

Synthesis of 6-Halo-substituted Pericosine A and Their Evaluations for Antitumor and Antiglycosidase Activities

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Contents

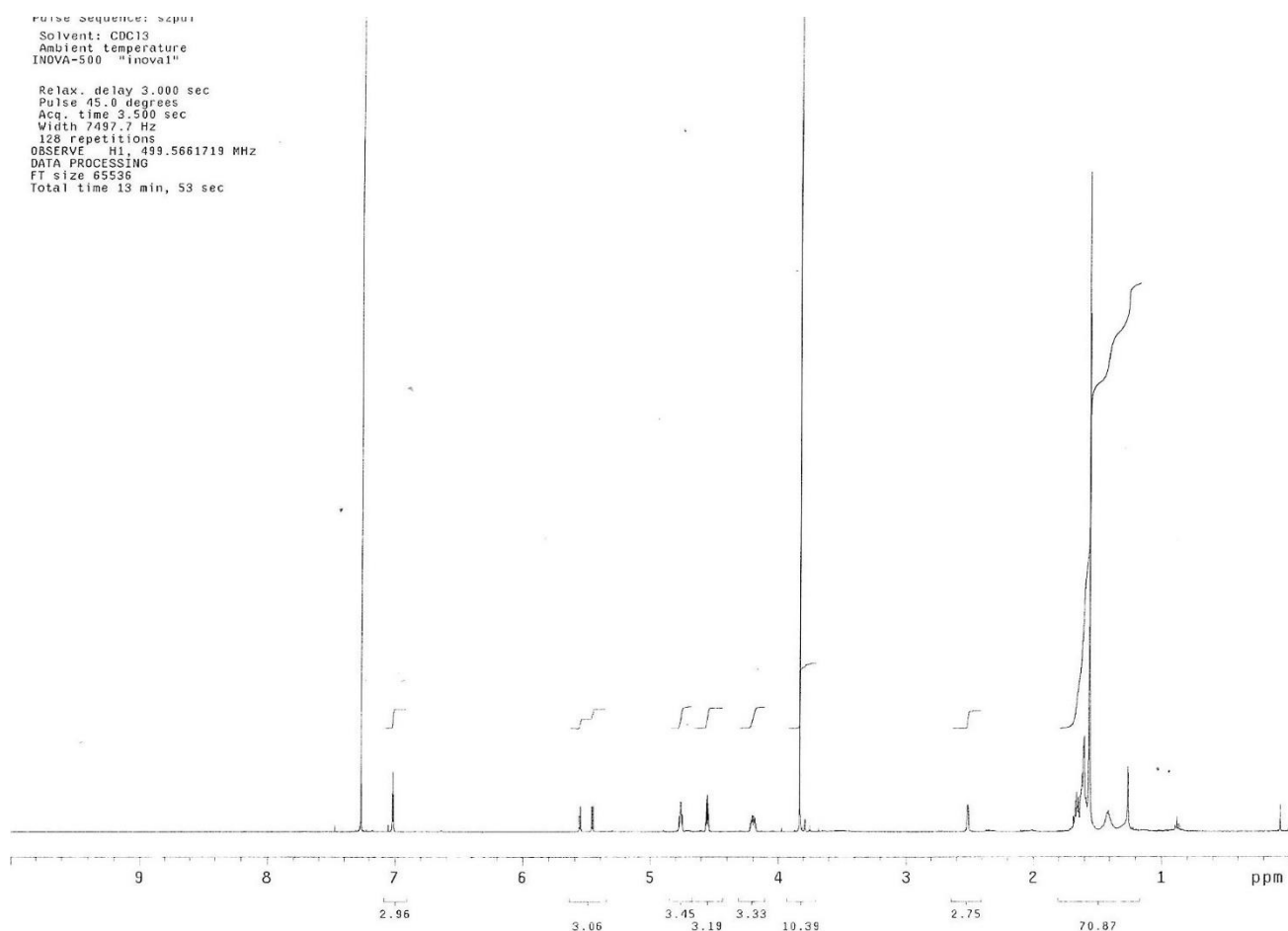
1. ¹H- and ¹³C-NMR spectra of new compounds and pericoxide, and HMBC spectrum of compound **12**

Figure S1. ¹ H-NMR spectrum of (-)- 10_F in CDCl ₃ (500MHz)	page SM- 3
Figure S2. ¹³ C-NMR spectrum of (-)- 10_F in CDCl ₃ (125 MHz)	page SM- 4
Figure S3. ¹ H-NMR spectrum of (+)- 10_F in CDCl ₃ (400 MHz)	page SM- 5
Figure S4. ¹³ C-NMR spectrum of (+)- 10_F in CDCl ₃ (100 MHz)	page SM- 5
Figure S5. ¹ H-NMR spectrum of (-)- 1_F in acetone-d ₆ (600 MHz)	page SM- 6
Figure S6. ¹³ C-NMR spectrum of (-)- 1_F in acetone-d ₆ (150 MHz)	page SM- 7
Figure S7. ¹ H-NMR spectrum of (+)- 1_F in acetone-d ₆ (600 MHz)	page SM- 8
Figure S8. ¹³ C-NMR spectrum of (+)- 1_F in acetone-d ₆ (150 MHz)	page SM- 9
Figure S9. ¹ H-NMR spectrum of (-)- 10_{Br} in acetone-d ₆ (600 MHz)	page SM-10
Figure S10. ¹ H-NMR spectrum of (-)- 10_{Br} in CDCl ₃ (600 MHz)	page SM-11
Figure S11. ¹³ C-NMR spectrum of (-)- 10_{Br} in acetone-d ₆ (150 MHz)	page SM-12
Figure S12. ¹ H-NMR spectrum of (+)- 10_{Br} in acetone-d ₆ (600 MHz)	page SM-13
Figure S13. ¹³ C-NMR spectrum of (+)- 10_{Br} in acetone-d ₆ (150 MHz)	page SM-14
Figure S14. ¹ H-NMR spectrum of (-)- 1_{Br} in methanol-d ₄ (600 MHz)	page SM-15
Figure S15. ¹³ C-NMR spectrum of (-)- 1_{Br} in methanol-d ₄ (150 MHz)	page SM-15
Figure S16. ¹ H-NMR spectrum of (+)- 1_{Br} in methanol-d ₄ (600 MHz)	page SM-16
Figure S17. ¹³ C-NMR spectrum of (+)- 1_{Br} in methanol-d ₄ (150 MHz)	page SM-16
Figure S18. ¹ H-NMR spectrum of (-)- 10_I in CDCl ₃ (600 MHz)	page SM-17
Figure S19. ¹³ C-NMR spectrum of (-)- 10_I in CDCl ₃ (150 MHz)	page SM-18
Figure S20. ¹ H-NMR spectrum of (+)- 10_I in CDCl ₃ (400 MHz)	page SM-19
Figure S21. ¹³ C-NMR spectrum of (+)- 10_I in CDCl ₃ (100 MHz)	page SM-19
Figure S22. ¹ H-NMR spectrum of (-)- 1_I in acetone-d ₆ (600 MHz)	page SM-20
Figure S23. ¹³ C-NMR spectrum of (-)- 1_I in acetone-d ₆ (150 MHz)	page SM-20
Figure S24. ¹ H-NMR spectrum of (+)- 1_I in acetone-d ₆ (600 MHz)	page SM-21

Figure S25. ^{13}C -NMR spectrum of (+)- 1 _I in acetone- d_6 (150 MHz)	page SM-21
Figure S26. ^1H -NMR spectrum of (-)- 11 in methanol- d_4 (600 MHz)	page SM-22
Figure S27. ^{13}C -NMR spectrum of (-)- 11 in methanol- d_4 (150 MHz)	page SM-22
Figure S28. ^1H -NMR spectrum of (-)- 12 in methanol- d_4 (600 MHz)	page SM-23
Figure S29. ^{13}C -NMR spectrum of (-)- 12 in methanol- d_4 (150 MHz)	page SM-23
Figure S30. HMBC spectrum of (-)- 12 in methanol- d_4 (600 MHz)	page SM-23
Figure S31. ^1H -NMR spectrum of (-)- 7 in methanol- d_4 (600 MHz)	page SM-24
Figure S32. ^{13}C -NMR spectrum of (-)- 7 in methanol- d_4 (150 MHz)	page SM-25
Figure S33. ^1H -NMR spectrum of (+)- 7 in methanol- d_4 (600 MHz)	page SM-26
Figure S34. ^{13}C -NMR spectrum of (+)- 7 in methanol- d_4 (150 MHz)	page SM-26
2. Table S1. Deprotection of (-)- 10 _{Br} with Dowex [®] 50WX8-H	page SM-27

1. ¹H- and ¹³C-NMR spectra of new compounds and pericopide

Figure S1. ¹H-NMR spectrum of (-)-10_F in CDCl₃ (500 MHz)



INDEX	FREQUENCY (PPM)	H ₂	HEIGHT
1	7.468	3730.9811	17.9
2	7.302	3647.6942	6.3
3	7.275	3634.4232	6.6
4	7.272	3633.0503	10.3
5	7.271	3632.1351	15.6
6	7.261	3627.5589	3492.0
7	7.256	3624.8132	11.8
8	7.253	3623.4403	7.1
9	7.222	3607.6524	6.5
10	7.050	3521.8485	18.0
11	7.020	3506.7470	106.0
12	7.014	3504.0013	166.5
13	7.009	3501.2556	103.4
14	5.553	2779.1302	70.1
15	5.551	2773.1811	71.0
16	5.552	2773.4367	71.7
17	5.467	2731.0800	70.4
18	5.456	2725.5885	72.5
19	5.300	2647.7930	6.5
20	4.775	2385.5764	39.9
21	4.773	2384.6612	41.9
22	4.769	2382.3730	43.7
23	4.767	2381.4576	46.4
24	4.762	2379.1697	84.0
25	4.756	2376.1952	82.9
26	4.752	2375.9071	48.9
27	4.750	2372.9918	45.0
28	4.745	2370.7037	48.6
29	4.744	2369.7885	43.6
30	4.560	2281.2389	54.4
31	4.560	2278.0355	89.4
32	4.554	2275.0610	102.7
33	4.548	2271.8577	79.2
34	4.542	2268.8831	49.1
35	4.223	2109.8599	24.5
36	4.218	2106.1990	39.9
37	4.212	2104.3685	33.1
38	4.208	2102.3092	31.7
39	4.205	2100.4787	45.3
40	4.195	2095.6737	44.9
41	4.191	2093.6432	32.3
42	4.187	2091.7939	32.3
43	4.184	2090.1823	39.0
44	4.176	2086.2925	22.9
45	3.973	1984.9295	11.0
46	3.828	1912.3966	2278.9
47	3.810	1903.4730	18.9
48	3.780	1893.4054	35.2
49	3.783	1889.7444	36.3
50	3.749	1872.8124	17.9
51	3.678	1837.3468	12.4
52	2.517	1257.5415	70.3

Figure S2. ^{13}C -NMR spectrum of (-)-10_F in CDCl_3 (125 MHz)

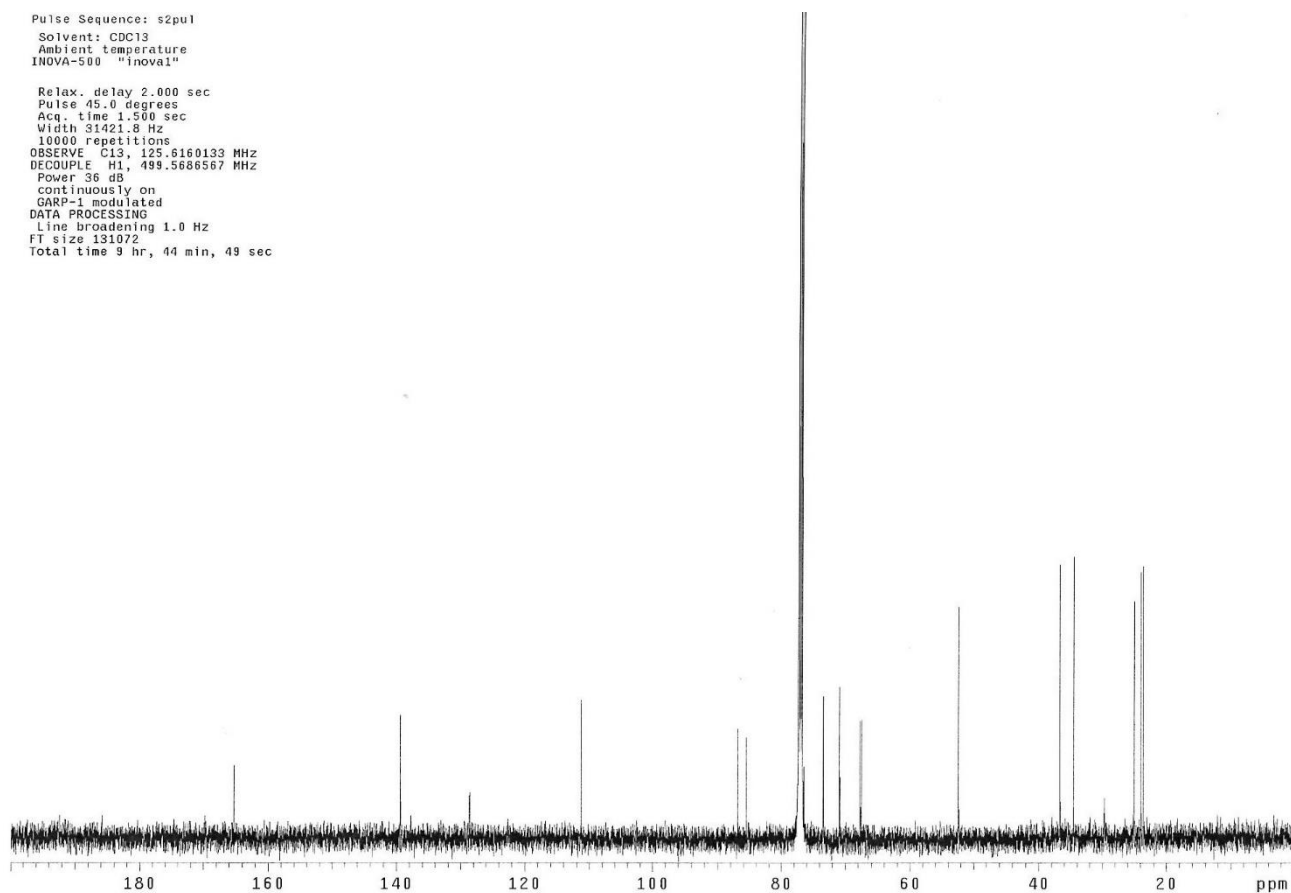


Figure S3. ¹H-NMR spectrum of (+)-10_F in CDCl₃ (400 MHz)

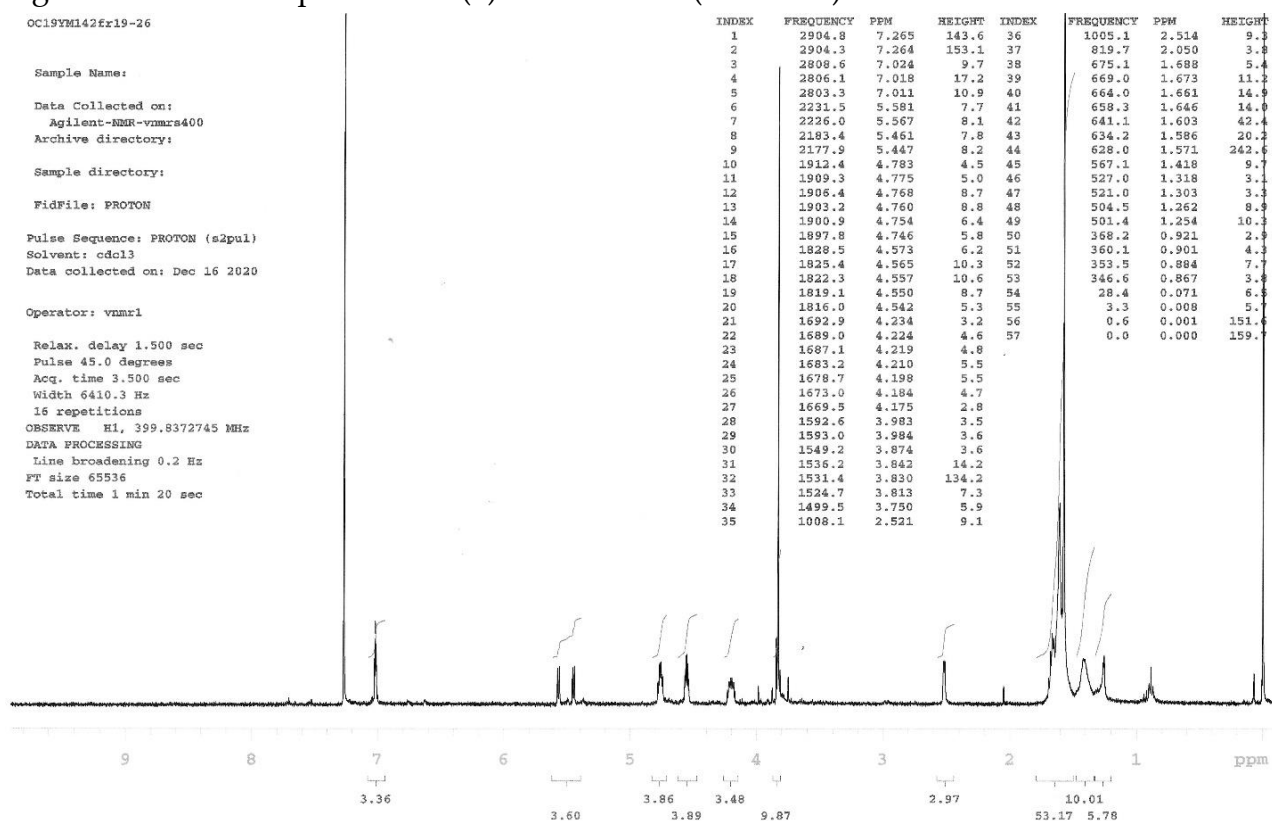


Figure S4. ¹³C-NMR spectrum of (+)-10_F in CDCl₃ (100 MHz)

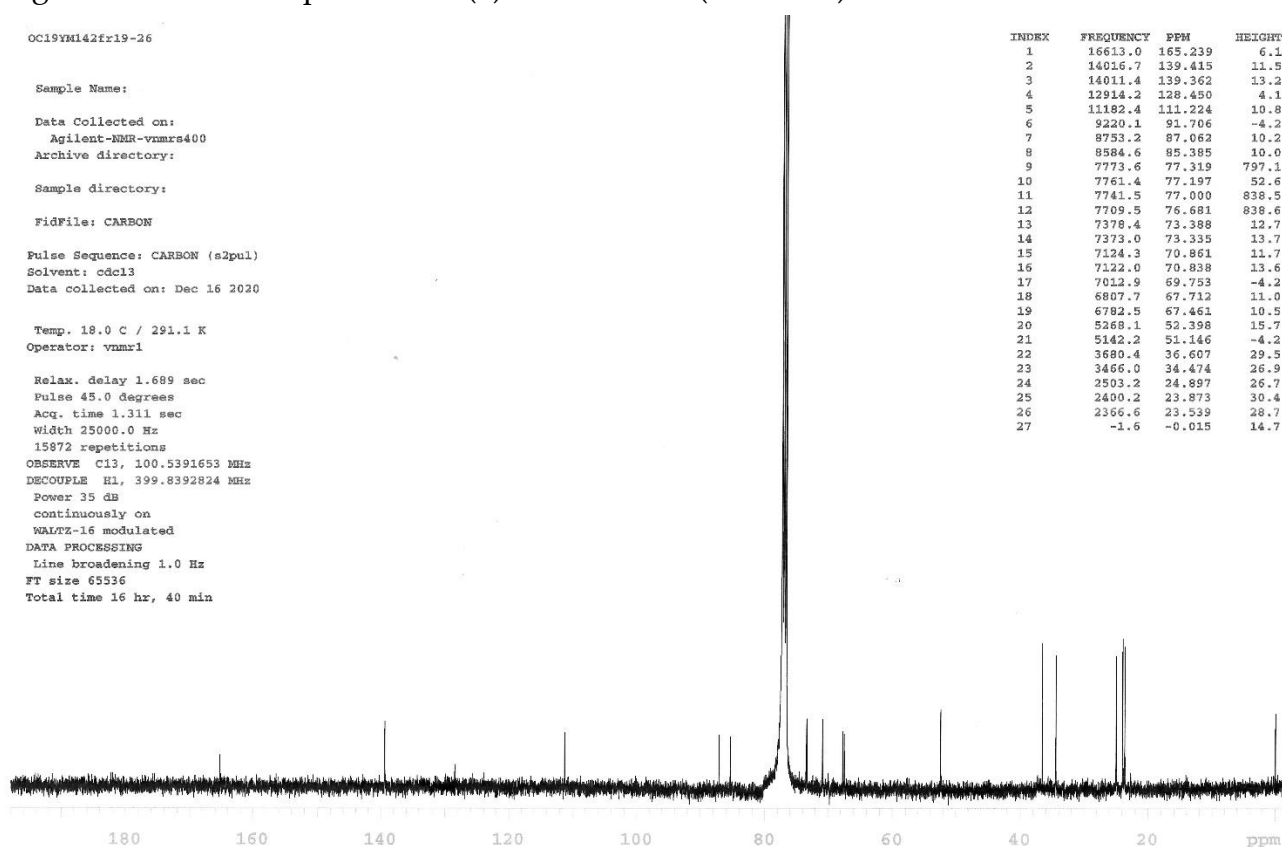
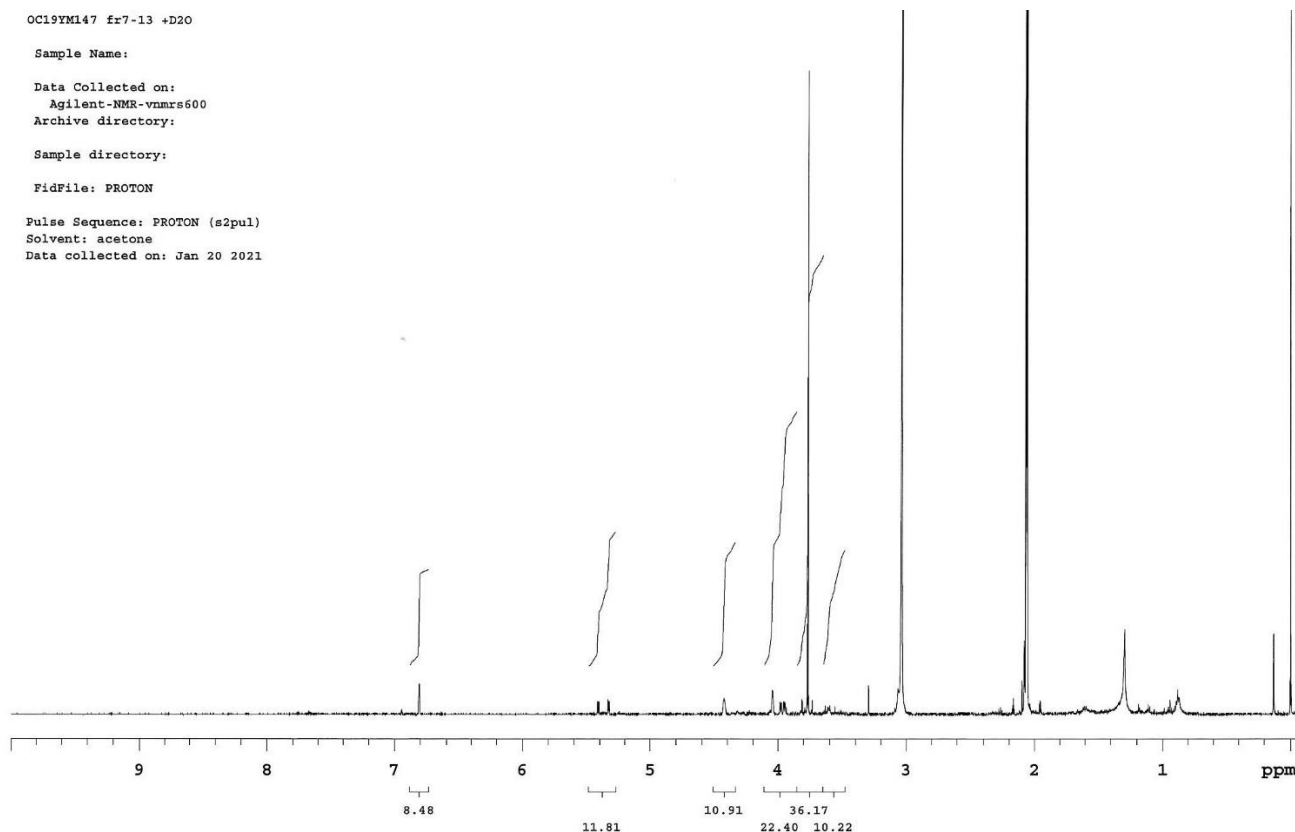


Figure S5. ¹H-NMR spectrum of (-)-1f in acetone-d₆ (600 MHz)



OC19YM147 fr7-13 +D2O

INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT
1	4166.8	6.946	7.0	51	1978.9	3.299	51.1	101	775.3	1.292	146.8
2	4166.2	6.945	7.2	52	1853.9	3.090	8.8	102	711.9	1.187	18.3
3	4086.1	6.811	48.8	53	1839.6	3.066	45.4	103	707.5	1.179	12.6
4	4085.2	6.810	53.6	54	1823.4	3.040	2108.2	104	674.9	1.125	7.3
5	4084.4	6.808	52.9	55	1821.7	3.037	2143.0	105	666.4	1.111	18.2
6	4083.5	6.807	45.3	56	1807.6	3.013	17.3	106	660.2	1.101	14.7
7	3249.8	5.417	22.0	57	1367.7	2.280	8.0	107	639.7	1.066	7.2
8	3249.2	5.416	23.1	58	1360.4	2.268	12.7	108	592.7	0.988	9.1
9	3248.1	5.414	23.1	59	1353.0	2.255	7.4	109	575.7	0.960	9.2
10	3247.5	5.413	22.1	60	1304.3	2.174	9.9	110	574.3	0.957	8.0
11	3243.1	5.406	22.7	61	1302.3	2.171	16.4	111	572.8	0.955	13.6
12	3241.9	5.404	22.3	62	1299.9	2.167	28.7	112	566.9	0.945	9.2
13	3241.3	5.403	21.3	63	1297.9	2.163	17.0	113	565.2	0.942	25.5
14	3200.2	5.335	26.3	64	1295.5	2.160	10.5	114	557.8	0.930	12.5
15	3199.7	5.334	24.7	65	1270.3	2.118	8.2	115	550.2	0.917	8.5
16	3198.5	5.332	24.2	66	1259.7	2.100	59.0	116	543.2	0.905	14.7
17	3194.1	5.324	23.2	67	1258.6	2.098	55.3	117	535.5	0.893	23.8
18	3193.5	5.323	23.2	68	1258.0	2.097	51.9	118	528.2	0.880	43.7
19	3192.3	5.321	23.3	69	1255.9	2.094	8.1	119	524.7	0.875	29.7
20	2656.8	4.429	26.9	70	1250.0	2.084	118.2	120	521.1	0.869	28.4
21	2654.7	4.425	26.6	71	1248.9	2.082	58.6	121	518.5	0.864	21.1
22	2437.6	4.063	7.1	72	1248.0	2.080	127.5	122	78.1	0.130	139.2
23	2434.4	4.058	7.2	73	1245.6	2.076	113.3	123	76.3	0.127	21.3
24	2426.4	4.045	43.5	74	1242.4	2.071	1707.9	124	75.4	0.126	17.8
25	2425.3	4.043	37.4	75	1240.1	2.067	3063.9	125	74.2	0.124	9.4
26	2424.1	4.041	41.8	76	1238.0	2.064	5056.4	126	58.1	0.097	7.5
27	2390.9	3.986	21.8	77	1235.7	2.060	3093.8	127	3.2	0.005	57.9
28	2388.9	3.982	19.3	78	1233.6	2.056	1683.8	128	0.0	0.000	1997.6
29	2384.8	3.975	21.4	79	1230.4	2.051	32.2	129	-3.5	-0.006	53.1
30	2382.7	3.972	19.8	80	1224.5	2.041	18.5				
31	2374.2	3.958	22.9	81	1222.2	2.037	18.5				
32	2372.2	3.954	21.4	82	1220.1	2.034	13.4				
33	2368.0	3.947	22.2	83	1217.8	2.030	10.0				
34	2366.3	3.944	20.3	84	1178.4	1.964	9.4				
35	2360.1	3.934	13.0	85	1176.1	1.960	19.9				
36	2288.5	3.815	26.0	86	1173.8	1.957	24.5				
37	2285.3	3.809	23.8	87	1171.7	1.953	21.2				
38	2275.6	3.793	9.3	88	1169.4	1.949	10.1				
39	2274.4	3.791	12.9	89	995.9	1.660	7.0				
40	2273.3	3.789	10.1	90	968.6	1.615	11.7				
41	2265.9	3.777	23.3	91	964.2	1.607	13.0				
42	2263.9	3.774	156.4	92	956.0	1.594	14.4				
43	2259.2	3.766	1102.7	93	950.4	1.584	10.2				
44	2239.5	3.733	24.9	94	944.3	1.574	7.9				
45	2184.1	3.641	8.6	95	930.5	1.551	7.5				
46	2179.1	3.632	16.0	96	925.2	1.542	7.4				
47	2168.5	3.615	13.7	97	853.3	1.422	8.0				
48	2165.6	3.610	12.5	98	846.0	1.410	8.1				
49	2158.8	3.599	15.9	99	839.5	1.399	8.5				
50	2133.6	3.557	11.6	100	832.2	1.387	9.5				

Figure S6. ^{13}C -NMR spectrum of (-)-**1f** in acetone- d_6 (150 MHz)

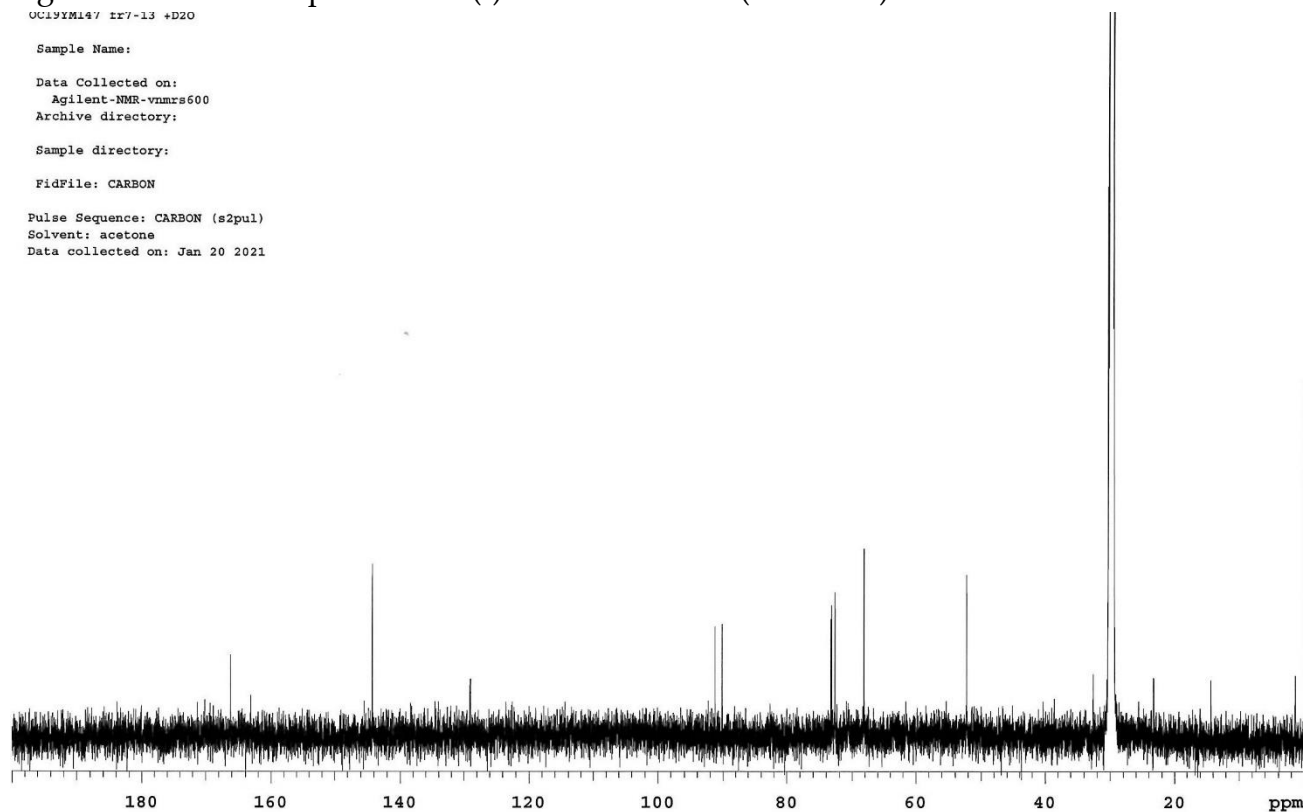


Figure S7. ¹H-NMR spectrum of (+)-1f in acetone-d₆ (600 MHz)

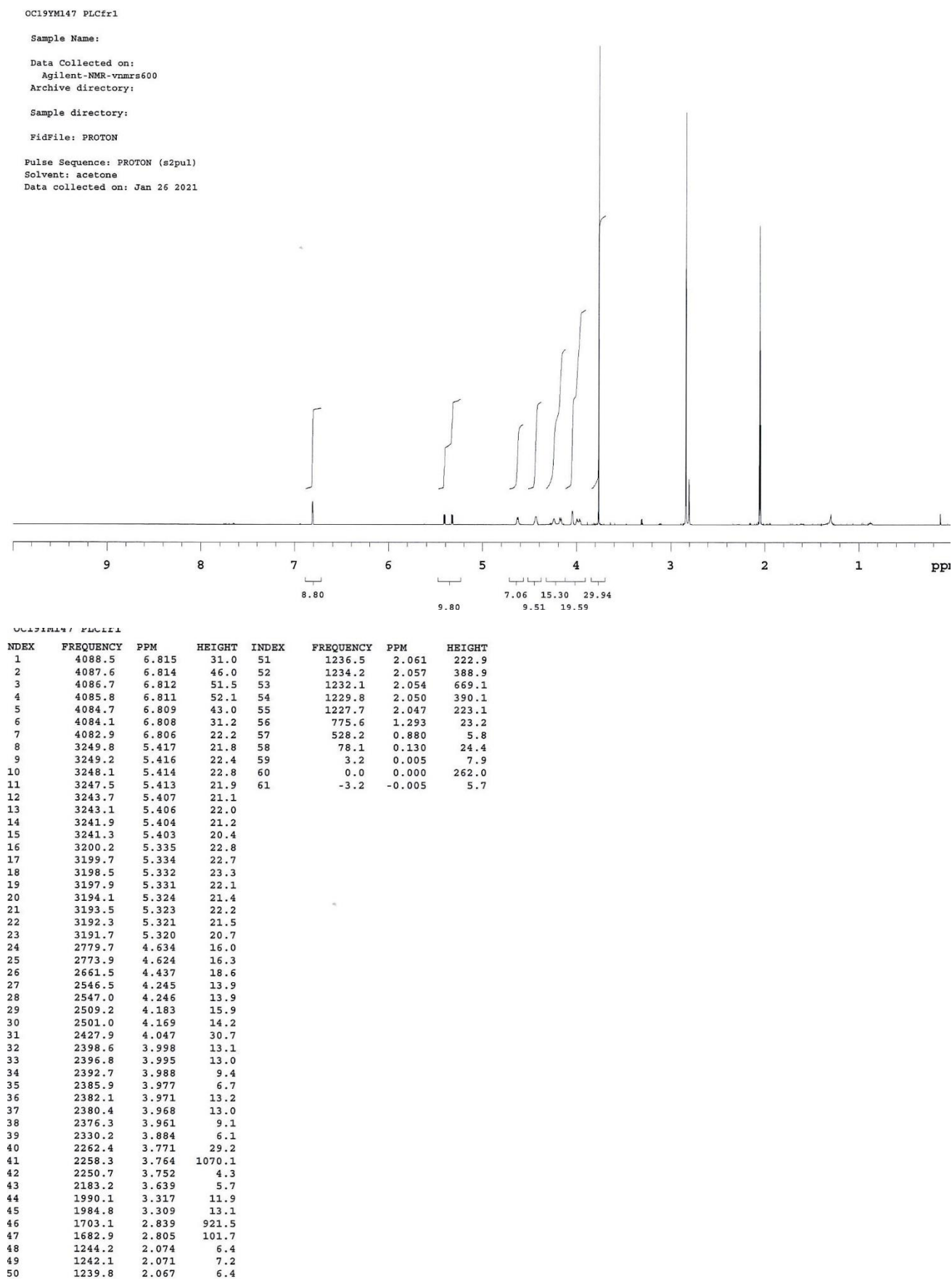
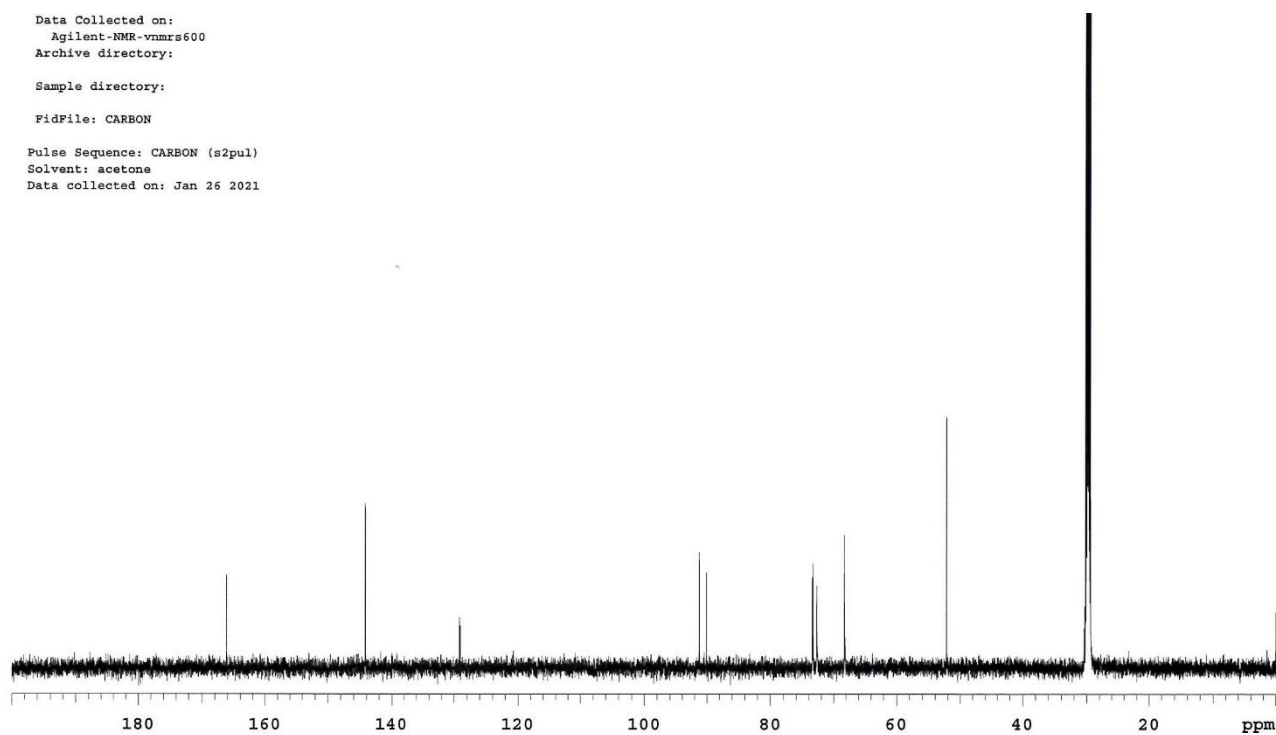
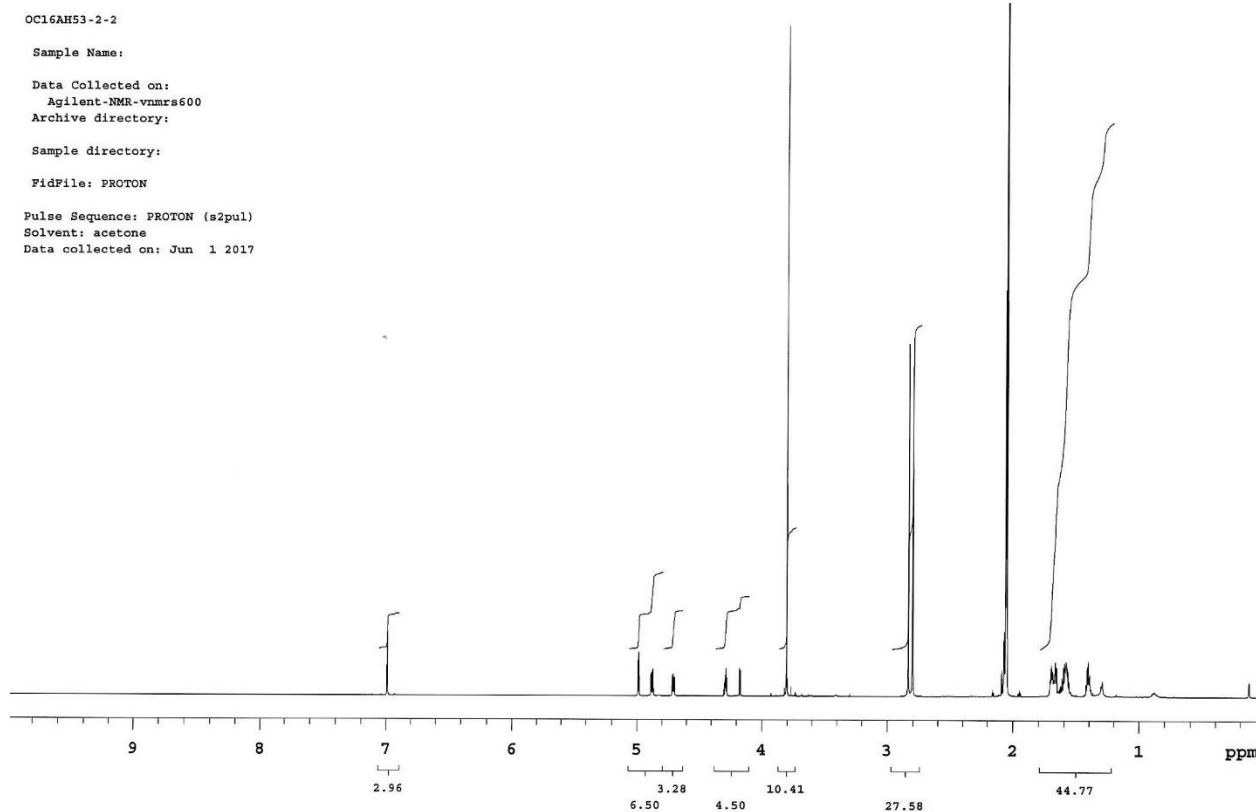


Figure S8. ^{13}C -NMR spectrum of (+)-**1F** in acetone- d_6 (150 MHz)



INDEX	FREQUENCY	PPM	HEIGHT
1	25068.3	166.187	19.9
2	21753.0	144.208	34.9
3	21746.1	144.162	33.6
4	19483.9	129.165	11.0
5	19465.4	129.043	9.2
6	13764.1	91.247	24.7
7	13596.5	90.136	20.5
8	11081.1	73.461	19.4
9	11060.3	73.323	22.3
10	10970.1	72.725	17.6
11	10300.8	68.288	28.1
12	10298.5	68.272	28.3
13	10283.5	68.173	6.6
14	7874.5	52.202	53.2
15	4578.8	30.354	13.3
16	4560.3	30.232	444.8
17	4540.6	30.101	1385.7
18	4521.0	29.971	2346.9
19	4502.5	29.849	2554.4
20	4482.8	29.718	2720.0
21	4463.2	29.588	1387.5
22	4443.5	29.458	386.4
23	-0.0	-0.000	12.1

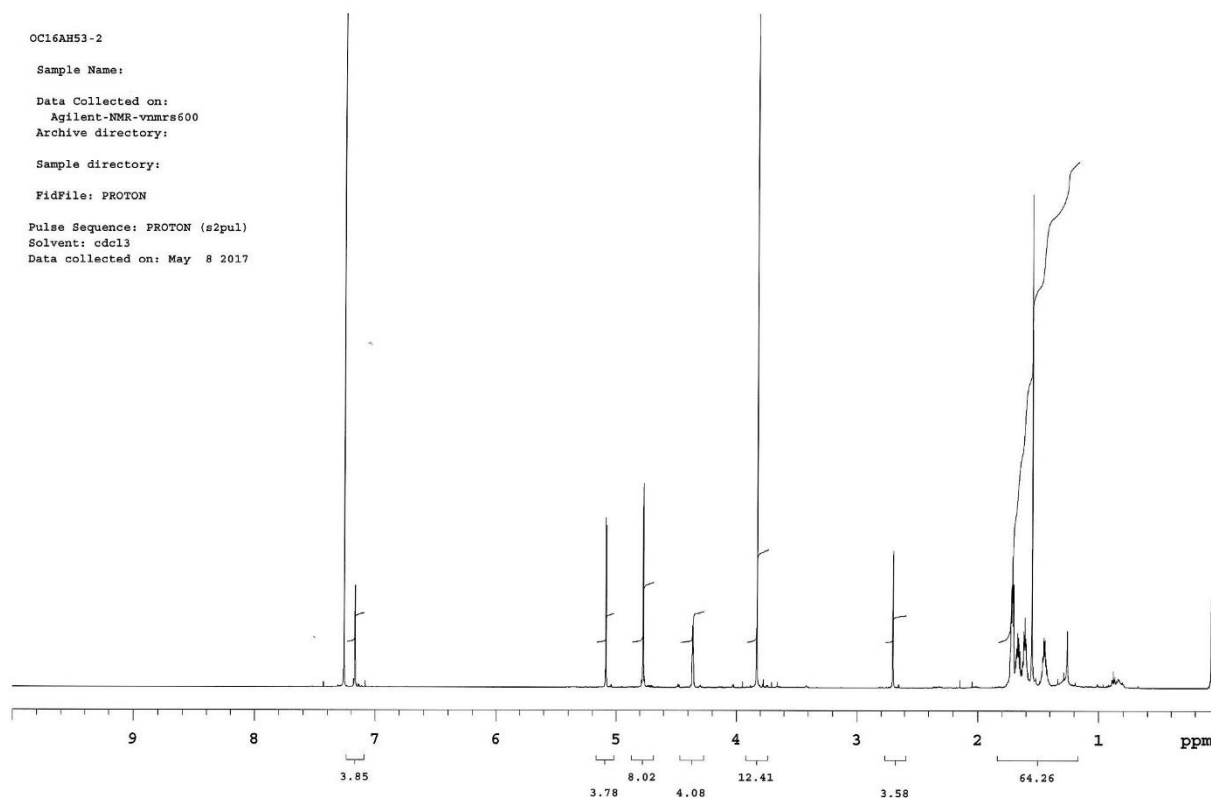
Figure S9. ¹H-NMR spectrum of (-)-10_{Br} in acetone-d₆ (600 MHz)



OC16AH53-2-2

INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT
1	4196.2	6.995	92.4	51	1227.7	2.047	1201.9
2	4194.7	6.992	167.2	52	1224.5	2.041	29.3
3	4192.9	6.989	100.9	53	1026.2	1.711	54.9
4	4191.5	6.987	197.1	54	1020.3	1.701	97.1
5	2993.1	4.989	134.6	55	1014.4	1.691	78.0
6	2989.3	4.983	120.1	56	1009.7	1.683	53.9
7	2988.7	4.982	130.5	57	1001.8	1.670	104.9
8	2932.0	4.888	67.2	58	996.5	1.661	89.1
9	2929.4	4.883	72.2	59	983.0	1.639	25.3
10	2928.8	4.882	68.9	60	977.1	1.629	33.4
11	2925.3	4.876	79.5	61	970.1	1.617	57.8
12	2922.4	4.871	83.3	62	964.2	1.607	90.0
13	2921.8	4.870	79.1	63	962.2	1.604	46.5
14	2829.3	4.716	39.1	64	958.4	1.598	101.7
15	2828.5	4.715	63.9	65	956.0	1.594	88.8
16	2825.8	4.710	41.8	66	951.9	1.587	106.2
17	2824.9	4.709	68.3	67	950.4	1.584	102.5
18	2822.3	4.705	36.5	68	946.6	1.578	73.4
19	2821.4	4.703	58.0	69	943.4	1.573	85.5
20	2818.8	4.699	35.7	70	940.2	1.567	35.0
21	2817.9	4.697	58.7	71	937.8	1.563	47.3
22	2574.0	4.291	49.8	72	855.4	1.426	37.4
23	2572.0	4.287	63.7	73	849.5	1.416	92.1
24	2570.5	4.285	55.5	74	843.6	1.406	108.6
25	2568.2	4.281	84.9	75	837.8	1.397	67.7
26	2566.1	4.278	33.6	76	832.2	1.387	22.6
27	2564.1	4.274	57.1	77	783.8	1.307	32.6
28	2503.9	4.174	85.4	78	775.6	1.293	47.4
29	2499.8	4.167	79.1	79	78.9	0.132	45.9
30	2292.9	3.822	25.6	80	0.0	0.000	570.0
31	2283.2	3.806	2040.0				
32	2279.1	3.799	55.0				
33	2277.4	3.796	22.7				
34	2260.6	3.768	29.1				
35	1701.6	2.837	1071.5				
36	1682.3	2.804	752.2				
37	1681.4	2.803	930.2				
38	1253.9	2.090	70.6				
39	1253.0	2.089	77.5				
40	1252.1	2.087	79.9				
41	1245.4	2.076	90.4				
42	1244.5	2.074	170.4				
43	1242.1	2.071	197.4				
44	1241.0	2.069	100.9				
45	1240.1	2.067	181.3				
46	1239.2	2.066	77.4				
47	1236.5	2.061	1234.5				
48	1234.5	2.058	2176.6				
49	1232.1	2.054	3577.8				
50	1230.1	2.051	2143.0				

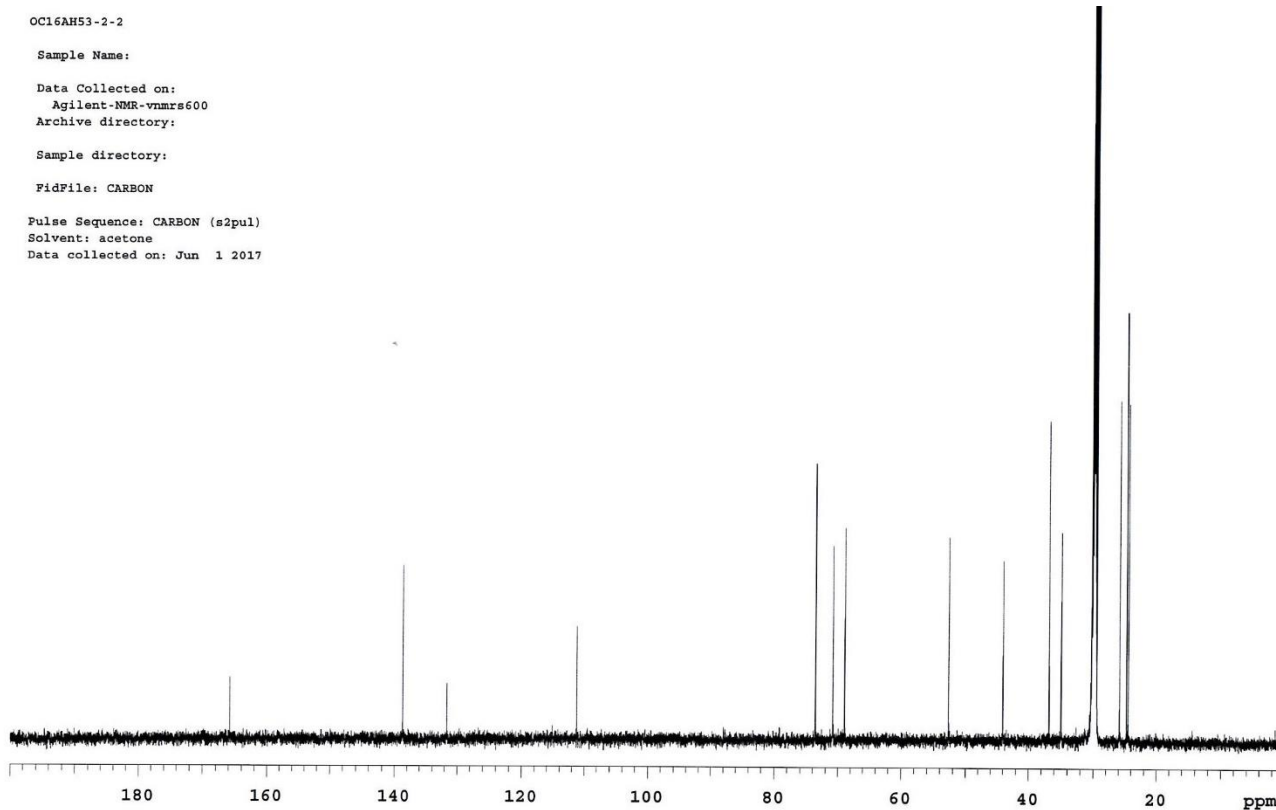
Figure S10. ^1H -NMR spectrum of (-)-**10**_{Br} in CDCl_3 (600 MHz)



OC16AH53-2

INDEX	FREQUENCY	PPM	HEIGHT
1	4355.8	7.261	735.3
2	4302.7	7.172	81.5
3	4301.8	7.171	78.4
4	4300.9	7.169	86.1
5	4299.8	7.167	81.4
6	3053.8	5.091	143.1
7	3050.0	5.084	136.3
8	2864.8	4.776	152.0
9	2862.8	4.772	169.0
10	2861.3	4.770	172.1
11	2620.1	4.368	21.2
12	2617.8	4.364	41.3
13	2616.3	4.361	52.6
14	2615.4	4.360	40.1
15	2614.2	4.358	51.2
16	2612.8	4.355	37.8
17	2610.4	4.351	20.4
18	2299.1	3.832	50.3
19	2296.4	3.828	1140.3
20	1621.2	2.703	111.7
21	1618.9	2.699	115.3
22	1034.1	1.724	85.5
23	1029.1	1.715	109.5
24	1022.9	1.705	87.7
25	1013.5	1.690	23.2
26	1008.0	1.680	33.6
27	1002.7	1.671	46.4
28	997.7	1.663	42.5
29	991.5	1.653	31.3
30	985.4	1.643	16.0
31	978.9	1.632	22.4
32	972.7	1.622	48.0
33	966.9	1.612	59.2
34	961.3	1.602	42.0
35	955.7	1.593	18.5
36	953.4	1.589	15.2
37	930.5	1.551	414.7
38	880.9	1.468	13.4
39	875.0	1.459	26.7
40	869.8	1.450	42.5
41	864.5	1.441	40.5
42	858.6	1.431	24.4
43	853.3	1.422	15.9
44	770.6	1.285	13.5
45	752.4	1.254	48.2
46	528.2	0.880	14.5
47	41.4	0.069	75.1
48	0.0	0.000	252.3

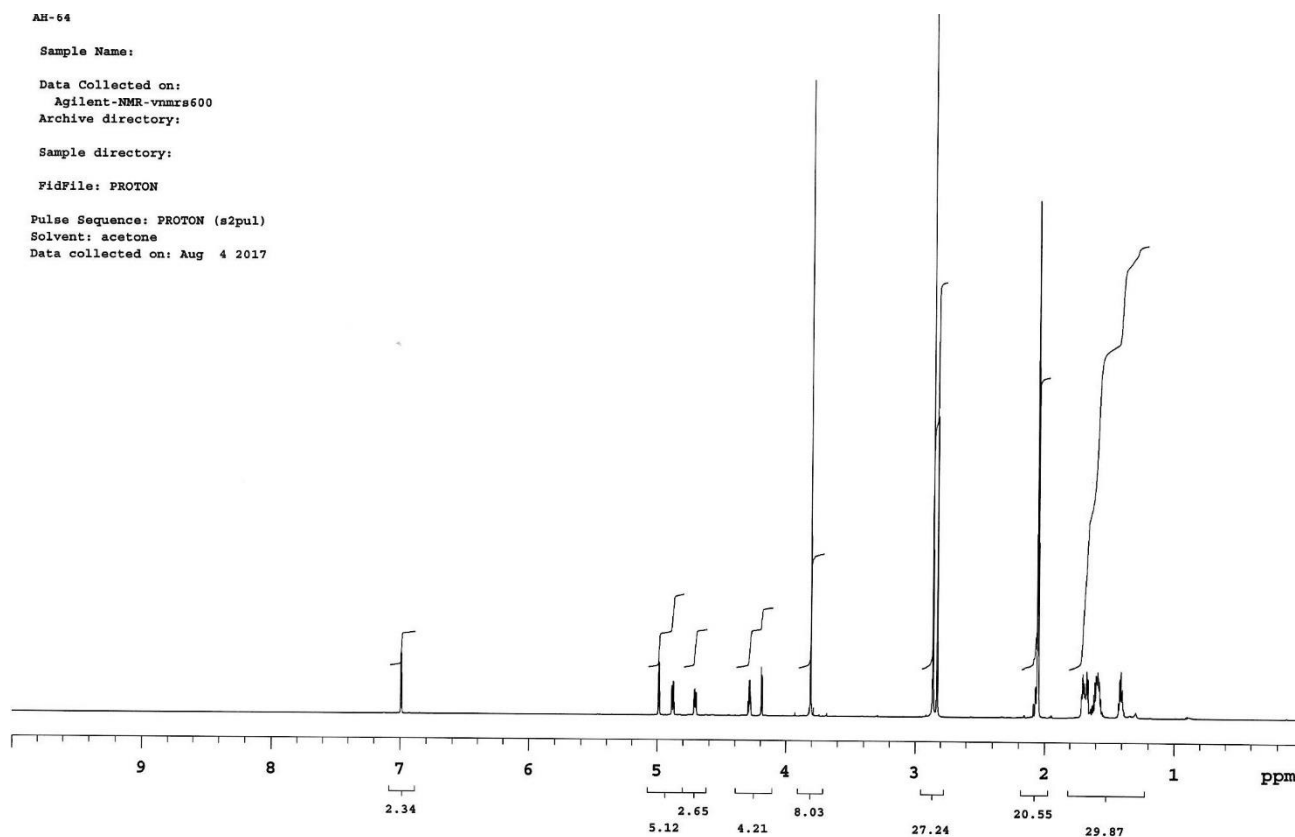
Figure S11. ^{13}C -NMR spectrum of (-)-10Br in acetone- d_6 (150 MHz)



OC16AH53-2-2

INDEX	FREQUENCY	PPM	HEIGHT
1	31119.8	206.304	77.1
2	31100.2	206.174	4823.7
3	31080.5	206.044	63.0
4	25007.1	165.780	13.4
5	20914.9	138.652	36.8
6	19850.3	131.594	12.2
7	16763.9	111.133	24.1
8	11097.3	73.568	58.5
9	10680.0	70.801	41.2
10	10403.7	68.970	26.0
11	10392.2	68.893	45.0
12	7936.9	52.616	43.1
13	6639.9	44.018	38.3
14	5549.8	36.792	67.5
15	5268.9	34.929	44.2
16	5266.6	34.914	33.0
17	4614.6	30.592	6.2
18	4578.8	30.354	28.6
19	4560.3	30.232	501.5
20	4540.6	30.101	1662.8
21	4521.0	29.971	3020.1
22	4502.5	29.849	2690.9
23	4482.8	29.718	3021.6
24	4463.2	29.588	1659.6
25	4443.5	29.458	496.2
26	3897.9	25.841	71.7
27	3728.0	24.714	90.3
28	3685.2	24.431	71.0
29	-0.0	-0.000	10.8

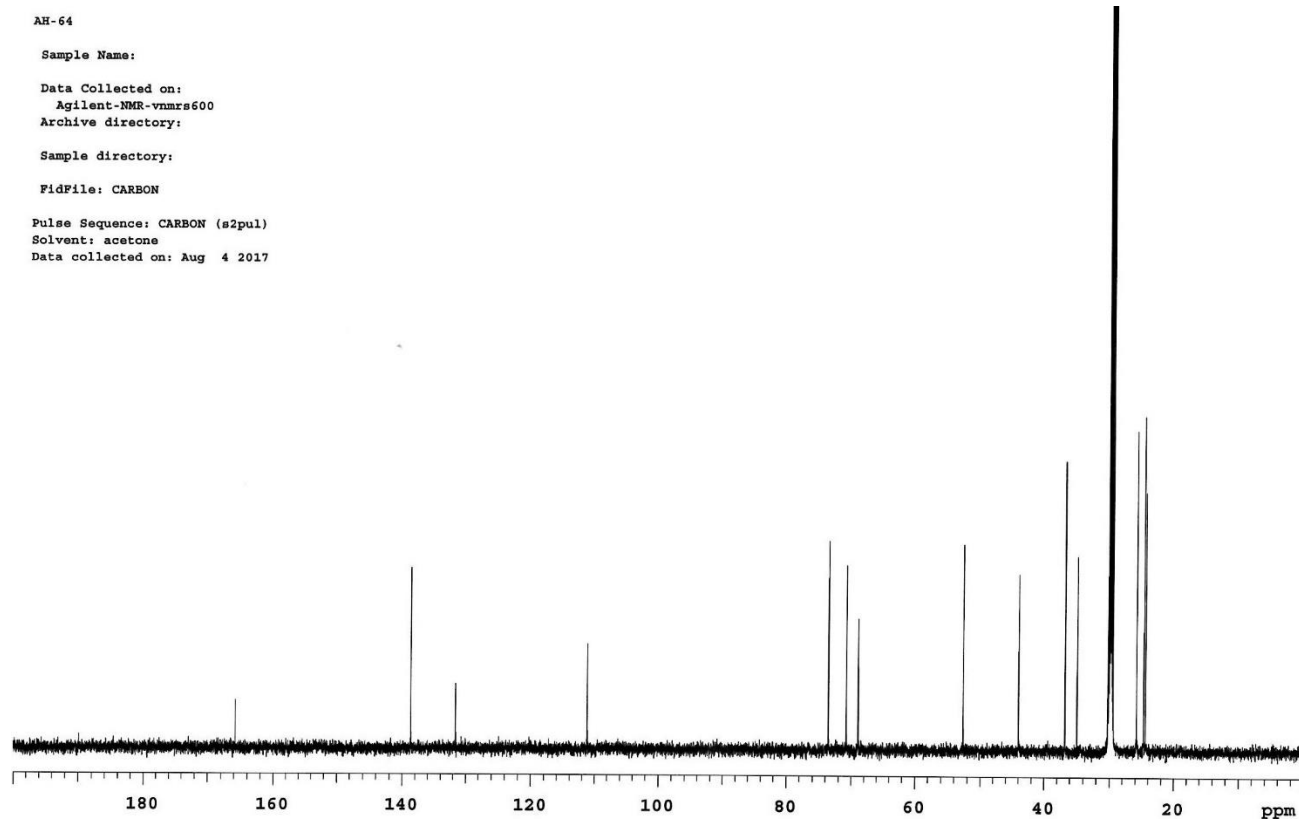
Figure S12. ¹H-NMR spectrum of (+)-10_{Br} in acetone-d₆ (600 MHz)



AH-64

INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT
1	4196.2	6.995	64.2	51	983.0	1.639	10.2
2	4194.7	6.992	44.9	52	977.1	1.629	13.7
3	4192.9	6.989	64.0	53	970.4	1.618	25.3
4	4191.5	6.987	43.0	54	964.2	1.607	38.5
5	2993.4	4.990	57.7	55	962.2	1.604	20.1
6	2989.0	4.982	55.8	56	958.4	1.598	45.4
7	2932.3	4.888	31.4	57	956.0	1.594	41.1
8	2929.4	4.883	31.5	58	952.2	1.587	48.7
9	2925.3	4.876	36.3	59	950.2	1.584	48.6
10	2922.1	4.871	35.4	60	946.9	1.578	34.2
11	2829.3	4.716	27.2	61	943.7	1.573	39.1
12	2828.5	4.715	21.1	62	940.2	1.567	15.6
13	2825.8	4.710	28.4	63	937.8	1.563	21.1
14	2824.6	4.709	21.7	64	930.5	1.551	7.4
15	2822.3	4.705	24.6	65	855.4	1.426	16.5
16	2818.5	4.698	24.7	66	849.5	1.416	41.6
17	2817.6	4.697	18.3	67	843.6	1.406	49.7
18	2578.1	4.298	15.6	68	837.8	1.397	30.7
19	2574.0	4.291	37.8	69	832.2	1.387	9.5
20	2572.0	4.287	19.8	70	-0.0	-0.000	41.3
21	2570.2	4.284	38.3				
22	2567.9	4.281	25.4				
23	2566.1	4.278	20.6				
24	2564.1	4.274	14.6				
25	2515.9	4.194	52.0				
26	2511.8	4.187	43.1				
27	2291.8	3.820	9.2				
28	2283.5	3.807	671.5				
29	2279.1	3.799	13.6				
30	2277.4	3.796	8.4				
31	2270.3	3.785	9.0				
32	1715.7	2.860	1134.6				
33	1696.7	2.828	268.6				
34	1695.8	2.827	317.7				
35	1254.4	2.091	12.5				
36	1253.6	2.090	15.1				
37	1245.1	2.075	31.6				
38	1242.7	2.072	33.5				
39	1240.7	2.068	33.3				
40	1237.1	2.062	193.8				
41	1235.1	2.059	376.5				
42	1232.7	2.055	545.2				
43	1230.7	2.051	369.8				
44	1228.3	2.048	184.8				
45	1026.2	1.711	26.1				
46	1020.3	1.701	46.7				
47	1014.4	1.691	37.1				
48	1010.3	1.684	25.9				
49	1002.4	1.671	49.7				
50	996.8	1.662	41.8				

Figure S13. ^{13}C -NMR spectrum of (+)-**10**_{Br} in acetone- d_6 (150 MHz)



INDEX	FREQUENCY	PPM	HEIGHT
1	25005.9	165.773	10.1
2	20916.1	138.660	37.6
3	19848.0	131.579	13.6
4	16762.7	111.126	21.9
5	11096.1	73.560	43.4
6	10678.8	70.794	38.4
7	10403.7	68.970	27.3
8	10392.2	68.893	17.2
9	7936.9	52.616	42.9
10	6638.7	44.010	36.8
11	5548.6	36.784	60.1
12	5268.9	34.929	25.5
13	5266.6	34.914	40.5
14	4577.6	30.347	11.4
15	4559.1	30.224	157.8
16	4540.6	30.101	595.7
17	4521.0	29.971	1274.4
18	4501.3	29.841	1321.1
19	4482.8	29.718	952.9
20	4463.2	29.588	606.2
21	4443.5	29.458	213.9
22	3896.8	25.833	66.4
23	3726.8	24.706	69.3
24	3684.1	24.423	53.7

Figure S14. ^1H -NMR spectrum of (-)-**1**_{Br} in methanol- d_4 (600 MHz)

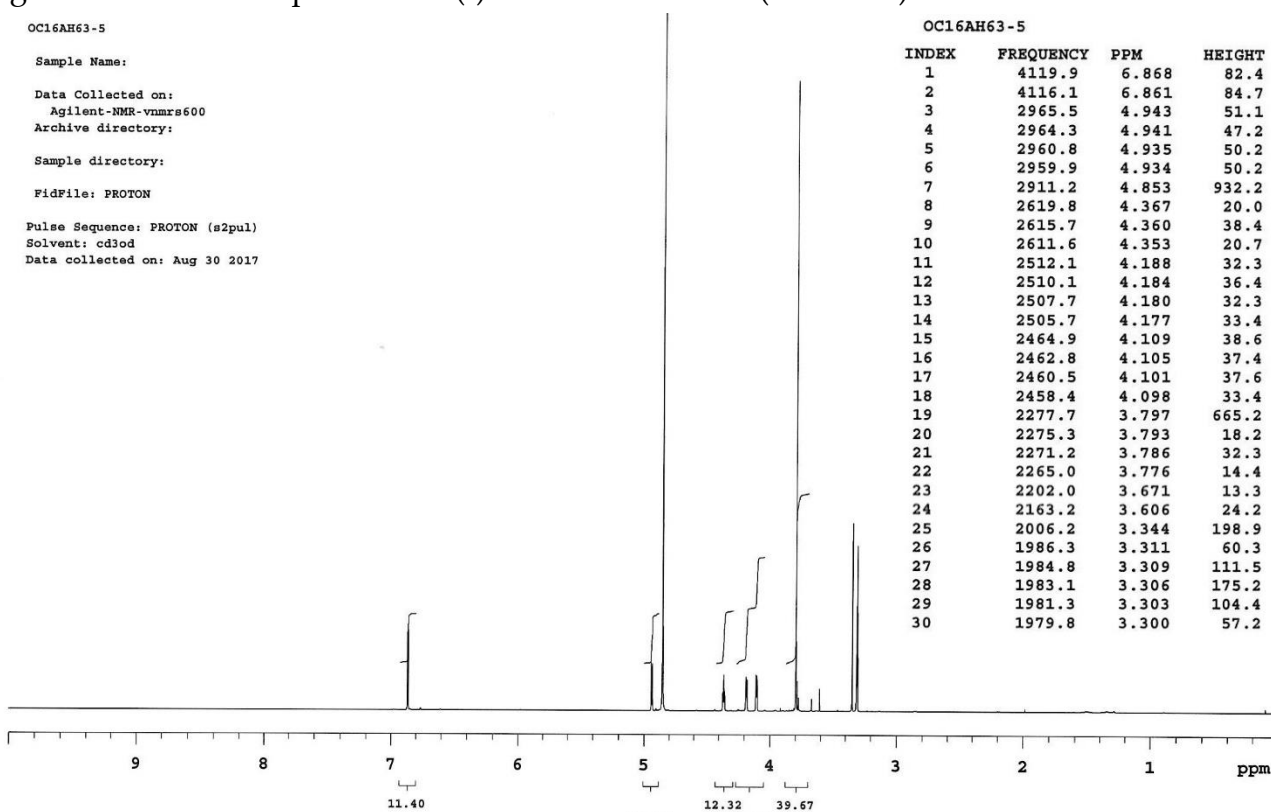


Figure S15. ^{13}C -NMR spectrum of (-)-**1**_{Br} in methanol- d_4 (150 MHz)

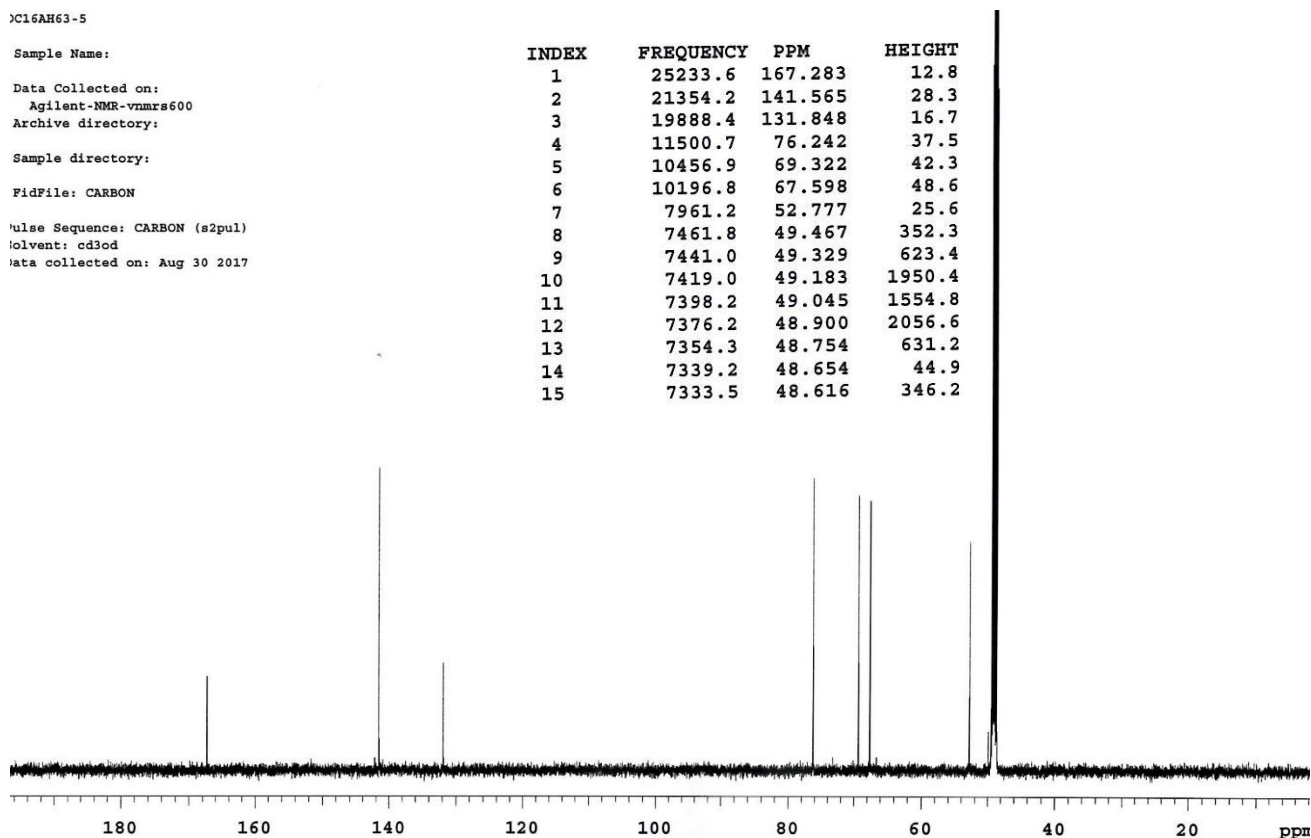


Figure S16. ^1H -NMR spectrum of (+)-**1**_{Br} in methanol- d_4 (600 MHz)

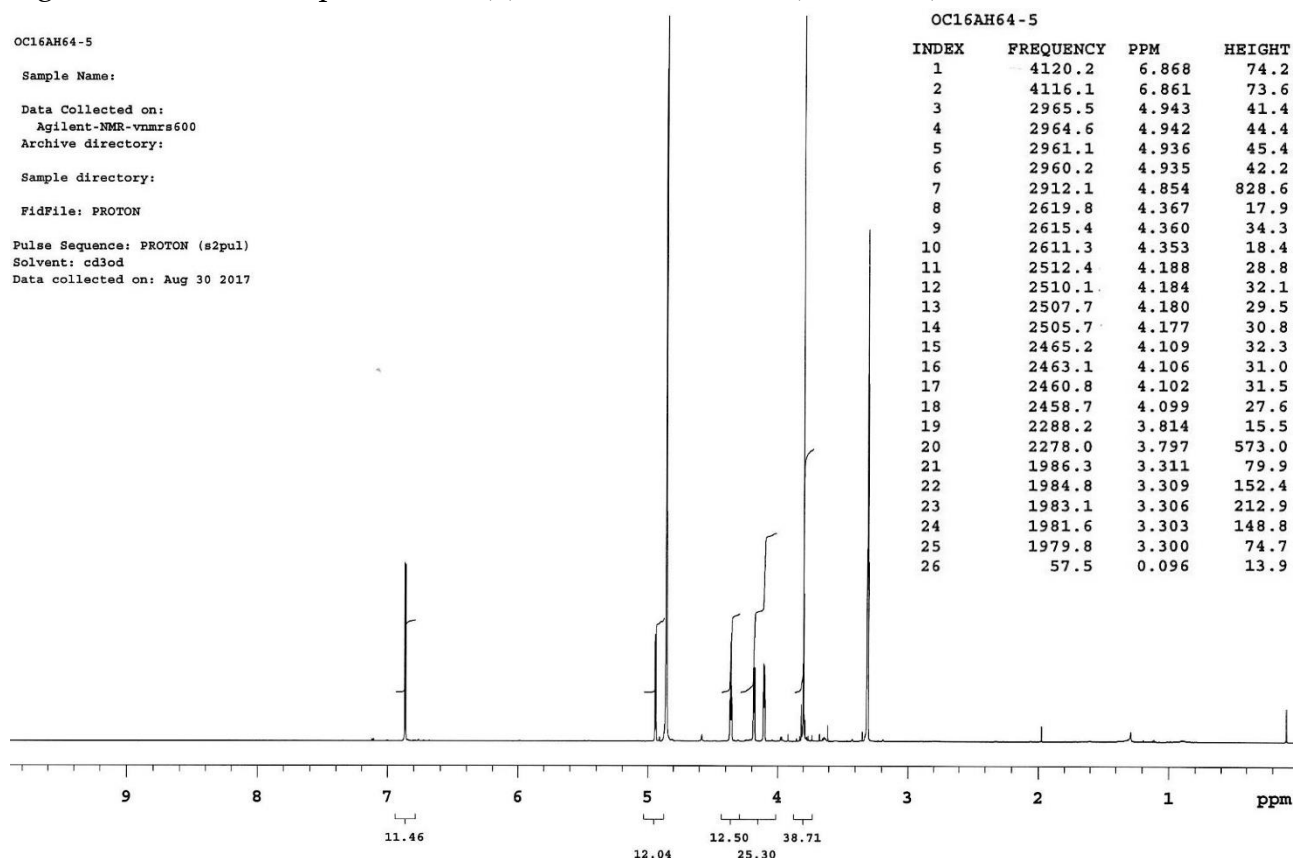


Figure S17. ^{13}C -NMR spectrum of (+)-**1**_{Br} in methanol- d_4 (150 MHz)

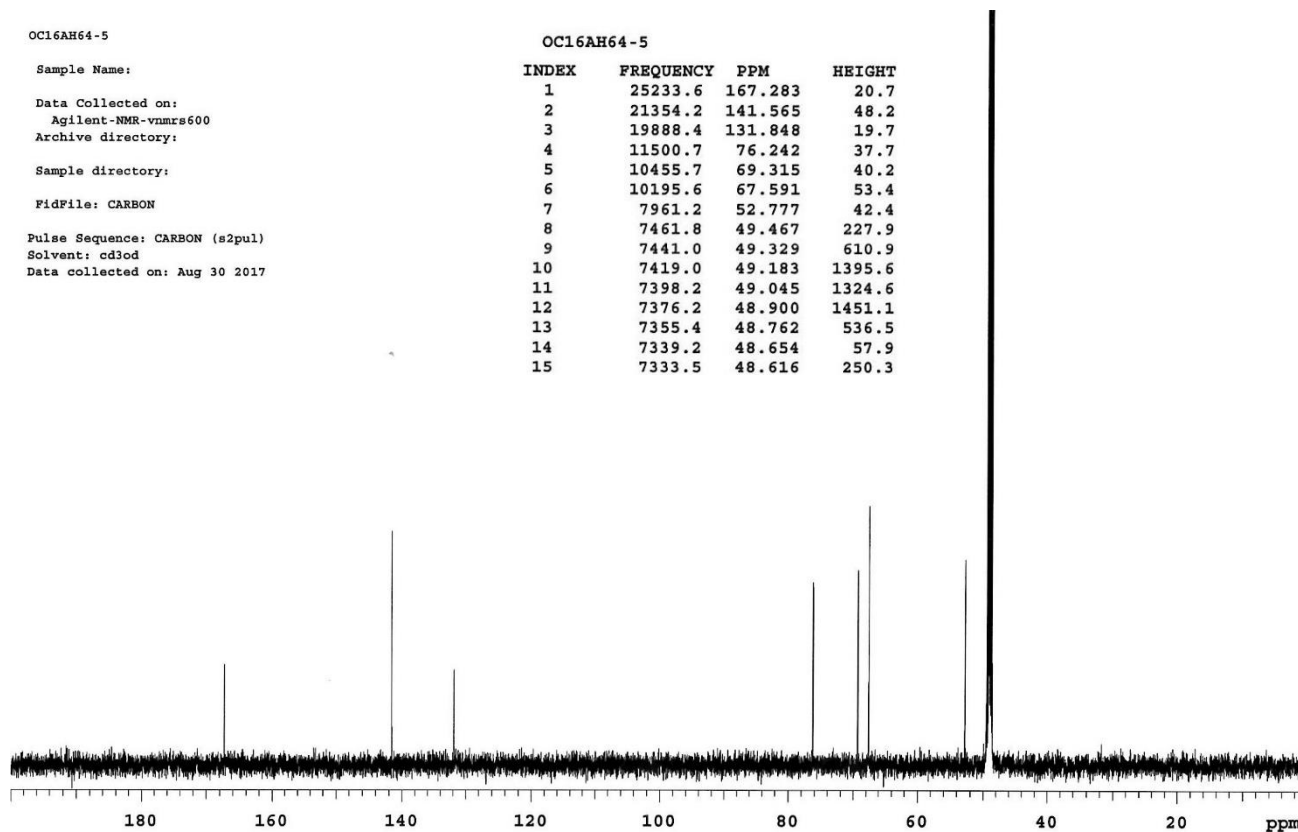
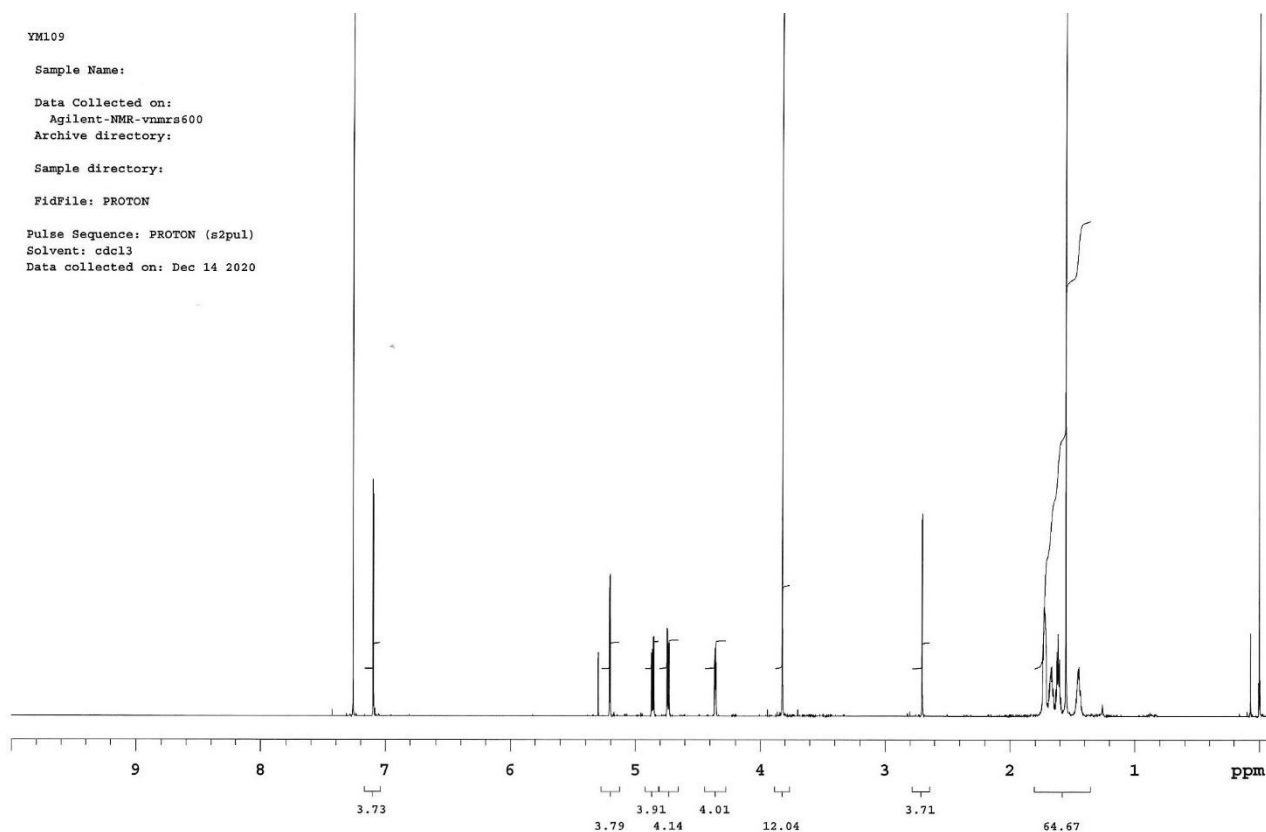


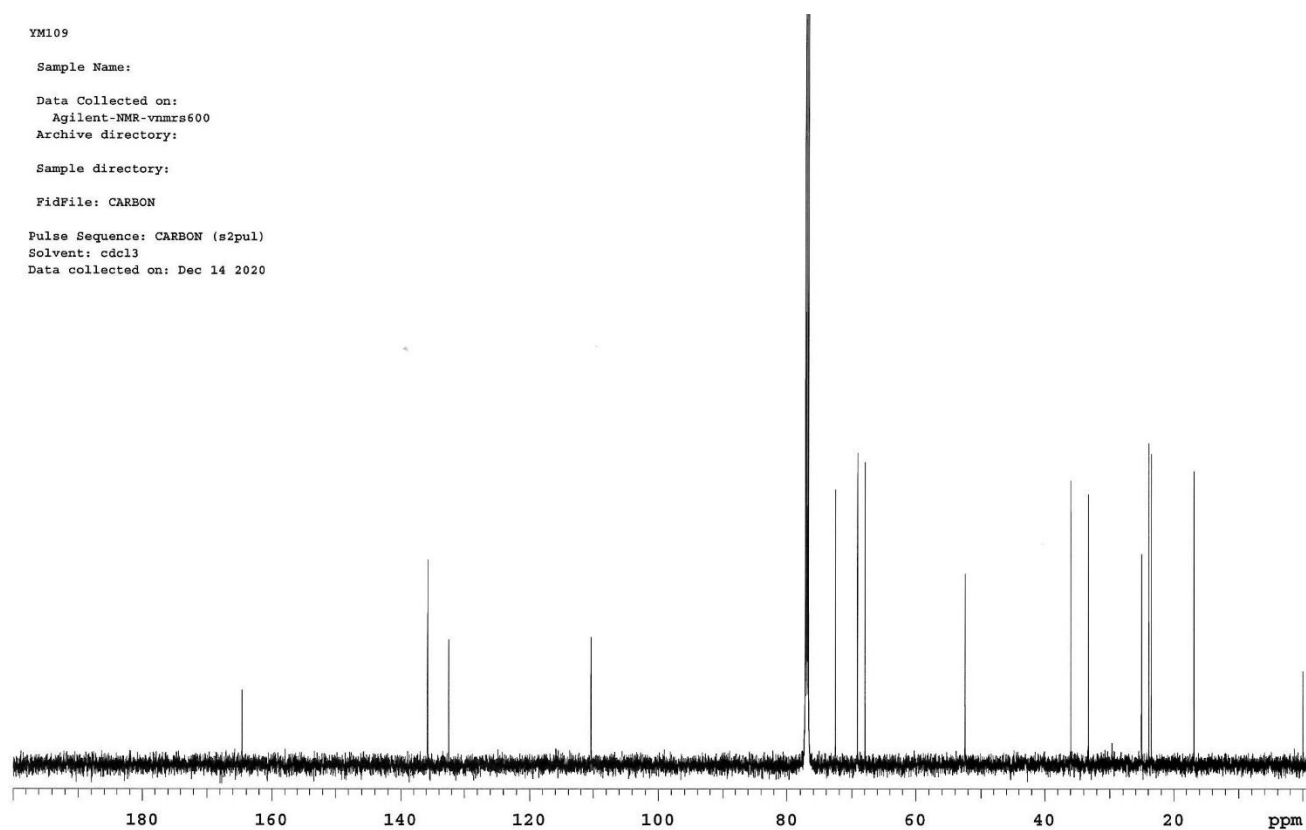
Figure S18. ¹H-NMR spectrum of (-)-10_I in CDCl₃ (600 MHz)



YML09

INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT
1	4355.8	7.261	531.7	51	854.5	1.424	4.1
2	4259.5	7.100	93.2	52	753.0	1.255	4.7
3	4256.3	7.095	87.6	53	41.4	0.069	32.8
4	3179.7	5.300	25.1	54	3.2	0.005	13.3
5	3125.7	5.210	55.3	55	0.0	0.000	536.4
6	3122.5	5.205	56.1	56	-3.2	-0.005	14.5
7	2921.2	4.869	25.1				
8	2917.1	4.863	26.4				
9	2913.3	4.856	31.2				
10	2909.1	4.849	31.5				
11	2846.1	4.744	34.8				
12	2843.1	4.739	34.2				
13	2838.4	4.732	28.5				
14	2835.2	4.726	29.0				
15	2620.4	4.368	20.8				
16	2618.1	4.364	23.9				
17	2616.9	4.362	24.7				
18	2616.3	4.361	26.4				
19	2614.8	4.359	26.7				
20	2613.9	4.357	24.6				
21	2613.1	4.356	23.2				
22	2610.7	4.352	21.2				
23	2293.5	3.823	593.5				
24	1623.0	2.705	77.5				
25	1620.7	2.702	80.0				
26	1042.3	1.737	23.5				
27	1038.2	1.731	43.2				
28	1035.3	1.726	43.4				
29	1032.3	1.721	40.1				
30	1030.0	1.717	34.3				
31	1022.9	1.705	5.3				
32	1018.5	1.698	5.2				
33	1014.4	1.691	10.6				
34	1011.5	1.686	13.2				
35	1008.3	1.681	16.0				
36	1003.3	1.672	19.3				
37	999.7	1.667	19.2				
38	993.3	1.656	11.0				
39	987.1	1.645	5.4				
40	980.4	1.634	10.8				
41	974.5	1.624	25.4				
42	968.6	1.615	32.5				
43	962.5	1.604	22.4				
44	956.9	1.595	7.6				
45	930.8	1.552	833.3				
46	881.8	1.470	6.3				
47	875.6	1.460	13.6				
48	870.9	1.452	18.4				
49	866.8	1.445	19.6				
50	860.9	1.435	10.4				

Figure S19. ^{13}C -NMR spectrum of (-)-10i in CDCl_3 (150 MHz)



YMI09

INDEX	FREQUENCY	PPM	HEIGHT
1	24838.3	164.662	15.3
2	20486.1	135.810	42.0
3	19986.7	132.499	25.7
4	16652.9	110.398	26.1
5	11649.9	77.231	1316.3
6	11617.5	77.017	1199.5
7	11586.3	76.810	1306.7
8	10949.3	72.587	56.5
9	10431.5	69.154	64.1
10	10250.0	67.951	62.1
11	7914.9	52.471	39.3
12	5428.4	35.987	58.4
13	5020.4	33.282	55.6
14	3784.6	25.090	43.2
15	3613.6	23.956	66.1
16	3548.8	23.526	63.9
17	2539.7	16.836	60.4
18	0.0	0.000	19.1

Figure S20. ^1H -NMR spectrum of (+)-**10i** in CDCl_3 (400 MHz)

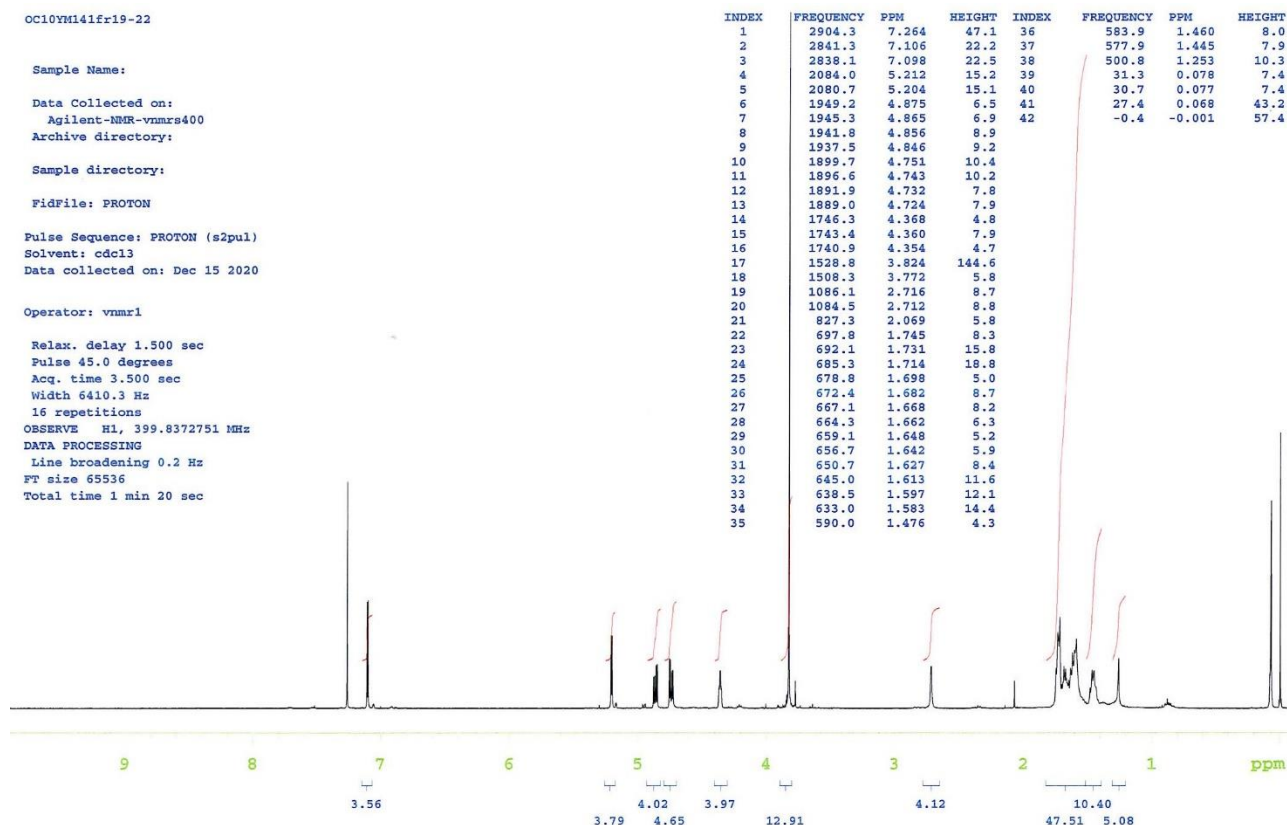


Figure S21. ^{13}C -NMR spectrum of (+)-**10i** in CDCl_3 (100 MHz)

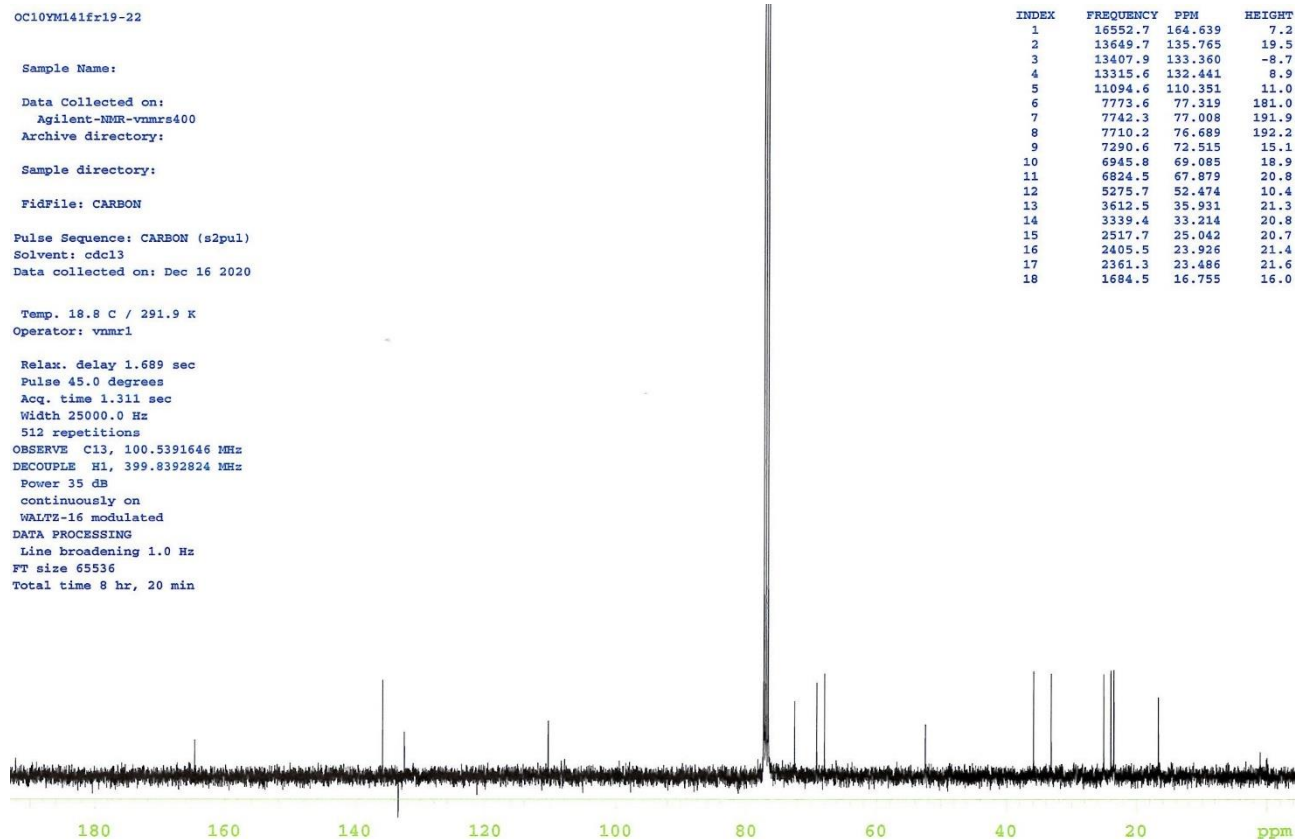


Figure S22. ¹H-NMR spectrum of (-)-1_I in acetone-d₆ (600 MHz)

Data Collected on:
Agilent-NMR-vnmrs600
Archive directory:
Sample directory:
FidFile: PROTON
Pulse Sequence: PROTON (s2pul)
Solvent: acetone
Data collected on: Jan 14 2021

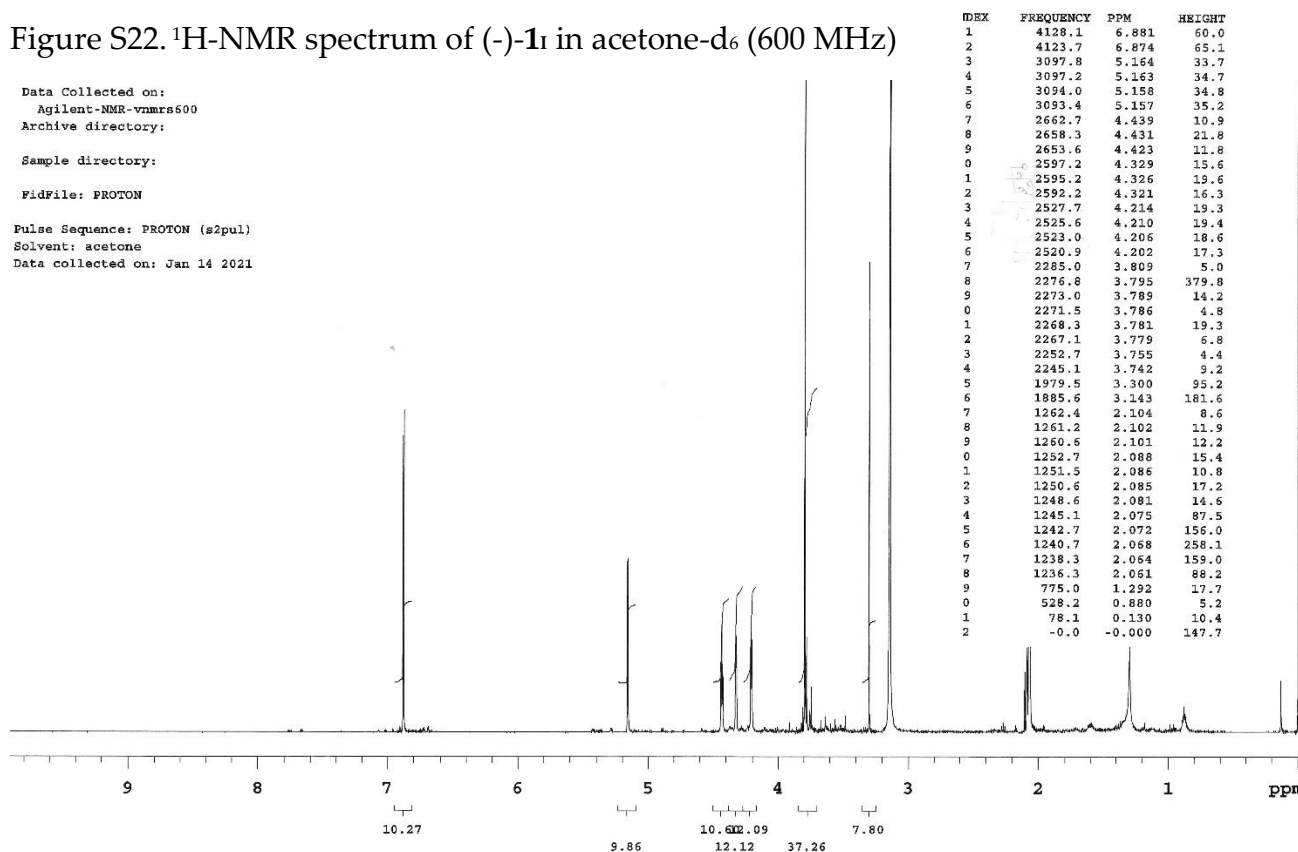


Figure S23. ¹³C-NMR spectrum of (-)-1_I in acetone-d₆ (150 MHz)

Data Collected on:
Agilent-NMR-vnmrs600
Archive directory:
Sample directory:
FidFile: CARBON
Pulse Sequence: CARBON (s2pul)
Solvent: acetone
Data collected on: Jan 14 2021

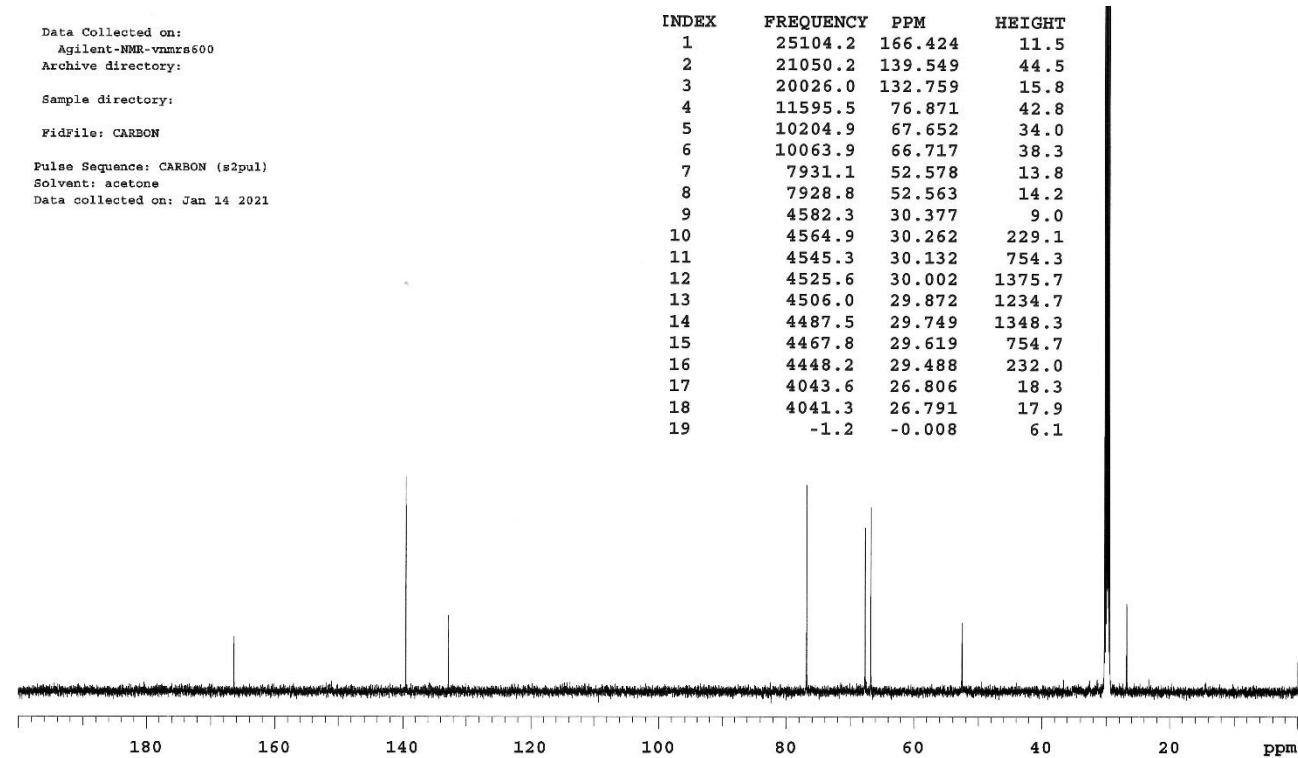


Figure S24. ¹H-NMR spectrum of (+)-1_I in acetone-d₆ (600 MHz)

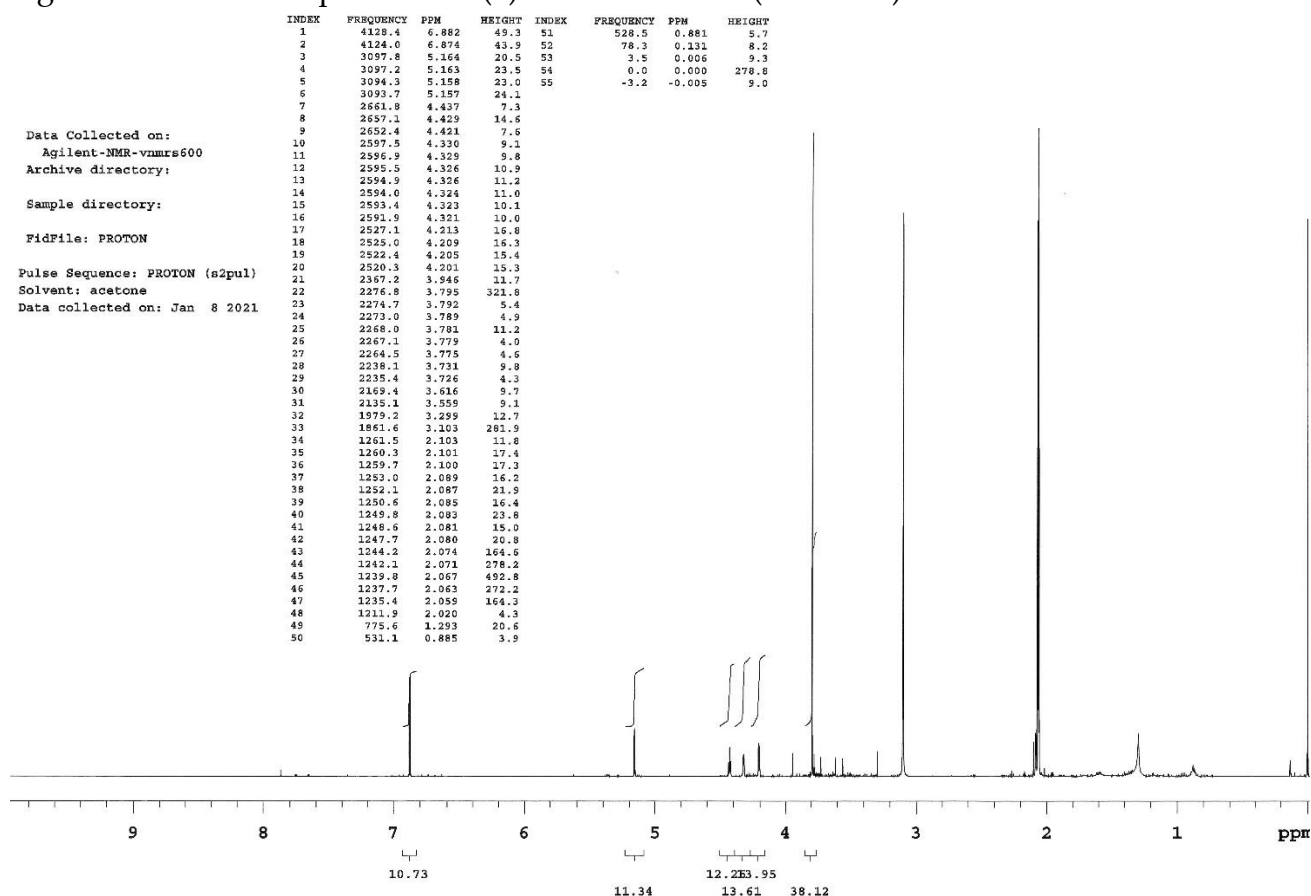


Figure S25. ¹³C-NMR spectrum of (+)-1_I in acetone-d₆ (150 MHz)

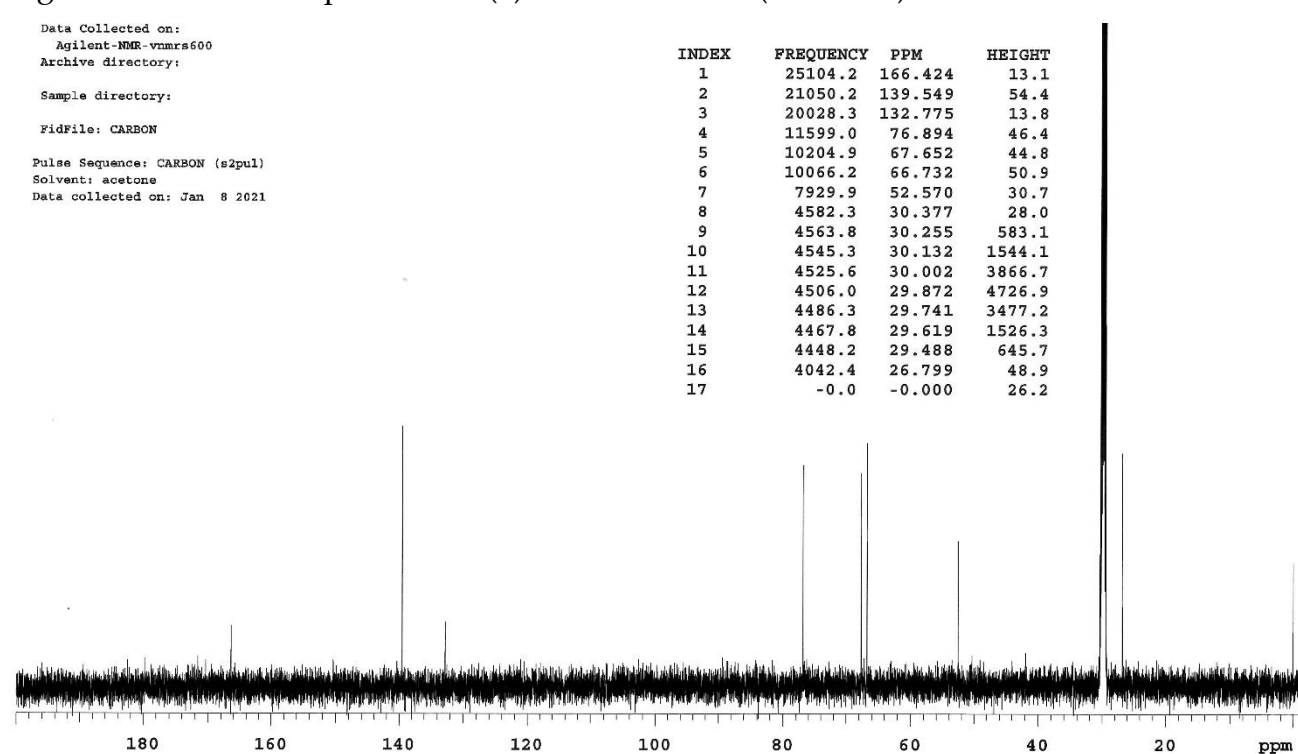


Figure S26. ¹H-NMR spectrum of (-)-11 in methanol-d₄ (600 MHz)

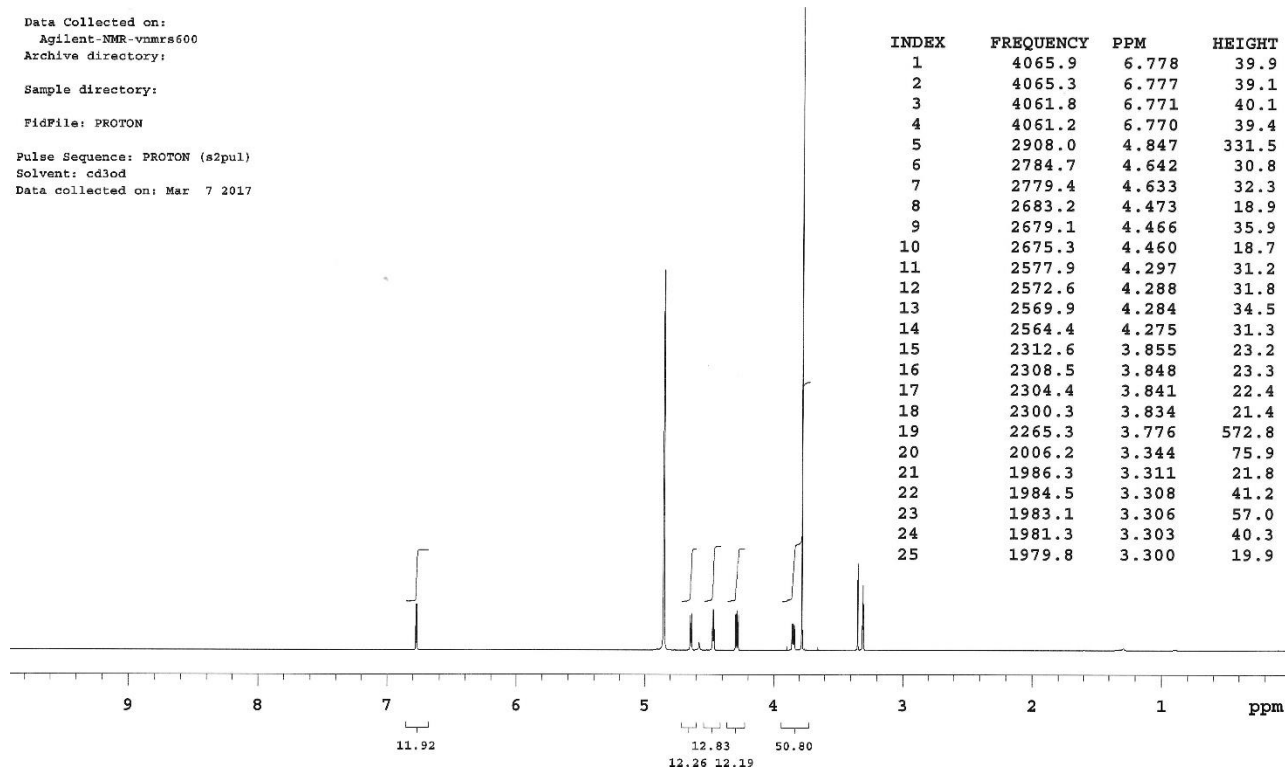


Figure S27. ¹³C-NMR spectrum of (-)-11 in methanol-d₄ (150 MHz)

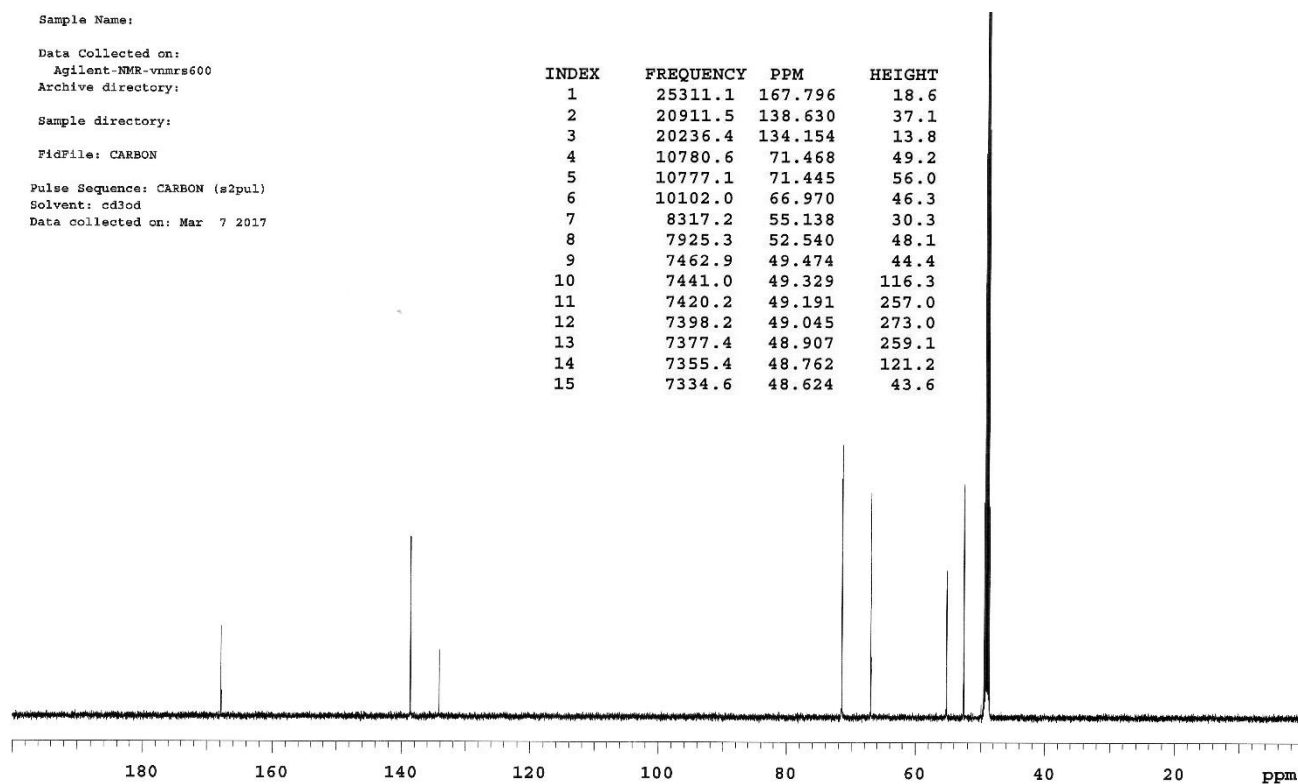


Figure S28. ¹H-NMR spectrum of (-)-12 in methanol-d₄ (600 MHz)

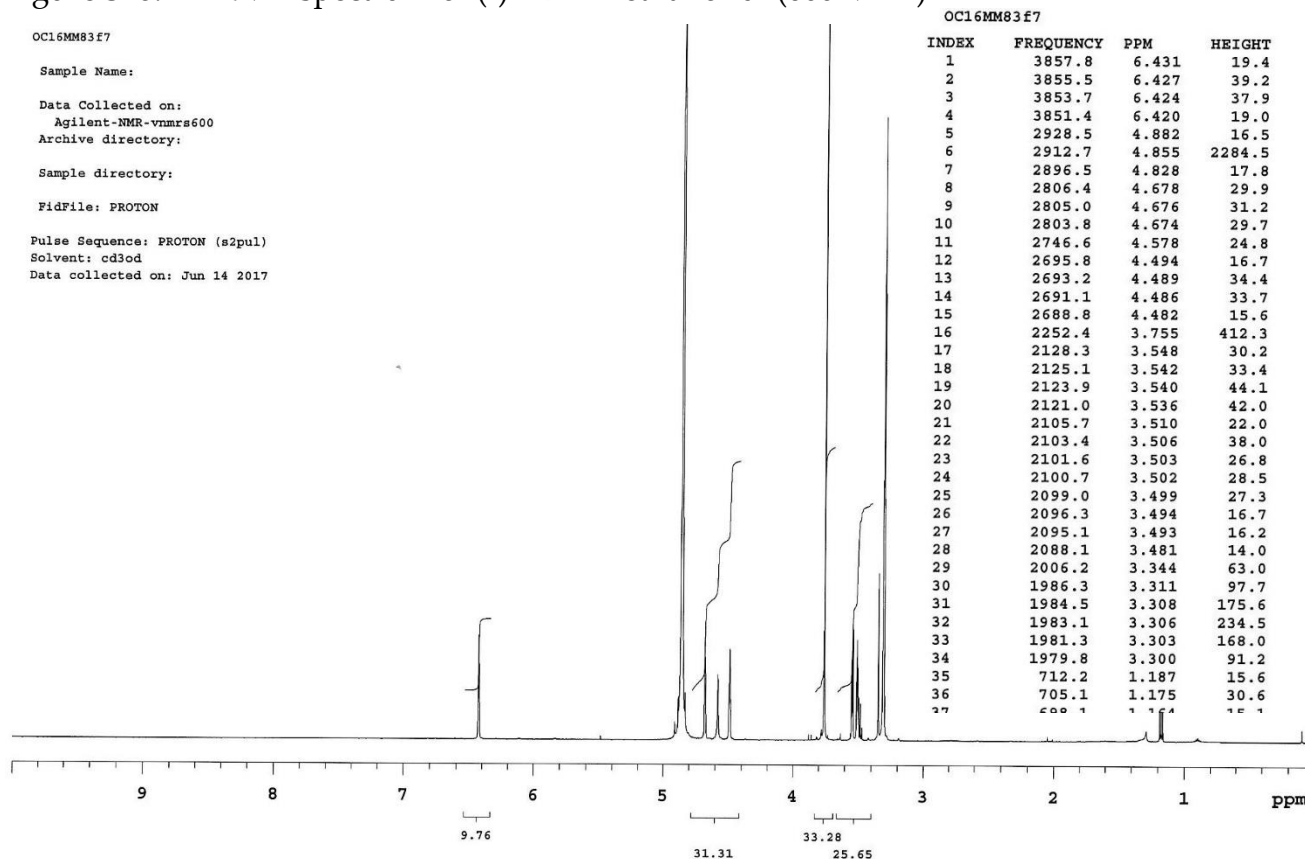


Figure S29. ¹³C-NMR spectrum of (-)-12 in methanol-d₄ (150 MHz)

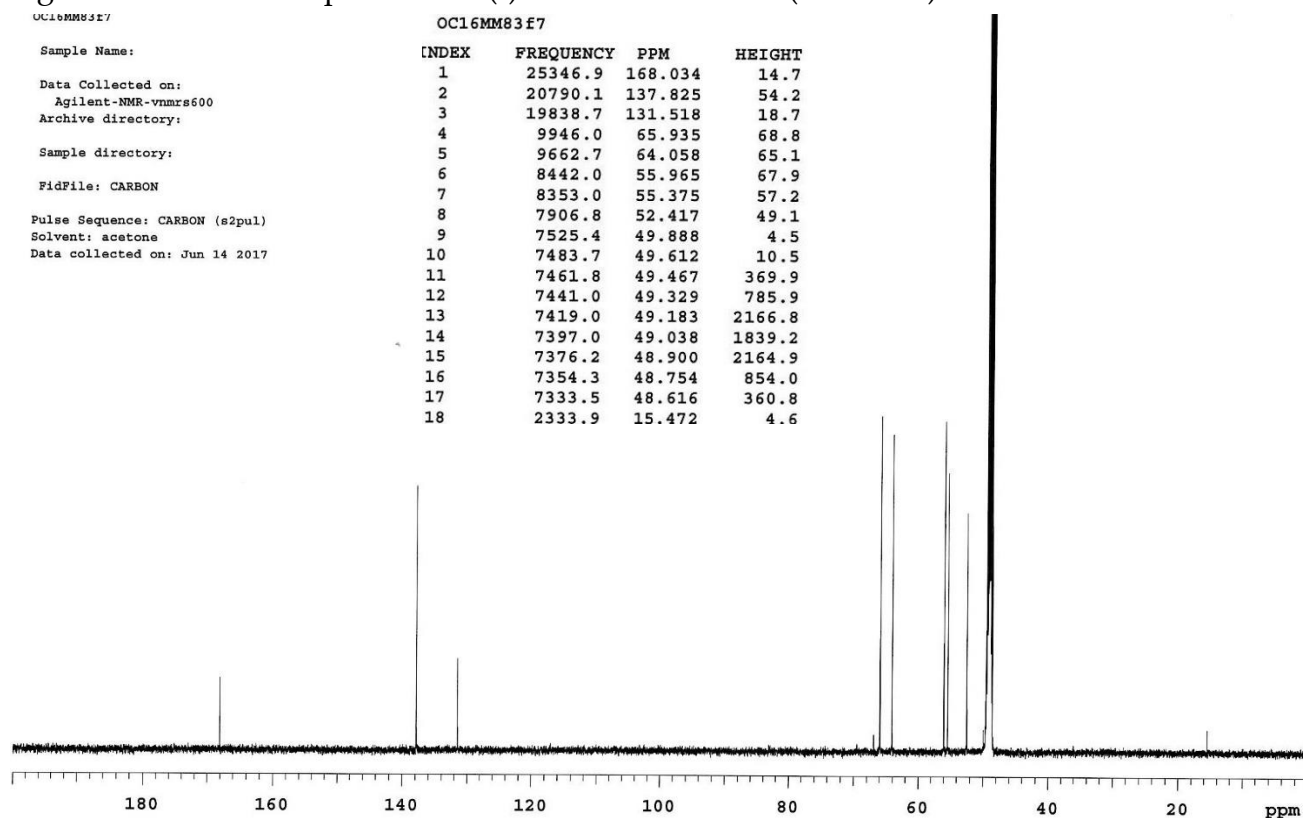


Figure S30. HMBC-NMR spectrum of (-)-**12** in methanol- d_4 (600 MHz)

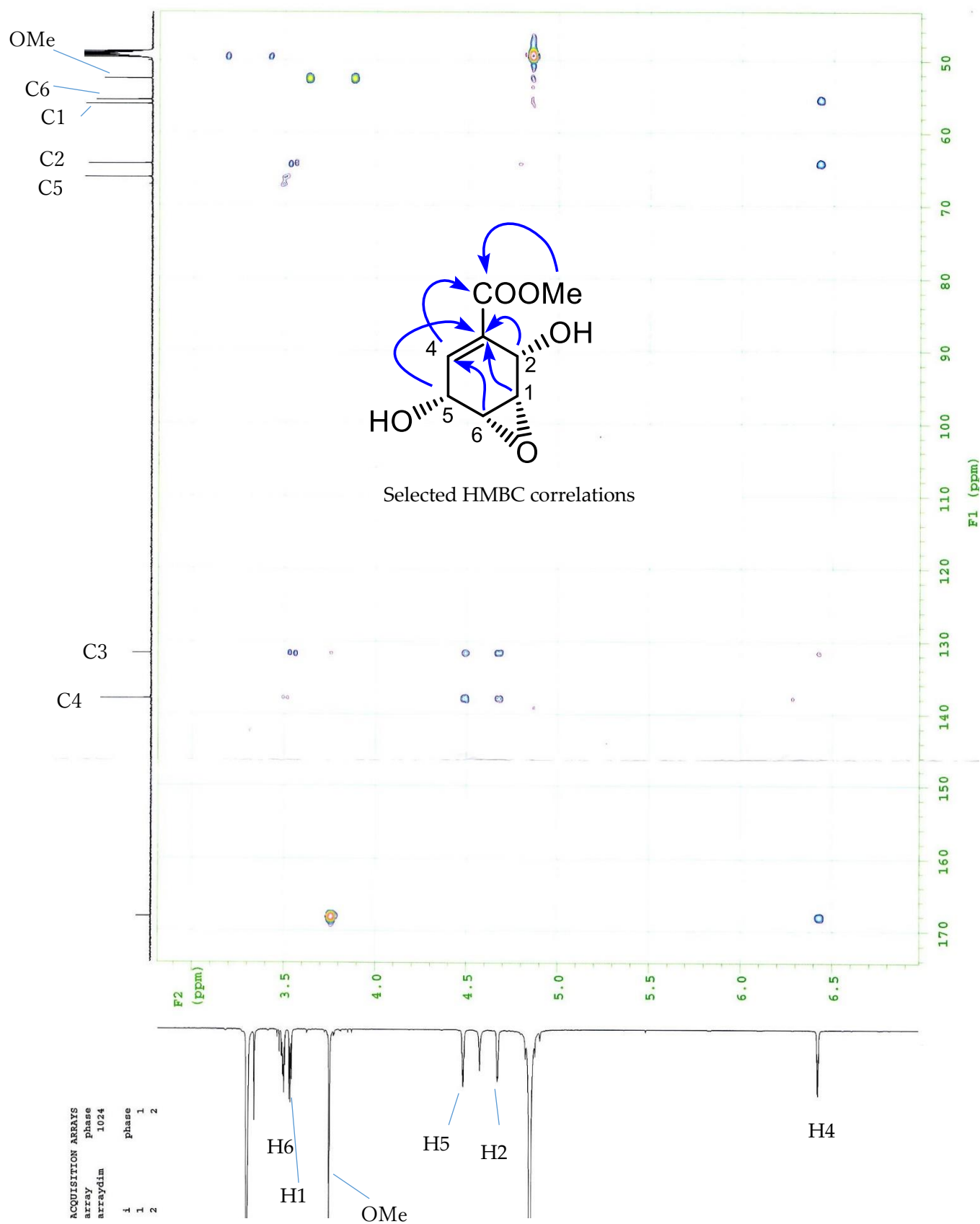


Figure S31. ¹H-NMR spectrum of (-)-7 in methanol-d₄ (600 MHz)

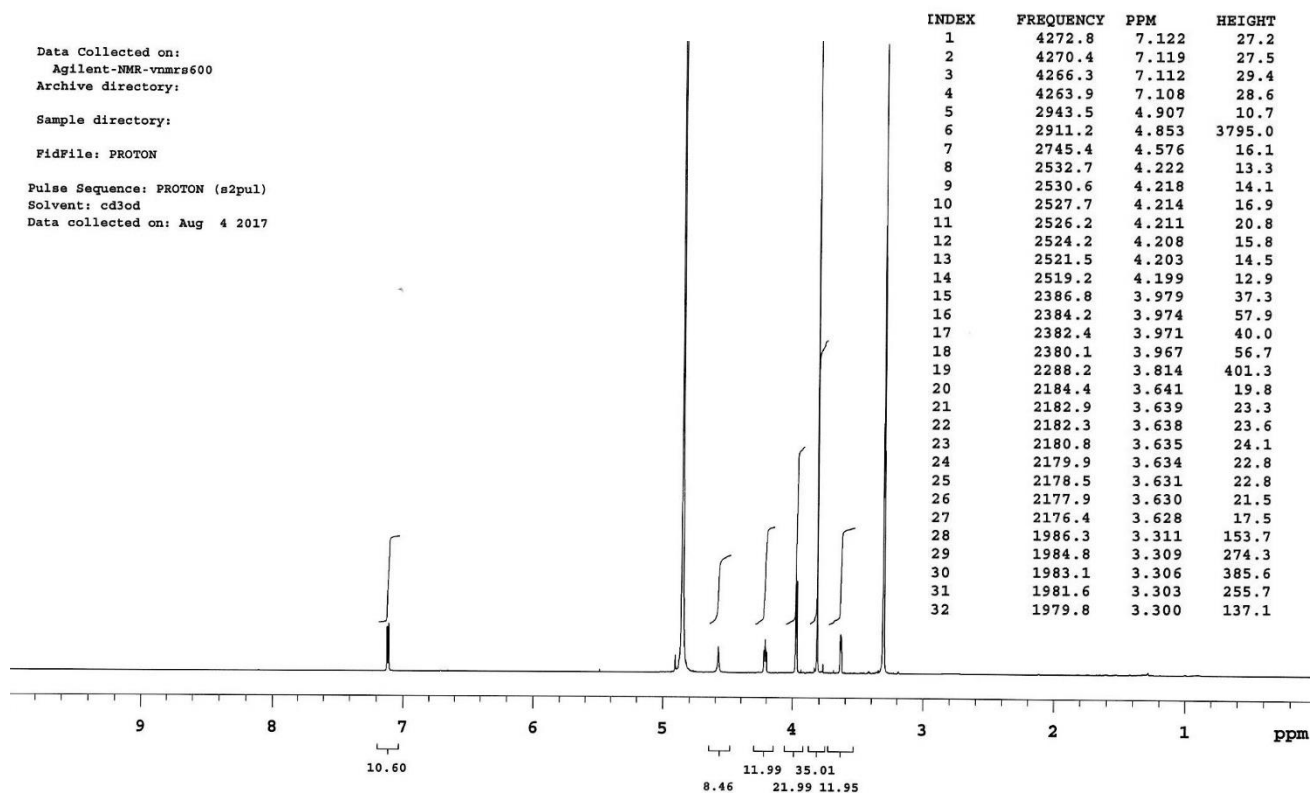


Figure S32. ¹³C-NMR spectrum of (-)-7 in methanol-d₄ (150 MHz)

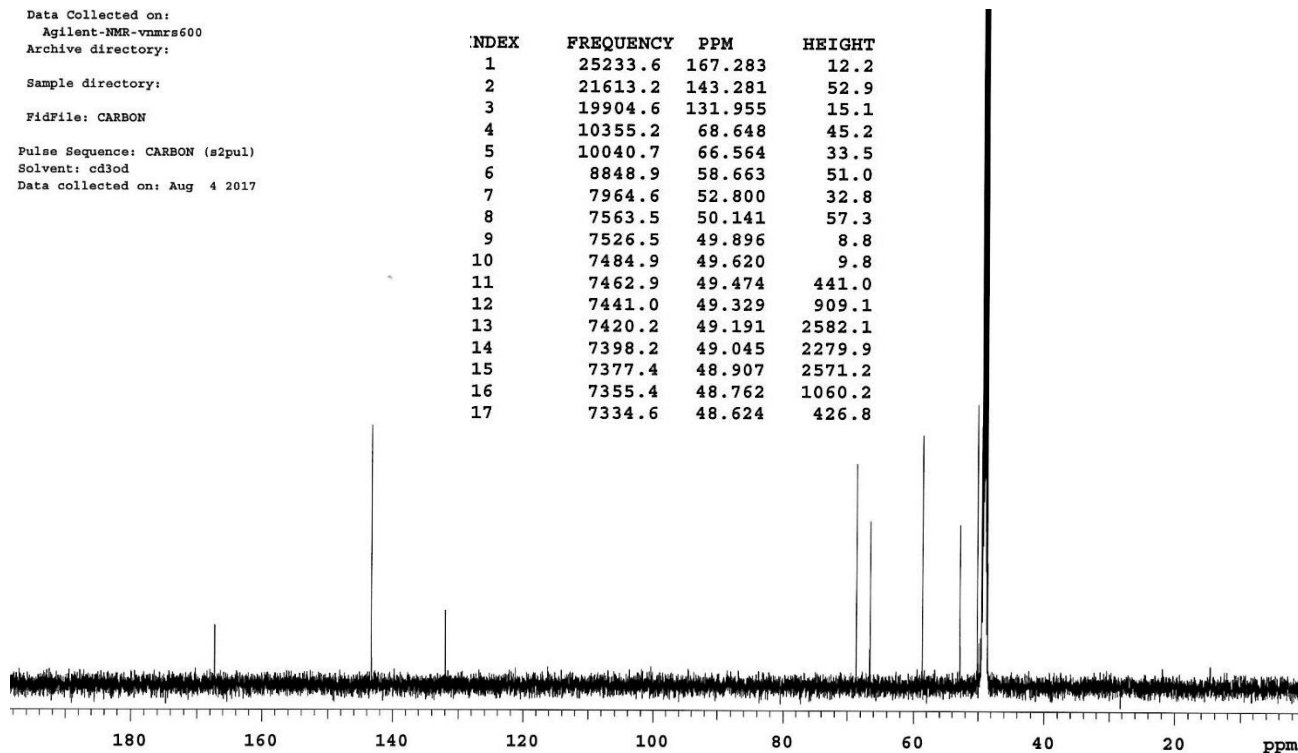


Figure S33. ¹H-NMR spectrum of (+)-7 in methanol-d₄ (600 MHz)

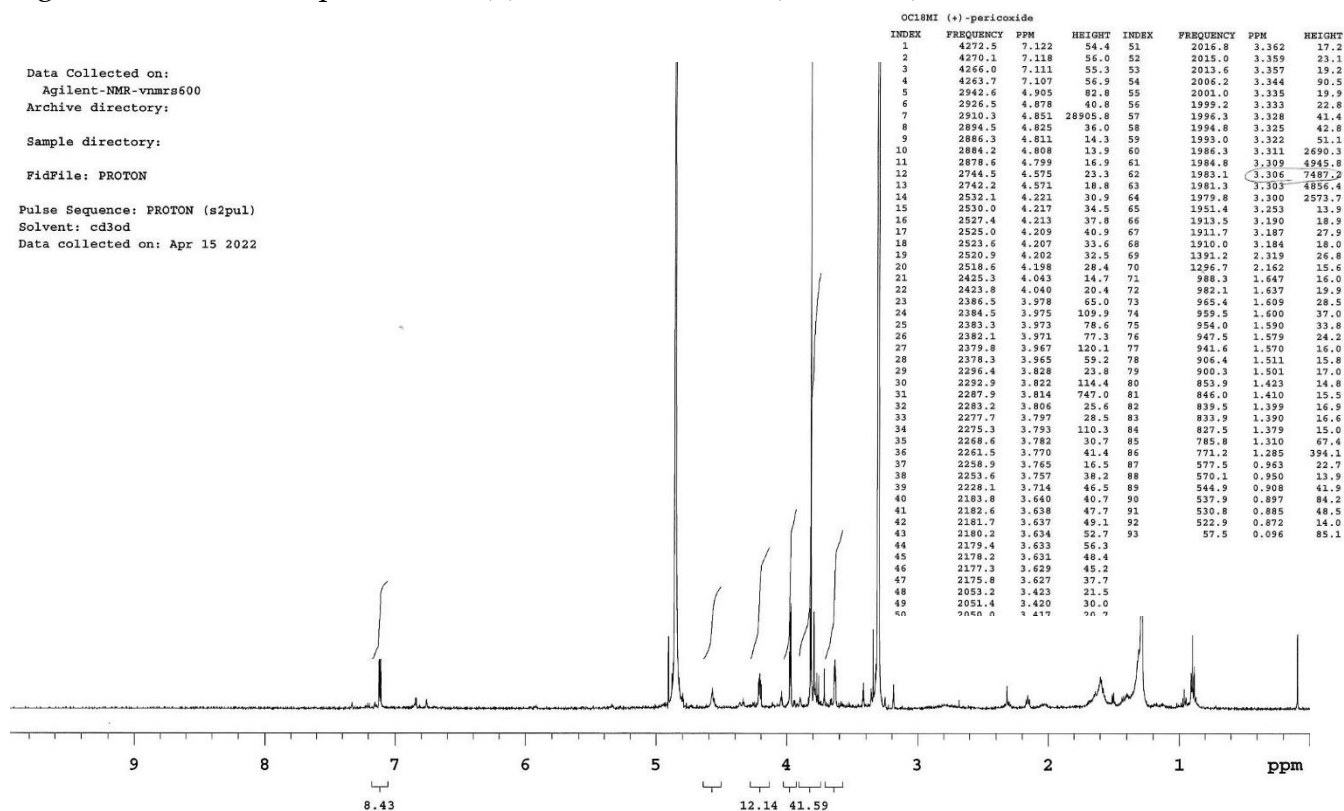
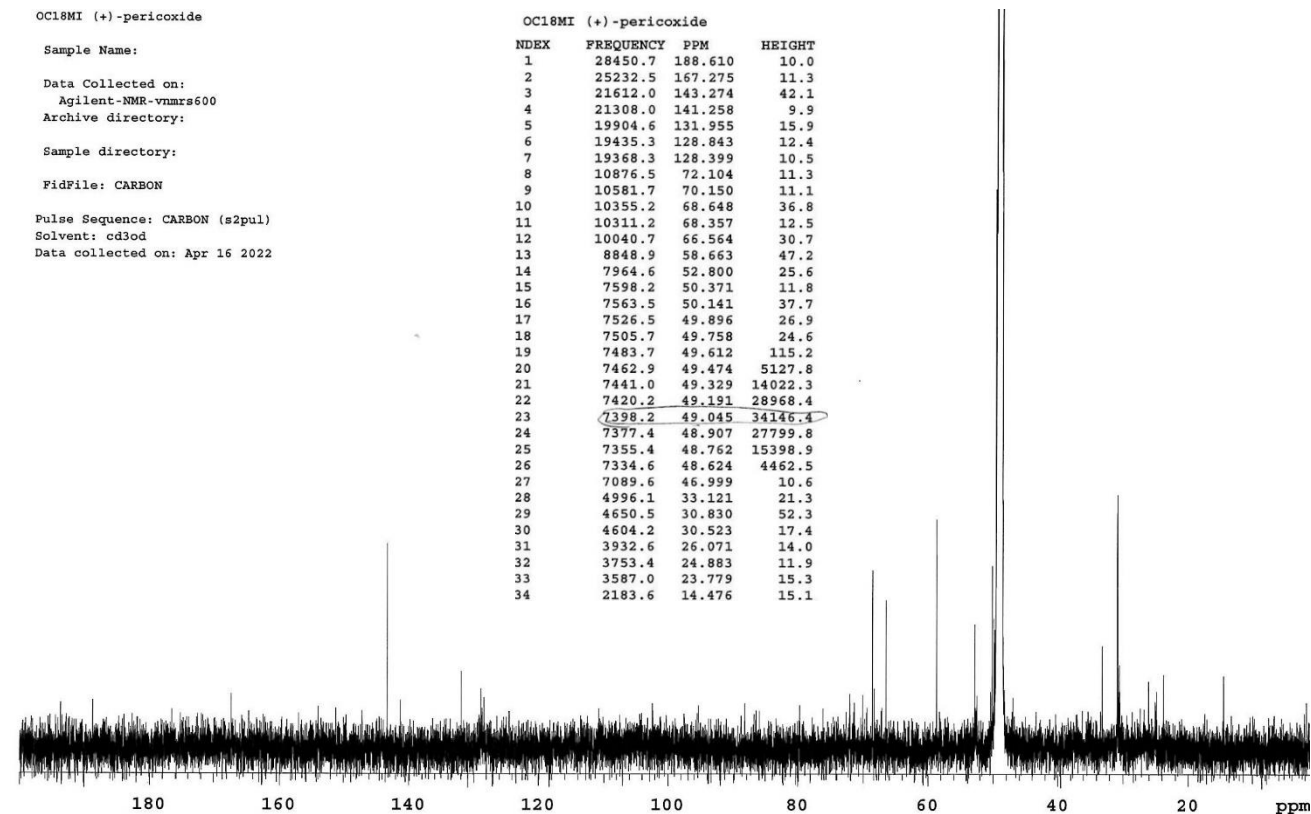
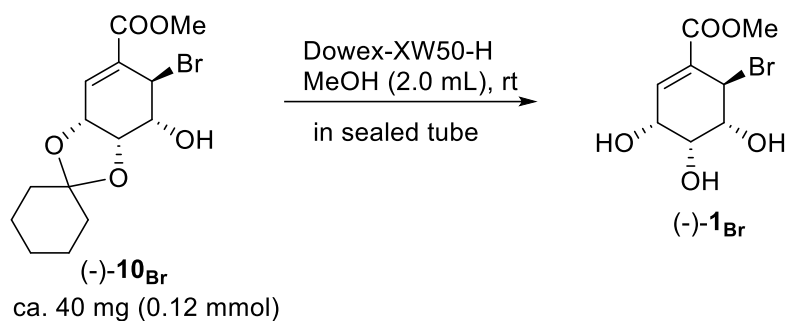


Figure S34. ¹³C-NMR spectrum of (+)-7 in methanol-d₄ (150 MHz)



2. Table S1. Deprotection of (-)-**10**_{Br} with Dowex® 50WX8-H



entry	Dowex XW-H	temperature	time (h)	1 _{Br} , yield (%)
1	108 mg	80 °C (MW)*	1	32
2	102 mg	0 °C	86	47
3	108 mg	rt	20	55
4	101 mg	rt	40	73
5	103 mg	rt	56	87
6	51.0 mg	rt	64	63

General procedure: entry 4 (same as described in text, experimental section); To a solution of (-)-**10**_{Br} (41.3 mg, 0.12 mmol) in MeOH (2.0 mL) was added Dowex® 50WX8-H (102.5 mg). The reaction mixture was stirred for 56 h at room temperature. The reaction mixture was filtered. The filtrate, which was condensed under reduced pressure to give a crude residue which was purified with silica gel column chromatography (eluent; CH₂Cl₂: MeOH = 95: 5) to afford (-)-**1**_{Br} (27.6 mg, 87%) with recovery of the starting (-)-**10**_{Br} (5.5 mg, 13%).

*Results suggested that reduced amount of resin decreased chemical yield of desired **1**_{Br} (entry 6) and optimum reaction time was 56 h (entries 3-5).