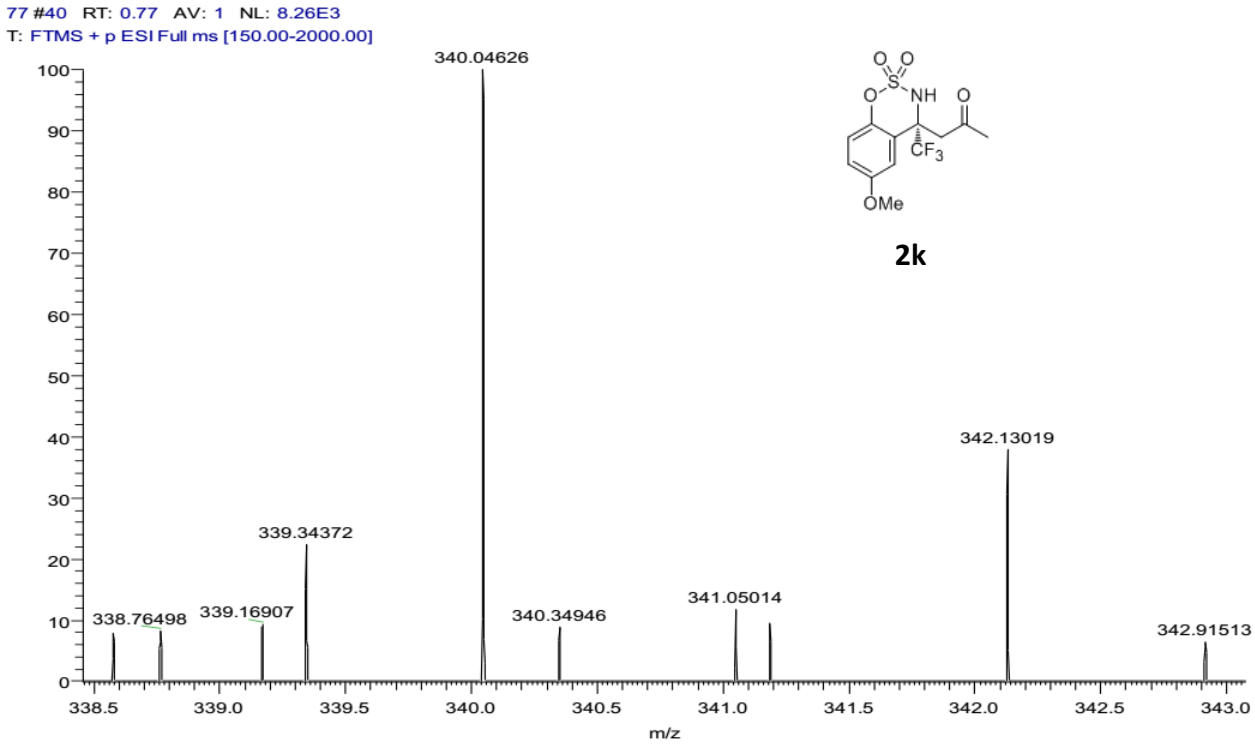


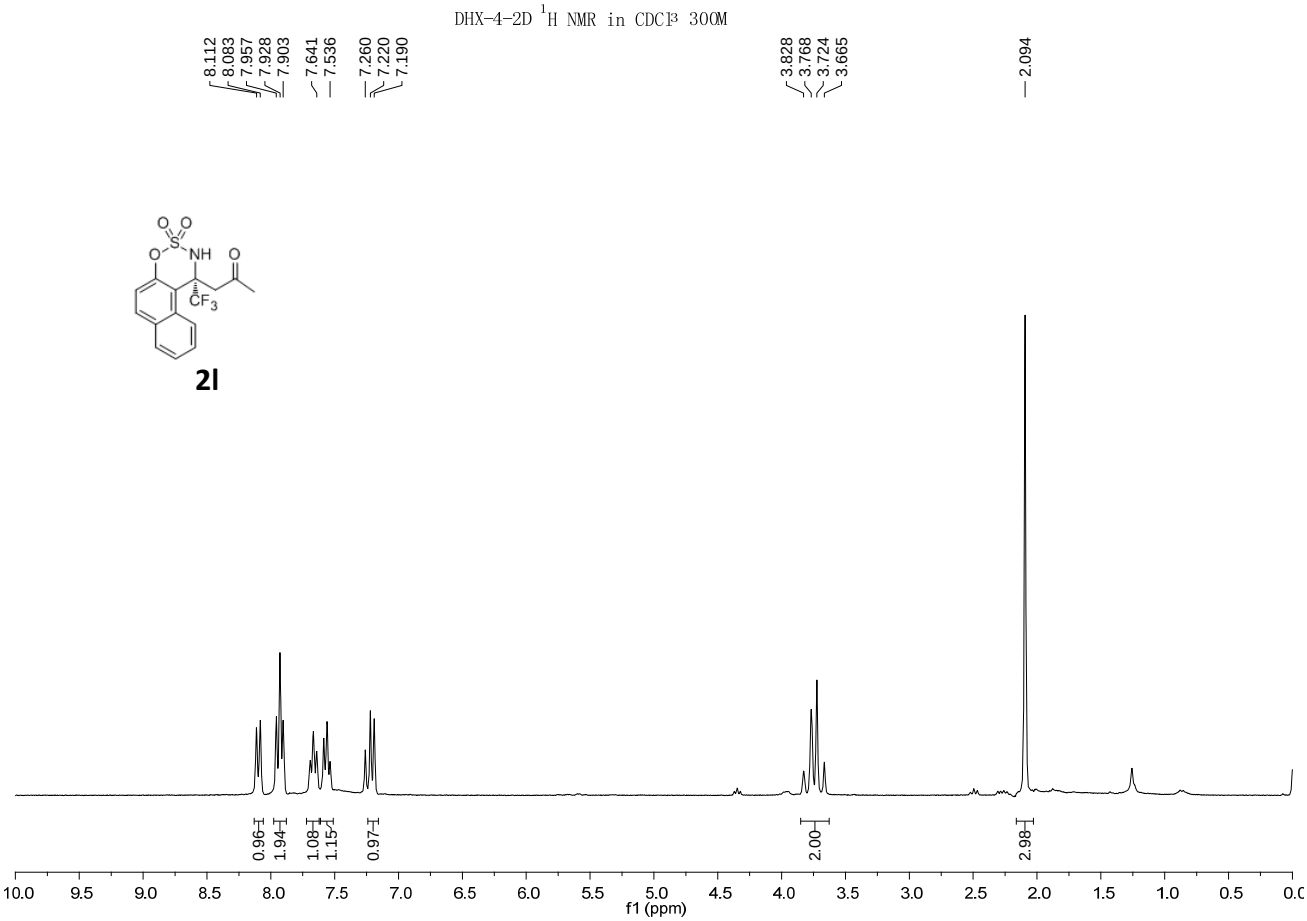
2k

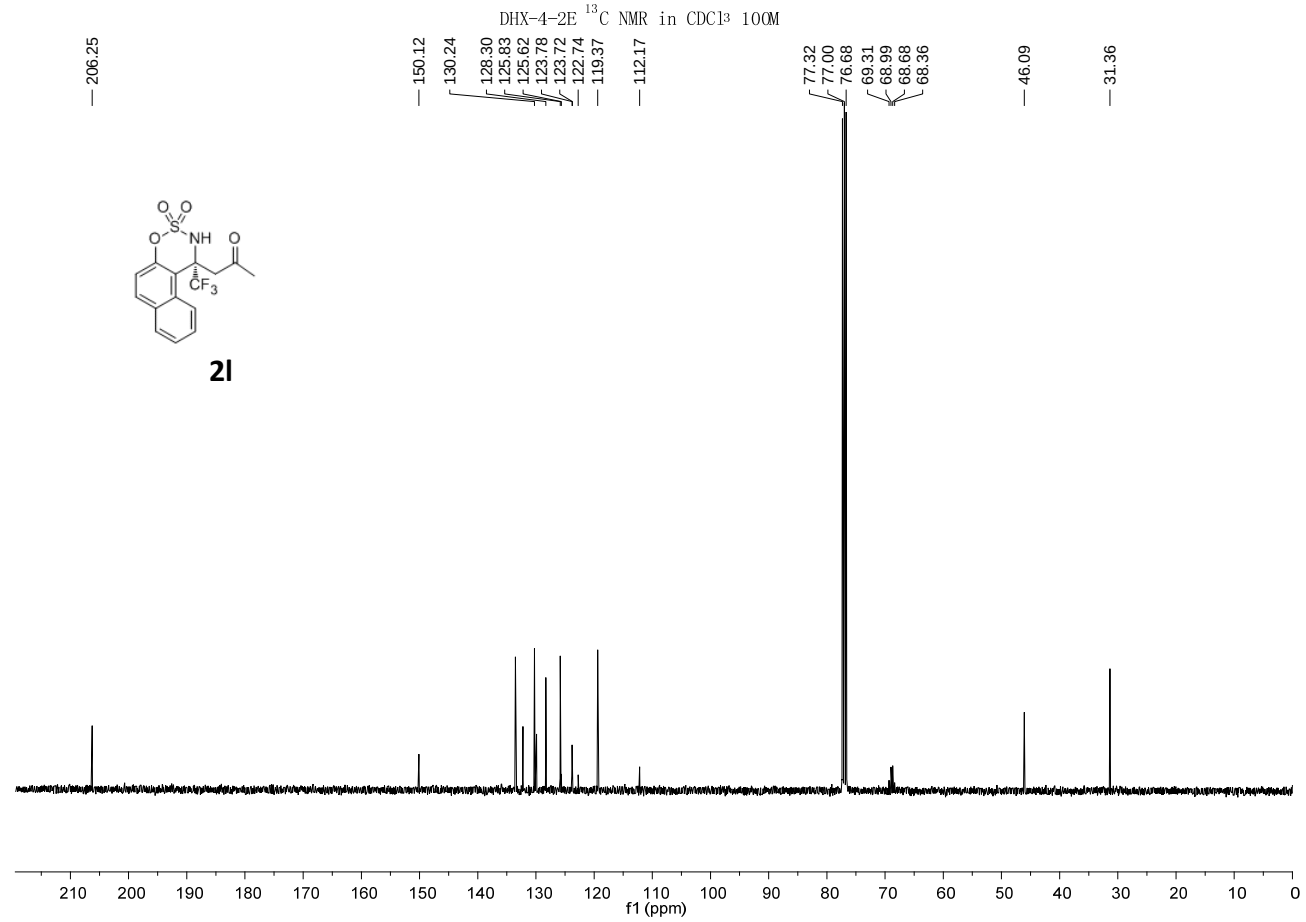


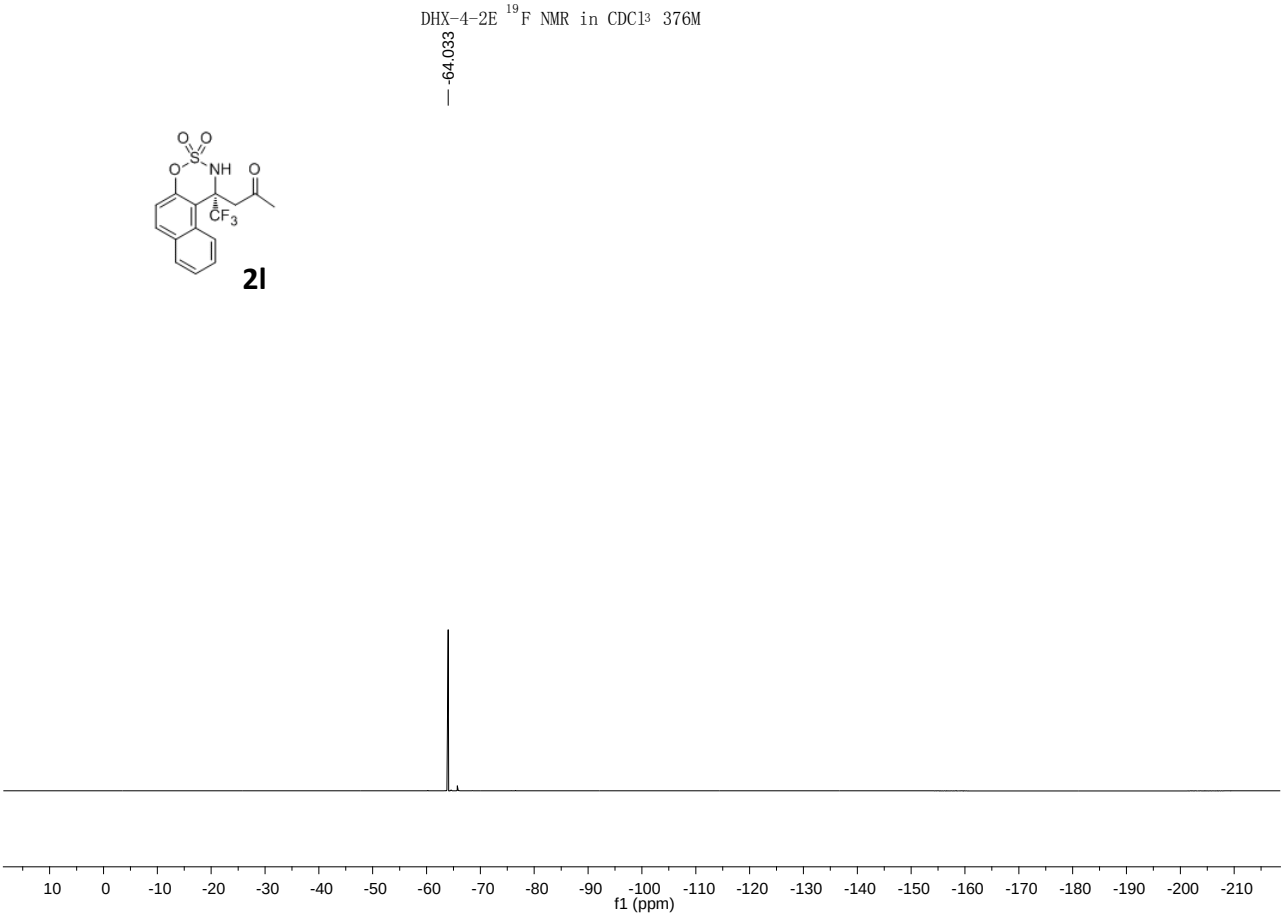
HRMS for 2k

DHX-4-1C: HRMS (ESI) m/z calcd for $C_{12}H_{13}F_3NO_5S^+$ $(M+H)^+$ 340.04610, found 340.04626.



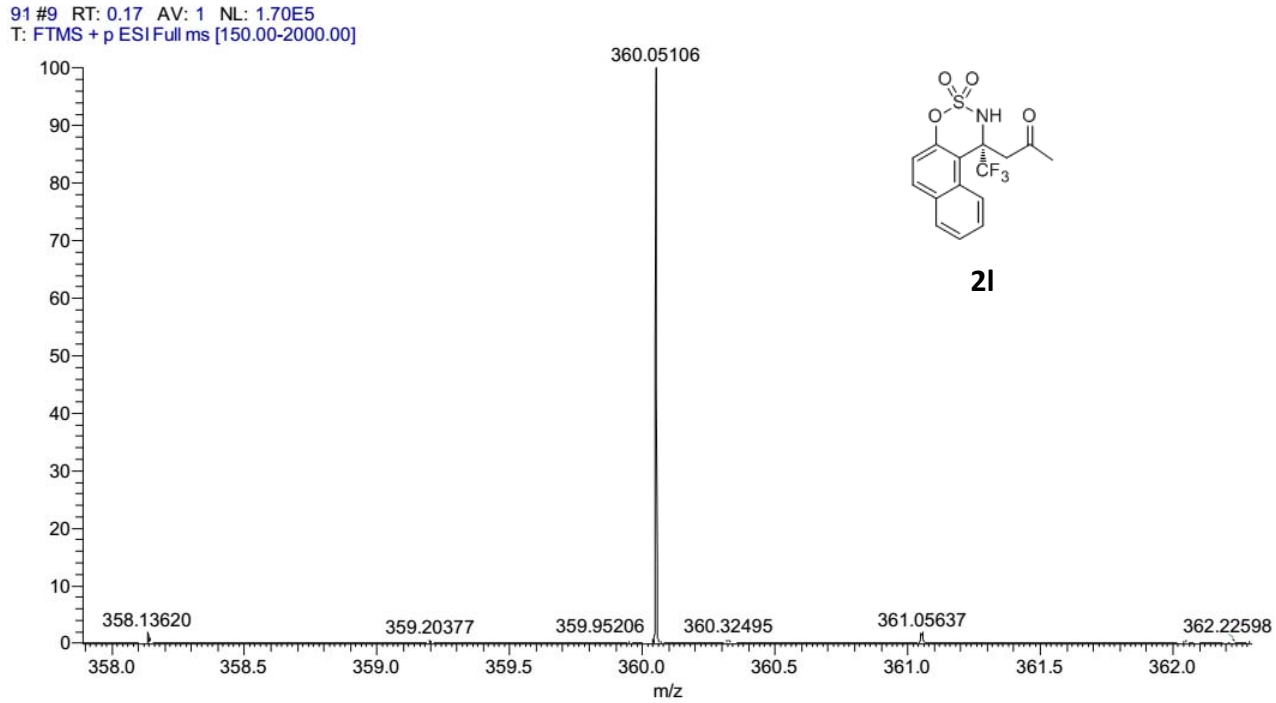

DHX-4-2D 1H NMR in CDCl3 300M
8.112
8.083
7.957
7.928
7.903
7.641
7.536
7.260
7.220
7.190
3.828
3.768
3.724
3.665
2.094
2l
0.96
1.94
1.08
1.15
0.97
2.00
2.98
f1 (ppm)


DHX-4-2E 13C NMR in CDCl3 100M
206.25
150.12
130.24
128.30
125.83
125.62
123.78
123.72
122.74
119.37
112.17
77.32
77.00
76.68
69.31
68.99
68.68
68.36
46.09
31.36
2l
f1 (ppm)

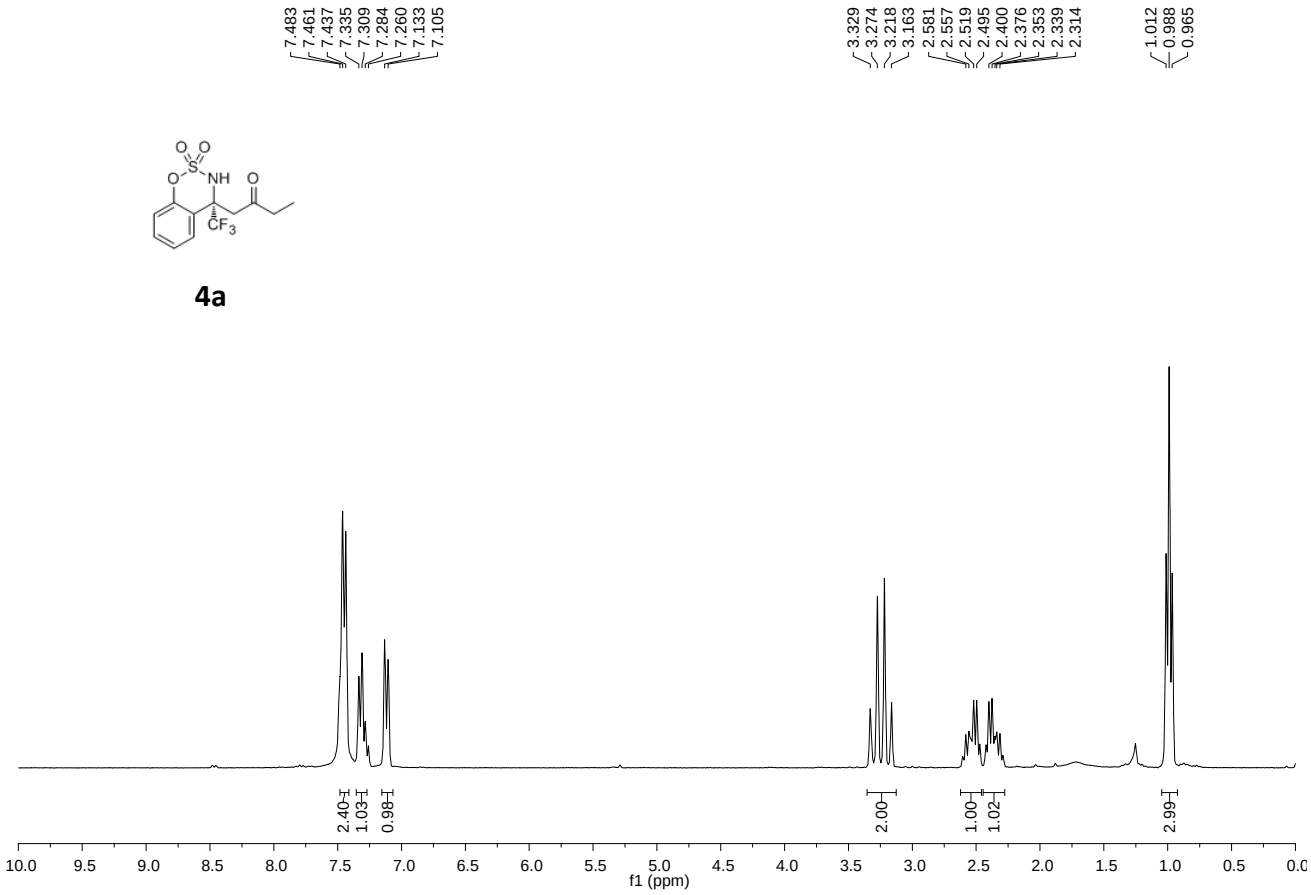


HRMS for 2l

DHX-4-2D. HRMS (ESI) m/z calcd for $C_{15}H_{13}F_3NO_4S^+$ $(M+H)^+$ 360.05119, found 360.05106.

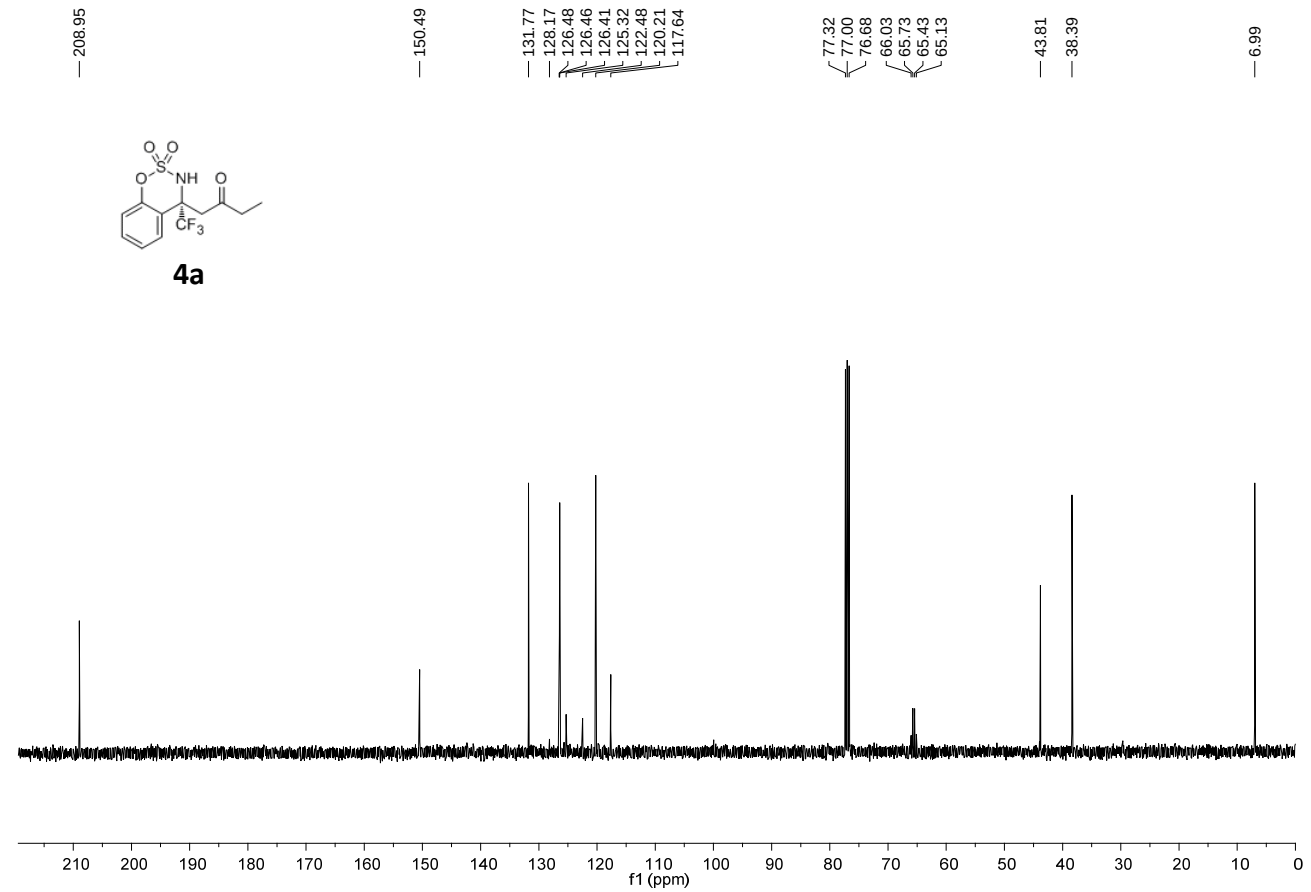


DHX-3-71A ^{1}H NMR in CDCl^{3} 300M

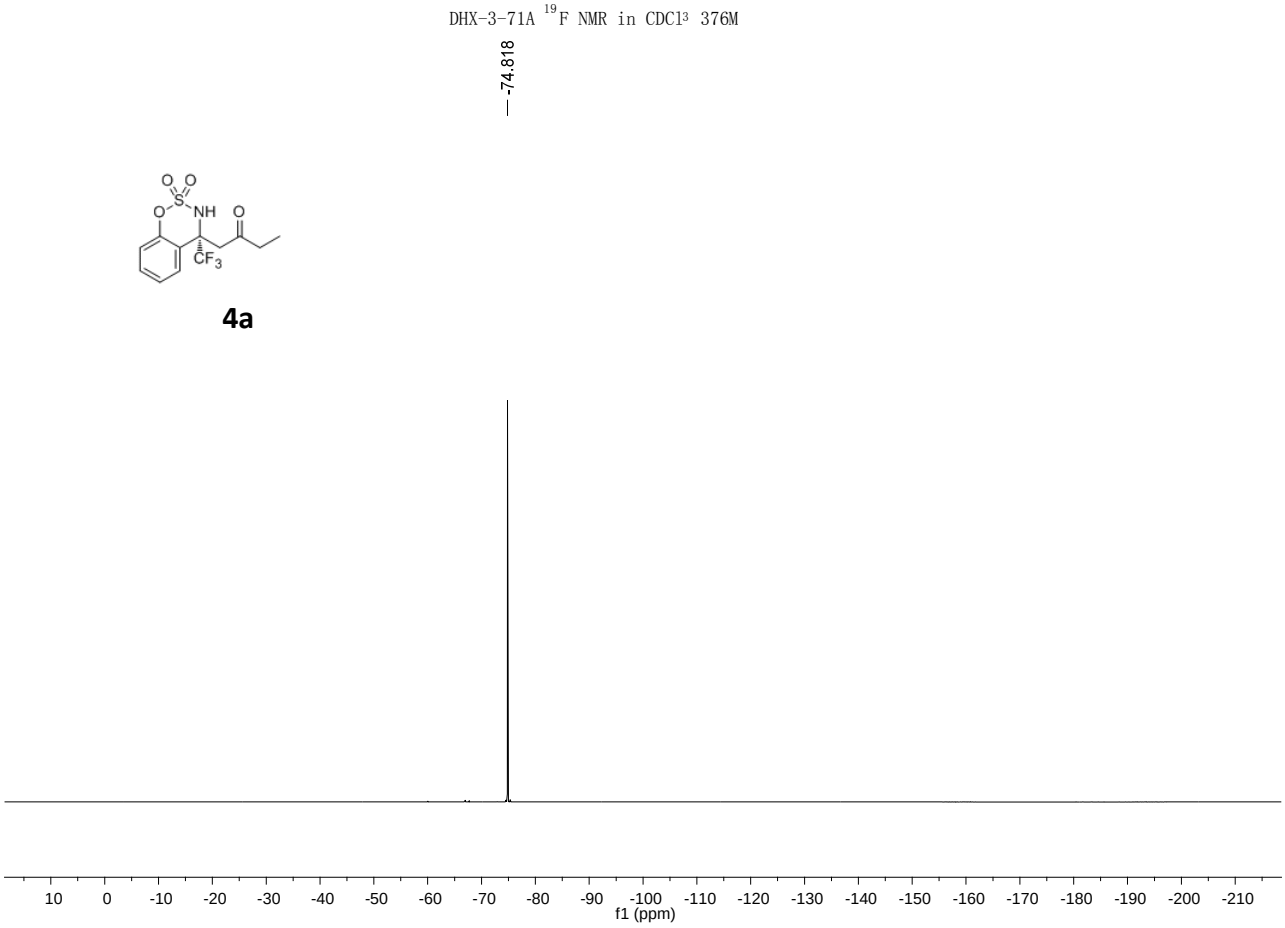


4a

DHX-3-71A ^{13}C NMR in CDCl^{3} 100M

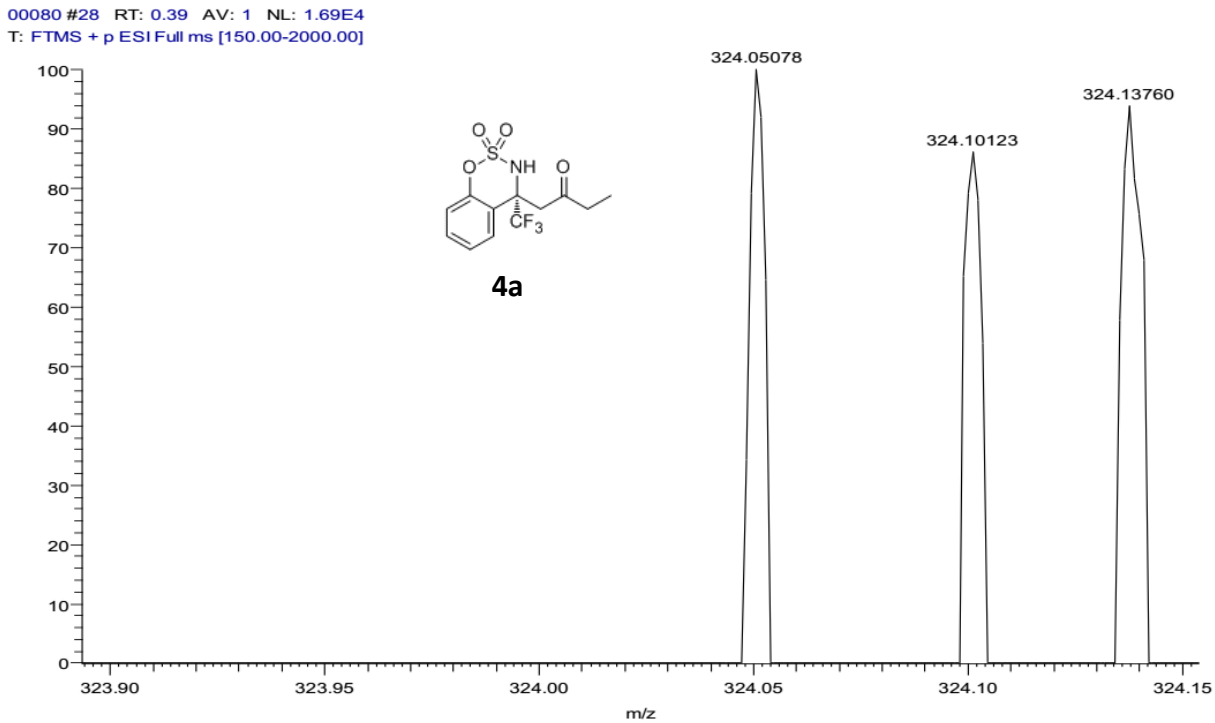


4a

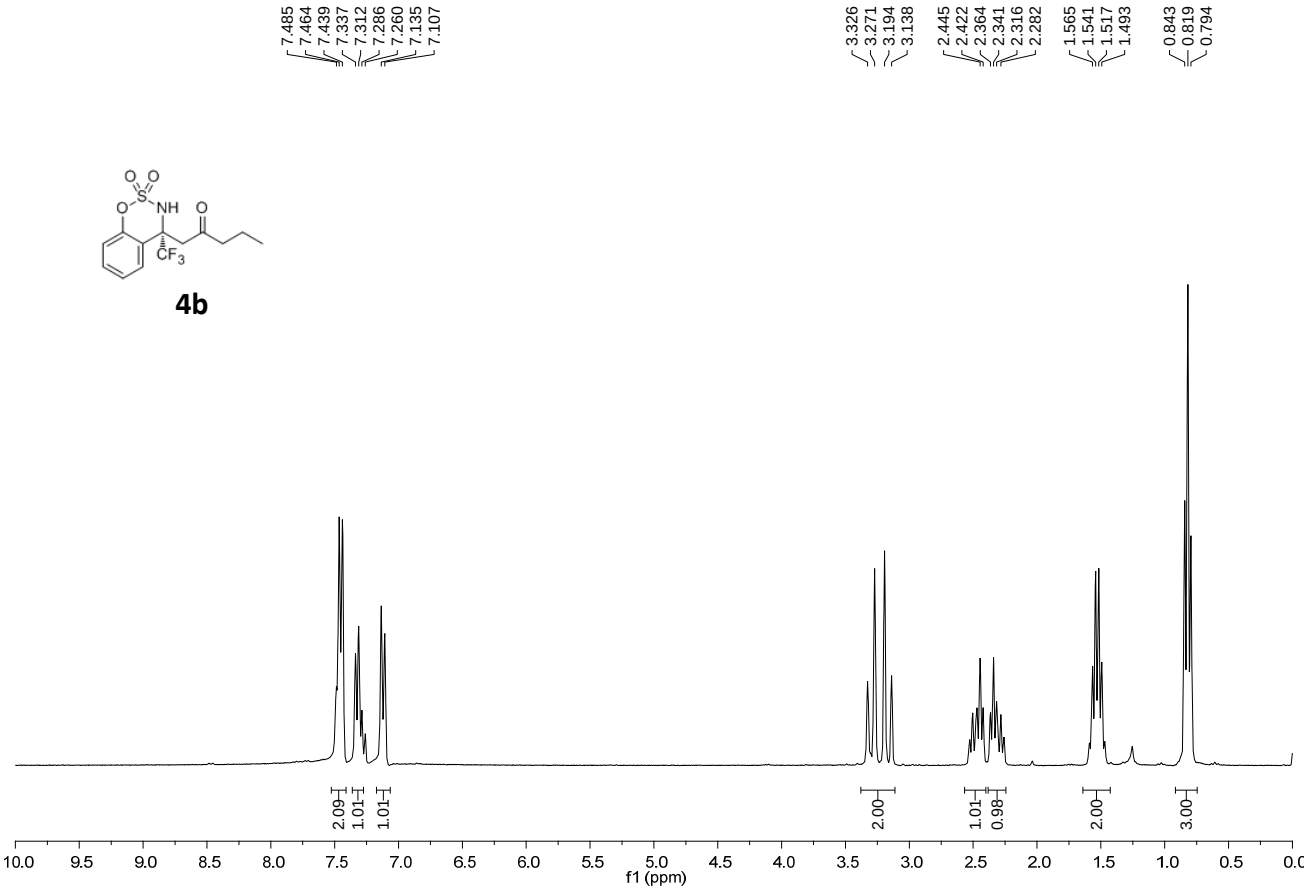


HRMS for 4a

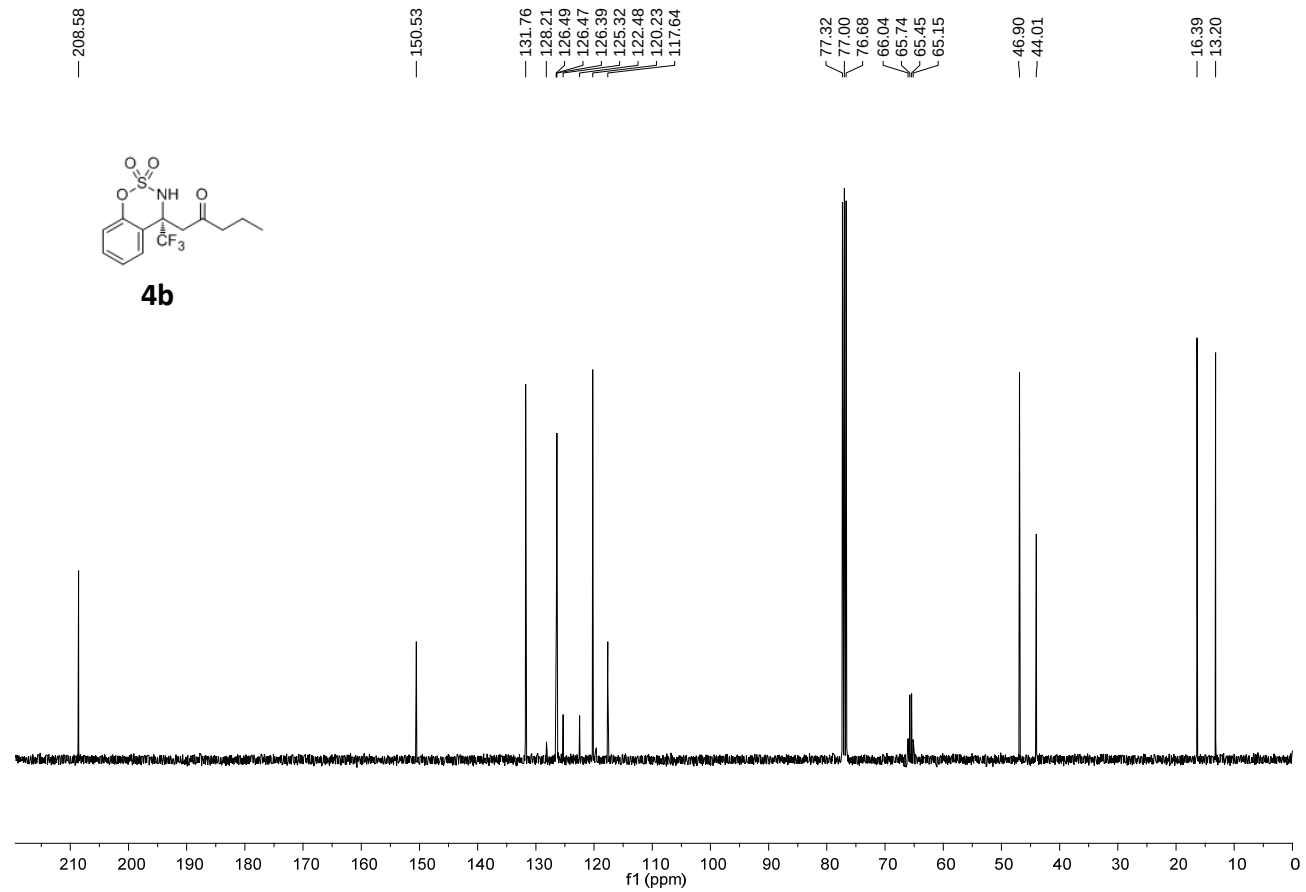
DHX-3-71A: HRMS (ESI) m/z calcd for $C_{12}H_{13}F_3NO_4S^+$ $(M+H)^+$ 324.05119, found 324.05078.

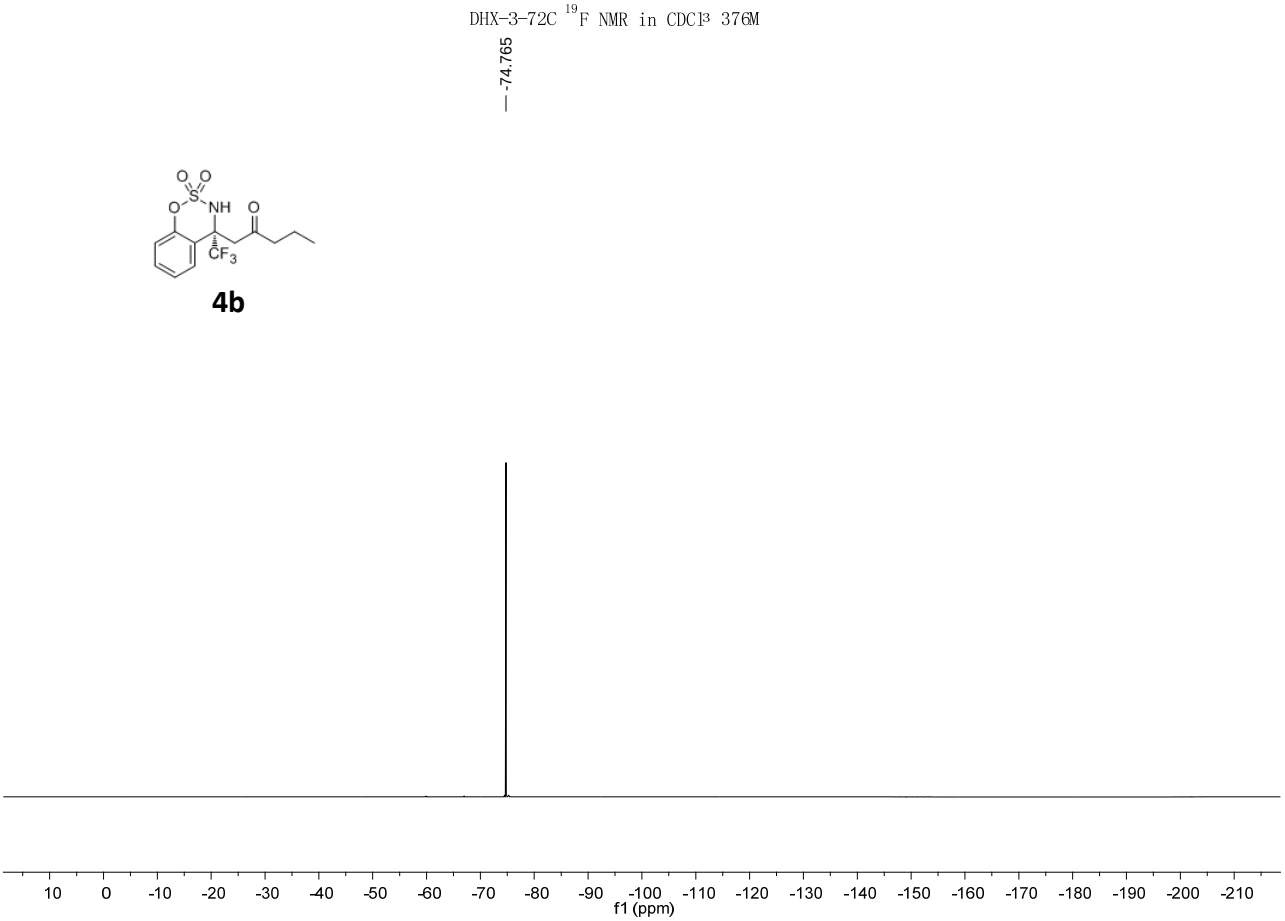


DHX-3-72C ^{1}H NMR in CDCl^{3} 300M



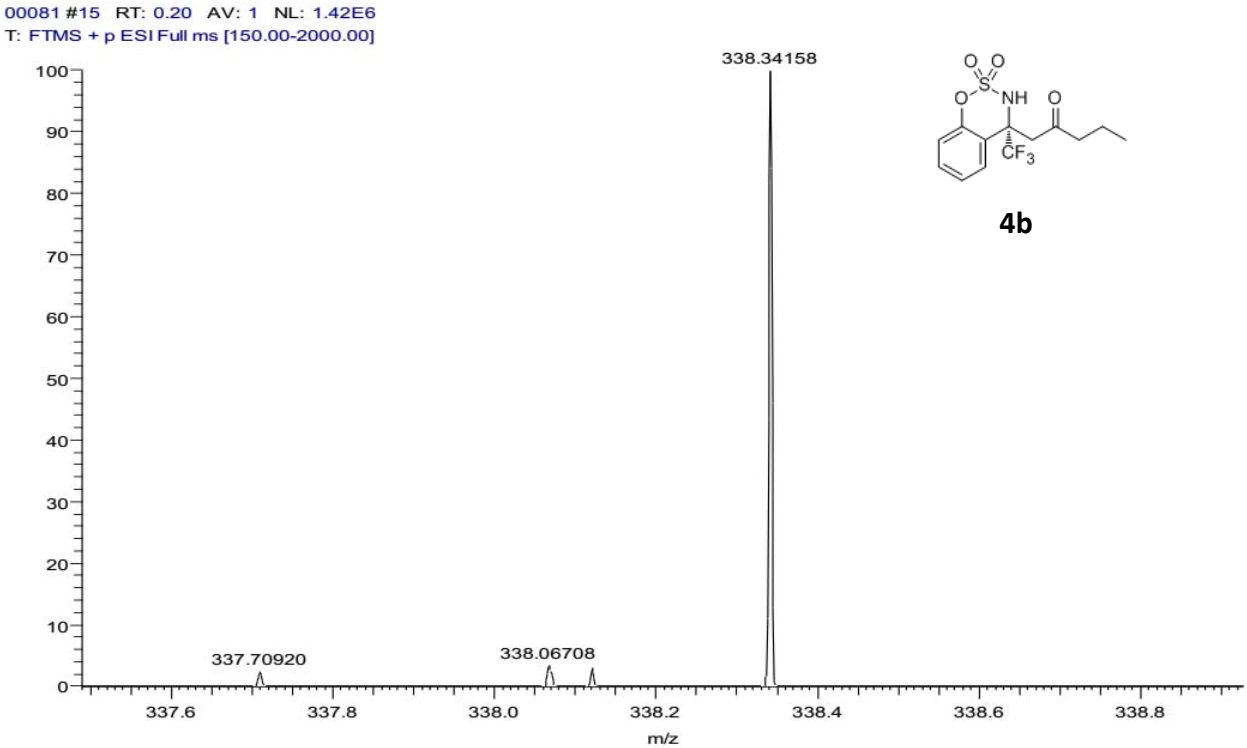
DHX-3-72C ^{13}C NMR in CDCl^{3} 100M



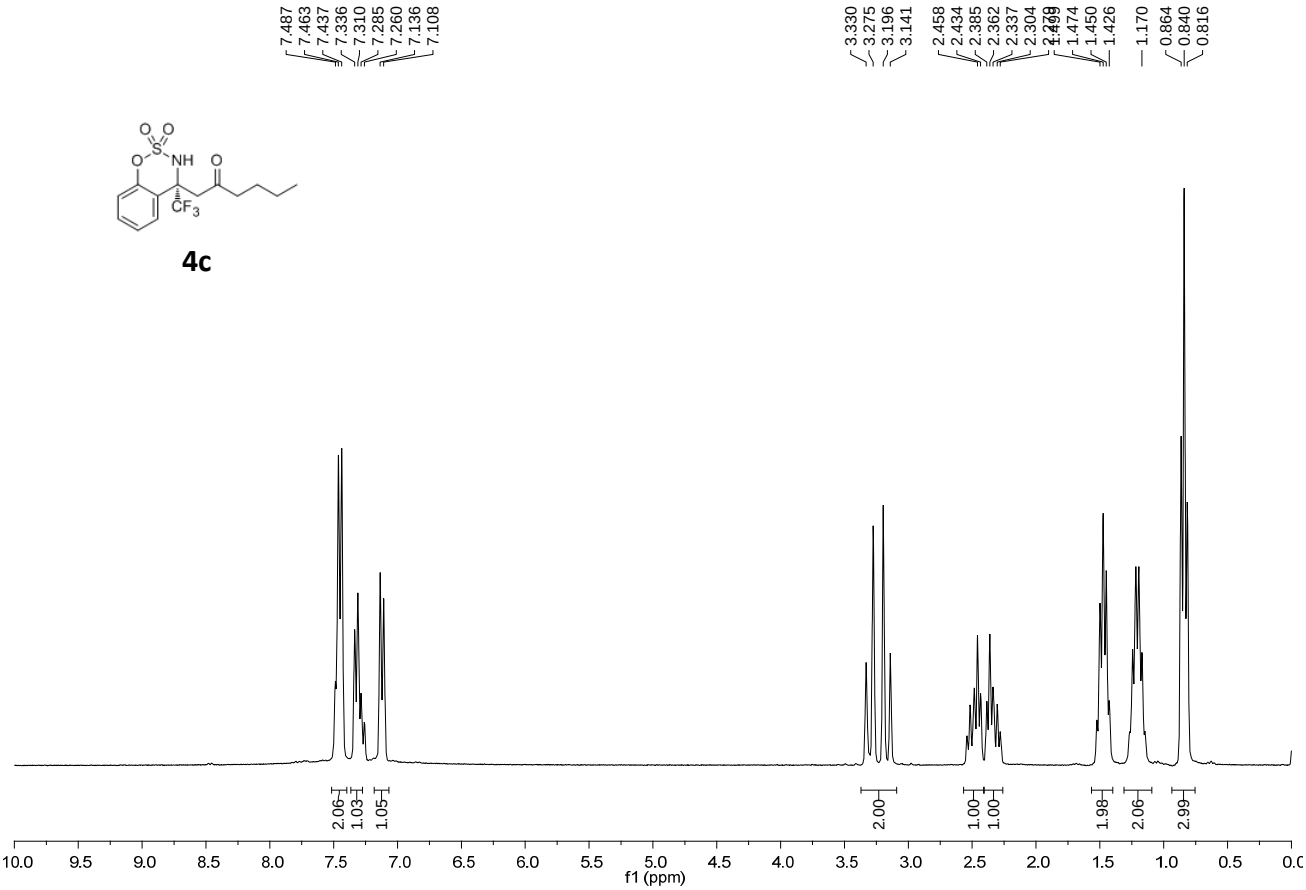


HRMS for 4b

DHX-3-72C: HRMS (ESI) m/z calcd for $C_{13}H_{15}F_3NO_4S^+$ $(M+H)^+$ 338.06684, found 338.06708.

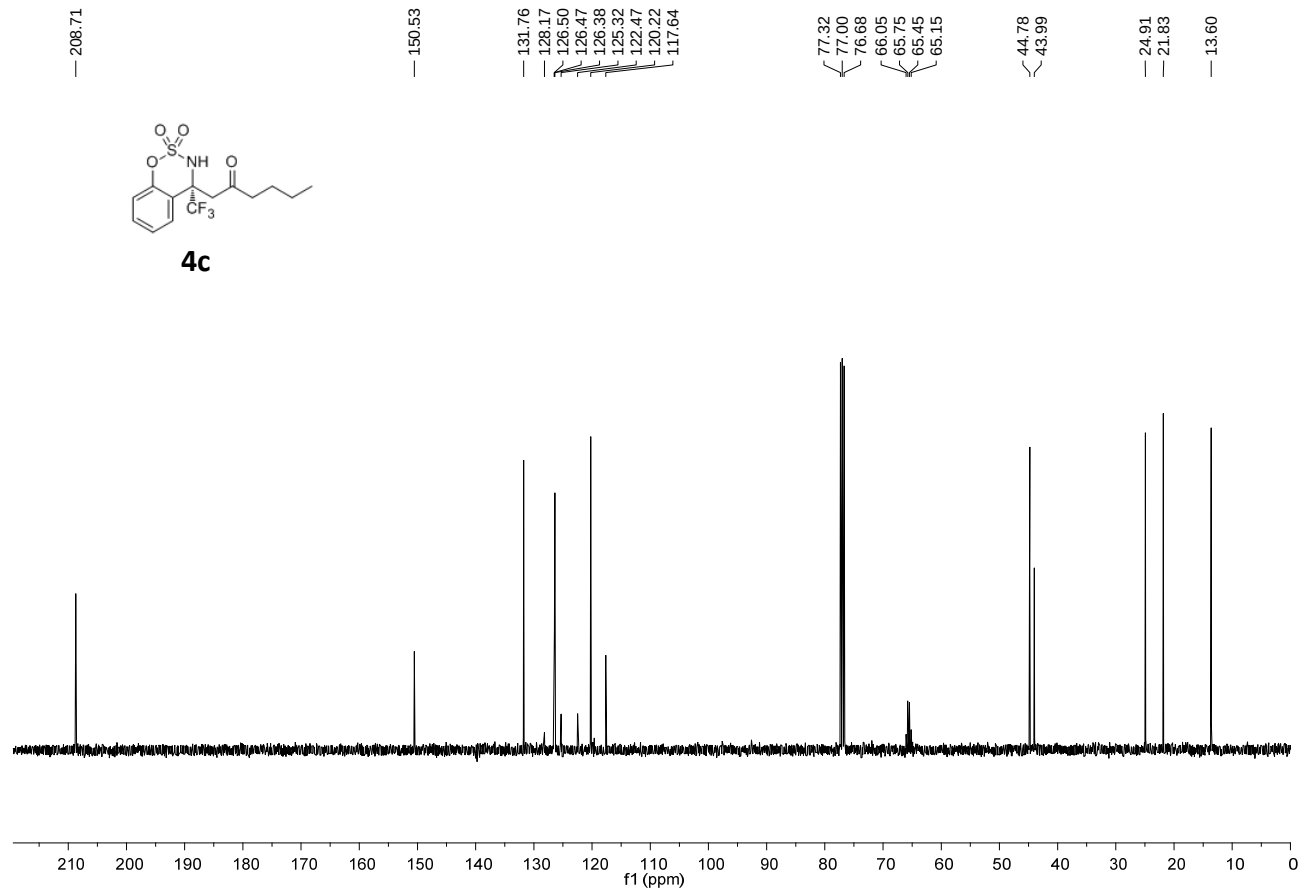


DHX-3-72D ^{1}H NMR in CDCl$_3$ 300M

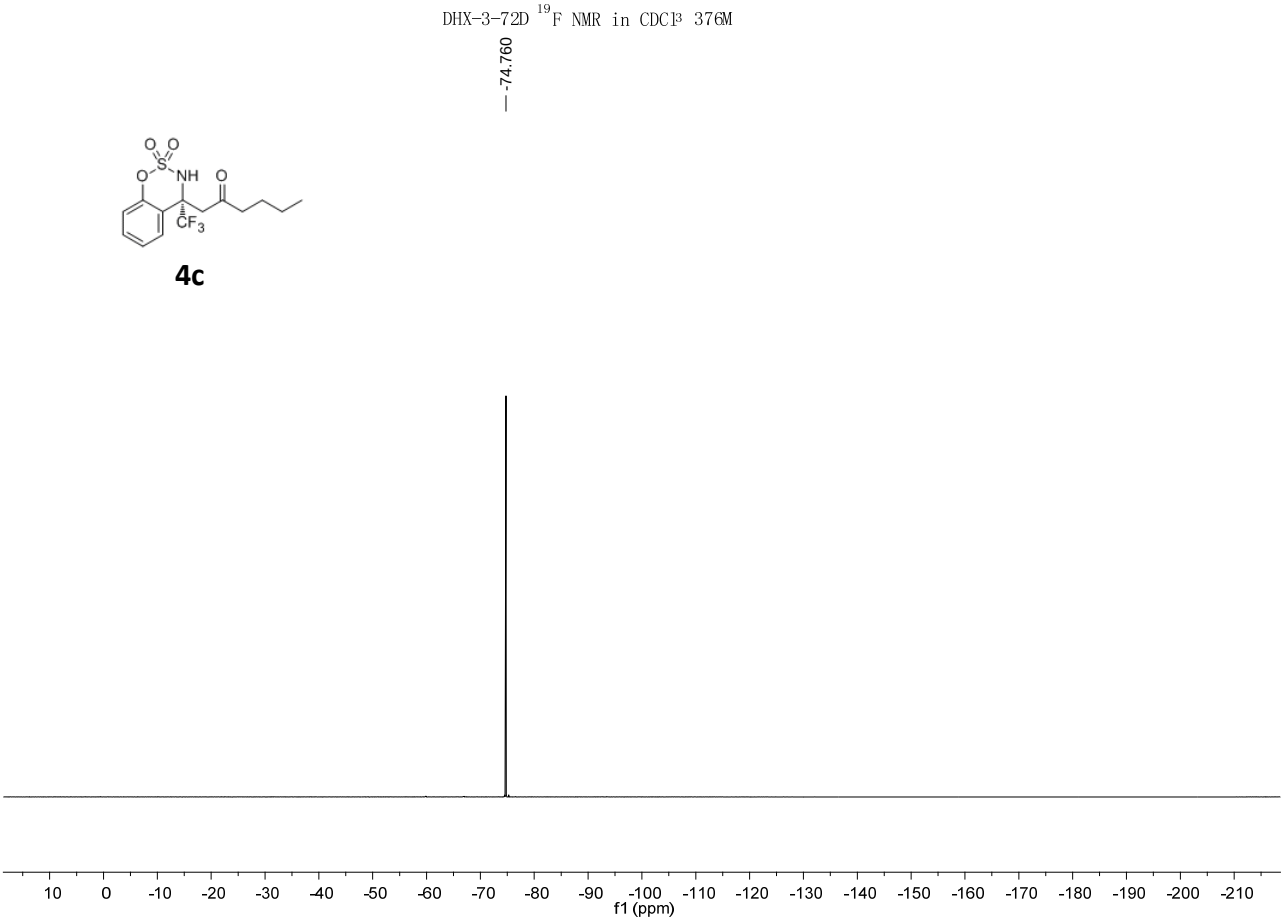


4c

DHX-3-72D ^{13}C NMR in CDCl$_3$ 100M

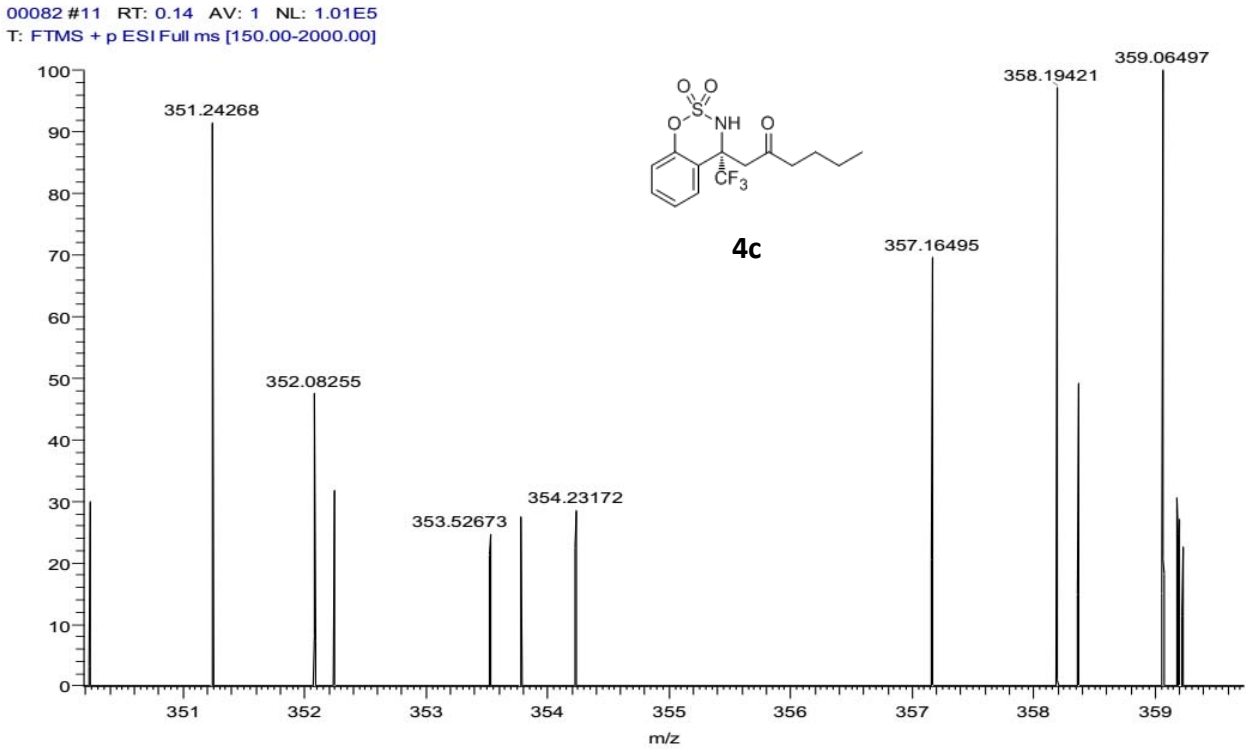


4c

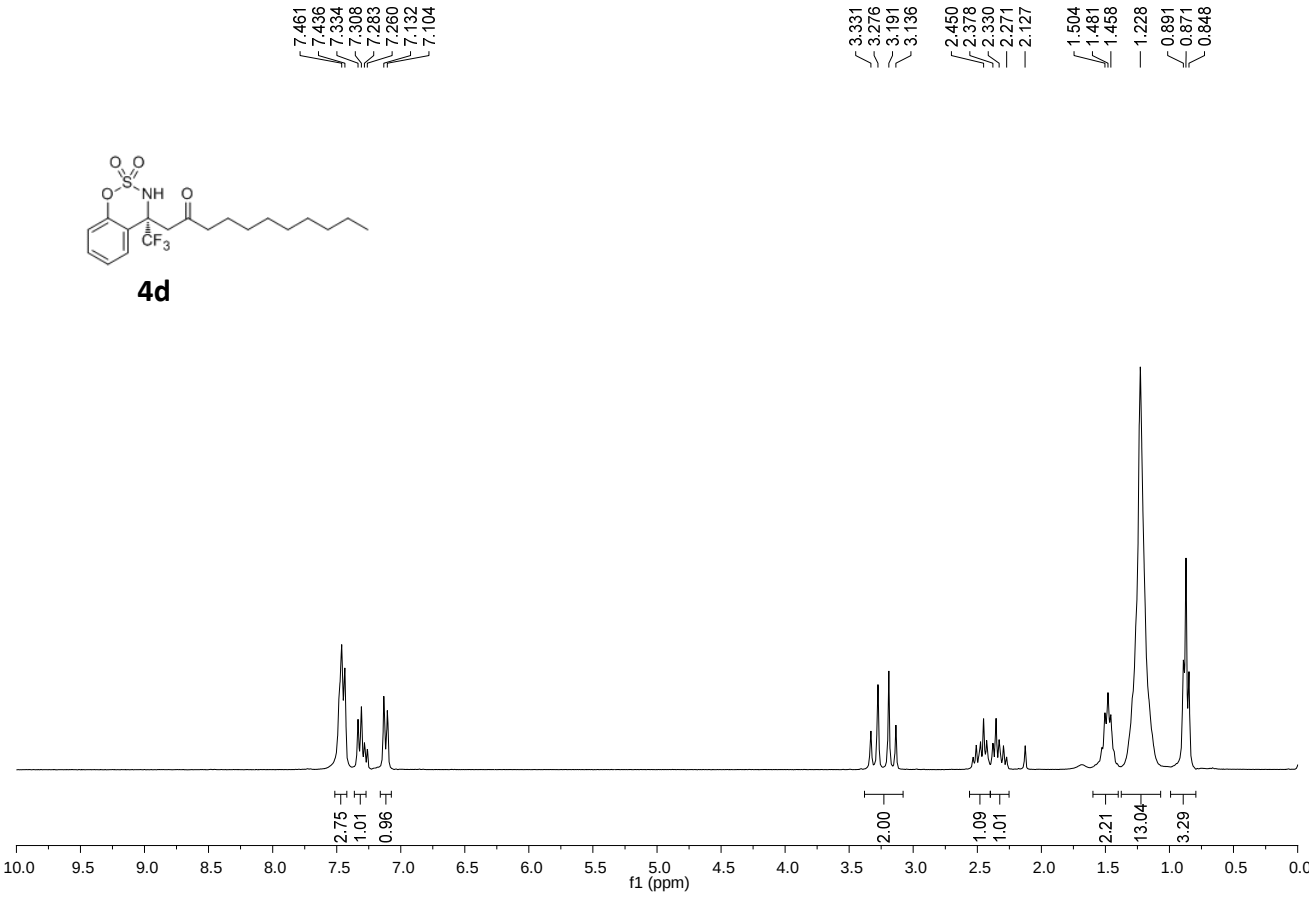


HRMS for 4c

DHX-3-72D: HRMS (ESI) m/z calcd for $C_{14}H_{17}F_3NO_4S^+$ $(M+H)^+$ 352.08249, found 352.08255.

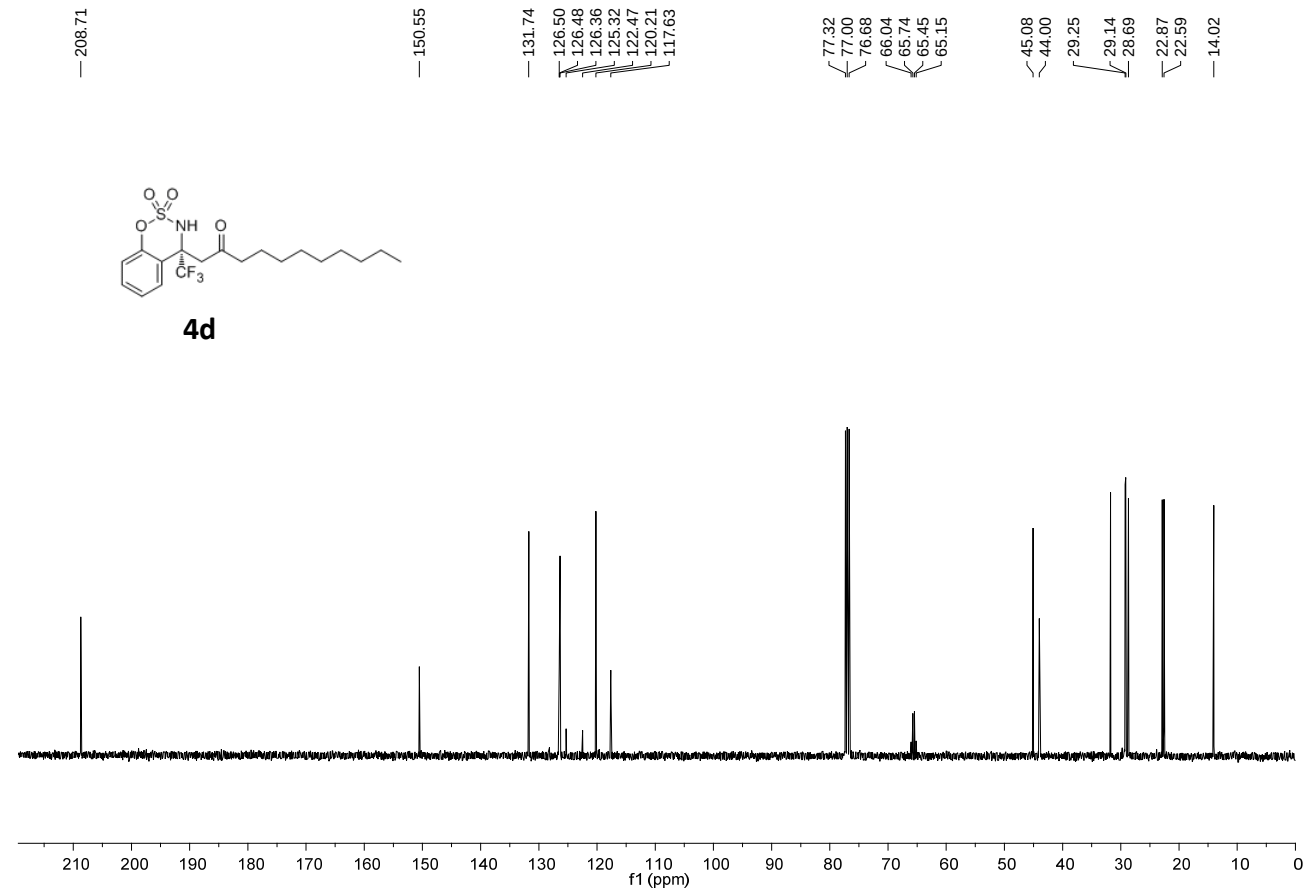


DHX-4-11D ^{1}H NMR in CDCl$_3$ 300M



4d

DHX-4-11D ^{13}C NMR in CDCl$_3$ 100M

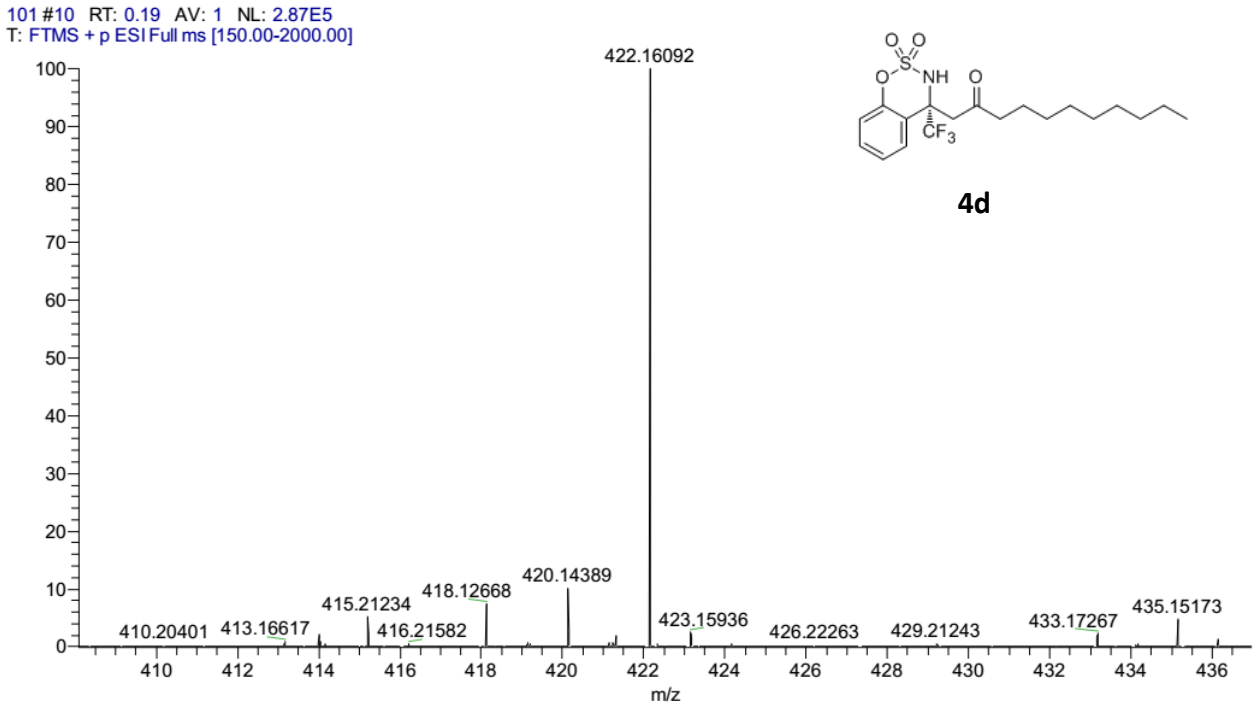


4d

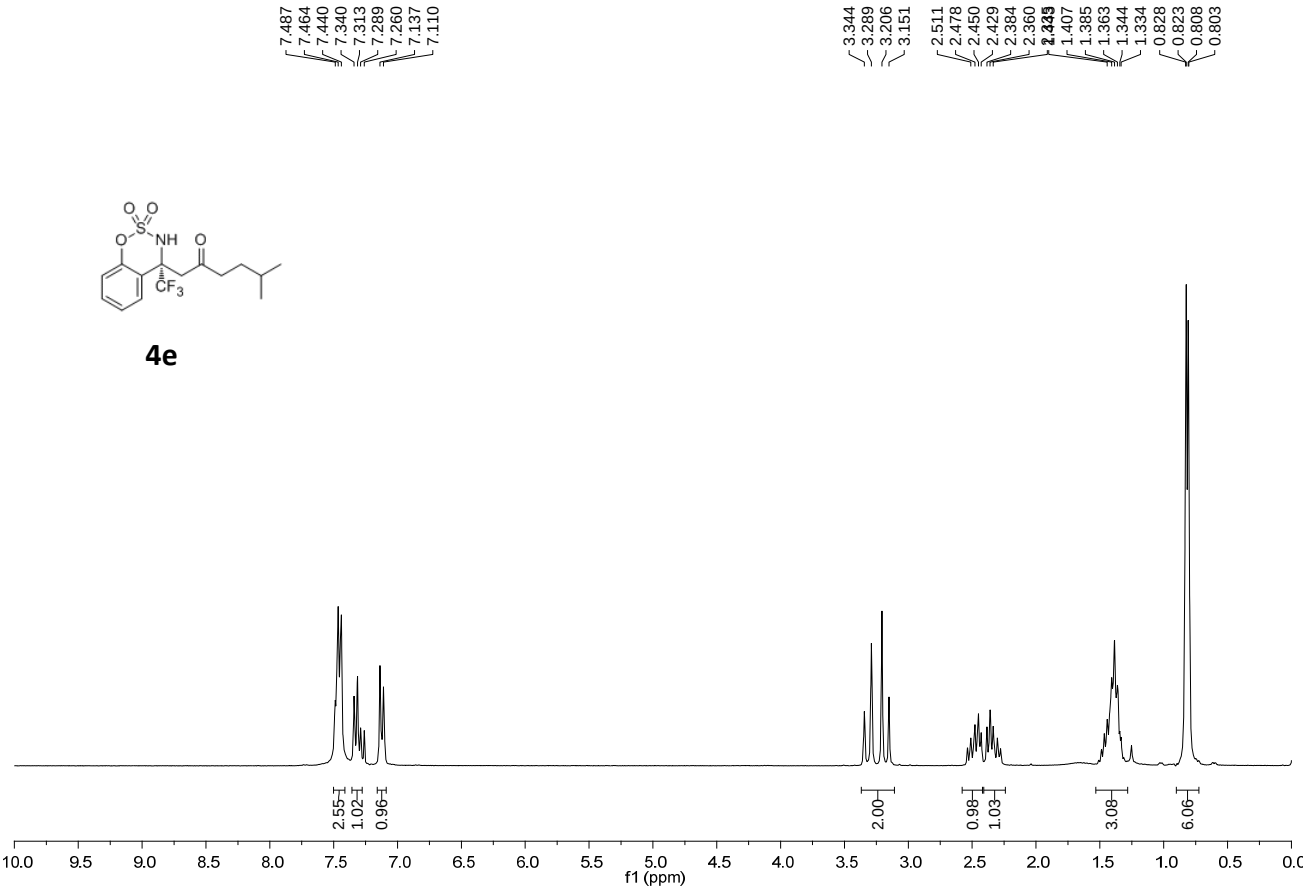
HRMS for 4d

DHX-4-11D. HRMS (ESI) m/z calcd for $C_{19}H_{27}F_3NO_4S^+$ $(M+H)^+$ 422.16074, foun

422.16092.

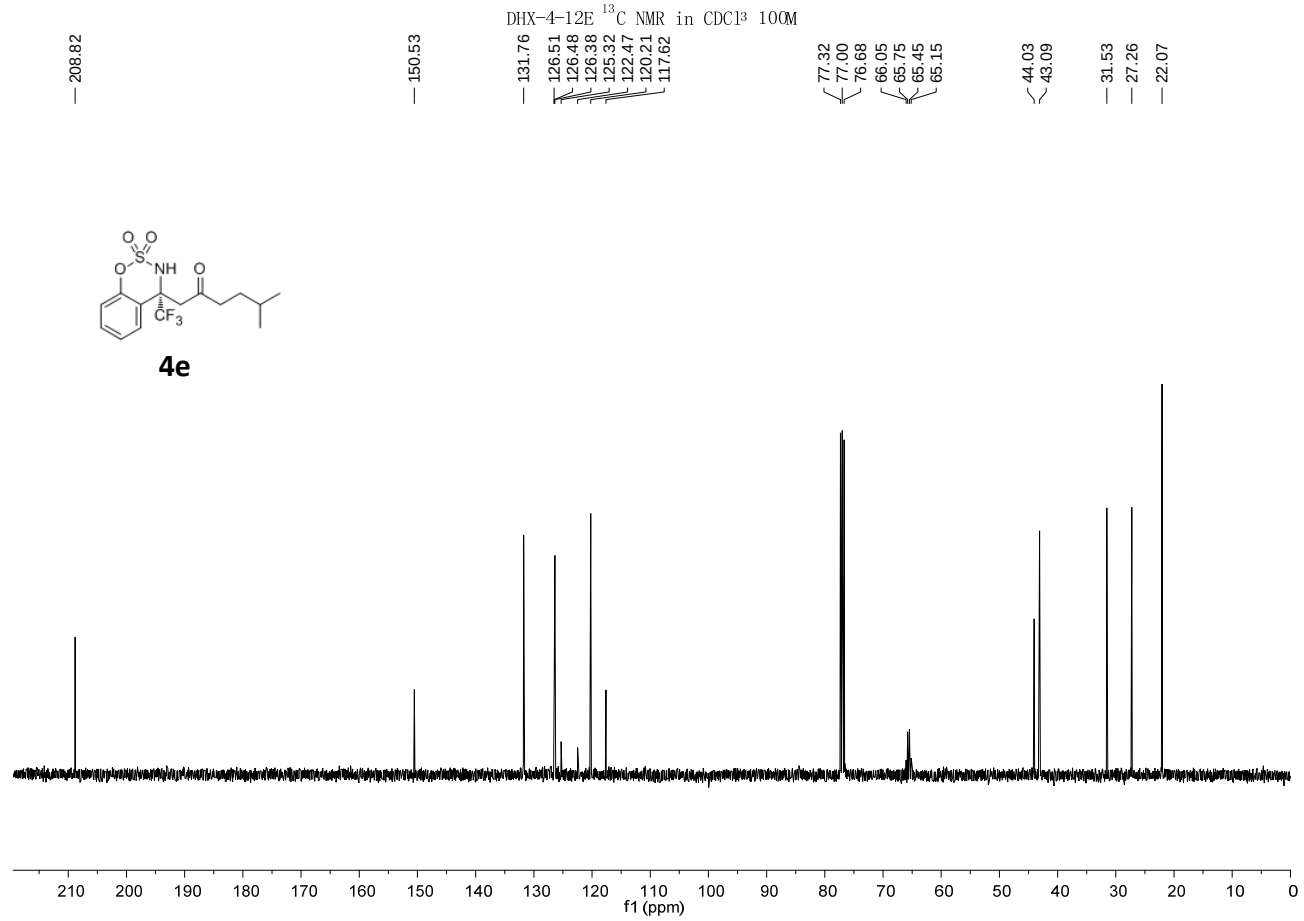


DHX-4-12E ^{1}H NMR in CDCl^{3} 300M



4e

DHX-4-12E ^{13}C NMR in CDCl^{3} 100M



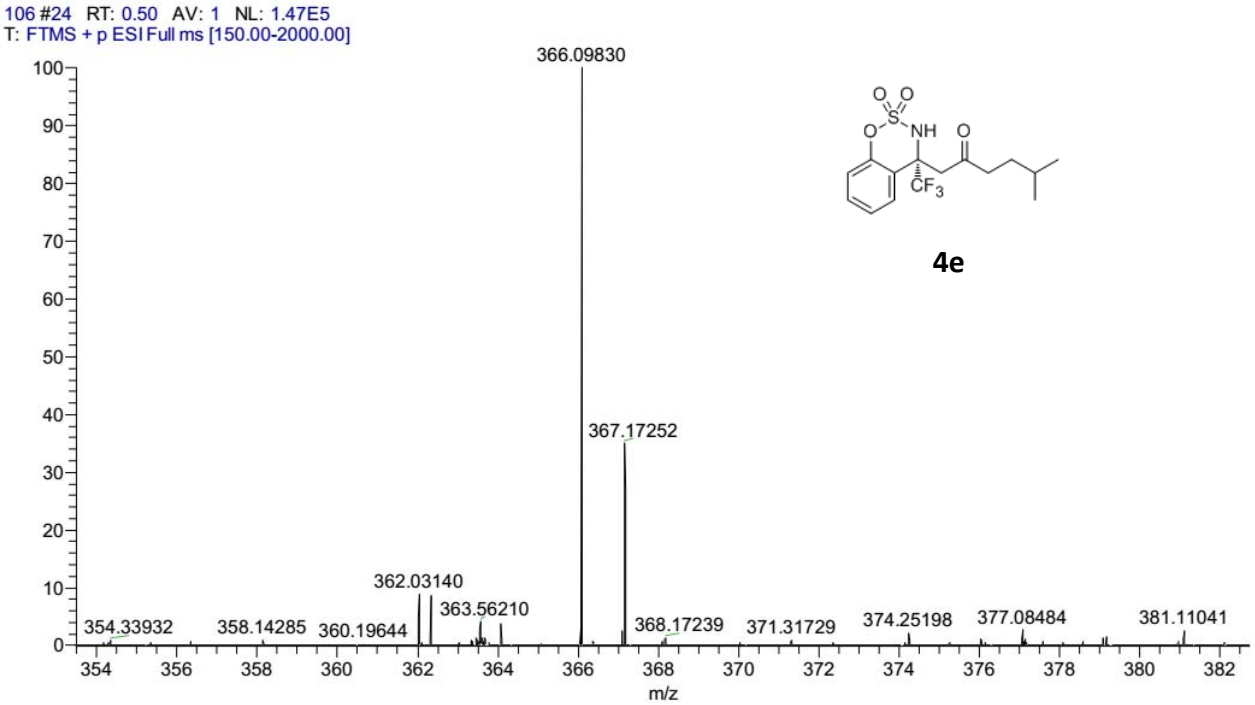
4e

DHX-4-12E ^{19}F NMR in $CDCl^3$ 376M

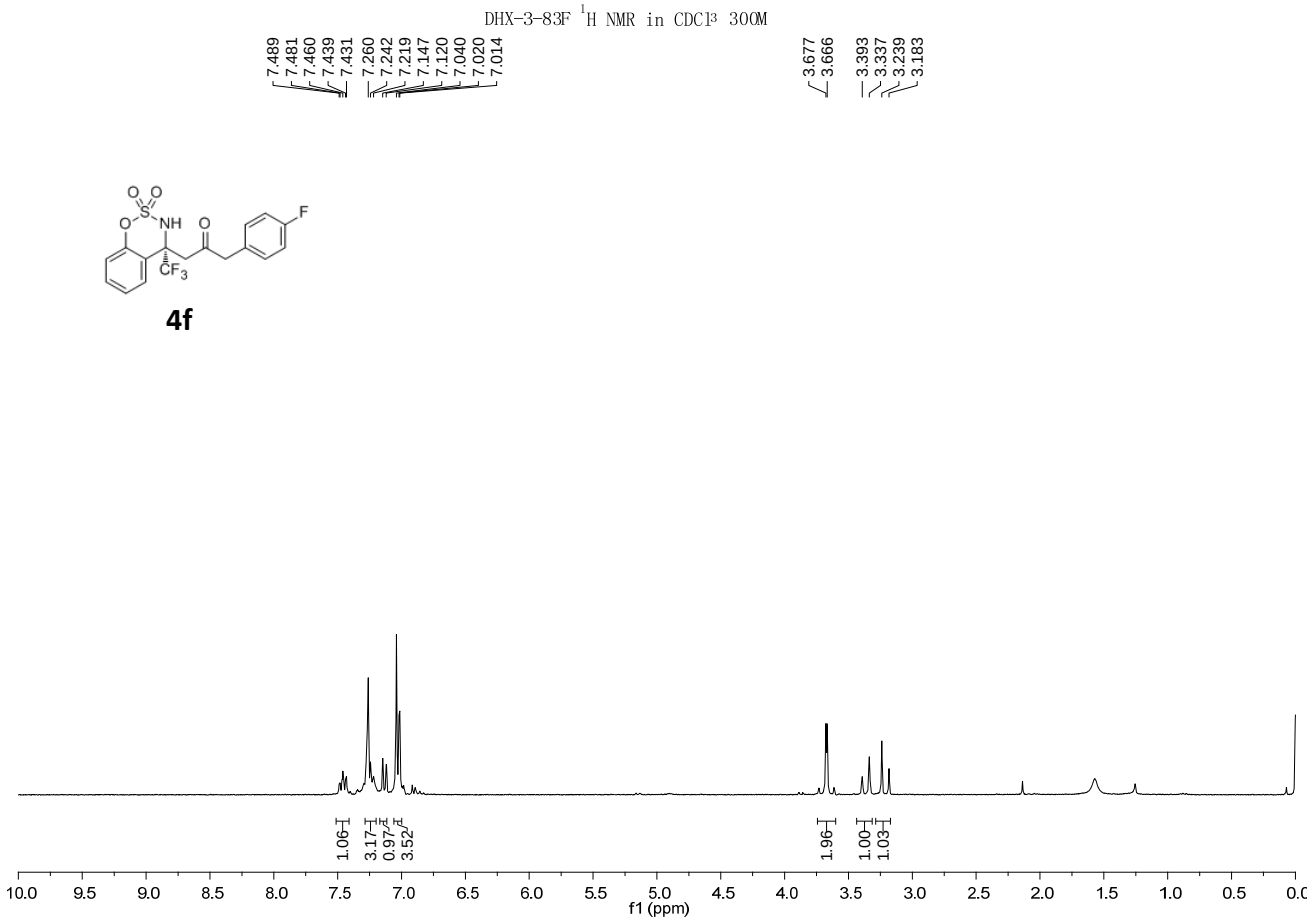
HRMS for 4e

DHX-4-12E. HRMS (ESI) m/z calcd for $C_{15}H_{19}F_3NO_4S^+$ $(M+H)^+$ 366.09814, founc

366.09830.

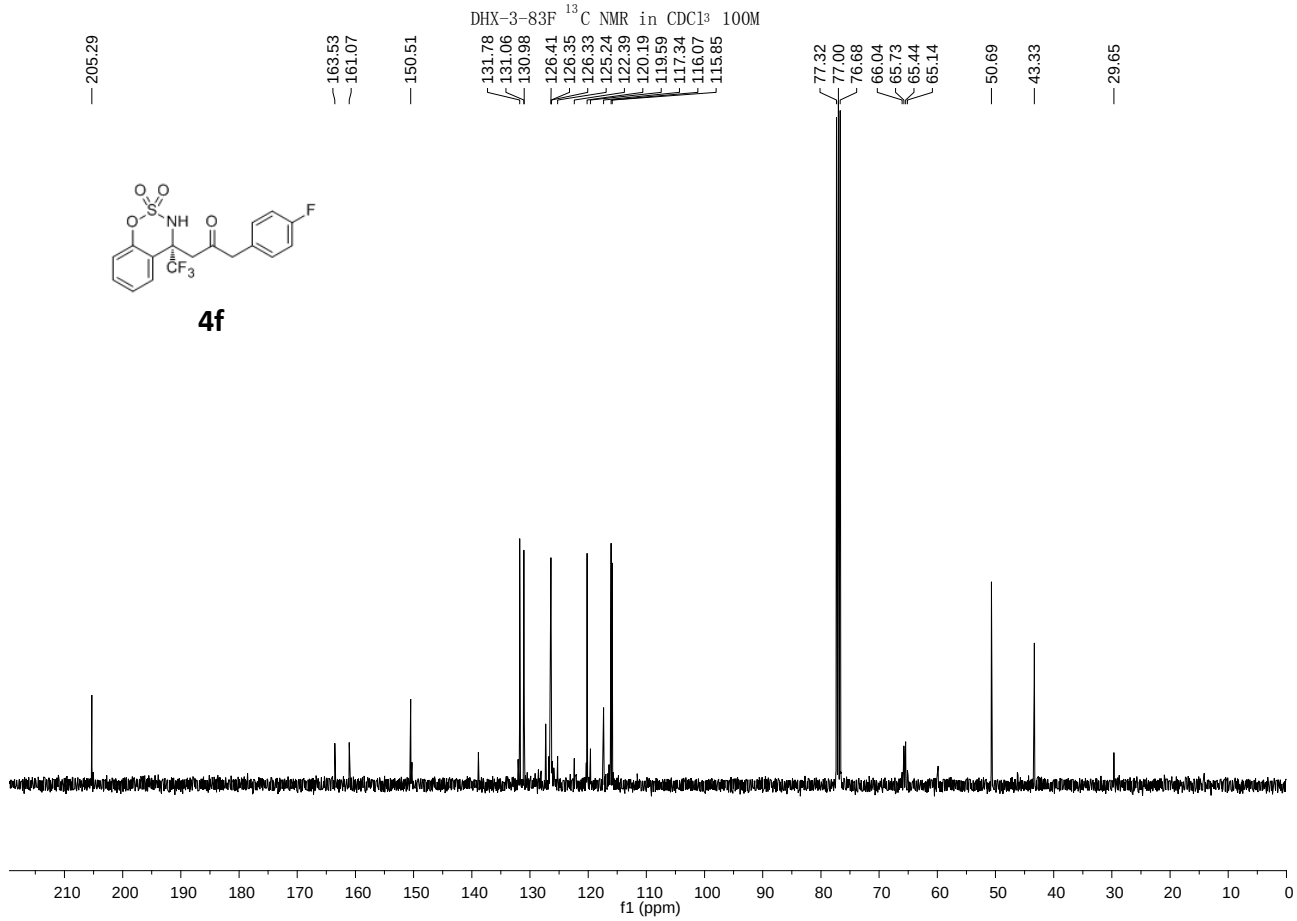


DHX-3-83F ^{1}H NMR in CDCl$_3$ 300M

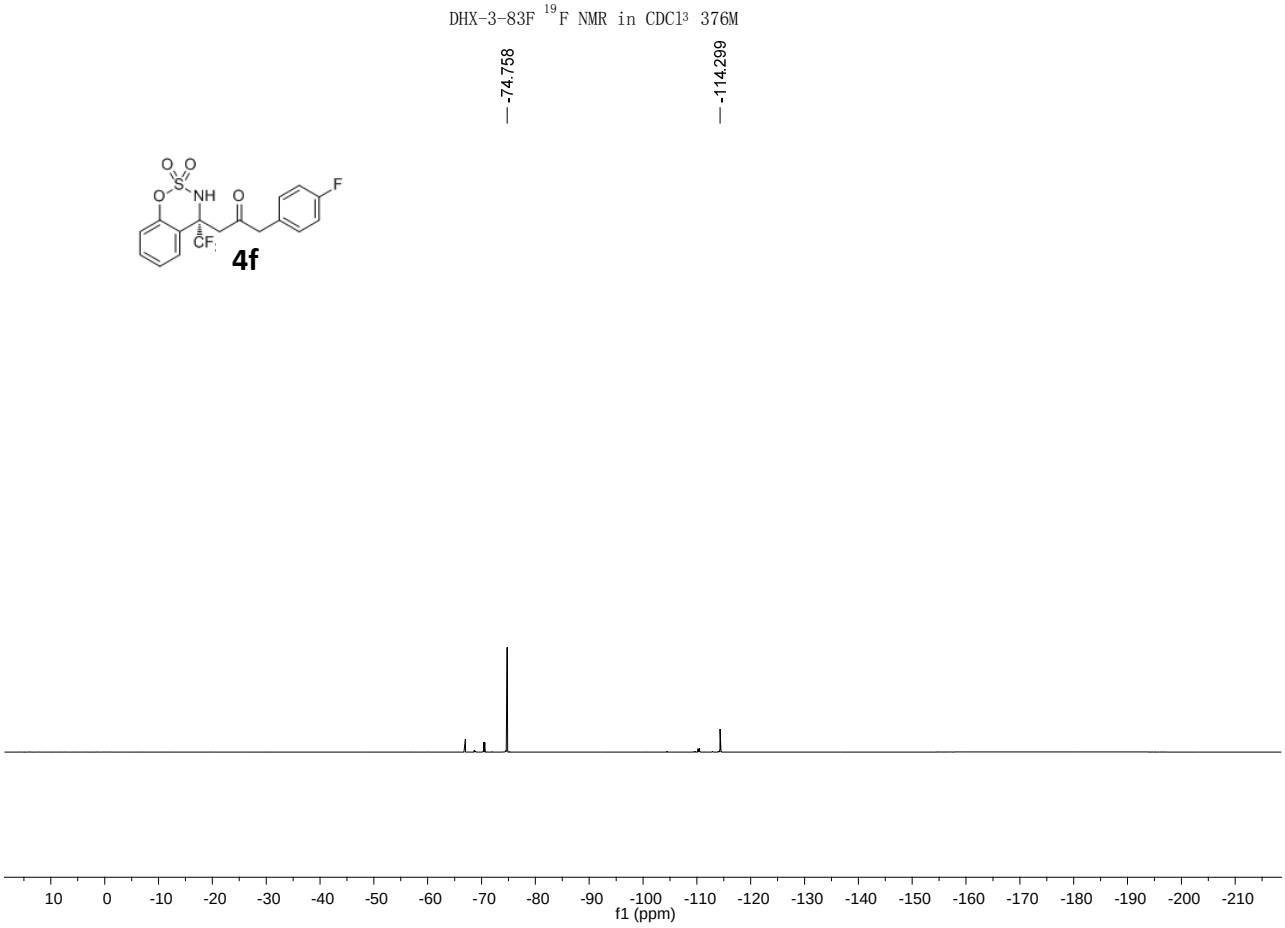


4f

DHX-3-83F ^{13}C NMR in CDCl$_3$ 100M

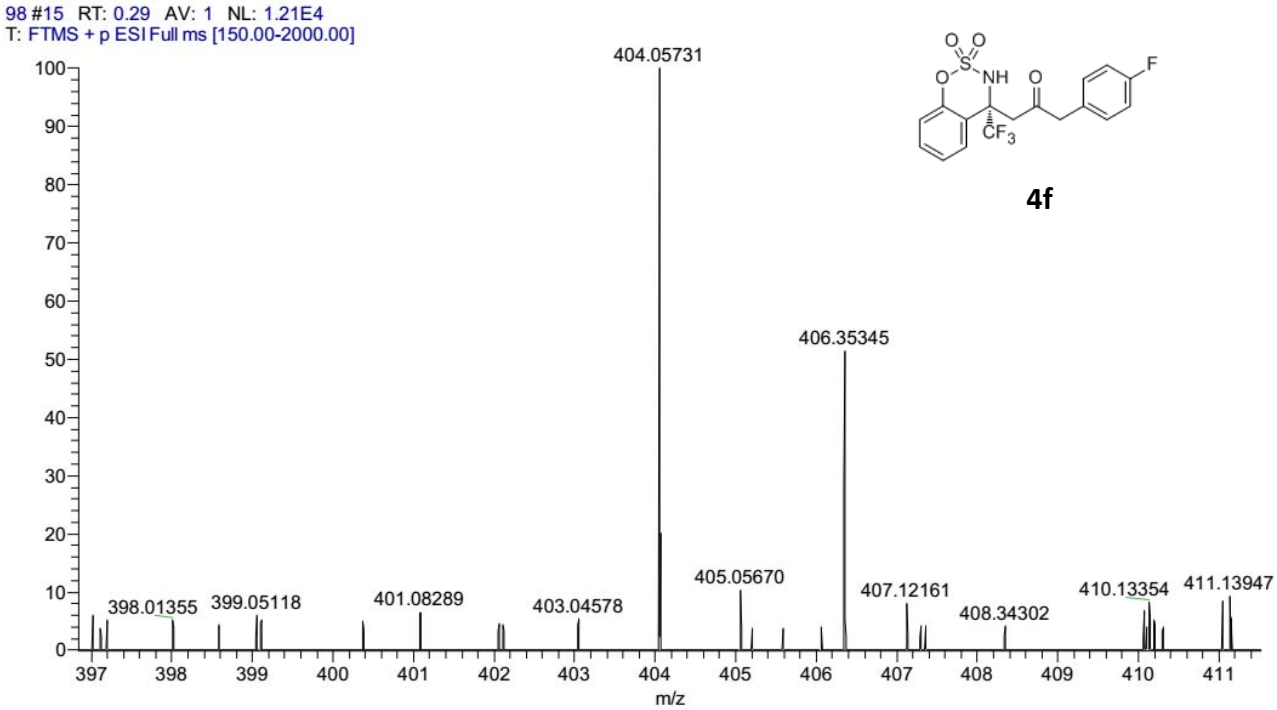


4f

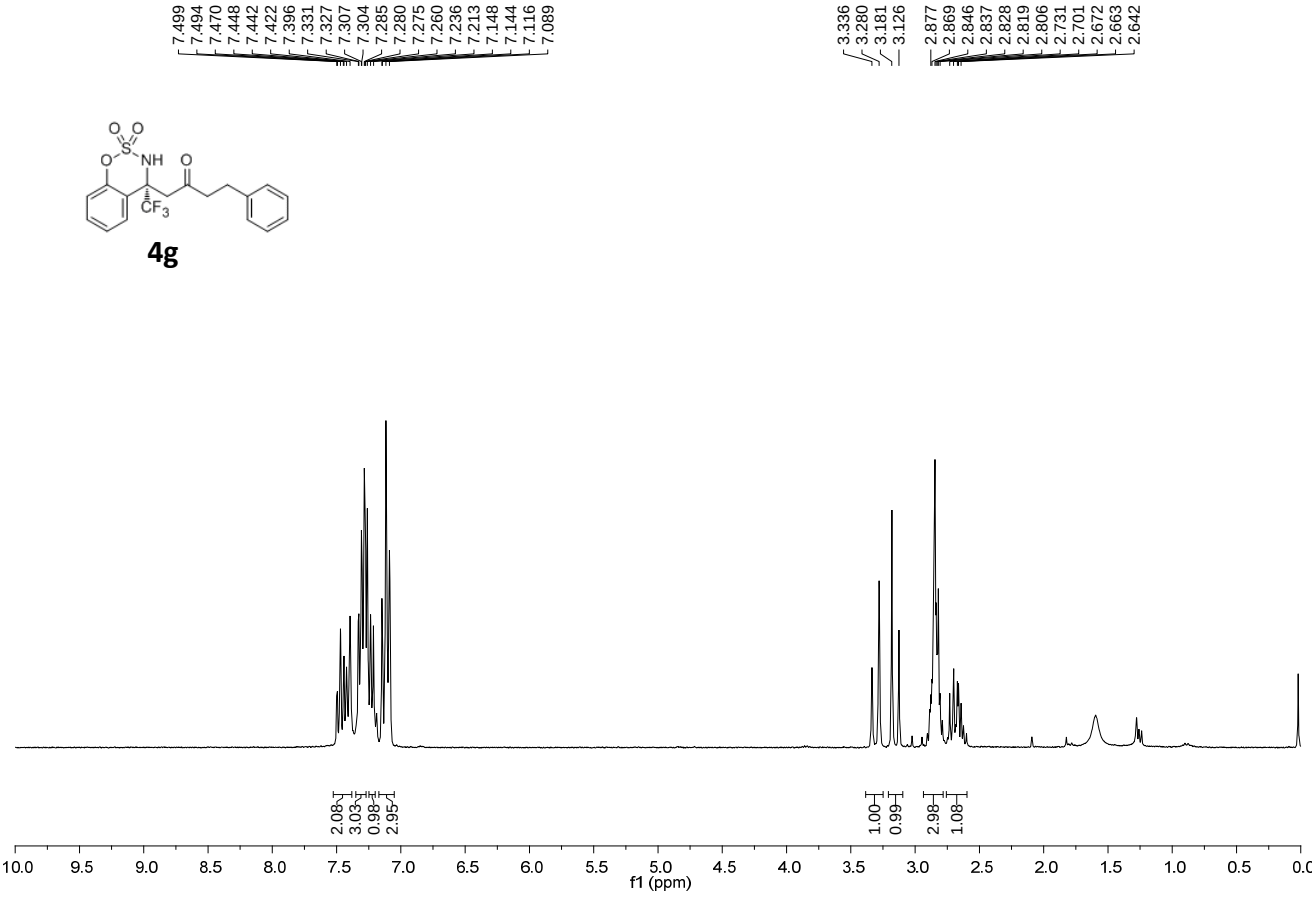


HRMS for 4f

DHX-3-83F. HRMS (ESI) m/z calcd for $C_{17}H_{14}F_4NO_4S^+$ $(M+H)^+$ 404.05742, found 404.05731.

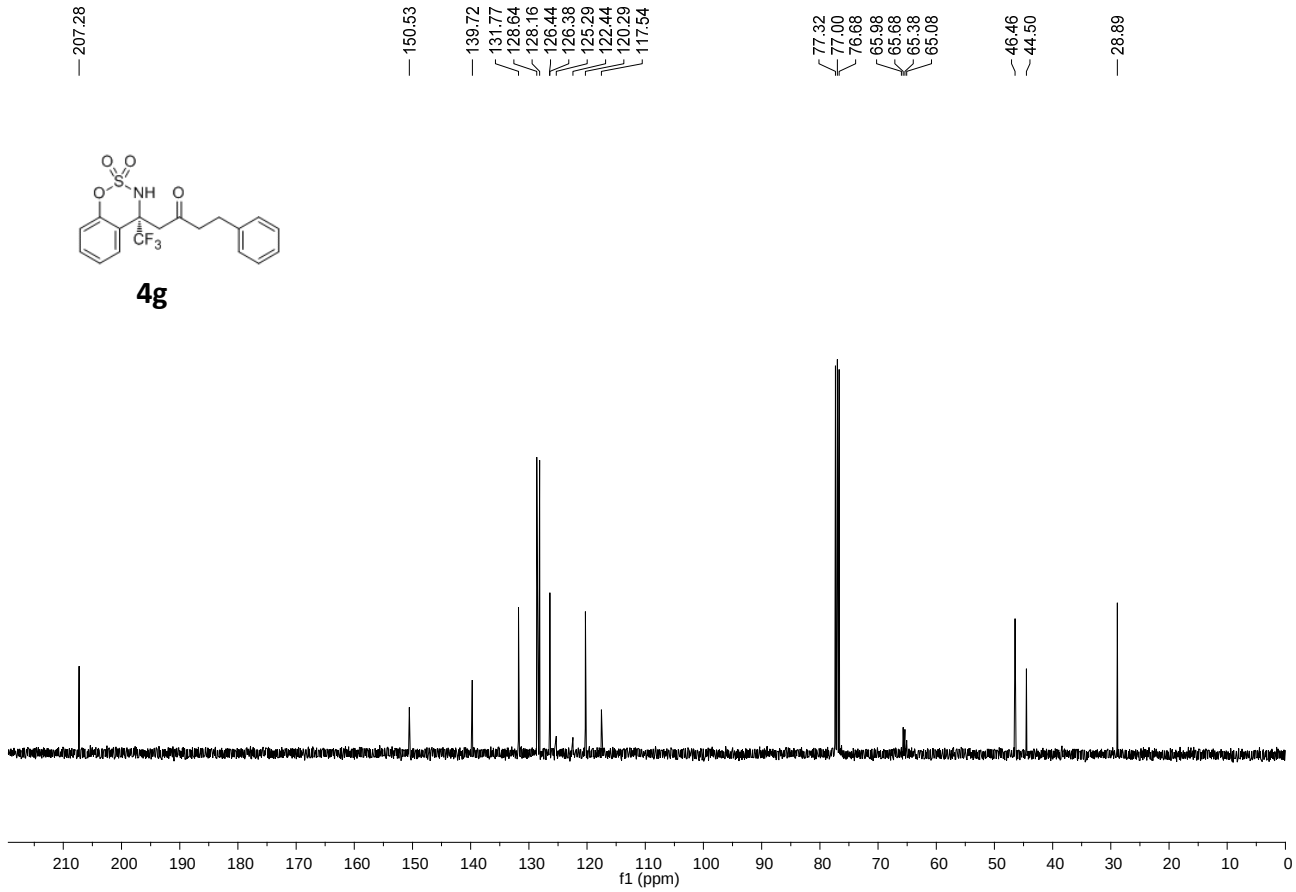


DHX-3-85J ^{1}H NMR in CDCl^{3} 300M



4g

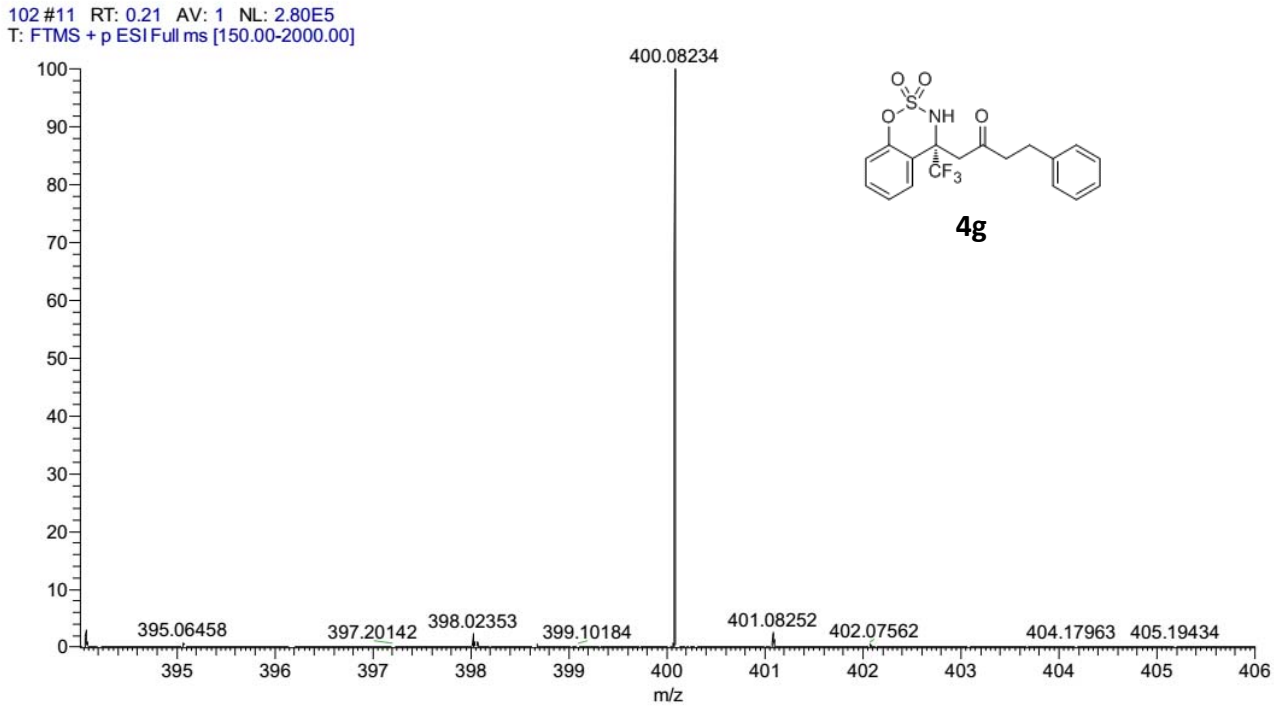
DHX-3-85J ^{13}C NMR in CDCl^{3} 100M



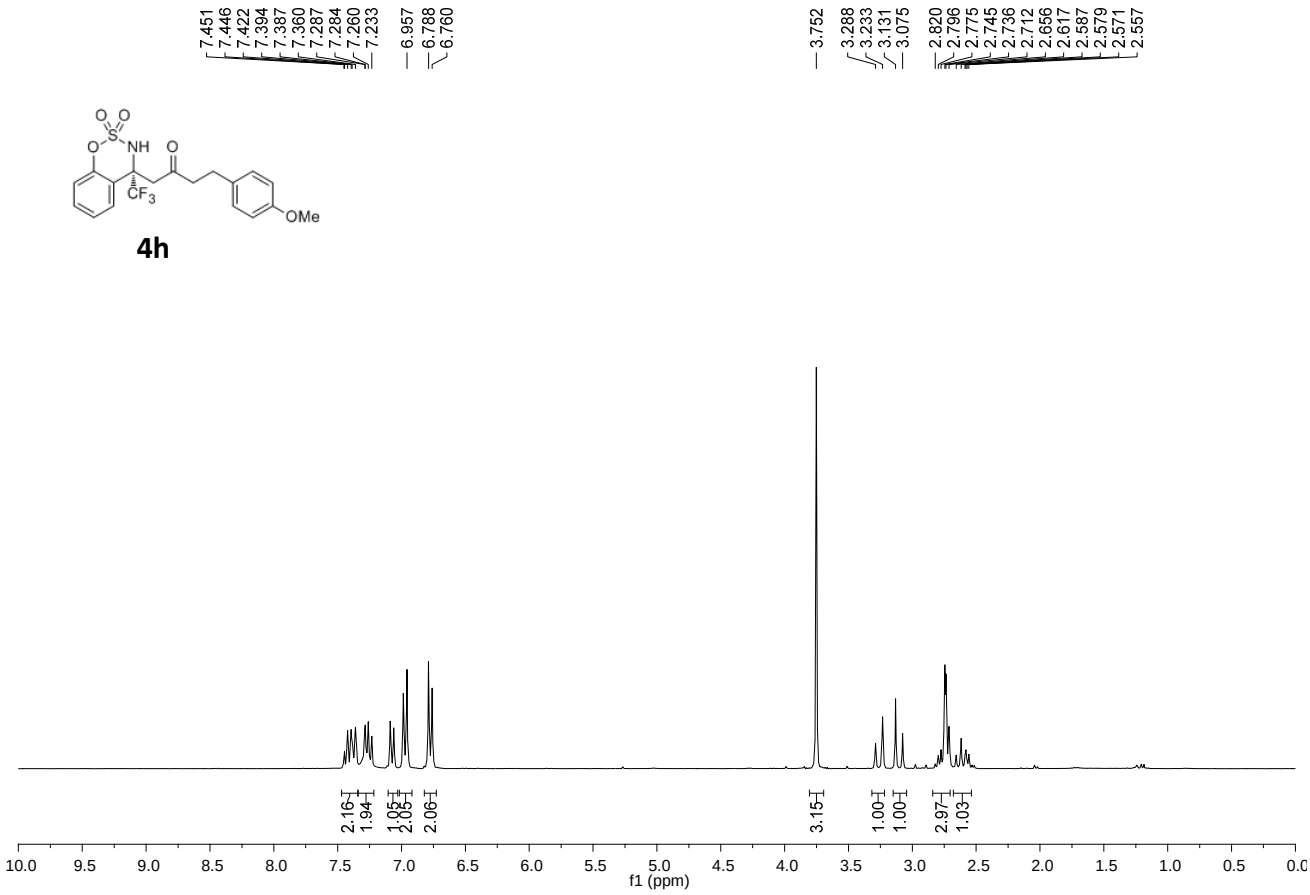
4g

HRMS for 4g

DHX-3-85J. HRMS (ESI) m/z calcd for $C_{18}H_{17}F_3NO_4S^+$ $(M+H)^+$ 400.08249, found 400.08234.

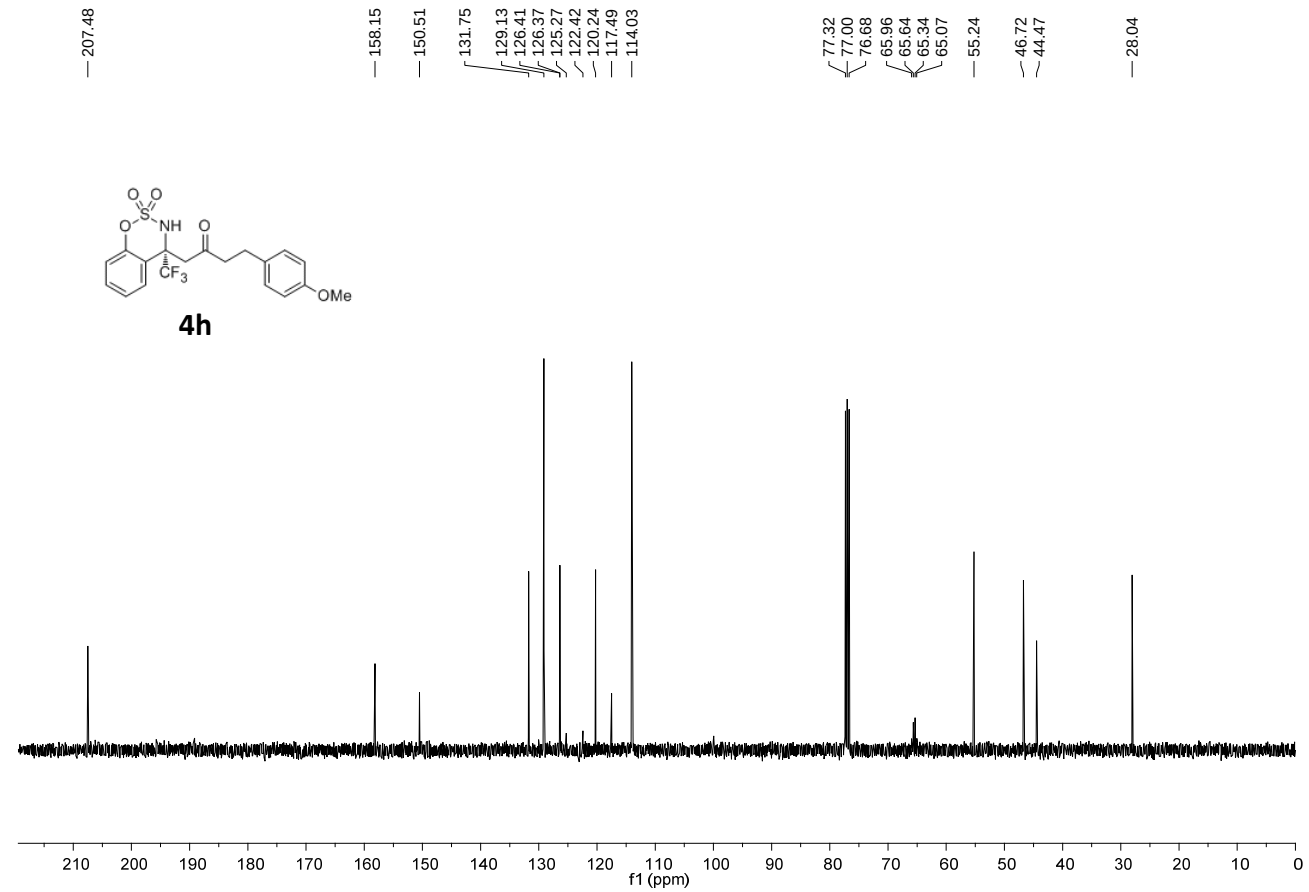


DHX-3-84H ^{1}H NMR in CDCl$_3$ 300M

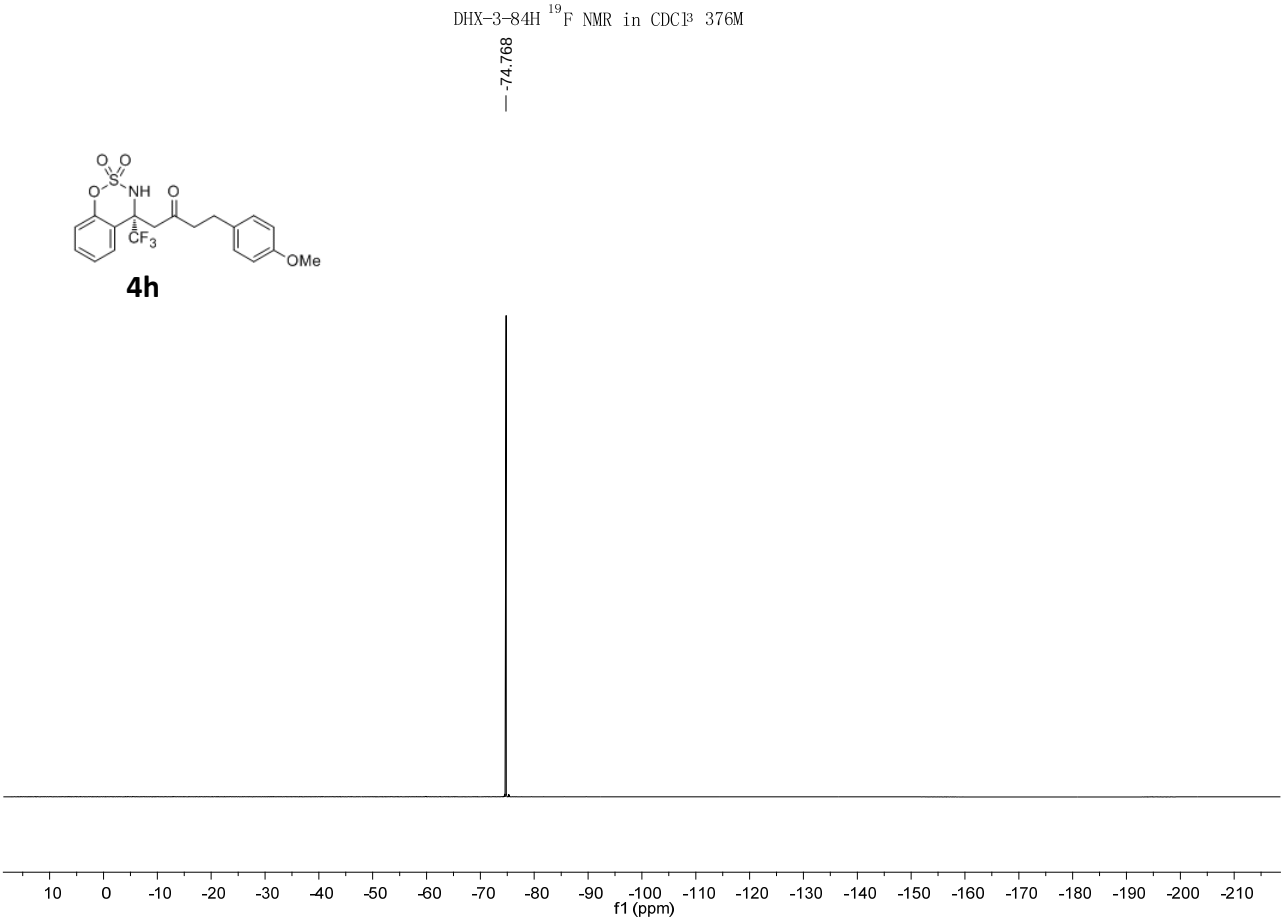


4h

DHX-3-84H ^{13}C NMR in CDCl$_3$ 100M

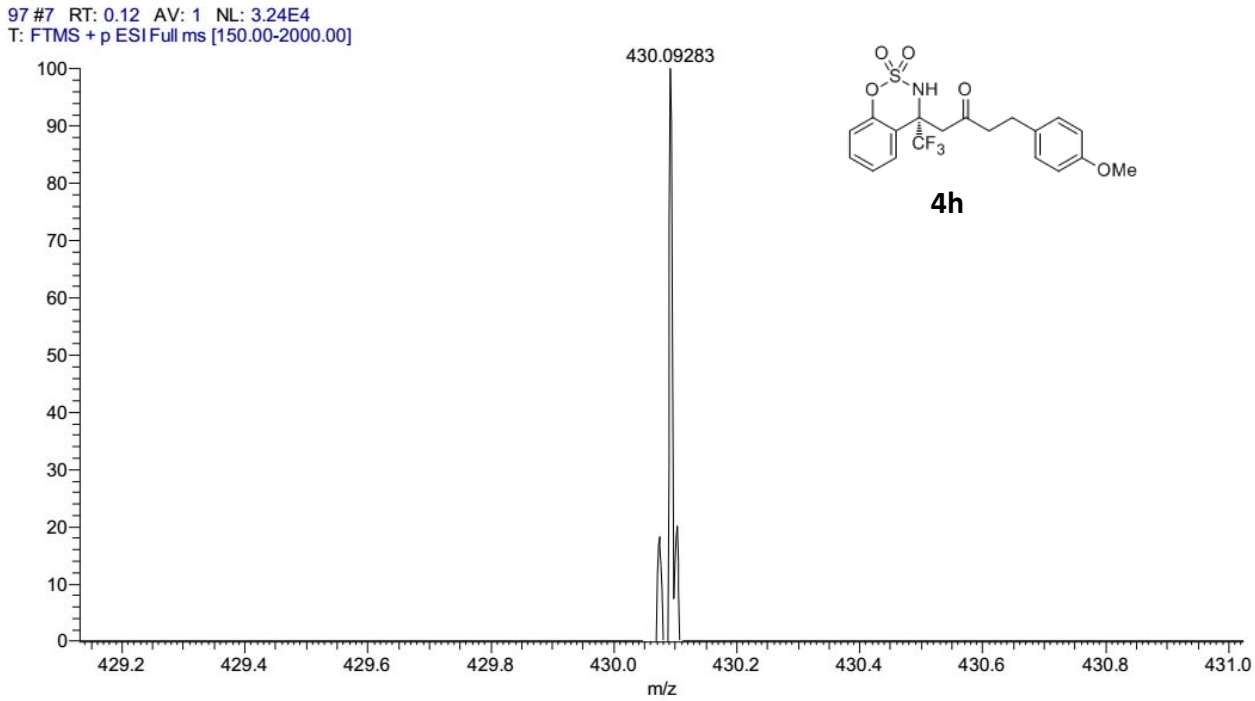


4h

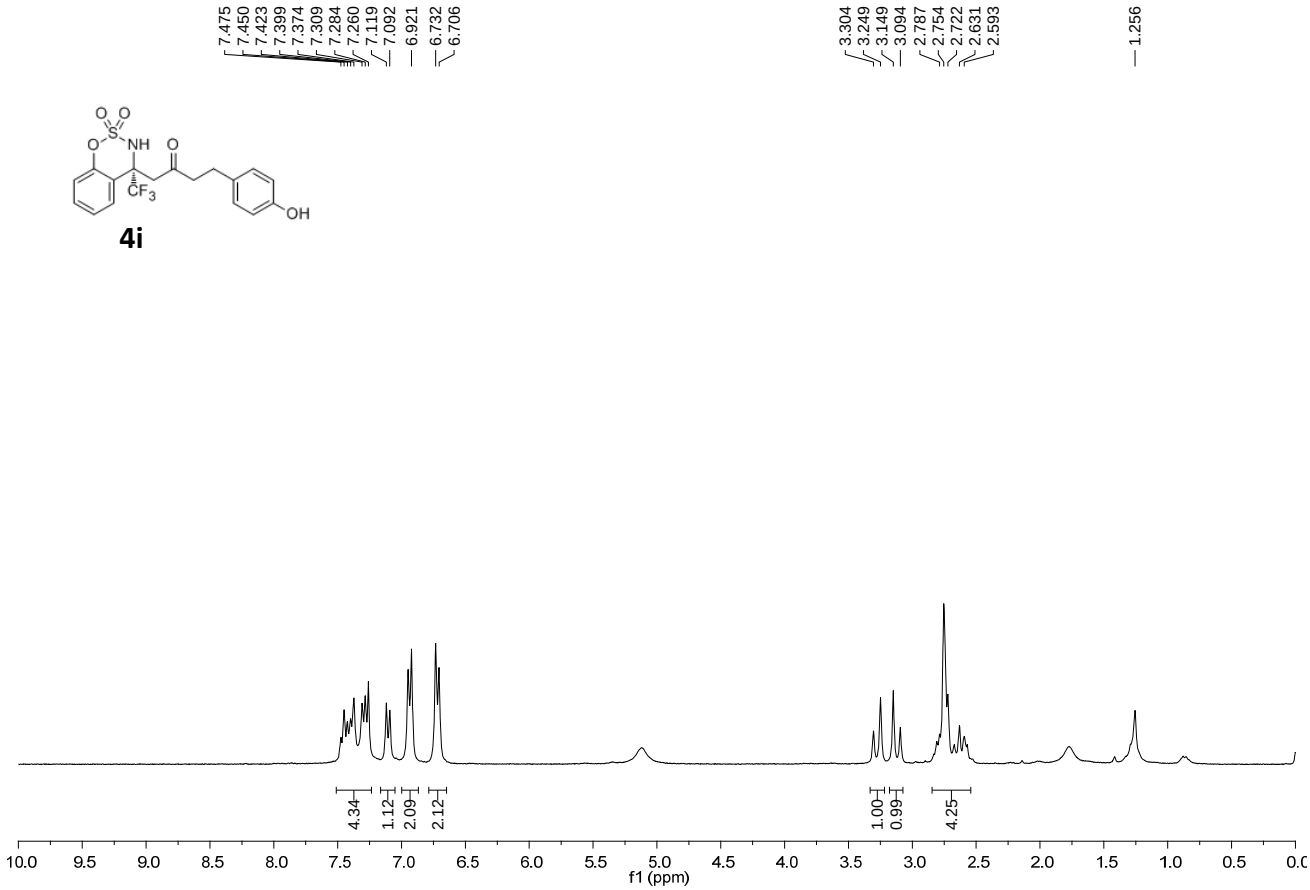


HRMS for 4h

DHX-3-84H. HRMS (ESI) m/z calcd for $C_{19}H_{19}F_3NO_5S^+$ $(M+H)^+$ 430.09305, found 430.09283.

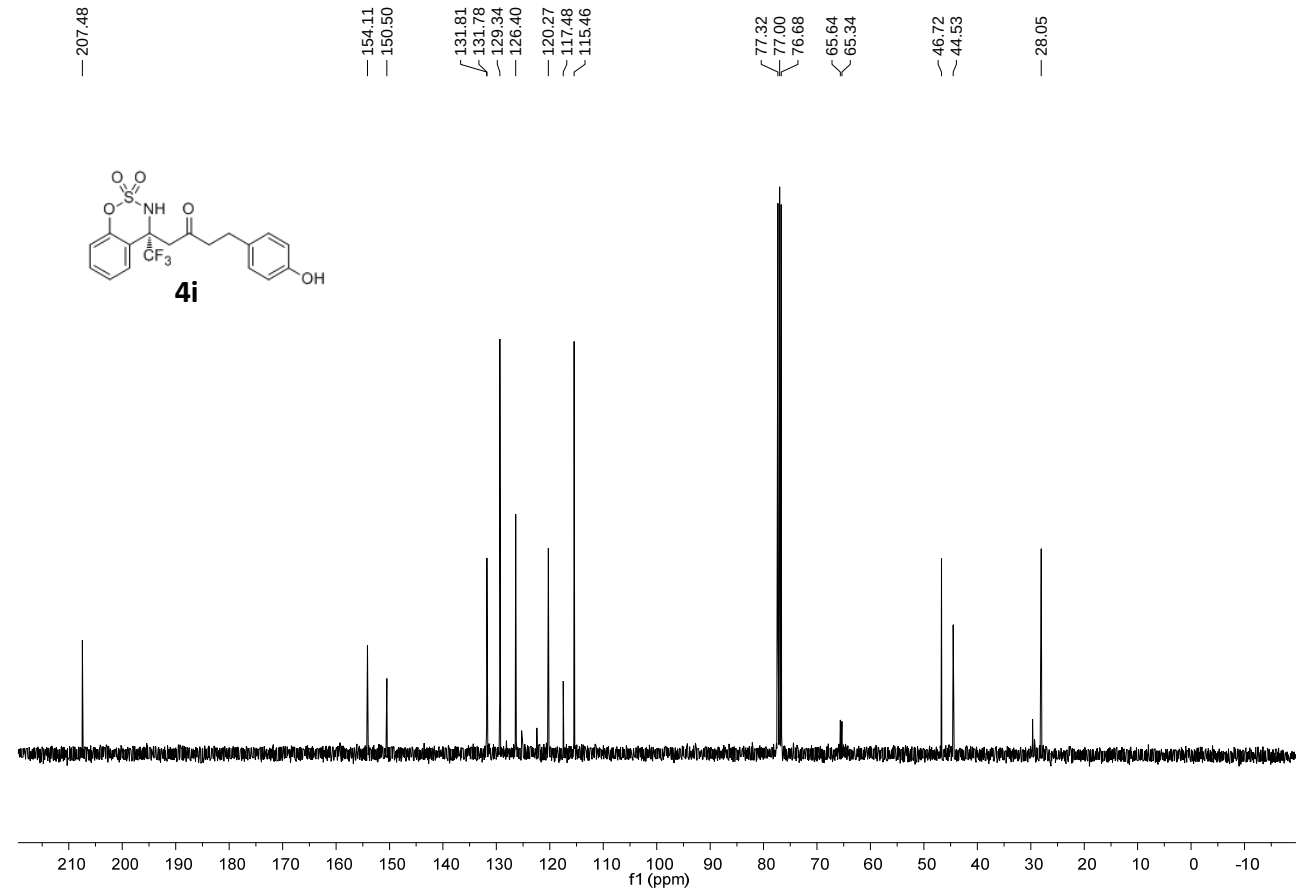


DHX-4-13G ^{1}H NMR in CDCl$_3$ 300M

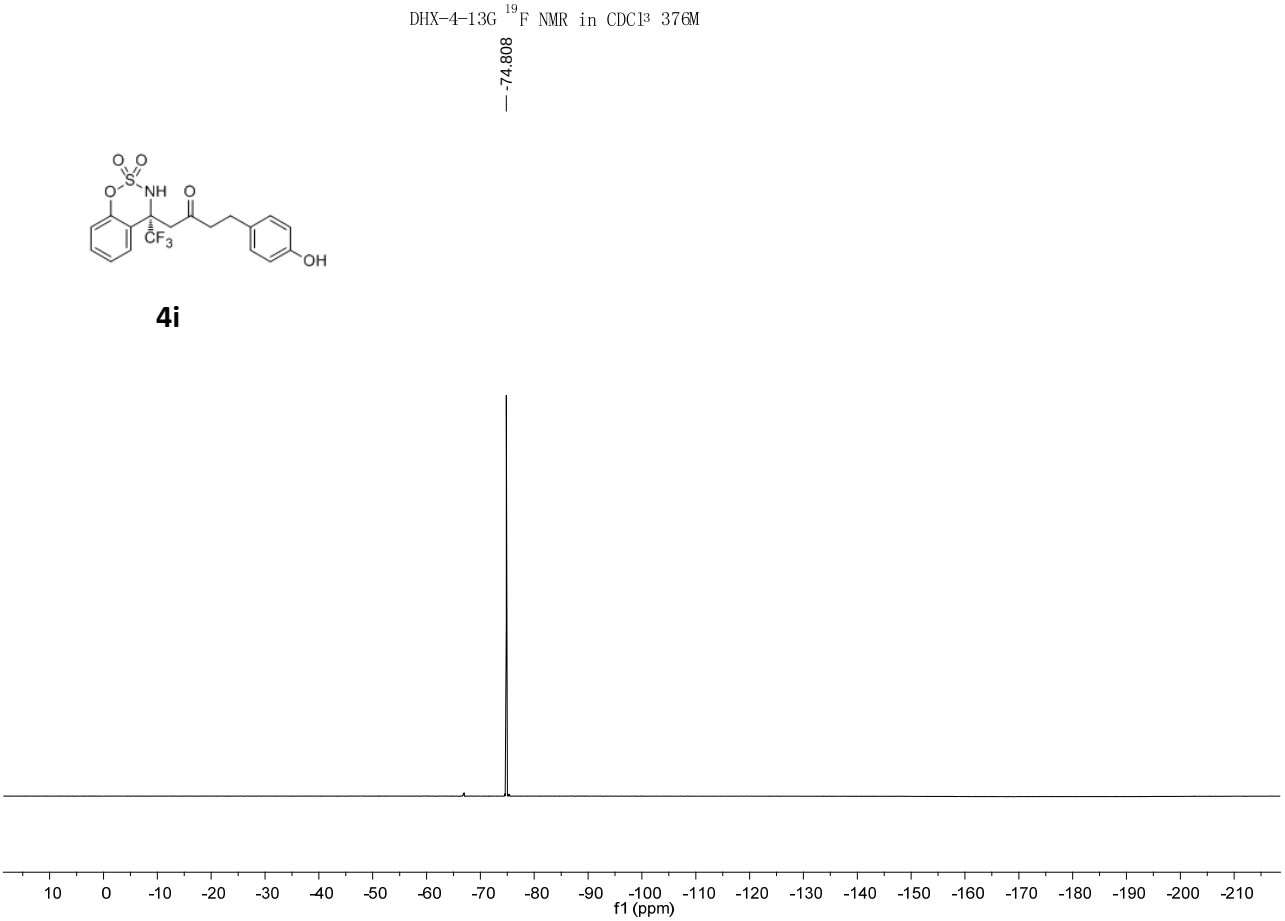


4i

DHX-4-13G ^{13}C NMR in CDCl$_3$ 100M

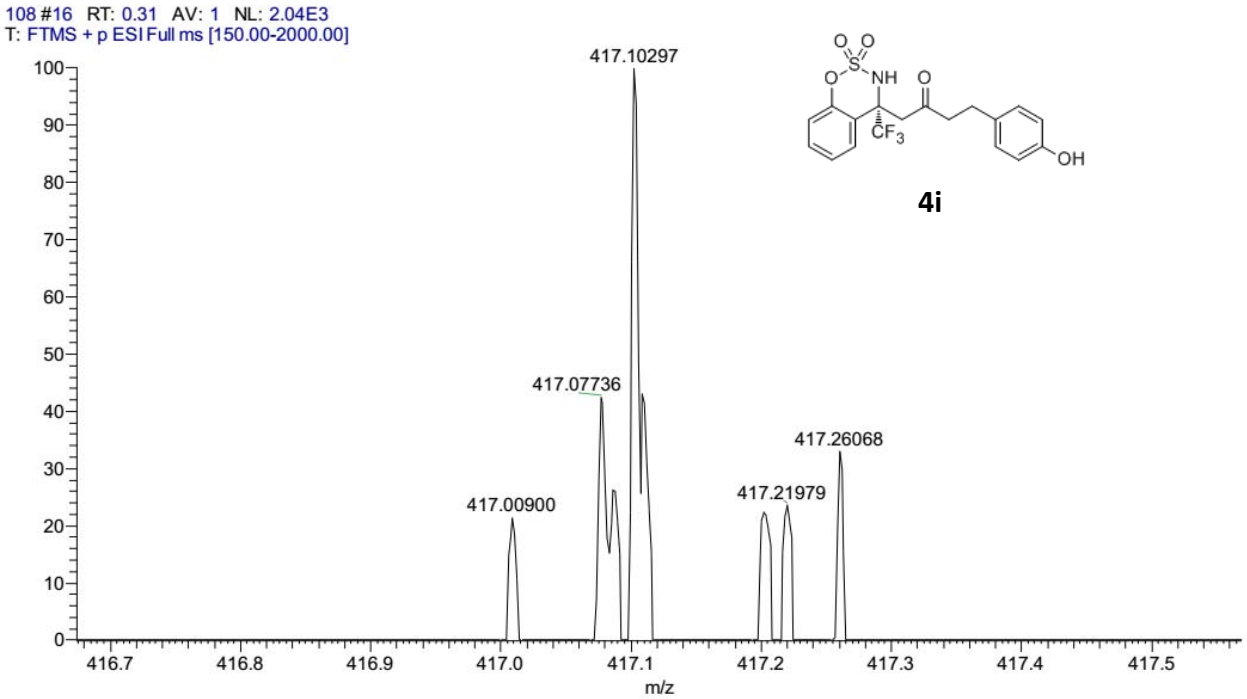


4i

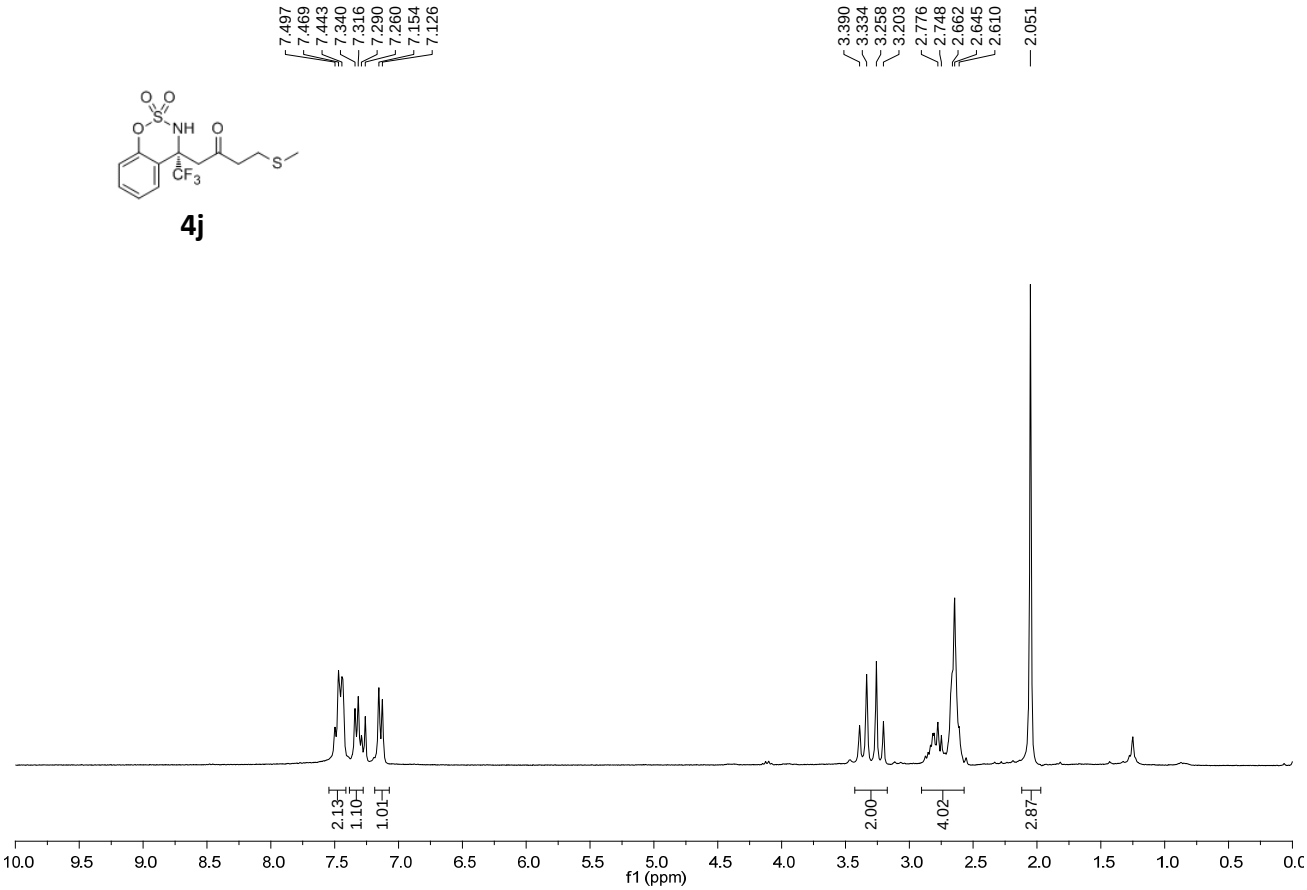


HRMS for 4i

DHX-4-13G. HRMS (ESI) m/z calcd for $C_{18}H_{17}F_3NO_5S^+$ $(M+H)^+$ 416.07740, found 416.07736.

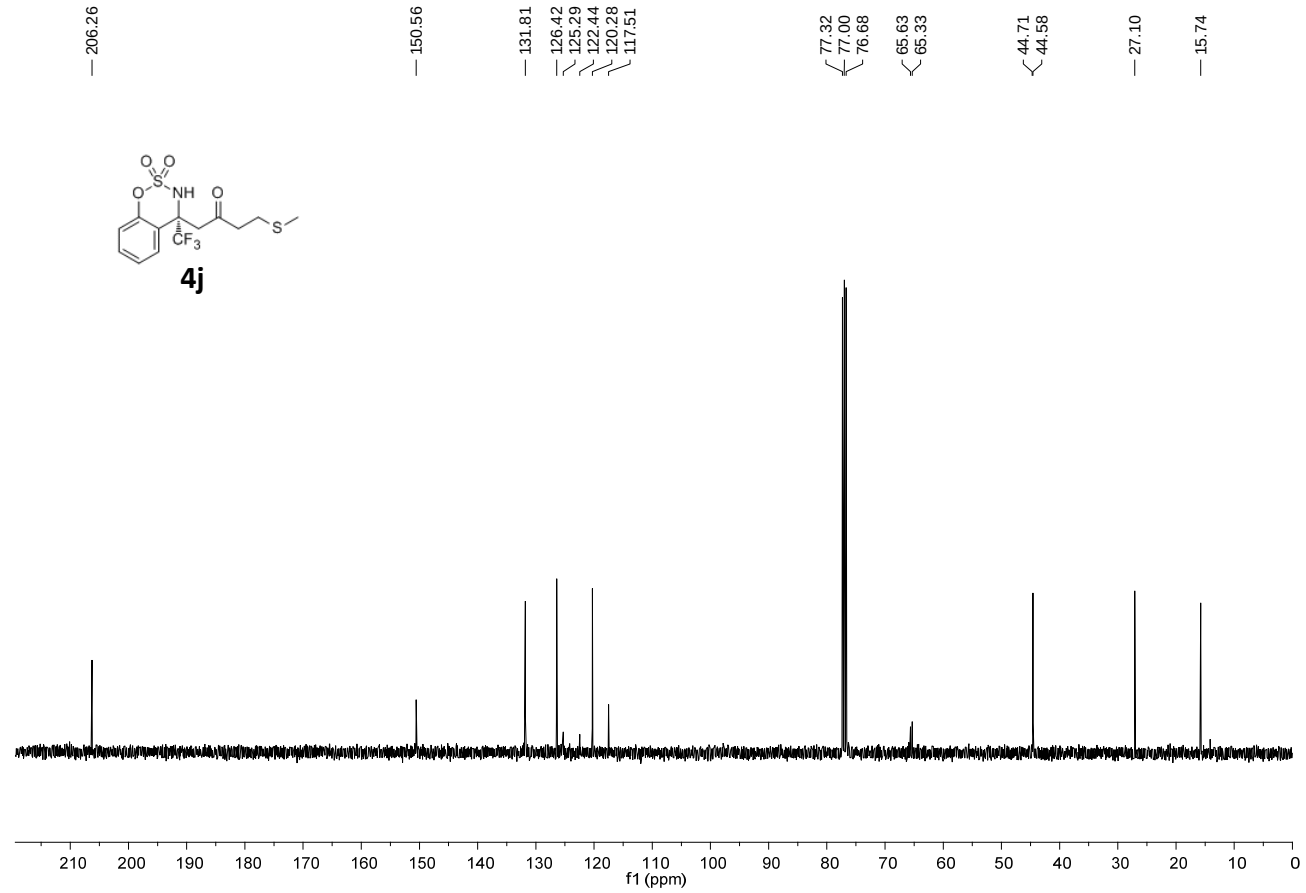


DHX-4-12F ^{1}H NMR in CDCl^{3} 300M



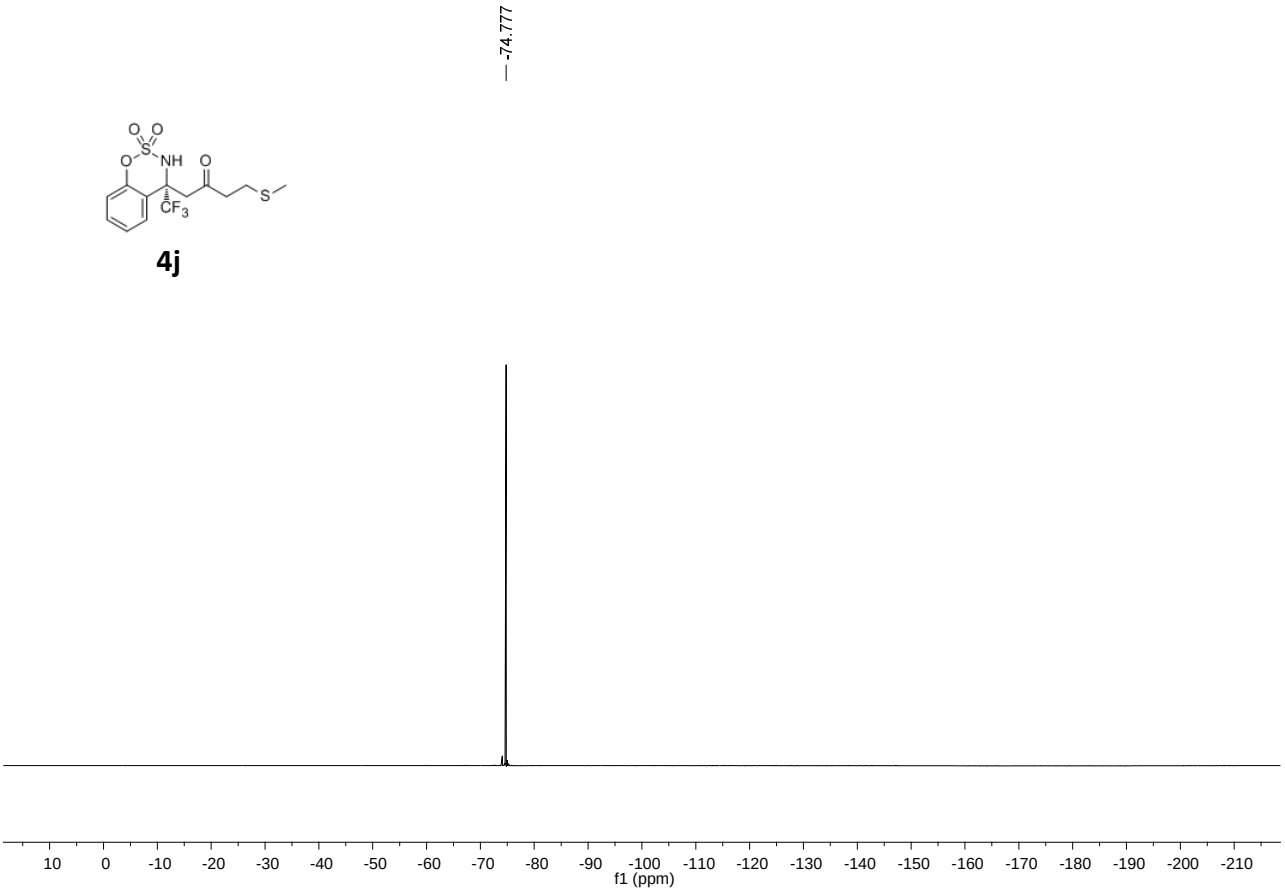
4j

DHX-4-12F ^{13}C NMR in CDCl^{3} 100M



4j

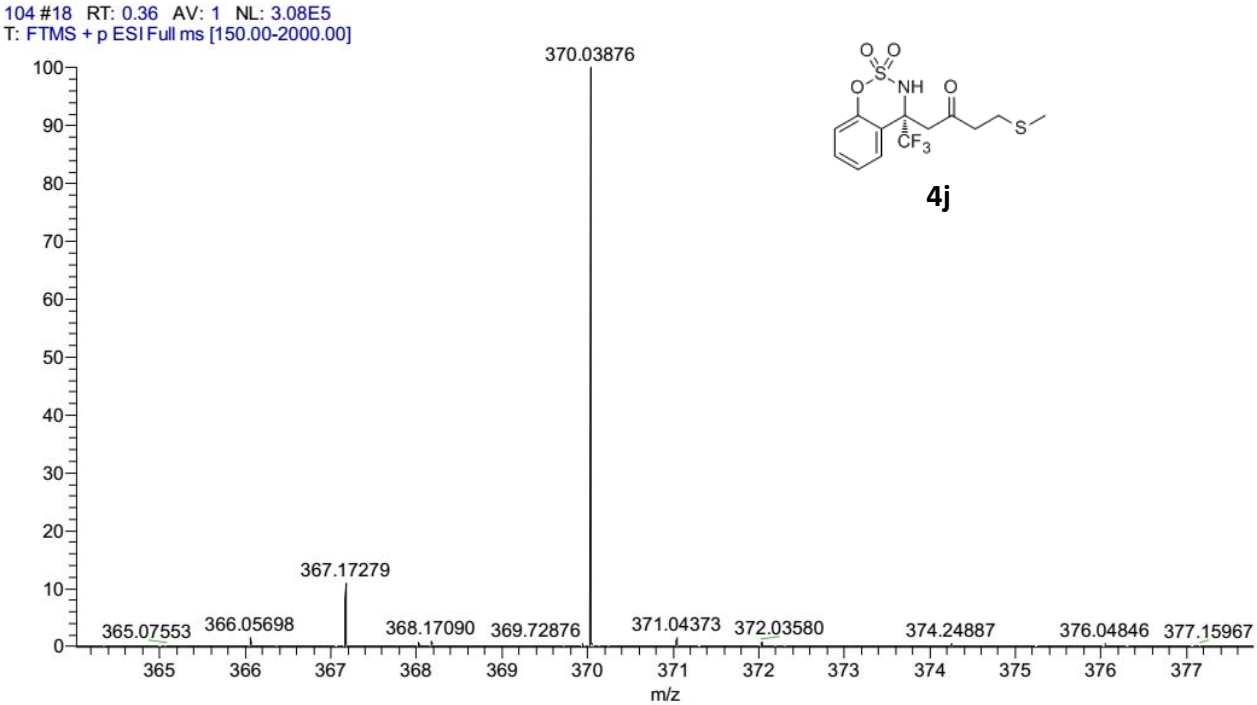
DHX-4-12F ^{19}F NMR in CDCl^3 376M



4j

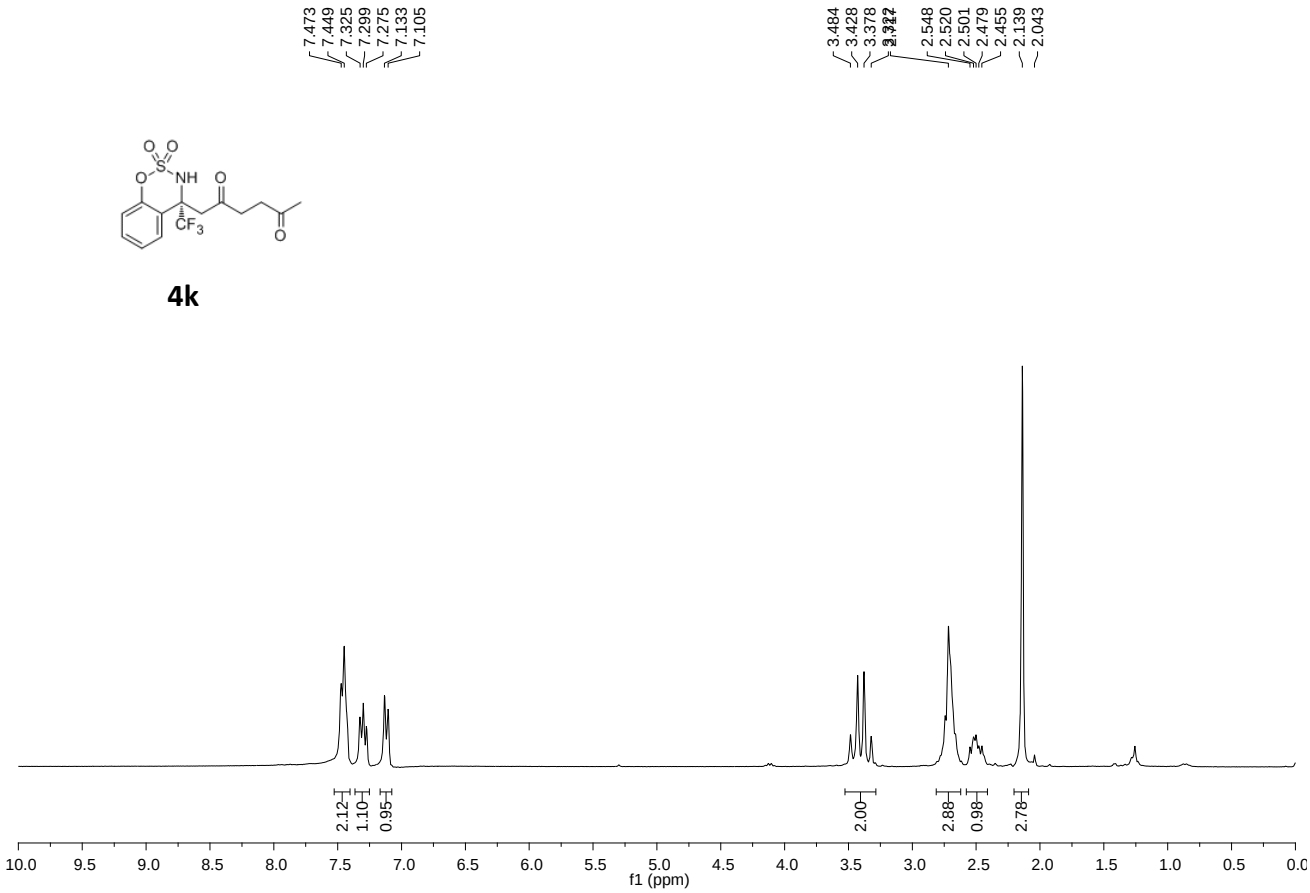
HRMS for 4j

DHX-4-12F. HRMS (ESI) m/z calcd for $C_{13}H_{15}F_3NO_4S_2^+$ $(M+H)^+$ 370.03891, found 370.03876.



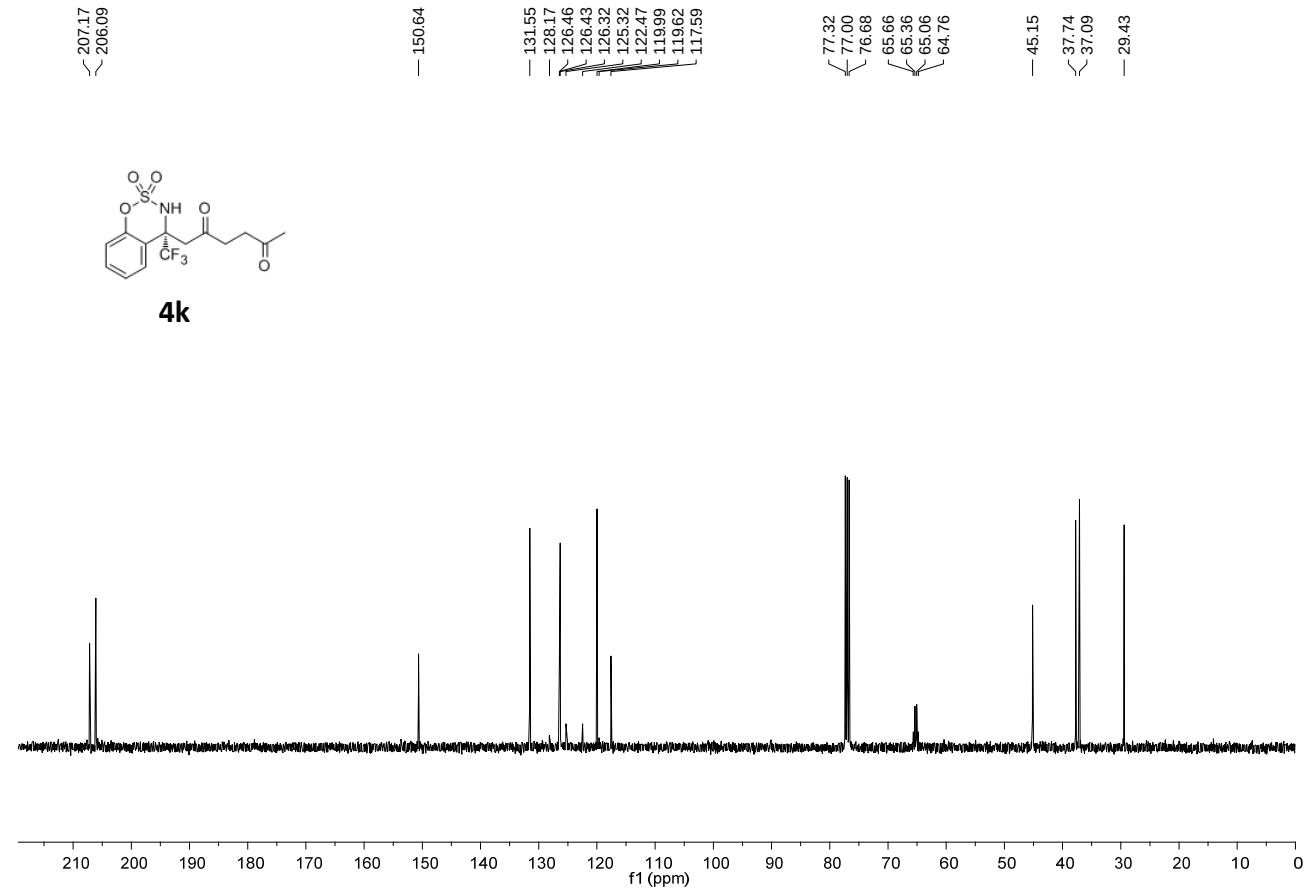
4j

DHX-4-11C ^{1}H NMR in CDCl^{3} 300M



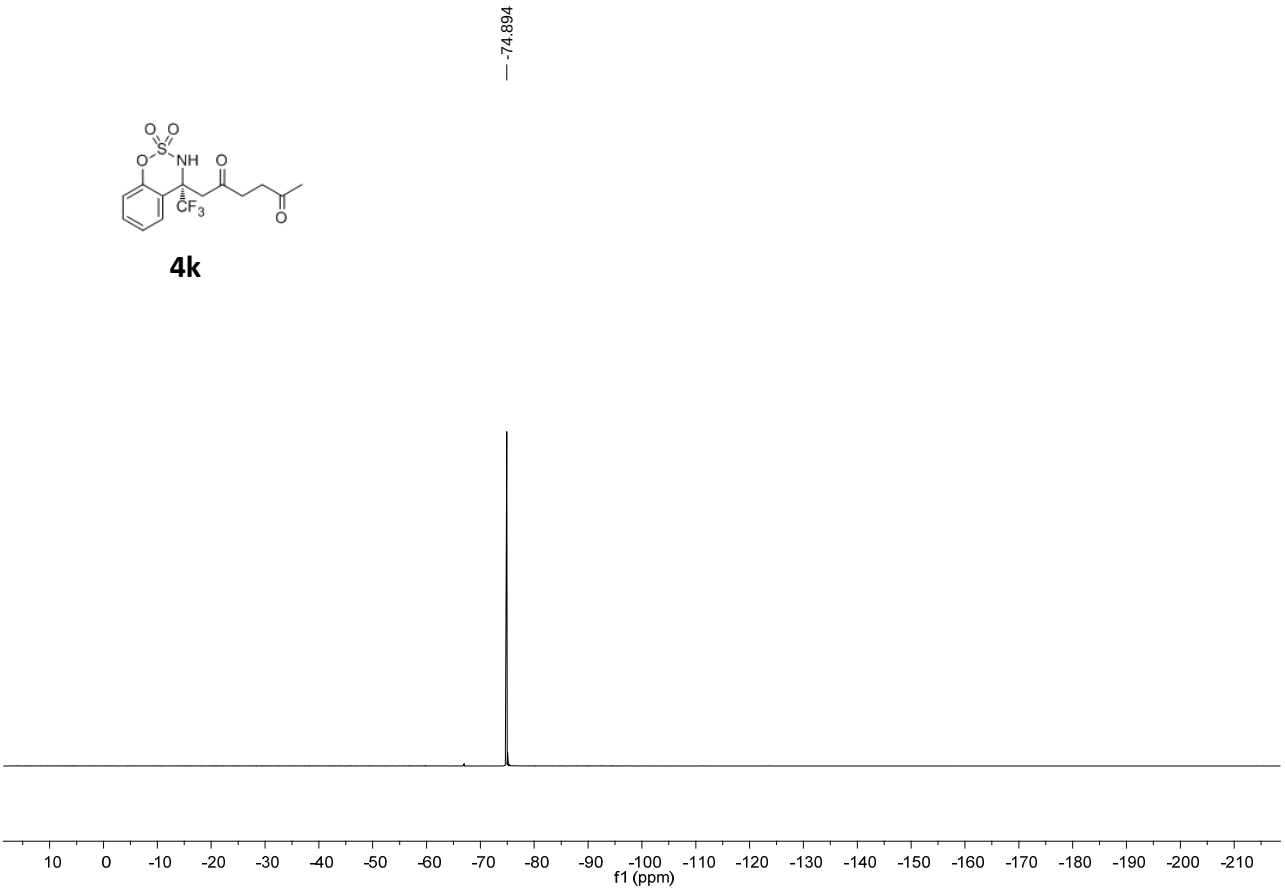
4k

DHX-4-11C ^{13}C NMR in CDCl^{3} 100M



4k

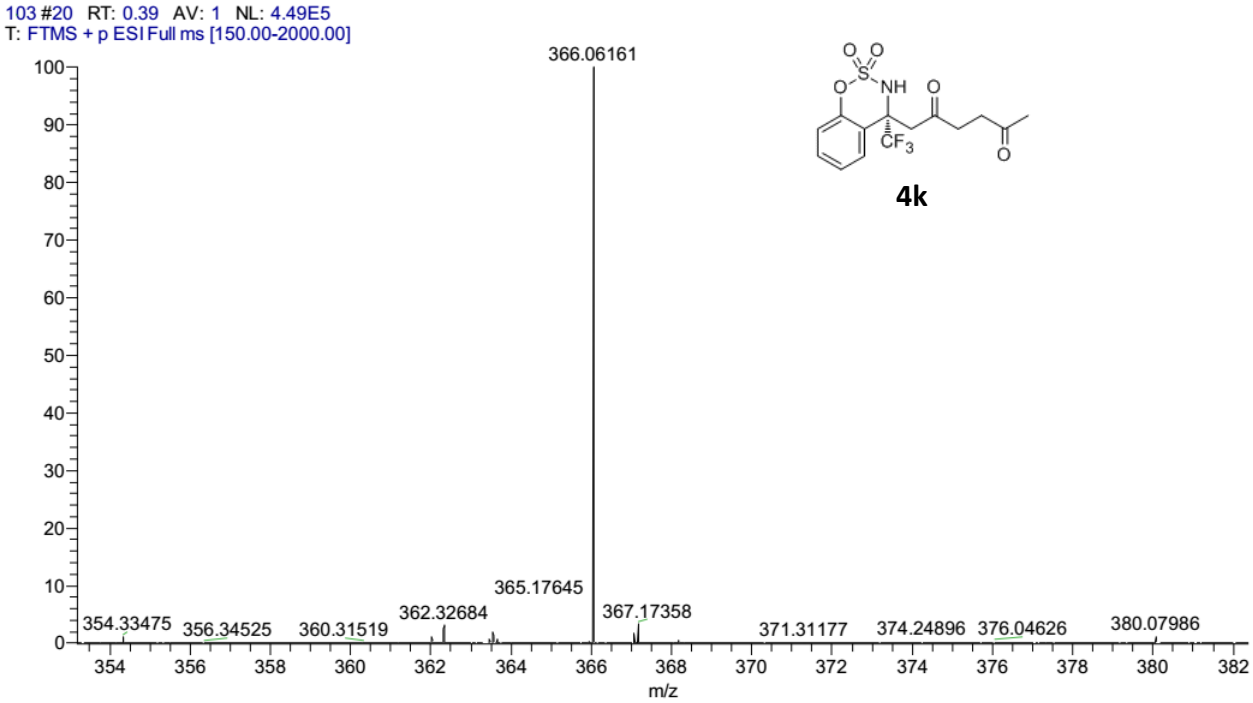
DHX-4-11C ^{19}F NMR in CDCl^3 376M



4k

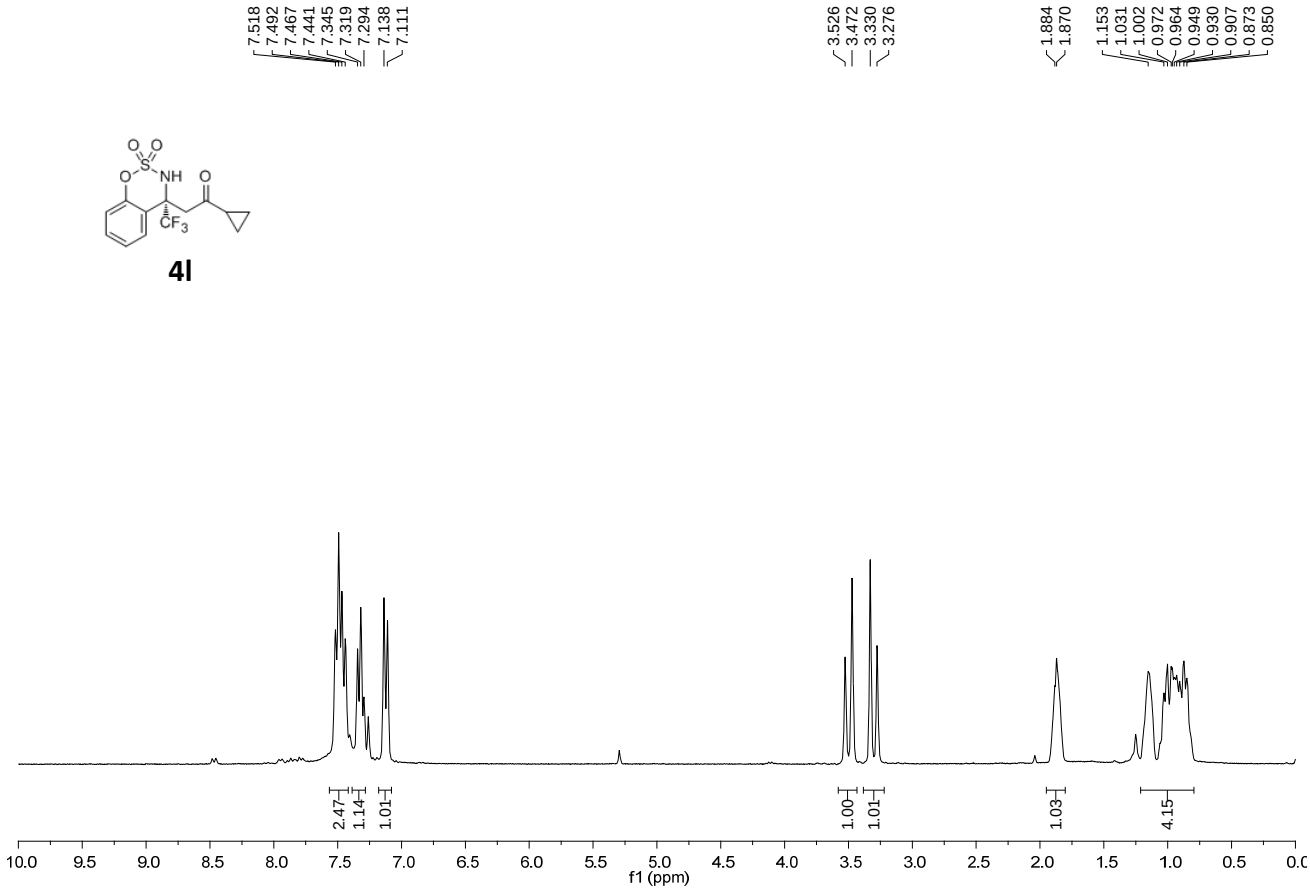
HRMS for 4k

DHX-4-11C. HRMS (ESI) m/z calcd for $C_{14}H_{15}F_3NO_5S^+$ $(M+H)^+$ 366.06175, found 366.06161.



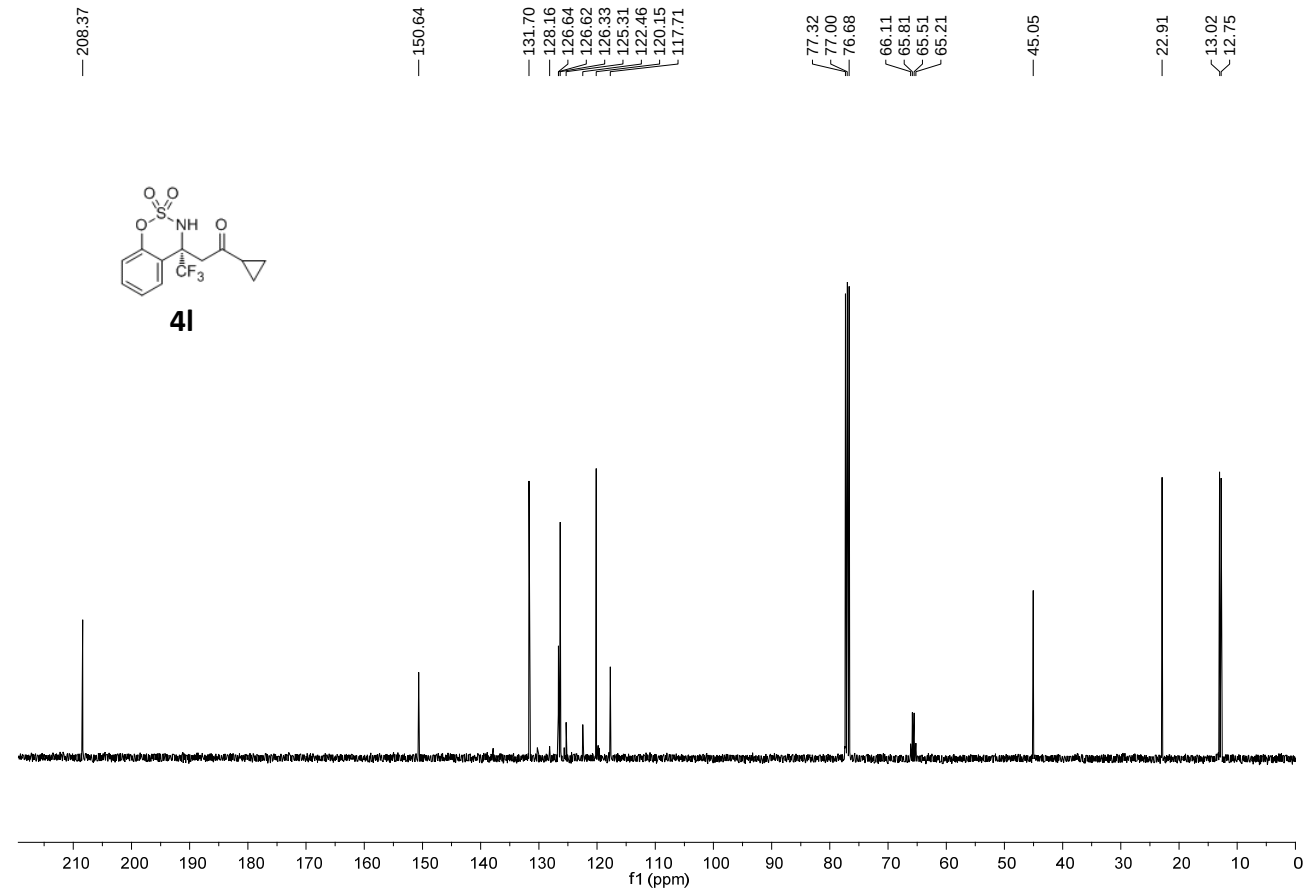
4k

DHX-3-72B ^{1}H NMR in CDCl^{3} 300M

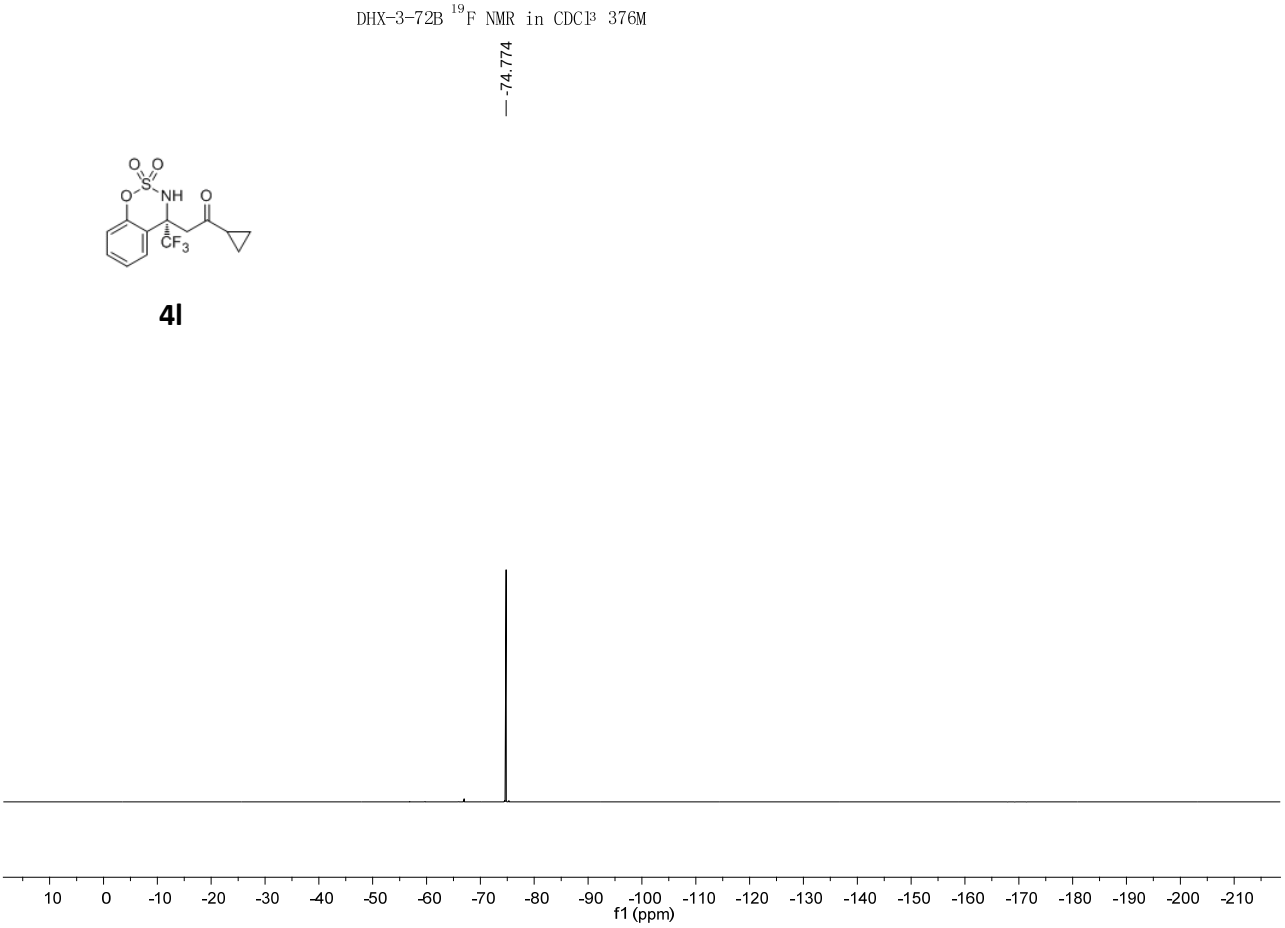


4l

DHX-3-72B ^{13}C NMR in CDCl^{3} 100M

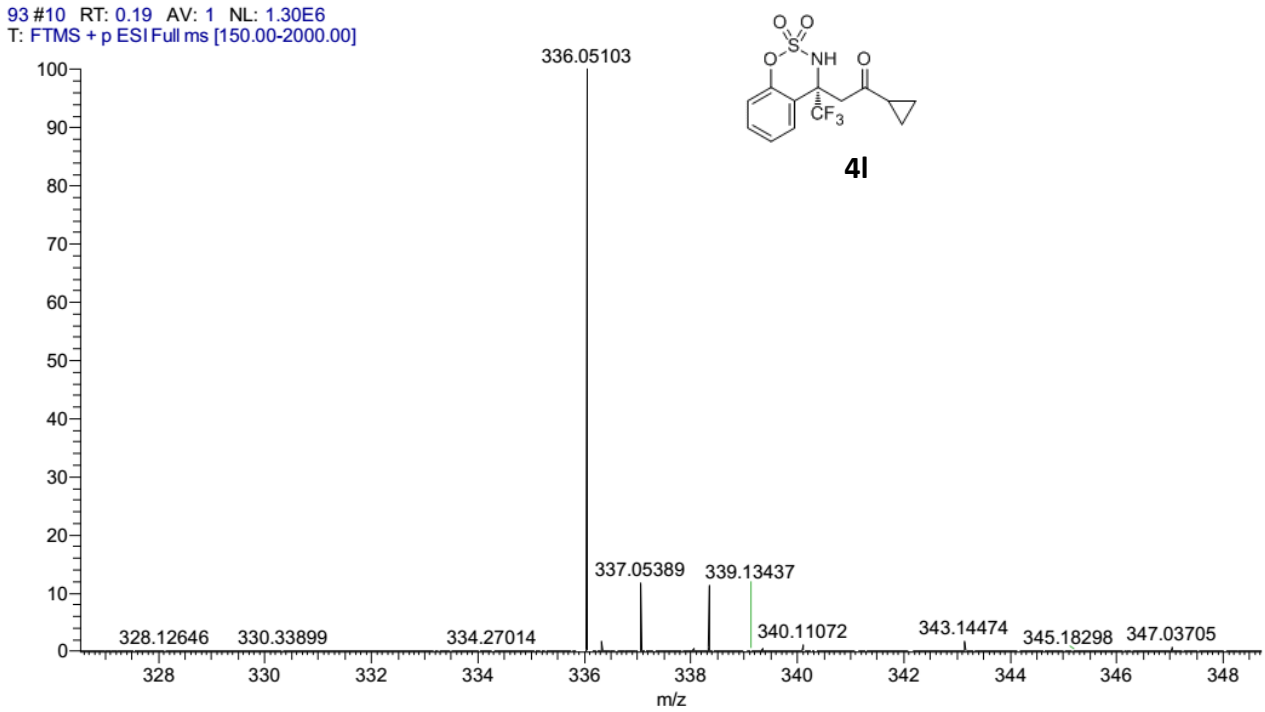


4l

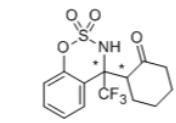


HRMS for 4l

DHX-3-72B. HRMS (ESI) m/z calcd for $C_{13}H_{13}F_3NO_4S^+$ $(M+H)^+$ 336.05119, found 336.05103.

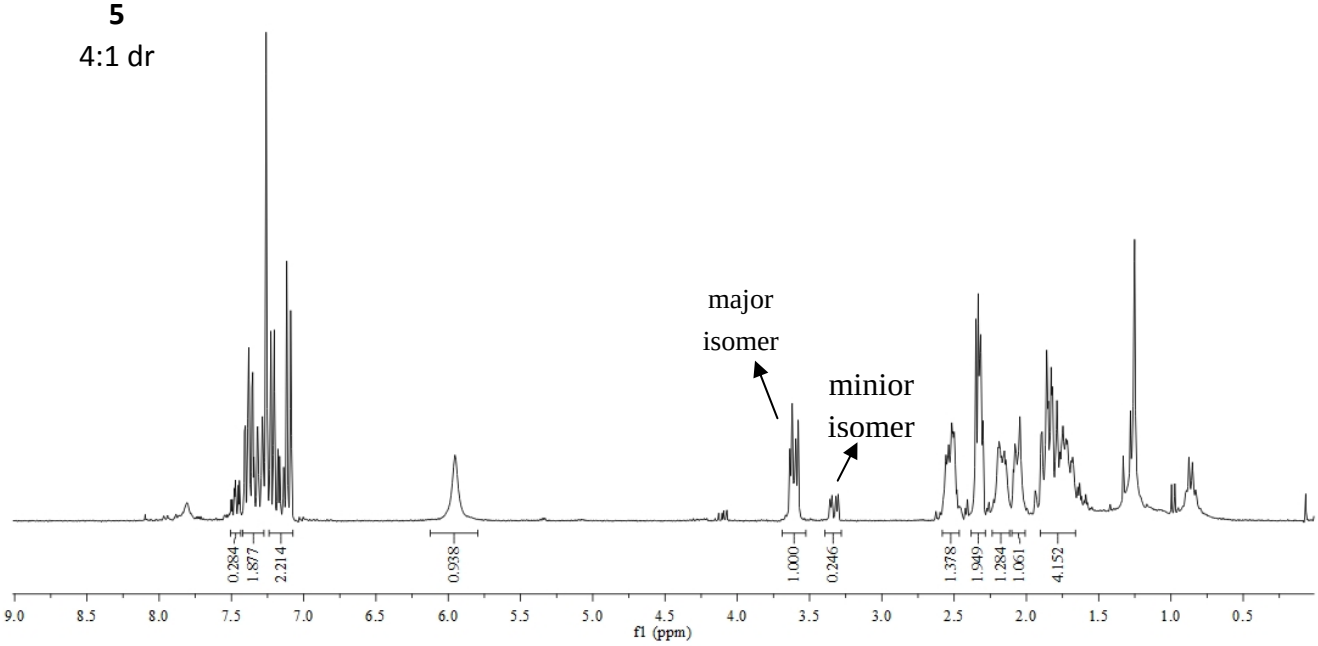


DHX-1-50 ^{1}H NMR in $CDCl_3$ 300M



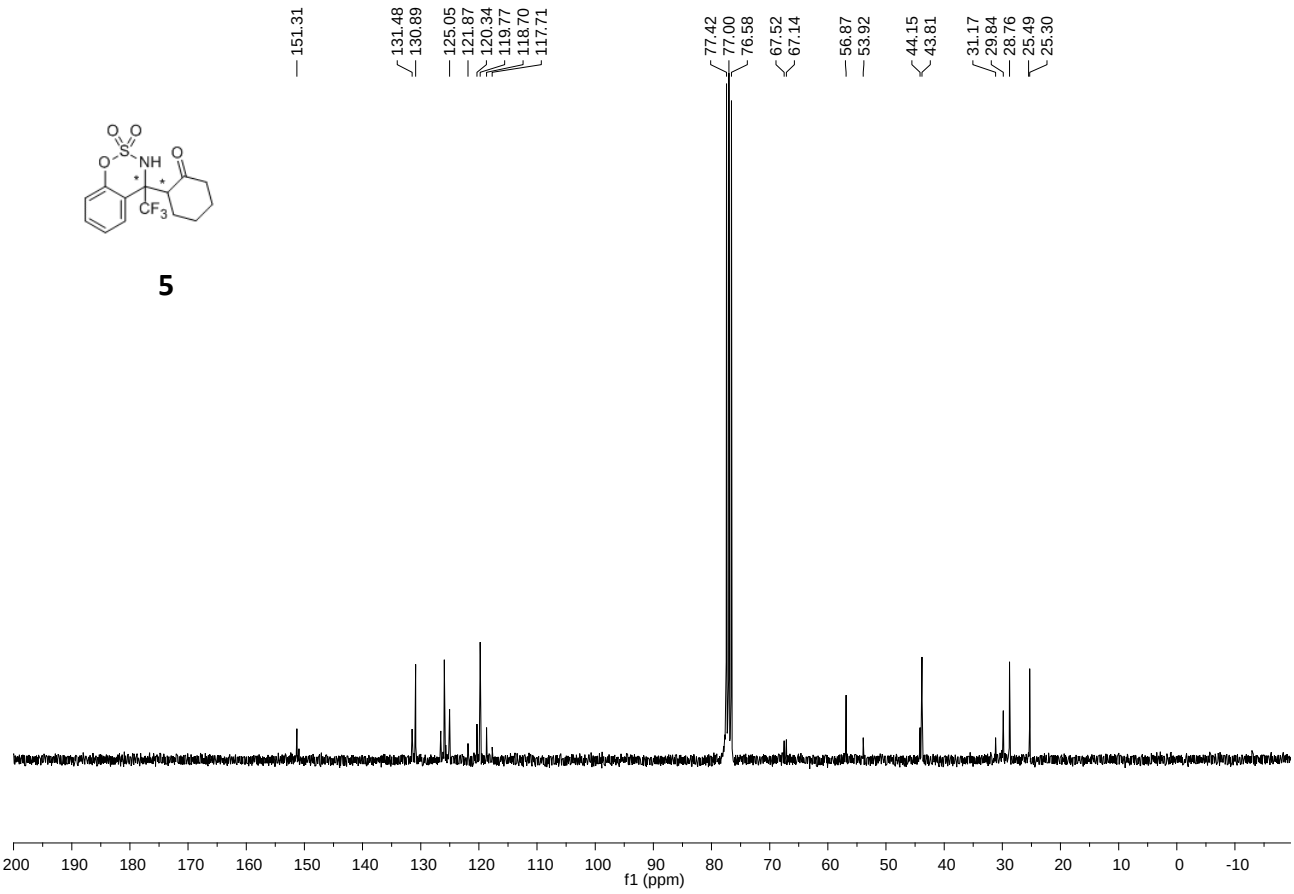
5

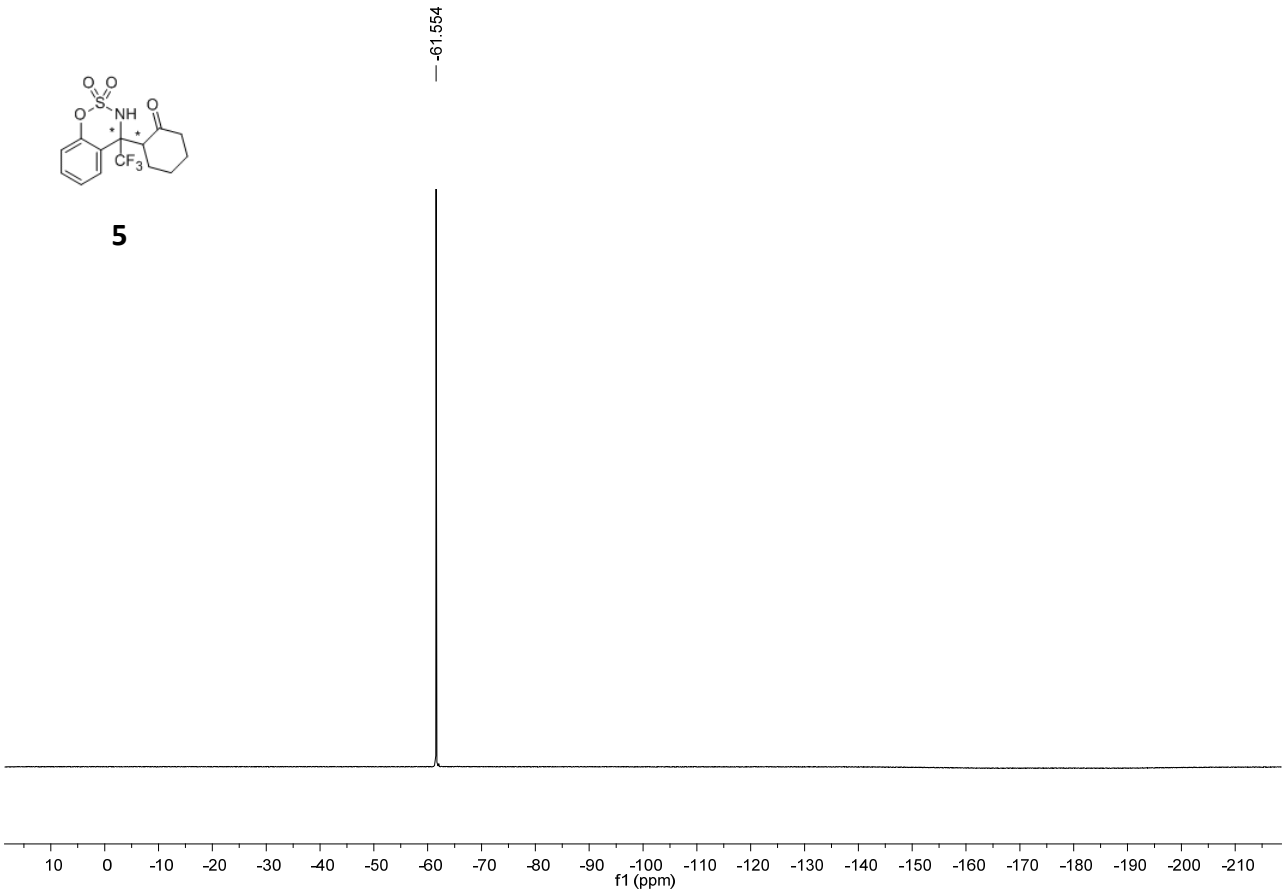
4:1 dr



DHX-1-50 ^{13}C NMR in $CDCl^3$ 100M

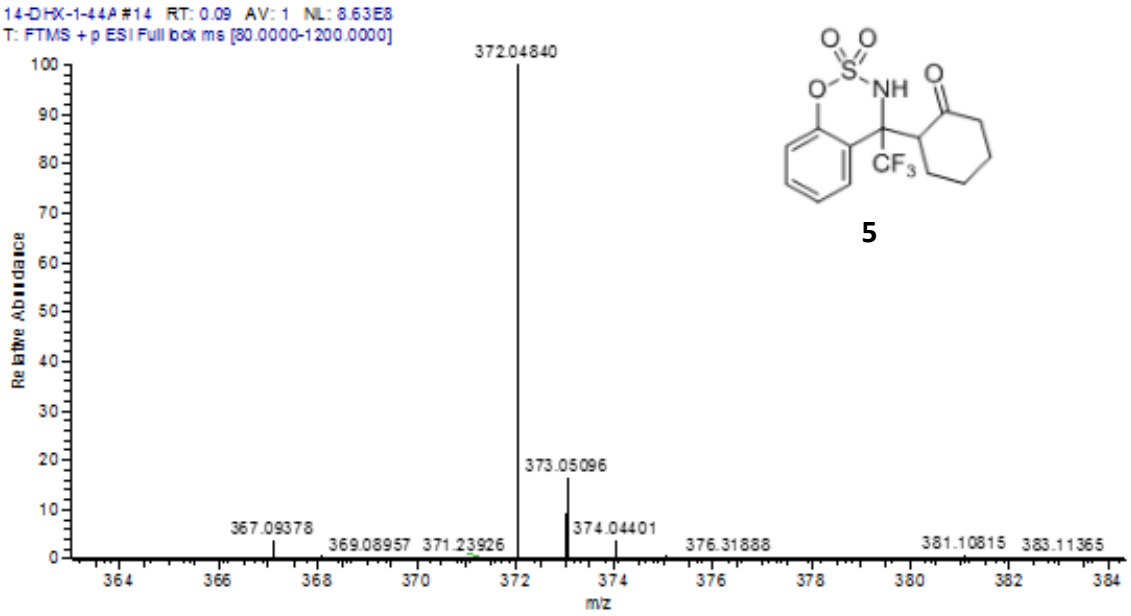
5



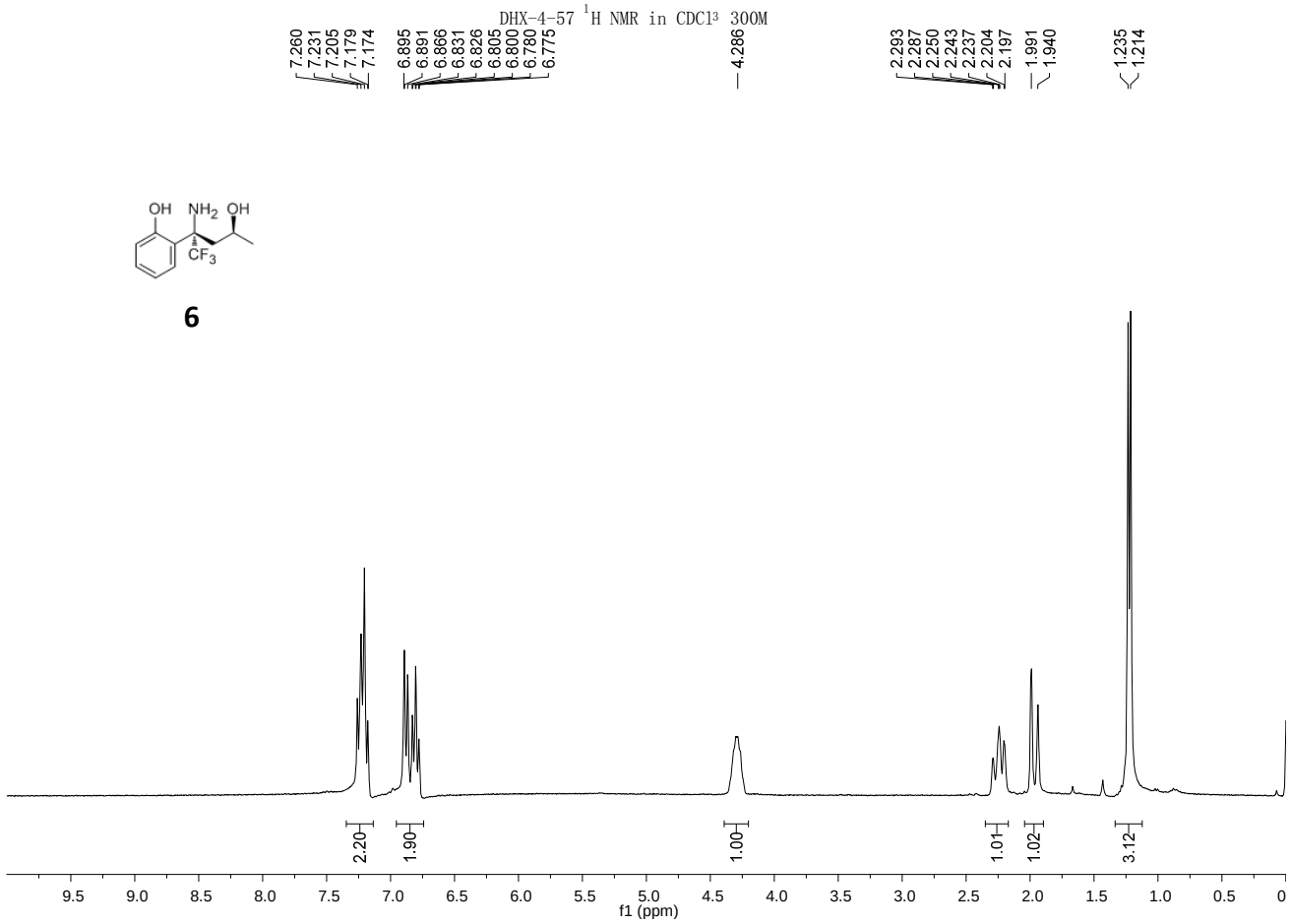


HRMS for 5

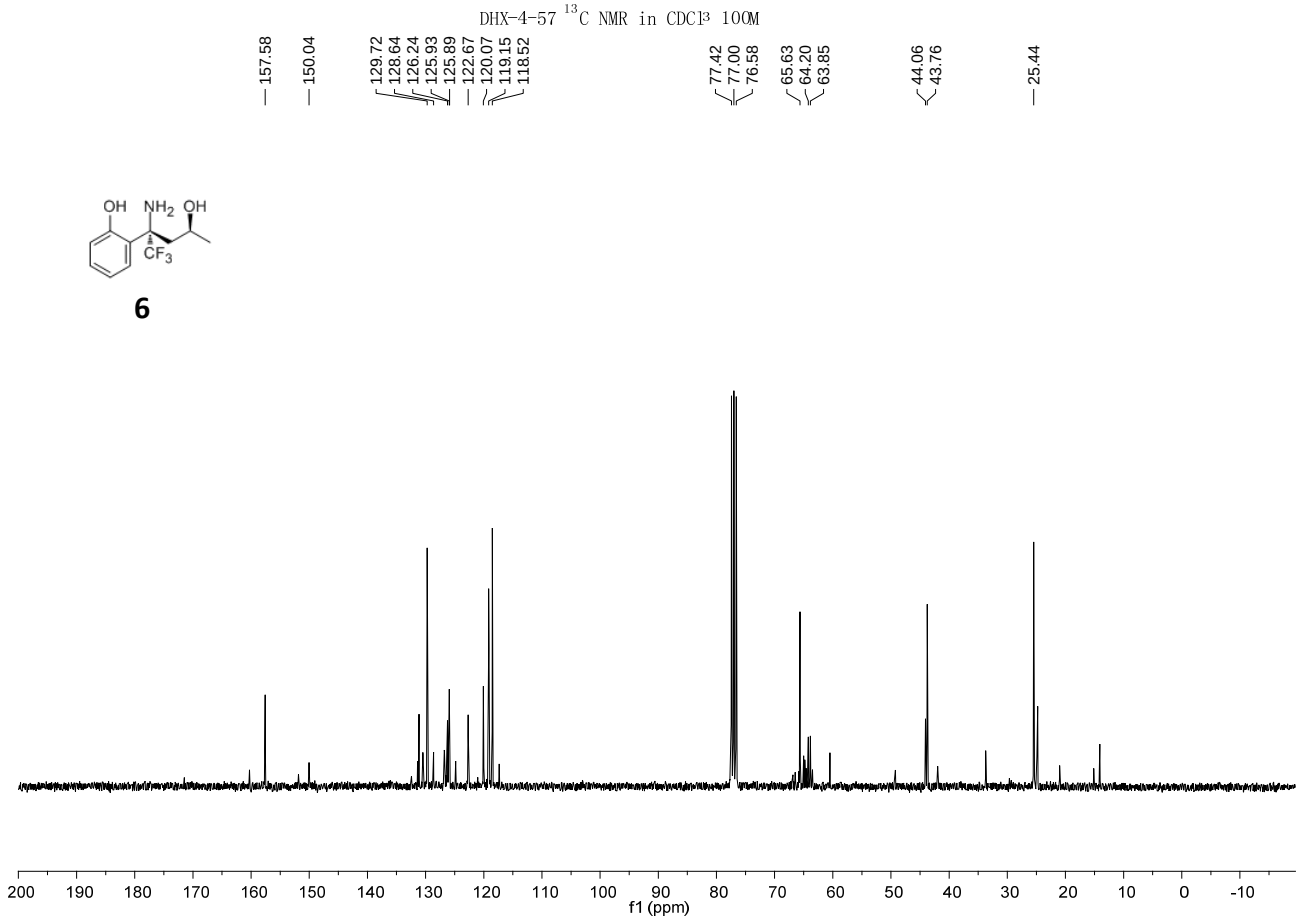
DHX-1-44A. HRMS (ESI) m/z calcd for $C_{14}H_{14}F_3NO_4SNa^+$ $(M+Na)^+$ 372.04878, found 372.04840.

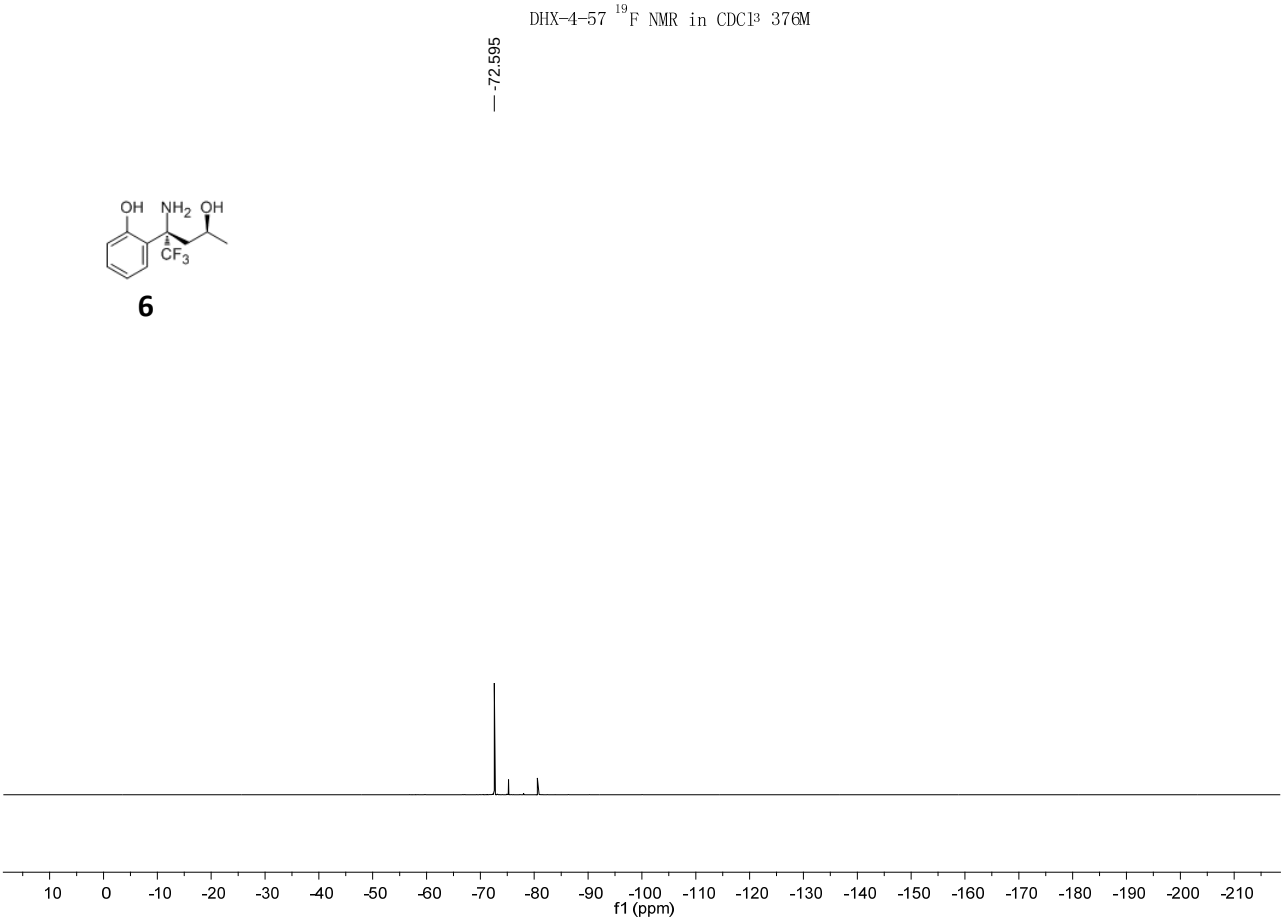


DHX-4-57 ^{1}H NMR in CDCl^{3} 300M



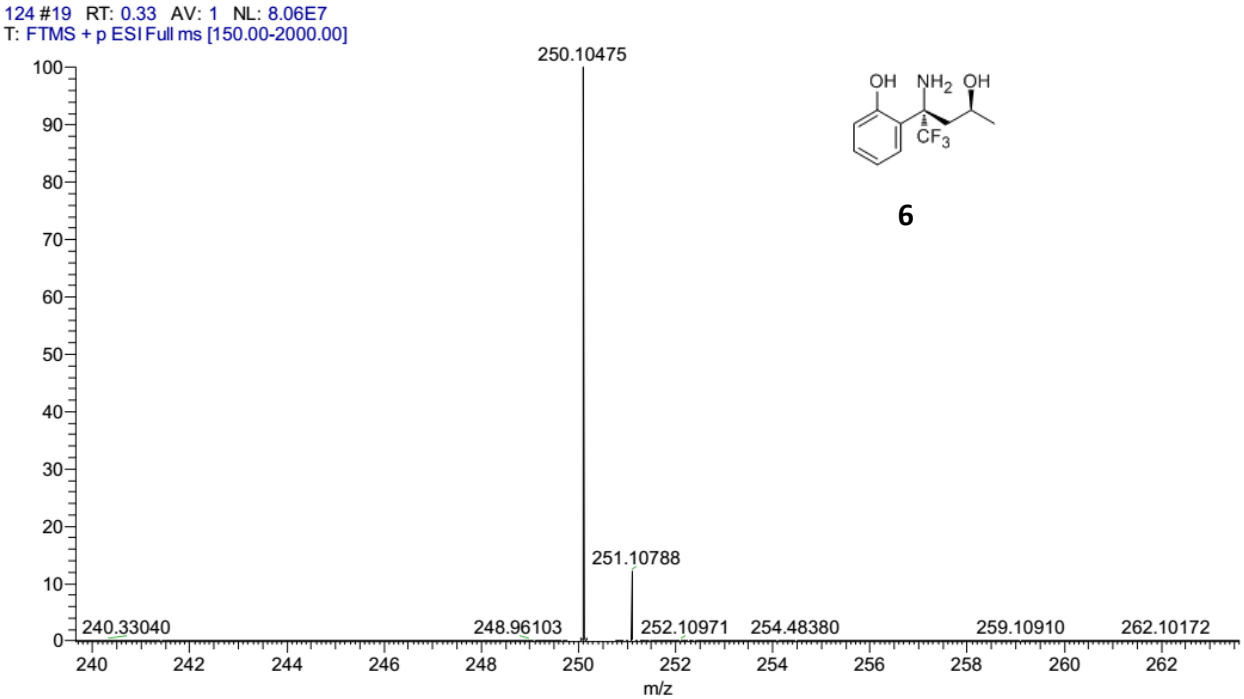
DHX-4-57 ^{13}C NMR in CDCl^{3} 100M



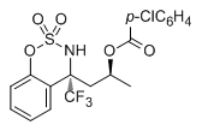


HRMS for 6

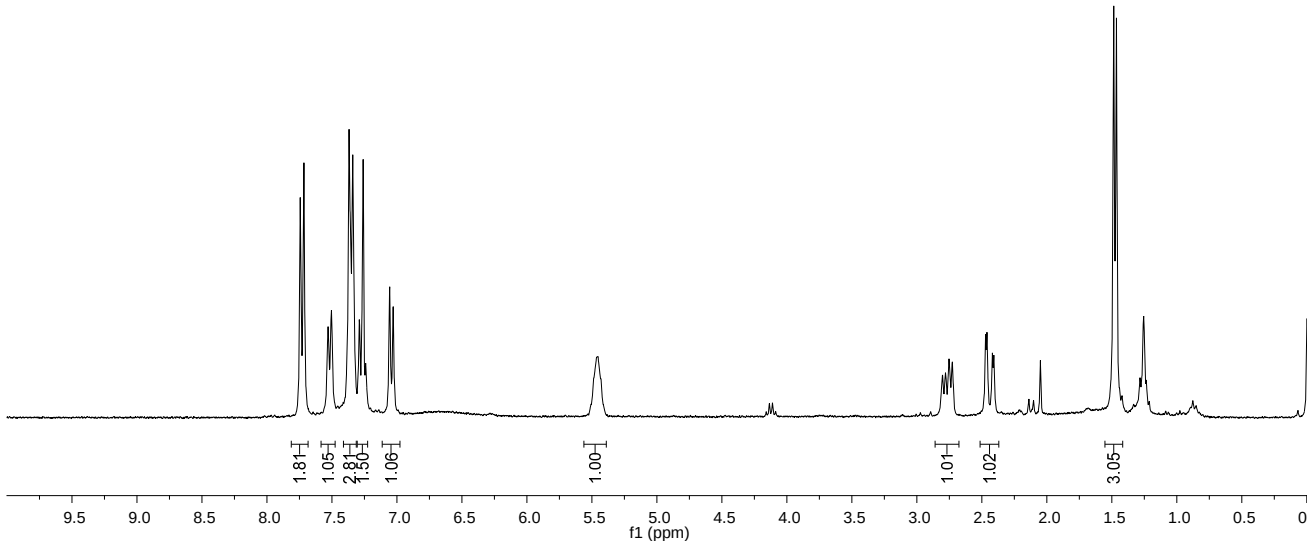
DXH-4-57. HRMS (ESI) m/z calcd for $C_{11}H_{15}F_3NO_2^+$ $(M+H)^+$ 250.10494, found 250.10475.



DHX-4-32 ^{1}H NMR in CDCl^{3} 300M

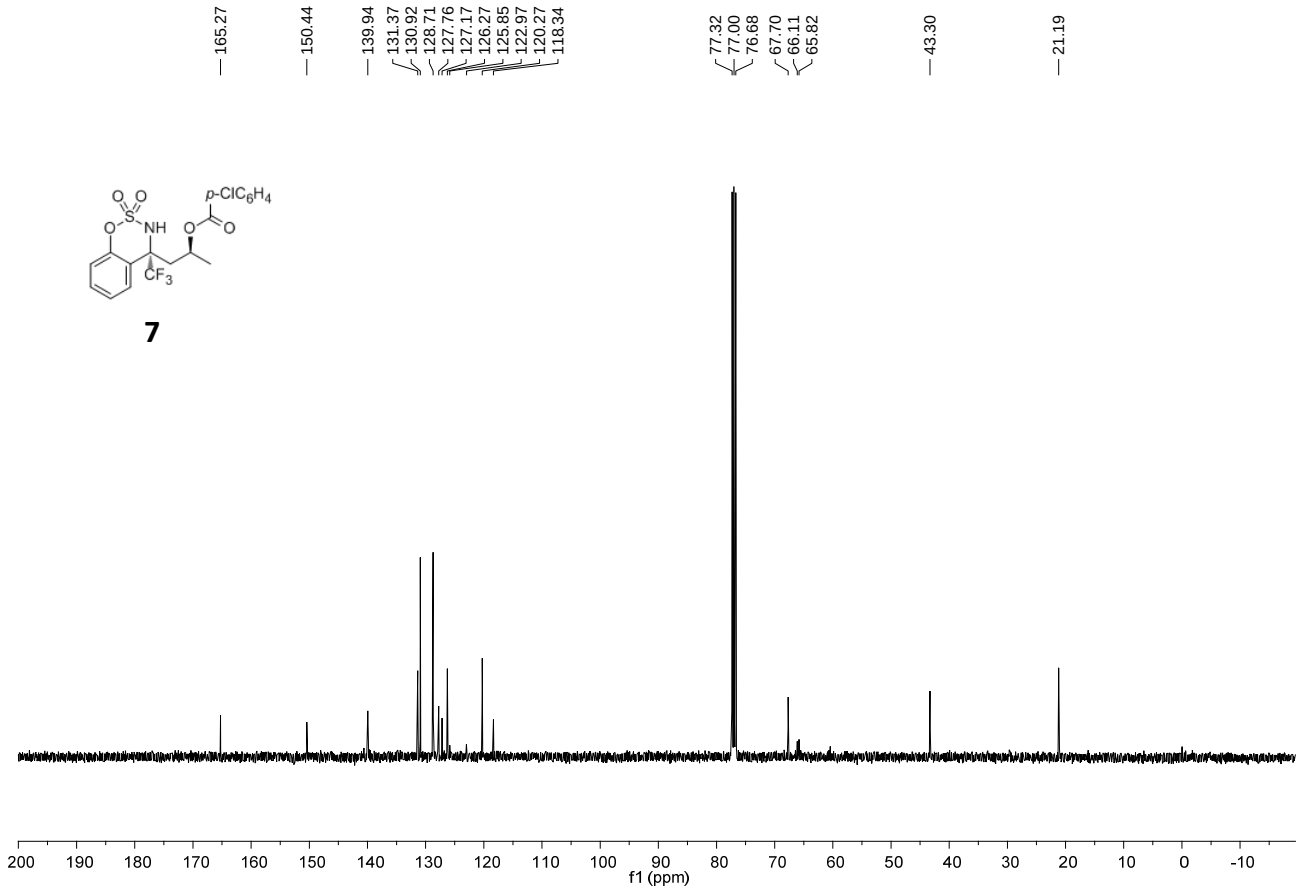


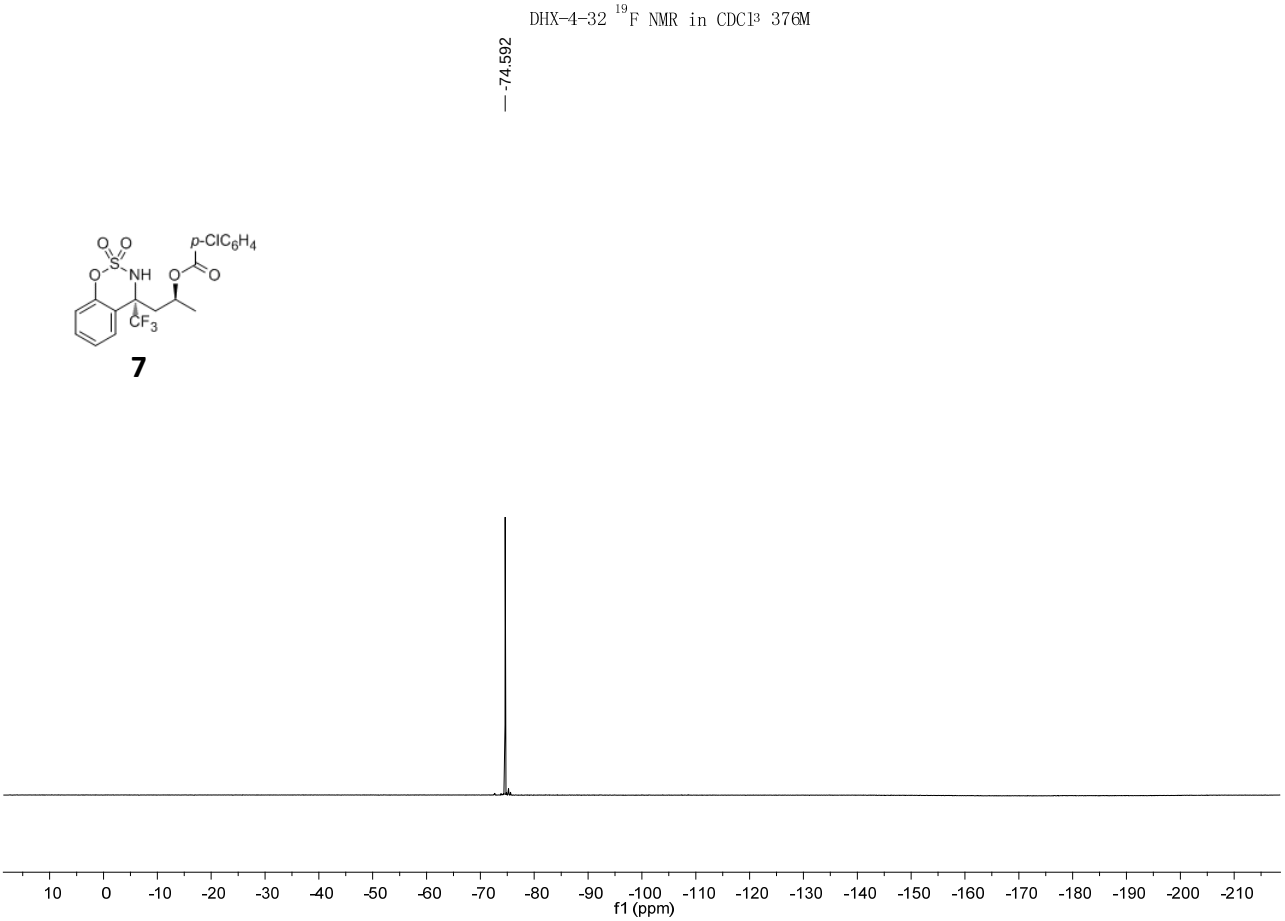
7



DHX-4-32 ^{13}C NMR in CDCl^{3} 100M

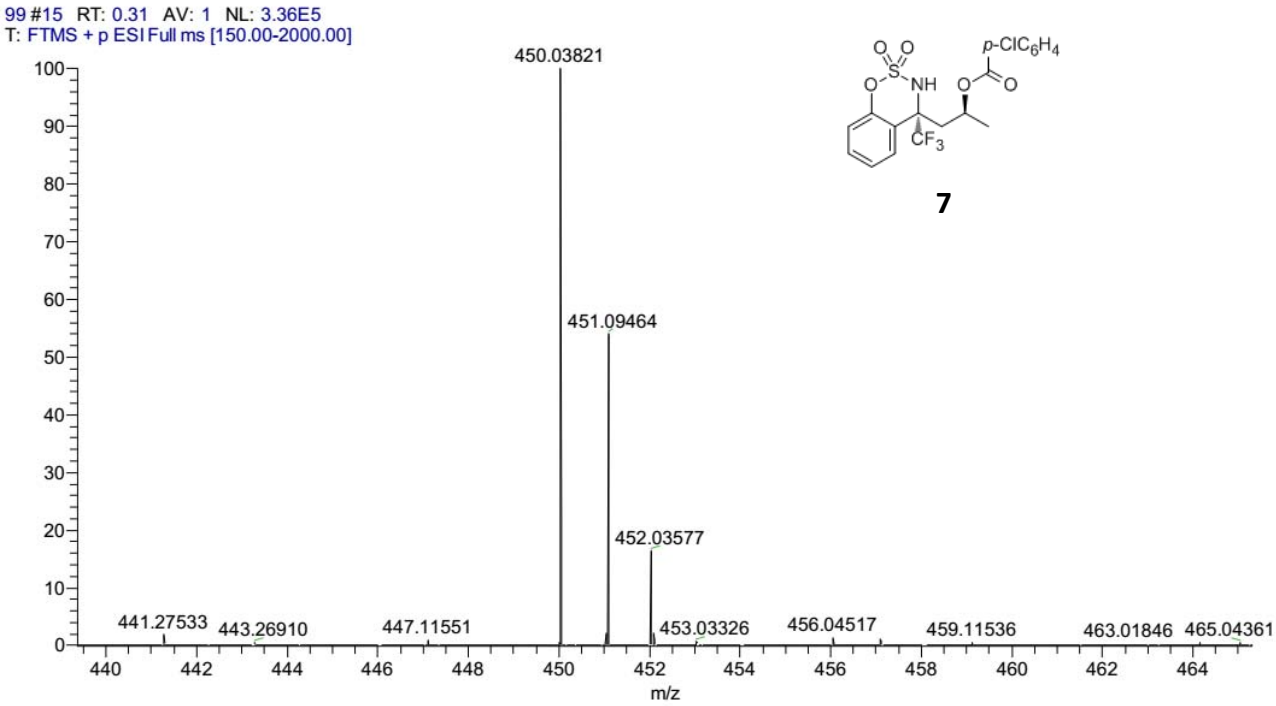
7



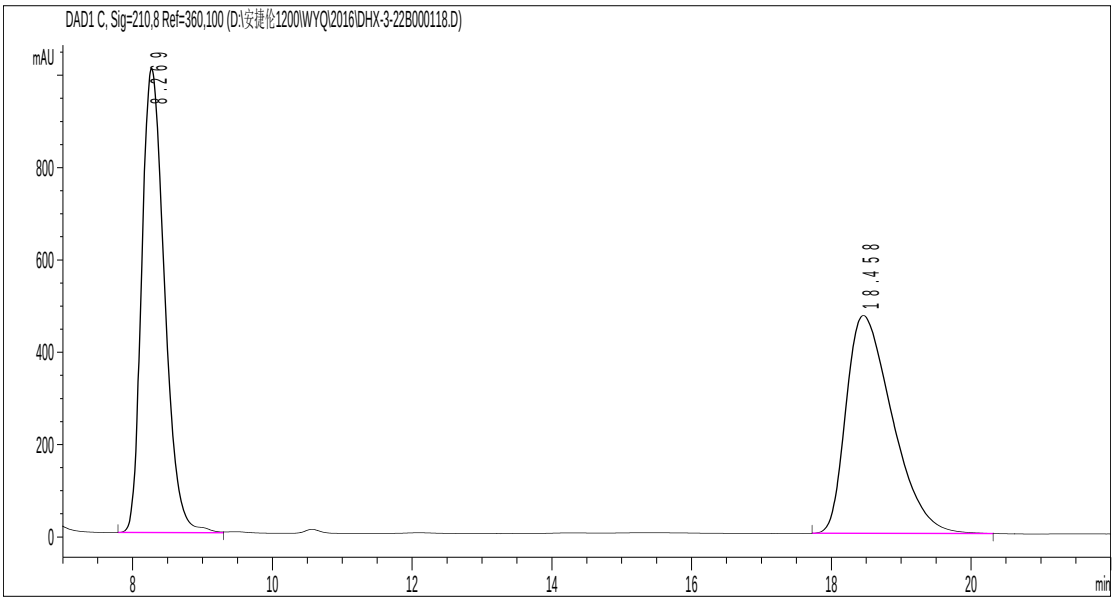


HRMS for 7

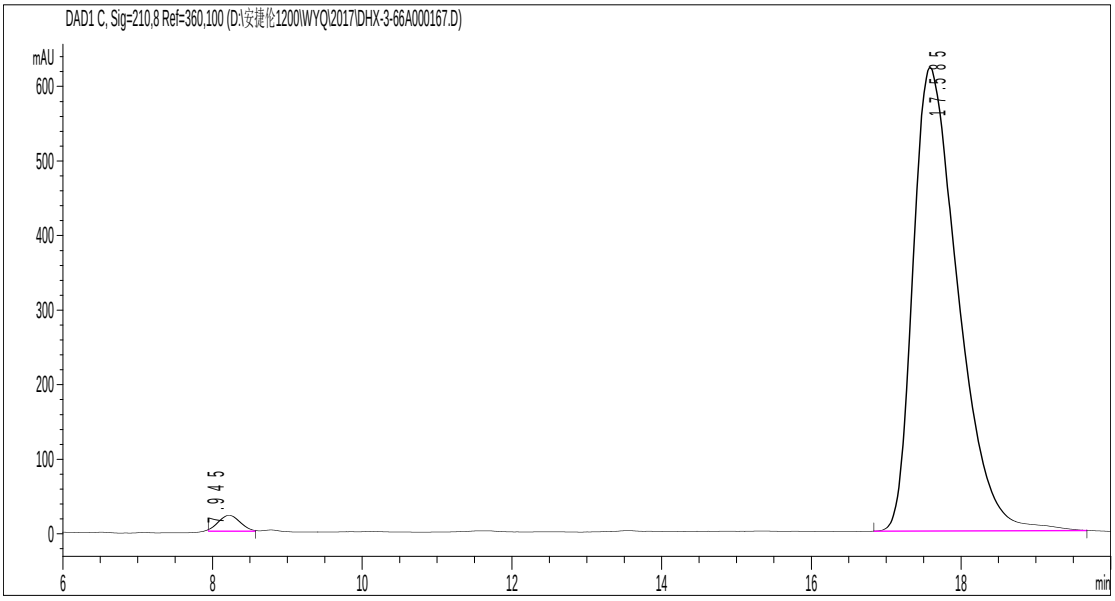
DHX-4-32. HRMS (ESI) m/z calcd for $C_{18}H_{16}ClF_3NO_5S^+$ $(M+H)^+$ 450.03843, found 450.03821.



HPLC for racemic and pure enantioenriched sample 2a

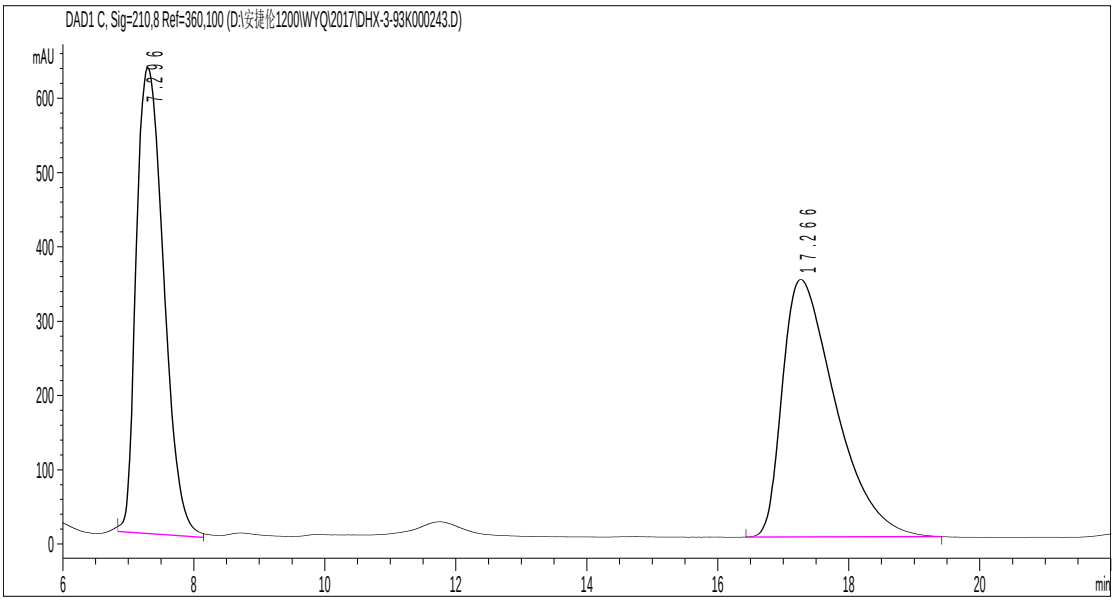


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	8.269	BB	0.3550	2.28509e4	1005.85278	51.2694
2	18.458	BB	0.7023	2.17194e4	472.48495	48.7306



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.945	MM R	0.3355	430.27454	2.20671	1.6292
2	17.585	BB	0.6372	2.59794e4	622.10645	98.3708

HPLC for racemic and pure enantioenriched sample 2b



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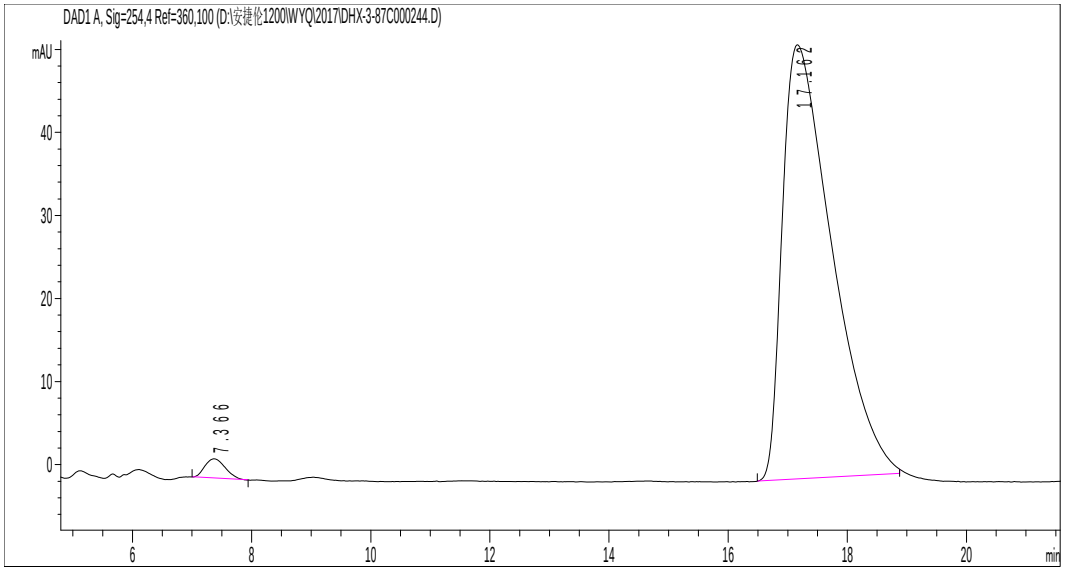
1	7.296	MM R	0.4858	1.82825e4	627.25397	48.3231
2	17.266	BB	0.8414	1.95514e4	346.97238	51.6769



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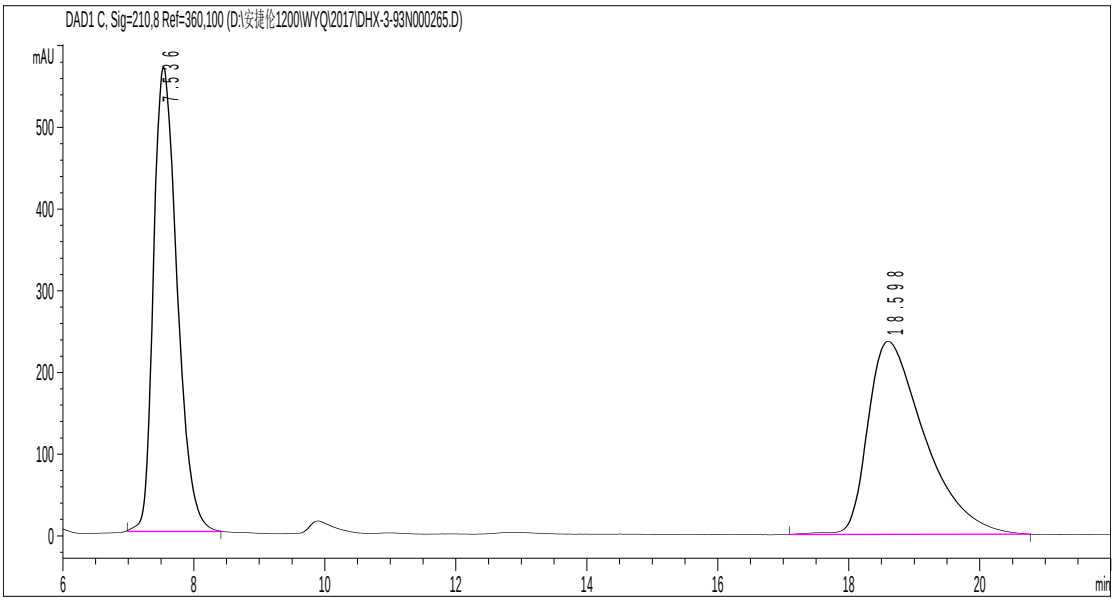
1	7.367	MM R	0.4360	924.73260	35.34650	2.2914
2	17.161	BB	0.9054	3.94325e4	623.91119	97.7086

HPLC for racemic and pure enantioenriched sample 2c



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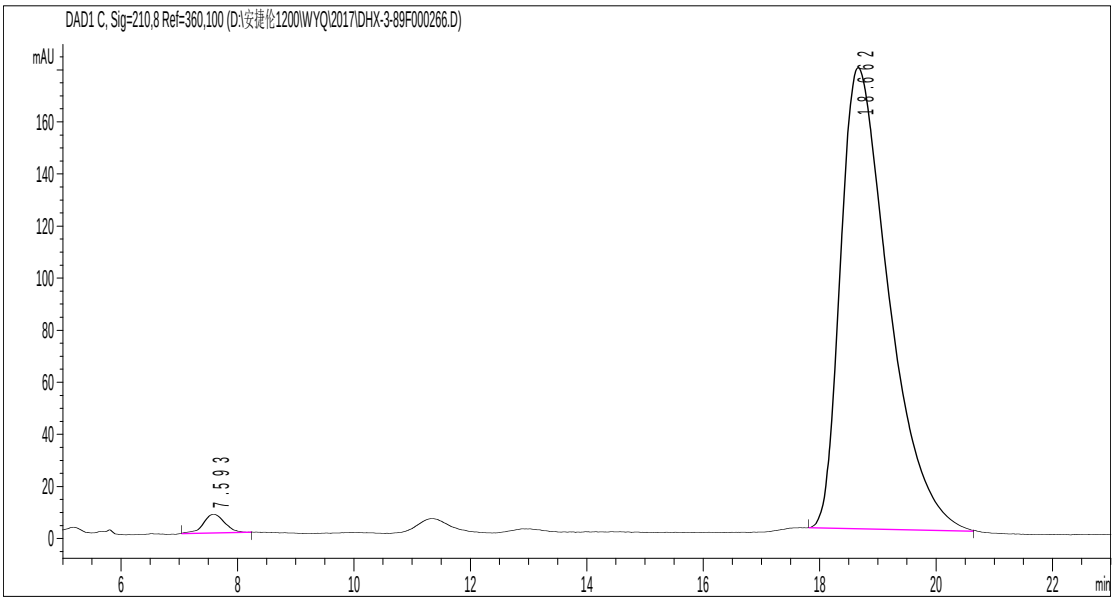
1	7.536	MM R	0.4197	1.43078e4	568.21912	50.0656
2	18.598	BB	0.8874	1.42703e4	236.68532	49.9344



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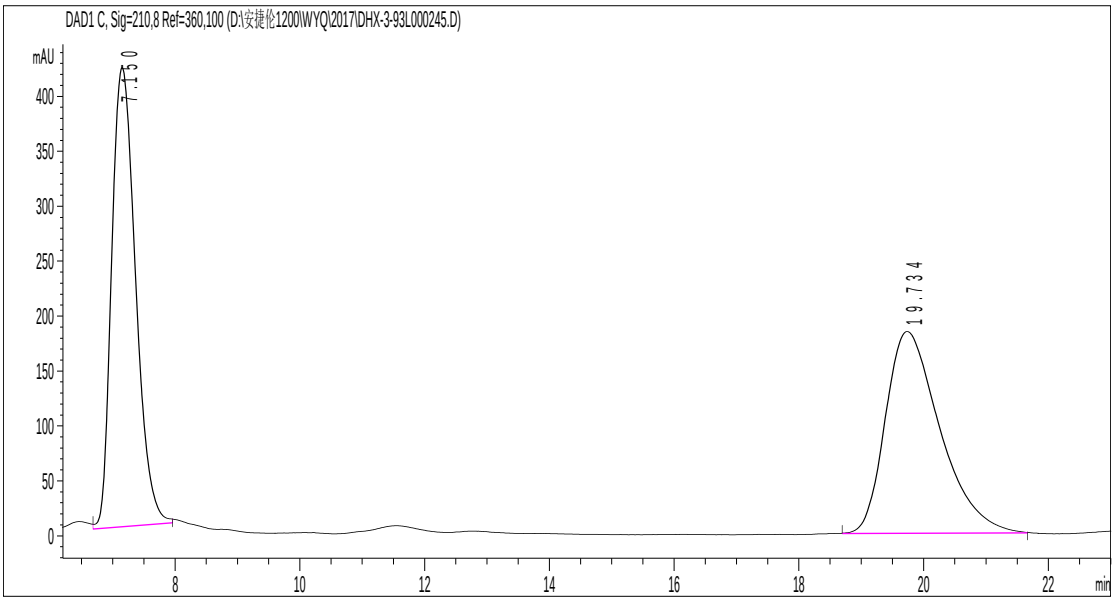
1	7.593	BB	0.3408	188.74818	7.27261	1.8174
2	18.662	BB	0.8336	1.01971e4	177.13791	98.1826

HPLC for racemic and pure enantioenriched sample 2d



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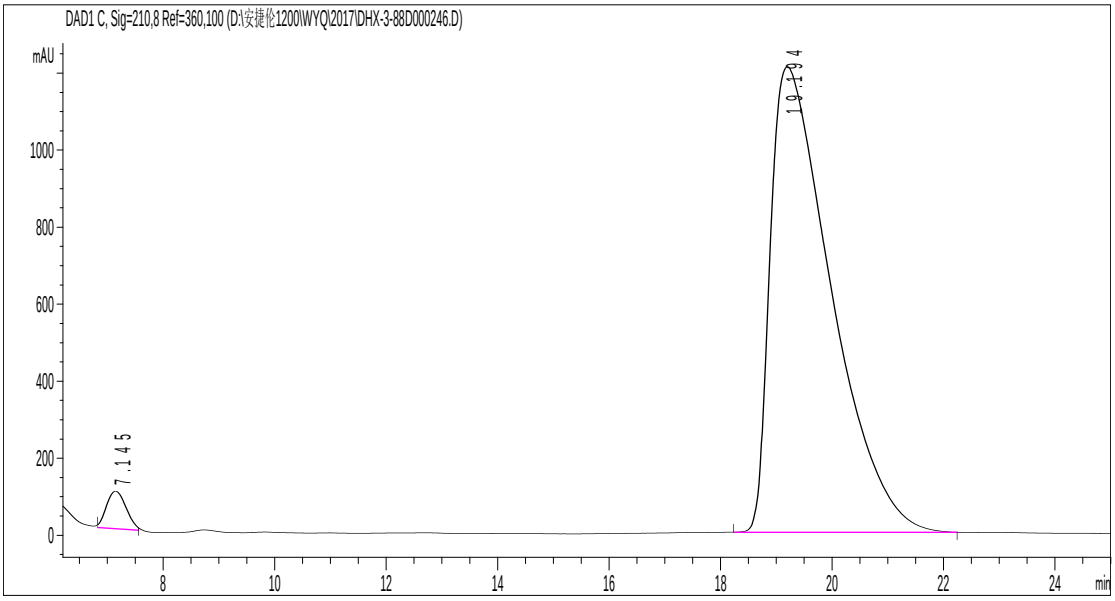
1	7.150	MM R	0.4446	1.11525e4	418.11880	49.9044
2	19.734	BB	0.9020	1.11953e4	183.95007	50.0956



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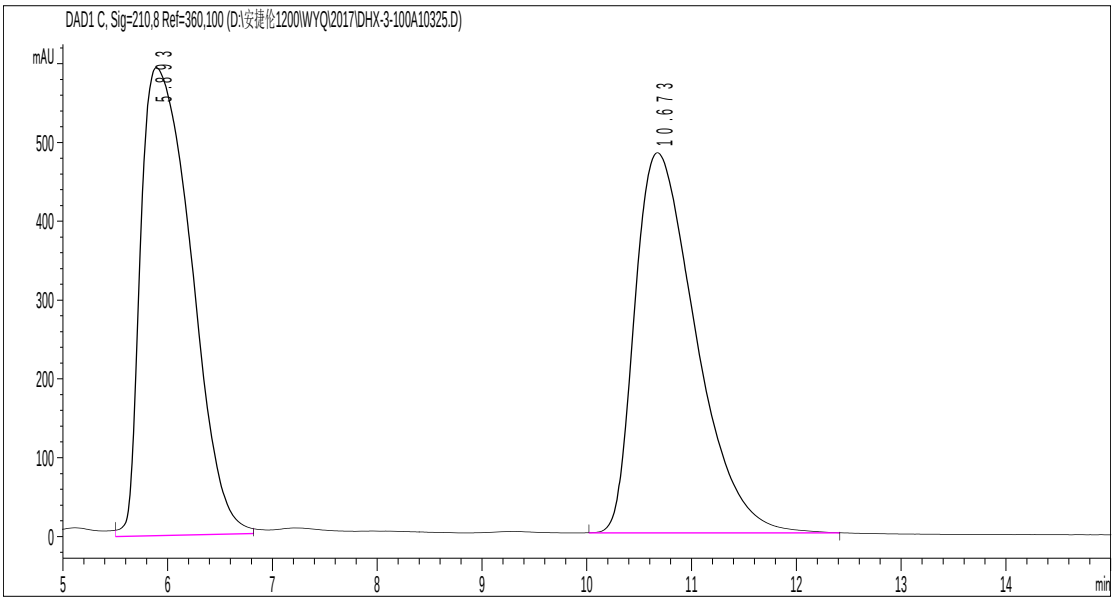
1	7.145	MM R	0.4060	2375.22119	97.49624	2.5278
2	19.194	BB	1.0077	9.15891e4	1209.22705	97.4722

HPLC for racemic and pure enantioenriched sample 2e



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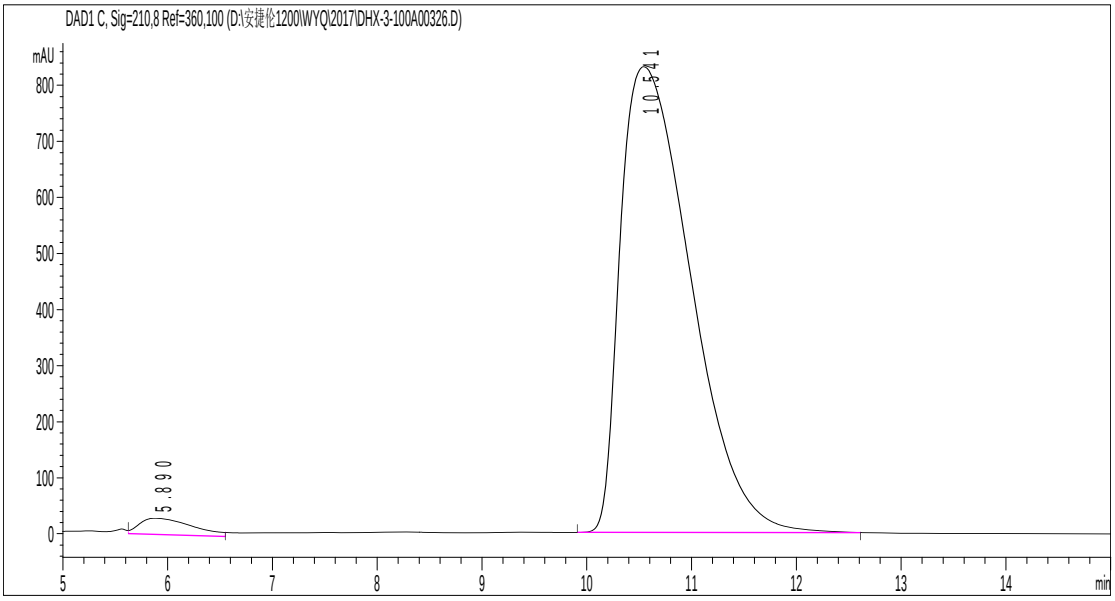
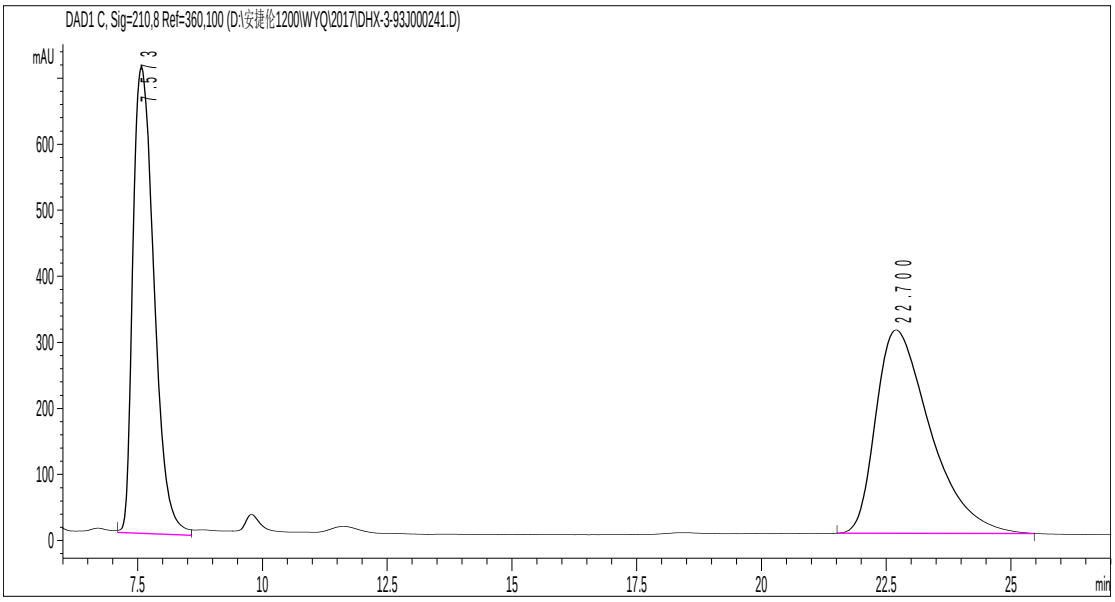
1	5.893	MM R	0.5576	1.98834e4	594.29059	50.4909
2	10.673	BB	0.6214	1.94968e4	482.50125	49.5091

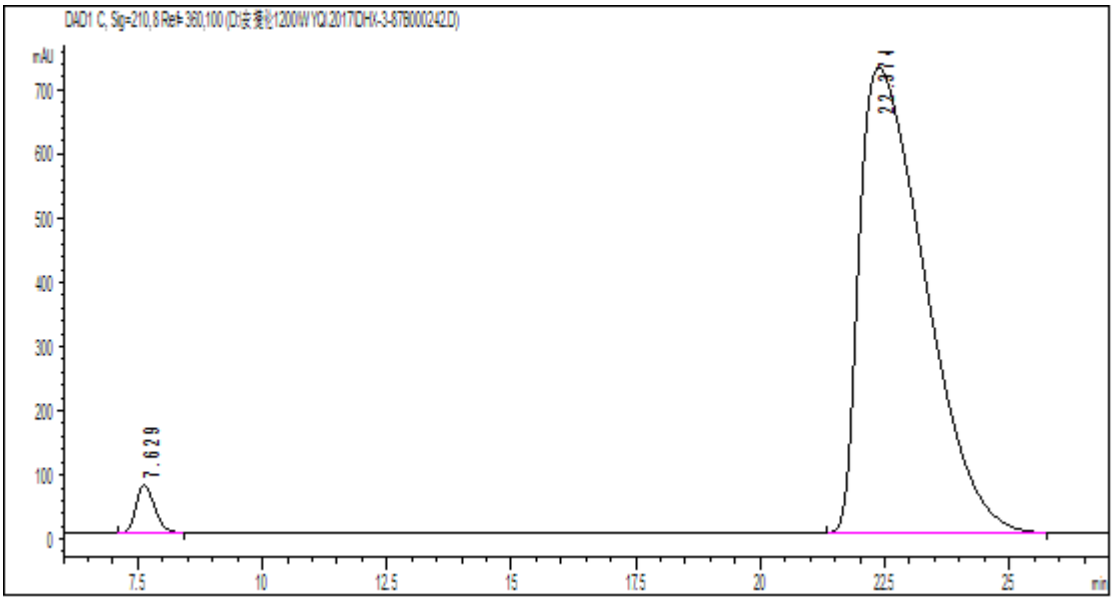


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.890	MM R	0.5873	1029.07019	29.20338	2.5842
2	10.541	BB	0.7067	3.87932e4	830.93774	97.4158

HPLC for racemic and pure enantioenriched sample 2f

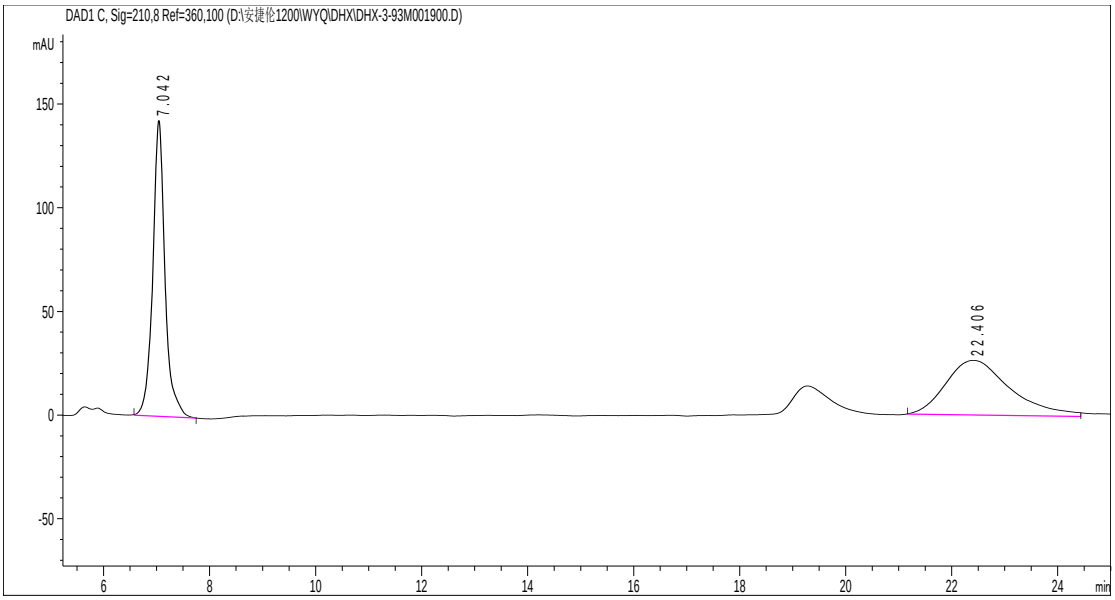


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.573	MM R	0.4924	2.08384e4	705.31836	47.0816
2	22.700	BB	1.1004	2.34218e4	308.27173	52.9184



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.629	BB	0.4044	1947.10925	74.61951	2.8460
2	22.374	BB	1.2371	6.64678e4	725.32281	97.1540

HPLC for racemic and pure enantioenriched sample 2g



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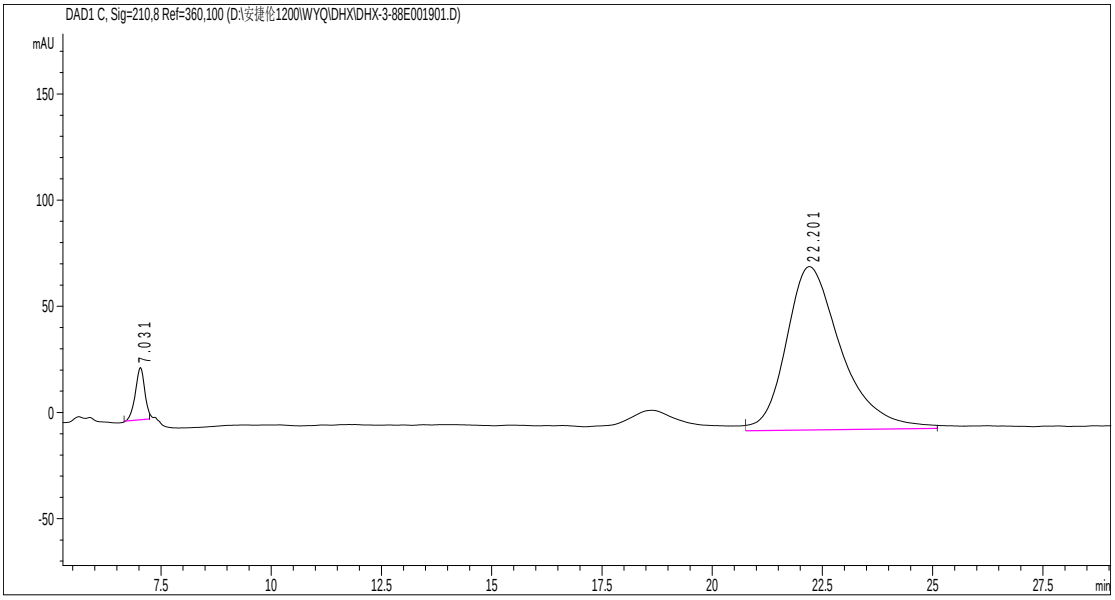
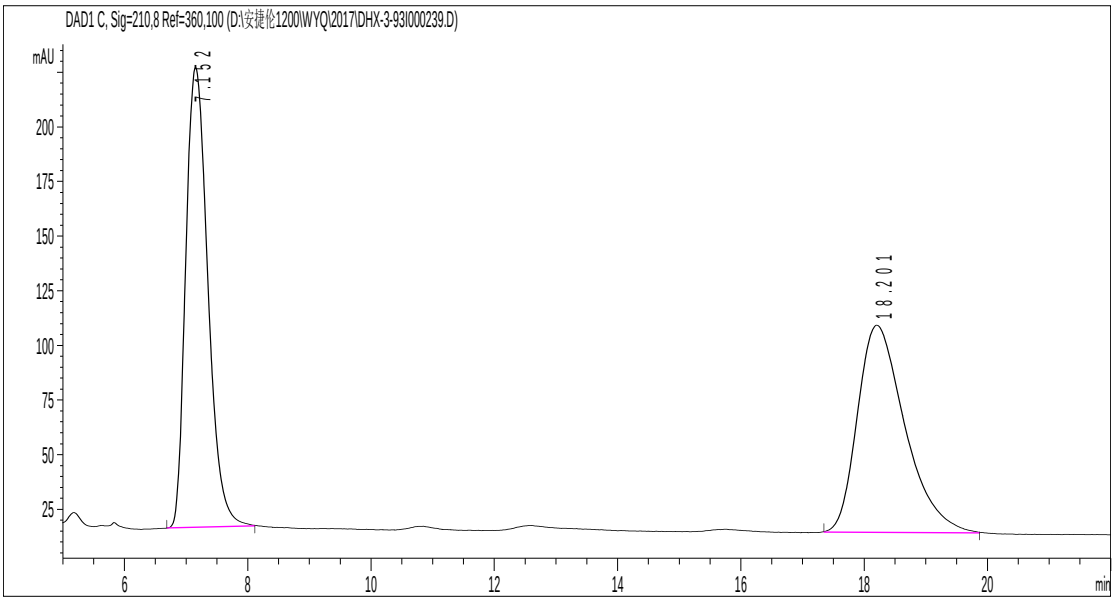
1	7.042	BB	0.2351	2289.61865	142.79085	50.5329
2	22.406	MM R	1.4146	2241.32983	26.40675	49.4671

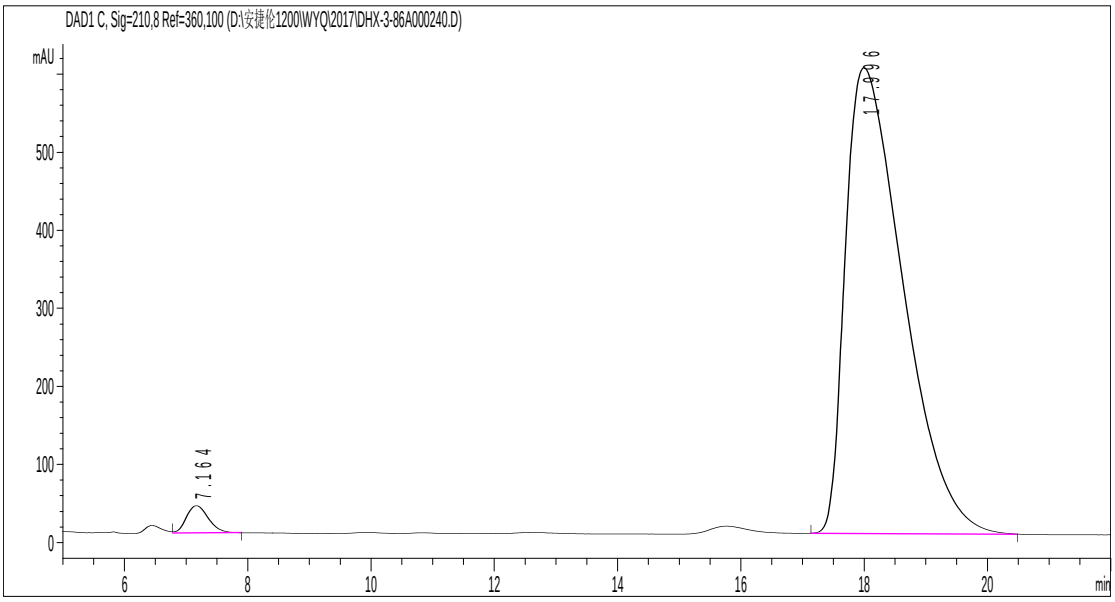


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.031	MM R	0.2453	361.68924	24.57687	5.1191
2	22.201	MM R	1.4513	6703.78809	76.98809	94.8809

HPLC for racemic and pure enantioenriched sample 2h

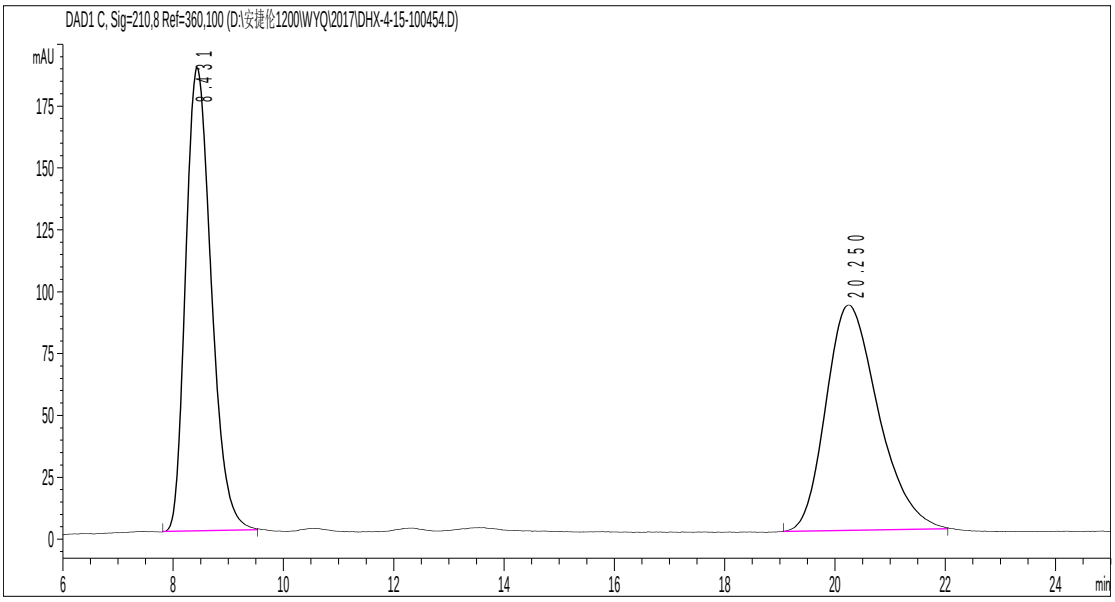


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.152	BB	0.3975	5261.59375	210.57118	50.8834
2	18.201	BB	0.7722	5078.89209	94.92702	49.1166

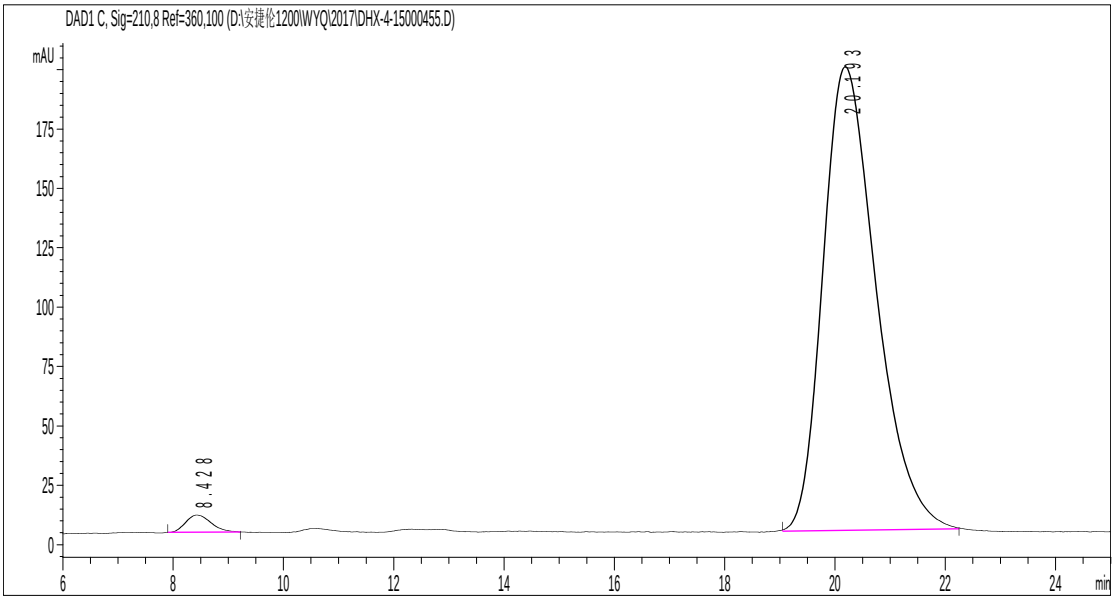


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.164	VB	0.3953	875.85937	35.07850	2.2052
2	17.996	BB	0.9812	3.88421e4	596.86255	97.7948

HPLC for racemic and pure enantioenriched sample 2i

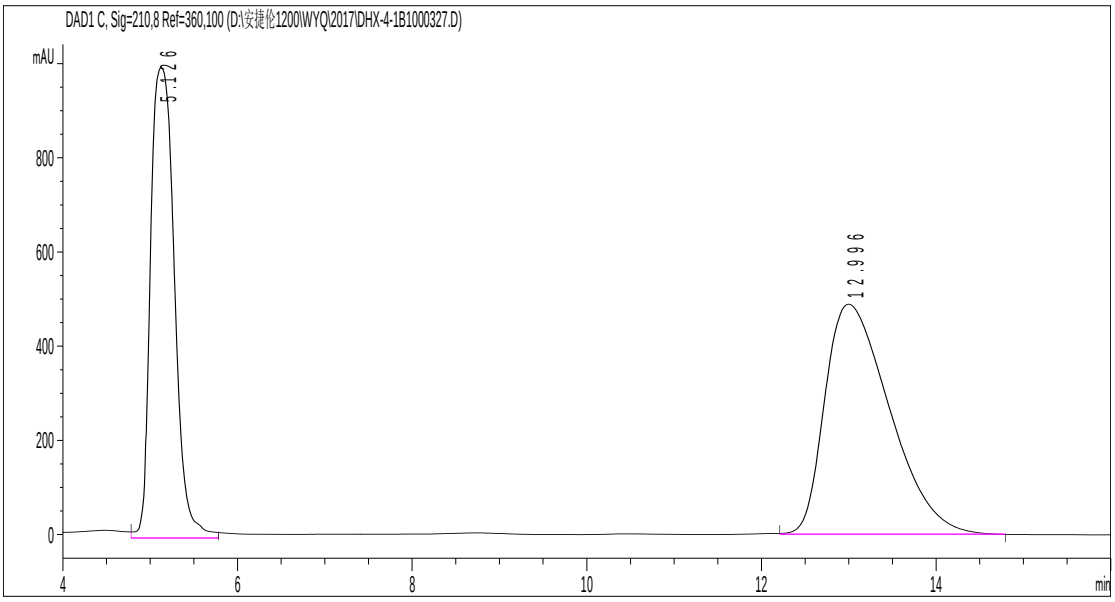


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	8.431	BB	0.5007	6046.85840	187.29225	50.0699
2	20.250	BB	0.8114	6029.98633	91.20264	49.9301

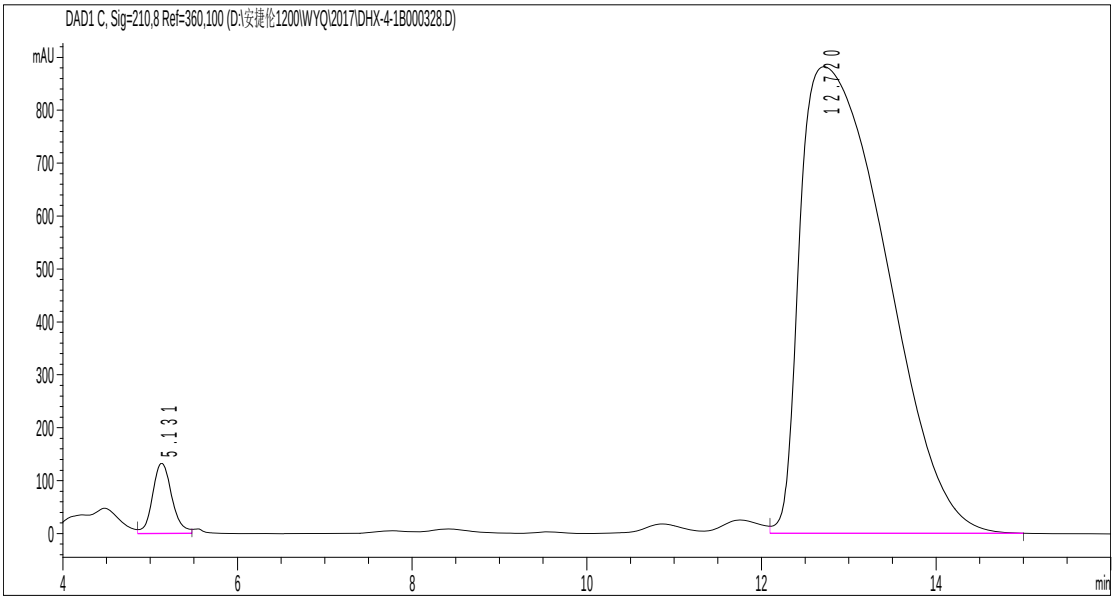


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	8.428	BB	0.4114	238.31754	7.36728	1.7876
2	20.193	BB	0.9798	1.30934e4	195.39058	98.2124

HPLC for racemic and pure enantioenriched sample 2j

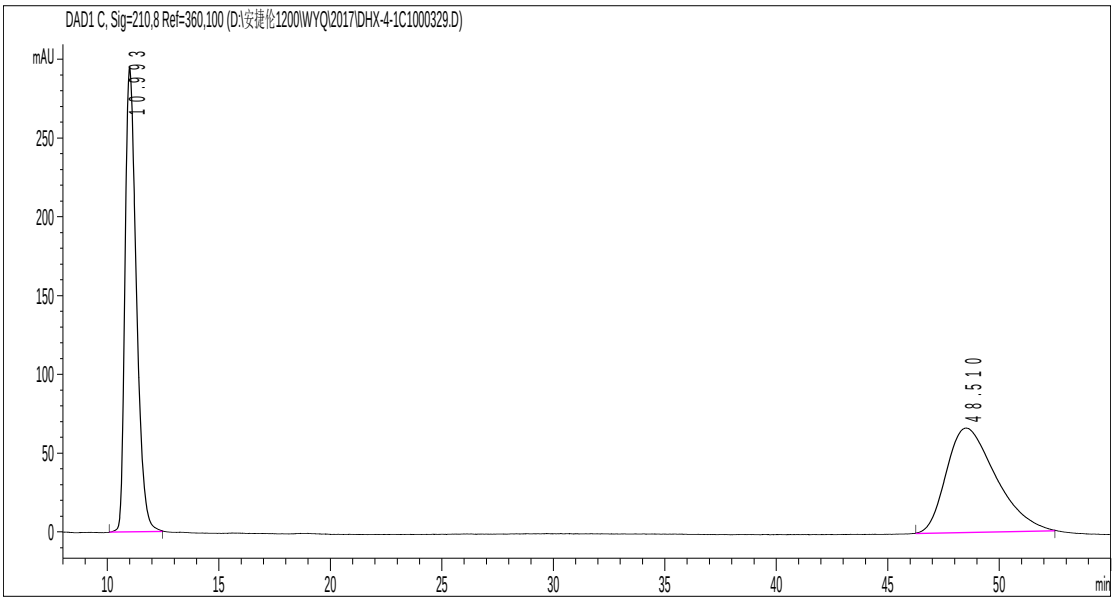


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.126	MM R	0.3173	1.90394e4	1000.06860	42.9742
2	12.996	BB	0.7964	2.52648e4	489.33118	57.0258

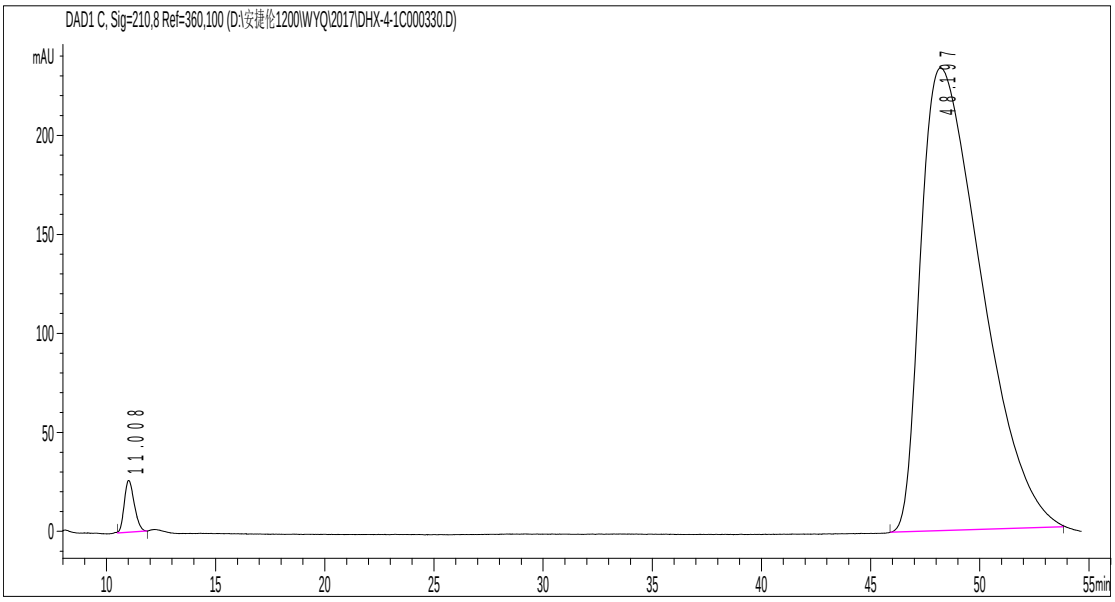


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.131	VV	0.2405	2062.78418	133.34058	3.3080
2	12.720	VB	0.9775	6.02940e4	882.04169	96.6920

HPLC for racemic and pure enantioenriched sample 2k

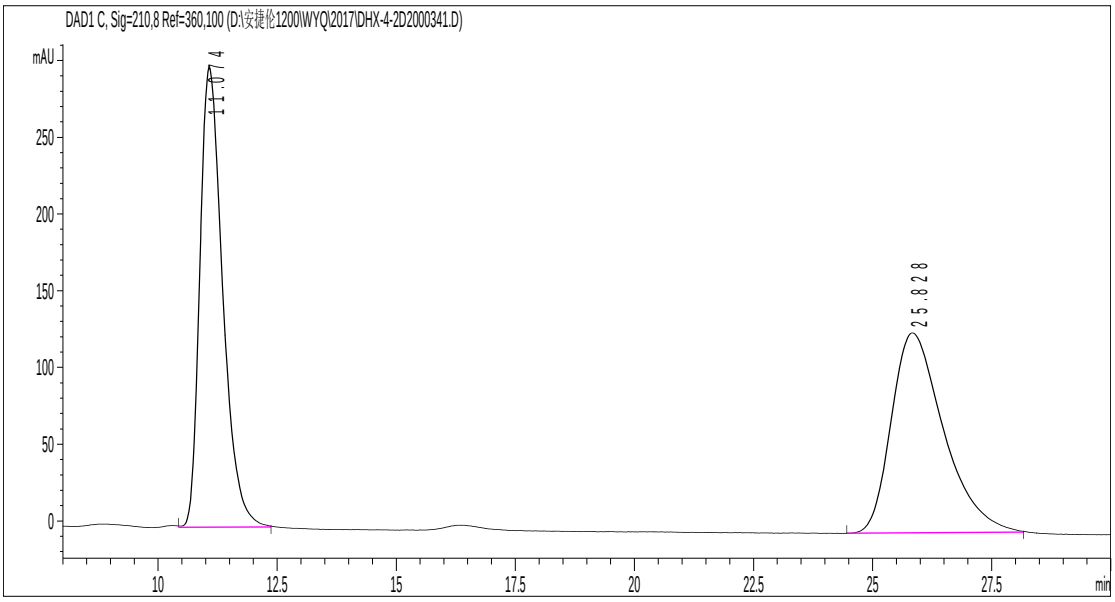


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.993	BB	0.5509	1.04847e4	294.83994	50.5105
2	48.510	BB	1.8173	1.02727e4	66.46149	49.4895

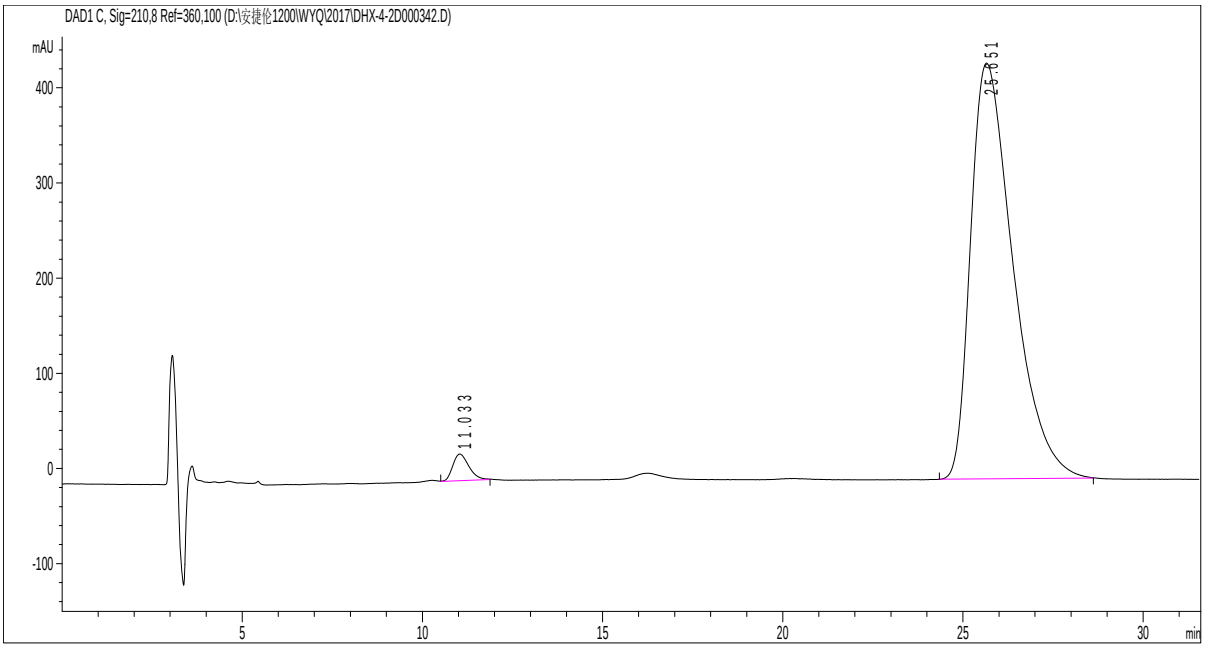


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.008	BB	0.4702	839.49939	26.31096	1.8295
2	48.197	BB	2.2669	4.50486e4	233.90634	98.1705

HPLC for racemic and pure enantioenriched sample 2l

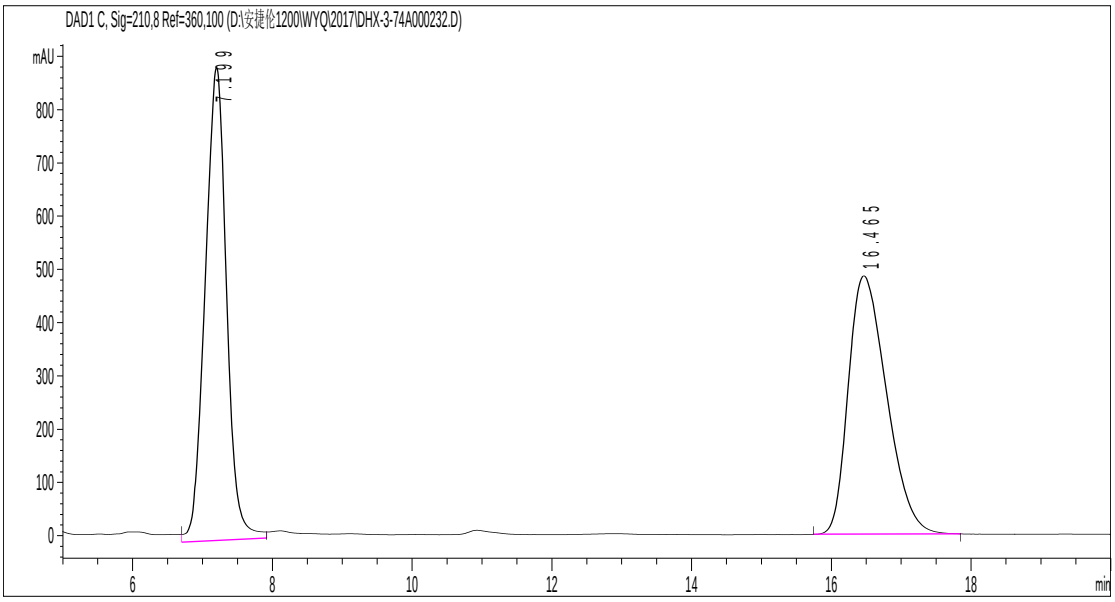


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.074	VB	0.5093	9994.13379	299.48883	50.1127
2	25.828	BB	1.0802	9949.16406	130.38763	49.8873

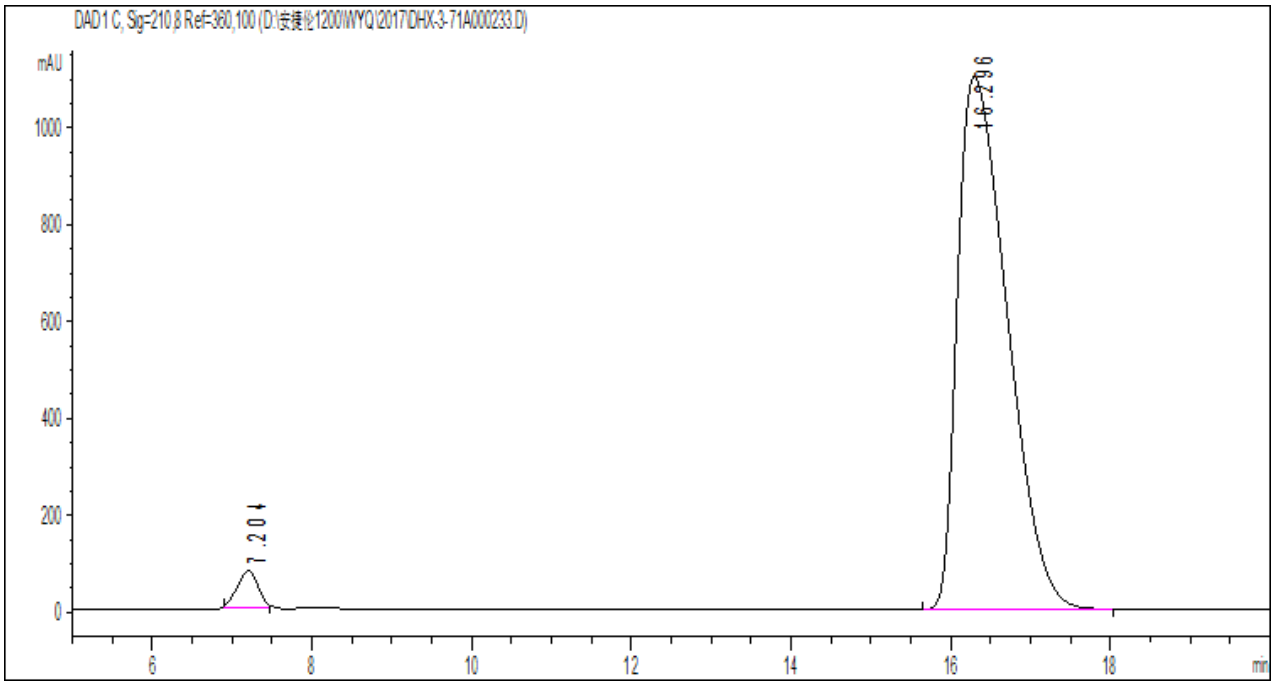


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.195	VB	0.5006	816.16150	22.32110	3.4972
2	26.216	BB	1.1639	2.25212e4	278.37402	96.5028

HPLC for racemic and pure enantioenriched sample 4a

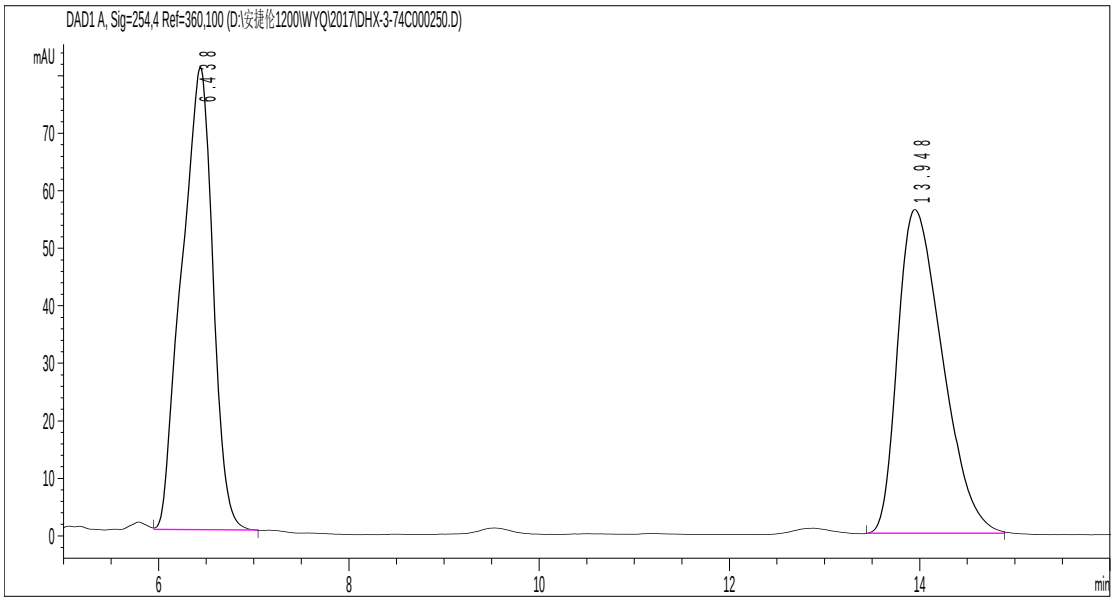


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.199	BB	0.3227	1.89340e4	888.14264	50.5731
2	16.465	BB	0.5907	1.85049e4	485.43060	49.4269

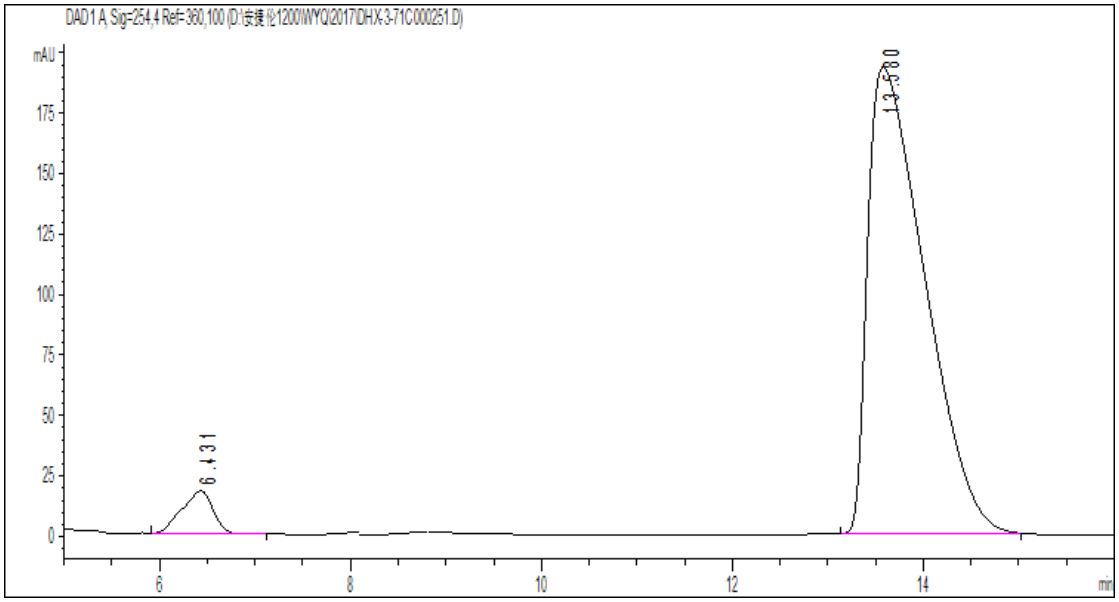


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.204	MM R	0.2993	1377.37524	76.70535	2.8116
2	16.296	BB	0.6647	4.76109e4	1100.64160	97.1884

HPLC for racemic and pure enantioenriched sample 4b

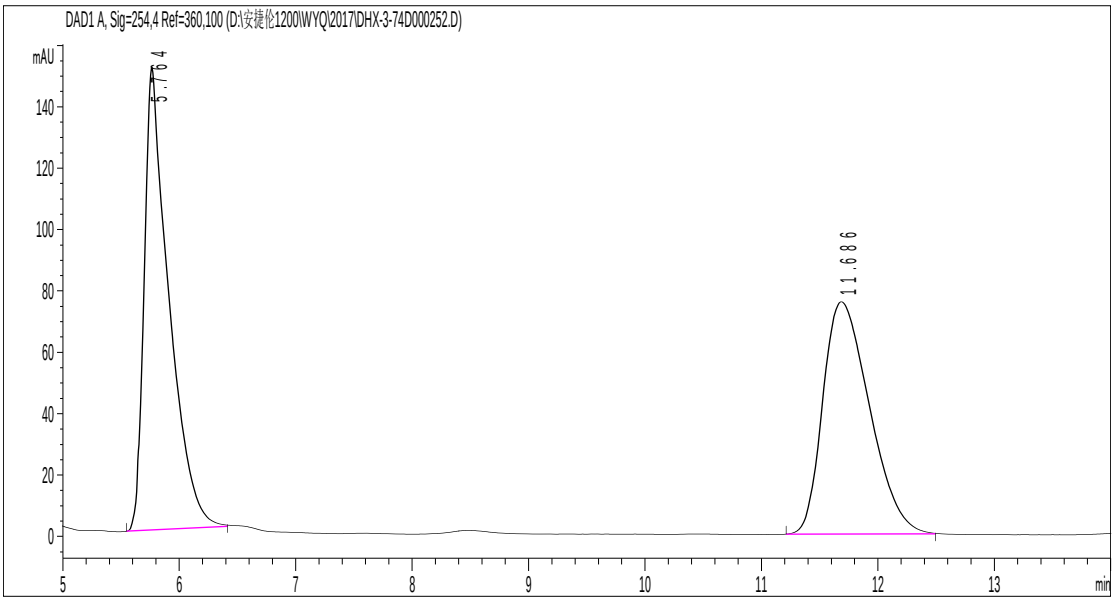


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	6.438	VB	0.3293	1828.43579	80.40789	49.8533
2	13.948	BB	0.5109	1839.19604	56.32944	50.1467

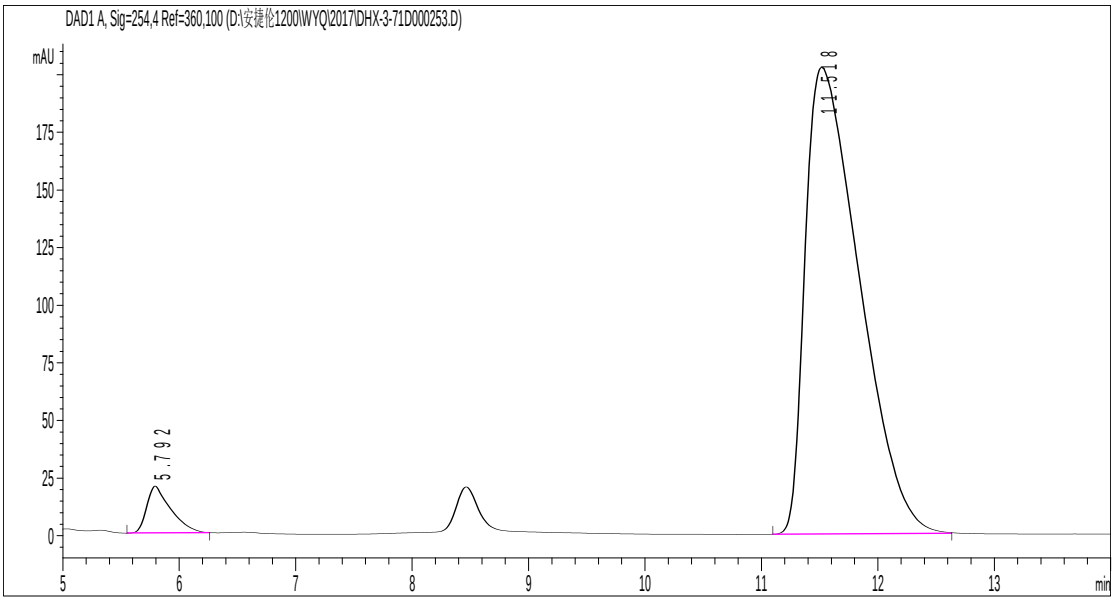


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	6.431	BB	0.3263	402.77682	17.77635	4.7933
2	13.580	BB	0.6391	8000.21631	193.18681	95.2067

HPLC for racemic and pure enantioenriched sample 4c

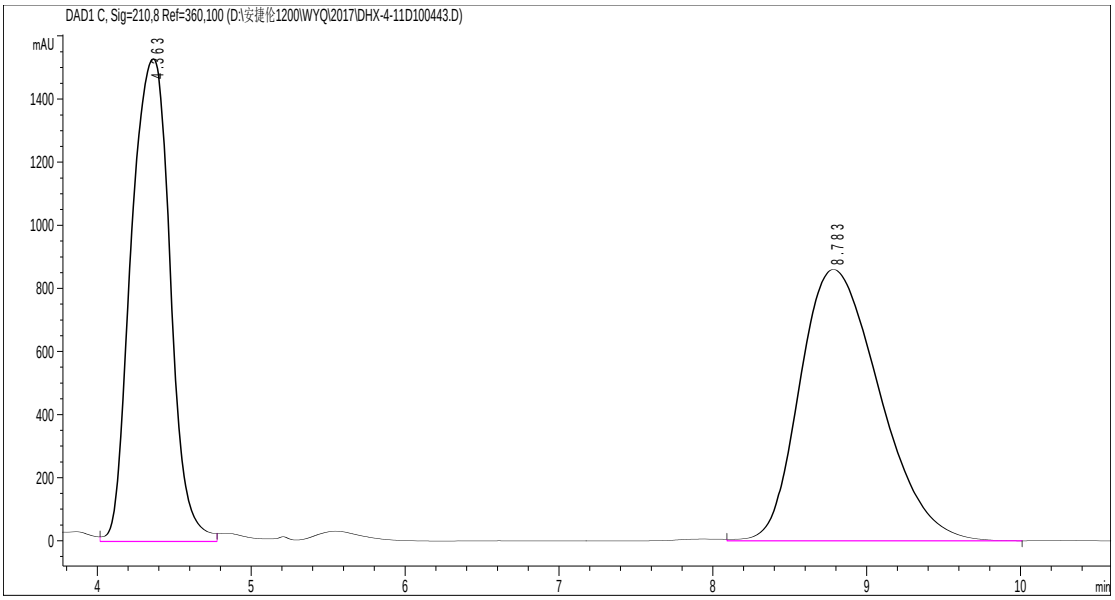


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.764	BB	0.1996	2219.09229	150.86299	51.2462
2	11.686	BB	0.4369	2111.16162	75.80260	48.7538

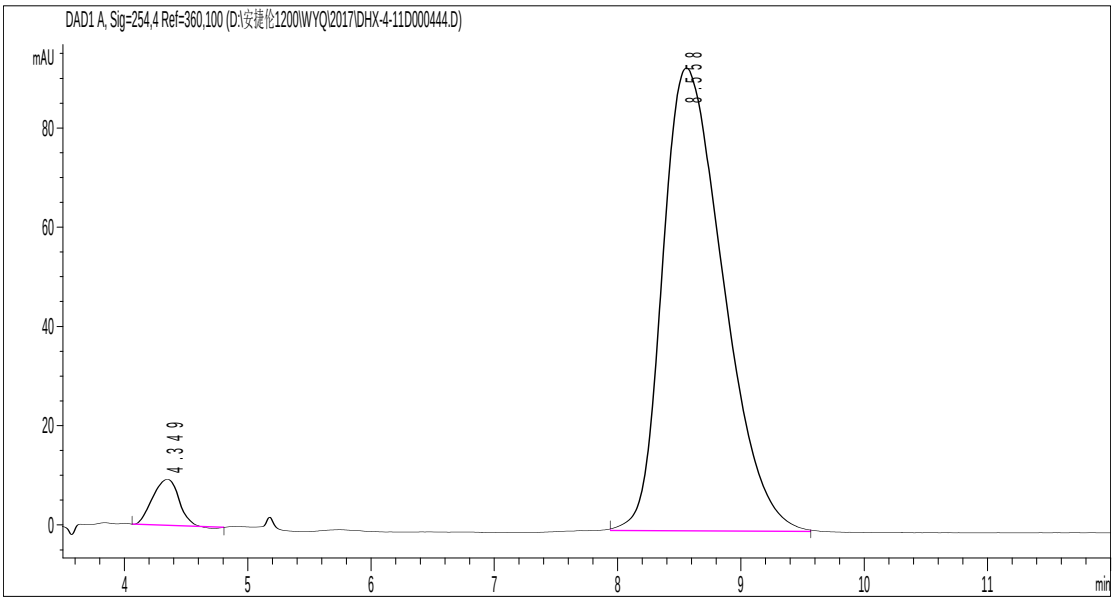


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.792	VB	0.1985	291.54465	20.42867	4.2705
2	11.518	BB	0.5064	6535.45264	202.54243	95.7295

HPLC for racemic and pure enantioenriched sample 4d

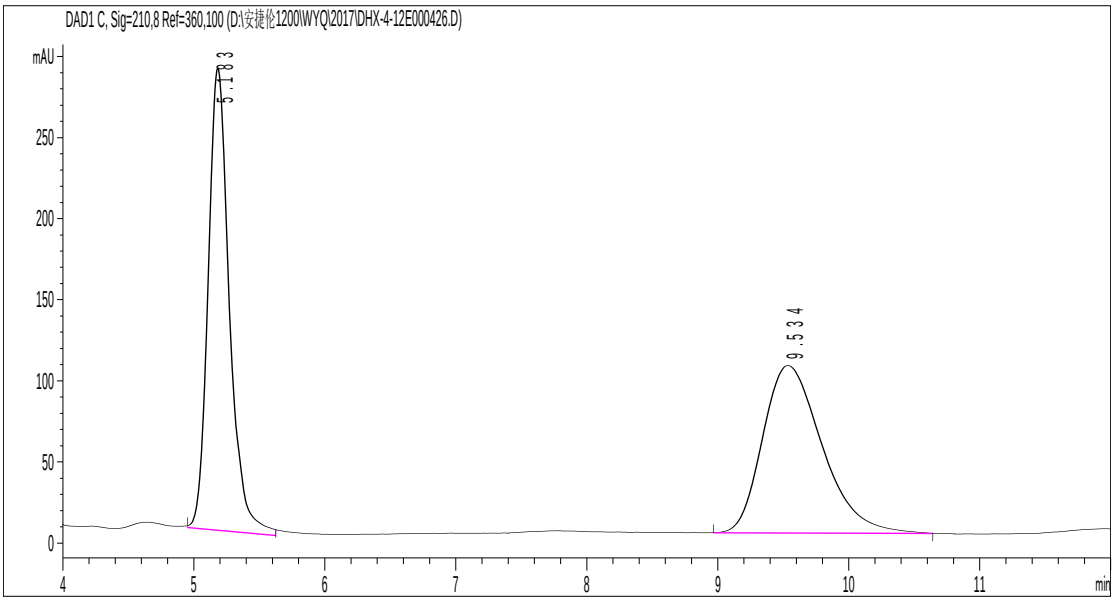


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	4.363	VV	0.2890	2.68881e4	1530.27991	46.4843
2	8.783	VB	0.5617	3.09552e4	860.41241	53.5157

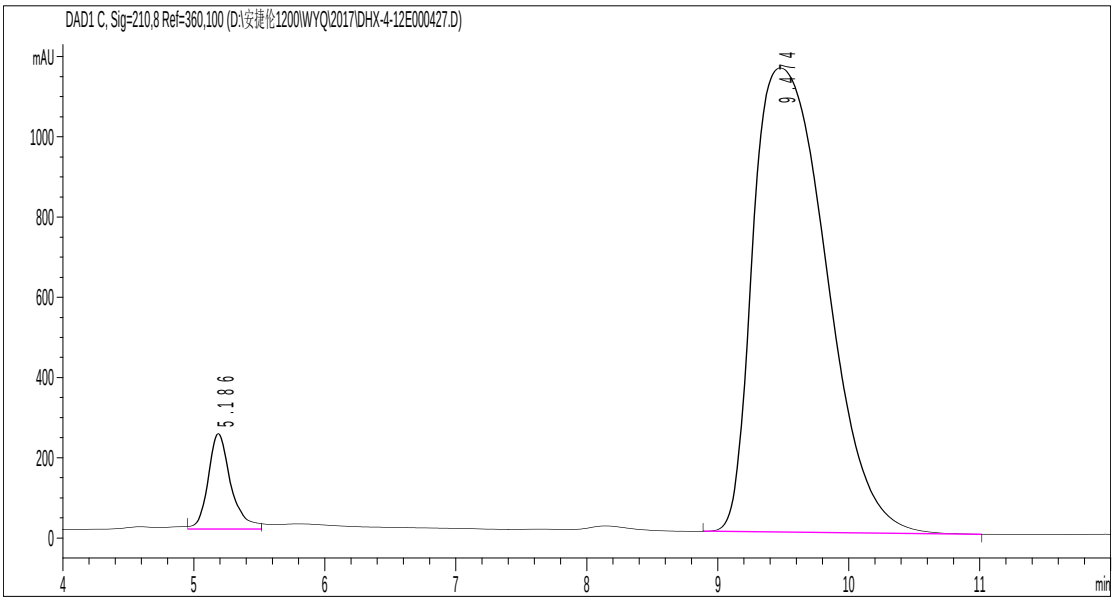


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	4.349	BB	0.2385	135.82462	9.29318	4.0908
2	8.558	BB	0.5343	3184.45361	93.28079	95.9092

HPLC for racemic and pure enantioenriched sample 4e

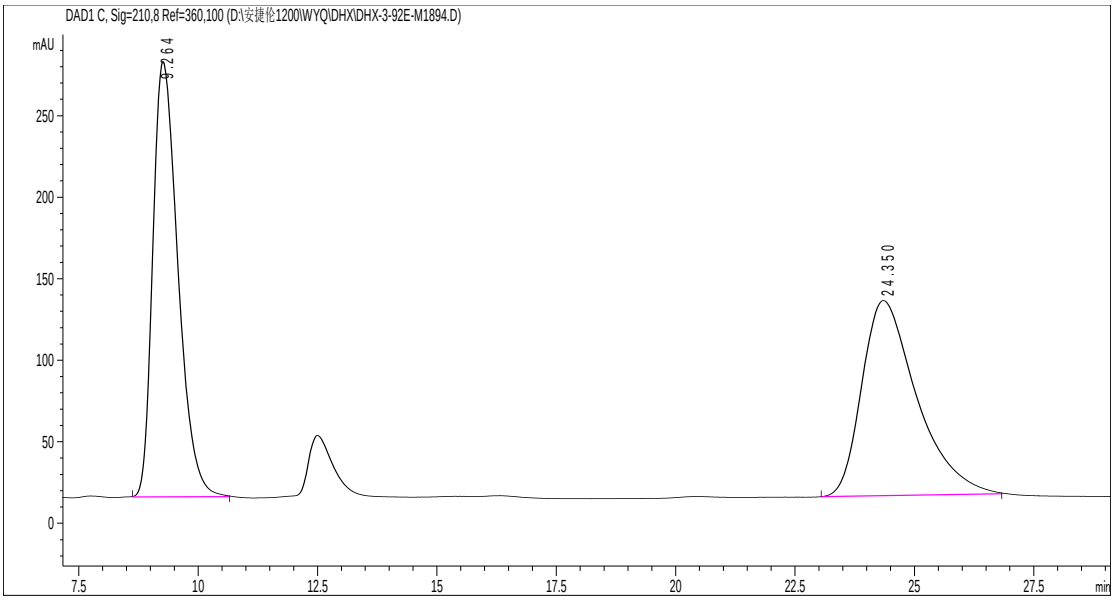


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.183	MM R	0.1874	3207.73413	285.23608	49.5974
2	9.534	BB	0.4879	3259.80884	103.37205	50.4026

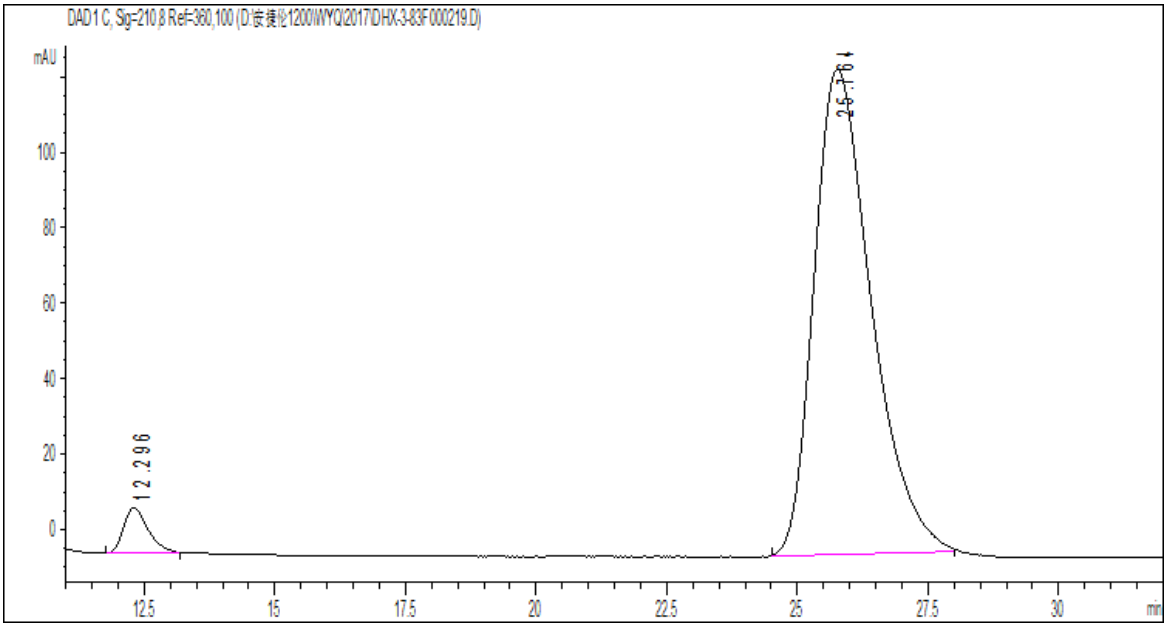


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.186	MM R	0.1997	2849.89575	237.87016	5.9614
2	9.474	BB	0.6191	4.49562e4	1157.46252	94.0386

HPLC for racemic and pure enantioenriched sample 4f

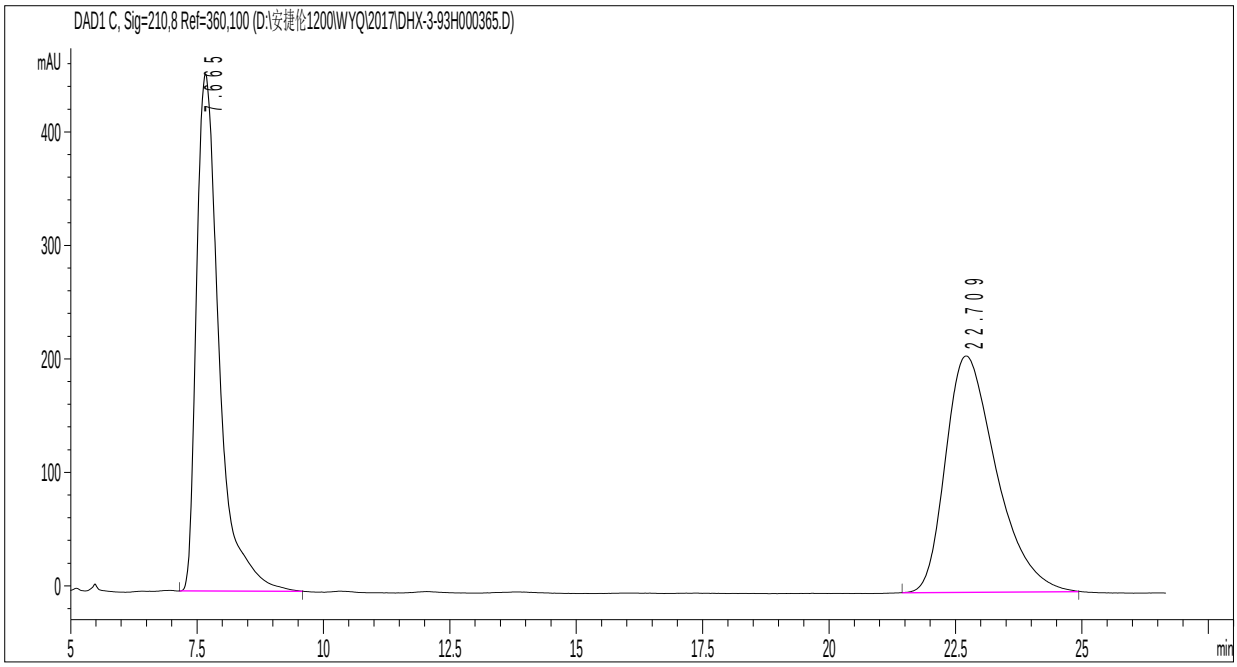


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.264	BB	0.5660	9747.59961	266.93234	50.3897
2	24.350	BB	1.1949	9596.81348	119.75757	49.6103

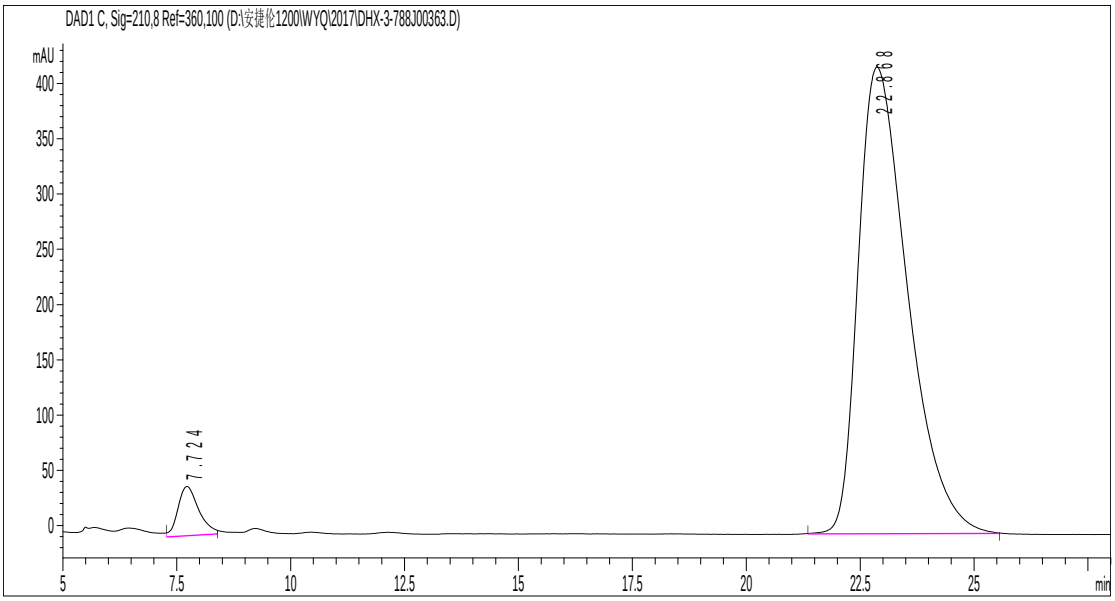


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	12.296	BB	0.4141	395.60696	12.07845	3.8704
2	25.764	BB	0.9928	9825.84961	128.68634	96.1296

HPLC for racemic and pure enantioenriched sample 4g

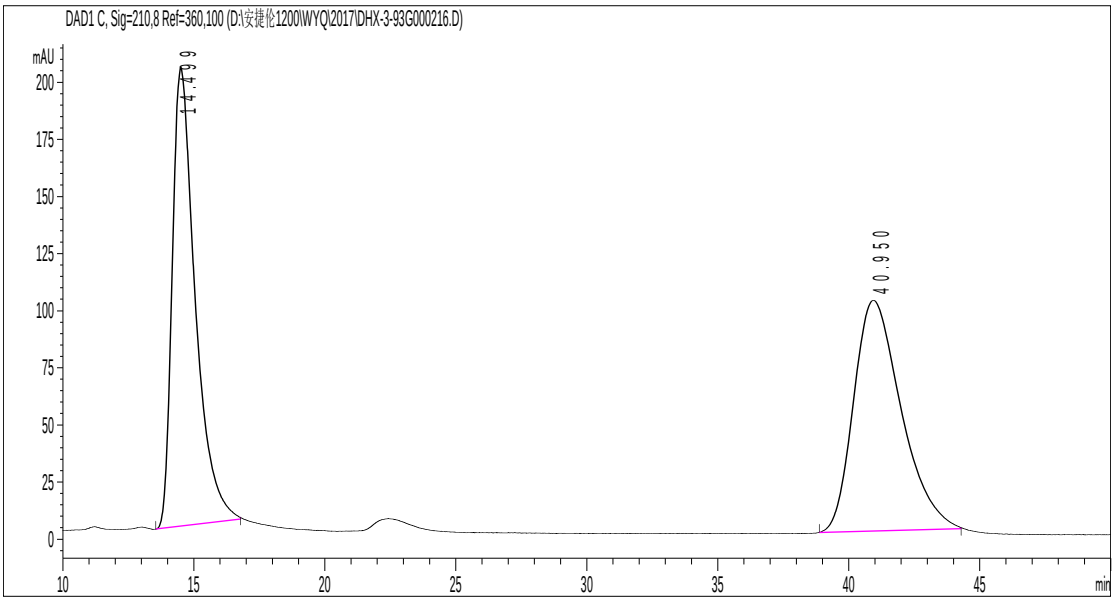


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.665	BB	0.4845	1.42274e4	455.36783	49.4326
2	22.709	BB	1.0366	1.45540e4	208.43335	50.5674

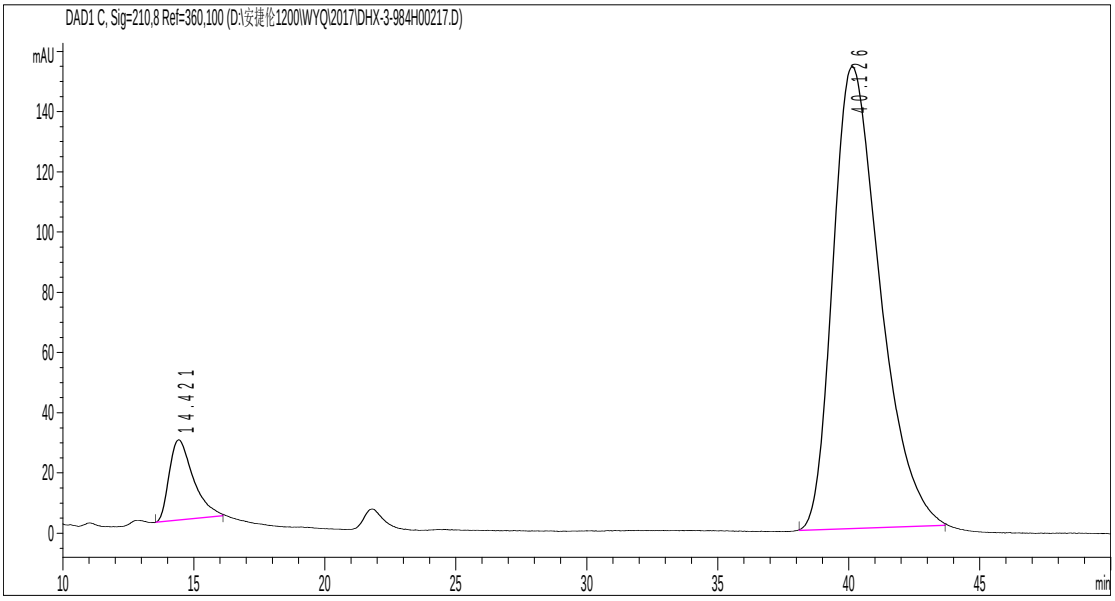


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	7.724	MM R	0.5303	1421.95789	44.69187	4.2765
2	22.868	BB	1.1177	3.18282e4	422.09238	95.7235

HPLC for racemic and pure enantioenriched sample 4h

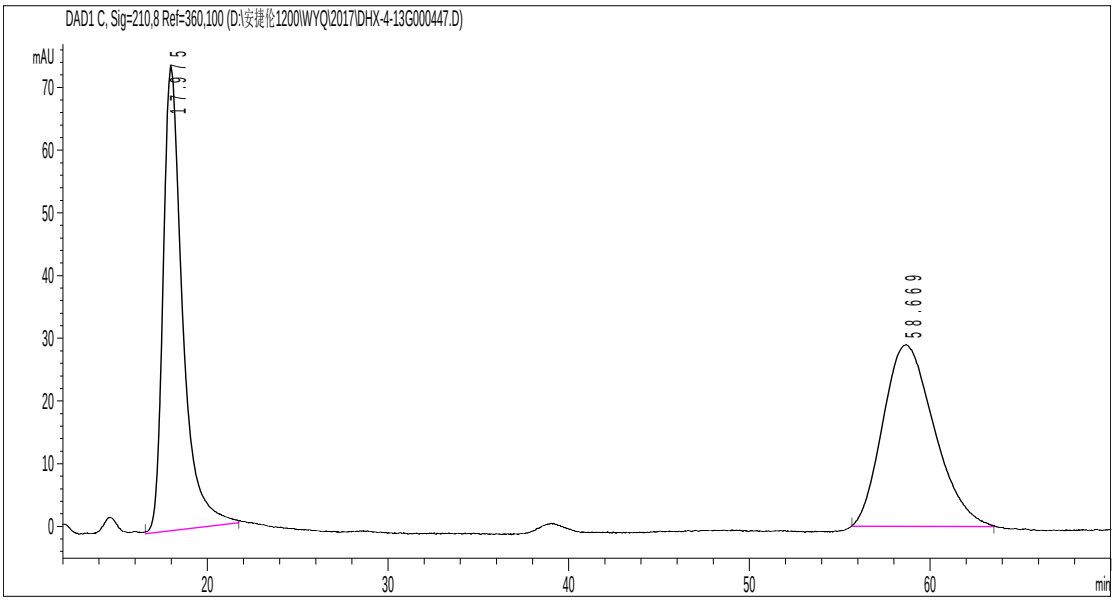


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	14.499	BB	0.9075	1.22476e4	200.83890	49.0358
2	40.950	BB	1.4866	1.27293e4	100.98801	50.9642

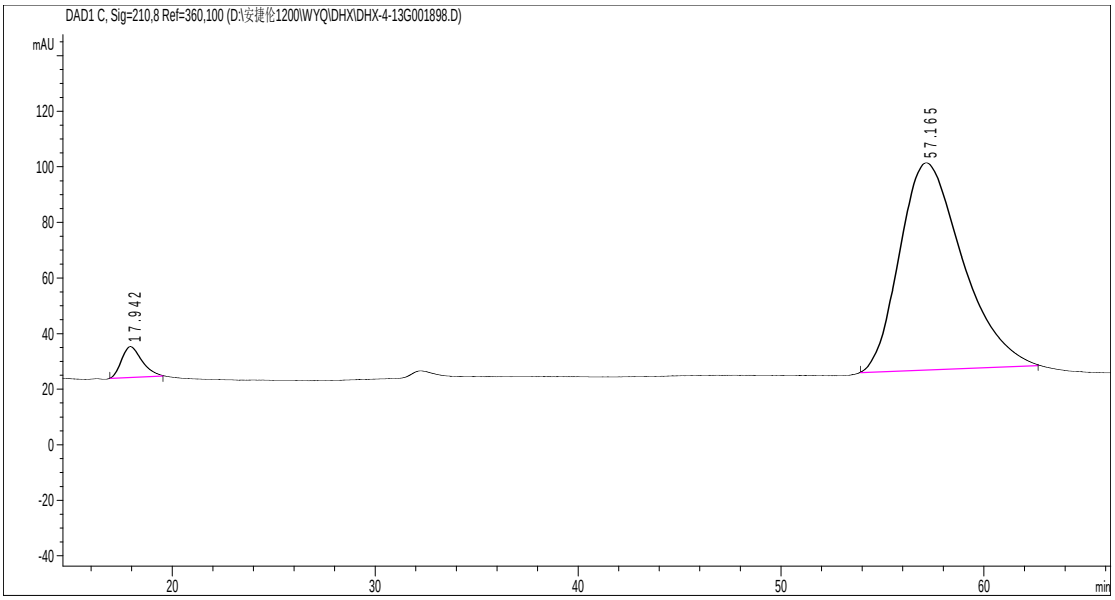


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	14.421	BB	0.7564	1698.67957	26.69275	8.1343
2	40.126	BB	1.4728	1.91843e4	153.42506	91.8657

HPLC for racemic and pure enantioenriched sample 4i

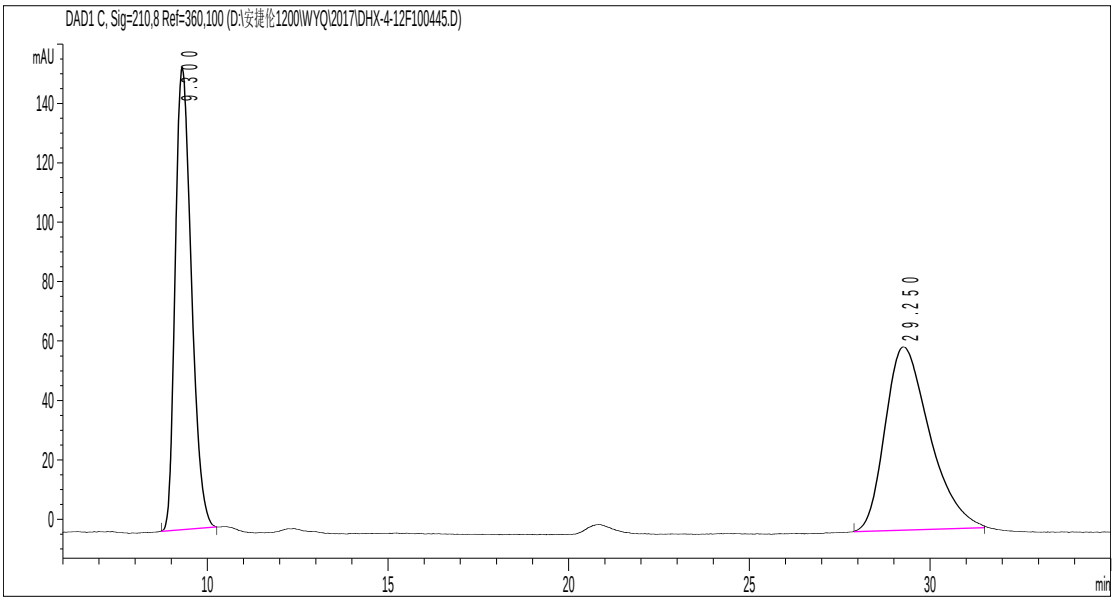


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	17.975	MM R	1.2528	5553.60645	73.88376	49.2381
2	58.669	BB	2.3128	5725.48389	29.00681	50.7619

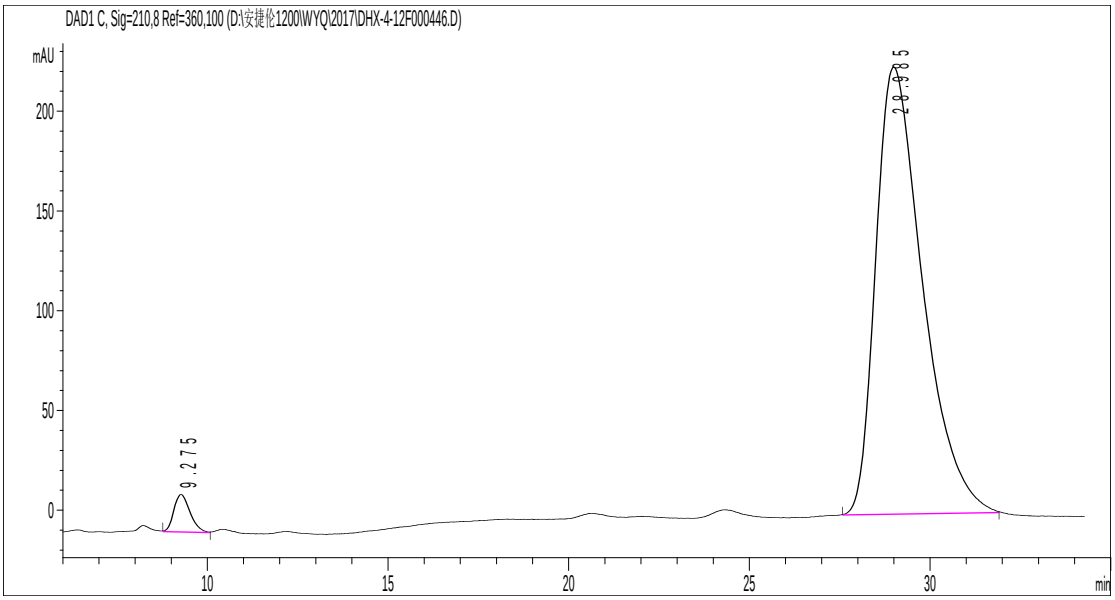


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	17.942	BB	0.8315	783.34174	11.15223	4.6435
2	57.165	BB	2.5230	1.60862e4	74.56137	95.3565

HPLC for racemic and pure enantioenriched sample 4j

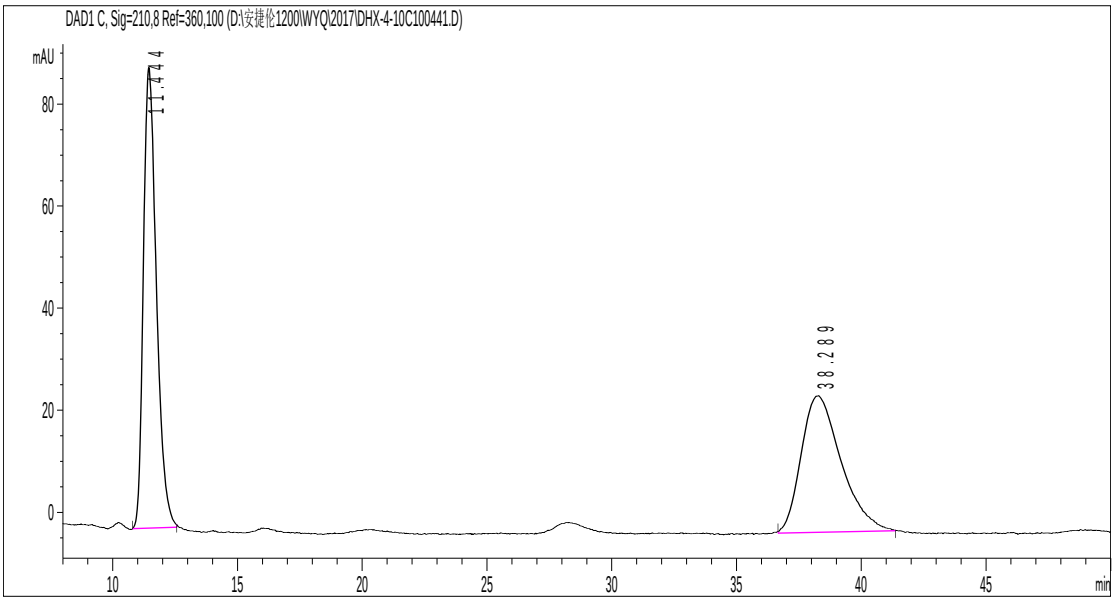


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.300	BB	0.4946	4865.21094	155.67033	47.8852
2	29.250	BB	1.0402	5294.95508	61.76247	52.1148

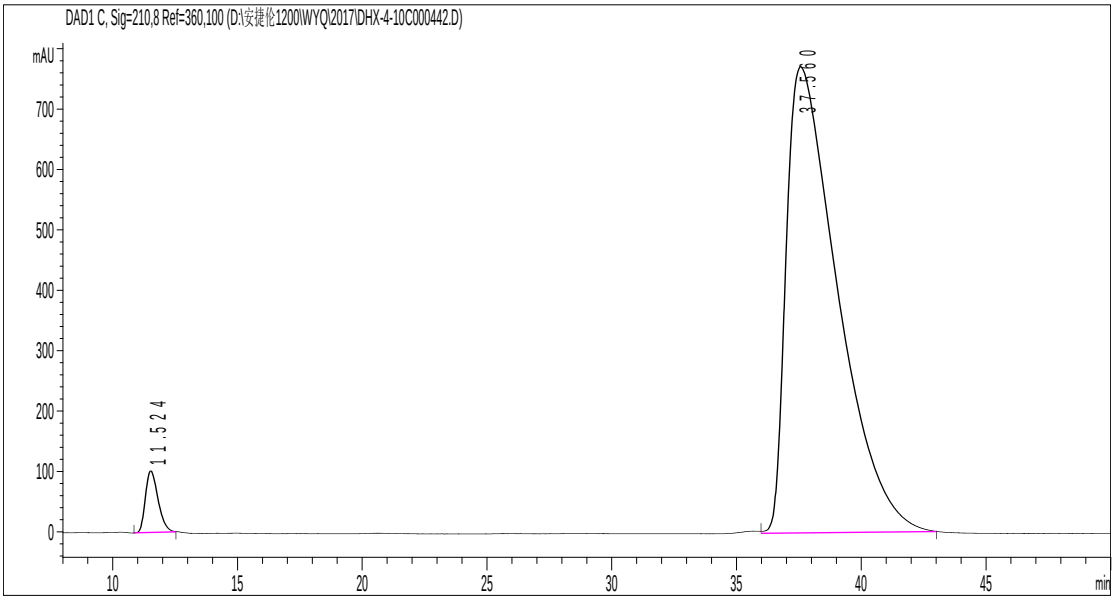


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.275	BB	0.4552	594.61340	18.89187	2.8547
2	28.985	BB	1.2004	2.02343e4	224.30801	97.1453

HPLC for racemic and pure enantioenriched sample 4k

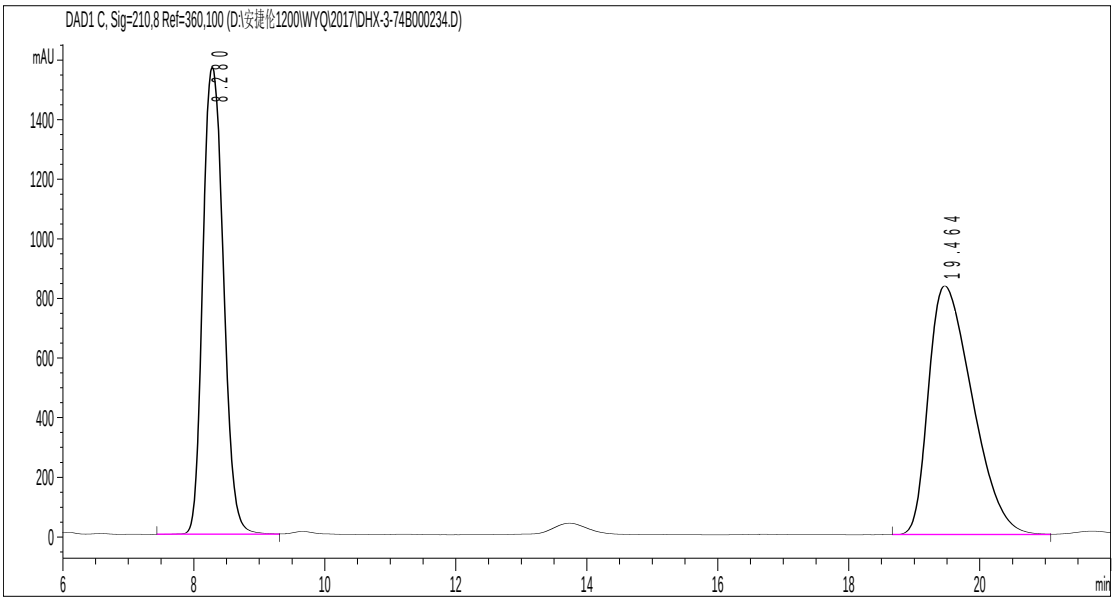


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.444	BB	0.5523	3285.47803	90.33292	52.4051
2	38.289	BB	1.3118	2983.91382	26.82398	47.5949

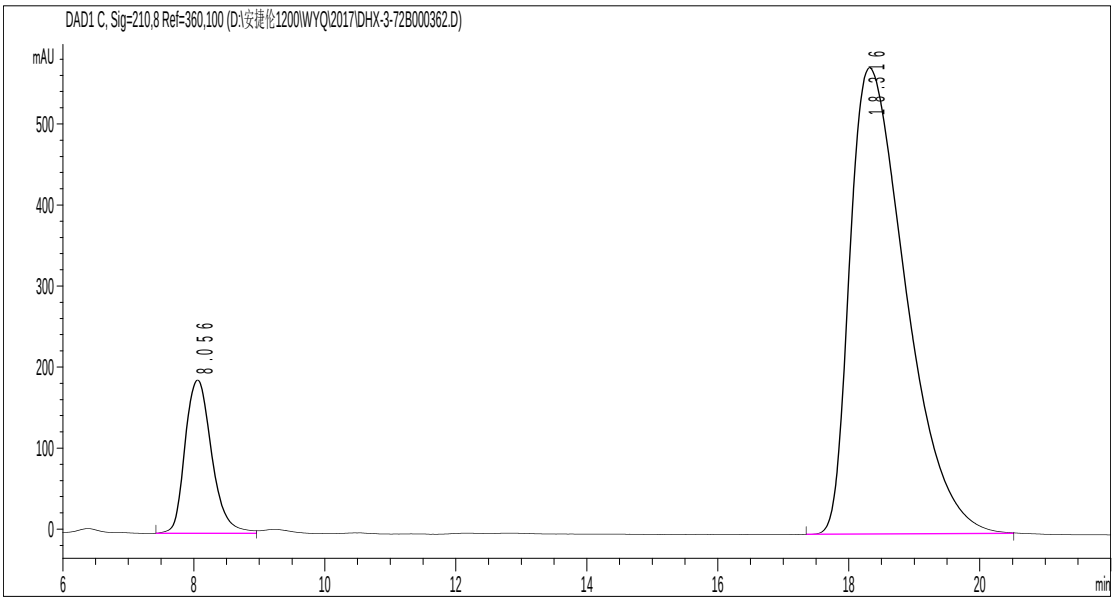


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.524	BB	0.5318	3609.92456	102.26315	3.1717
2	37.560	VB	1.6912	1.10208e5	772.13208	96.8283

HPLC for racemic and pure enantioenriched sample 4l

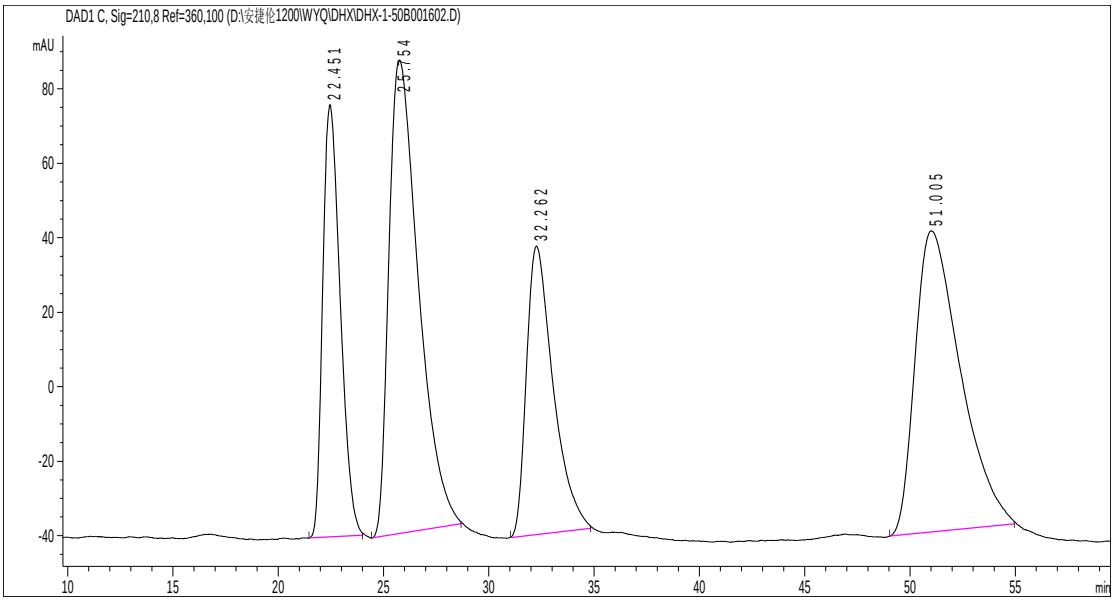


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	8.280	BB	0.3502	3.44108e4	1567.19385	46.9660
2	19.464	BB	0.7148	3.88566e4	835.09180	53.0340

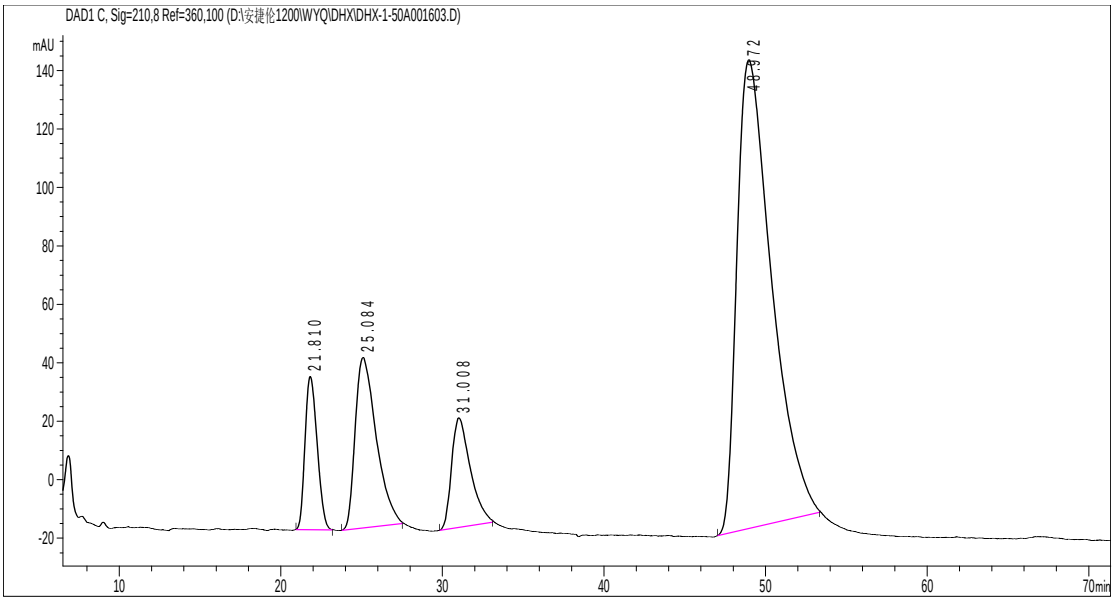


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	8.056	BB	0.4465	5367.05811	189.43440	13.6024
2	18.316	BB	0.8869	3.40896e4	575.64124	86.3976

HPLC for racemic and pure enantioenriched sample 5

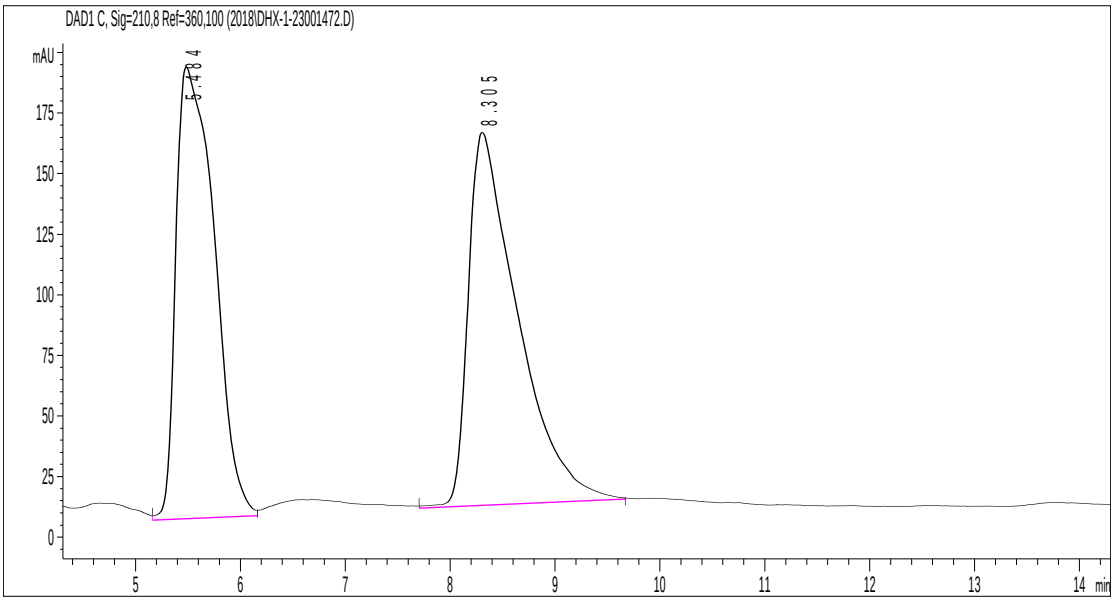


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	22.451	BB	0.8608	6713.09521	116.06893	17.6512
2	25.754	BB	1.3186	1.24140e4	127.20128	32.6411
3	32.262	BB	1.0461	6831.85986	77.52512	17.9635
4	51.005	BB	1.7468	1.20729e4	80.91203	31.7441

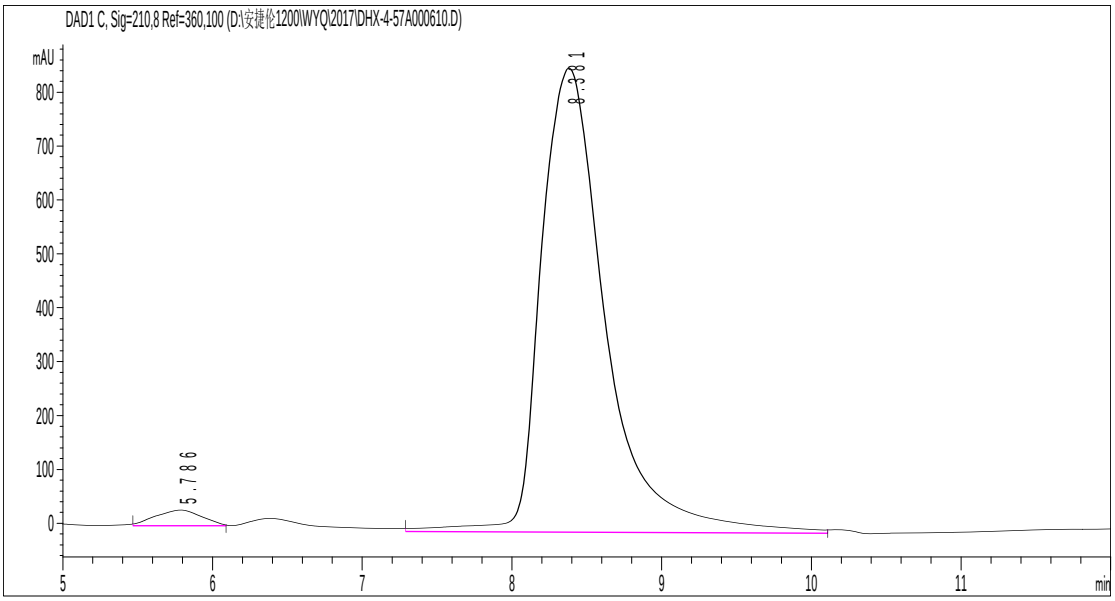


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	21.810	BB	0.7126	2747.20947	52.49472	7.8402
2	25.084	BB	1.0747	5303.67578	58.33379	15.1360
3	31.008	BB	0.9639	3039.16870	37.56606	8.6734
4	48.972	BB	1.7635	2.39500e4	160.44479	68.3504

HPLC for racemic and pure enantioenriched sample 6

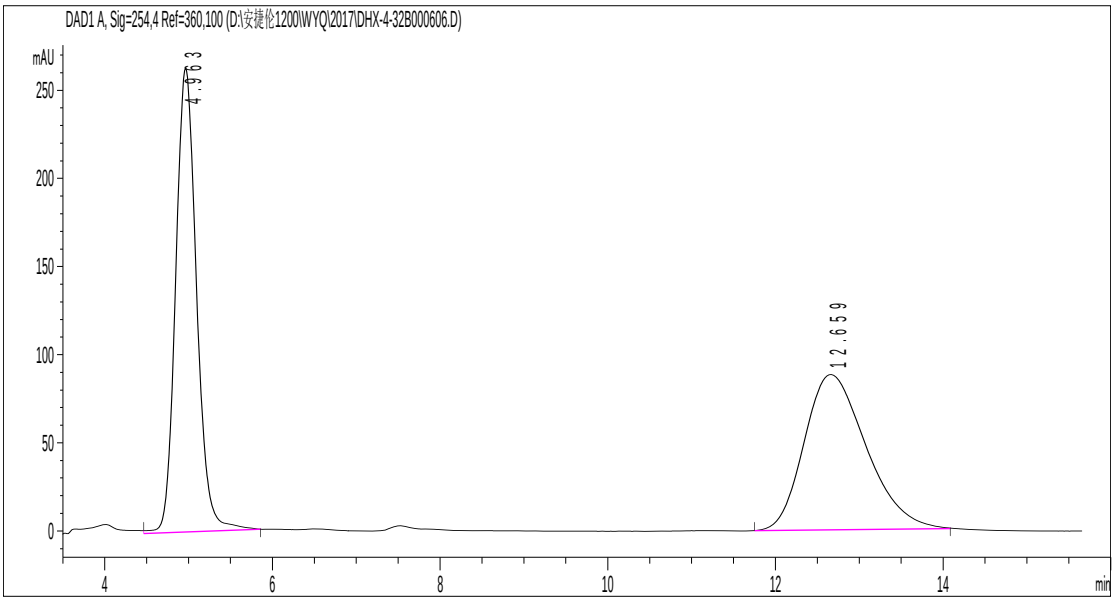


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.484	VV	0.3429	4744.98047	186.48170	48.4294
2	8.305	VB	0.4567	5052.74365	154.04422	51.5706

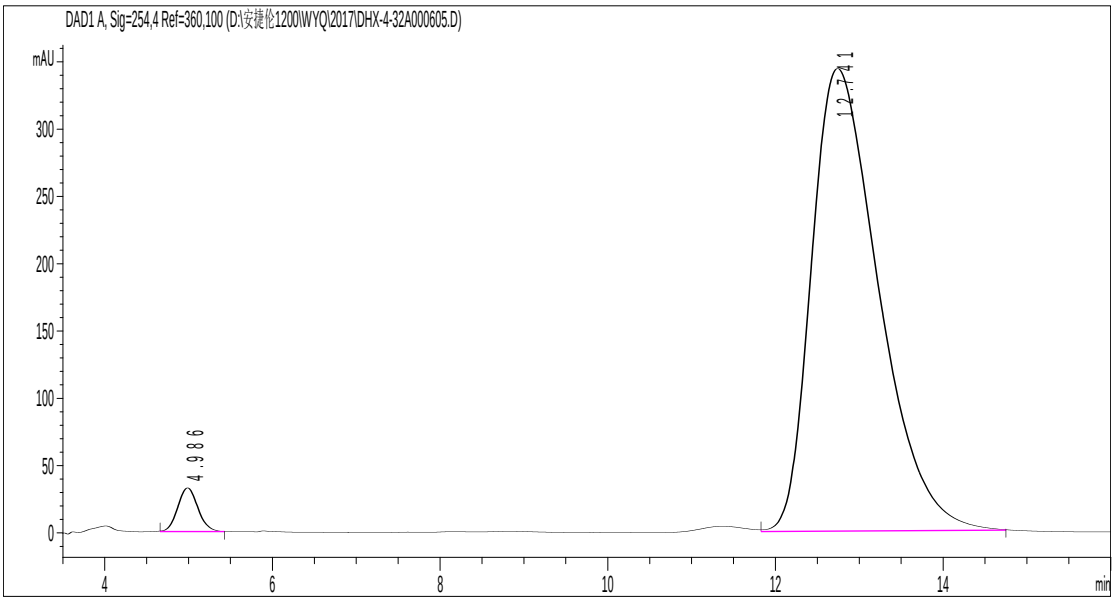


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.786	MM R	0.3613	642.99628	29.66068	2.4168
2	8.381	BB	0.4674	2.59621e4	861.89642	97.5832

HPLC for racemic and pure enantioenriched sample 7



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	4.963	VB	0.2666	4571.98291	263.23938	50.1831
2	12.659	BB	0.7919	4538.62842	88.26167	49.8169



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	4.986	BB	0.2613	543.68292	32.48432	2.7655
2	12.741	VB	0.8585	1.91156e4	343.87207	97.2345