

SUMMARY

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Table S1. investigated variables and their levels in three-level BBD.

Variables	Levels		
	-1	0	1
Water content (%)	10	30	50
Temperature (°C)	40	50	60
Solid/liquid ratio (mg/mL)	75	100	125

Table S2. Analysis of variance for regression model equation (TF content).

Source	Sum of squares	df	Mean square	F value	p-value prob > F
Model	9.3115	9	1.0346	20.6183	0.0003
a	1.1640	1	1.1640	23.1966	0.0019
b	0.0827	1	0.0827	1.6489	0.2400
c	0.3030	1	0.3030	6.0378	0.0436
ab	0.0032	1	0.0032	0.0639	0.8077
ac	0.0090	1	0.0090	0.1795	0.6845
bc	0.0939	1	0.0939	1.8716	0.2136
a ²	4.7109	1	4.7109	93.8809	< 0.0001
b ²	1.3871	1	1.3871	27.6428	0.0012
c ²	0.8799	1	0.8799	17.5358	0.0041
Residual	0.3513	7	0.0502		
Lack of fit	0.0014	3	0.0005	0.0054	0.9994
Pure error	0.3498	4	0.0875		
R ²	0.9636				
Adj R ²	0.9169				

Table S3. Analysis of variance for regression model equation (20-hydroxyecdysone content).

Source	Sum of squares	df	Mean square	F value	p-value prob > F
Model	0.1354	9	0.0150	24.8548	0.0002
a	0.0045	1	0.0045	7.3541	0.0301
b	0.0027	1	0.0027	4.4102	0.0739

c	0.0040	1	0.0040	6.6164	0.0369
ab	0.0047	1	0.0047	7.8128	0.0267
ac	0.0006	1	0.0006	0.9476	0.3628
bc	0.0135	1	0.0135	22.3573	0.0021
a ²	0.0324	1	0.0324	53.5689	0.0002
b ²	0.0099	1	0.0099	16.3002	0.0049
c ²	0.0534	1	0.0534	88.1754	<0.0001
Residual	0.0042	7	0.0006		
Lack of fit	0.0026	3	0.0009	2.0255	0.2529
Pure error	0.0017	4	0.0004		
R ²	0.9697				
Adj R ²	0.9306				

Table S4. NMR data of compound **2** in CD₃OD.

Position	¹ H (J value)	DEPT	¹³ C
2		C	157.0
3		C	133.5
4		C	178.0
5		C	161.3
6	6.17 <i>d</i> (1.9)	CH	98.3
7		C	164.3
8	6.37 <i>d</i> (1.9)	CH	93.2
9		C	156.9
10		C	104.3
1'		C	121.8
2'	7.71 <i>d</i> (2.1)	CH	115.9
3'		C	144.4
4'		C	148.3
5'	6.86 <i>d</i> (8.4)	CH	114.7
6'	7.62 <i>d</i> (8.4, 2.1)	CH	121.8
<i>Galactose</i>			
1''	5.40 <i>d</i> (7.9)	CH	100.3
2''	3.99 <i>dd</i> (7.9, 9.4)	CH	74.6
3''	3.79 (<i>m</i>)	CH	73.4
4''	3.55 <i>d</i> (3.5)	CH	68.3
5''	3.71 (<i>m</i>)	CH	73.3
6''a	3.42 (12.6, 6.8)	CH ₂	65.5
6''b	3.70 (12.6, 4.7)		
<i>Ramnose</i>			
1'''	4.52 <i>d</i> (1.5)	CH	100.6
2'''	3.57 (3.4, 1.5)	CH	70.8
3'''	3.78 <i>d</i> (3.4)	CH	69.3
4'''	3.27 <i>t</i> (9.4)	CH	72.6
5'''	3.51 <i>dq</i> (9.4, 6.2)	CH	71.8
6'''	1.18 <i>d</i> (6.2)	CH ₃	16.5
<i>Apiose</i>			
1''''	5.46 <i>d</i> (1.2)	CH	109.5
2''''	4.06 <i>d</i> (1.2)	CH	76.6
3''''		C	79.4
4'''' a	3.68 <i>d</i> (10)	CH ₂	74.2
4'''' b	4.04 <i>d</i> (10)		
5''''	3.61 <i>s</i>	CH ₂	64.8

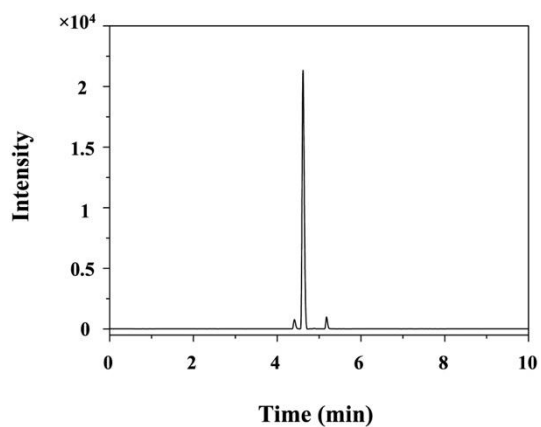


Figure S1. UPLC-QqQ-MS/MS spectrum of standard 20-hydroxecdysone.

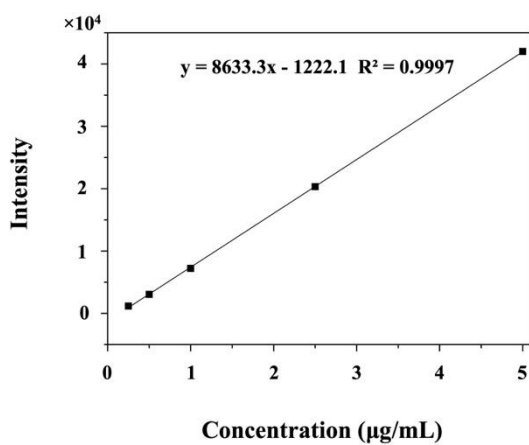


Figure S2. Standard curve of 20-hydroxecdysone.

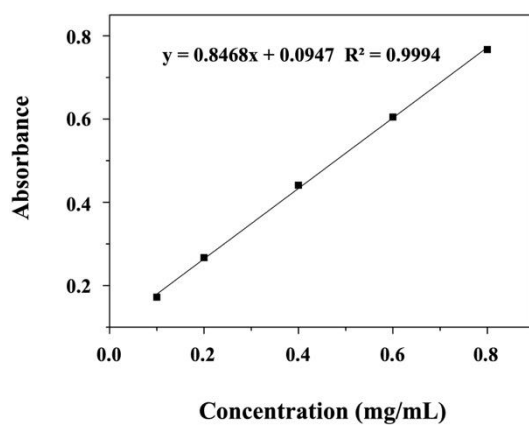


Figure S3. Standard curve of TF.

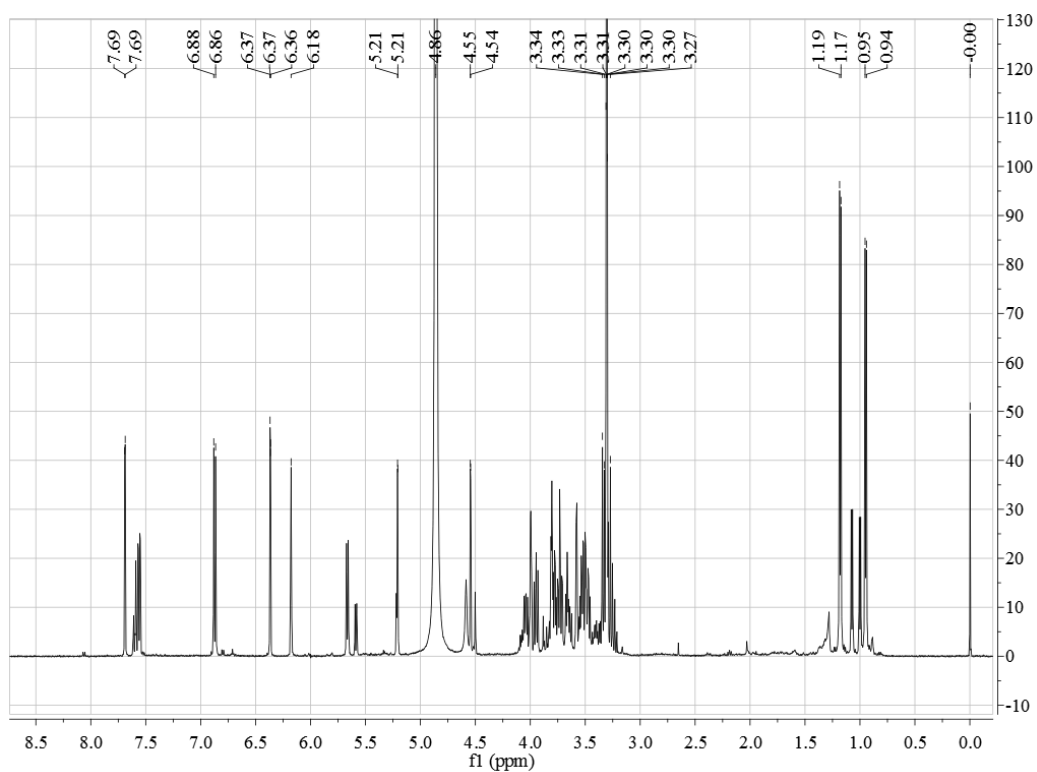


Figure S4. ^1H NMR of compound 1.

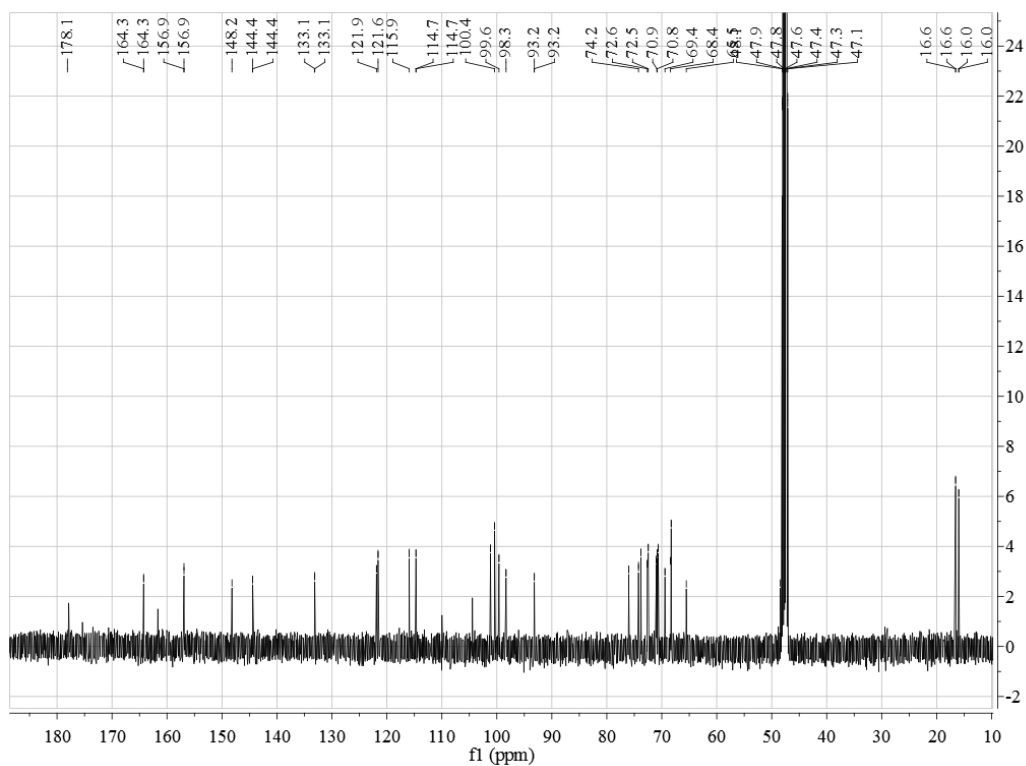


Figure S5. ^{13}C NMR of compound 1.

20181112-ZJ-1_181112092546 #97-98 RT: 1.55-1.56 AV: 2 NL: 1.21E6
T: FTMS - p ESI Full ms [150.00-1000.00]

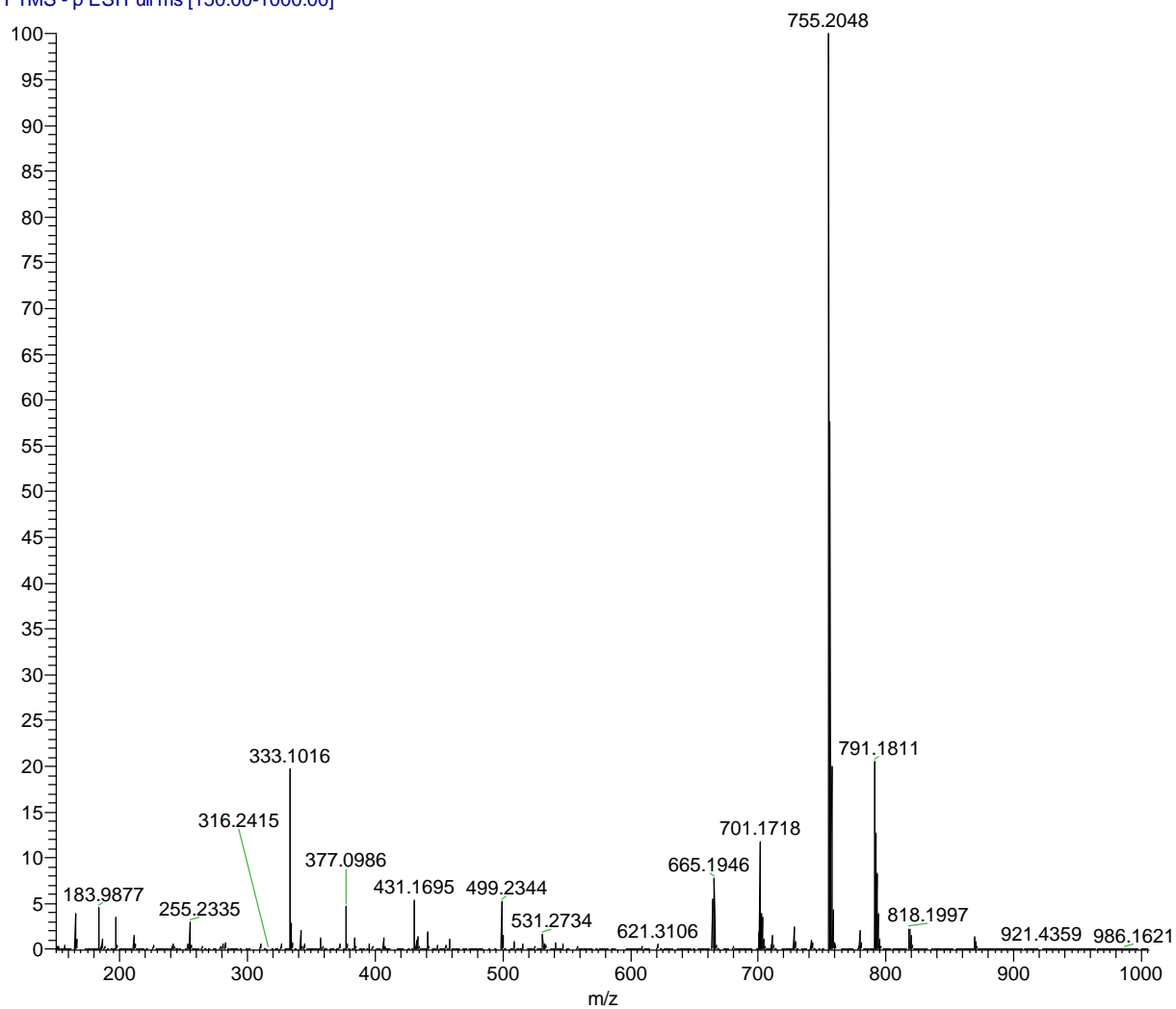


Figure S6. HRESI-MS of compound 1.

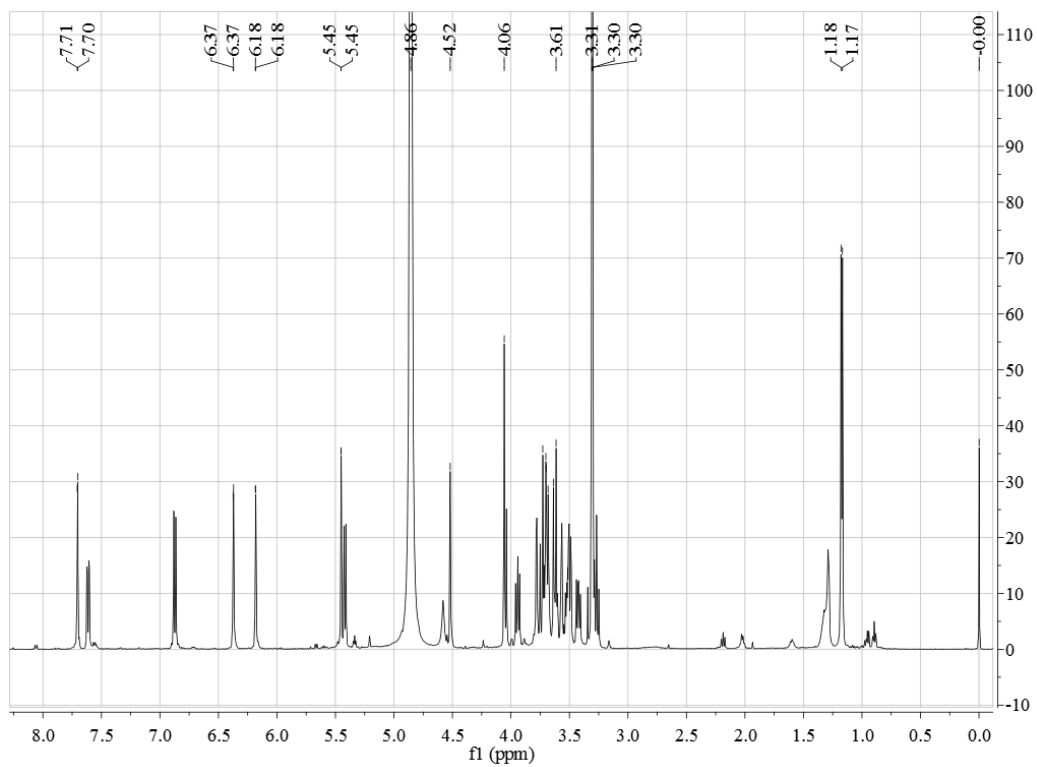


Figure S7. ^1H NMR of compound 2.

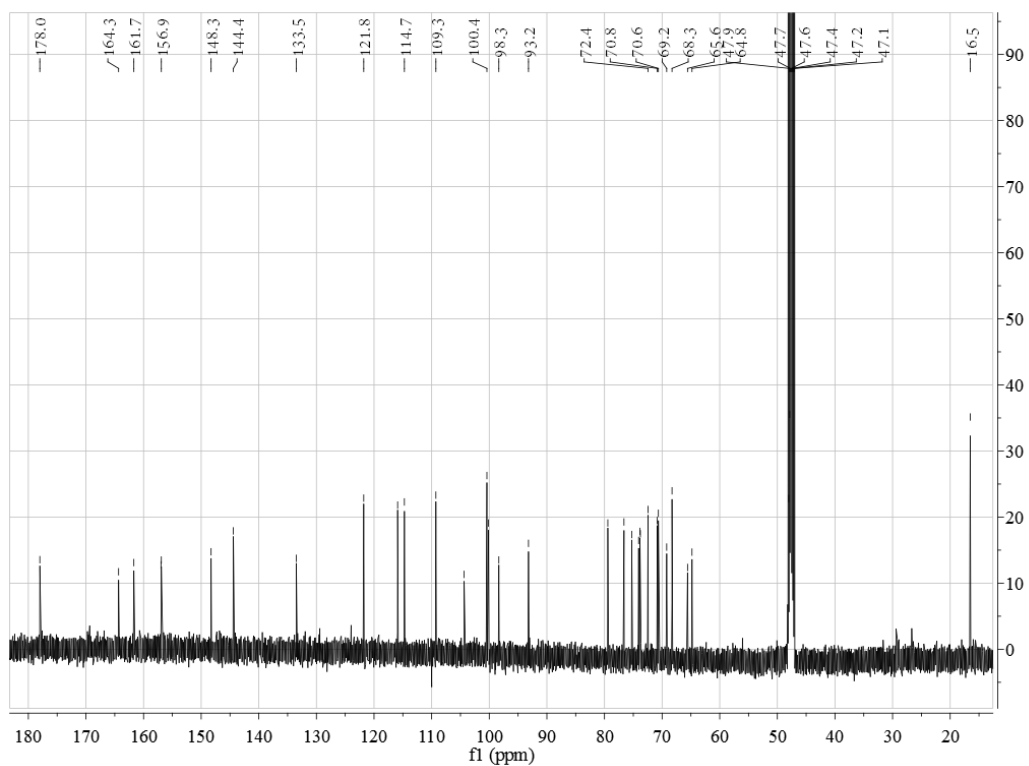


Figure S8. ^{13}C NMR of compound 2.

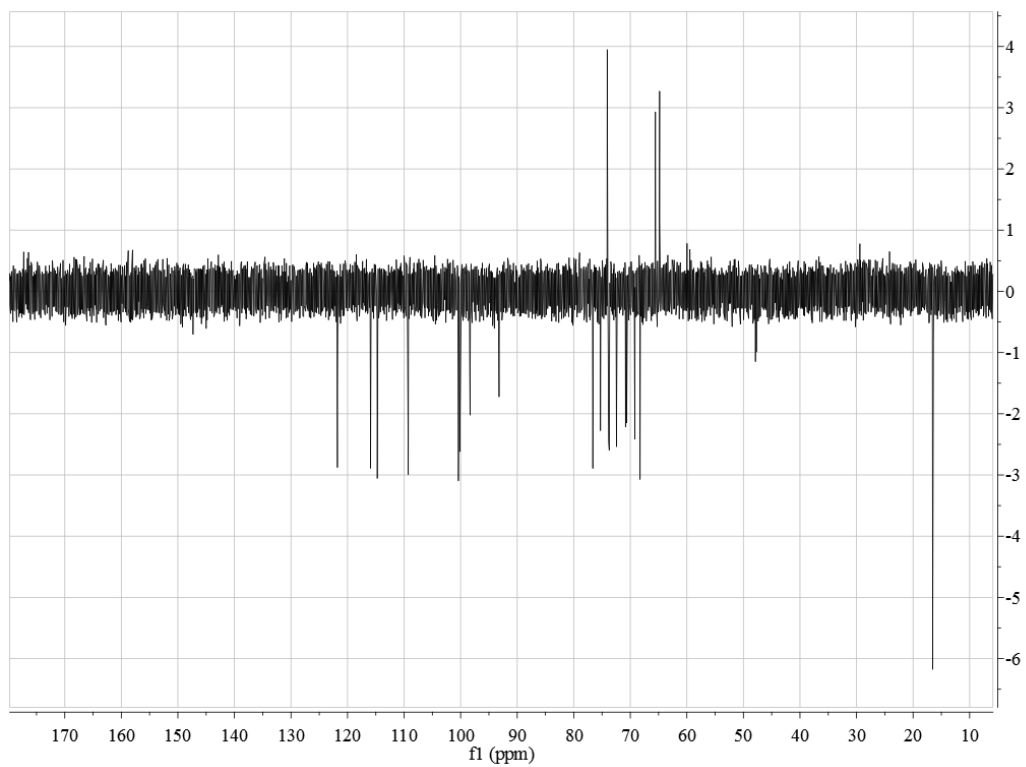


Figure S9. DEPT (135°) of compound 2.

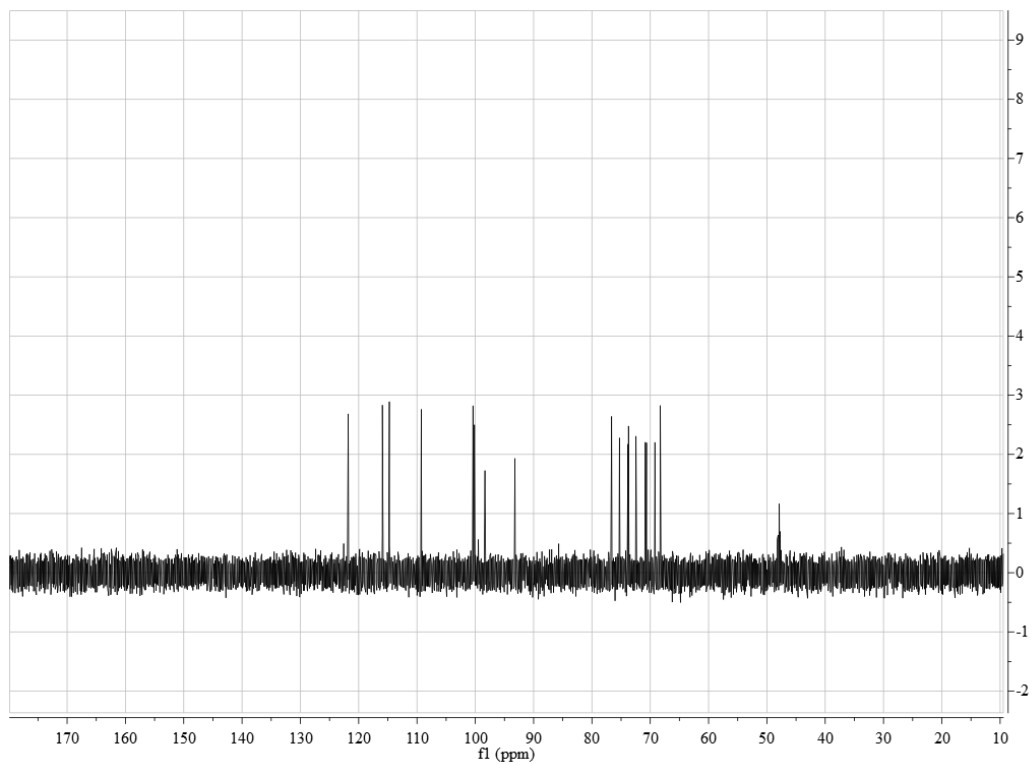


Figure S10. DEPT (90°) of compound 2.

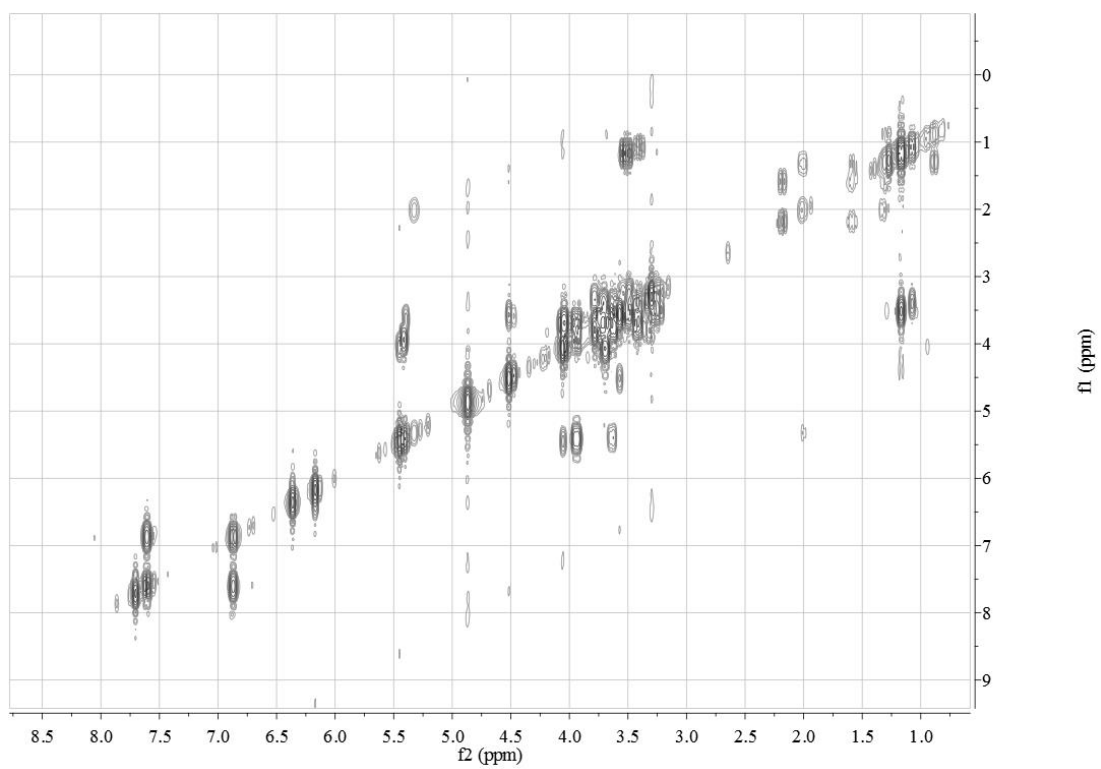


Figure S11. ^1H - ^1H COSY of compound 2.

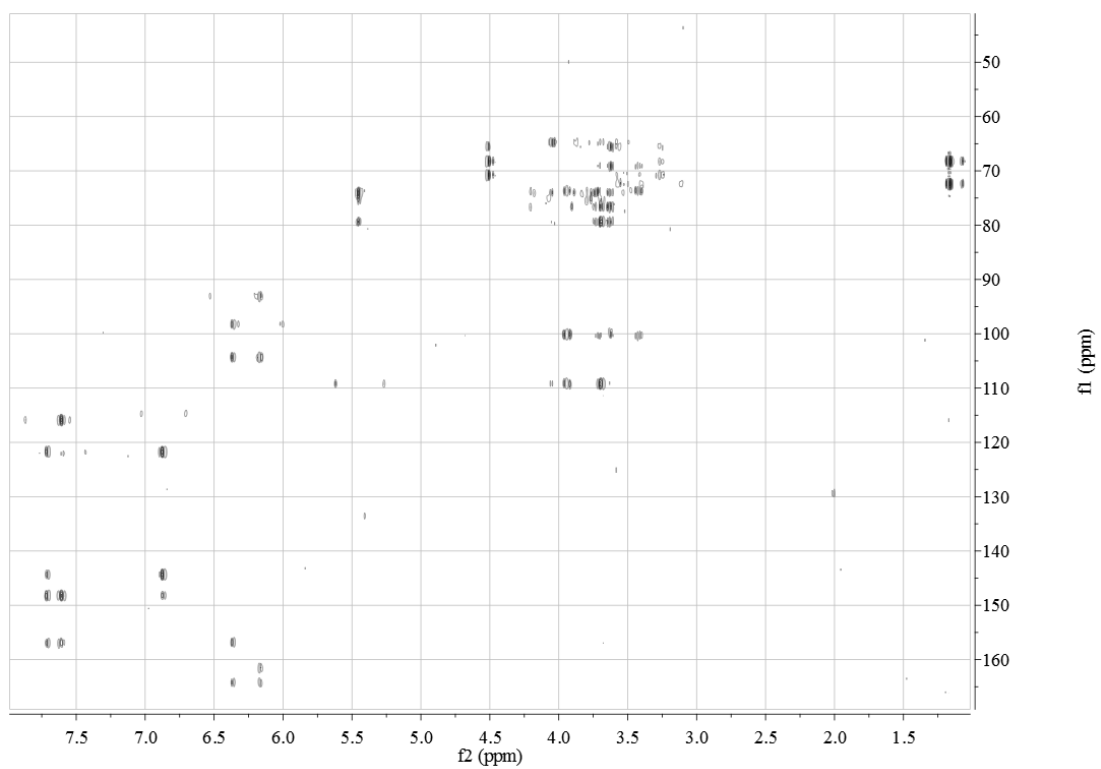


Figure S12. HMBC of compound 2.

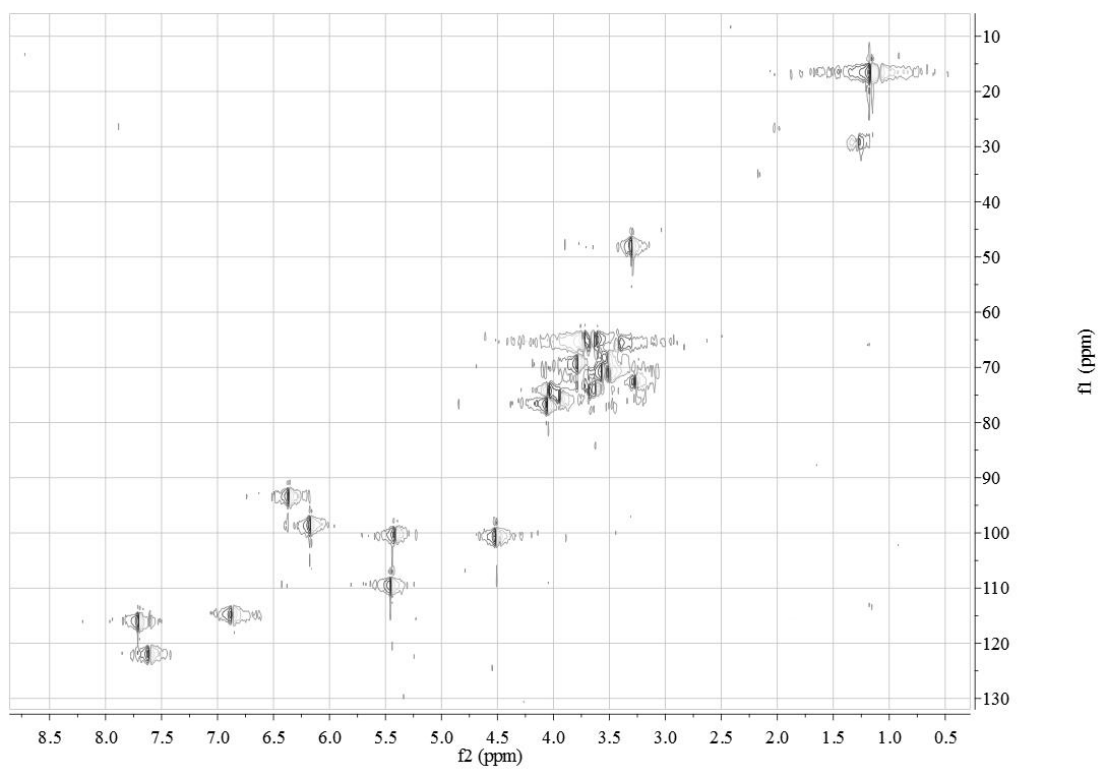


Figure S13. HSQC of compound 2.

20181112-ZJ-3_181112092546 #50 RT: 0.66 AV: 1 NL: 7.24E6
T: FTMS - p ESI Full ms [150.00-1000.00]

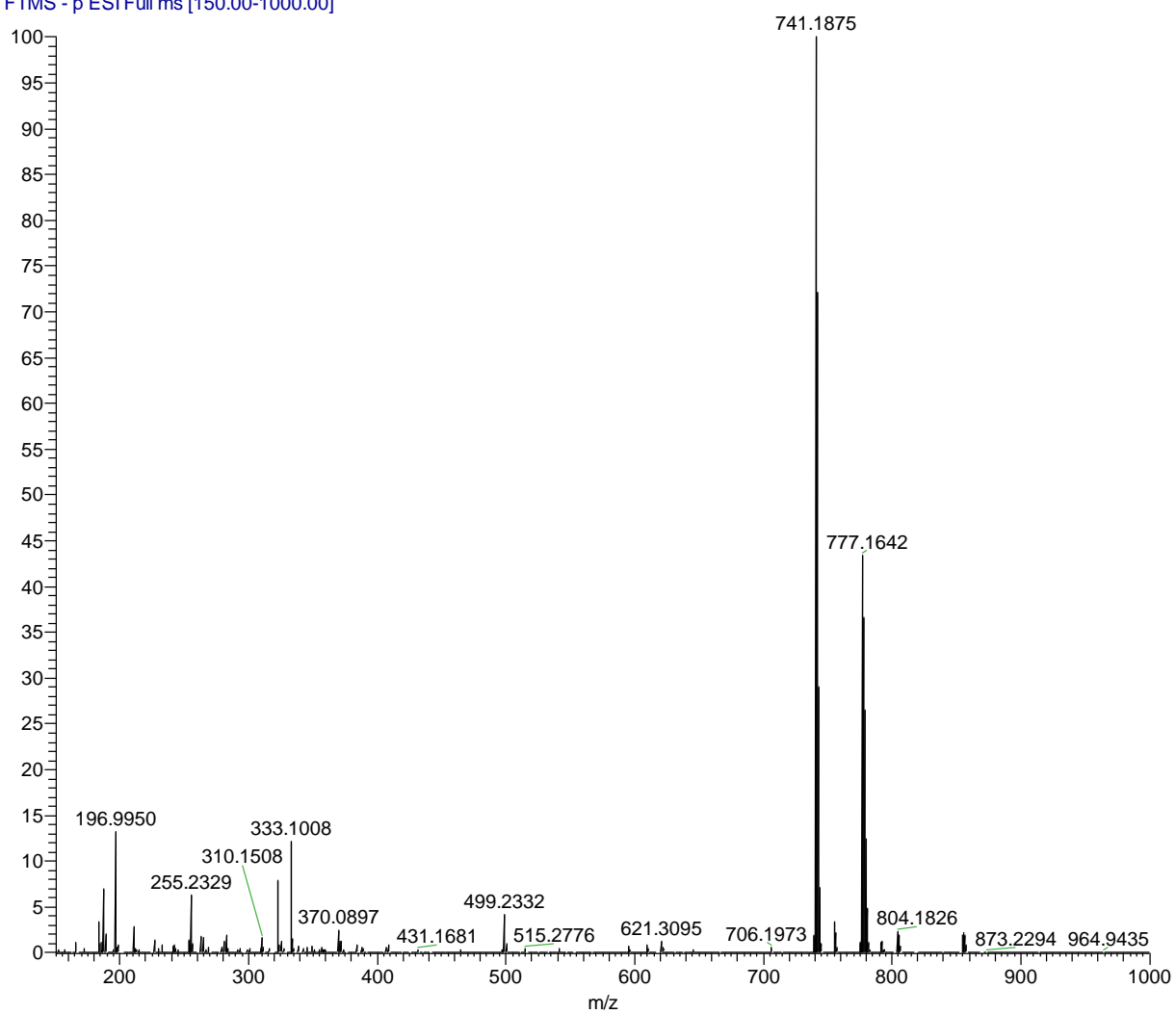


Figure S14. HRESI-MS of compound 2.

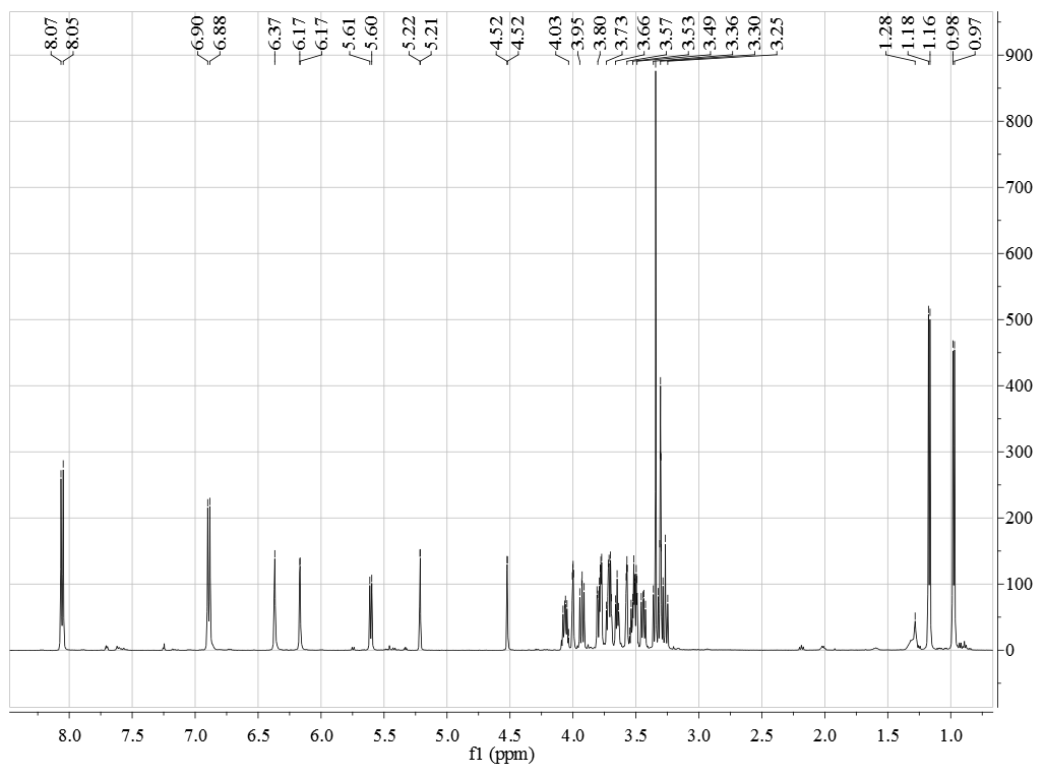


Figure S15. ^1H NMR of compound 3.

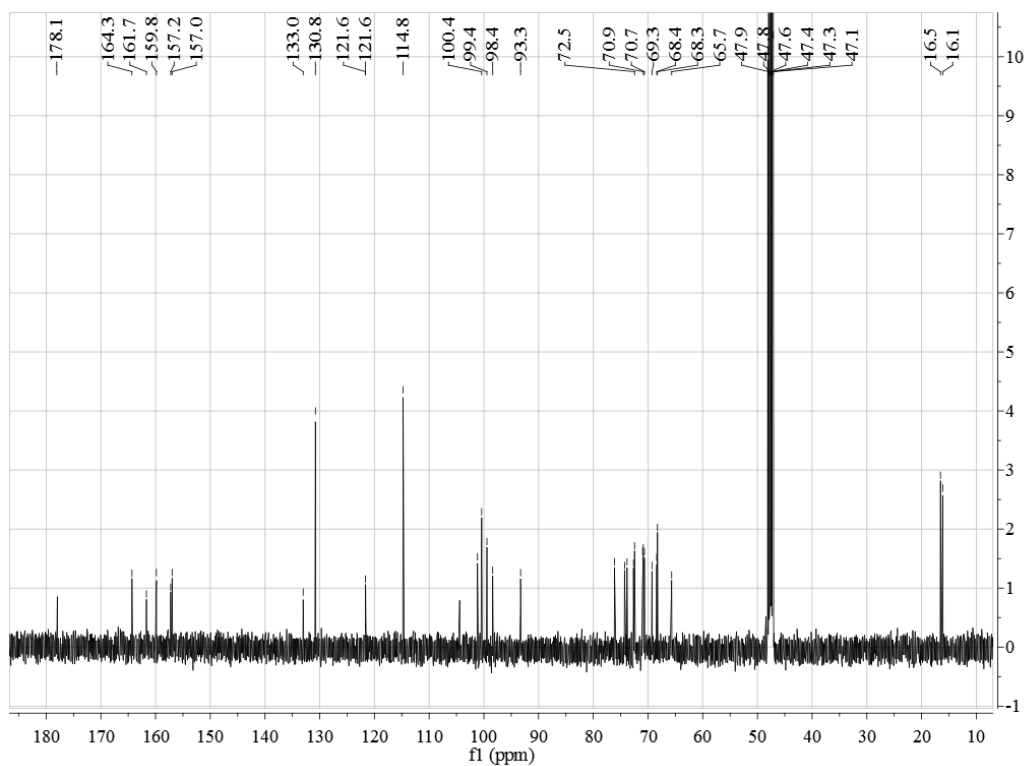


Figure S16. ^{13}C NMR of compound 3.

20181112-ZJ-7_181112092546 #27-28 RT: 0.42-0.43 AV: 2 NL: 1.21E6
T: FTMS - p ESI Full ms [150.00-1000.00]

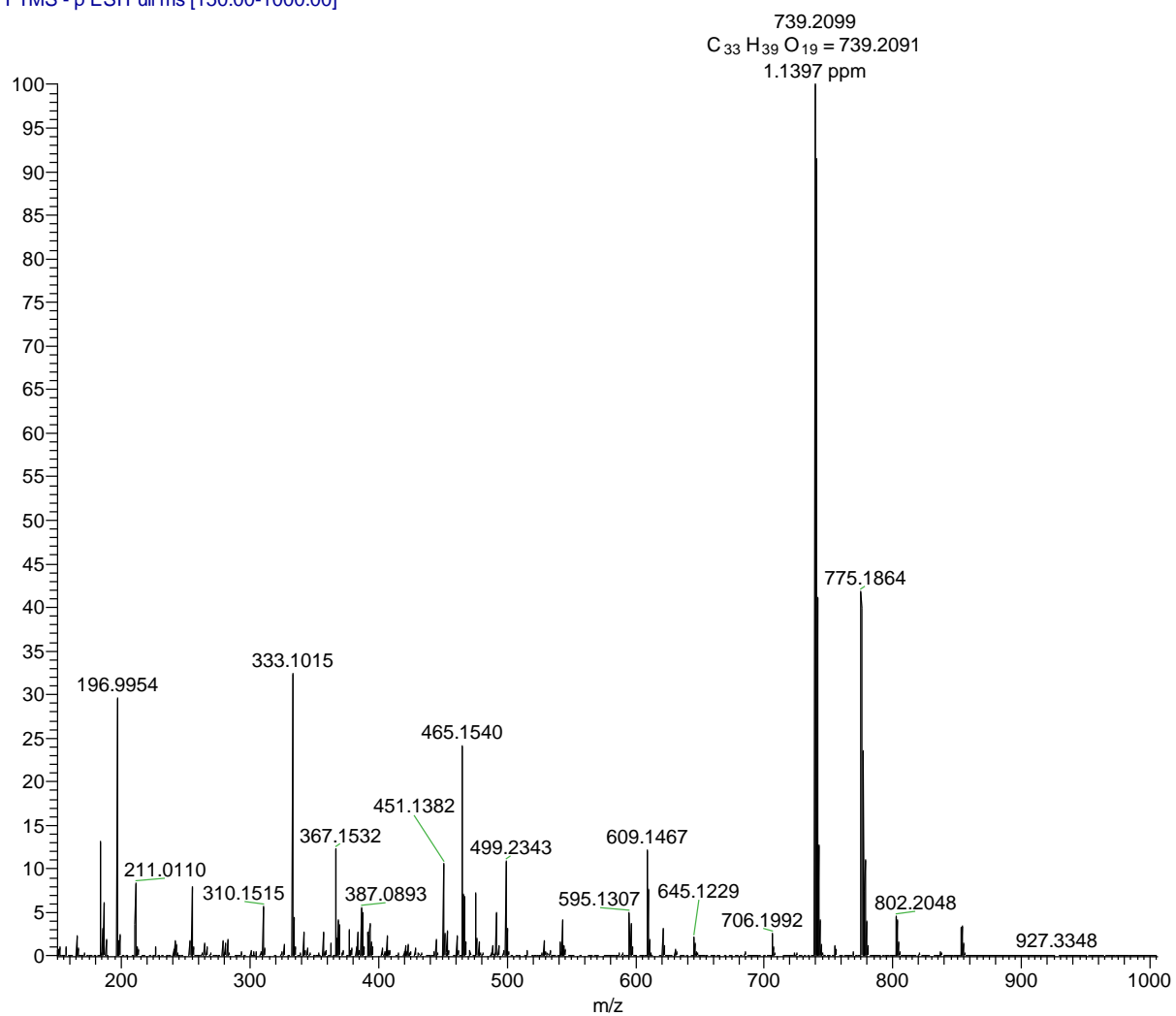


Figure S17. HRESI-MS of compound 3.

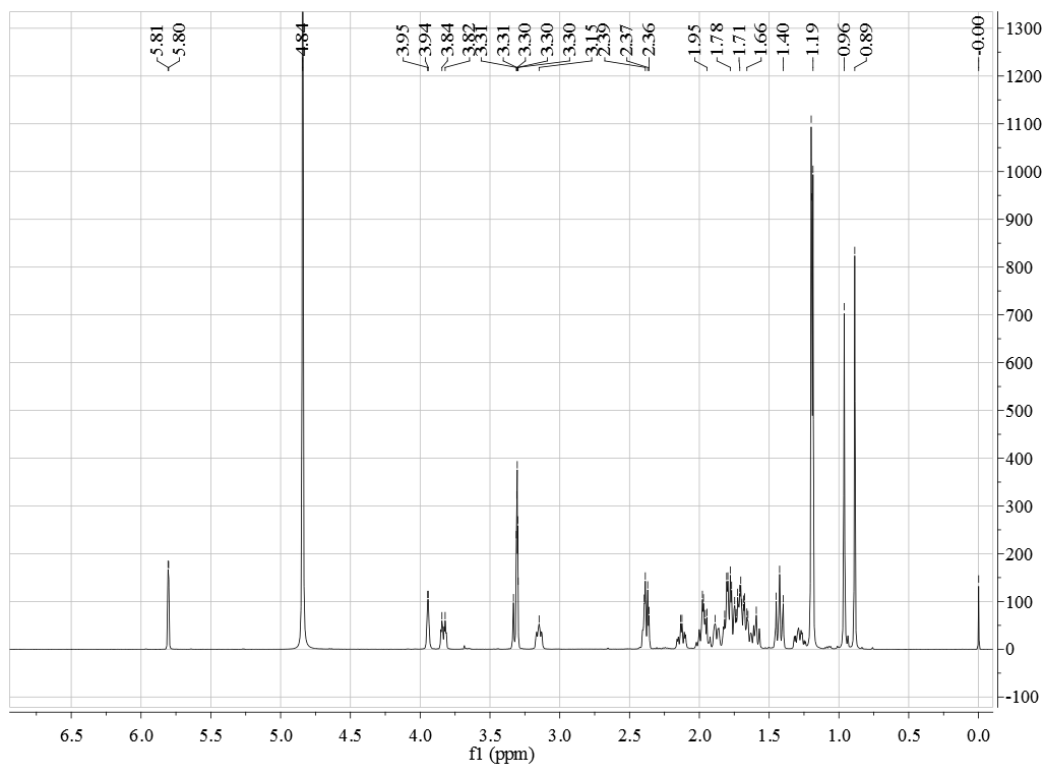


Figure S18. ¹H NMR of compound 4.

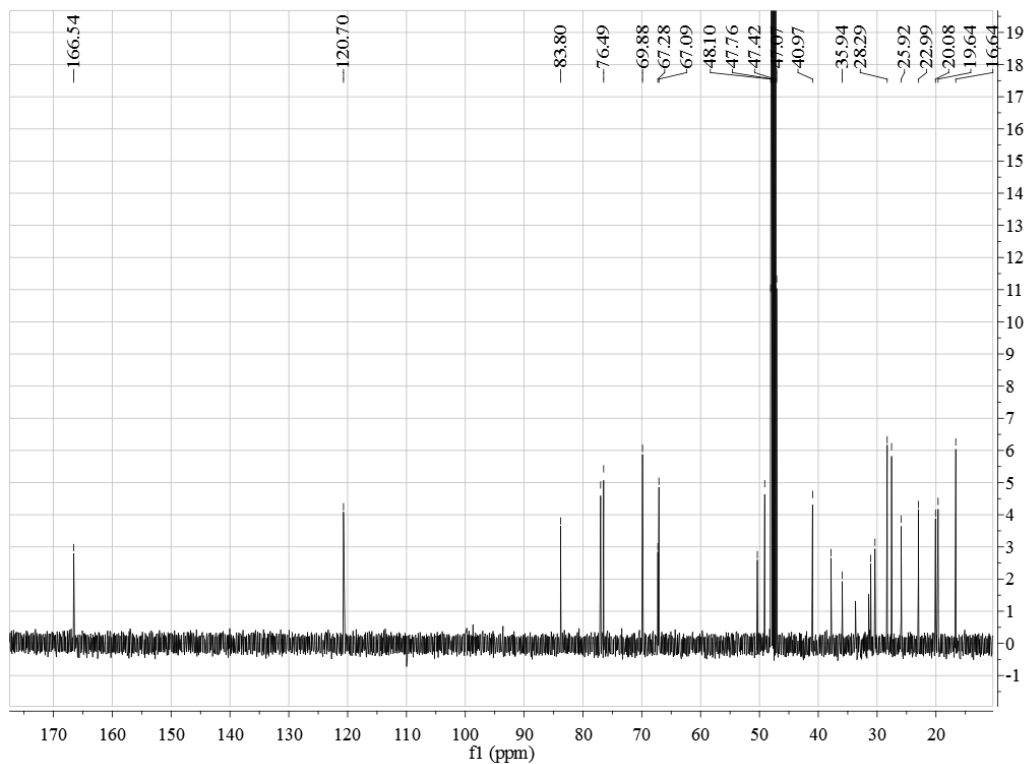


Figure S19. ¹³C NMR of compound 4.

20181112-ZJ-10_181112092546 #45-46 RT: 0.71-0.73 AV: 2 SB: 10 0.05-0.20 NL: 3.69E4
T: FTMS - p ESI Full ms [150.00-1000.00]

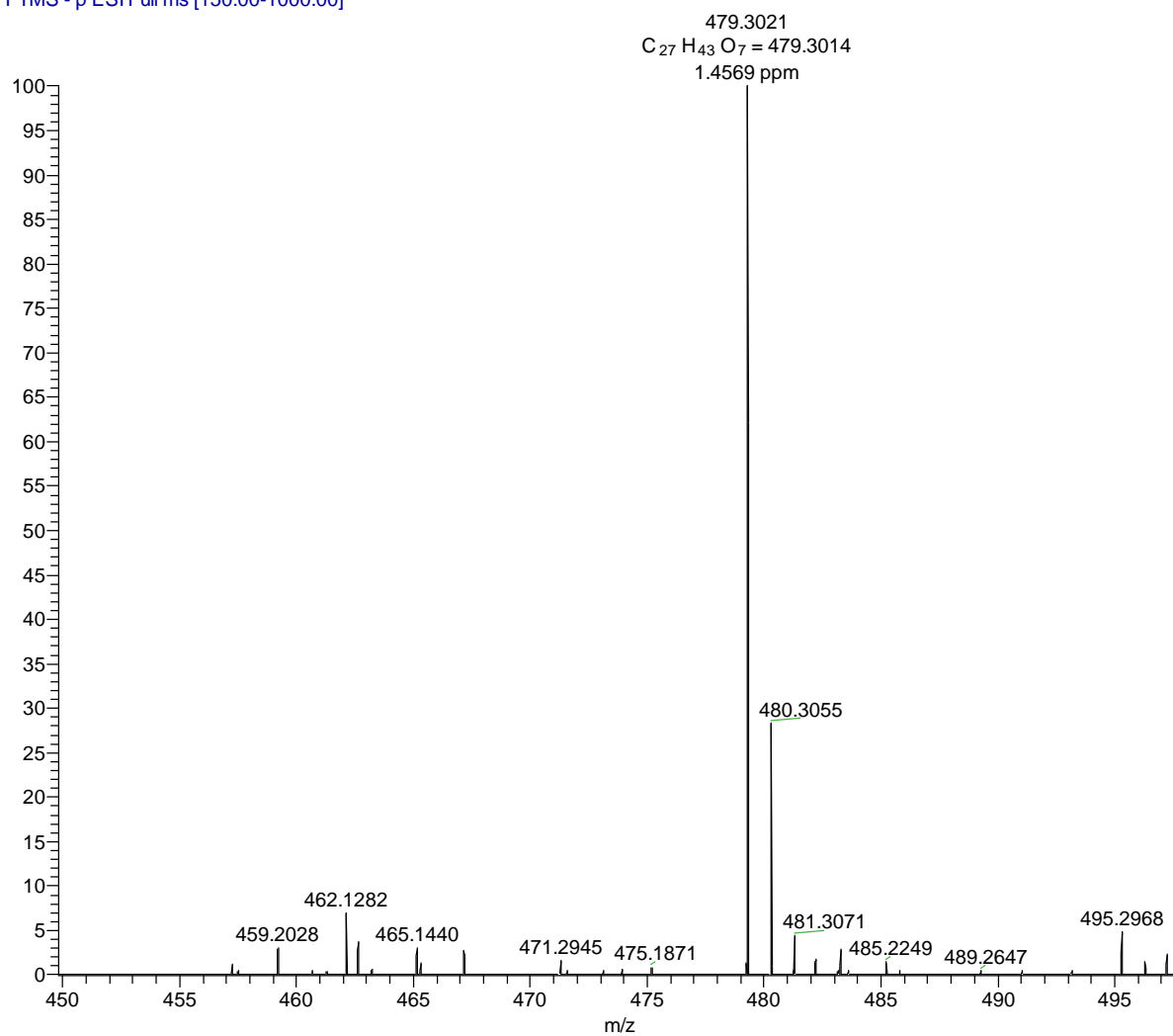


Figure S20. HRESI-MS of compound 4.